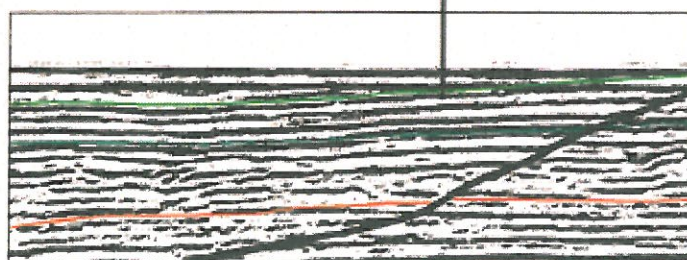
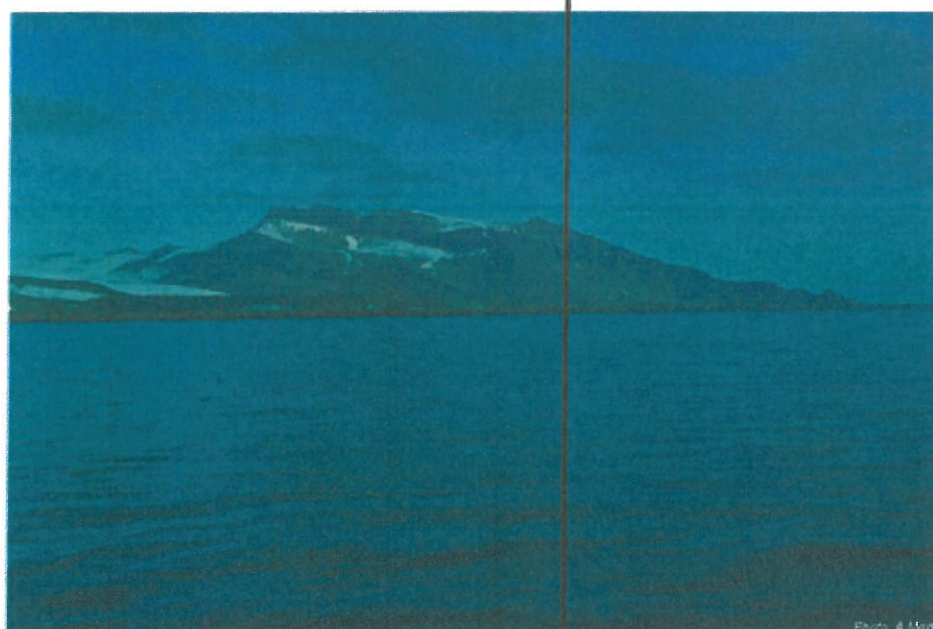
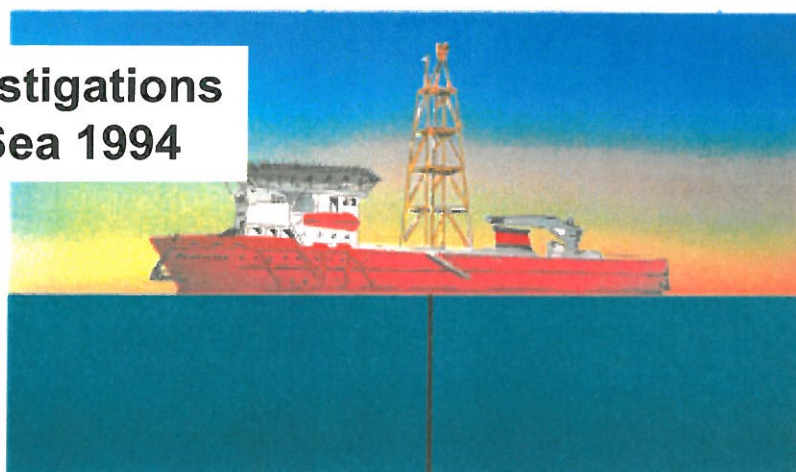


Geological investigations North Barents Sea 1994

Nordflaket



Core 7418/01-U-01

SEDIMENTOLOGY

Core data:

Quaternary overburden:	7.5m
API-drilling in bedrock:	1.9m
Total depth below seafloor:	126.15m
Core recovery:	113.3m

Two hammer-samples with fragments from the local bedrock were sampled, no samples were taken of the local Quaternary moraine. The corehole was logged by gamma, density, neutronporosity, sonic, dipmeter, resistivity and caliper.

This Late Paleocene and Early to Middle Eocene cored section exhibits a range of depositional facies with dark grey, moderately bioturbated, silty claystones (muddy shelf), brown grey, moderately bioturbated claystones (basin floor) and grey, intensely bioturbated, silty very fine grained sandstones (distal lower shoreface/transition zone). The trace fossils occur in the *Cruziana*, *Nereites* and *Zoophycos* ichnofacies: Although the ranges of the micropaleontological zones suggest that the change from Late Palaeocene to Early and Middle Eocene is uncertain; the core observations do suggest that there were a series of major breaks in sedimentation at 121.5, 89.2, 70.7 and 36.2 m respectively.

The core is subdivided into three lithological units. The gamma log pattern also shows three faint sequences which support the subdivision.

UNIT A 126.2 (TD) - 89.05m

This unit is dominated by alternating grey and darker grey laminated to moderate bioturbated (BI=3-4) silty claystones. Lenticular bedding in the form of thin light grey silt- to very finegrained sandstone lenses (generally 2-4 cm long, 1-10 mm thick) (Plate XX)) occur throughout the whole unit. At 119.2m, 121.25m og 108m some thin polymictic intervalls with matrixsupported lithoclasts consisting of well-rounded light grey sandstone-pebbles and dark grey mudclasts and subangular olive green volcanic clasts occur (bilde XX). MPS is 0.5x1cm in the lowermost interval and 0.2x0.5cm in the upper. The boundaries between these intervals are diffuse.

Two fine- to mediumgrained low bioturbated (BI=2) sandstonebeds with sharp lower and upper boundaries occur at 100.3m (Plate 100.3m). The beds show lowangled crosstratification and contain pyrite and small scattered coalfragments.

The bioturbation is generally moderate (BI=3-4) and dominated by *Phycosiphon* (to størrelser), *Scolicia*, *Skolithos*, *Chondrites*, *Planolithes* and *Schaubcyldrihnus* (plate 2C). A zone of large *?Teichichnus* burrows with sandstone infill marks a firmground colonisation (Plate 2D) and is associated with scattered lithic and volcanic clasts (119.0-121.5m). This colonisation marks a depositional hiatus. The presence of a low diversity (2-3) deposit-feeding community reflects possible low to variable oxygen levels (periodic anoxia) on a muddy shelf.

94.8m, 99.5m, 100.3m, 110.9m, 119.2m, 121.25m, 124.4m.

Unit B 89.15m - 70m

This unit consists of grey weakly laminated to intensively bioturbated (BI=5-6) fine- to very fine grained silty sandstone with an overall fining upward and silting upward cycle. Some 1-2cm thick light grey fine grained sandstone beds are interfingering and represent high energetic episodes. The lower surface (Plate 2B) and upper surface (Plate 1B) of this unit are defined by abundant lithic clasts (non-bored pebbles) and volcanic fragments casting a firmground colonisation by *Thalassinoides*. The lower surface have erosional base and consists of a clast-supported polymict inverse graded conglomerate. Well-rounded grey sandstone pebbles, light brown clayclasts and olive green volcanic clasts make up the conglomerate. The biggest clast is represented by a lithoclast of 2x6cm, MP 1x1cm. The clasts in the upper surface are matrix-supported. The lower surface records a major shallowing event and could also be an angular unconformity (?Late Paleocene to Early Eocene). The top surface is a major transgressive surface, marked by clasts and a firmground, colonisation by *Teichichnus* and also could be an angular unconformity (?Late Paleocene to Early Eocene).

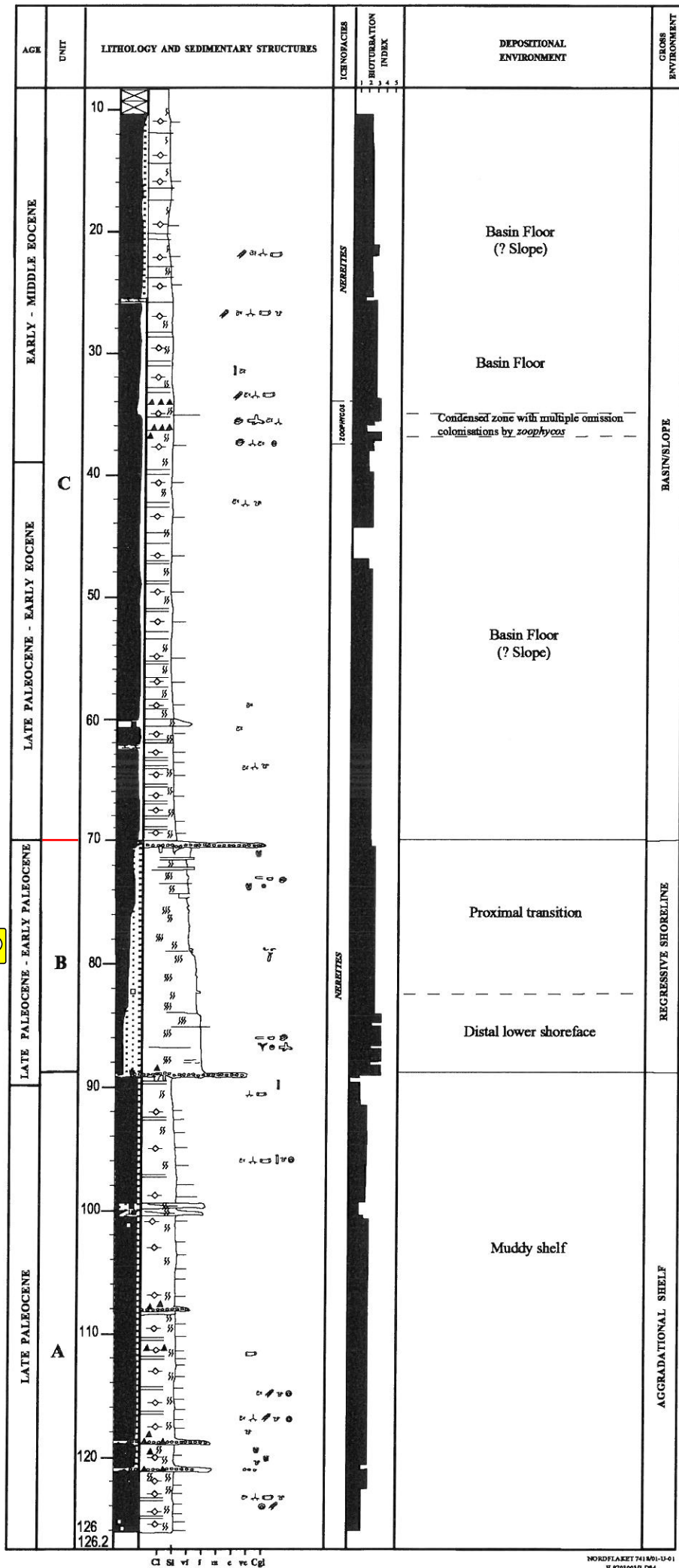
The bioturbation consists of *Planolites*, *Chondrites*, *Rosselia*, *Teichichnus*, *Schaubcylindrichnus*, *Phycosiphon*, faecal pellets, bivalve burrows, *Palaeophycus* and *Scolithos* (Plate 1D, 2A, 2B). The high diversity (5-7) and the nature of colonisation with both deposit-feeding (fairweather) and suspension-feeding (storm) communities plus lack of sedimentary structures define an overall deepening upward trend of distal lower shoreface to proximal transition zone facies (cf. Vossler & Pemberton, 1988, Frey 1990).

Bilder: 70.6m, 77.6 m, 87.3m, 89.2m.

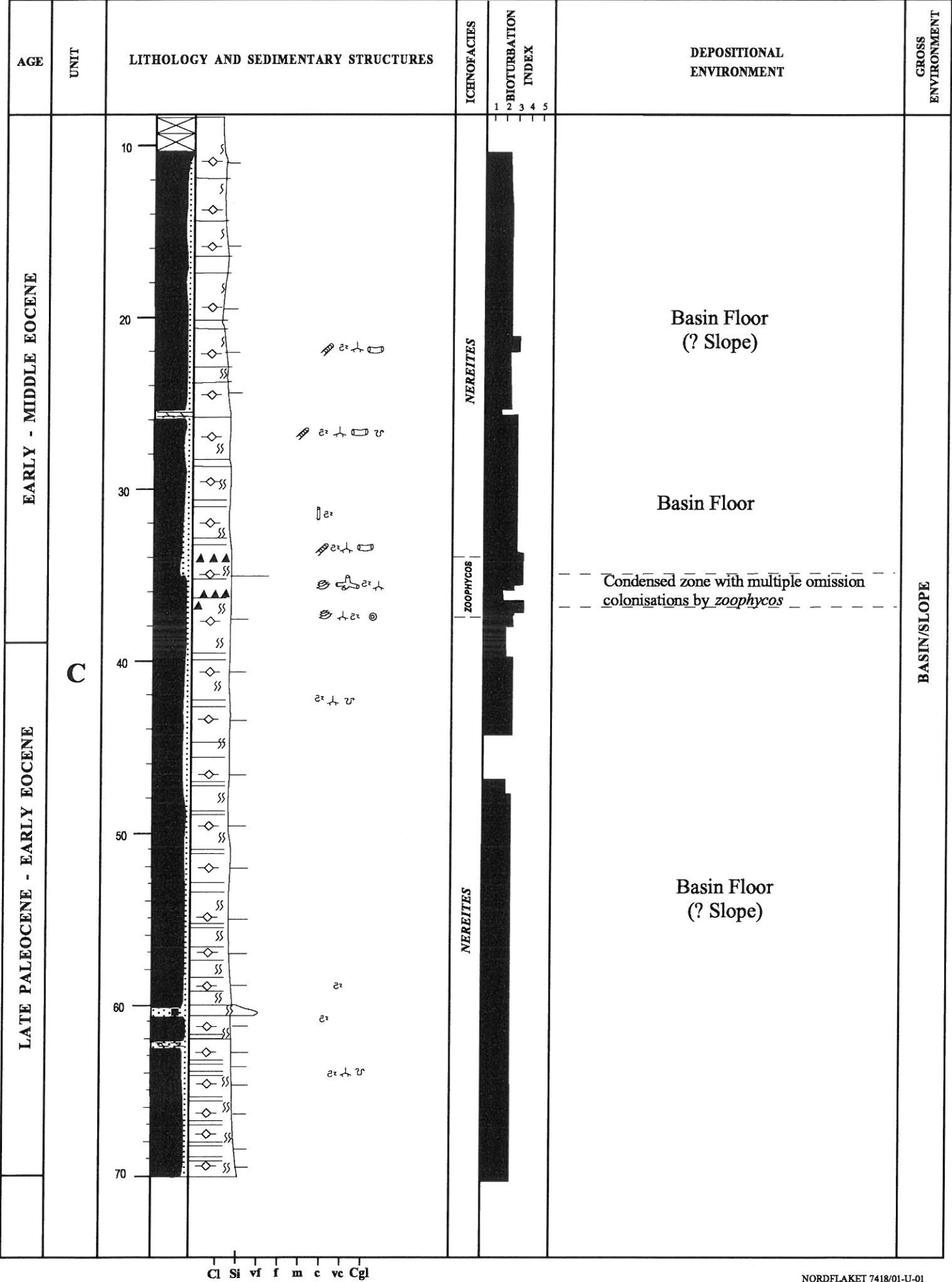
UNIT C 70 m - 8.40m-(top)

This unit consists of grey to dark grey claystones and silty claystones with thin sand- to siltstone lenses. The claystones occur with intermixing grey and thin darker grey layers with diffuse transitions between the layers. The dark grey stringers are slightly more clayey than the lighter grey silty claystones. Sideritic concretions/layers occur with some subvertical calcite-filled fractures (0.5-1mm thick) and with a high pyrite and mica content. The unit records an overall laminated to moderately bioturbated (BI=3-4) expression with *Chondrites*, *Phycosiphon* (2 sizes), *Schaubcylindrichnus*, *Scolizia* and *Thalassinoides* (Plates 1A-C). This is cross cut by a zone of large *Zoophycos* burrows which are infilled by lithic and volcanic clasts (34.0-37.0m: Plate 1B). This colonization may indicate a condensed section. The presence of a low diversity (2-3) tiered, deposit-feeding community could reflect either soupground conditions (compacted and sheared bioturbate texture: Plate 1C) or that low to variable oxygen levels controlled colonisation on a muddy basin floor.

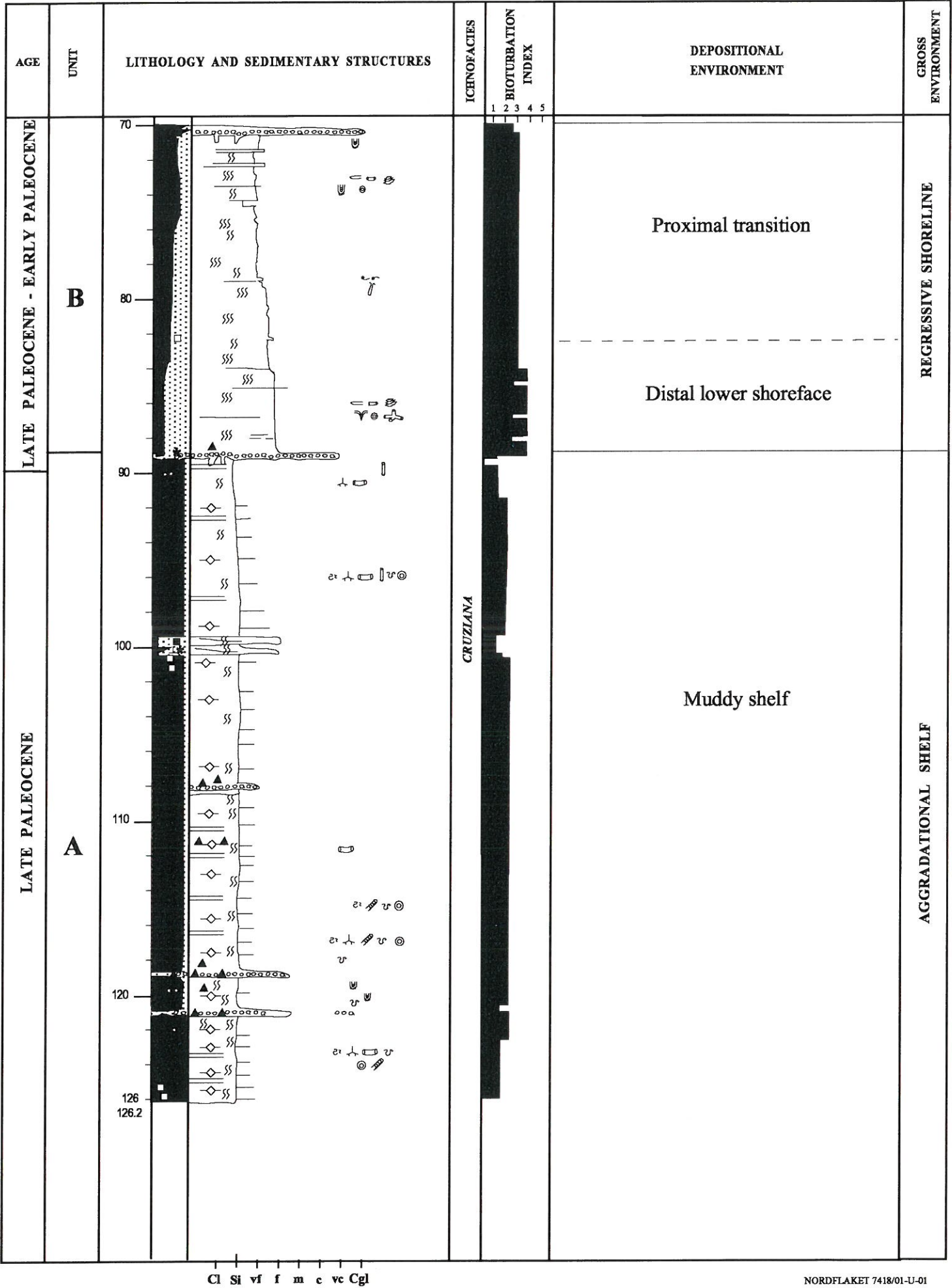
Bilder: 23.5m, 34.8m, 36.3m, 56.5m, 60.6 m, 61.2m.



WELL 7418/01-U-01



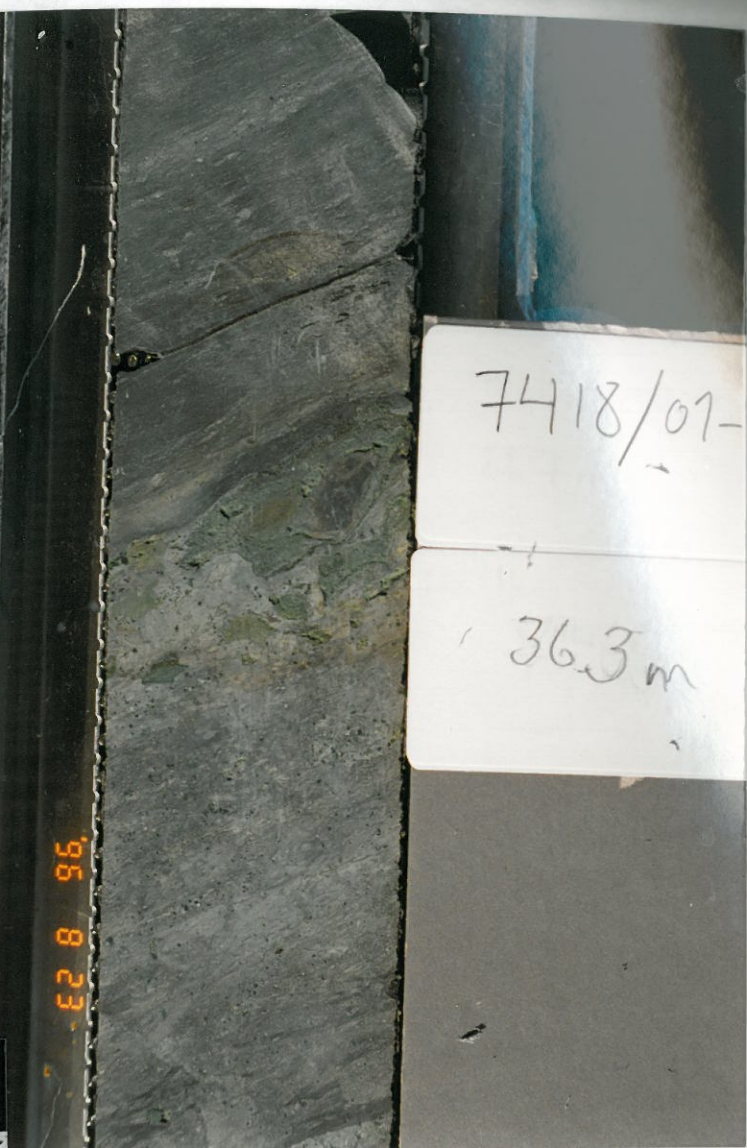
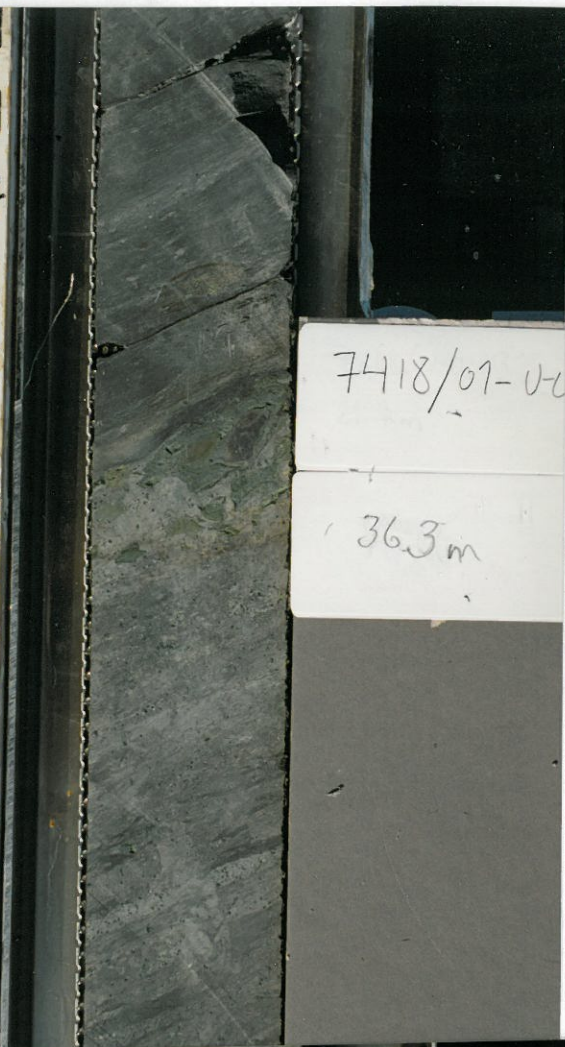
WELL 7418/01-U-01



Cl Si vf f m c vc Cgl

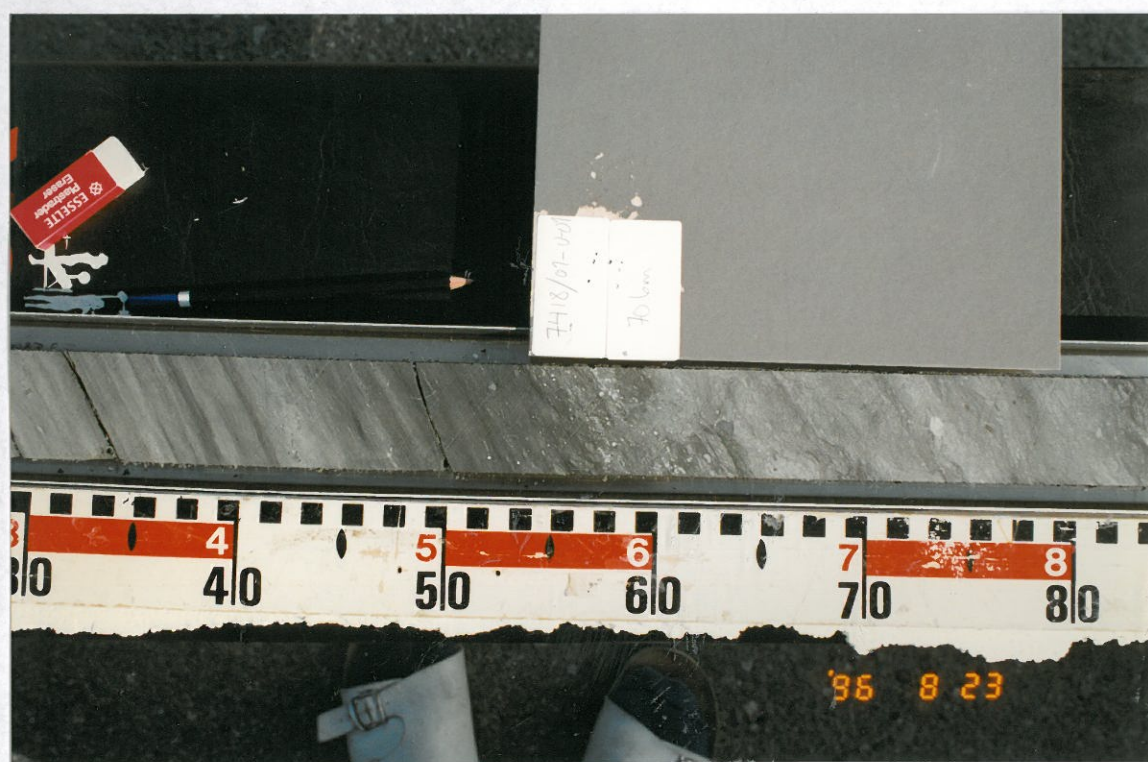


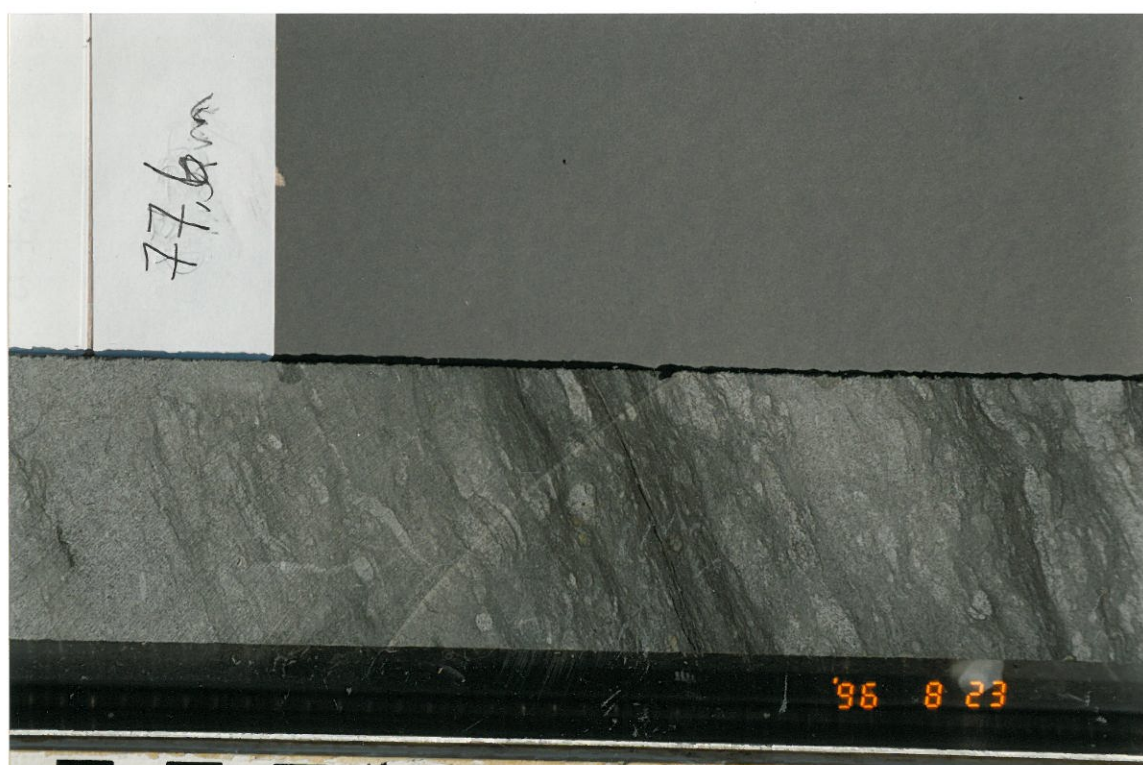
















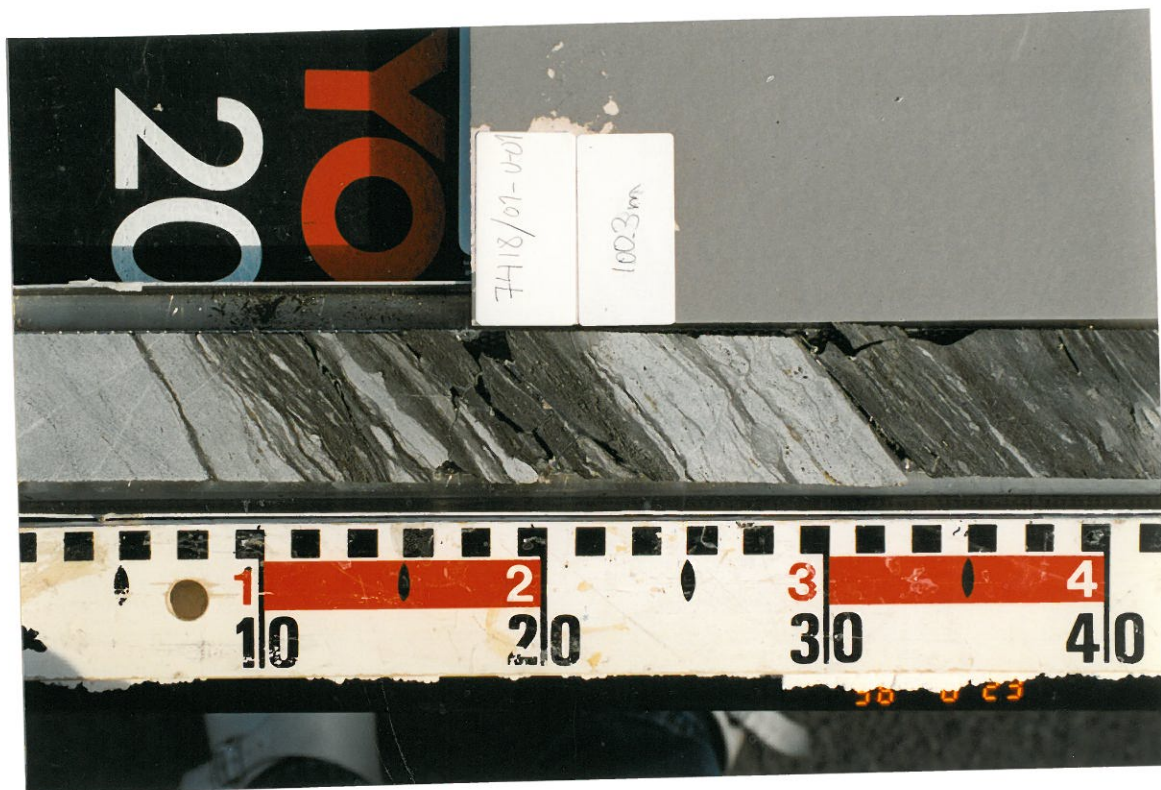


7418/01-U-01

94,8 m

'96 8 23











7418/07-0-01

124.4 m

4

5

7418 07 23

Core 7517/12-U-01

SEDIMENTOLOGY

Core data:

Quaternary overburden	110.7m
API-drilling in bedrock	0.0m
Total depth below seafloor	200.0m
Core recovery	87.8m

Thirteen hammer samples varying in length from 6 to 60 cm (altogether 2m) were collected in the Quaternary sediments. Three temperature measurements in the Quaternary sediments, and six temperature measurements in the bedrock were taken. The corehole was logged by gamma, density, neutron porosity, sonic, dipmeter, resistivity and caliper.

This core has been exposed to tectonization and a concentration of fractures occurs in the most fine grained heterolithic horizons (e.g. 115.35m). Calcite filled subvertical fractures are common (picture 137.10m). Detail pictures before the core was slabbled with focus on fractures is presented in appendix ZZ (note 25-30° dip on core).

(Reservoir potential; porosity 5.8% to 19.9%, permeability 0.04mD to 21mD (tabell I.2 , App. I, vedlegg X))

This Late Paleocene core represents a generally coarsening upward sequence built up by a series of smaller repeating coarsening upward sequences. Two facies associations, laminated and bioturbated sandstone facies and bioturbated heterolithic facies, intermix with sharp to normally diffuse boundaries throughout the core.

The core is not investigated in detail for trace fossil identification.

Pale grey very fine to fine grained laminated and grey bioturbated sandstones dominate the sandstone facies association which occurs in 2-13 m thick intervals. This facies association dominates the upper half of the core and sandstone intervals are throughout thicker and the rapid intermixing with the bioturbated heterolithic facies association is decreased. The glauconite content (fig BA-rapport) is enriched in the upper part giving the core a greenish surface colour (detail picture 112.5m). Siderite beds/nodules and laminae occur close to the glauconite concentrated intervals showing a brownish surface colour (detail picture 112.5m).

The sandstones are laminated with occasionally convex lamination indicating hummocky cross stratification or wave ripples (bilde 135.9m, 166.25m, 181.85m). The laminated sandstones occur with and without truncation surfaces. Thin sandlamination with possible mud couplets is common. Current ripples or combined wave/current ripples (also climbing) are observed through the section. Bioturbation is varying and sometimes disturbing the primary cross stratification. Cm-thick dark grey to black non-bioturbated claystones is occasionally draping the sandstones.

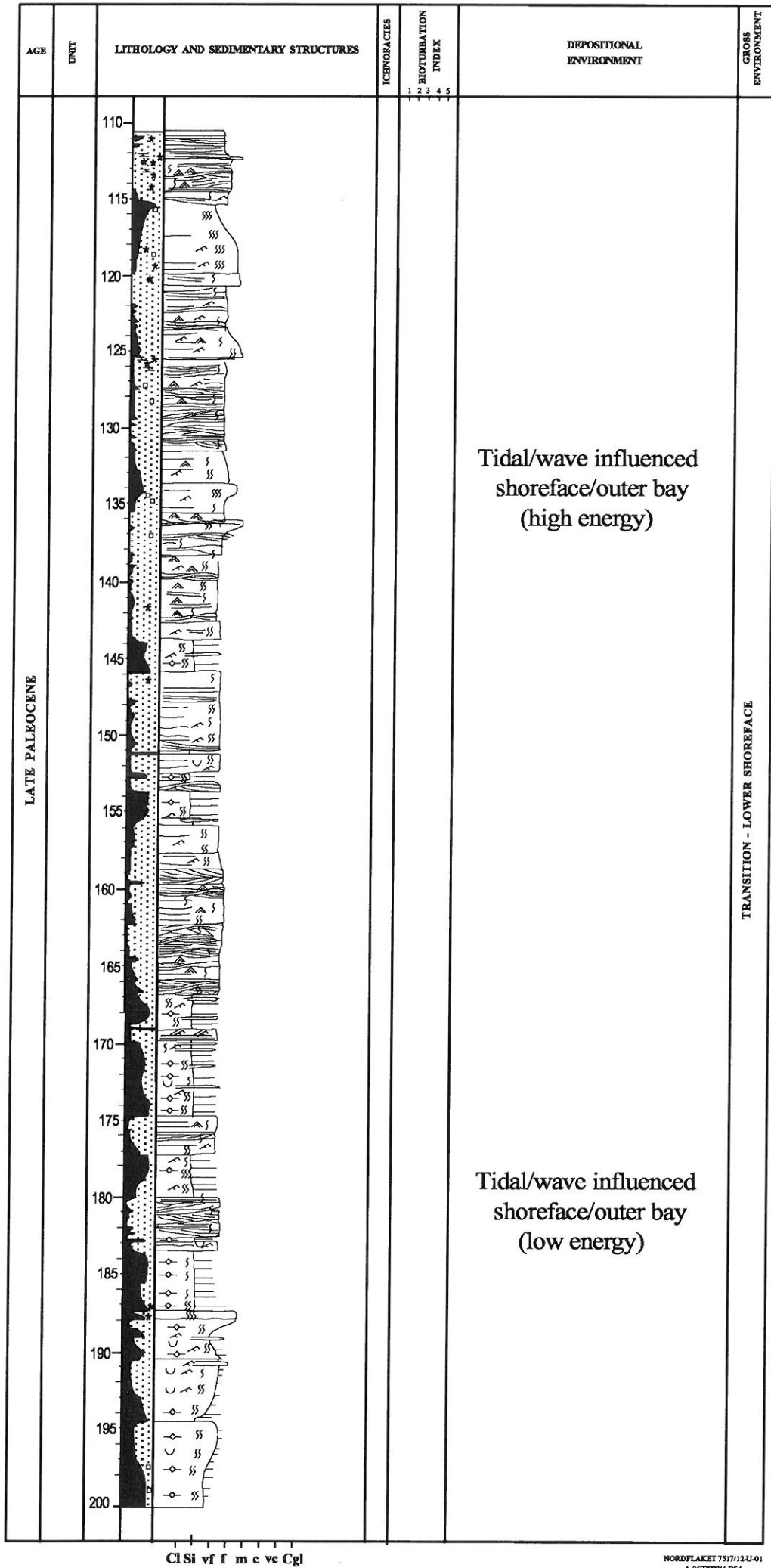
The heterolithic intervals consist of sandy dark grey clay- and siltstones and grey silty very fine grained sandstones (picture 117.5m, 161.8m, 173.5m, 199.8m). Moderate to high bioturbation disturbs the lenticular, flaser and wavy bedding, destroying more or less the primary ripple lamination.

The lower interval of the core (200-193.2m) is the most marine part revealing a normal marine aspect of calcareous taxa and an average high foraminiferal species diversity (see rapport Nagy). From here, there is an upward increasing degree of restriction attributed to deltaic influence (Nagy..). 

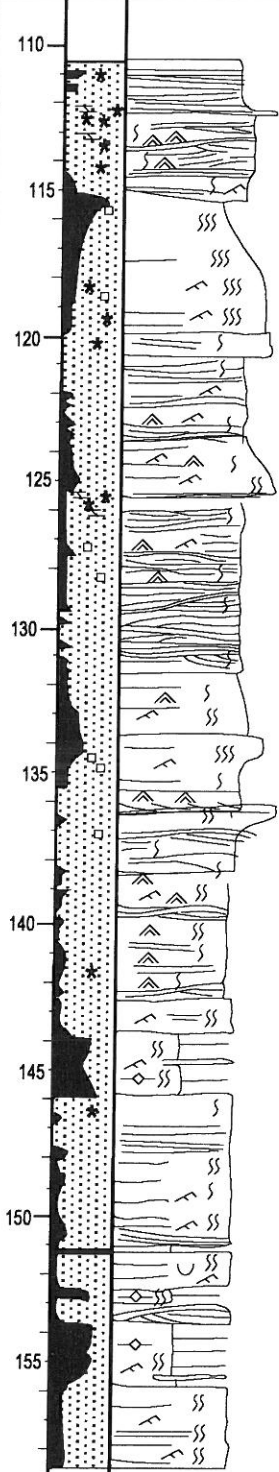
The alternating sandstone-siltstone-shale succession in the rest of the core has a strongly reduced diversity, high dominance and almost total absence of calcareous taxa indicating brackish conditions. These in association with changing sandy and shaley lithologies and presence of wave and tidal generated structures (double drapes), indicate proximal prodelta to delta front environmental settings (transition - lower shoreface). Preservation of tide generated structures indicates that the wave activity were at a minimum in fair weather periods.

A tidal- and wave influenced shoreface, e.g. outside a tidal dominated delta mouth bar is suggested as a paleoenvironment for these sediments. The vertical development was probably weakly regressive with a condensation near the top of the core.

WELL 7517/12-U-01

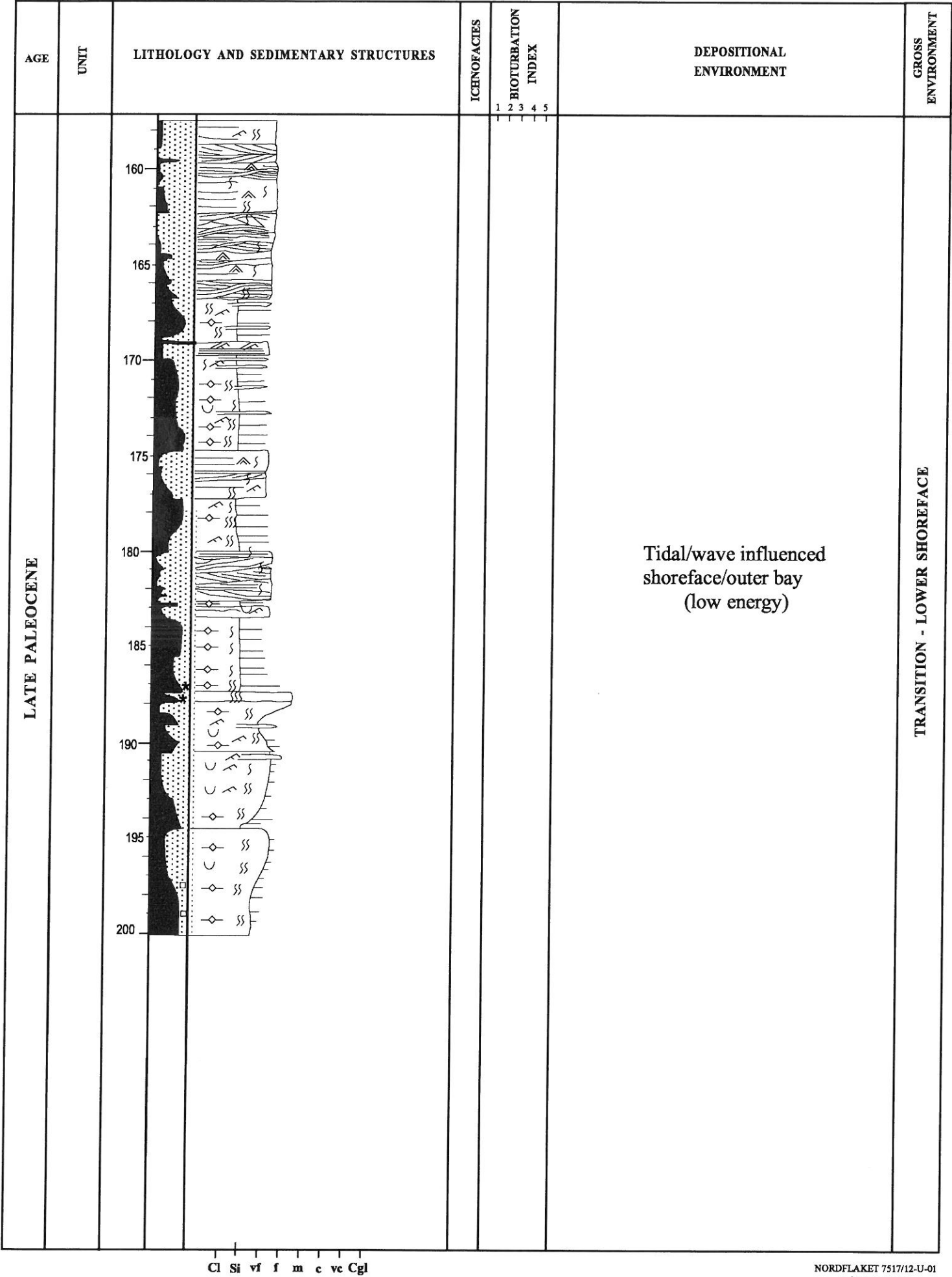


WELL 7517/12-U-01

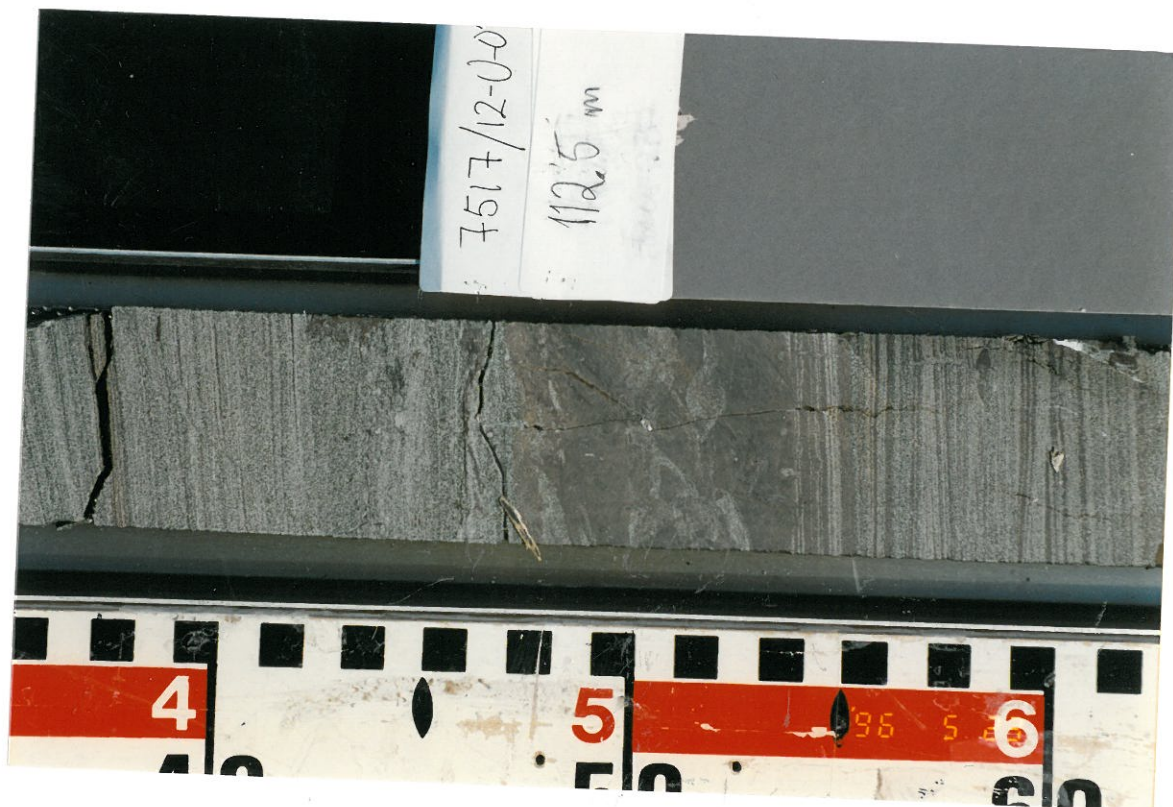
AGE	UNIT	LITHOLOGY AND SEDIMENTARY STRUCTURES	ICHO FACIES	BIOTURBATION INDEX 1 2 3 4 5	DEPOSITIONAL ENVIRONMENT	GROSS ENVIRONMENT
LATE PALEOCENE					Tidal/wave influenced shoreface/outer bay (high energy)	TRANSITION - LOWER SHOREFACE

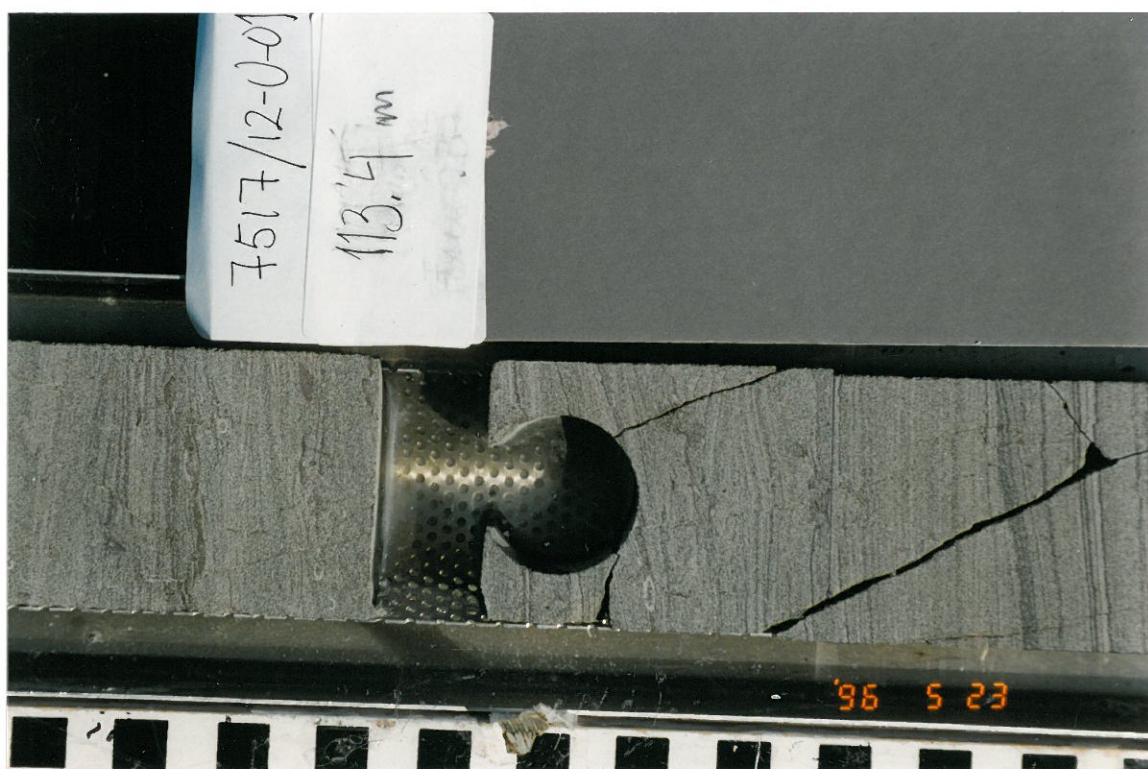
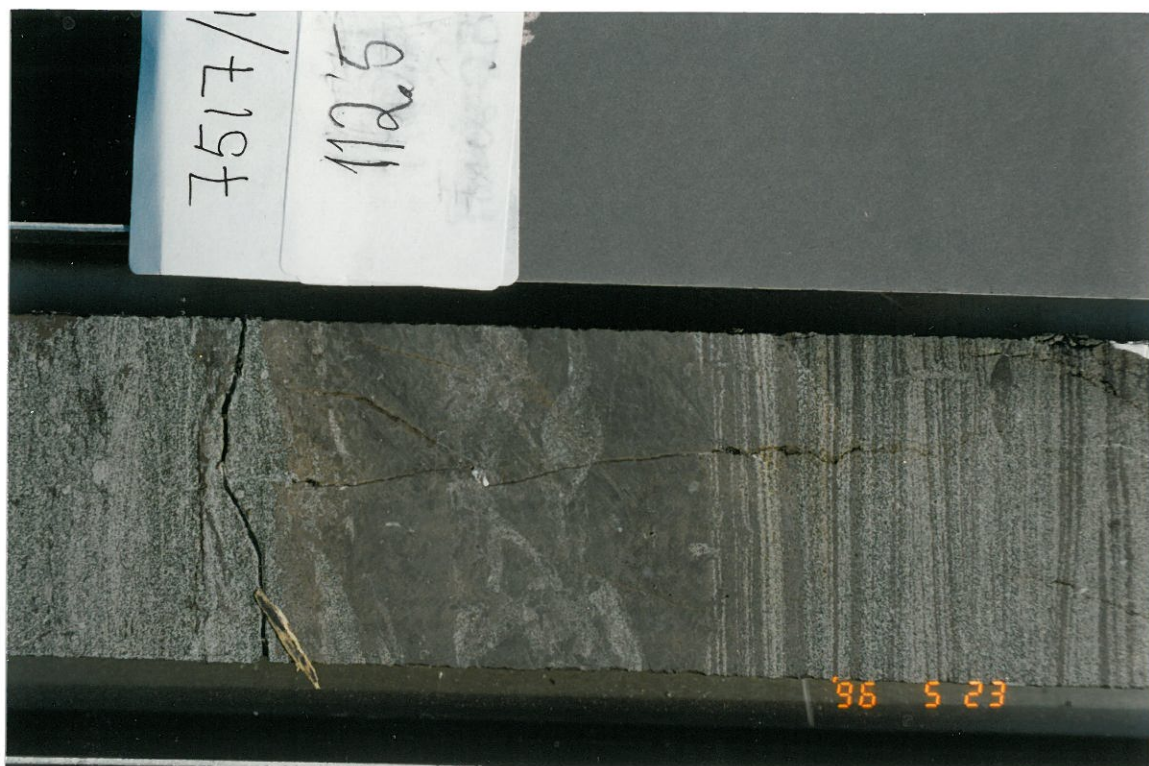
Cl Si vf f m c vc Cgl

WELL 7517/12-U-01



Cl Si vf f m c vc Cgl











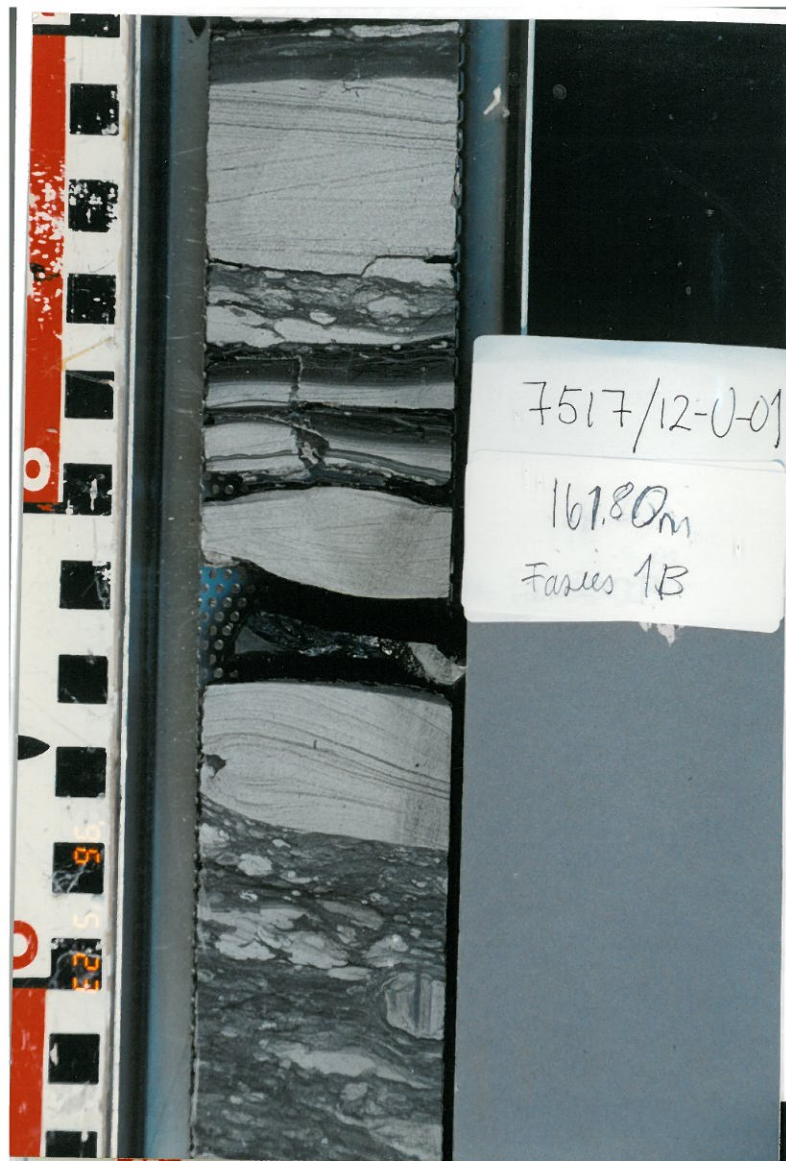


7517

Fan





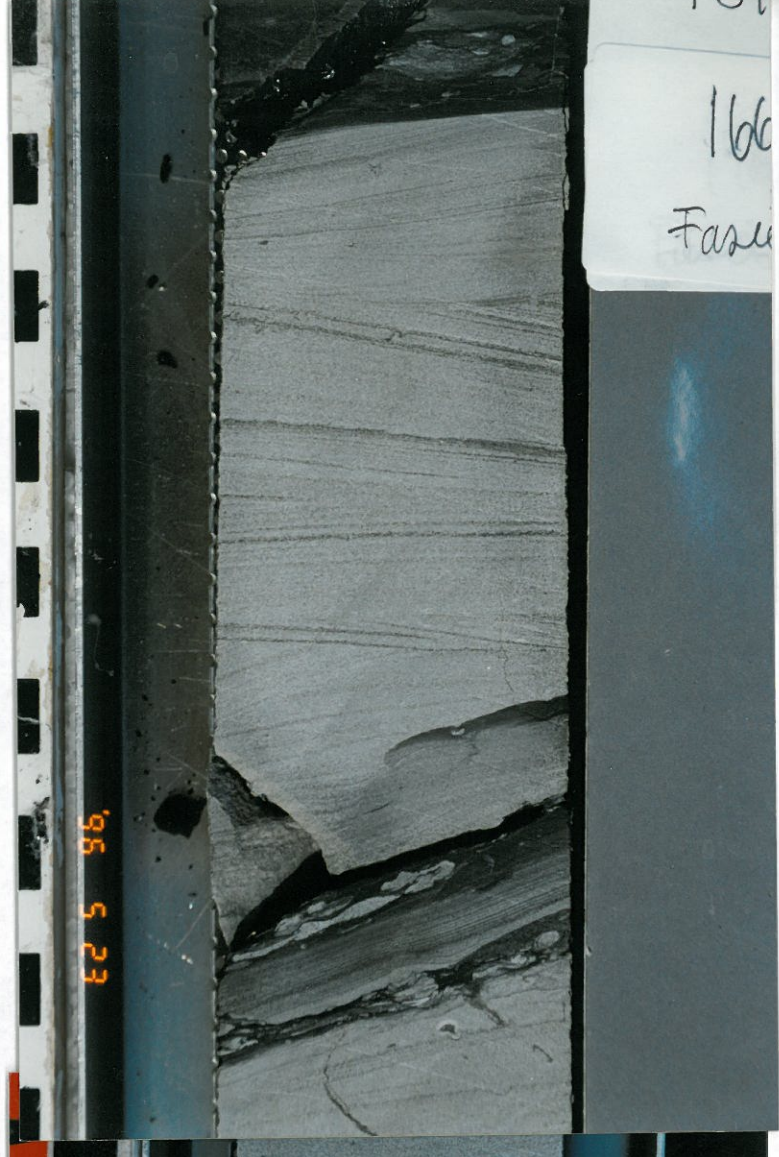




7517/12-U-01

166.25m

Facies 1A



166
Facies



7517/12-U-01

167.25m

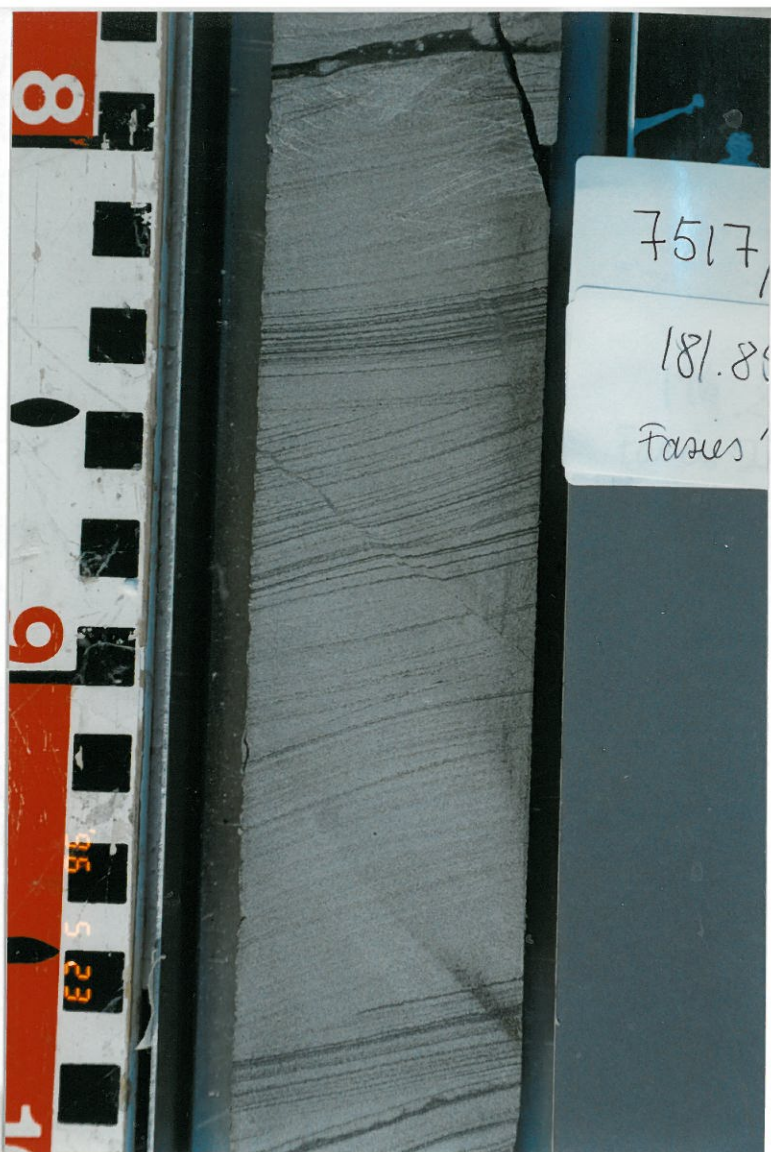
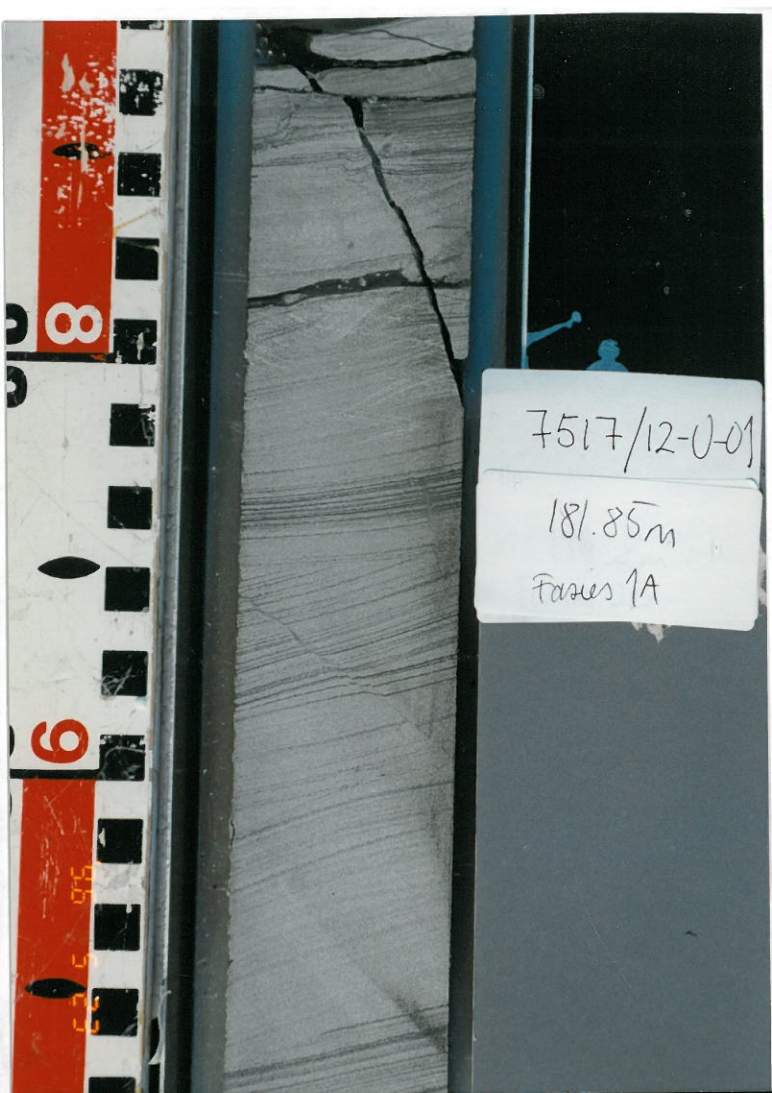
Facies 1B

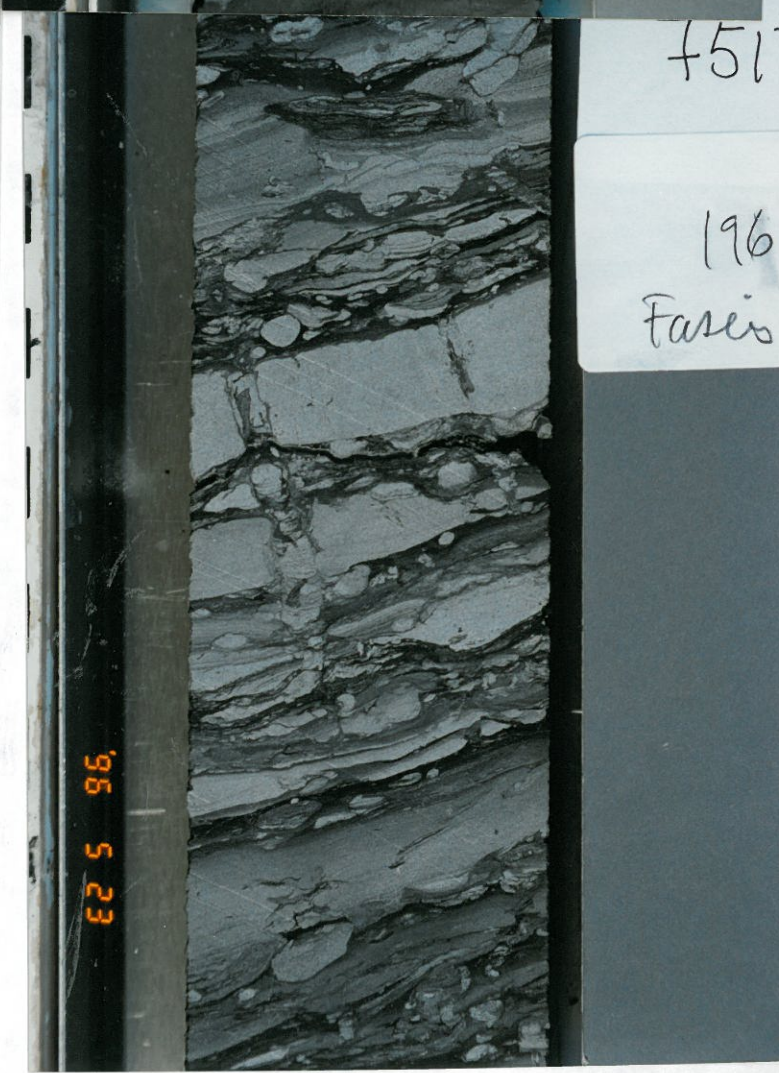
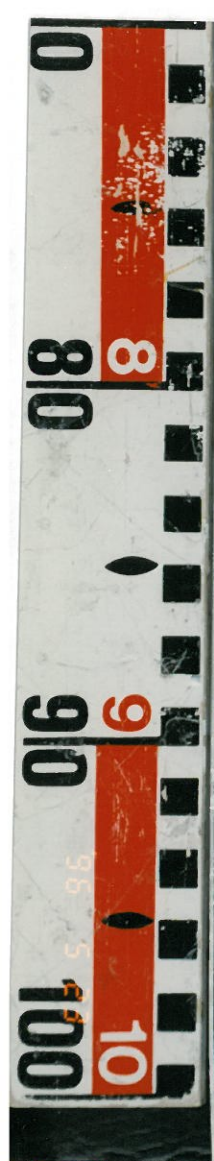


7517

167.25m

Facies





Core 7616/11-U-01

SEDIMENTOLOGY

Core data:

Quaternary overburden:	2.0 m
API-drilling in bedrock:	3.0 m
Total depth below seafloor:	69.25 m
Core recovery:	63.36 m

No samples were taken in the soft Quaternary glacial marine clay.

The corehole was logged by: gamma, density, neutron porosity, sonic, dipmeter, resistivity and caliper.

Part of this well (2.0-47.5) is dated as Early Cretaceous and exhibits three depositional facies with buff, non-bioturbated, laminated fine grained sandstones (high density sandy turbidites); grey, bioturbated, silty, very fine grained sandstones (transition zone) and black, sparsely bioturbated claystones (muddy shelf). The trace fossils present occur within the *Cruziana* ichnofacies. The undated section (47.5 - 69.25 m) consists of two depositional facies with buff, bioturbated to rippled, very fine to fine grained sandstones (lower shoreface) and grey, bioturbated, silty, very fine grained sandstones (transition zone). The trace fossils present occur within the mixed *Skolithos/Cruziana* ichnofacies.

The core is subdivided into four units (intervals):

Unit A 69.25 m (base) - 55.18 m

This interval consists of an overall coarsening upward and cleaning trend with grey, intensely bioturbated (BI=5), shelly, silty, very fine to fine grained sandstones (Plate 4A, 4B) which pass upwards into grey, moderately bioturbated (BI=3), decimetre scale, rippled to cross-stratified fine grained sandstones (Plate 3D). These sandstones are burrowed by *Asterosoma*, *Planolites*, *Teichichnus*, *Phycosiphon*, *Schaubcylindrichnus*, *Taenidium*, *Rosselia*, *Scolicia*, *Chondrites*, *?Ophiomorpha*, escape burrows, faecal pellets, *Paleophycus* and *Skolithos*. The presence of *Diplocraterion* burrows cross-cutting the other traces present (e.g. 61.7 m: Plate 4B) may reflect a period of depositional hiatus. The high diversity (5-8) and the nature of colonisation (tiered) with deposit-feeding, escape and suspension-feeding communities help define an overall shallowing upward cycle of proximal transition zone to proximal lower shoreface facies.

Unit B 55.18 - 43.8 m

This interval consists of an overall fining upward and silting upward trend with grey, moderate to intensely bioturbated (BI=4-5), shell-rich, silty, very fine grained sandstones with *Asterosoma*, *Planolites*, *Teichichnus*, *Phycosiphon*, *Schaubcylindrichnus*, *Scolicia*, *Chondrites*, faecal pellets, bivalve burrows, *Paleophycus* and *Thalassinoides* (Plate 3C). The high diversity (5-7) and the nature of colonisation with a distinctive alternation of deposit-feeding, escape and suspension-feeding communities defines an overall deepening upwards cycle of proximal to distal transition zone.

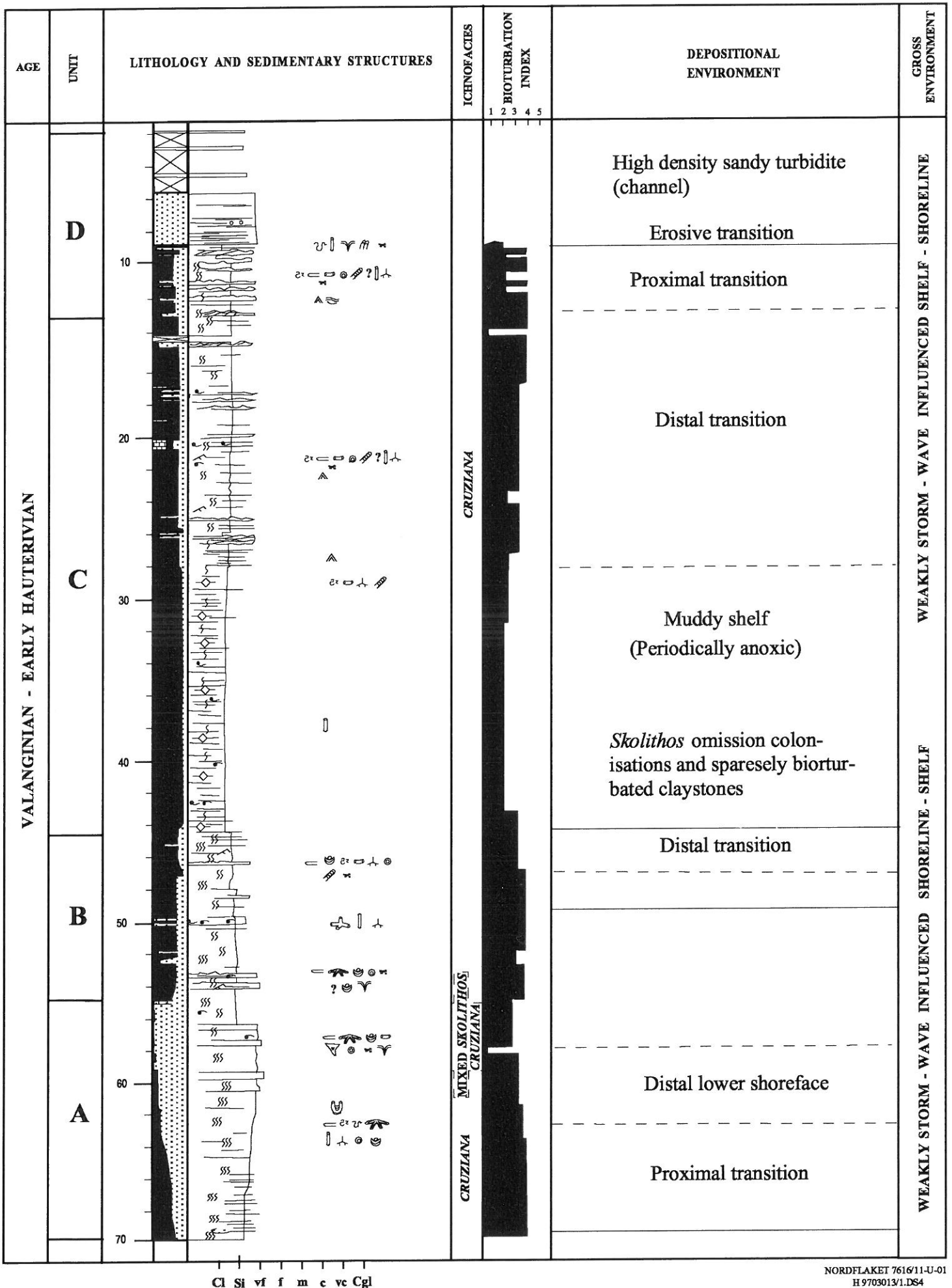
Unit C 43.8 - 8:80m

This interval consists of a coarsening upwards and cleaning upward unit with, at the base black, laminated to sparsely bioturbated (BI=2-3) claystones with *Phycosiphon*, *Chondrites*, excavation burrows, *Scolicia* and *Planolites* (Plate 3A). This low to moderately diversity (2-4) deposit feeding community reflects low to variable oxygen levels (periodic anoxia) on a muddy shelf. These claystones pass upwards into grey, moderate to intensely bioturbated (BI=3-5) silty claystones and thinly bedded, wave rippled, very fine grained sandstones with *Planolites*, *Scolicia*, *Skolithos*, J-shaped burrows, *Gyrochorte*, *Chondrites*, *Paleophycus heberti*, escape burrows, faecal pellets, *Schaubcylichnus* and *Teichichnus*. The diverse community (6-9) which consists of deposit-feeding structures with a few suspension-feeding burrows present, suggests tiered colonisation of distal event beds within the transition zone on a muddy shelf. A large *Skolithos* burrow cross-cutting the other traces may reflect a period of depositional hiatus (e.g. 38.2 m: Plate 3B).

Unit D 8.80 m - 2.00 (top)

Pale grey, laminated to low-angle cross-stratified, very fine to fine grained sandstones with centimetre-scale mudstone clasts and shell debris. These sandstones are not colonised and are considered to have been deposited by gravity flow rather than by storm processes.

WELL 7616/11-U-01



Cl Si vl f m c vc Cgl

Core 7617/11-U-02

The wells 7617/11-U-01 and 7617/11-U-02 are drilled on the same seismic line with a distance of about 100m. It seems to be a 10m overlap in the bedrock between the wells where well 7617/11-U-01 fills in the core loss in well 7617/11-U-02.

SEDIMENTOLOGY

Core data:

Quaternary overburden:	9.5 m
API-drilling in bedrock:	0.5 m
Total depth below seafloor (TD):	154.05 m
Core recovery:	137.00 m

No Quaternary samples were taken.

The well is logged with gamma, density, neutron porosity, sonic, dipmeter, resistivity and caliper.

This Late Paleocene cored section exhibits repeated cycles of five depositional facies with dark grey, laminated to moderately bioturbated, silty claystones (muddy shelf), dark grey, moderately bioturbated, centimetre-scale interbedded siltstones and very fine grained sandstones (proximal and distal transition zone) and buff, interbedded decimetre-scale, bioturbated, rippled, laminated and hummocky cross stratified, very fine to fine grained sandstones (proximal and distal lower shoreface). The trace fossils present occur in the *Cruziana* and mixed *Cruziana-Skolithos* ichnofacies. It should be noted that the top of this cored section is directly correlatable to the core taken in 7617/11-U-01. A brecciated zone between 36.0-39.0m in claystones above a thick sandstone interval corresponds to a major deepening event but is likely to be faulted contact.

The core is divided into three units (intervals):

Unit A 154.05 (base)-55.0m:

This interval consists of at least nine coarsening upward and cleaning upward cycles, which exhibit an overall shallowing upward trend. Bioturbation levels are high throughout (BI=3-5) with distinct decimetre-scale wave rippled to bioturbated couplets and scattered shell debris. In the siltstones and silty very fine grained sandstones *Planolites*, *Teichichnus*, *Phycosiphon* (two sizes) *Scolicia*, *Chondrites*, *Schaubcylindrichnus*, J-shaped burrows, excavation burrows, faecal pellets, *Taenidium*, *Palaeophycus* and *P. heberti* are widespread (Plates 5C, 5D, 6B). Black laminated claystone intervals have a lower diversity ichnofauna of *Chondrites* and *Phycosiphon* (Plate 6A). Hiatal colonisation are marked by cross-cutting burrows of large *Teichichnus* (Plate 5C), *Rosselia* (Plate 5D), *Skolithos* (Plate 6A) and *Chondrites* (Plate 6B). The high diversity (5-8) and dominance of the deposit-feeding community (fairweather) defines and overall shallowing upward trend of muddy shelf to distal lower shoreface dominated by transition zone facies.

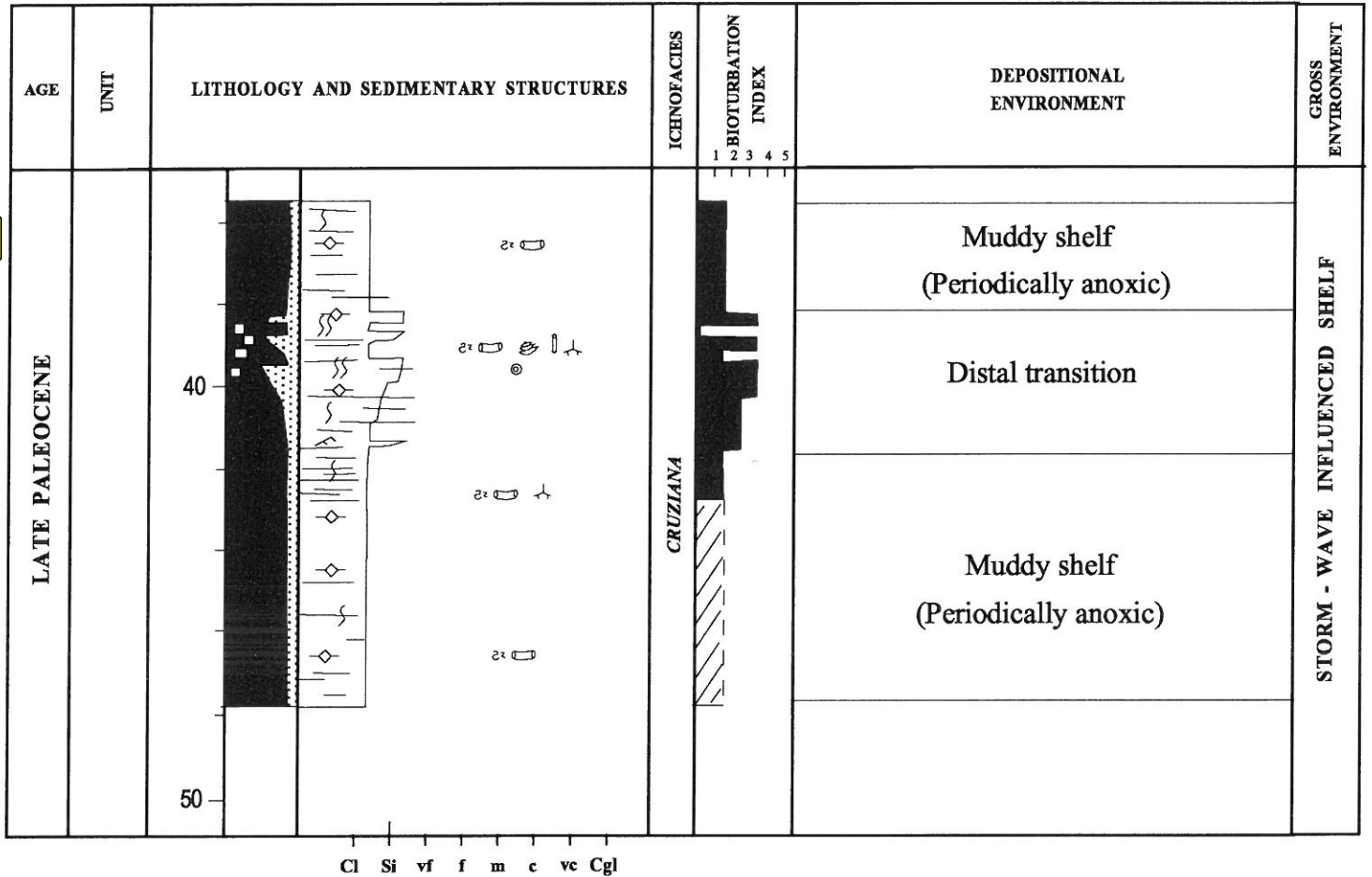
Unit B 55.0-39.3m:

This interval consists of an overall coarsening upward and cleaning upward cycle, with at the base, dark grey intensely bioturbated (BI=5) and rippled, silty very fine grained sandstones which pass upwards into distinct, decimetre-scale fining upward bed sets of wave rippled to bioturbated couplets (Plate 5B). These event beds can become amalgamated and interbedded with sparsely bioturbated (BI=0-3), hummocky cross-stratified very fine grained sandstones (Plate 5A). In the more bioturbated argillaceous intervals, *Planolites*, *Teichichnus*, *Phycosiphon*, *Schaubcyllindricnus*, J-shaped burrows, escape burrows, faecal pellets, *Palaeophycus* and *Skolithos* are recorded. In the sandprone event beds colonisation is more restricted, with *Skolithos*, *Planolites*, escape burrows and *Phycosiphon* (Plates 5A, 5B). The high diversity (5-9) and the nature of colonisation with a distinctive alternation of a deposit-feeding (fairweather) and escape plus suspension-feeding (storm) communities defines an overall shallowing upward trend of proximal transition zone to proximal lower shoreface facies.

Unit C 39.3-10.55m (top):

In this interval a number of coarsening upward and cleaning upward cycles with, at the base black, laminated to moderately bioturbated (BI=2-3) silty claystones with J-shaped burrows, *Scolicia* and *Planolites*. This low diversity (2-3) deposit feeding community reflects low to variable oxygen levels (periodic anoxia) on a muddy shelf. These claystones pass upwards into dark grey, moderately bioturbated (BI=3-4), silty claystones and thinly bedded, rippled, very fine grained sandstones with *Planolites*, *Scolicia*, *Trichichnus*, *Skolithos*, J-shaped burrows, escape burrows, *Gyrochorte*, *Schaubcyllindricnus* and *Teichichnus*. The diverse community (5-7) consists of dominantly deposit-feeding structures which indicates a tiered colonisation of distal event beds within the transition zone. Also present are siderite cemented large *Skolithos* burrows cross cutting the other traces present (e.g. 25.2m) which may reflect a period of depositional hiatus.

WELL 7616/11-U-02



Core 7617/11-U-01

SEDIMENTOLOGY

Core data:

Quaternary overburden:	9.5 m
API-drilling in bedrock:	1.4 m
Total depth below seafloor:	30.25 m
Core recovery:	19.15 m

One hammer sample in Quaternary sediments were collected before bedrock coring was started. The sediments consist of silty and sandy clay (hammer sample at 4.5-5.1 m). Skjærfasthet ca 10 kPa. The upper 8 m consist of possible glacial marine clay. No samples were taken from the lower part of the Quaternary overburden. The drilling indicated that the moraine was hard and blockrich.

The bedrock section is not dated (no recovery) but is similar to the upper part of the cored section in well 7617/11-U-02 which is dated as Late Paleocene in age. These two shallow cores are drilled on the same seismic line with a distance of ca. 100 m. It seems to be an overlap of approximately 10 m in the bedrock between the two cores which means that the complete core from well 7617/11-U-01 fills in the loss of core in well 7617/11-U-01. The cored section exhibits repeated cycles of three depositional facies with dark grey, laminated to moderately bioturbated, centimetre-scale interbedded, decimetre-scale rippled, very fine grained sandstones and bioturbated siltstones. There is an overall deepening upward trend. The trace fossils present occur in the *Cruziana* ichnofacies. It should be noted that this cored section is directly correlatable to the core taken in 7617/11-U-02.

The core is interpreted to represent a storm-wave influence shelf.

The core is subdivided into two units

UNIT A 30.25 m (base) - 24.8 m

Grey, moderate to intensely bioturbated (BI=3-5) siltstones and buff, thinly bedded, ripple cross-laminated, very fine grained sandstones. Cross stratification with truncation and convex topsurfaces occur in an interval with low bioturbation (28.6 m). Sediment starved ripples (lenticular bedding) and thin sand layers are colonized. The bioturbation is identified by *Phycosiphon*, *Chondrites*, *Planolites*, *Schaubcylindrichnus*, *Trichichnus*, *Palaeophycus heberti*, *Teichichnus*, *Scolicia*, excavation burrows, faecal pellets and J-shaped burrows (Plate 6D). This diverse community consists of dominantly deposit-feeding structures indicating a tiered colonisation of distal event beds within the transition zone on a muddy shelf. The differentiation of proximal to distal transition zone reflects the thickness and preservation of the sand-prone event beds and the relative abundance of *Trichichnus* burrows (more abundant in the proximal transition zone).

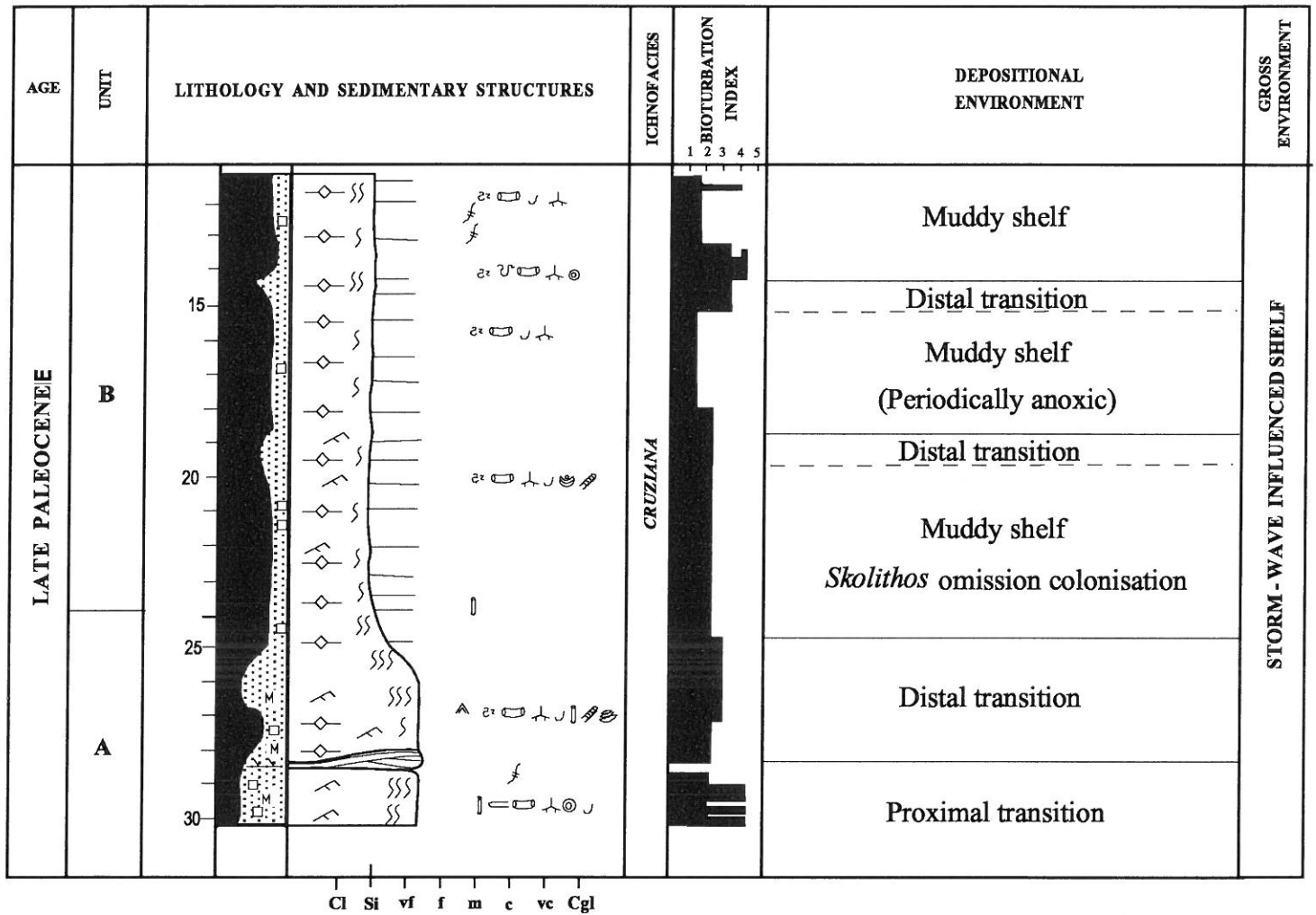
UNIT B: 24.8 - 11.05 m (top)

Dark grey, laminated to moderately bioturbated (BI=2-3) silty claystones and claystones with sediment starved ripples (lenticular bedding) of very fine grained sandstone colonised by *Phycosiphon* (two sizes), *Chondrites*, J-shaped burrows and *Planolites* (Plate 6C). This low

diversity (2-4) deposit-feeding community reflects possible low to variable oxygen levels (periodic anoxia) on a muddy shelf. It can be cross cut by large *Skolithos* burrows, often a pyrite infill, which mark potential hiatal colonisations (e.g. 23.5 m: Plate 6C). In this interval there are two horizons with more pronounced siltier event beds colonised by additional burrows such as *Scolicia*, *Teichichnus* and *Schaubcylindrichnus*. These horizons relate to minor shallowing episodes into distal transition zone facies (see below).

Begynn her!

WELL 7617/11-U-01







7617/11-0-0

12.25m

7617/1

12.25m



7617/11-0-01
19.4m



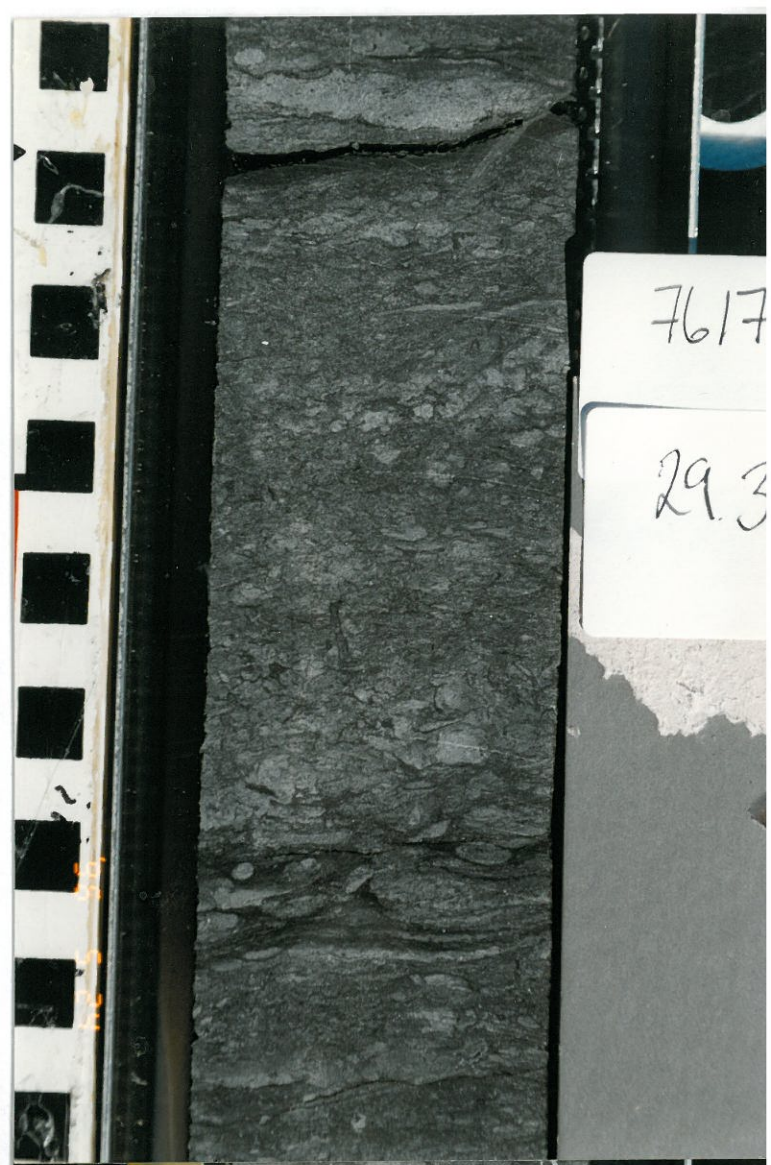
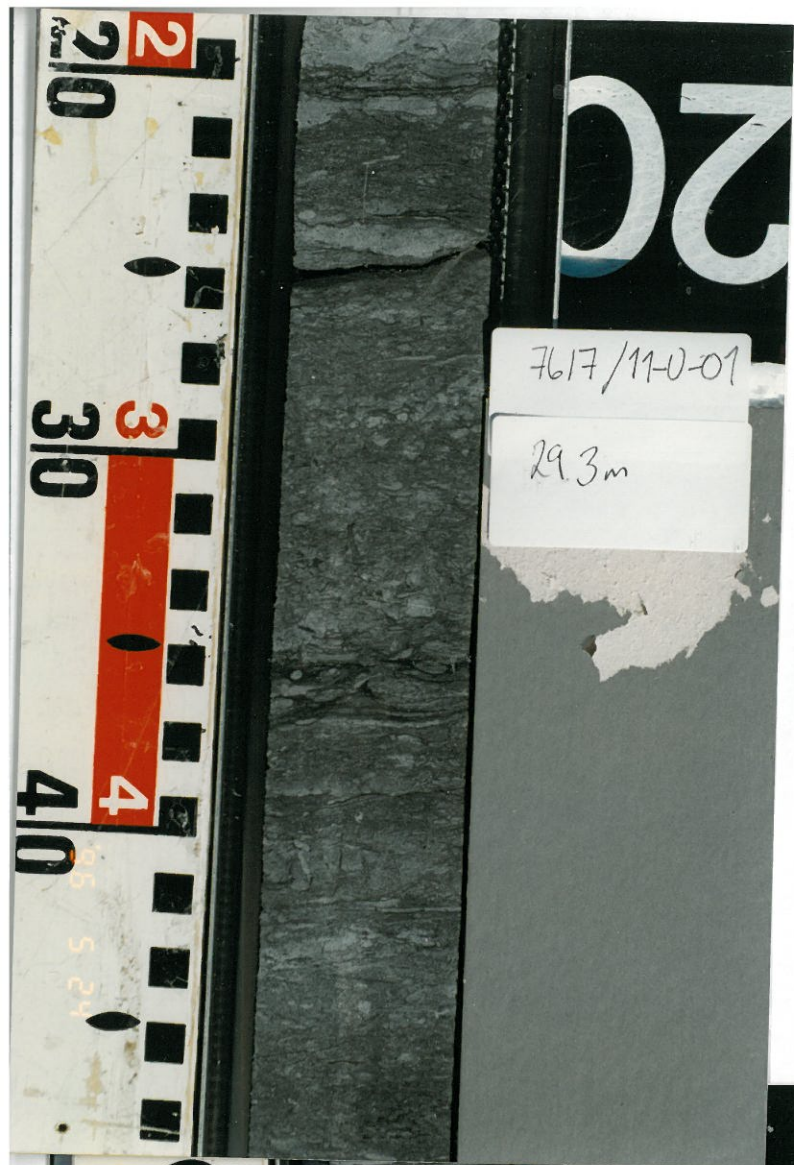
7617
19.4



7617/11-0-01
23.6m



7617
23





Core 7617/11-U-02

The wells 7617/11-U-01 and 7617/11-U-02 are drilled on the same seismic line with a distance of about 100m. It seems to be a 10m overlap in the bedrock between the wells where well 7617/11-U-01 fills in the core loss in well 7617/11-U-02.

SEDIMENTOLOGY

Core data:

Quaternary overburden:	9.5 m
API-drilling in bedrock:	0.5 m
Total depth below seafloor (TD):	154.05 m
Core recovery:	137.00 m

No Quaternary samples were taken.

The well is logged with gamma, density, neutron porosity, sonic, dipmeter, resistivity and caliper.

This Late Paleocene cored section exhibits repeated cycles of five depositional facies with dark grey, laminated to moderately bioturbated, silty claystones (muddy shelf), dark grey, moderately bioturbated, centimetre-scale interbedded siltstones and very fine grained sandstones (proximal and distal transition zone) and buff, interbedded decimetre-scale, bioturbated, rippled, laminated and hummocky cross stratified, very fine to fine grained sandstones (proximal and distal lower shoreface). The trace fossils present occur in the *Cruziana* and mixed *Cruziana-Skolithos* ichnofacies. It should be noted that the top of this cored section is directly correlatable to the core taken in 7617/11-U-01. A brecciated zone between 36.0-39.0m in claystones above a thick sandstone interval corresponds to a major deepening event but is likely to be faulted contact.

The core is divided into three units (intervals):

Unit A 154.05 (base)-55.0m:

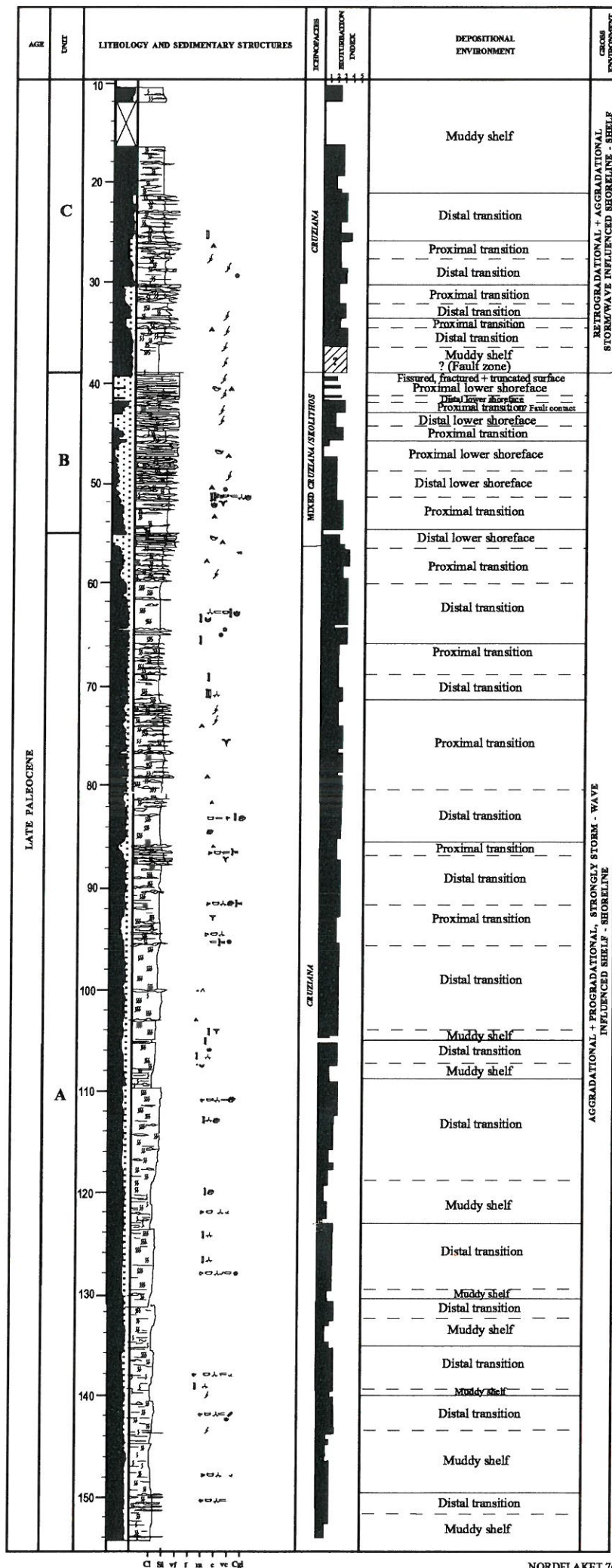
This interval consists of at least nine coarsening upward and cleaning upward cycles, which exhibit an overall shallowing upward trend. Bioturbation levels are high throughout (BI=3-5) with distinct decimetre-scale wave rippled to bioturbated couplets and scattered shell debris. In the siltstones and silty very fine grained sandstones *Planolites*, *Teichichnus*, *Phycosiphon* (two sizes) *Scolicia*, *Chondrites*, *Schaubcylindrichnus*, J-shaped burrows, excavation burrows, faecal pellets, *Taenidium*, *Palaeophycus* and *P. heberti* are widespread (Plates 5C, 5D, 6B). Black laminated claystone intervals have a lower diversity ichnofauna of *Chondrites* and *Phycosiphon* (Plate 6A). Hiatal colonisation are marked by cross-cutting burrows of large *Teichichnus* (Plate 5C), *Rosselia* (Plate 5D), *Skolithos* (Plate 6A) and *Chondrites* (Plate 6B). The high diversity (5-8) and dominance of the deposit-feeding community (fairweather) defines and overall shallowing upward trend of muddy shelf to distal lower shoreface dominated by transition zone facies.

Unit B 55.0-39.3m:

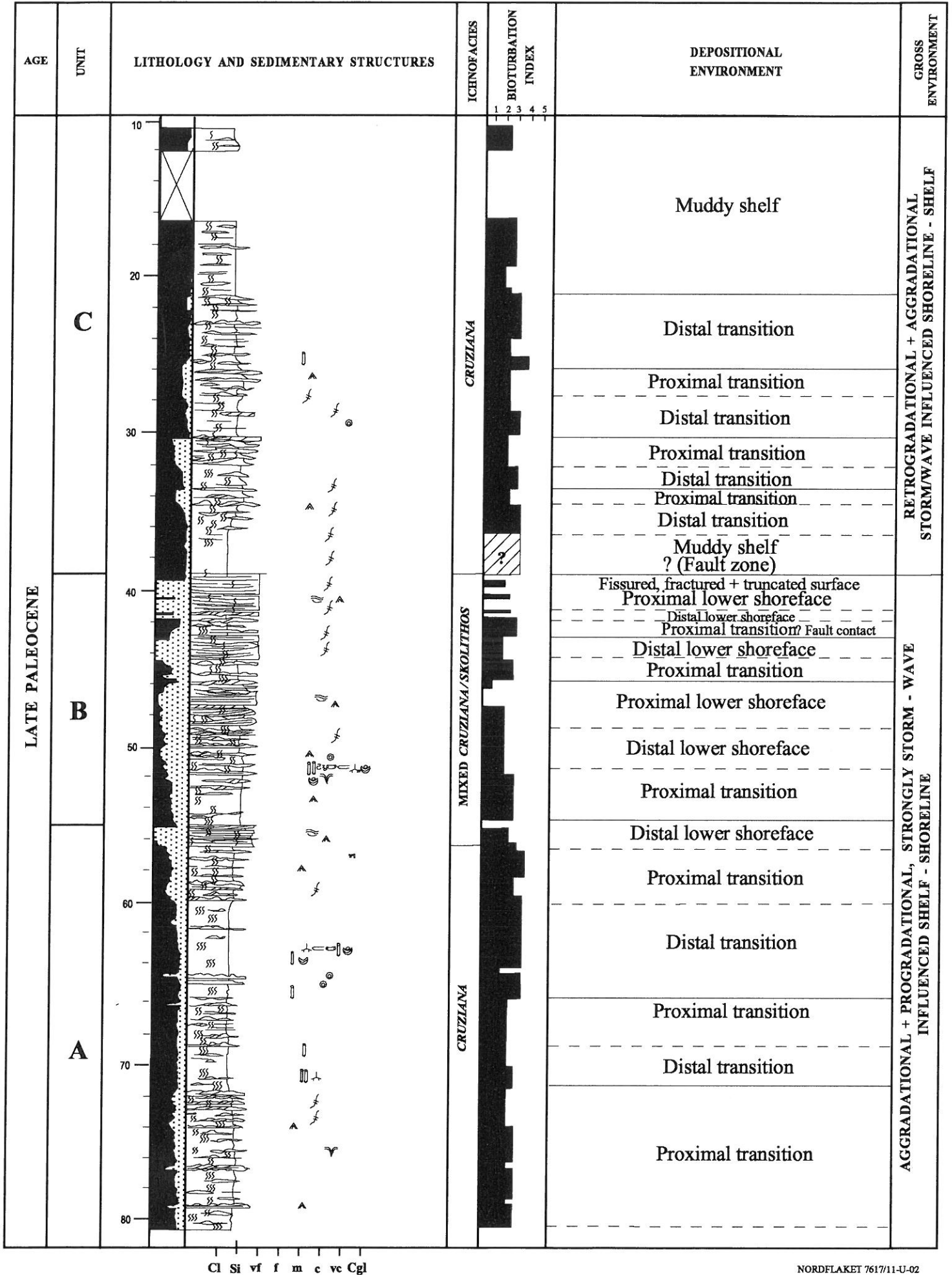
This interval consists of an overall coarsening upward and cleaning upward cycle, with at the base, dark grey intensely bioturbated (BI=5) and rippled, silty very fine grained sandstones which pass upwards into distinct, decimetre-scale fining upward bed sets of wave rippled to bioturbated couplets (Plate 5B). These event beds can become amalgamated and interbedded with sparsely bioturbated (BI=0-3), hummocky cross-stratified very fine grained sandstones (Plate 5A). In the more bioturbated argillaceous intervals, *Planolites*, *Teichichnus*, *Phycosiphon*, *Schaubcyllindricnus*, J-shaped burrows, escape burrows, faecal pellets, *Palaeophycus* and *Skolithos* are recorded. In the sandprone event beds colonisation is more restricted, with *Skolithos*, *Planolites*, escape burrows and *Phycosiphon* (Plates 5A, 5B). The high diversity (5-9) and the nature of colonisation with a distinctive alternation of a deposit-feeding (fairweather) and escape plus suspension-feeding (storm) communities defines an overall shallowing upward trend of proximal transition zone to proximal lower shoreface facies.

Unit C 39.3-10.55m (top):

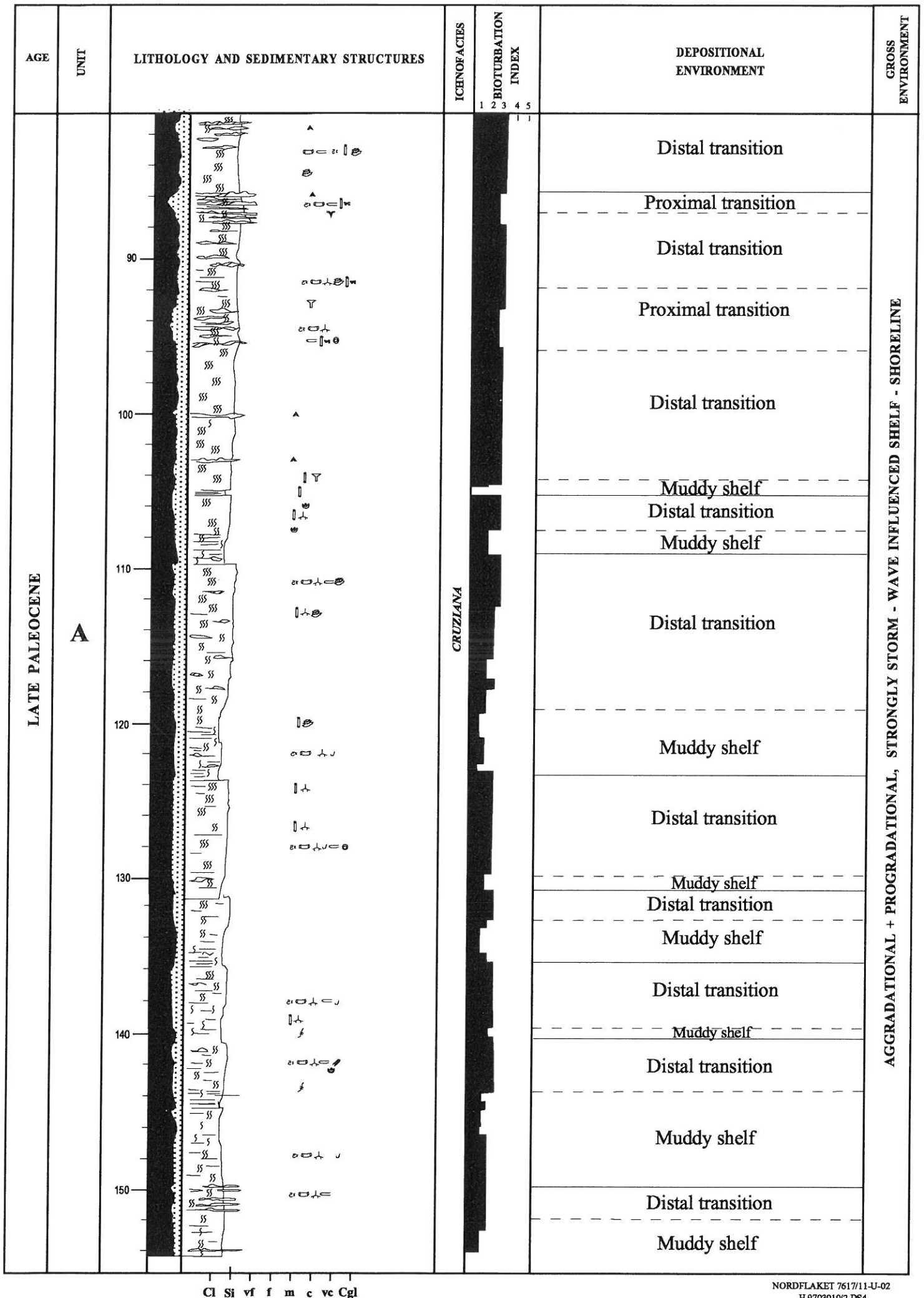
In this interval a number of coarsening upward and cleaning upward cycles with, at the base black, laminated to moderately bioturbated (BI=2-3) silty claystones with J-shaped burrows, *Scolicia* and *Planolites*. This low diversity (2-3) deposit feeding community reflects low to variable oxygen levels (periodic anoxia) on a muddy shelf. These claystones pass upwards into dark grey, moderately bioturbated (BI=3-4), silty claystones and thinly bedded, rippled, very fine grained sandstones with *Planolites*, *Scolicia*, *Trichichnus*, *Skolithos*, J-shaped burrows, escape burrows, *Gyrochorte*, *Schaubcyllindricnus* and *Teichichnus*. The diverse community (5-7) consists of dominantly deposit-feeding structures which indicates a tiered colonisation of distal event beds within the transition zone. Also present are siderite cemented large *Skolithos* burrows cross cutting the other traces present (e.g. 25.2m) which may reflect a period of depositional hiatus.



WELL 7617/11-U-02



WELL 7617/11-U-02



Cl Si vf f m c vc Cgl

CORE 7618/10-U-01

SEDIMENTOLOGY

Core data:

Quaternary overburden:
API-drilling in bedrock:
Total depth below seafloor:
Core recovery:

Age: Valanginian - Early Hauterivian
Formation: Knurr/Kolje Formation , Janusfjell Formation (Spitsbergen)
Core length: 12.90m (13,06-28,8m)

This Early Cretaceous cored section exhibits three depositional facies with buff, non-bioturbated, laminated fine grained sandstones (high density sandy turbidites); grey, bioturbated fine grained sandstones (high density sandy turbidites and hiatal colonisation) and black, sparsely bioturbated claystones (muddy shelf). The trace fossils present occur within the *Cruziana* ichnofacies. It should be noted that the upper part of this cored section is directly correlatable to the core taken in 7618/10-U-03.

The core is subdivided into four lithological units (intervalls)

Unit A 28.75 (base) - 25.6 m: Interbedded dark grey claystones and rippled to planar laminated sandstones colonised by *Phycosiphon*, *Chondrites*, *Schaubcylindrichnus*, small *Skolithos* and *Planolites*. Shell debris (?*Inoceramus* sp.) is also present. Picture 26.4 shows convex surfaces and truncation surfaces indicating possible hummocky cross stratification. The unit is deposited on a well oxygenated shelf affected by episodic minor sandy turbidites.

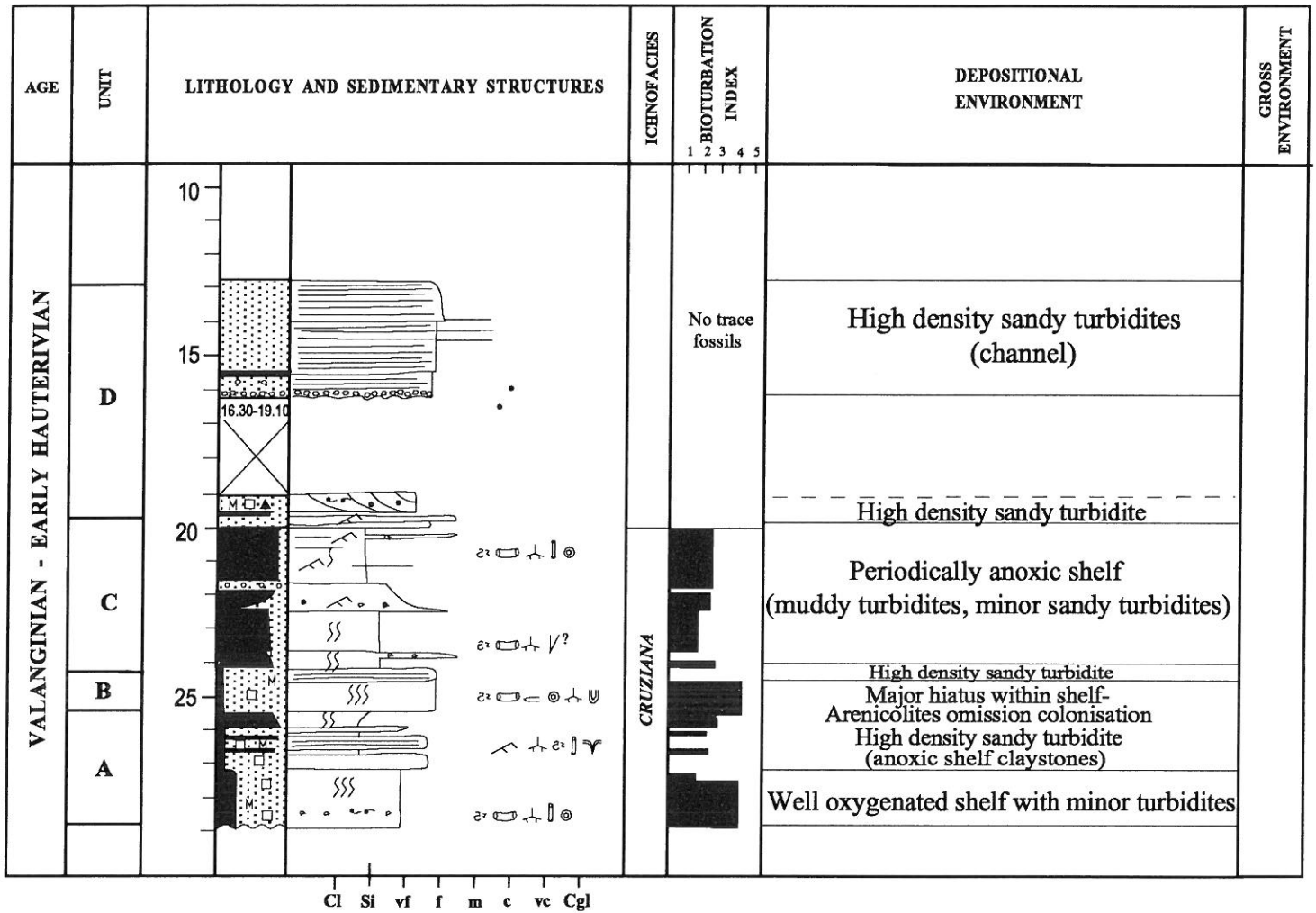
Unit B 25.6 - 24.6 m: Dark grey, intensily bioturbated (BI=5), silty fine grained sandstones with *Phycosiphon*, *Palaeophycus*, escape burrows and *Chondrites* burrows, crosscut by large sand-filled *Arenicolites* (Plate 7A, 7B). The *Arenicolites* burrows are reburrowed by *Phycosiphon* and *Chondrites*. The multiple *Arenicolites* colonisations reflect a change from deposit-feeding to suspension-feeding that may relate to a major depositional hiatus (bypass or non-deposition). It is a candidate for correlatable transgressive surface within the muddy shelf.

Unit C 24.6 - 19.9 m: Dark grey, laminated to sparsely bioturbated (BI=2-3) claystones with *Phycosiphon* (two sizes), *Schaubcylindrichnus*, small *Skolithos* (pyritic infill) which interbed (sharp boundaries) with pale grey, centimetre-scale, ripple cross laminated fine grained sandstones (see Plate 7C) with small clasts and shell debris (?*Inoceramus* sp) in som horizons (Bilde 20.10m). The presence of a low to moderate diversity (2-4) deposit-feeding community could reflect low to variable oxygen levels (periodic anoxia) on a muddy shelf with minor event (?turbidite) bed deposition.

Unit D 19.9m - 13.05 (top): Pale grey, laminated to low-angle cross-stratified very fine to fine grained sandstones with centimetre-scale coarser grained horizons. Also scattered floating

granules and fossil fragments occur. At 16.05 m occurs two well rounded chert pebbles, (2x3 and 3x4 cm) (picture 16.05 m). The interval just below (16.30-19.10 m) is missing and can represent a poor semented conglomeratic horizon (?) and an important unconformity???. The sandstones are not colonized and are considered to be deposited by gravity flow rather than by storm processes.

WELL 7618/10-U-01

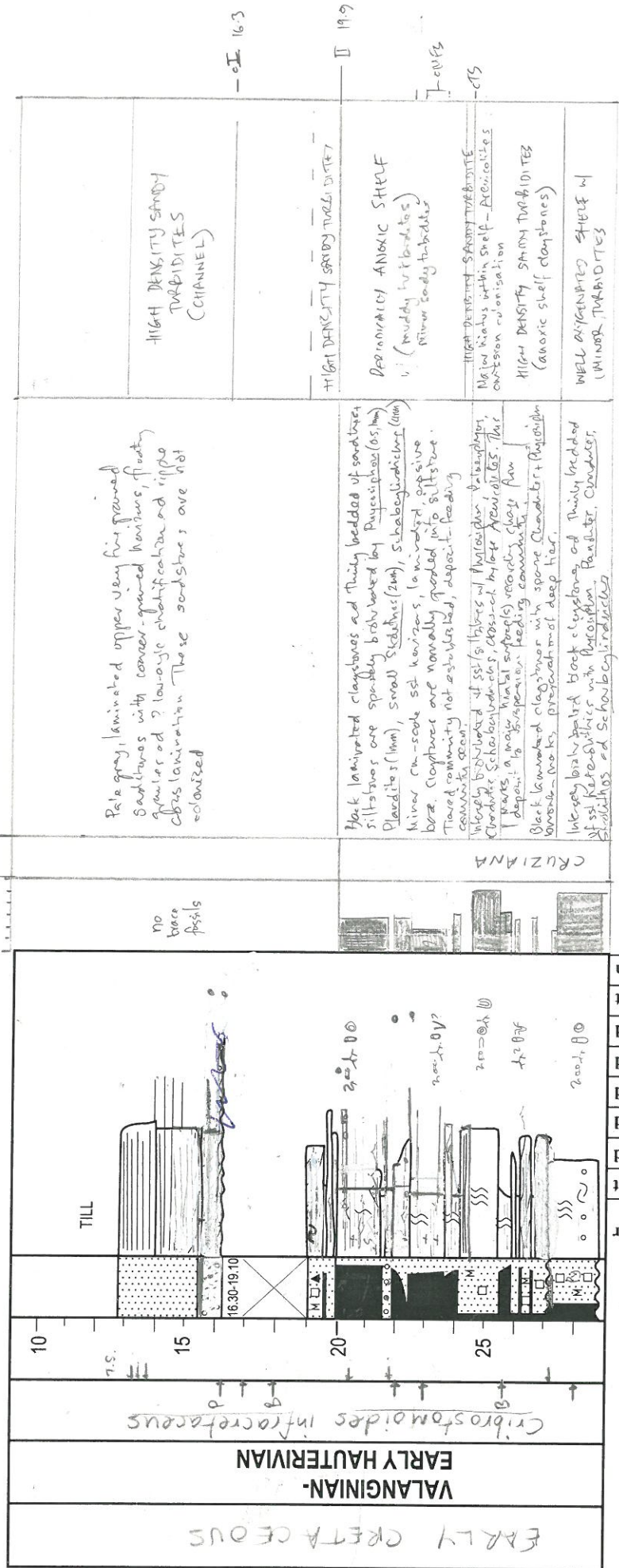


WELL 7618/10-u-01

BIOTURBATION INDEX (CINOTRITES)

ENVIRONMENTS + SURFACES

COMMENTS

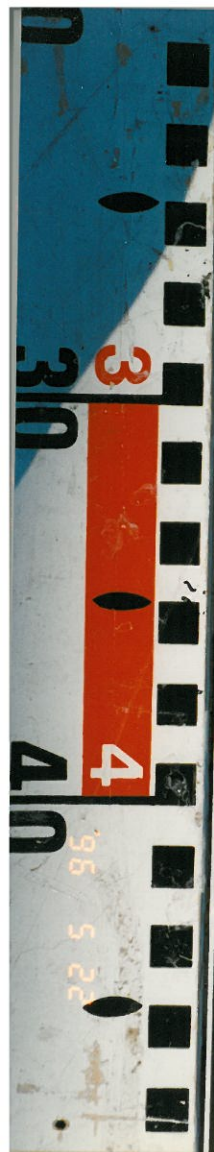




7618/10-0-

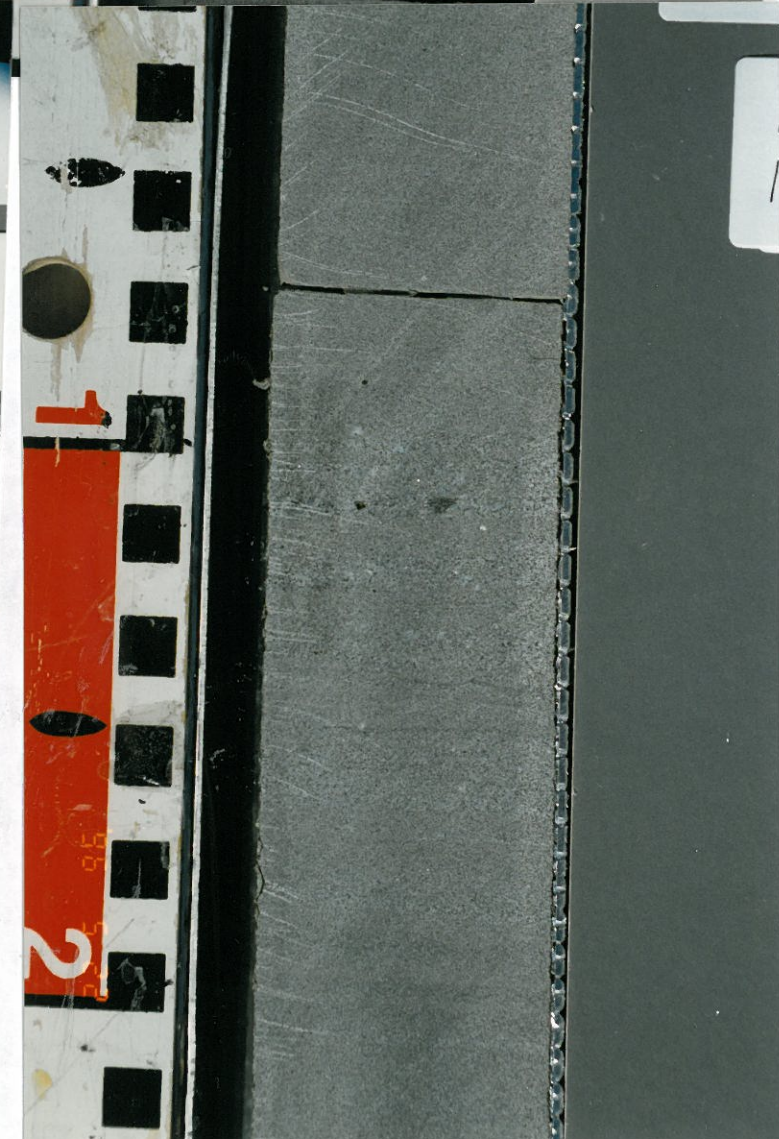
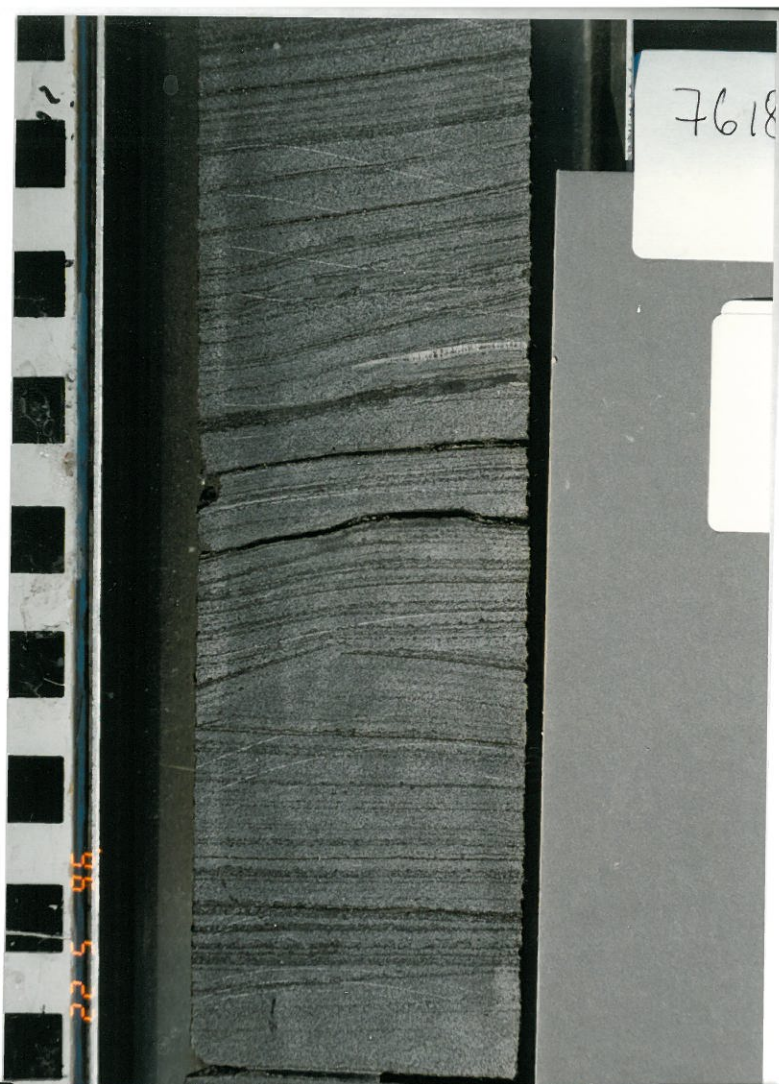
14. #

22 5 96.

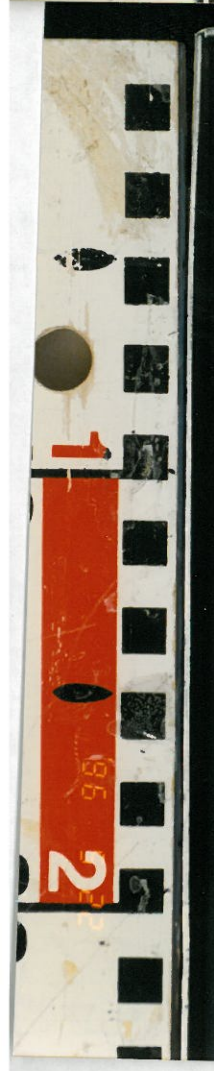


7618/10-0-01

26.4_m

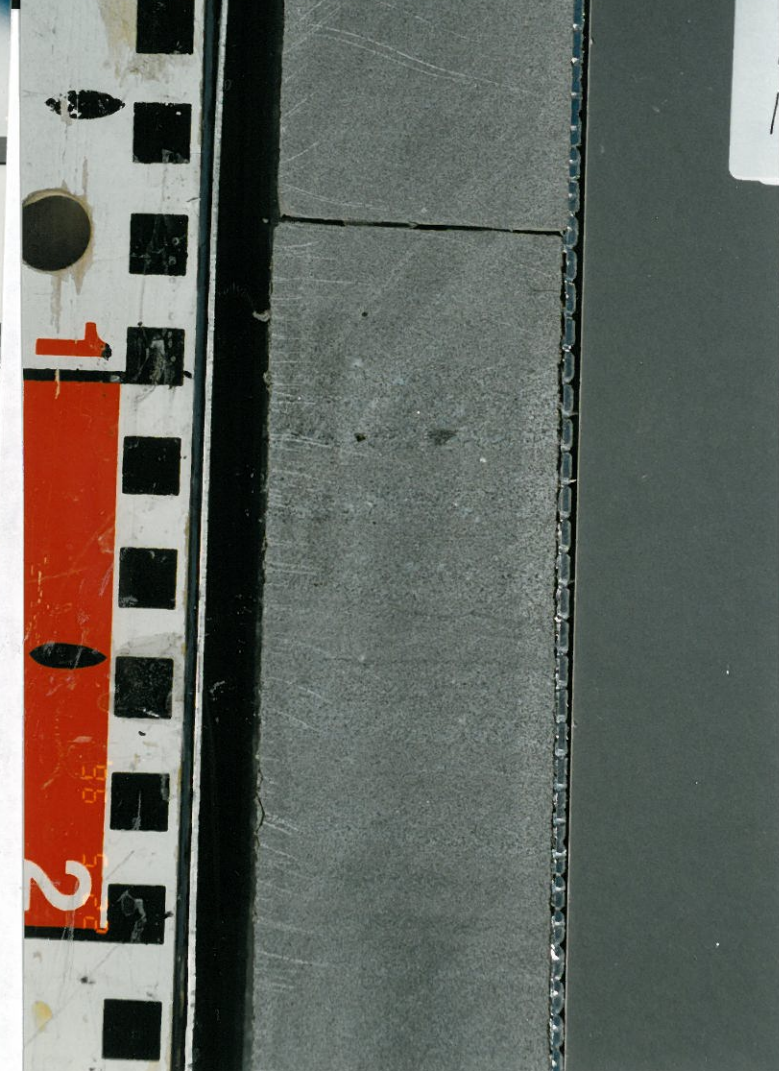


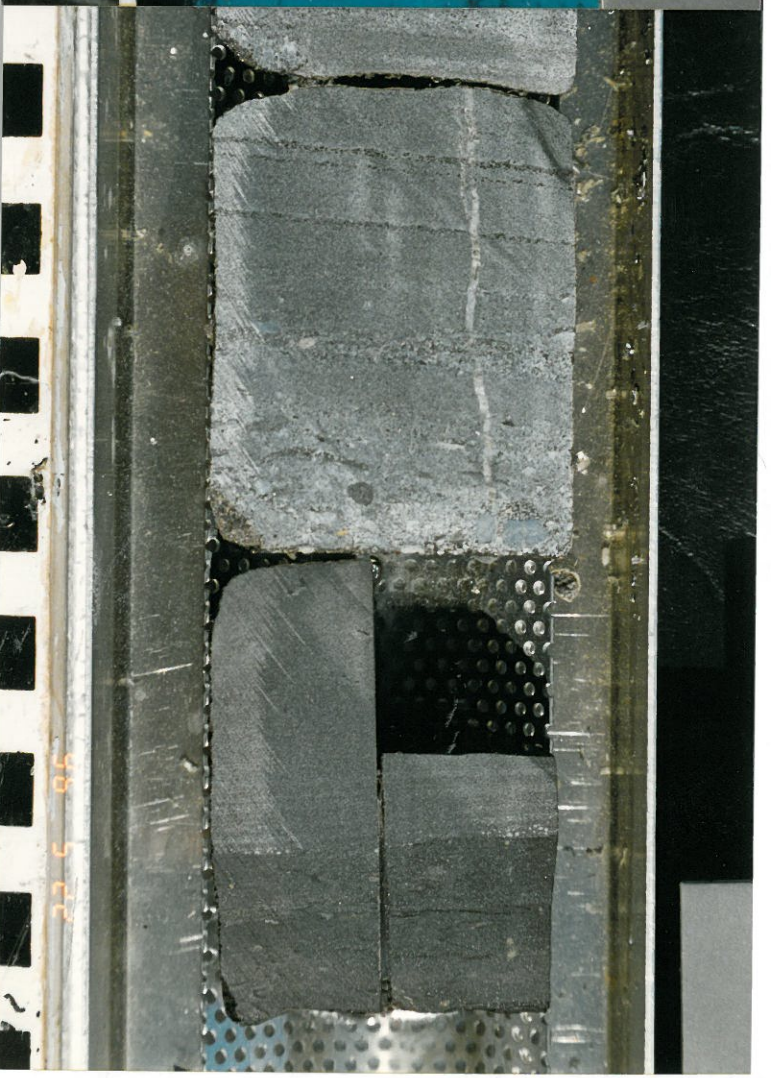
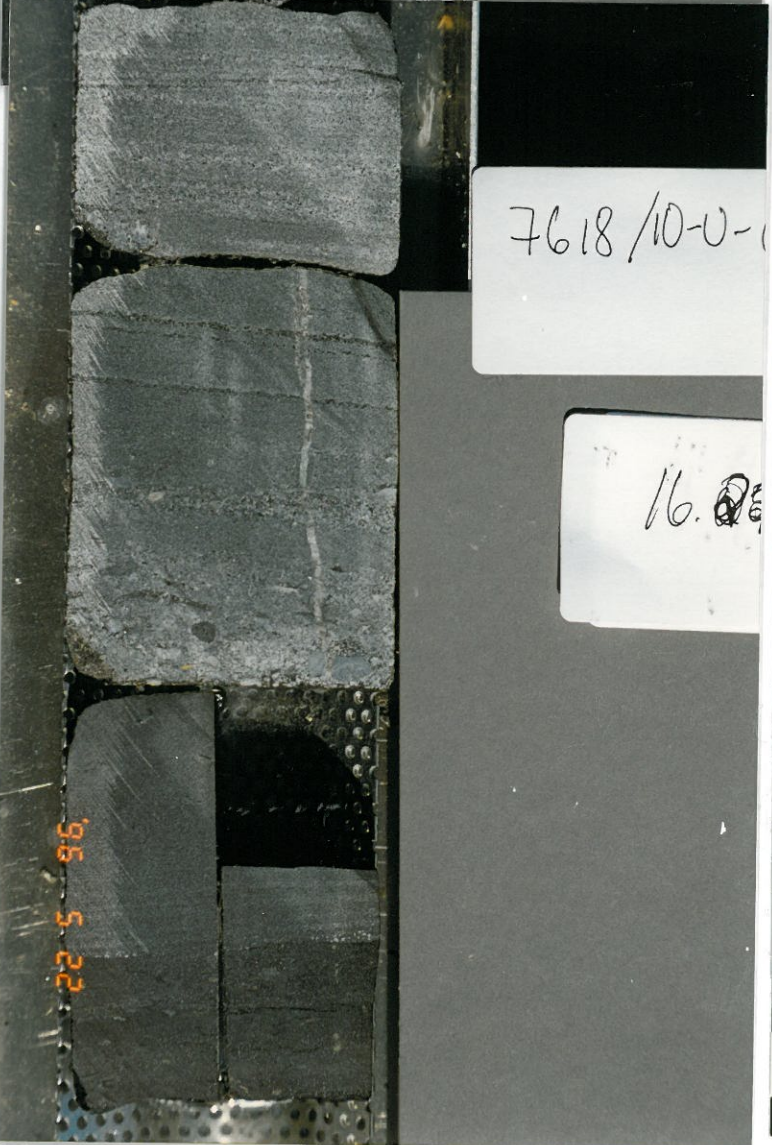
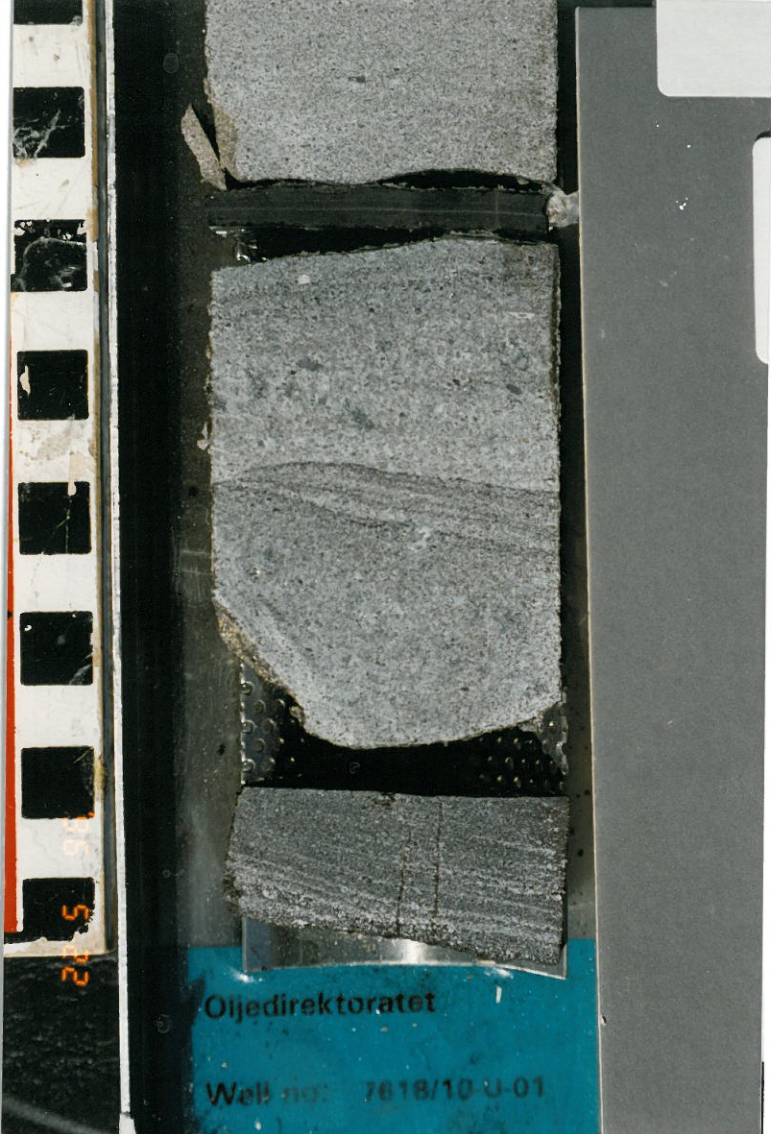
7618

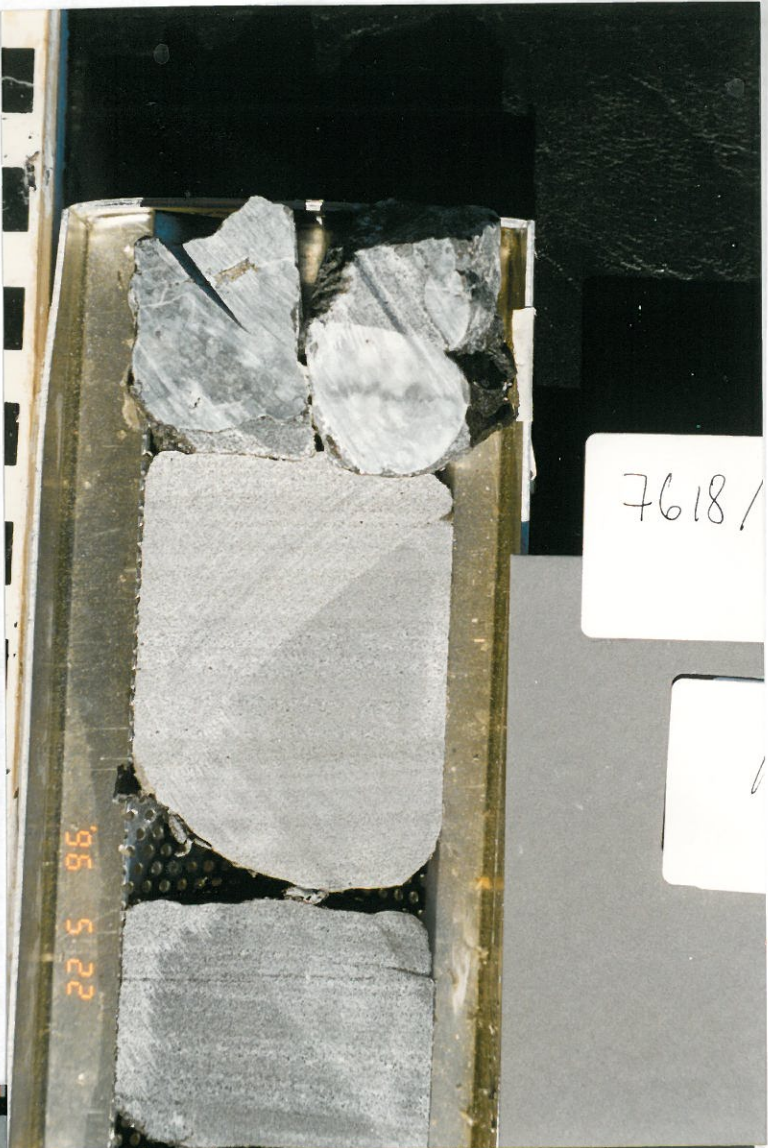


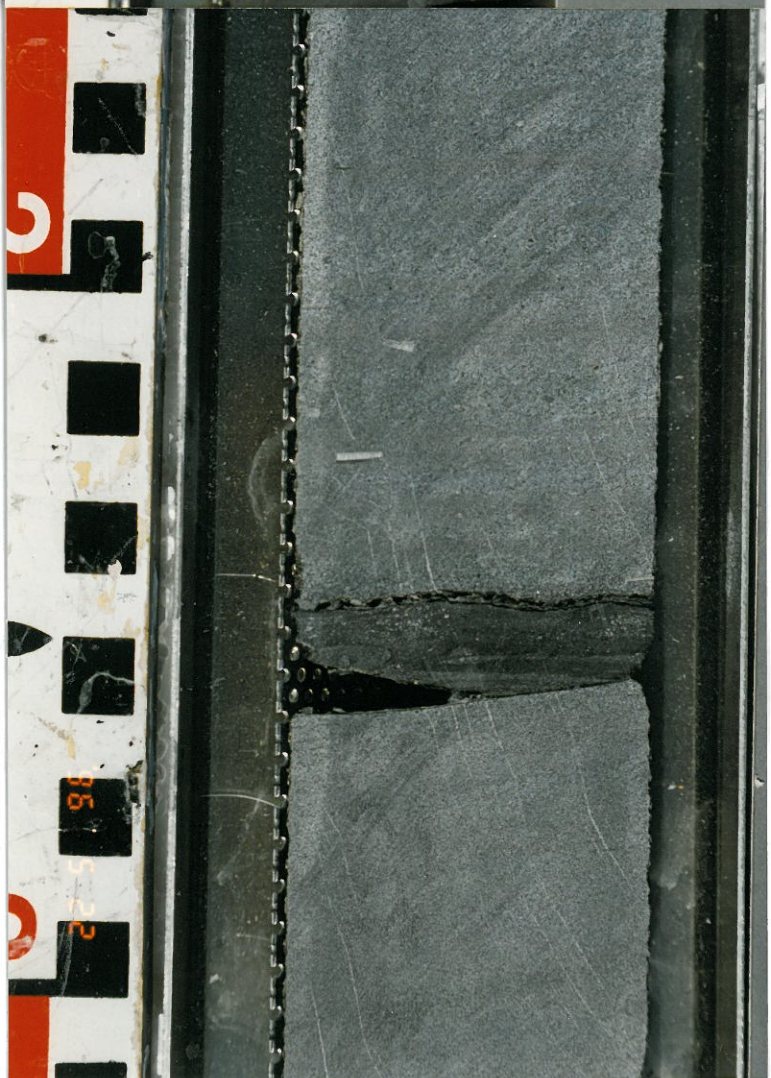
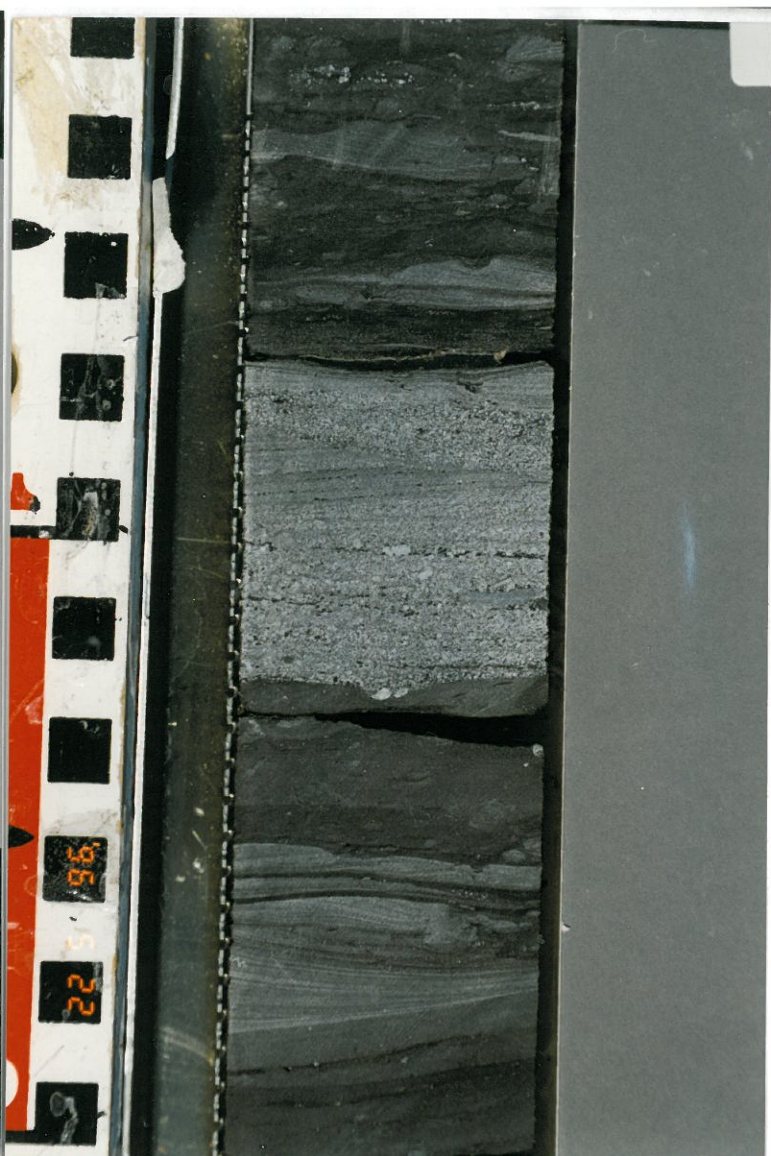
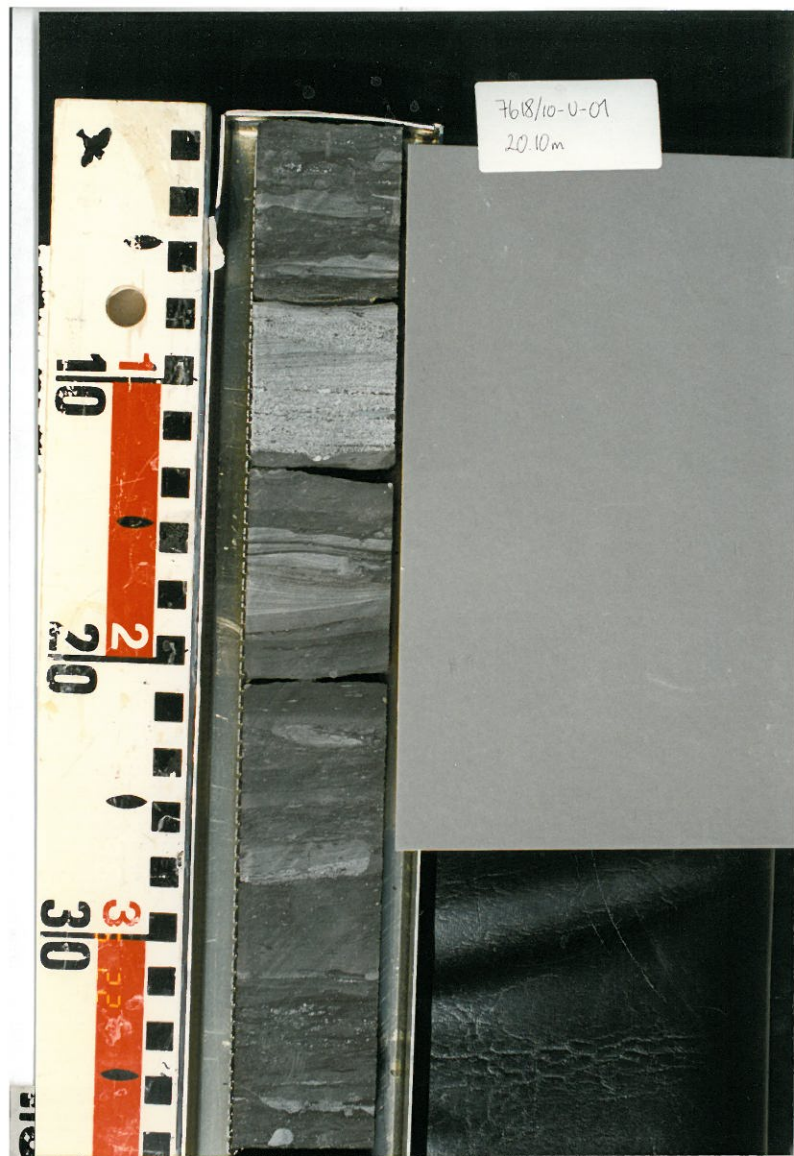
7618/10-0-01

~~Blank~~
15.10_m









7618/10-V-01

27.4m

SSS Finer 4

22 5 96

22 5 96

7618/10-V-01
25.70m

50 6 7 8
22 5 96

6

7

22 5 96

Core 7618/10-U-03

SEDIMENTOLOGY

Core data:

Quaternary overburden:	13.7 m
API-drilling in bedrock:	m
Core drilling in bedrock	8.65 m
Total depth below seafloor:	22.35m
Core recovery:	7.7 m

Age: Valanginian - Early Hauterivian

Formation: Knurr/Kolje Formation (Hammerfest Basin), Janusfjellet Formation (Spitsbergen)

There were no samples taken in the Quaternary sediments.

This core is not dated (poor recovery) but it is likely to be of Early Cretaceous age as it is similar to the core recovered from 7618/10-U-01. This section exhibits two depositional facies with buff, non-bioturbated, laminated fine grained sandstones (high density sandy turbidites) and black, sparsely bioturbated to laminated claystones (muddy shelf). The trace fossils present occur within the *Cruiziana* ichnofacies.

The core are subdivided into three lithological units:

Unit A 19.35 -22.35 m (base)

Dark grey to black, laminated to sparsely bioturbated (BI=2-3) silty claystones with scattered shell debris (?*Inoceramus* at 21.7 m) and *Phycosiphon*, *Schaubcylindrichnus*, small *Skolithos*, *Chondrites*, J-shaped burrows and *Planolites* (Plate 7D). A low to moderate diversity (BI=2-4) deposit-feeding community colonised a muddy shelf subjected to periodic anoxia.

Unit B 15.15 - 19.3 m

Interbedded dark grey to black, laminated to sparsely bioturbated (BI=2-3) claystones with *Phycosiphon*, *Schaubcylindrichnus*, *Chondrites* and *Planolites* and decimetre-scale pale grey, laminated, fine grained sandstones with coarser grained layers (Bilde 15.7 m). The sandstones shows parallel to low-angle cross stratification and wave ripple lamination and are colonised post-depositionally (top surface downwards) by assemblage of the overlying ichnofauna. Convex top surfaces and truncation surfaces can indicate hummocky cross-stratification (?). 1-5 cm thick matrix-supported unsorted to normal graded conglomeratic layers mainly consisting of subangular chert pebbles (up to 2x3 cm), rounded mud clasts and fossil fragments. The low to moderate diversity (2-4) deposit-feeding community indicate colonisation on a muddy shelf subjected to periodic anoxia with minor high density sandy turbidite deposition.

Unit C 14.13 (top) - 15.15 m

Pale grey, laminated to low-angle cross-stratified, very fine to fine grained sandstones with centimetre-scale coarse grained sandstone horizons. The sandstones are not colonised and are considered to be deposited by gravity flow rather than by storm processes.

The reservoir potential; (tabell I.2 , App. 1, vedlegg X)

WELL 7618/10-U-03

AGE	UNIT	LITHOLOGY AND SEDIMENTARY STRUCTURES		ICHOFAIES	BIOTURBATION INDEX	DEPOSITIONAL ENVIRONMENT	GROSS ENVIRONMENT				
VALANGINIAN - EARLY HAUTERIVIAN	C	14.13		CRUZIANA	1	High density sandy turbidites (channel) Interbedded high density sandy turbidites and periodically anoxic muddy shelf (channel wing) Periodically anoxic muddy shelf (muddy turbidites, minor sandy turbidites.)					
		15			2						
	B	16			3						
		17			4						
	A	18			5						
		19									
		20									
		21									

Cl Si vf f m c vc Cgl

1-200

H 9703006



