DANMARKS OG GRØNLANDS GEOLOGISKE UNDERSØGELSE RAPPORT 1997/99

Nannofloral analysis of the Lower Cretaceous of the Deep Adda-1 well

- a contribution to the EFP-93 project: Lower and Upper Cretaceous stratigraphy in the Central Trough

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Appendix 1

1. Introduction

As part of the EFP-93 Cretaceous Stratigraphy Project, nannofossil analysis of the cored interval from the Lower Cretaceous (Tuxen/Valhall Formations) of the Deep Adda-1 well was undertaken. A stratigraphic subdivision has been produced and is presented in this report.

The chronostratigraphic subdivision of the Lower Cretaceous that has been established from the material analysed in the EFP93 project and on both published and confidential proprietary schemes from the North Sea and adjacent areas is included in this report (Figures 1 & 2) and as a fully described scheme in a separate section of the EFP93 report.

1.1 Materials and methods

Core samples were collected using normal techniques appropriate to the discipline involved. In the case of nannofossils, this required stringent precautions to avoid contamination from sample to sample. Implements used to take samples were cleaned with mild acid before a new sample was taken.

The nannofossil samples were prepared by smear technique. That is, the samples were crushed and put into solution with distilled water in a test tube. This was physically agitated and left to stand for ten seconds to allow the larger fragments to fall out of suspension. A small amount of the dissolved material was removed from the top 1 cm of solution by use of a dropper pipette. The sediment solution was then spread on a cover slip and left to dry. When it had dried, the cover slip was set onto a standard thickness microscope slide with an epoxy resin (Norland Optical Adhesive) and set under ultra violet light. At all stages, precautions to avoid contamination were taken. Nannofossils are small enough to be transported in the air around a room so a positive pressure environment would be desirable. Unfortunately, this was not available for this project.

Number of samples analysed: Nannofossil: 15

A full sample list is given in Appendix 1. Preparations for this project are catalogued and stored in the GEUS laboratory.

2. Biostratigraphic summary

All depths quoted are in feet and inches and are measured depth from rotary table (MDRT). The stratigraphic distribution of micro and nannofossils are summarised in Summary Chart 1.

2.1 Compiled biostratigraphy: Deep Adda-1 well

INTERVAL AGE	NANNOZONE	DEPTH	COMBINED ZONE
Middle to Lower Barremian (top not seen)	o	8025.26'	TX5
Lower Barremian	p	8027.55'	TX6
	r-s	8030.16'	TX8-9
	t	8030.90'	TX11
Upper Hauterivian	y1-2	8038.90'	TX15
?lowest Lower Valanginian	?g3	8054.50'	?VH7c
Lowest Lower Valanginian	g3	8061.50'	VH7c
Upper Ryazanian (base not seen)	d	8073.90'	VH8

Last sample examined at 8080.77'

2.2 Biostratigraphic description

Deep Adda-1 well: Nannofossils

8025.26' (first sample examined) - 8027.55': Middle to Lower Barremian

Two samples were analysed at 8025.26'. The lithology consisted of a dark grey chalky claystone matrix with lighter grey chalky claystone 'floating' clasts. Analysis of both the lithologies provided evidence to the origin and history behind the formation of the lithology.

8025.26' (matrix)

The sample was dominated by super abundant *Watznaueria bamesae*. The associated nannoflora included very common *Cyclagelosphaera margarelii* and very common *Micrantholithus obtusus*. More stratigraphically useful species included *Tegumentum octiformis* , *Assipetra infracretacea, Staurolithites crux* and *Nannoconus abundans.* This association suggests that the sample matrix is no older than Middle to Lower Barremian, although based on the stratigraphic position of the zone in relation to the Munk Marl, it is more probably of Middle Barremian age (Crux, 1989).

8025.26' (clast)

The nannoflora recovered from the clast at this depth was distinct from that extracted from the matrix. The nannoflora was dominated by super abundant *W. barnesae* and *A. infracretacea*. In addition, *Micrantholithus hoschultzii* and *Rhagodiscus asper* were very common. The occurrence of very common *M.hoschulzii* is significant as it was seen in the analysis of the Valdemar-2 and North Jens-1 wells that this species of *Micrantholithus* became dominant in the Lower Barremian and Upper Hauterivian.

8027.55' - 8038.90': Lower Barremian

The presence of *Crucibiscutum salebrosus* in the sample at 8027.55' indicates Lower Barremian age at that depth. This is supported by the occurrence of a single specimen of

Tegulalithus septentrionalis at 8030.90'. As in the overlying interval, the nannofloras were dominated by super abundant W. barnesae. The high organic content and reduction in nannofloral diversity and abundance of samples at 8030.16' and 8030.90' suggests that this may be a Munk Marl equivalent and therefore Lower Barremian in age.

At 8035.20', clasts were noted in the lithology and therefore two samples were analysed, one from the matrix and the other representative of the clasts. The matrix sample contained *Lithraphidites bollii* which is indicative of Lower Barremian age. The clast sample contained a very poor nannoflora which was overgrown and recrystallised. No significant age diagnostic species were recorded and therefore no valid estimation of the age difference between clast and matrix could be made.

At 8037.00', *M. hoschulzii* was super abundant and this event can probably be correlated with the similar event just below the Munk Marl in North Jens-1 well at 7565.33'.

8038.90' - 8054.50': Upper Hauterivian

The incoming of common *T.septentrionalis* at 8038.90' suggests that the Late Hauterivian has been reached, There is also a reduction in diversity but *W.bamesae* is still super abundant. nannofloras in this interval were overgrown and damaged.

8054.50' - 8061.50' : ?lowest Lower Valanginian

The dominance of the *Watznaueria communis* together with a general reduction in nannofossil diversity and abundance suggests that the lowest part of the Lower Valanginian has been reached. The evidence is not strong but the nannoflora in the underlying interval has positive indications of that age and therefore this interval is tentatively assigned to lowest Lower Valanginian

8061.50' - 8073.90': lowest Lower Valanginian

The occurrence of *Triquetrorhabdulus*(?) *shetlandensis* together with *Nannoconus concavus, Nannoconus quadratus* and common *Rotelapilla laffitei* at 8061.50' is suggestive of lowest Lower Valanginian age. The accompanying nannoflora at this depth was moderately diverse and dominated by *Watznaueria communis* and *W. barnesae*.

8073.90' - 8080.77' (last sample examined): Upper Ryazanian

The occurrence of *N. concavus* without the accompanying *T.*(?) *shetlandensis* together with an increase in the abundance of *Watznaueria* spp. indicates that the Upper Ryazanian has been reached. Nannofloral assemblages were notably reduced in diversity in this interval. At 8080.77', *C.margarelii* was super abundant as were the species of *Watznaueria*.

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Enclosures

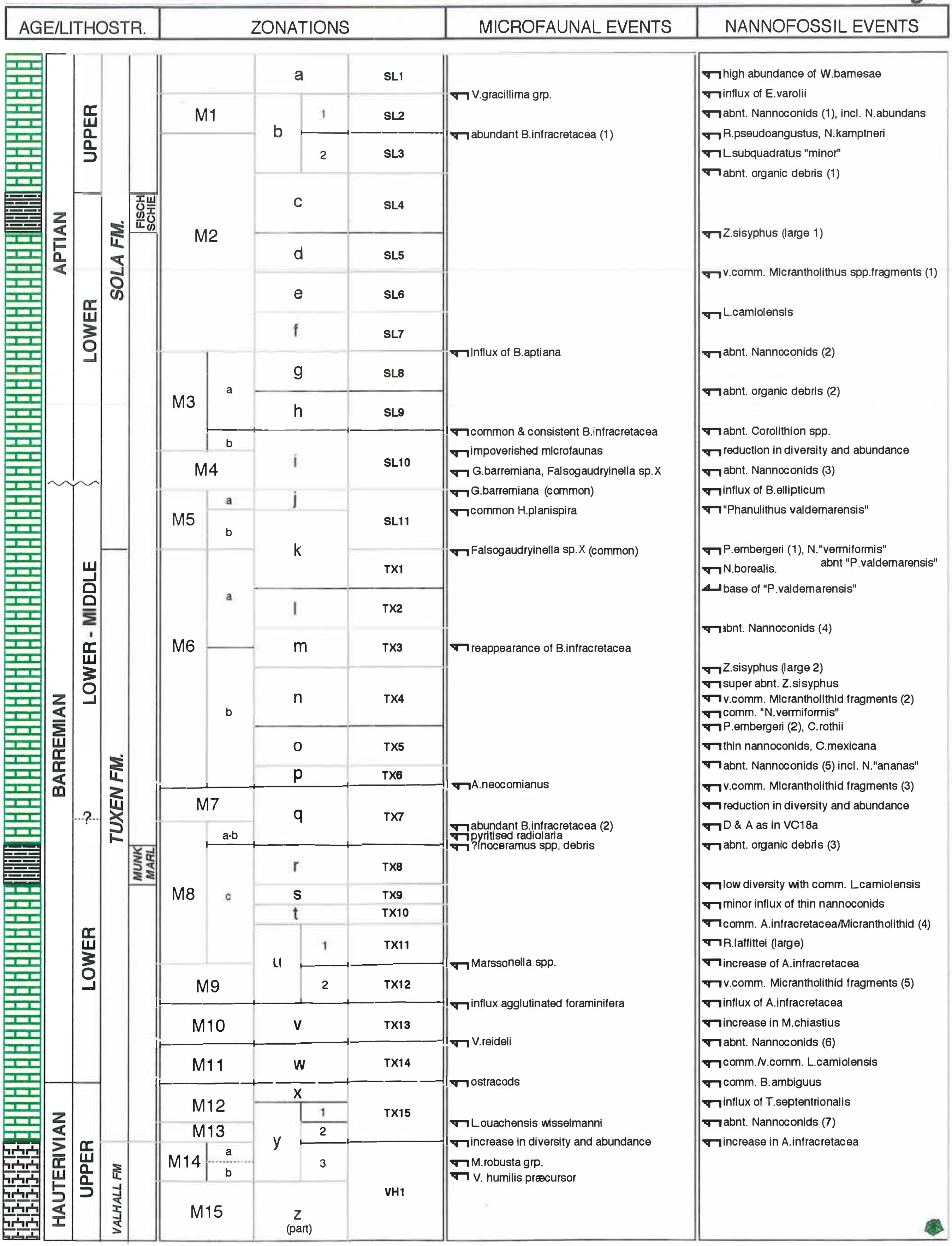
Figs 1 & 2, and Summary Sheet 1

EFP 93

LOWER APTIAN TO HAUTERIVIAN BIOSTRATIGRAPHIC ZONATION

(Based on data from North Jens-1 and Valdemar-2 wells)

Fig.1



EFP 93

HAUTERIVIAN TO RYAZANIAN BIOSTRATIGRAPHIC ZONATION

MAY 1997

AGE/LITHOSTR.			ZONATIONS: microfauna	nannofossil	combined	MICROFAUNAL EVENTS	NANNOFOSSIL EVENTS
HAUTERIVIAN	UPPER	TUX.	M12	x	TX15		influx of T.septentrionalis
HAUTERIVIAN	UPPER	TUX.	M12	y 1	TX15	L.ouachensis wisselmanni	abnt. Nannoconids (7)
HAUTERIVIAN	UPPER	TUX.	M13	y 2	TX15		
HAUTERIVIAN	UPPER	VALHALL FM.	M14	y 3	VH1	incr. in diversity and abundance: D.macfadyeni; M.robusta grp.; V. humilis præcursor	incr.in A.infracretacea C.cuvillierii, S.colligata
HAUTERIVIAN	UPPER	VALHALL FM.	M15	z	VH1		
HAUTERIVIAN	LOWER	VALHALL FM.	M16	z	VH2	L.nodosa, P.superba, incr. P.mandelstami abundant T.bettenstædti	T.(?) shetlandensis
HAUTERIVIAN	LOWER	VALHALL FM.	M17	α	VH3	influx of radiolaria	C.silvaradlon, comm. C.margarelii T.stradneri
HAUTERIVIAN	LOWER	VALHALL FM.	M18	α	VH4	G.neocomiensis (sensu Sliter), H.inconstans gracile, influx G.hannoverana	
HAUTERIVIAN	LOWER	VALHALL FM.	M19	α	VH5	A.cellensis	
VALANGINIAN	UPPER	VALHALL FM.	M20	β 1	VH6 a	agglt. influx: Glomospira spp., B.clavellata; E.tenuicostata, A.eocretaceus	v comm. D.lehmanni & C.achylosum R.wisei, N.steinmanni minor
VALANGINIAN	UPPER	VALHALL FM.	M20	β 2	VH6 b		abnt C.achylosum, N.steinmanni minor; M.speetonensis, T.gabalus
VALANGINIAN	UPPER	VALHALL FM.	M20	β 3	VH6 c		N.dolomiticus, D.rectus
VALANGINIAN	LOWER	VALHALL FM.	M21	γ 1	VH7 a	B.loeblichi, M.valdensis, C.valdensis F.wolburgi	abnt C.salebrosus. comm. Sollasites spp.
VALANGINIAN	LOWER	VALHALL FM.	M21	γ 2	VH7 b		K.borealis; K.borealis (small)
VALANGINIAN	LOWER	VALHALL FM.	M21	γ 3	VH7 c		K.curvata, N.concavus
RYAZANIAN	UPPER	VALHALL FM.	M22	δ	VH8	incr. B.loeblichi, Trocholina spp.	S.arcuatus; T.(?) shetlandensis
RYAZANIAN	UPPER	VALHALL FM.	M22	ε	VH8		S.arcuatus, abnt R.asper
RYAZANIAN	LOWER	FARSUND FM.	M23	ε	F1	Tricolocapsa sp.1 & sp.2, P.jonesi H.calloviensis	
VOLG.	UPPER	FARSUND FM.				Præconocaryomma(?) sp.2 (Dyer & Copestake) comm. S.devorata	

Fig.2

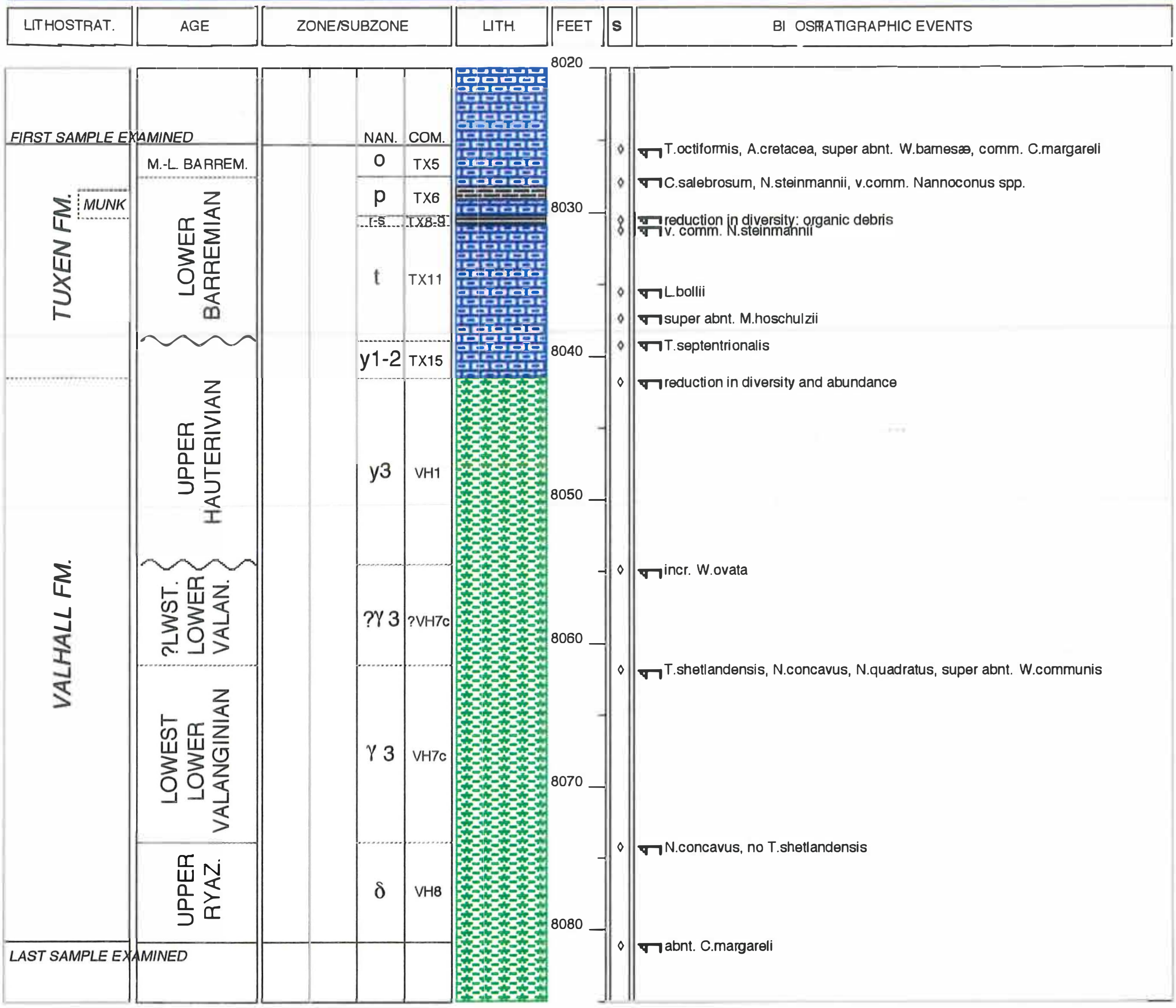
GEUS

BIOSTRATIGRAPHIC SUMMARY SHEET

1

EFP 93

Well: DEEP ADDA-1
Operator: MÆRSK OLIE OG GAS
Country: OFFSHORE DENMARK
Analyst(s): D. JUTSON
Date: JULY 1996



Appendix 1

Samples Analysed for Micro/nannopaleontology

Deep Adda-1

Nannofossils

8025.26' (2)
8027.55'
8030.16'
8030.90'
8035.16' (2)
8037.00
8038.90'
8041.45' (2)
8054.50'
8061.50'
8073.90'
8080.77

Total number of samples: Nannofossils 15

N.B. all samples are conventional core samples