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OMRÅDE: 34/10-15

Nr.	Til	Dato	Nr.	Til	Dato
1	LET-BØ Arkiv	✓			
2	Sirk (E.U)	✓			
3.	Gullfaks V/ASH	✓			
4	N. HYDRO	✓			
5	SAGA	✓			
6	OD	✓			
7	LAB	✓			
8	UND-arkiv				

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1. INTRODUCTION

This report presents the results of the stratigraphical and paleontological study of samples from Well 34/10-15, drilled by Statoil in the North Sea (Norwegian Offshore) in 1982.

The information presented here is based on the analyses of ditch samples collected at 3m intervals between 1,450m and 2,400m. No ditch samples were available over the intervals 1,867m-1,942m, 2,170m-2,212m and 2,293m-2,321m, but core chips were available in these intervals and have been incorporated into this study.

A total of 57 samples (8 sidewall cores, 29 ditch cuttings and 20 core samples) have been analysed for palynology from the interval 1,702m-2,400m.

This report is accompanied by the Stratigraphic Log (Enclosure 1) and Palynostratigraphical Log (Enclosure 2).

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STRATIGRAPHICAL CONSULTANTS

Client Company

STATOIL

Title

WELL 34/10–15

NORWEGIAN OFFSHORE

PALEONTOLOGICAL/STRATIGRAPHICAL FINAL REPORT.

Project No.

1050

Stratigraphers

J. JACOVIDES. C. KING. J.B. KEEGAN.

R.W. MEYRICK.

MANAGING DIRECTOR: DR. V. L. ROVEDA (IT.)

Date

February, 1983.

CONTENTS.

SEDIMENTARY HISTORY©

CLIENT: STATOIL

WELL NO: 34/10-15 Norwegian offshore

FIGURE: 1 | DATE: FEBRUARY 1983

PROJECT NO: 1050 | ANALYST: J.J., C.K., J.B.K.

PALEOSERVICES
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KEY:

- Missing section
- Open marine circulation
- Restricted circulation
- Mainly coarse clastics (sand)
- Mainly fine clastics (silt, clay)
- Carbonates
- Evaporites
- Volcanics
- Transgressive unit
- Regressive unit

AGE M.Y | RELATIVE CHANGES OF SEA LEVEL* (Rise / Fall) | SERIES / STAGE | PALEO MARKERS: MICROFLORAL, MICROFAUNAL | ENVIRONMENT: CONTINENTAL, TRANSITIONAL, MARINE (SUBLITTORAL: INNER, OUTER; BATHYAL: UPPER, LOWER) | WELL DEPTH

0 PLEISTOCENE
PLIOCENE
5
MIOCENE — LATE / MIDDLE / EARLY
20
25
OLIGOCENE — LATE / EARLY
30
35
EOCENE — LATE / MIDDLE / EARLY
50
55
PALEOCENE — LATE / EARLY
60
65
MAASTRICHTIAN
70
CAMPANIAN
75
SANTONIAN
80
CONIACIAN
85
TURONIAN
90
CENOMANIAN
95
100
ALBIAN
105
APTIAN
110
115
BARREMIAN
120
HAUTERIVIAN
125
VALANGINIAN
130
BERRIASIAN / RYAZANIAN
135
PORTLANDIAN
140
KIMMERIDGIAN
145
OXFORDIAN
150
CALLOVIAN
155
BATHONIAN
160
165
BAJOCIAN
170
AALENIAN
175
TOARCIAN
180
PLIENSBACHIAN
185
SINEMURIAN
190
HETTANGIAN
195
RHAETIAN
200
NORIAN

Present sea level.

Odontochitina costata

Pseudotextularia elegans
Bolivinopsis spectabilis
Coscinodiscus sp.1
Cyclammina amplectens
Reussella szajnochae

Common Sphaeripollenites spp. and Sphaeromorph clusters
Nannoceratopsis gracilis
Parvocysta nasuta
Ovalipollis ovalis

Gammacythere ubiquita
Ogmoconchella spp.
Barren

SECTION ABOVE 1,450m NOT STUDIED

1,450m
1,510m
1,564m
1,681m
1,681m
c.1,825m

Ca. 5 m.y.s. ±

Ca 100 -105 m.y.s.

c.1,825m
DRAKE
COOK
BURTON AMUNDSEN
DUNLIN
2,209.9m

Ca 10 m.y.s. ±

2,209.9m
?BASAL STATFJORD/CORMORANT
2,400m
L.S.R.

2. SUMMARY

1. The highest sample examined in this study (1,450m-1,453m) is a claystone of Early Eocene age.

2. The section between 1,450m-1,510m comprises Early Eocene claystones, deposited in a marine, outer sublittoral to bathyal environment. These rest on tuffaceous claystones of basal Eocene-Late Paleocene age (1,510m-1,564m), representing the 'Ash Series'.

3. The Late Paleocene claystones of the Lista Formation (1,564m-1,681m) were deposited in a marine, outer sublittoral to bathyal environment. Interbeds of fine to coarse sand, which are present in the lower part of this interval (below 1,639m), are interpreted as deep water mass-gravity deposits. The Late Paleocene rests unconformably on the Late Cretaceous (Late Maastrichtian).

4. The Shetland Group is represented by Late Maastrichtian marly claystones with beds of chalky limestone, deposited in an outer sublittoral-bathyal environment influenced by open oceanic circulation, overlying Maastrichtian-Campanian claystones (1,705m-c.1,825m) with a micro-fauna dominated by agglutinating foraminiferids, deposited in a restricted outer sublittoral to bathyal environment.

   The Maastrichtian-Campanian rests unconformably on claystones of Early Jurassic (Toarcian) age at c.1,825m. The lower part of the Shetland Group, the Cromer Knoll and Humber Groups, the Brent Formation and the uppermost part of the Dunlin Formation (topmost part of the Drake unit) are absent.

5. The Dunlin Formation (c.1,825m-2,209.9m) in this well comprises part of the Drake Member, the Cook, Burton and Amundsen Members, and ranges in age from Toarcian to Early Pliensbachian. A number of the faunal and

floral markers which are used in regional correlations are recorded within this interval.

The Dunlin Formation was deposited in a marine, mainly inner sublittoral environment.

6. From personal discussions with Statoil geologists, the boundary between the Dunlin Formation and basal Statfjord?/Cormorant Formation at 2,209.9m is considered to be a brecciated fault boundary.

Sands and claystones of ?basal Statfjord/Cormorant Formations occur between 2,209.9m and 2,400m (L.S.R.). These are of ?Rhaetian age, with deposition taking place in a continental, alluvial and fluvial environment.

3. STRATIGRAPHICAL SUMMARY

Interval.		Age.	Thickness.
1,450m-	1,510m	Early Eocene	60m
1,510m-	1,564m	Basal Eocene-Late Paleocene	54m
1,546m-	1,681m	Late Paleocene	135m
---------- UNCONFORMITY ----------			
1,681m-	1,705m	Late Cretaceous; Late Maastrichtian	24m
1,705m-	c.1,825m	" " Maastrichtian-Campanian	c.120m
---------- UNCONFORMITY ----------			
c.1,825m-	1,852m	Early Jurassic; Toarcian	c.27m
1,852m-	c.1,861m	" " Early Toarcian	c.9m
c.1,861m-	c.1,945m	" " Early Toarcian-Late Pliensbachian	c.84m
c.1,945m-	2,125m	Early Jurassic; Late Pliensbachian	c.180m
2,125m-	2,209.9m	Early Jurassic; Early Pliensbachian	84.9m
---------- FAULT ----------			
2,209.9m-	2,400m	?Late Triassic; ?Rhaetian	190.1m

4. STRATIGRAPHY

4.1 1,450m-1,510m EARLY EOCENE

Lithostratigraphy:

Claystone, silty, dominantly light greenish-grey; occasional pink and brown beds. Thin beds of limestone, grey/brown, micritic; pyrite occurs commonly throughout; siderite is present throughout, becoming abundant between c.1,486m-c.1,502m.

Biostratigraphy:

Agglutinating foraminiferids occur frequently through this interval, including species of Rhabdammina, Cyclammina, Bathysiphon and Ammodiscus. The species Cyclammina amplectens is recorded throughout the section. The presence of this species, and the occurrence of common spherical reticulate radiolaria, indicates an Early Eocene date. At the base of this interval, from 1,507m-1,510m, specimens of the planktic foraminiferid Globigerina gr. linaperta are recorded, representing a planktic foraminiferid marker which is widespread in the North Sea in the Early Eocene.

Environment:

Marine, outer sublittoral to bathyal, with rather restricted circulation.

4.2 1,510m-1,681m BASAL EOCENE AND LATE PALEOCENE

Lithostratigraphy:

1,510m-1,516m Claystone, grey-green, silty.

1,516m-c.1,564m Claystone, grey, brown and buff, with abundant tuffaceous debris, coarse-grained at some levels. Occasional beds of limestone, buff and brown, micritic, argillaceous.

c.1,564m-1,639m Claystone, grey to grey-green, silty to very silty; occasional beds of limestone, light grey, argillaceous.

1,639m-1,681m Claystone, as above; sand, fine to coarse grained, subangular; beds of limestone, light grey to buff, frequent below 1,660m. Sphaerosiderite is common between c.1,670m-1,681m.

Biostratigraphy:

1,510m-1,564m Basal Eocene-Late Paleocene

This interval is characterised by the presence of pyritised and siliceous specimens of the diatom Coscinodiscus sp. 1, which are diagnostic of the basal Eocene-top Paleocene interval which usually corresponds to the 'Ash Marker' (Balder and Sele Formations). Other fossils are rare and probably caved.

1,564m-1,681m Late Paleocene

The top of this interval is defined by the downhole re-appearance of an abundant microfauna of agglutinating foraminiferids, including Bathysiphon, Rhabdammina and the characteristic large Paleocene specimens of Bolivinopsis spectabilis. This assemblage persists through the interval, with only minor variation. The diagnostic Paleocene species Trochammina aff. albertensis is recorded at 1,672m.

This assemblage is diagnositc of the Late Paleocene. Diagnostic Middle and Early Paleocene fossils are absent, indicating that the Late Paleocene rests unconformably on the Late Maastrichtian.

Environment:

The 'Ash Series' was deposited in a marine, sublittoral or bathyal environment of uncertain depth,

with tuffaceous debris derived from contemporaneous volcanism.

The underlying Late Paleocene sequence was deposited in an outer sublittoral, bathyal environment similar to the Early Eocene. The sand interbeds below 1,639m were probably deposited by mass-gravity mechanisms.

4.3 1,681m-c.1,825m LATE CRETACEOUS (Maastrichtian-Campanian)

Lithostratigraphy:

Shetland Group

Claystone, grey, calcareous; a few beds of limestone, light grey to white, chalky, near the top of the interval; passing down to less calcareous silty claystone, with thin beds of limestone, grey to buff, argillaceous. Pyrite is present throughout.

Below 1,750m sample quality is poor and there is contamination by cement.

Biostratigraphy:

1,681m-1,705m Late Maastrichtian

Microfauna: Abundant planktic and benthic foraminiferids are present throughout this interval. The top Maastrichtian is defined by the downhole appearance of abundant planktic foraminiferids, including Heterohelix spp., Pseudotextularia elegans, Racemiguembelina fructicosa, Globigerinelloides messinae and Globotruncana contusa. This assemblage is typical of the Late Maastrichtian.

Microflora: A restricted assemblage of palynomorphs is present in the one sample examined from this interval at 1,702m. No short-ranging Late Cretaceous taxa are present. The long-ranging Cretaceous to Jurassic (mainly Cenomanian-Toarcian) miospore Callialasporites dampieri is found reworked in this assemblage.

1,705m-c.1,825m Maastrichtian-Campanian

Microfauna: The top of this interval is defined by the downhole appearance of the calcareous benthic foraminiferid Reussella szajnochae. This is a regional event marker within the Late Maastrichtian.

In the upper part of this interval, planktic and calcareous benthic foraminiferids are abundant, but they become less common downhole, and below about 1,723m, long-ranging agglutinating foraminiferids are dominant. There is no specific evidence for the penetration of Campanian sediments, as diagnostic fossils are absent.

Microflora: A number of characteristic Late Cretaceous (Maastrichtian and Campanian) taxa occur downhole within this interval, including Aquilapollenites spp. (1,729m), Spongodinium delitiense (1,744m), Membranosphaera maastrichtica (1,757m) and Trithyrodinium suspectum (1,774m). The deepest sample examined from this interval (1,819m-1,822m) contains the first downhole occurrence of the dinoflagellate cyst Odontochitina costata. Regionally O. costata is taken to indicate penetration of sediments of Campanian age.

Reworked palynomorphs occur commonly within this interval, including the Cretaceous (typically Cenomanian or older) dinoflagellate cyst Cyclonepheluim compactum and the miospores

Callialasporites dampieri and Cerebropollenites mesozoicus, and the Jurassic forms Kraeuselisporites reissingeri and Lycopodiacidites rugulatus are also present.

Environment:

The section with abundant planktic and calcareous benthic foraminiferids was deposited in a well-oxygenated, outer sublittoral to bathyal environment, with open oceanic circulation. The lower part of the section, with abundant agglutinating foraminiferids, was deposited in an environment with more restricted circulation.

Remarks:

Campanian sediments rest unconformably on the Early Jurassic (Toarcian) Dunlin Formation.

4.4 c.1,825m-2,209.9m EARLY JURASSIC; Toarcian-Early Pliensbachian.

Lithostratigraphy:

Dunlin Formation:

Drake Member:

c.1,825m-1,861m Claystone, silty, dark grey, with thin beds of limestone, pyrite and glauconite common throughout.

Throughout this unit sample quality is poor and there is contamination by cement.

Cook-Burton-Amundsen Members

N.B. Ditch samples were available from 1,861m-1,867m and 1,942m-1,990m only. The interval between 1,867m-1,942m was cored, and only selected samples were available.

1,861m-1,880.8m Sand, predominantly fine grained, occasionally coarse, angular-subangular; with thin interbeds of claystone, grey, silty.

1,881m-1,884.4m Sand, as above, together with sandstone; common woody debris.

1,885.3m Sandstone, medium-fine grained, well-cemented, calcareous.

1,886.2m-1,887.1m Sandstone, fine-coarse grained, pyrite coated, angular-subangular, poorly sorted, micromicaceous.

1,888m Sand, fine grained, subangular-subrounded; with claystone,grey, silty, sandy.

1,888.9m-1,888.93m Sandstone, very fine grained, angular, silty, micaceous.

1,901.78m-1,901.80m Claystone/siltstone, grey, very silty, sandy, micromicaceous.

1,938.60m-1,938.63m Sandstone, fine grained, subangular-subrounded, micromicaceous.

1,942m-1,960m Sandstone, very fine grained? (very poor samples).

1,960m-1,990m Sandstone, very fine grained, calcareous, micaceous; pyritic, common traces of lignite.

1,990m-c.2,026m Limestone, brown, micritic, argillaceous; claystone, silty, grey.

c.2,026m-c.2,056m Sand, loose, fine-grained, subangular, well-sorted.

c.2,056m-c.2,065m Siltstone/claystone, with abundant chamositic pseudooliths, spherical/ovoid, grey-green.

c.2,065m-c.2,161m Siltstone/claystone, grey; traces of pyrite.

c.2,161m-2,170m Sandstone, very fine grained, silty; limestone, grey, argillaceous.

N.B. The interval between 2,170m-2,212m was cored, and only selected core chips were available from this interval.

2,170m-2,207.8m (core samples) Sandstone, very fine grained, silty, highly micaceous, with argillaceous streaks.

Biostratigraphy:

c.1,825m-1,852m Toarcian

Microfauna: The microfauna recorded within this interval comprises predominantly agglutinating foraminiferids. These include Ammodiscus 'incertus' (1,825m-1,852m) together with Haplophragmoides canui (1,825m-1,828m and below), Haplophragmoides kingakensis (1,834m-1,843m and below), Trochammina globigeriniformis (1,843m-1,846m), Trochammina canningensis (1,849m-1,852m) and Verneuilinoides mauritii (1,849m-1,852m). This assemblage is typical of the Toarcian part of the Drake Member.

The ostracod Camptocythere toarciana, recorded from onshore Southern England sections where it is restricted to Late-Middle Toarcian, occurs in the sample between 1,840m-1,843m.

Ostracods and foraminiferids typical regionally of the topmost part of the Drake Member are not recorded in this well.

Microflora: One sample was examined in this interval, the SWC at 1,829m. The presence of the dinoflagellate cysts Nannoceratopsis gracilis and Parvocysta nasuta, in a miospore dominated assemblage, indicates penetration of sediments of Early Bajocian (=Aalenian) to Toarcian age.

1,852m-c.1,861m Early Toarcian

Microfauna: The top of this interval is marked by the highest occurrence of the ostracod Kinkelinella intrepida, which is restricted to the Early Toarcian in onshore sections in England. The associated microfauna includes agglutinating foraminiferids also recorded from the overlying interval.

Microflora: A more diverse assemblage of dinoflagellate cysts occurs in the single sample studied from this interval at 1,852m. Nannoceratopsis gracilis and Parvocysta nasuta, Phallocysta eumekes, Facetodinium inflatum and Dapcodinium semitabulatum occur. Regionally this association is consistent with an Early Toarcian age.

c.1,861m-c.1,945m Early Toarcian-Late Pliensbachian

Microfauna: The top of this interval is defined on lithological evidence. No microfauna is recorded. This interval is dated as Early Toarcian-Late Pliensbachian because of its stratigraphic position between the overlying and underlying dated intervals.

Microflora: The highest sample from this interval, the SWC at 1,865m, contains a similar assemblage to that in the overlying interval with the dinoflagellate cysts Nannoceratopsis gracilis, Dapcodinium semitabulatum and Facetodinium inflatum occurring. This association is more characteristic of assemblages from the lower part of the Drake Member rather than the Cook Member. However, this SWC is included within the Early Toarcian-Late Pliensbachian interval on lithological evidence (see comments below). Spheripollenites spp. and Sphaeromorph clusters occur commonly at 1,881m. Their common/abundant occurrence is regionally typical of sediments of Early Toarcian age.

Long-ranging miospores dominate the assemblages from this interval, with subsidiary microplankton, of the latter acritarchs and Nannoceratopsis gracilis being most common.

Remarks:

The Cook Member, which is defined by the highest occurrence of coarse-medium/fine sand occurs at 1,861m. However, the SWC at 1,865m contains a microflora which is more typical of the lower part of the Drake Member. This may imply a discrepancy between the ditch samples and the SWC depths at this junction.

c.1,945m-2,125m Late Pliensbachian

Microfauna: The highest occurrence of the ostracod Ogmoconchella adenticulata gr. (1,945m) defines a conventional top for the Late Pliensbachian. Important regionally correlatable microfaunal markers present within this sequence are recorded as follows:-

1,987m - top Ogmoconchella aequalis (large form)

1,996m - top Gastropod level.

2,047m - top Ogmoconcha amalthei (large form)

2,059m - top Ogmoconchella transversa

2,077m - top Wicherella semiora

The occurrence of the ostracod Wicherella semiora between 2,077m and 2,119m is the lowest event recognisable in the Late Pliensbachian in this area.

Microflora: No short-ranging palynomorphs are present in the assemblages from this interval. Long-ranging Mesozoic spores and pollen dominate

the assemblages, with bisaccate pollen, Cyathidites spp.,Classopollis torosus and Chasmatosporites spp. the dominant forms present. Cerebropollenites thiergartii, which first appears downhole at 2,002m, is characteristic of Pliensbachian or older sediments. Zebrasporites interscriptus, which occurs at 2,100m,is a miospore most typical of the Hettangian but it is known occasionally to range higher. However, its appearance here may be the result of reworking.

The presence of Nannoceratopsis gracilis down to 2,122m is consistent with a Late Pliensbachian age for this interval.

2,125m-2,209.9m Early Pliensbachian

Microfauna: The highest occurrence of the ostracod Gammacythere ubiquita at 2,125m marks the top of the Early Pliensbachian. As in the overlying interval, rich and diverse ostracod and foraminiferid assemblages are recorded. The ostracod Ogmoconchella danica, which ranges from the basal Late Pliensbachian into the Late Sinemurian, is recorded from the basal part of the overlying interval and throughout this section.

An interval with small, ornamented ostracods, consistently recognised by Paleoservices in wells in block 34/10 by the top occurrence of ostracods of the genus Kinkelinella, is recorded in the core samples between 2,178.90m and 2,203.10m. This assemblage includes the ostracods Kinkelinella elongata, Gramannella cf. laevigata, Gramannella apostolescui, Cytheropteron foveolatum, Ogmoconcha amalthei amalthei and Ogmoconcha form A. This association indicates an Early Pliensbachian age.

Microflora: Long-ranging Mesozoic miospores dominate the assemblages through this interval; most of these were also recorded higher up the well.

Rare acritarchs are present in most of the core samples.

Environment:

c.1,825m-1,861m Marine, sublittoral.

1,861m-2,209.9m Marine, mainly inner sublittoral, possibly littoral within the Cook Member. These sediments were deposited in a shallow marine environment. In the Dunlin Formation the Cook 'sand' Member is interpreted as a regressive episode, while the fine sands at the base of the Amundsen Unit represent a transgressive phase.

Remarks:

Personal communications with Statoil geologists indicate that the boundary between the Dunlin Formation and the underlying basal Statfjord?/ Cormorant Formation is a brecciated fault boundary rather than an unconformity.

N.B. The top of the Basal Statfjord?/Cormorant Formation is taken at the first record of red claystones in the core samples, at 2,209.9m.

4.5 2,209.9m-2,400m (T.D.) ?LATE TRIASSIC (?Rhaetian)

Lithostratigraphy:

Basal Statfjord?/Cormorant Formation

2,209.9m-2,210.53m (core samples) Claystone, red, silty, and siltstone, red, micaceous, limestone, red.

2,212m-2,242m Sand, yellow and white, subrounded

to subangular, medium to very fine grained; traces of siltstone, red, micaceous.

2,242m-2,293m Sand, as above, with claystone, red, silty.

2,293m-2,304.96m (No samples).

2,304.96m-2,317.30m (core samples) Siltstone/very silty sandstone, very fine to fine grained, micaceous.

2,318m-c.2,354m Sand, very fine to medium grained; claystone, red, silty, micaceous.

c.2,354m-2,400m Dominantly claystone and siltstone, red, micaceous; traces of limestone, red. Some beds of sandstone, white and orange, fine to very fine grained, subangular.

Biostratigraphy:

2,209.9m-2,400m ?Rhaetian

Microfauna: Barren.

Microflora: No age-restricted taxa are present in the assemblages from this interval. All the palynomorphs present continue through from the overlying intervals.

The SWC at 2,387m, from near the base of this interval, contains only rare long-ranging spores and pollen.

The highest downhole occurrence of the pollen Ovalipollis ovalis is at 2,399m. This species is typical of the Rhaetian, although it is known to range up into the Hettangian.

Environment:

Continental, alluvial-fluvial.

Core sample descriptions

1,879m	Claystone, light grey, silty, with fine sandstone laminae, very fine grained, subangular, micaceous. (M)
1,879.9m	Sands, light grey, medium-fine grained, angular-subangular, poorly sorted, micaceous, with accessory carbonaceous material. Claystone, medium grey, silty, sandy.(M)
1,880.8m	Sands, light grey, fine-medium grained, angular-subangular, poorly sorted, micaceous. Claystone, medium grey, silty, sandy. (M)
1,881m	Sand-Sandstone, medium grey, medium-fine grained, angular-subangular matrix clayey silty, micromicaceous.(P,M)
1,884.4m	Sand-Sandstone, as above, very silty, with accessory carbonaceous material.(M)
1,885.3m	Sandstone, grey, medium-fine grained, subangular, micromicaceous, well cemented, calcareous matrix, accessory lignite-pyrite.(M)
1,886.2m	(Poor sample) Sandstone, grey, ?loosely cemented, pyrite coated, fine-coarse grained, angular-subangular, poorly sorted, micaceous, with accessory pyrite. (M)
1,887.1m	(Poor sample) Sandstone, grey, coarse-fine grained, subangular, micaceous, as above. (M)
1,888m	(Poor sample) Sand, light grey-white,predominantly fine grained, poorly micromicaceous. Claystone, grey, silty, sandy. (P,M)

Core 2

1,888.90-93m Sandstone, grey, very fine grained, angular, silty, clayey streaks, very micromicaceous. (P,M)

Core 3

1,901.78-80m (Poor sample) Claystone/Siltstone, very silty, sandy, micromicaceous. (P,M)

Core 4

1,920.20-23m (Poor sample) Claystone/Siltstone, very silty, sandy, micromicaceous. (P,M)

Core 5

1,938.60-62m (Poor sample) Sandstone, grey, very fine grained, subangular-subrounded, micromicaceous. (P,M)

Core 6

2,170.90-93m (Poor sample) Sandstone, grey, very fine grained, angular-subangular, moderately cemented, calcareous matrix, micromicaceous. (P,M)

2,174.50-53m (Poor sample) Sandstone, grey, very fine -fine grained, angular-subangular, well cemented, calcareous matrix, grey, micromicaceous. (M)

2,178.90-93m (Poor sample) Sandstone, grey, very fine grained, angular-subrounded, cemented, very micromicaceous. (M)

2,182.50-53m (Poor sample) Sandstone, light grey, very fine grained, cemented, light grey matrix, very micromicaceous. (P,M)

Core 7

2,190.16-19m	(Poor sample) Sandstone, light grey, very fine grained, cemented, light grey matrix, very micaceous-micromicaceous. (P,M)
2,194.36-40m	(Poor sample) Sandstone, light grey, very fine grained, loosely cemented, very micromicaceous. (M)
2,197.10-14m	(Poor sample) Sandstone, light grey, very fine grained, loosely cemented, very micromicaceous. (P,M)

Core 8

2,203.06.10m	(Poor sample) Sandstone, light grey, very fine grained, subangular, loosely cemented, very micromicaceous. (P,M)
2,205m	Sandstone, light grey, very fine grained, subangular, loosely cemented, non-calcareous matrix, very micromicaceous, with accessory pyrite. (P,M)
2,206.86-90m	Sandstone, light grey, very fine grained, loosely cemented, non-calcareous matrix, very micromicaceous. (P,M)
2,207.8m	Sandstone, light grey, very fine grained, loosely cemented, non-calcareous matrix, very micromicaceous. (M)
2,209.9m	Claystone, red, silty, grading to siltstone, micromicaceous. (P,M)
2,210.50-53m	Limestone, red, argillaceous, with calcite veins. (M)
2,210.7m	Claystone, red, silty, sandy, calcareous. (P,M)
2,211.2m	Claystone/Siltstone, red, very silty, sandy, non-calcareous. (P,M)

Core 9 Box 3

2,304.96m-2,305.00m Sandstone/Siltstone, red/purple, and green, very fine grained, angular, well cemented, very clayey matrix, non-calcareous, micaceous. (P,M)

Box 7

2,311.25-30m Sandstone-Siltstone, light green/ light grey, sand, fine grained, angular-subangular, well cemented, clayey matrix, non-calcareous, micaceous with carbonaceous material.(P,M)

Core 10 Box 4

2,317.25-30 Sandstone-siltstone, light green/ light grey, sand fine-grained, angular-subangular, well cemented, clayey matrix, slightly calcareous, micaceous.)P,M)

STATOIL	ANALYSTS J.J., R.W.M., C.K., J.B.K.	PROJECT No 1050	DATE FEB. 1983	ENCLOSURE No 1

WELL 34/10-15

INTERVAL 1450m.-2400m. (L.S.R.)

NORWEGIAN OFFSHORE.

STRATIGRAPHIC LOG

SCALE 1 : 500

(Metric)

PREPARED BY PALEOSERVICES
UNIT 15, SANDOWN ROAD, WATFORD WD2 4UB ENGLAND.

LEGEND

CLAY/CLAYSTONE · SANDSTONE (F M C) · LIMESTONE
SHALE · CONGLOMERATE · CHALK
MARL-CALCAREOUS SHALE · VOLCANICS LAVAS/TUFFS · DOLOMITE
SILTSTONE/SILT · UNDIFFERENTIATED BASEMENT · SALT
SAND (F M C) · NO SAMPLES · ANHYDRITE/GYPSUM
MEGAFOSSILS · G GLAUCONITE · MICA
CHERT · S SIDERITE · CORES
PYRITE · LIGNITE/COAL · SIDEWALL CORES
P.S. POOR SAMPLES

Boundary
Unconformity
T.D. (Total depth)
Partial or interrupted sequence
F.S.R. First sample received
L.S.R. Last sample received

FOSSILS AND ACCESSORY MINERALS
Abundant
Common
Rare
Abundant, Common, Rare } FOSSILS IN SIDEWALL CORES
PETROGRAPHICAL ANALYSIS

STATOIL	ANALYSTS J.B.K.	PROJECT No. 1050	DATE FEB. 1983	ENCLOSURE No 2

WELL 34/10-15

INTERVAL 1702m.-2400m. (L.S.R.)

NORWEGIAN OFFSHORE

PALYNOSTRATIGRAPHIC LOG

SCALE 1 : 500

(Metric)

PREPARED BY
PALEOSERVICES
UNIT 15, SANDOWN ROAD, WATFORD WD2 4UB ENGLAND.

LEGEND

CLAY/CLAYSTONE — SANDSTONE (F, M, C) — LIMESTONE
SHALE — CONGLOMERATE — CHALK
MARL - CALCAREOUS SHALE — VOLCANICS LAVAS/TUFFS — DOLOMITE
SILTSTONE/SILT — UNDIFFERENTIATED BASEMENT — SALT
SAND (F, M, C) — NO SAMPLES — ANHYDRITE/GYPSUM
MEGAFOSSILS — G GLAUCONITE — MICA
CHERT — S SIDERITE — CORES
PYRITE — LIGNITE/COAL — SIDEWALL CORES
P.S. POOR SAMPLES

Boundary
Unconformity
T.D. (Total depth).
Partial or interrupted sequence
F.S.E. First sample examined
L.S.R. Last sample received

FOSSILS AND ACCESSORY MINERALS
Abundant
Common
Rare
Abundant / Common / Rare — FOSSILS IN SIDEWALL CORES
* RETROGRAPHICAL ANALYSIS