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PALEONTOLOGICAL STUDY OF THE STATOIL 34/10-7

OFFSHORE NORWAY WELL

By

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INTRODUCTION

Paleontological studies were carried out on the Statoil 34/10-7 well, from 1666m to 2250m, to verify and eventually polish up Paleoservices' interpretation.

We used slides borrowed from Paleoservices for the palynological studies and samples prepared at EPR-E for the nannofossil, foraminifer and ostracode studies. The list of the samples studied at EPR-E is given in the appendix.

Our studies support the following stratigraphic interpretation:

<u>TOP (m)</u>	<u>AGE</u>
1666	Late Maastrichtian
1702	Early Maastrichtian
1806	Early Toarcian
1834.6	Late Pliensbachian
1996	Lowermost Late Pliensbachian
2026	Early Pliensbachian
2062	Indeterminate
2250 (T.D.)	Indeterminate

STRATIGRAPHY

CRÉTACEOUS 1666m - 1804m

LATE MAASTRICHTIAN: 1666m - 1697m

Nannofossils:

The presence, at 1666m, of *Nephrolithus frequens* together with *Arkhangelskiella cymbiformis* indicates a Late Maastrichtian age. *Eiffellithus turriseiffeli*, *Kamptnerius magnificus*, *Predicosphaera cretacea*, *Micula staurophora* are the most important species present in this unit.

Foraminifera:

Pseudotextularia elegans, *Heterohelix globulosa*, *H. striata* and *Globigerinelloides multispina* are present at 1669m.

From 1678m, *Abathomphalus mayaroensis*, *Globotruncana contusa*, *G. arca*, *G. cf. bolli*, *Rugoglobigerina ex. gr. rugosa* are observed.

EARLY MAASTRICHTIAN: 1702m - 1804m

Nannofossils:

The presence of *Arkhangelskiella cymbiformis* without *Nephrolithus frequens* may suggest an Early Maastrichtian age.

From 1738m, the cuttings are poor or barren.

Foraminifera:

Globigerinelloides multispina, *Rugoglobigerina ex. gr. rugosa*, *Globotruncana havanensis* are the most important species present in this unit.

A single specimen of *Abathomphalus cf. intermedius* is observed at 1774m.

JURASSIC: 1806m - 2062m

EARLY TOARCIAN: 1806m - 1826.9m

The six sidewall core samples from the 1806 to 1818m interval are characterized by the presence of numerous small sphaeromorphs (*Inaperturopollenites* spp.). As noted in our report on the 34/10-5 well (EPR-E.Wall.80) (p. 5), similar abundances of *Inaperturopollenites* spp. are known to occur in the Early Toarcian. *Nannoceratopsis senex* and *N. gracilis* sbsp. A are abundant in the sidewall cores from 1813.25m, 1815m and 1818m. *Mancodinium semitabulatum* is also present in several samples from this interval.

LATE PLIENSBACHIAN: 1834.6m - 1987m

The top of the Late Pliensbachian is placed at 1834.6m, where *Luehndea spinosa* has its top occurrence. From 1834.6m to 1890m, this dinoflagellate marker species occurs in each of the nine core or sidewall core samples available. In the upper part of the Late Pliensbachian interval, *Nannoceratopsis senex* is more abundant than *N. gracilis*. A similar relative dominance of *Nannoceratopsis senex* over *N. gracilis* in the upper part of the Late Pliensbachian, has also been observed in the 34/10-4 and 34/10-5 wells. No representative of the genus *Nannoceratopsis* has been observed below 1986m. As observed in the 34/10-4 and 34/10-5 wells, marine microplankton is relatively common in the upper part of the Late Pliensbachian, but relatively scarce in the lower part of this horizon.

Among the terrestrial palynomorphs, the upper part of the Late Pliensbachian is characterized by the common occurrence of *Chasmatosporites* spp.

Among the Late Pliensbachian ostracodes, *Ogmoconchella* ex. gr. *adenticulata* seems to have its top occurrence at 1882m, *O. aequalis* at 1912m, *Ogmoconcha* gr. *amalthei* at 1960m.

EARLIEST LATE PLIENSBACHIAN: 1996m - 2017m

The ostracode marker species *Whichearella semiora* occurs at 1996m. This species is known to be restricted to the lowermost part of the Late Pliensbachian (lower part of the *A. margaritatus* zone).

EARLY PLIENSBACHIAN - SINEMURIAN: 2026m - 2062m

The Early Pliensbachian age proposed for the upper part of this interval is based on the top occurrence of the ostracode marker *Gammacythere ubiquita* at 2026m and confirmed by the occurrence of the ostracode *Ogmoconchella* cf. *danica* at 2044m.

At 2062m, marine microplankton is completely lacking, but the terrestrial palynomorphs include *Cerebropollenites mesozoicus*, suggesting an age not older than Sinemurian. A specimen of *Ovalipollis ovalis* identified at 2050m is considered to be reworked.

Below 2062m, the three sidewall core samples available contain only a few non-significant palynomorphs, which, moreover, could be the result of mud contamination. The cutting samples seems to contain mainly, or exclusively, caved palynomorphs and must be considered as useless. Paleontological data do not permit, therefore, to date the interval between 2062m and 2250m (T.D.).

COMPARISONS BETWEEN EPR-E AND PALEOSERVICES

BIOSTRATIGRAPHIC INTERPRETATION ON STATOIL 34/10-7

(See attached paleolog)

CRETACEOUS

EPR-E agrees with Paleoservices in attributing the first sample we examined, at 1666m, to the Late Maastrichtian.

Paleoservices places the upper limit of its Maastrichtian - ?Campanian unit at 1693m, based on the first downhole occurrence of *Reussella szajnochae*. We prefer, however, to place the top of our Early Maastrichtian at 1702m, where *Arkhangelskiella cymbiformis* is present, but *Nephrolithus frequens* absent.

JURASSIC

We agree with Paleoservices in placing the top of the Jurassic at 1806m and attribute this first Jurassic horizon to the Early Toarcian.

There is also a good agreement on the top of the Late Pliensbachian, despite the different criteria used: our limit is based on the top occurrence of the dinoflagellate *Luehndea spinosa*, apparently not identified by Paleoservices, while Paleoservices uses the top occurrence of the ostracode genus *Ogmoconchella*. It should also be noted that Paleoservices does not recognize the dinoflagellate species *Nannoceratopsis senex*, probably including it within their *N. gracilis*. On the other hand, Paleoservices recognizes the ostracode marker *Whicherella semiora*, but does not use it to define a separate horizon.

Paleoservices and EPR-E both place the top of the Early Pliensbachian at the same depth based on the same criterium: the top occurrence of *Gammacythere ubiquita*; the three meters' difference is due to the sample selection. We identified *Ogmoconchella danica* at 2044m, whereas Paleoservices considered it to be absent.

We also support Paleoservices in attributing an age not older than Sinemurian to the sample at 2062m in which *Cerebropollenites mesozoicus* is present. We do not support, however, the very tentative identification of *Ovalipollis ovalis* at 2083m. We have observed *Ovalipollis ovalis* at 2250m, where it is obviously reworked.

APPENDIX

LIST OF SAMPLES STUDIED FOR PALYNOLOGY

(slides loaned by Paleoservices)

	<u>DEPTH (m)</u>		<u>DEPTH (m)</u>
SWC	1806	SWC	1975
"	1808	"	1986
"	1810	Cutt.	2011-17
Core	1813.25	SWC	2021.5
"	1815	"	2031
"	1818	"	2041
"	1826.9	"	2050
"	1834.6	"	2053
"	1838.85	Cutt.	2050-56
"	1844.50	SWC	2058
"	1857.25	"	2062
"	1860.9	Cutt.	2065-71
SWC	1870	SWC	2083
Core	1876.7	Cutt.	2080-86
SWC	1885	"	2098-104
"	1890	"	2110-16
"	1900	"	2125-31
"	1910	"	2140-46
"	1925	"	2158-64
"	1930	SWC	2173.5
"	1935	Cutt.	2170-76
Core	1942	SWC	2184.4
"	1948	Cutt.	2185-91
SWC	1954	"	2200-06
"	1960	"	2215-21
"	1965	"	2230-36
		"	2245-50

LIST OF SAMPLES STUDIED FOR MICROPALAEONTOLOGY

(Processed at EPR-E)

(M: Foraminifer and/or Ostracode, C: Coccolith)

	<u>DEPTH (m)</u>			<u>DEPTH (m)</u>	
Cutt.	1666	M-C	Cutt.	1849	M
"	1669	M-C	"	1864	M
"	1672	C	"	1873	M
"	1678	M-C	"	1882	M
"	1687	M-C	"	1891	M
"	1697	C	"	1900	M
"	1702	C	"	1912	M
"	1708	M-C	"	1921	M
"	1717	C	"	1930	M
"	1726	M-C	"	1939	M
"	1738	C	"	1951	M
"	1747	M-C	"	1960	M
"	1756	C	"	1969	M
"	1768	M-C	"	1978	M
"	1774	M	"	1987	M
"	1777	C	"	1996	M
"	1789	M-C	"	2008	M
"	1795	C	"	2017	M
"	1804	M-C	"	2026	M
"	1810	M	"	2035	M
"	1819	M	"	2044	M
"	1828	M	"	2053	M
"	1840	M	"	2062	M

STATOIL 34/10-7

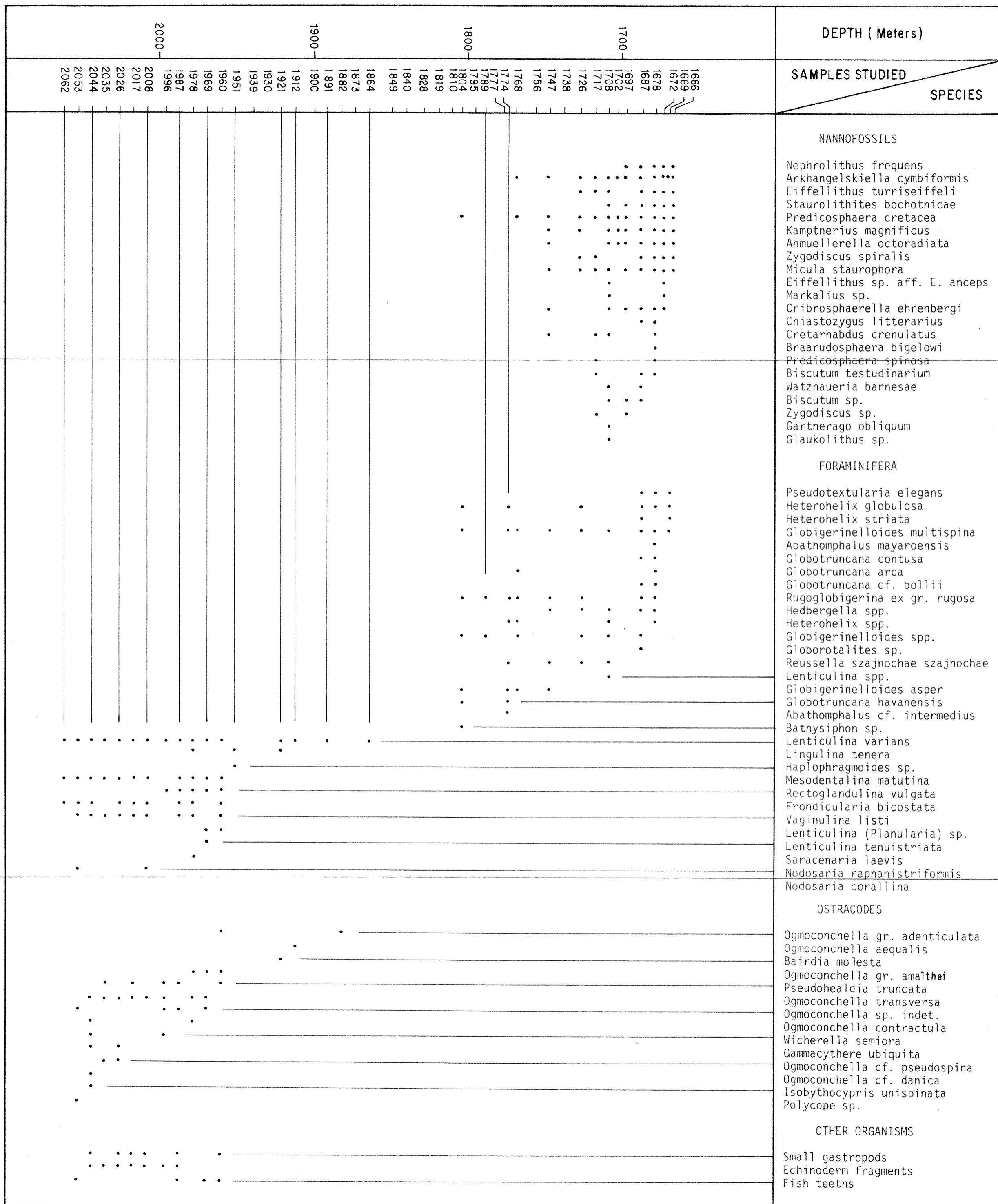
LOG 1

SCALE : 1/2000

PREPARED BY M.E. MILLIoud, J.P. COLIN, M. PONS
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EPR-E PROPRIETARY

METERS	EPR - E	PALEOSERVICES	REMARKS
			<i>Nephrolithus frequens, Arkhangelskiella cymbiformis</i>
	1666	1666	1666
	LATE MAASTRICHTIAN	LATE MAASTRICHTIAN	1669 <i>Pseudotextularia elegans, Heterohelix globulosa, H. striata</i>
1700	1702	1693	1702 <i>Arkhangelskiella cymbiformis</i> without <i>Nephrolithus frequens</i>
	EARLY MAASTRICHTIAN	MAASTRICHTIAN	
		—	
		? CAMPANIAN	1774 <i>Abathomphalus cf. intermedius</i>
1800	1806	1806	1804 <i>Globotruncana havanensis</i> 1806 <i>Nannoceratopsis gracilis</i>
	EARLY TOARCIAN	EARLY TOARCIAN	1810 } <i>Sphaeromorphs dominant</i> 1813.3 } 1815 }
	1834.6	LATE PLIENSBACHIAN	1834.6 <i>Top Luehndea spinosa</i>
		1837	
1900	LATE PLIENSBACHIAN	LATE PLIENSBACHIAN	1882 <i>Ogmoconchella gr. adenticulata</i> 1890 <i>Base Luehndea spinosa</i>
			1912 <i>Ogmoconchella aequalis</i>
			1960 <i>Ogmoconcha gr. amalthei</i>
2000	1996		1986 <i>Base Nannoceratopsis senex</i> 1996 <i>Wicherella semiora</i>
	lowermost LATE PLIENSBACHIAN		
	2026	2023	2026 <i>Gammacythere ubiquita</i>
	EARLY PLIENSBACHIAN	EARLY PLIENSBACHIAN	
	SINEMURIAN		
	2062	2053	2062 <i>Base Cerebropollenites mesozoicus</i>
		2062	
		SINEMURIAN	



DISTRIBUTION CHART OF CALCAREOUS MICROFOSSILS IN 34/10-7

Prepared by J.P. COLIN and M. PONS EPR-E (Bordeaux) October 1980

