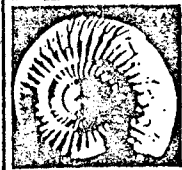


IKU



Continental Shelf Institute

# Institutt for kontinentalsokkelundersøkelser

REPORT TITLE  Biostratigraphy of Statoil Well  (N) 34/10-1 210-2462 m	
CONTRACTOR  Statoil	
<b>WELLFILE</b>	
CONTRACTORS REF.:	JOB. NO.:
34/10-1	0-163

SCIENTIST Løfaldli, Verdenius, Vigran, Rønningsland, Bell	DATE October 1978	PROJECT NO.
DEPARTMENT  Geology	NO. OF PAGES 34	NO. OF ENCLOSURE 5
RESPONSIBLE SCIENTIST Bell		

SUMMARY
<p>The uppermost deposits dated are of Pleistocene age. These are succeeded by a fairly complete Tertiary section. The Cretaceous/Tertiary boundary is set at 1678 m. Thin Maastrichtian, Campanian and Santonian - Ely. Campanian deposits occur down to 1780 m at which level post-Albian Middle Cretaceous is present to at least 1782 m. Probable Bathonian is present from (?1787.6) 1789 to 1826 m, Bajocian from 1826-1938 m, Toarcian from 1939.58-2094, Pliensbachian from 2113-2232 and ?Pliensbachian from 2232-2375 m. The well bottoms in ?Triassic which is present from 2390-2462.</p>

## KEY WORDS

34/10-1

Biostratigraphy

# C O N T E N T S

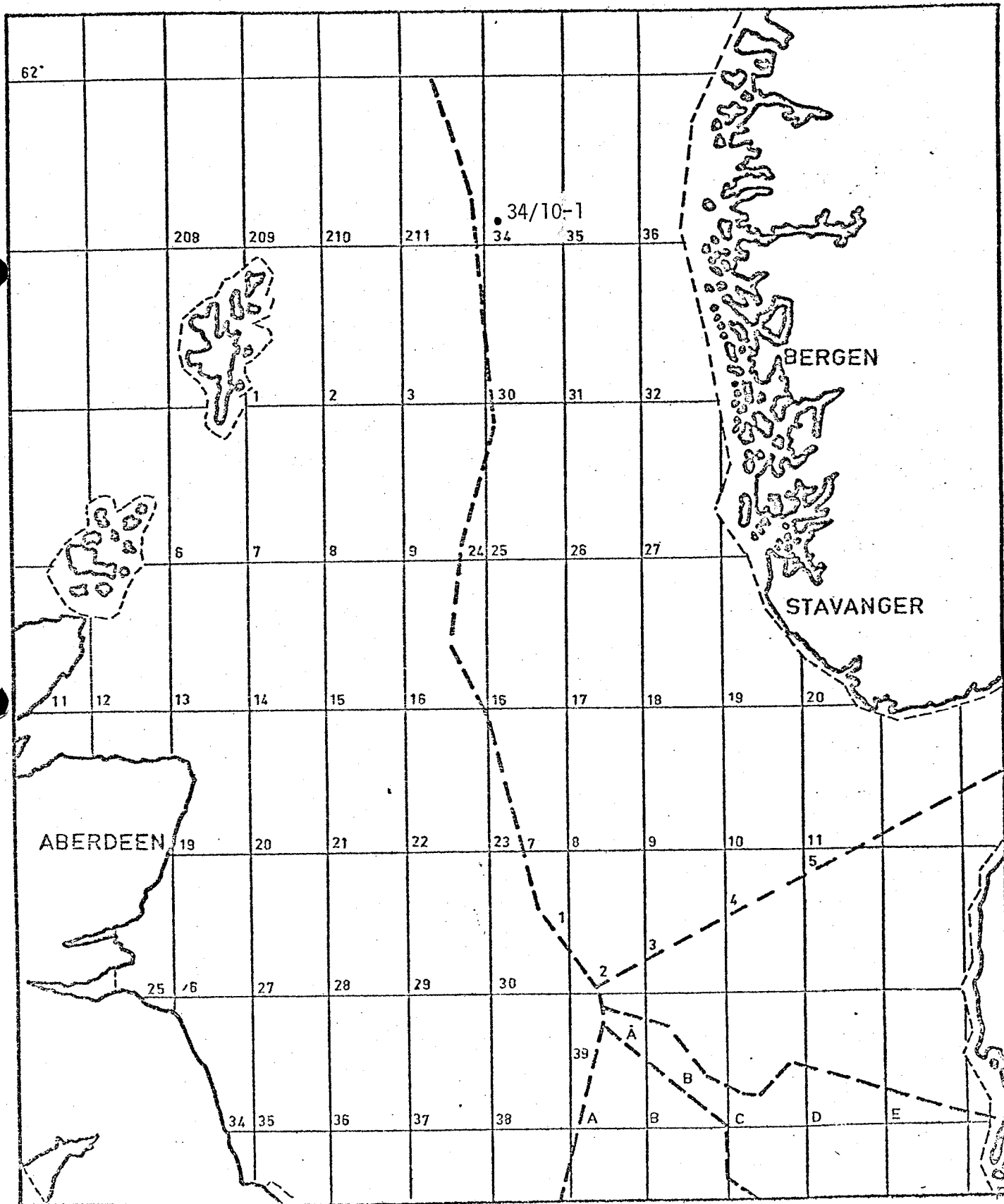
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SUMMARY STRATIGRAPHY

Pleistocene	210 - 330 m
Pliocene	330 - 560 m
Pliocene - Miocene	560 - 810 m
Miocene lt. Oligocene	810 - 910 m
?Oligocene	910 - 1080 m
Eocene	1080 - 1513 m
?Eocene	1513 - 1549 m
Paleocene	1549 - 1678 m
Maastrichtian	1678 - 1708 m
Campanian	1717 - 1741 m
Santonian Ely. Campanian	1741 - 1780 m
Post-Albian Middle Cretaceous	1780 - 1782(+) m
?Bathonian	1787.6 - 1826 m
Bajocian (?to Aalenian)	1826 - 1936/38 m
Toarcian	1939.58 - 2094/7 m
Pliensbachian	2113/16 - 2232 m
?Pliensbachian	2232 - 2375 m
Hettangian - Pliensbachian	2375 - 2390 m
?Triassic, ?Unfossiliferous Jurassic	2390 - 2462 m

*Handwritten notes:*  
} *...*  
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# LOCALITY MAP



## INTRODUCTION

The biostratigraphy of well 34/10-1 is based on foraminifera (Løfaldli), nannofossils (Verdenius), spores and pollen (Vigran), dinoflagellates (Bell) and ostracodes. Identification of ostracodes was undertaken by T. Kilenyi of Stratigraphic Services International, London. The ostracode data is incorporated into the biostratigraphy presented here and a copy of the original report given as appendix (i). Analyses are based on wet cuttings, sidewalls and cores. Lists of taxa are given in enclosures 2-5.

Generalised lithology, biostratigraphic interpretation, palynofacies and environmental data are summarized on the stratigraphic log (encl. 1). Lithological data (Rønningsland) for individual samples is given in appendix (ii).

Unquoted academic references are not included in the report but are available on request.

## QUATERNARY AND TERTIARY BIOSTRATIGRAPHY 210-1678 M

### 210-330 m - PLEISTOCENE

#### Lithology

Quartz sands together with smaller amounts of sandy and silty clay and carbonate shell fragments. Shell fragments dominate in the uppermost part of the interval.

#### Micropalaeontology

A rich fauna of calcareous, benthonic foraminifera is obtained from this interval. The fauna has a shallow-water character, and is dominated by Elphidium clavatum and Cassidulina crassa. Species of Islandiella, Buccella, Nonion, Trifarina, Protelphidium and Lagena are also quite common. Planktonic forms occur throughout the whole sequence.

330-560 m - PLIOCENE

Lithology

Fine to medium grained quartz sand, moderately sorted again dominates though from about 375 m metamorphic rock fragments are a consistent constituent of the samples. A shelly calcareous band is developed at ca. 470-480 m and silty clays at 510-520 m.

Micropalaeontology

A quite rich fauna of mainly calcareous forms occurs in this interval. A Pliocene age is suggested by the occurrence of the benthonic species Cibicides lobatulus, var. grossa, Cassidulina leavigata, Ammonia batavus, Nonion affine and Bulimina elongata. Other foraminifera found include species of the genera Buccella, Islandiella, Protelphidium, Elphidium, Nonion, Eponides, Trifarina, and Quinqueloculina. Some planktonic forms are also found.

This fauna indicates an inner neritic condition.

560-810 m - PLIOCENE - MIOCENE

Lithology

Quartz sands and metamorphic rock fragments together with small amounts of calcareous shell fragments and silty clay at some horizons. At 690-700 m metamorphic rock fragments make up over 80 % of the sample. Below this level metamorphics are a major constituent.

Micropalaeontology

The microfauna found here is very similar to the fauna in the overlying Pliocene part. However, the occurrences of the species Sigmoilopsis schlumbergeri, Cibicides cf. peelensis and Elphidium antonina indicate a possible Miocene age.

However, the remaining part of the fauna has so much in common with that of the overlying unit that an exclusively Miocene age is difficult to defend. The unit is therefore dated as Pliocene - Miocene.

810-910 m - MIOCENE TO LATE OLIGOCENE

Lithology

The lithology of this interval is again dominated by quartz sands and metamorphic rock fragments. Metamorphic rock fragments are not recorded in other than small amounts below about 850 m. Chert is recorded between 850 and 890-900 m.

Micropalaeontology

This unit has a quite rich fauna of mainly calcareous, benthonic foraminifera. The species Nodosaria soluta, Cibicides aknerianus, Polymorphina subnodosa, and Cassidulina cf. subglobosa indicate a Miocene - late Oligocene age. Environment: Open marine, probably a neritic condition. Supposed caved specimens from the upper Tertiary are also present in this interval.

910-1080 m - ?OLIGOCENE

Lithology

Clays and silts, sandy in parts with increasing amounts of fine to coarse, moderately sorted, angular to sub-rounded quartz sand occurring from about 1030-40 m to the base of the interval (1080 m) at which it is the major component.

Micropalaeontology

This interval has a poor foraminiferal fauna. Nonion affine and Cassidulina cf. subglobosa occur in the upper part of the sequence, whereas species of the arenaceous genera Cyclammina and Haplophragmoides dominate in the lower part. The evidence of Oligocene age is therefore rather poor. Throughout the whole sequence supposed caved specimens from the upper Tertiary are present.

1080-1513 m - EOCENE

Lithology

The upper part of this unit consists of quartz sands (as above, base ?Oligocene) with variable amounts of grey to light grey silty claystones.

The base of the sand is at about 1350 m. Below this level grey and greenish grey siltstones and limestones (from ca. 1330-40 m) are present.

#### Micropalaeontology

The fauna consists mainly of agglutinated specimens and a minor element of calcareous forms. Species of the genera Cyclamina, Haplophragmoides, Bathysiphon, Ammodiscus and Glomospira occur in most parts of the sequence, but with some planktonic forms especially in the lowermost part of the unit. The presence of Bathysiphon eocenicus in the whole interval and Cyclamina ampletens in the lower part suggests an Eocene age for this interval. Large radiolaria are quite common in the lowermost part of the sequence. Supposed caved specimens from upper Tertiary are found in the upper part. This fauna indicates an outer neritic to bathyal environment.

#### 1513-1549 m - ?EOCENE

##### Lithology

Minor amounts of limestone together with light brownish coloured siltstone and brownish, greenish grey claystone are the main lithologies in this interval. Sandier sediments and limestones are more common towards the base.

##### Micropalaeontology

Large radiolaria and diatoms dominate in this interval, whereas a few individuals of foraminifera are present. A few Coscinodiscus sp. 1 occur at 1513 m. These are very few compared with the maximum distribution of Coscinodiscus sp. 1 in the Paleocene sequence between 1549-1579 m. The occurrence of C. sp. 1 at 1513 m are therefore thought to be reworked from older strata.

#### 1549-1678 m - PALEOCENE

##### Lithology

Grey and greenish claystones and limestones in the upper part (down to ca. 1625) are the main lithologies. Quartz sands and siltstones occur around 1625-50 m.



### Micropalaeontology

The foraminiferal fauna consists mainly of agglutinated forms, including Ammodiscus incertus, Glomospira charoides, Bolivinopsis spectabilis, Pelosina caudata, Haplophragmoides obliquicameratus and Bathysiphon eocenicus. Diatoms and large radiolaria are common in the upper part of the unit.

The uppermost level at which the diatom Coscinodiscus sp. 1 is particularly common is 1549 m, and this is taken to indicate the top of the Paleocene.

The fauna and flora present indicate an open marine, probably outer neritic to bathyal environment.

### CRETACEOUS BIOSTRATIGRAPHY 1678-1789 M

#### 1678-1708 m - MAASTRICHTIAN

### Lithology

Limestones, giving way to claystones in the uppermost part of the unit.

### Micropalaeontology

Foraminifera: Important species within this unit are Heterohelix globulosa, Pseudotextularia elegans and Bolivina incrassata crassa together with species of Globotruncana and Rugoglobigerina. Other foraminifera include species of Gavelinella, Lenticulina, Pullenia, Gyroidinoides, Oolina, Lagena, Ammodiscus and Haplophragmoides. This indicates a Maastrichtian age down to at least 1699 m. An open marine environment is suggested.

Nannofossils: A Maastrichtian nannoflora is met from 1687 to 1708 m. The common occurrence of Nephrolithus frequens gives a Late Maastrichtian aspect to the association.

#### 1717-1741 m - CAMPANIAN

### Lithology

Limestones, giving way to brownish and greyish siltstones near the base of the unit.

Micropalaeontology:

Foraminifera: 1699-1741 m Early Maastrichtian to Campanian; a fairly rich foraminiferal fauna consisting of mostly benthonic forms, is obtained from this interval. The presence of Reussella szajnochae at 1699-1701 m indicates an Early Maastrichtian - Campanian age. Other benthonic forms include species of the genera Lenticulina, Lagena, Dentalina, Nodosaria, Oolina, Glandulina, Astacolus, Batysiphon, Spiroplectamina, Dorothia, Haplophragmoides and Ammodiscus. Plan tonic foraminifera are represented by species of Rugoglobigerina and Globotruncana.

Environment: Open marine.

Nannofossils: 1717-1736 m, Campanian; the presence of Eiffellithus anceps and Lucianorhabdus cailleuxi from 1717 m and below is evidence of a Campanian age between 1717 and 1736 m. This age is supported by Bukryaster hayi at 1720 m.

Comment: Foraminiferal and nannofossil evidence are in agreement over the age of this interval through the divisions enabled by the two groups differ in detail. Nannofossils at 1717 m are the first downhole evidence of Campanian. Foraminifera indicate an Early Maastrichtian to Campanian (and therefore Campanian if taken in conjunction with nannofossils) down to 1741 m.

1741-1780 m - SANTONIAN TO EARLY CAMPANIAN

Lithology

Brownish and light grey coloured siltstones, sandy in part.

Micropalaeontology

Foraminifera: This unit is characterized by a poor microfauna dominated by agglutinated foraminifera and with some large radiolaria (Cenosphaera) in the lowermost part (1760 - 1780). Arenaceous specimens of the genera Batysiphon, Pelosina, Haplophragmoides, Dorothia, Ammodiscus and Spiroplectamina occur together with some calcareous species of Rugoglobigerina, Lagena, Oolina, Gyroidinoides and Lenticulina. The occurrences of Cenosphaera in the lowermost part may indicate that the Santonian boundary is penetrated,

but the poor microfauna gives a rather weak evidence of Campanian Santonian age of this interval.

Nannofossils: Identification of this interval is based on lowermost occurrences. Reinhardites anthophorus and Lucianorhabdus cailleuxi do not occur earlier than Santonian. Alternatively Bucryaster hayi is restricted to one early Campanian level. This suggests a Santonian or possibly earliest Campanian age for this interval.

1780 - at least 1782 m - MIDDLE TO LATE CRETACEOUS

#### Lithology

Mixed clayey silt and sand. Sand grains are red/brown in colour probably ferric oxide. This may indicate reworking of the sand from earlier deposits.

#### Micropalaeontology

Foraminifera and Nannofossils: Analysis of samples from this level gave negative results.

#### Palynology

Very poor undiagnostic assemblages were recovered. The presence of triporate pollen, representatives of the dinoflagellate genera Isabelia and Chatangiella and other deflandroid cysts indicate a general middle Cretaceous, but post-Albian age. A very tentative Cenomanian - Turonian age can be suggested though the evidence is weak and inconclusive. The presence of Scriniodium apatelum and Pareodinia dasyforma indicate that there is some reworked Late Jurassic or Early Cretaceous.

JURASSIC AND TRIASSIC BIOSTRATIGRAPHY c. 1787,6-2462 M

1787.6-1826 m - ?BATHONIAN

#### Lithology

Coal and sandstones. The sandstones are coarse and friable in the upper part and finer and better consolidated in the lower part of the interval.

### Palynology

From 1789 m (core) to the base of this and the underlying interval typical Middle Jurassic spore/pollen assemblages were recovered. Although spore/pollen zonations of the Middle Jurassic have been carried out with some measure of success in the southern North Sea, it is not considered possible to apply these zonations in the present area due to floral provincialism.

The most effective means of zonation is therefore dinoflagellate cysts though even here, present knowledge of the various forms and their ranges is incomplete. Use of dinoflagellate cysts is further restricted as they are marine organisms and cannot be used effectively in deposits with little or no marine influence. Reliability, and thus repeatability in correlation of the present sequence, is therefore related to the occurrence of marine deposits.

The uppermost level at which a reasonably reliable dating of the Middle Jurassic can be given is the base of this interval at 1829 m (core). This sample yielded Nannoceratopsis gracilis and Wanaea acolaris. The top range of N. gracilis is thought to be latest Bajocian/earliest Bathonian. The bottom range of W. acolaris is at present believed to be latest Bajocian, though the distribution of this species in Bajocian deposits is poorly known.

This suggests that the 1826 m core is close to the Bajocian/Bathonian boundary which is here drawn at this level. This implies a Bathonian age for the deposits above. The 1787.6 sidewall was barren though the lithology resembles other sandstones recovered from this interval.

### Palynofacies

Organic matter recovered consists largely of coaly fragments indicating deltaic deposition with little marine influence.

1826-1936/38 m - BAJOCIAN (?TO AALENIAN)

### Lithology

Coals and medium to fine grained, moderately sorted sandstones predominate down to ca. 1870 m. Below this level sandy siltstones and dark grey claystones (from ca. 1900 m) are the main lithologies.

### Palynology

Sporadic occurrences of N. gracilis suggest a Bajocian age for this interval. Evidence of Aalenian deposits was not recorded though dinoflagellate cysts are rare in the lower part of the interval. The possibility of an Aalenian age for the lower part of this interval should therefore be kept in mind.

Spores and pollen recorded include Foveosporites canalis, Leptolepidites equatibossus, Chasmatosporites apertus, C. major, Chasmatosporites sp., Dictyophyllidites mortoni and Exesipollenites scabratus. These support a Middle Jurassic (probably Early) age.

### Palynofacies

Organic matter is more abundant than the above interval, particularly marine derived debris. Winged pollen grains, dinoflagellates and a lack of an abundant and varied spore assemblage indicate a shallow marine, low energy depositional environment.

### 1939,58-2094/7 m - TOARCIAN

#### Lithology

Coals again occur frequently. Thin sandstone is present in the uppermost part ca. 1838-42 m. Below this level siltstones and clayey siltstones predominate down to about 1975 m, at which level increasing amounts of silty claystone are met with down to ca. 2025 m. From here almost to the base of the interval fine to coarse angular/subangular sandstones predominate. Silty claystones are present at the base of the interval, ca. 2094-97 m.

#### Micropalaeontology

From ca. 1953-2016 m agglutinated foraminifera are fairly frequent. Ammodiscus asper and Trochammina spp. together with the calcareous Citharina clathrata are noteworthy. These indicate a Toarcian age.

### Palynology

The first occurrence downhole of a microflora with distinct Early Jurassic affinities in an assemblage completely dominated by an abundance of Nannoceratopsis gracilis is taken as evidence of the penetration of Toarcian deposits.

The 1939,58 core yielded an assemblage containing a number of as yet undescribed species (see encl. 4, Dinoflagellate sp. I-VI). Total ranges of these species are not known though some of them have previously been recorded in deposits of supposed Early Jurassic age. Species VI has been recorded from the Toarcian of Spitsbergen as ?Parvocysta cracens by Bjærke (1978/9 in (press)). The most important pollentypes recovered are Chasmatosporites apertus and Chasmatosporites major.

### Comment

A Toarcian age (possibly Late Toarcian) seems well established down to at least 2016 m. Below this level micropalaeontological preparations are very poor and no new palynological aspects are recorded though N. gracilis is recorded regularly and in considerable abundance at 2013-16, 2052-55 and 2094-97 m. An abundance of N. gracilis in the Toarcian is consistent with other North Sea records. The interval 2013-16 to 2094-97 m is therefore tentatively dated as Toarcian.

### Palynofacies

Between 1939 and ca. 1953 m shallow marine, off delta conditions prevailed. Below this level down to ca. 2000 m residues consist largely of coaly fragments and other land derived material and are generally poor; fairly high energy conditions, fairly close to shore prevailed. From 2013/16 m to the base of the interval residues are richer containing sapropel and wood remains suggesting shallow marine deltaic conditions.

2113/16-2232 m - PLIENSBACHIAN (?DOMERIAN)

### Lithology

Coals and quartz sands with subordinate claystones and siltstones at 2136-39 m and siltstones at 2278-81 m and 2220-23 m.

### Micropalaeontology

Three ostracod-rich samples from the base of this interval yielded assemblages dominated by Ogmoconcha amathei and other species which together indicate a pre-Toarcian, probable Pliensbachian age (see appendix (i)). Later investigations showed this assemblage to extend from 2216/8 to 2232 m.

Foraminifera recovered between 2115 and 2202 m include Astacolus primus, Lenticulina gottingensis and L. varians which range from Pliensbachian to Sinemurian.

### Palynology

Nannoceratopsis gracilis occurs frequently throughout the whole of this interval. This species is known to extend from the Late Pliensbachian into younger strata. Its range in strata older than this is uncertain.

### Palynofacies

The upper part of this interval, down to ca. 2136-39 resembles the interval above though with perhaps some deeper water. From 2157 m. assemblages are less marine in character though most samples contain some marine elements. Low energy inner deltaic conditions with some marine influxes prevailed.

### Comment

A Pliensbachian age seems well established between 2115 and 2232 m on the basis of ostracod, foraminifera and dinoflagellate evidence. Moreover, dinoflagellate evidence suggests that a Late Pliensbachian age (= Domerian) is perhaps likely.

2232-2375 m - ?PLIENSBACHIAN

### Lithology

Fine to medium quartz sands poor to moderately sorted with claystones at the top and base of the interval.

### Micropalaeontology

Stratigraphically significant microfossils were not recovered from this interval.

### Palynology

N. gracilis was recovered fairly frequently from most cuttings samples and sporadically from most sidewalls and cores. This species is normally taken to indicate a Late Pliensbachian or younger age. The position of this interval however suggests that an Early Pliensbachian age is perhaps more likely. Additional evidence favouring a Pliensbachian age is the presence of Mendicodinium reticulatum and Mendicodinium spp. between 2235,45 and 2243,5 m. The range of M. reticulatum is uncertain, though it has been recorded from the Late Pliensbachian.

### Palynofacies

Inner deltaic conditions with less marine influence than in the above interval. Shallower water, higher energy conditions dominate down to ca. 2310 m. Towards the base fairly rich residues with increased amounts of marine debris occur. This implies deeper water and considerably increased marine influence. However, caved material is suspected in this interval, which may have influenced results.

### Comment

The lack of supporting micropalaeontological evidence and the uncertainty over the ranges of the palynomorphs recovered does not enable a definite Pliensbachian age to be given to this interval. However, sporadic occurrences of N. gracilis in sidewalls and cores appear to favour a Pliensbachian rather than a Sinemurian or earlier Jurassic age. This would imply a slightly older bottom range for N. gracilis than has been previously suggested.



2375-2390 m - HETTANGIAN - PLIENSBACHIAN

Lithology

Fine to coarse sandstones and shales.

Palynology

Palynological assemblages recovered from cuttings are thought to consist largely of caved material. The 2375 m sidewall yielded N. gracilis and this is the lowermost level at which the occurrence of this species is certain, suggesting Pliensbachian at this level. Below this level there is insufficient evidence to propose any definite dating.

2390-2462 m - ?TRIASSIC, ?UNFOSSILIFEROUS JURASSIC

Lithology

Quartz sands and red-brown claystones.

Palynology

Cuttings samples down to 2462 m yielded fairly rich Early Jurassic assemblages. Complete lack of these assemblages in sidewalls from 2390 m and below indicate that these are caved. Some cuttings samples above this level may also be contaminated by cavings. Sidewalls from this interval contain very little or almost no organic material, and preparations consist largely of mineral grains. Previous experience suggests that this may indicate a possible Triassic age, though there is no effective biostratigraphic evidence for this.

The 2440 m sidewall yielded Cerebropollenites cf. mesozoicus. C. mesozoicus has previously been taken as an indication of a post-Triassic (i.e. Jurassic in this case). The extent to which this correlation can be applied in this area is highly speculative as ranges of pollen taxa in the southern and northern North Sea differ and thus this occurrence is not taken as evidence of a Jurassic age. Nevertheless, the possibility that this interval includes in part unfossiliferous Early Jurassic should not be dismissed.

Palynofacies

An inner deltaic possibly freshwater environment, with little or no marine influence is suggested.

Reference:

Bjærke, T. 1978/9: Toarcian dinoflagellates from Spitsbergen. in press.

APPENDIX (i)

MICROPALAEONTOLOGICAL EXAMINATION OF THREE BOREHOLE SAMPLES  
FROM THE NORTHERN NORTH SEA AREA.

Report prepared for the CONTINENTAL SHELF INSTITUTE, Trondheim

Your ref: Bb1/78/DGB/mg 0-163

Our ref: BKS 781

STRATIGRAPHIC SERVICES INTERNATIONAL  
LONDON

prepared by: R.H.Bate, T.I.Kilenyi & Leslie M. Sheppard.

3rd October 1978

Report on the micropaleontological investigation of three borehole samples received from the CONTINENTAL SHELF INSTITUTE, Trondheim.

Three samples were received on 1st October 1978 from interval: 2223-2232m, two of them (2226-29m & 2229-32m) as slides containing ostracods, the third sample (2223-26m) as residue. The entire residue of this sample was picked.

Results:

Sample 2223-26m.

Sample very rich in ostracods, total number estimated to be over 100 carapaces. All ostracods were closed carapaces with one exception but this proved to be a caved specimen. Preservation is good although some carapaces appeared to be slightly crushed. The fauna consists of:

Ogmoconcha amalthei (Quenstedt 1858)

A N.W. European species, total range: L.Sinemurian - U. Pliensbachian. In Scotland it ranges from L.Sinemurian to Mid/Upper Pliensbachian.

Ogmoconcha liassica (Blake 1876)

Cosmopolitan species, total range: basal Hettangian - U. Sinemurian.

Bairdia molesta Apostolescu 1959

N.W. European species, total range: L.Sinemurian - U.Pliensbachian.

Kinkelinnella foveolata Michelsen 1975

Danish off-shore area, total range: U.Sinemurian - L.Pliensbachian.

Mandelstania triebeli Kilenyi 1961

Upper Oxfordian-Lower Kimmeridgian species. Caved.

Dominant species: Ogmoconcha amalthei (over 90%)

Sample 2226-29m.

The slide contained 10 carapaces. Preservation as above. The fauna consists of:

Ogmoconcha amalthei

Ogmoconcha liassica

Isobythocypris sp.

Sample 2229-32m.

The slide contained 18 carapaces. Preservation as above. The fauna consists of:

Ogmoconcha amalthei

Ogmoconcha liassica

Bairdia molesta

Bairdia sp.

Dominant species Ogmoconcha amalthei.

Interpretation

Age.

The fauna quite clearly indicates Upper Sinemurian-Upper Pliensbachian range. Ogmoconcha amalthei (and other species of this genus) do not go into the Toarcian, although in the very basal Toarcian in England there are still a few specimens of Ogmoconcha. The minimum age is accurately fixed as Late Pliensbachian. The maximum age is Lower Sinemurian (allowing for possible caving from younger Liassic deposits). The most likely age in our opinion is Pliensbachian.

Ecology.

All the ostracods recovered indicate marine deposits. Species of Ogmoconcha are probably indicators of relatively deep water with restricted circulation.

Two specimens of foraminifera were also recovered from sample 2223-26m, identified as Lenticulina sp.

APPENDIX (ii)

Lithology of individual samples

Only generalized lithology was carried out, largely as an aid to the biostratigraphy. Visual estimates of the percentages of different lithologies present in the 0.125 - 2.00 mm washed cuttings fraction were made. From parts of the section also core and side-wall core samples were examined. Electric logs were not examined.

At a number of horizons very considerable amounts of black coaly matter were recovered. Some of these may derive from the mud as an additive. As it is not always possible to distinguish additive from indigenous coal the data have not been adjusted. Coal percentages may therefore be overrepresented at some levels.

Depth (m)	Lithology
210 - 220	60% carbonate shell fragments. 15% quartz sand, very fine to fine and occasional coarse grains, angular to subrounded, moderately sorted, light to clear. 15% clay, sandy and silty, grey. 5% mica (?drilling contaminant). 5% metamorphic rockfragments. obs. foraminifera.
230 - 240	70% quartz sand, fine to medium, scattered coarse grains, angular to subrounded, moderately sorted, light to clear. 25% clay, sandy and grey. 5% carbonate shell fragments. sm.am. foraminifera; metamorphic rockfragments; mica.
250 - 260	80% quartz sand, very fine to fine, some medium and coarse grains, angular to subrounded, moderately sorted, light to clear. 10% carbonate shell fragments. 10% metamorphic rockfragments; clay, grey, silty/sandy; claystone. obs. foraminifera.
270 - 280	90% quartz sand, as above. 10% carbonate shell fragments. obs. sandstone; claystone; foraminifera; metamorphic rockfragments.
290 - 300	73% quartz sand, as above. 20% clay, silty/sandy, grey. 5% carbonate shell fragments. 2% metamorphics. sm.am. foraminifera. obs. claystone.

Depth (m)	Lithology
310 - 320	95% quartz sand, as above. 2% carbonate shell fragments. 3% metamorphics; limestone; foraminifera; claystone; sandstone; chert; clay; glauconite; siltstone.
330 - 40	91% quartz sand, as above. 5% carbonate shell fragments. 3% metamorphics. 1% limestone. obs. claystone; siltstone; glauconite; sandstone.
350 - 60	96% quartz sand, as above. 2% carbonate shell fragments. 2% metamorphics. obs. forams.
370 - 80	94% quartz sand, fine to medium, angular to subrounded, moderately sorted, light to clear. 5% metamorphics. 1% carbonate shell fragments. obs. limestone.
390 - 400	84% quartz sand, as above. 15% metamorphics. 1% carbonate shell fragments. obs. glauconite.
410 - 20	79% quartz sand, as above. 20% metamorphics. 1% carbonate shell fragments. obs. limestone.
430 - 40	90% quartz sand, as above. 9% metamorphics. 1% carbonate shell fragments.
450 - 60	89% quartz sand, as above. 10% metamorphics. 1% carbonate shell fragments. obs. pyrite.
470 - 80	45% carbonate shell fragments. 45% metamorphics. 10% quartz sand, as above.
490 - 500	80% quartz sand, as above. 15% metamorphics. 5% carbonate shell fragments. obs. limestone; sandstone.
510 - 20	85% silty clay, partly sandy, light grey. 10% metamorphics. 5% quartz sand, as above. sm.am. carbonate shell fragments.
530 - 40	63% quartz sand, as above. 25% metamorphics. 10% clay, as above. 2% carbonate shell fragments. obs. chert.
550 - 60	70% quartz sand, as above. 29% metamorphics. 1% carbonate shell fragments.
570 - 80	83% quartz sand, as above. 15% metamorphics. 2% carbonate shell fragments. obs. pyrite.
590 - 600	75% quartz sand, as above. 23% metamorphics. 2% carbonate shell fragments. obs. chert, pyrite, foraminifera.
610 - 20	85% quartz sand, as above. 15% metamorphics. sm.am. carbonate shell fragments.
630 - 40	75% quartz sand, as above. 24% metamorphics. 1% carbonate shell fragments. obs. pyrite.



Depth (m)	Lithology
650 - 60	75% quartz sand, as above. 25% metamorphics. sm.am. carbonate shell fragments.
670 - 80	75% quartz sand, as above. 25% metamorphics. sm.am. carbonate shell fragments.
690 - 700	84% metamorphics. 8% quartz sand, as above. 8% clay, silty, light grey. sm.am. carbonate shell fragments.
710 - 20	60% quartz sand, as above. 40% metamorphics. sm.am. carbonate shell fragments.
730 - 40	60% quartz sand, as above. 38% metamorphics. 2% carbonate shell fragments. obs. pyrite.
750 - 60	70% metamorphics. 25% quartz sand, fine to coarse, poorly sorted, angular to subrounded, moderately sorted, light to clear. 5% carbonate shell fragments.
770 - 80	70% metamorphics. 27% quartz sand, as above. 3% carbonate shell fragments. obs. pyrite.
790 - 800	49% metamorphics. 49% quartz sand, as above. 2% carbonate shell fragments. obs. pyrite.
810 - 20	49% metamorphics. 48% quartz sand, as above. 3% carbonate shell fragments.
830 - 40	60% quartz sand, as above. 37% metamorphics. 2% carbonate shell fragments. 1% clay, grey. obs. forams; pyrite.
850 - 60	90% quartz sand, coarse, well-sorted, subangular to rounded, light. 10% chert; claystone; metamorphics. obs. limestone; pyrite, glauconite.
870 - 80	85% quartz sand, as above. 15% chert (partly rounded and as fossil fragments); claystone; metamorphics. obs. pyrite, glauconite.
890 - 900	85% quartz sand, as above. 15% chert (partly rounded and as fossil fragments); claystone; clay; metamorphics. obs. glauconite.
910 - 30	98% clay/silt, sandy, light grey/grey. 2% quartz sand. obs. pyrite; glauconite.
930 - 40	100% clay/silt, sandy, light grey/grey. sm.am. quartz sand.
950 - 60	100% clay/silt, sandy, light grey/grey. obs. quartz sand, pyrite, glauconite.

Depth (m)	Lithology
970 - 80	100% clay/silt, sandy, light grey/grey. obs. quartz, pyrite.
990 - 1000	100% clay/silt, sandy, light grey/grey. sm.am. quartz sand; glauconite.
1010 - 20	95% clay to clayey silt, slightly sandy, grey/light grey, brownish grey. 5% quartz sand. sm.am. glauconite.
1030 - 40	70% clay to clayey silt, slightly sandy, grey, light grey. 30% quartz sand, fine to coarse, moderately sorted, angular to subrounded, clear to light grey. sm.am. glauconite. obs. pyrite.
1050 - 60	50% clay to clayey silt, slightly sandy, grey/light grey. 50% quartz sand, fine to coarse, poorly sorted, angular to subrounded, clear to light grey. sm.am. glauconite.
1070 - 80	75% quartz sand, as above. 25% clay to clayey silt, as above. sm.am. glauconite; mica.obs. pyrite.
1090 - 1100	92% quartz sand, medium to coarse, moderately sorted, angular to subrounded, clear to light grey. 8% claystone to clayey siltstone, grey, light grey. sm.am. glauconite; mica. obs. pyrite.
1110 - 20	94% quartz sand, coarse, well-sorted, subangular to rounded, clear to light grey. 3% sandstone, very fine to fine, clear to light grey, glauconite observed. 3% claystone to clayey siltstone, grey, light grey. sm.am. glauconite.
1130 - 40	100% quartz sand, coarse, subangular to rounded, well-sorted, clear to light grey. sm.am. glauconite. obs. silty claystone.
1150 - 60	97% quartz sand, as above. 3% silty claystone. sm.am. glauconite. obs. pyrite.
1170 - 80	80% quartz sand, as above. 10% sandstone, very fine to fine, light grey, with glauconite. 10% claystone, grey, light grey. sm.am. glauconite. obs. pyrite.
1190 - 1200	68% quartz sand, as above. 25% silty claystone, grey, light grey. 7% quartz sandstone, very fine to fine, light grey, with glauconite. sm.am. glauconite. obs. pyrite.
1210 - 20	90% quartz sand, as above. 10% silty claystone, as above. sm.am. glauconite. obs. pyrite.

Depth (m)	Lithology
1230 - 40	50% quartz sand, as above. 50% claystone, grey, some greengrey. sm.am. quartz sandstone, very fine to fine, light grey, with glauconite. obs. glauconite, pyrite.
1250 - 60	85% quartz sand, as above, but with some very coarse grains. 15% claystone, grey, some greenish grey. sm.am. pyrite; glauconite; quartz sandstone, very fine to fine, with glauconite. obs. pyrite; glauconite.
1270 - 80	80% quartz sand, as above, but with some very coarse grains. 20% claystone, grey, some greenish fragments. obs. pyrite; glauconite; quartz sandstone, very fine to fine.
1290 - 1300	60% claystone, greengrey. 38% quartz sand, as above. 2% pyrite.
1310 - 20	50% claystone, greenish grey to grey. 50% quartz sand, as above. sm.am. pyrite; limestone.
1330 - 40	18% claystone, greenish grey to grey. 46% quartz sand, as above, but with some very coarse grains in addition. 36% limestone, grey, light. sm.am. pyrite. obs. siltstone.
1350 - 60	90% claystone, grey, greenish grey, some silty fragments (brownish light grey). 10% limestone, grey, some light. obs. siltstone; pyrite.
1370 - 80	60% claystone, grey, greenish grey. 40% limestone, grey, light. obs. sandstone; siltstone; pyrite.
1390 - 1400	70% claystone, grey, greenish grey, some silty brownish light grey fragments. 30% limestone, grey, light, brownish. obs. sandstone, pyrite.
1400 - 10	60% limestone, grey, light. 40% claystone, grey, greenish grey. obs. pyrite; sandstone.
1410 - 20	60% limestone, grey, light. 40% claystone, grey, greenish grey. obs. pyrite, quartz.
1420 - 30	55% claystone, grey, greenish grey. 45% limestone, grey, light.
1430 - 40	65% claystone, grey, greenish grey. 35% limestone, grey, light. obs. sandstone; pyrite; quartz.
1440 - 50	65% limestone, grey, light. 35% claystone, grey, greenish grey.

Depth (m)	Lithology
1450 - 60	97% claystone, grey, greenish grey. 3% silty claystone, light. sm.am. limestone.
1470 - 80	95% claystone, grey, greenish grey, brownish grey. 4% silty claystone, light. 1% limestone.
1492 - 1501	60% claystone, grey, greenish grey, brownish grey, green. 39% limestone, light, grey, brownish. 1% pyrite.
1501 - 07	70% claystone, greengrey, grey, brownish grey, green. 29% limestone, light, grey, light brown. 1% pyrite, some cubic crystals.
1507 - 13	65% claystone, greengrey, grey, brownish grey, green. 20% siltstone, light, brownish. 15% limestone, light, brownish. sm.am. pyrite, some cubic crystals.
1513 - 19	50% siltstone, light, brownish. 45% claystone, brownish grey, grey, greenish grey, green. 5% limestone, light, brownish. obs. quartz; pyrite.
1519 - 25	100% claystone, partly silty, greengrey, brownish grey, grey, green. sm.am. limestone, light, light brown.
1531 - 37	50% claystone, as above. 45% sand/siltstone, light, brownish. 5% limestone. obs. pyrite.
1537 - 43	40% claystone, grey, greenish, brownish. 30% sand/siltstone, light, brownish. 30% limestone, light, some grey and brownish.
1543 - 49	85% claystone, brownish grey, grey, greengrey, green. 15% limestone, light, some brownish.
1549 - 55	78% claystone, silty, grey, greenish, brownish. 15% sand/siltstone, light, brownish. 7% limestone, light. sm.am. siltstone; quartz; pyrite.
1555 - 61	40% siltstone, sandy, light, brownish. 30% claystone, as above. 20% quartz sand, light to clear. 10% limestone, light. obs. pyrite; marchasite.
1561 - 69	75% sand/siltstone, light, brownish. 20% claystone, grey, greenish, brownish. 5% limestone.
1567 - 73	97% claystone, grey, some bluish fragments. 3% limestone. sm.am. siltstone; quartz. obs. pyrite.
1573 - 79	100% claystone, partly silty, grey, some greengrey fragments. sm.am. limestone; siltstone; quartz. obs. pyrite.

Depth (m)	Lithology
1579 - 85	94% claystone, grey. 3% siltstone; quartz. 3% limestone, light, some brownish.
1585 - 91	93% claystone, grey. 7% limestone; quartz; siltstone.
1597 - 1600	50% claystone, grey, greengrey. 50% limestone, brownish, grey, light.
1603 - 09	80% claystone, grey, brownish, greenish. 15% limestone. 5% quartz sand. sm.am. pyrite.
1609 - 15	78% claystone, grey, greengrey, green. 15% quartz sand, very fine to medium, angular to subrounded, poorly sorted. 7% limestone, brownish, grey, light.
1615 - 21	75% limestone, light, grey. 25% claystone, partly silty, grey to light grey. sm.am. siltstone, quartz sand; pyrite.
1627 - 33	74% claystone, grey to light grey, greengrey. 13% quartz sand, light to clear. 13% siltstone, brownish grey. obs. pyrite.
1639 - 45	65% claystone, as above. 25% quartz sand. 5% siltstone, brownish grey. 5% limestone. sm.am. pyrite.
1663 - 69	92% claystone, grey to light grey, some green. 5% siltstone, brownish light grey. 3% coal. sm.am. quartz sand. obs. pyrite; limestone.
1687 - 90	60% limestone, light grey. 40% claystone, grey to light grey, some green. sm.am. coal. obs. pyrite.
1699 - 1702	100% limestone, light grey, grey. sm.am. claystone. obs. pyrite.
1717 - 20	93% limestone, light, light grey. 7% coal. sm.am. claystone, siltstone. obs. pyrite.
1726 - 29	94% limestone, grey, light grey. 5% claystone. 1% coal. sm.am. siltstone. obs. pyrite.
1736 - 39	60% siltstone, sandy, brownish light grey. 20% limestone, light, light grey. 20% coal. sm.am. sand/siltstone.
1753 - 56	55% siltstone, sandy, brownish light grey. 45% coal. sm.am. limestone; claystone; sand/siltstone.

Depth (m)	Lithology
1762 - 65	55% coal. 45% siltstone, as above. sm.am. sandstone, grey; claystone, grey.
1965 - 68	55% siltstone, as above. 42% coal. 3% sandstone, grey. 2% claystone, grey. sm.am. pyrite.
1774 - 77	57% siltstone, clayey, light, light grey, some brownish light sandy siltstone. 40% coal. 3% clay/siltstone, grey; sandstone, grey. obs. pyrite.
1781 - 84	95% siltstone, sandy, light, light grey and brownish light grey (quartz and partly dark sand grains), grey. Large amounts mud additives (nut shells). 5% mica (?additive). sm.am. quartz sand, light; mica; claystone, green, grey; sandstone, silty, with glauconite.
1784 - 86	85% quartz sand, medium to coarse, angular/subangular, moderately sorted, light. 15% coal. sm.am. siltstone, sandy, light grey; mica (?mud additive).
1792 - 95	100% quartz sand, medium to coarse, subrounded to angular, moderately sorted, light, some grey grains. sm.am. coal.
1796 - 98	100% quartz sand, as above.
1798 - 1800	100% quartz sand, as above. sm.am. coal; siltstone, sandy.
1802 - 04	60% coal. 40% quartz sand, medium to coarse, moderately sorted, angular to subrounded, light. obs. pyrite.
1806 - 08	70% coal. 30% quartz sand, medium to fine, angular/subangular, moderately sorted/well sorted, light. sm.am. siltstone.
1818 - 20	87% coal. 10% quartz sand, as above. 3% mica (?mud additive).
1822 - 24	70% quartz sand, medium to fine, angular/subangular, moderately sorted, light. 30% coal. sm.am. siltstone; mica (?mud additive).
1826 - 28	100% coal (?partly lignosulphate).
1830 - 32	100% coal. sm.am. quartz sand; siltstone; mica. obs. claystone, grey; pyrite.
1838 - 40	75% quartz sand, medium to coarse, moderately sorted, angular/subangular, light. 25% coal. sm.am. siltstone, sandy, light/light grey, brownish. obs. claystone, green.
1848 - 50	90% coal. 10% quartz sand.

Depth (m)	Lithology
1870 - 72	96% quartz sand, medium to coarse, moderately sorted, angular to subrounded, light to clear. 4% coal. sm.am. sandy siltstone, light/light grey. obs. claystone.
1882 - 84	55% sandy siltstone, light/light grey. 40% quartz sand, medium to fine, moderately sorted, very angular to sub-angular, light to clear. 5% coal.
1894 - 96	95% mud additives (nut shells). 5% coal. sm.am. sandy siltstone, as above; claystone; quartz sand; mica.
1914 - 16	47% siltstone, sandy, light, light grey. 30% claystone, grey, dark grey. 20% nut shells. 3% coal.
1922 - 24	65% siltstone, sandy, light, light grey, partly brownish. large amounts mud additives (nut shells, mica). 25% claystone, grey, dark grey, green. 10% coal. sm.am. quartz sand.
1928 - 30	100% siltstone, as above. Large amounts mud additives (nut shells, mica). obs. claystone, as above.
1936 - 38	100% coal. Large amounts of mud additives (nut shells). sm.am. claystone; quartz sand; sandy siltstone.
1938 - 40	80% quartz sand, medium to coarse, moderately sorted, angular to very angular, light. 20% coal.
1940 - 42	70% quartz sand, coarse to very coarse, moderately sorted, angular to subrounded, light. 20% coal. 10% siltstone, light, light grey.
1953 - 56	60% coal. 25% quartz sand/sandstone. 10% siltstone, as above. 5% pyrite. sm.am. limestone, brown, silty claystone, grey.
1959 - 62	90% siltstone and clayey siltstone, light/light grey, brownish light grey, grey. 10% pyritized material. sm.am. limestone, grey, brown; quartz sand; coal.
1971 - 74	100% sandy siltstone, light/light grey, some very coarse fragments, most of the sand sized grains are dark (?volcanic origin), quartz, possibly garnet.
1992 - 95	65% silty claystone, grey. 25% coal. 10% sandy siltstone, as above.
2013 - 16	90% silty claystone, grey. 5% coal. 5% sandy siltstone, as above. sm.am. pyrite.

Depth (m)	Lithology
2031 - 34	80% quartz sand/sandstone, fine to coarse, angular/sub-angular, light to clear. 15% silty claystone, grey. 5% coal. sm.am. limestone.
2052 - 55	92% quartz sand, fine to coarse, angular/subangular, light to clear, light grey. 3% sandy siltstone, as above. 3% coal. 2% claystone, grey. obs. pyrite.
2073 - 76	72% quartz sand/sandstone, fine to medium and very fine, poorly sorted, very angular to subangular, light to clear, glauconite observed in sandstone fragments. 20% coal. 5% sandy siltstone, as above, but brownish light grey. 3% silty claystone to siltstone, grey. sm.am. limestone, light. obs. glauconite, pyrite.
2094 - 97	95% silty claystone, grey with small amounts coal. 5% sand/sandstone, as above. sm.am. sandy siltstone, as above, but brownish light grey. obs. pyrite.
2115 - 18	70% quartz sand/sandstone, fine to medium and some very fine, poorly/moderately sorted, very angular to subangular, light grey to clear. 25% coal. 5% claystone, silty, grey. sm.am. siltstone, grey, with coal; sandy siltstone, as above, but brownish light grey. obs. pyrite.
2136 - 39	40% coal. 40% quartz sand/sandstone, as above. 10% claystone, silty, grey. 10% sandy siltstone, quartz grains and dark grains, light/light grey, brownish. sm.am. limestone; siltstone; pyrite.
2157 - 60	90% coal. 6% sandy siltstone, as above. 3% claystone, silty, grey. 1% sand/sandstone, glauconite and coal observed in sandstone fragments. sm.am. limestone.
2178 - 81	60% coal. 20% quartz sand/sandstone, as above, glauconite observed in sandstone fragment. 20% sandy siltstone, as above. sm.am. limestone; claystone; pyrite.
2199 - 2202	100% coal. sm.am. claystone; siltstone, as above; quartz.
2220 - 23	70% coal. 15% quartz sand/sandstone, as above. 10% siltstone, as above. 5% mica (?drilling contaminant).
2250 - 53	70% silty claystone to siltstone, grey/light grey, glauconite observed in siltstone. 30% coal. sm.am. quartz sand, as above. obs. glauconite, pyrite.



Depth (m)	Lithology
2271 - 74	100% quartz sand/sandstone, medium to fine and coarse, moderately sorted, very angular to subangular, light to clear. sm.am. coal. obs. silt/claystone; glauconite; pyrite.
2292 - 95	100% quartz sand/sandstone, fine to coarse and some very coarse grains, very angular to subangular, poorly sorted, light to clear. sm.am. coal.
2310 - 13	95% quartz sand, fine to medium, some coarse/very coarse, moderately sorted, angular to subangular, light to clear. 5% coal. sm.am. pyrite, claystone.
2331 - 34	100% quartz sand, medium to coarse, poorly sorted, angular to subangular, light to clear. sm.am. coal, claystone. obs. pyrite.
2352 - 55	100% quartz sand, medium to coarse, some fine and very coarse, poorly sorted, angular/subangular, light to clear, some redbrown. sm.am. claystone, grey, redbrown; coal; pyrite.
2370 - 73	50% quartz sand, fine to coarse, poorly sorted, angular/subangular, light to clear. 50% claystone, grey, redbrown. obs. pyrite.
2394 - 97	100% claystone, grey, redbrown, yellowish. sm.am. limestone, light; coal; quartz sand; pyrite.
2415 - 18	75% quartz sand, medium to fine and coarse, poorly sorted, angular/subangular, light to clear. 25% claystone, redbrown, yellowish, grey, greenish grey. obs. pyrite; glauconite; coal.
2436 - 39	95% claystone, redbrown, yellowish, grey, greenish grey. 5% quartz sand. sm.am. limestone, light. obs. coal, glauconite, pyrite.
2457 - 60	55% quartz sand, medium to fine and some coarse, poorly sorted, angular/subangular, light to clear. 45% claystone, as above.
2460 - 62	60% quartz sand, as above. 40% claystone, as above. obs. limestone, light.

Side-wall core samples

Depth (m)	Lithology
1772,5	silt/claystone, grey.
1775,5	clayey siltstone, grey.
1778,5	clayey siltstone, grey.
1780	clayey siltstone, grey.
1781,5	mixed clayey silt and sand, very fine/fine, consisting of redbrown quartz grains (oxidized), grey medium sand grains observed, pyrite observed. the redbrown quartz grains originate possibly from resedimentation of redbrown sand/sandstone.
1789	quartz sand, medium to fine, moderately sorted, subangular, brown because of organic matter.
1795,5	quartz sand, coarse, some fine/very fine, subangular to subrounded, moderately sorted, brownish (org. matter), light/light grey.
1798,5	silty clay, grey, with coal and sand/silt, light, and consisting of quartz and muscovite, with coal.
1957	clay, silty, brownish grey.
1958,5	clay/silt, grey.
1959,5	silt/clay, scattered sand grains, grey.

Core samples

Depth (m)	Lithology
1782,60	siltstone, clayey, grey, coaly, pyrite observed.
1787,60	siltstone, scattered sand grains, light/light grey.
1820,60	laminations of clayey siltstone, brownish dark grey, very micaceous, with sm.am. coal, and coarse to medium sandstone with very fine sand and coarse silt as matrix, and very fine/fine very micaceous coaly sand.
1829,55	siltstone, light grey, with sm.am. coal.
1833,30	clay/siltstone, grey, with muscovite and sm.am. coal.
1939,58	silt/claystone, grey, with muscovite, coal observed.

Depth (m)	Lithology
1941,05	silt/claystone, grey, mica-rich, pyrite observed.
1942,10	silt/claystone, grey, very micaceous, with coal.
1942,87	silty sandstone, very fine, with coarse/very coarse grains, grey, with coal.
1943,74	silt/claystone, grey, very micaceous, with coal.
1944,58	silty claystone, grey, with scattered medium coarse sand grains, micaceous, with coal; and siltstone, light grey, with coal.
1945,47	silty claystone, grey, micaceous, with coal.
1946,30	clayey and sandy siltstone, grey, very micaceous, with coal, pyrite observed.
1947,15	siltstone, clayey, sandy, grey, very rich in muscovite, with coal, pyrite observed.
1947,85	clayey siltstone, grey/light grey, very micaceous, with coal, pyrite observed.
1949,02	clay/siltstone, grey, with coal, pyrite observed.
1950,05	silty claystone to siltstone and parts consisting of very fine sand, grey, very micaceous, with coal.
1951	siltstone, clayey, grey, micaceous, with coal.



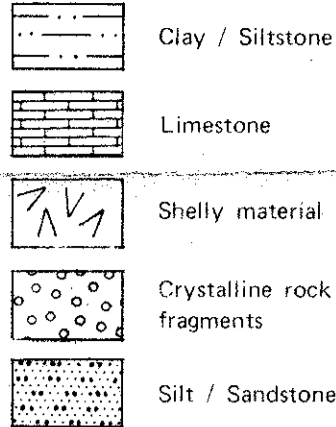
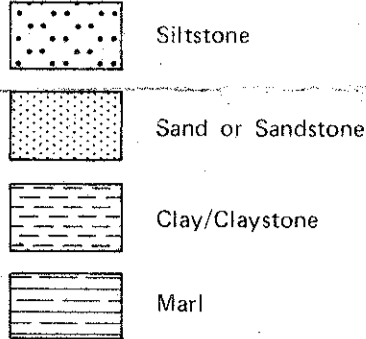
N.26

COMPANY: STATOIL  
WELL NO: 34/10 - 1

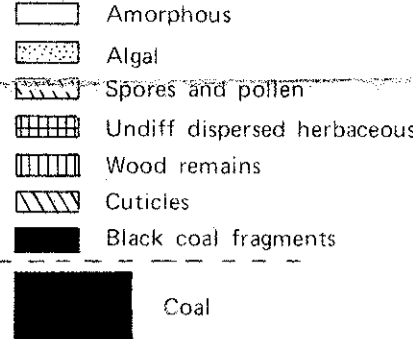
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REF: Q - 163

SYNTHESIS: D.G. Bell  
DATE: OCTOBER 1978

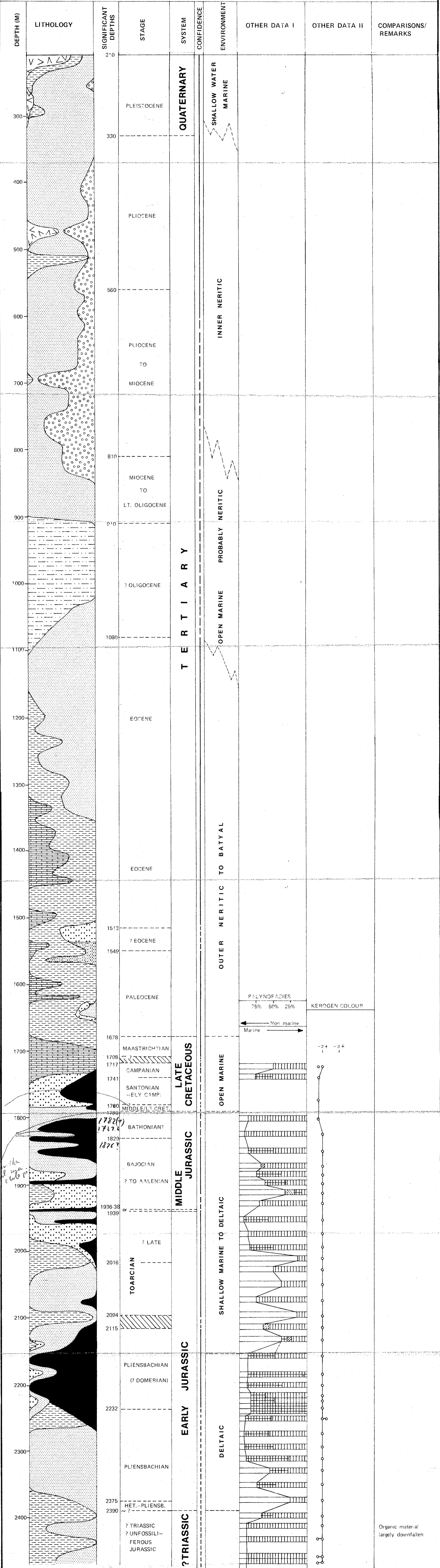
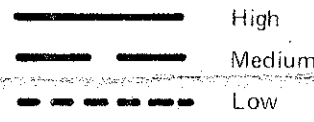
LITHOLOGY



PALYNOFACIES



CONFIDENCE





NANNOFOSSILS

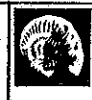
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- Eiffelithus turriseiffelli
- Nephrolithus frequens
- Archangeliskella cymbiformis
- Micula stauropora
- Kampnerius magnificus
- Tegumentum stradneri
- Prediscosphaera cretacea
- Cretarhabdus spp.
- Microarhabdulus strandneri
- Eiffelithus anceps
- Gartnerago obliquum
- Cretarhabdus loriei
- Ahmuellerella octoradiata
- Reinhardtites aff. anthophorus
- Lucianorhabdus cailleuxi
- Lichrapidites helicoideus
- Bukryaster hayi
- Tetralithus obscurus
- Reinhardtites anthophorus
- Vekshimella stradneri

DEPTH

Not to scale

1684	● ●	x ●	● ●																	
1699	● ●	x ●	● ●		● ●	● ●	●													
1708	● ●	● ●	● ●		● ●	● ●	●													
1717	● x	● ●	● ●		● ●	● ●		● ●	● ●	● ●	● ●									
1720	● ●	● ●	● ●		● ●	● ●	●	● ●	● ●	●				● ●	●					
1736			●		● ●	●									●					
1741	● ●	●	● ●		● ●	●		● ●	●											
1753			x		● ●	x								●	● ●					
1777					●	●														
1826																				
1848																				
1870		Barren																		
1899																				

SUMMARY STRATIGRAPHY



IKU

TAXALIST  
 ENCLOSURE 3  
 Well 34/10 - 1  
 Depth 1684 - 1894  
 Analyst: J.G. Verdenius  
 Date: October 1978

REMARKS

Maastricht.  
 Campanian  
 Santonian  
 (earliest campanian)

- Present
- x Abundant

N26

WELLFILE



IKU

TAXALIST  
ENCLOSURE 4  
Well 34/10 - 1  
Depth 1726 - 2460  
Analyst: D.G.Bell  
Date: October 1978

SUMMARY STRATIGRAPHY

DEPTH	DINOFLLAGELLATES																	
	Triporate polliah	Isabelia / Chetangiella	Palaeoperidinium cretaceum	Scr. apatium / P. dasyforma	Middle jurassic spores / pollen	Indet. gonyaulacysta spp.	Wanaea acolaris	Nannoceratopsis gracilis	Dinoflagellate sp. I	Dinoflagellate sp. II	Dinoflagellate sp. III	Dinoflagellate sp. IV	Dinoflagellate sp. V	Dinoflagellate sp. VI	Microhystridium spp.	Dinoflagellate sp. VII	Mendicodinium reticulatum	Mendicodinium sp.

Not to scale				1																
1781 S	•	•																		
1782,6 C	•		•	R																
1787,6 C				•																
1789 S																				
1802 - 04	K			•																
1820,6 C				•	•															
1826 - 28				•																
1829 C						•	•													
1833 C							•													
1848 - 50						•	•													
1870 - 72				•																
1894 - 96																				
1914 - 16	K																			
1936 - 38	K						•													
1939,58 C							2	•	•	•	•	•	•	•						
1941,05 C							2		•					•						
1942,87 C							2													
1944,58 C							•			•	•									
1946,3 C														•						
1947,15 C							•													
1949,02 C							•													
1950,05 C							•													
1958,5 S							•													
1959,5 S							•	•												
1971 - 73																				
1980 S							•													
1992 - 95																				
2013 - 16							2													
2031 - 34																				
2052 - 5S							2													
2073 - 76																				
2094 - 97							2													
2115 - 18							•													
2136 - 39							•													
2157 - 60																				
2178 - 81																				
2199 - 02																				
2220 - 23							•						•							
2223 - 26							•						•							
2226 - 29							•						•							
2229 - 32																				
2235,45 C																•	•			
2241,4 C																•				
2243,5 C							•									•				
2250 - 53							•													
2271 - 74							•													
2292 - 95																				
2310 - 12																				
2331 - 34																				
2352 - 55																				
2370 - 73							•													
2375 S							•													
2390 S																				
2394 - 97							3													
2415							3													
2420 S																				
2436 - 39							3													
2440 S																				
2457 - 60							3													
2460 - 62							3										3			

R-reworked species  
 ?/cf.-uncertain affinity  
 K-contamination  
 S-sidewall  
 C-core  
 All other samples cuttings  
 1-see encl.  
 2-N,gracilis dominant  
 3-probably caved,see notes.

REMARKS	
Cretac	N. 26
? Bathon	
Bajocian	WELL FILE
Toarcian	
? Late	
Toarcian	
Pliensbach.	
? Late	
? Pliensbach.	
? Triassic	
? Unfoss. Jurassic	

