

No 33
WELLFILE



PALEOSERVICES LTD.

STRATIGRAPHICAL AND PALEONTOLOGICAL CONSULTANTS

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Client Company	<u>STATOIL</u>
Title	A PALYNOSTRATIGRAPHIC STUDY OF 11 SAMPLES FROM CORE NO. 12 (1938.75m-1951.13m) OF WELL 34/10-1, NORWEGIAN OFFSHORE.
Project No.	583
Stratigraphers	<u>S. J. MORBEY.</u>
Date	January, 1979.

CONTENTSPage

1.	INTRODUCTION	1
2.	CONCLUSIONS	2
3.	STRATIGRAPHIC SUMMARY	4
4.	STRATIGRAPHY	5
	4.1 Middle Jurassic.	
	4.2 Middle - Early Jurassic.	

APPENDIX 1:	General Core and Sample descriptions (Core no. 12.).	8
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ENCLOSURES:-

1. Palynostratigraphic Log (scale 1:125)
of core no. 12 (1938.75m-1951.13m).



1. INTRODUCTION

Palynologic analyses have been undertaken on 11 samples from core no. 12 (1938.75m - 1951.13m) of the Statoil, Norwegian offshore well, 34/10-1. We gratefully acknowledge the assistance given by Statoil in allowing this material to be collected in Norway, examined, and utilised in part for the stratigraphic assessment of the adjacent 34/10-2 well (Paleoservices Project No. 600).



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2. CONCLUSIONS

2.1 Core no. 12 in the well 34/10-1 was cut in a sequence transitional in lithofacies from the Dunlin Formation at its base (1951.13m) to the Brent Formation at its top (1938.75m).

2.2 The basal core samples (1949.55m, 1951.13m) are no older than Late Toarcian, Early Jurassic in age.

2.3 The creamy-beige sandstones at the top of the core (1938.75m - 1939.15m) are probably no younger than Early Bajocian, Middle Jurassic in age and probably equivalent in lithofacies and palynofacies to the basal sandstones in core no. 2 of the Statoil well 34/10-2.

2.4 There appear to be no significant stratigraphic hiatuses within the core. The boundary between the Early and Middle Jurassic cannot be determined.

i) Fine grained, grey shaly claystones of Dunlin type at the base of the core, coarsen upwards and are replaced gradually by coarse, gritty, friable sands of basal Brent type (between 1951.13m and 1939.15m). These lithologies represent a continuous, regressive sequence of deposition of Late Toarcian to Early Bajocian (Aalenian) age.

ii) The lithologic break at 1939.15m between the friable, coarse, grained (gritty) sands/sandstones and overlying medium to fine grained, creamy-beige sandstones is considered to mark a distinct environmental change rather than a stratigraphic hiatus of stage/sub-stage significance.



- 2.5 It is difficult to compare the stratigraphic relationships at the Brent/Dunlin contact between the wells 34/10-1 and 34/10-2. The nature of the cored sequence in the 34/10-1, both in terms of age and environment (lithofacies, palynofacies), suggests that detailed correlations of the Brent/Dunlin transition in adjacent wells can only be effected with accuracy, when complimentary core material is available. The abundant caving in the well 34/10-2 of Late - Middle Jurassic (Callovian - Bathonian) lithologies and palynofloras in the ditch samples at the Brent/Dunlin contact preclude precise comparisons.
- 2.6 The junction between the Early Jurassic and Middle Jurassic in the well 34/10-1 could be arbitrarily drawn, for local correlation purposes, on dinoflagellate evidence at the transition (c. 1940.2m) from *Nannoceratopsis gracilis* (senex) morphotype dominated phytoplankton assemblages of Late Toarcian age to phytoplankton assemblages dominated by mixed morphotypes of *Nannoceratopsis gracilis*. The latter are more typically developed in the Brent Sands and probably represent a facies assemblage of Early Bajocian age. (Comparisons of *N. gracilis* morphotypes in core no. 2 of the well 34/10-2 confirm these findings. The *N. gracilis* assemblages in the sample at 3112.5m in this core are similar to the assemblages in core sample at 1939.1m in well 34/10-1).



3. STRATIGRAPHIC SUMMARY

STATOIL WELL 34/10-1

(CORE NO. 12)

<u>Interval</u>	<u>Lithology</u>	<u>Age</u>
1938.75m-1939.15m	Creamy-beige sandstones (Brent Formation)	Bajocian (?Early) (Middle Jurassic)
1939.15m-1951.13m	Coarse, gritty, friable sands (basal Brent Formation) underlain by a transitional sequence of grey shaly claystones (Dunlin Formation).	Early Bajocian (Middle Jurassic) - Late Toarcian (Early Jurassic)



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4. STRATIGRAPHY

4.1 MIDDLE JURASSIC

1938.75m - 1939.15m Bajocian (?Early)

Palynology

Two samples have been examined for their palynofloral content from the creamy-beige sandstones at the top of core no. 12,

The sample at 1939m contained a fine to fine medium grained organic residue of predominantly mixed cuticular and humic wood debris. The palynoflora in this sample is a typical Middle Jurassic, Brent-type assemblage being dominated by *Deltoidispora* spp., morphotypes. These occur in association with less common *Callialasporites* spp., *Klukisporites variegatus*, *Perinopollenites elatoides*, *Cerebropollenites mesozoicus*, *Classopollis torosus*, and *Inaperturopollenites turbatus*.

The underlying sample at 1939.1m contains a palynofacies of transitional Dunlin-Brent aspect. The presence of abundant cuticular and humic material together with a palynoflora dominated by the dinoflagellate *Nannoceratopsis gracilis*, *N. gracilis* (senex) and rare occurrences of *Quadraeculina anellaeformis*, bisaccate pollen, *P. elatoides*, *Osmundacidites - Baculatisporites* spp., *Callialasporites* spp., *C. mesozoicus*, *C. torosus*, *Leptolepidites rotundus* and *Spheripollenites - Sphaeromorph* morphotypes, suggests a Bajocian age, probably not younger than Early Bajocian (Aalenian).

The overall organic contents of the samples at 1939m and 1939.1m from the well 34/10-1 compare, as do the lithologies, favourably with the organic content of the sample at 3112.5m from core no.2 in the adjacent well 34/10-2.



Environment:

Littoral, marine, paralic with fluvio-deltaic influences.

4.2 MIDDLE - EARLY JURASSIC

1939.15m - 1951.13m Early Bajocian (Aalenian) - Late Toarcian

Palynology:

The samples at 1939.2m and 1939.85m collected from the friable, gritty sand/sand clast interval of the core are of basal Brent aspect and contain humic kerogen rich, fine to medium grained organic residues which differ from the overlying sandstones by having only insignificant quantities of cuticular material (cutinite).

The friable sandstone at 1939.2m and 1939.85m have similar phytoplankton contents to the overlying Bajocian beige sandstones (1939.1m) and directly underlying grey claystones (1940.2m). Two distinct types of the dinoflagellate species *Nannoceratopsis gracilis* occur-here called *N. gracilis* and *N. gracilis* (senex).

The occurrence of these forms, together with miospore assemblages of mixed Middle and Early Jurassic aspect, suggests that the palynofloras from samples at 1939.2m, 1939.85m and 1940.2m are probably of Early Bajocian (Aalenian) age.

Samples from 1942.35m to 1951.13m collected from grey shaly claystones/siltstones of Dunlin type, contain organic residues dominated by fine/fine medium grained, humic material. The palynofloras over this interval contain fluctuating abundances of bisaccate pollen, *Cerebropollenites mesozoicus*, *Deltoidospora* spp., *Perinopollenites elatoides*, *Lycopodiumsporites* spp., *Classopollis torosus*, and *Nannoceratopsis gracilis* (senex),



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in addition to consistent occurrences of *Quadraeculina anellaeformis*, *Stereisporites* spp., *Spheripollenites* - *Sphaeromorph* morphotypes, and *Osmundacidites* - *Baculatisporites* spp. *Nannoceratopsis gracilis* (senex) is the only morphotype of the dinoflagellate species *N. gracilis* present within the grey claystones below 1940.2m.

The occurrence of these taxa together with rare miospores more typically developed in Middle Jurassic, Brent-type facies (i.e. *Klukisporites variegatus*, *Trilites* cf. *Iygodiodes*, *Staplinisporites caminus*, and *Callialasporites* spp.) suggests, on regional evidence, Late Toarcian, Early Jurassic age.

The presence of rare miospores of Middle Jurassic aspect down to the sample at 1949.55m and the absence of marked abundances of *Spheripollenites* - *Sphaeromorph* morphotypes within the basal part of the core, suggests that sediments of Early Toarcian age are not present in core no. 12.

The boundary between the Bajocian and Toarcian (Middle/Early Jurassic) cannot be ascertained with confidence on the criteria available. There is a gradual palynologic change in core no. 12 from Early to Middle Jurassic palynofloras and palynofacies.

Environment:

Regressive, restricted marine inner sublittoral-becoming littoral with fluvio-deltaic influences.



APPENDIX 1: GENERAL CORE AND SAMPLE DESCRIPTIONS

(CORE NO. 12).

<u>Interval</u>	<u>Lithology</u>
1938.75m - 1939.15m	Sandstone, well cemented, creamy-beige, medium to finer grained. Black woody stringers and phytoclasts.
Samples at 1939.0m	Sandstone, creamy-beige.
1939.1m	Sandstone, creamy-beige.
1939.15m - 1939.7m	Sands/weakly cemented sandstones, coarse, gritty, friable. Grey claystone laminae/wedges.
Sample at 1939.2m	Sands/sandstone, friable, coarse, gritty. Thin, shaly claystone laminae.
1939.7m - 1940.0m	Sand clasts, coarse, gritty, friable, within grey claystone/siltstone matrix.
Sample at 1939.85m	Sand clast, friable, coarse, gritty. In claystone matrix.
1940.0m - 1943.3m	Claystones/siltstones, grey, shaly, intercalated with medium-fine to coarse, gritty, friable sands/sandstones.
Samples at 1940.2m	Siltstone/claystone, grey, shaly.
1942.35m	Claystone, grey.
1943.3m - 1946.85m	Claystones/siltstones, grey, shaly.
Samples at 1943.35m	Claystone, grey, (below thin coal).
1944.3m	Ferruginous, gritty, ?oolite, with soft, white (?) gypsiferous fragments.
1946.85m - 1951.13m	Claystones, grey, shaly.
Samples at 1946.85m	Claystone, grey, pyritic.
1949.55m	Claystone, grey.
1951.13m	Claystone, grey.



WELLFILE DETAILED

PALYNOSTRATIGRAPHY OF SAMPLES
SELECTED FROM CORE No. 12
OVER INTERVAL 1938.75 m - 1951.13 m.

WELL 34/10-1

STRATIGRAPHIC CORE LOG

PALEOSERVICES LIMITED,
UNIT 2, SANDOWN ROAD,
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LEGEND

- CLAYSTONE/CLAY, SANDSTONE, LIMESTONE, SHALE, CONGLOMERATE, CHALK, MARL - CALCAREOUS SHALE, VOLCANICS LAVAS/TUFFS, DOLOMITE, SILTSTONE/SILT, UNDIFFERENTIATED BASEMENT, SALT, ANHYDRITE/GYPSUM, MEGAFOSSILS, GLAUCONITE, MICA, CHERT, SIDERITE, CORES, PYRITE, LIGNITE/COAL, SIDEWALL CORES, PALYNO MORPHS, PETROGRAPHICAL ANALYSIS, POOR SAMPLES, NO SAMPLES, BOUNDARIES, FOSSILS AND ACCESSORY MINERALS, Abundant, Common, Rare, F.S.R., L.S.R.

SCALE 1:125

Table with columns: Depth (METRES), Lithology, Core sample depths, KEROGEN TYPE, ORGANIC GRAIN SIZE, PALYNO MORPHS (MIOSPORES, PHYTOPLANKTON), Significant floral events, Environment, Lithostratigraphy, Age (Stage, Subsystem). Includes a detailed stratigraphic log for Well 34/10-1 from 1938.75m to 1951.13m, showing lithology, kerogen types, and palynomorph data.