NO 34\11-4

①

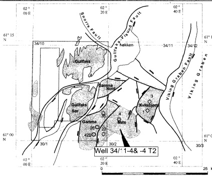
STATOIL

Norsk Hydro, Elf	**34/11-4 & 34/11-4T 2**	**Mats**
PARTNERS	WELL	PROSPECT STRUCTURE

COMPOSITE LOG
1 : 500

AREA:	Norwegian North Sea
LICENCE:	PL193
COORDINATES:	61deg 03' 26.2"N 02deg 22' 46.5"
KB:	24m
WATER DEPTH:	133m
TOTAL DEPTH:	4438m
FM. AT T.D.:	Cook Formation
SPUD DATE:	09.12.1998
RIG RELEASE:	14.04.1999
WELL STATUS:	Permanent plugged and abandoned
RIG:	Transocean Arctic
CONTRACTOR:	Transocean
GEOLOGIST :	O.Beyer, D.Phillips, T.F. Kristensen, S.Borthen, S.Bjerkenes, P.Furmyr
PREPARED BY:	J.M.Østby

LOCATION MAP



CASING DATA

LEAK OFF TESTS

30"	218 mMD	
20"	1210 mMD	1.69 g/cc
13 3/8"	3509 mMD	1.93 g/cc
9 7/8"	3939 mMD	(FIT) 2.12 g/cc

VELOCITY SURVEY

A zero incidence VSP survey was shot. Two runs in the the 17 1/2" section, one in open hole and one in 20" casing. One survey in the 12 1/4" section and into 13 3/8" casing. One survey in the 8 1/2" section and into the 9 7/8" casing.

LOGS RUN

CONTRACTOR: BAKER ATLAS

DLL-MAC-DGR-TTRM 1A: 2200 - 1100m 1B: 3513 - 2043m HDIL-MAC-DGR-TTRM 5C: 4435 - 3890m	ZDL-CND-DSL-TTRM 1A: 3507 - 1210m ZDL-CND-SGR-TTRM 5C: 4358 - 3939m	MAC-HDIP-ZDL-DGR -TTRM 2B: 3938 - 3500m	FMT-GR 4A: 4143.9 & 4145.7m 5B,C,D,E: 4297.5 - 4143	HDIP-DGR-TTRM 5B: 4376 - 3943m	VSP 1A: 3427 - 1630m 1B: 1200 - 780m 2C: 3930 - 3410m same run1750 - 1210m 5D: 4420 -400m	MWD LOGGING Runs 1 - 20

COMMENTS:

- The well was technically sidetracked from 1523 mMD after a twist-off in the mud motor.
- The 9 7/8" casing was backed off at several connections when drilling out the shoe and was leaking at several places when tested. Due to this most of the 9 7/8" casing was pulled and a technical sidetrack, named 34/11-4 T2, was drilled from 3580m using oil based mud.
- After final TD logging, the well 34/11-4 T2 was plugged back to 4020m and sidetracked from 4098m in order to get good HC samples in the reservoir using waterbased mud. This third technical sidetrack was named 34/11-4 T3.

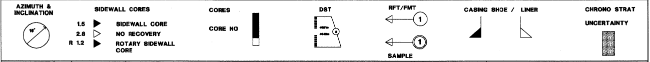
The log curves below are a composite of curves from both MWD and electric logging. The MWD-GR & RES are depth shiftet +1.5m at 3505m, 3524m, 3696m, 3776m and with +1.0m at 3836m to match wireline logs.

GR-curve : MWD-GR 218-1211m, MAC-GR 1211-3490m, MWD-GR 3490-3934.5m and MAC-GR 3934.5m-TD
RS-curve : RPCHM 218-1213m, wireline-RS 1213-3506m, RPCHM 3509-3933m and wireline R(20) 3939.5m-TD
RD-curve : RACHM 218-1216m, wireline-RD 1216-3505m, RACHM 3505-3509m, RACLM 3509-3933m and wireline R(90) 3939.5m-TD
DT-curve : MAC-runs 1A, 1B, 2B and 5C
CNC-curve : CDL-runs 1A and 1B
ZDEN-curve: ZDEN-runs 1A, 2B and 5C

LITHOLOGICAL SYMBOLS

CONGLOMERATE	SHALE	MARL	COAL LIGNITE	FORAMS	MICA
SAND SANDSTONE	LIMESTONE	TUFF	WOOD FRAGS	BURROWS	KAOLINITE
SILT SILTSTONE	CHALK	SALT GEN'L	FOSSILS GEN'L	PYRITE	CHERT
CLAY CLAYSTONE	DOLOMITE	ANHYDRITE	SHELL FRAGS	GLAUCONITE	SIDERITE

CUTTINGS/FLUORESCENCE ♢	OIL SHOW ●	OIL/GAS SHOW ✹	GAS SHOW ☼

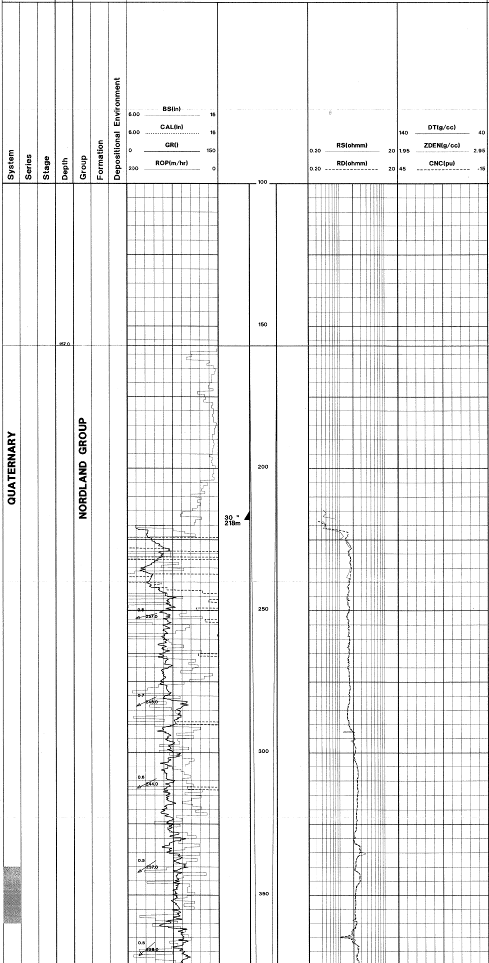


Chron Strat

Litho Strat

WELL 34/11-4 & 4 T2

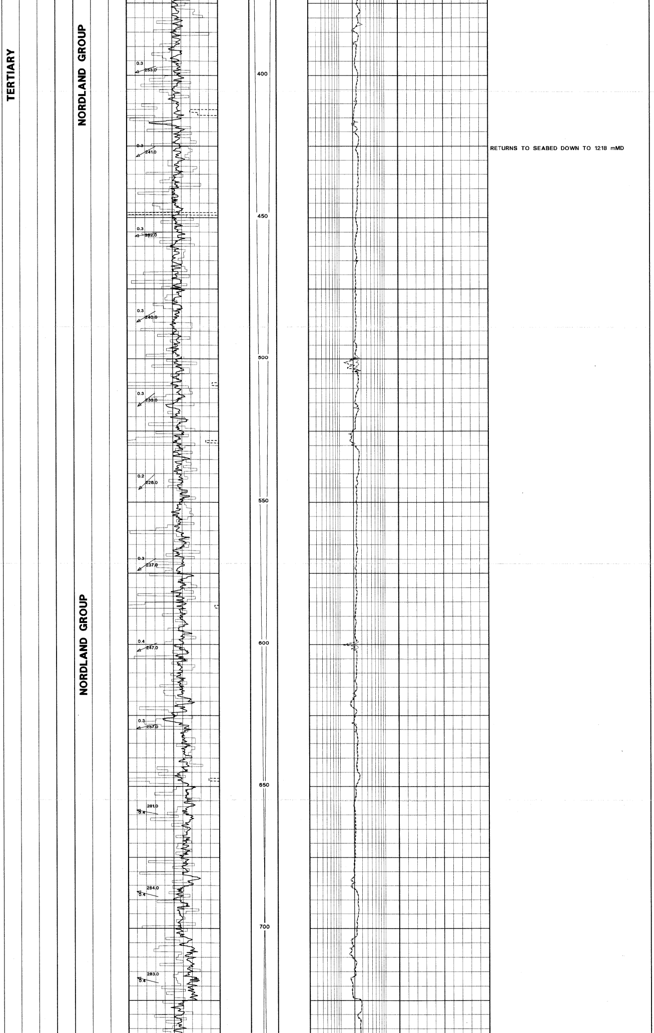
Lithological Descriptions



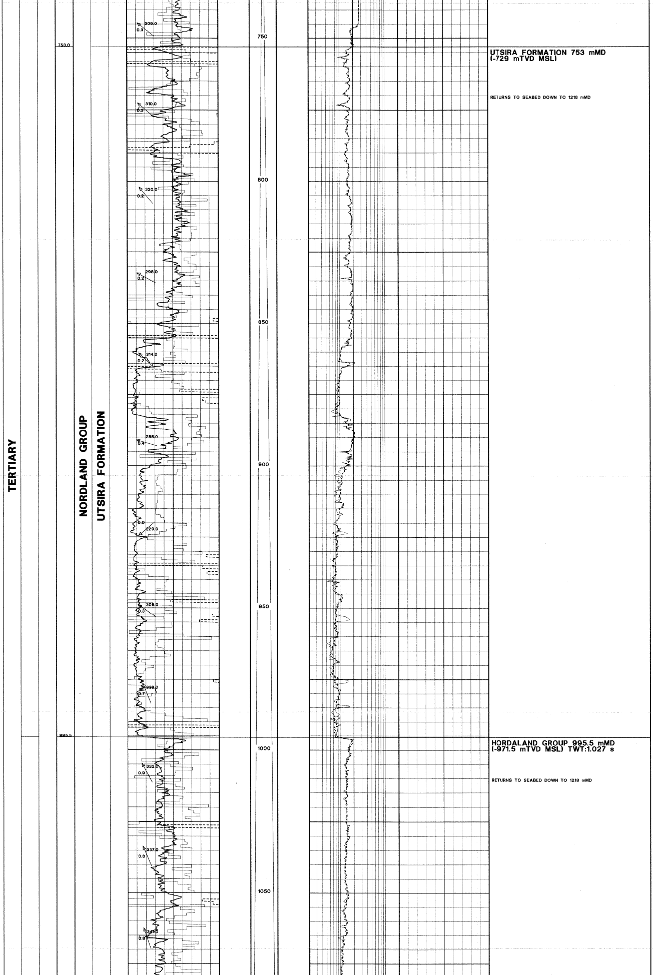
AIR GAP 24 m
WATER DEPTH 133 M

NORDLAND GROUP 157 mMD
(-133 mTVD MSL)

RETURNS TO SEABED DOWN TO 1218 mMD



RETURNS TO SEABED DOWN TO 1218 mMD

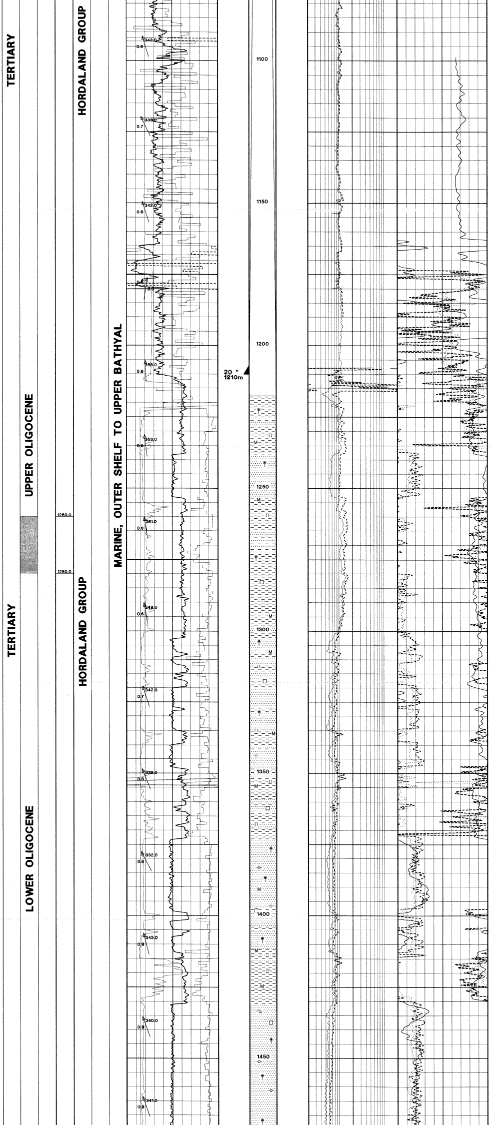


UTSIRA FORMATION 753 mMD
(-729 mTVD MSL)

RETURNS TO SEABED DOWN TO 1218 mMD

HORDALAND GROUP 995.5 mMD
(-971.5 mTVD MSL) TWT:1.027 s

RETURNS TO SEABED DOWN TO 1218 mMD



CLAYSTONE: predominantly olive grey, occasionally brownish grey, firm, subblocky to blocky, non calcareous, locally silty, occasionally grading to siltstone, trace micromicaceous, trace glauconitic

SANDSTONE: loose clear quartz grains, very fine to fine, well sorted, subangular to subrounded, trace glauconitic

CLAYSTONE: olive grey to olive black, occasionally brownish grey, traces dusky yellow brown, firm, subblocky to blocky, non calcareous, locally silty, micromicaceous, trace glauconitic, trace pyritic, trace very fine to fine sand

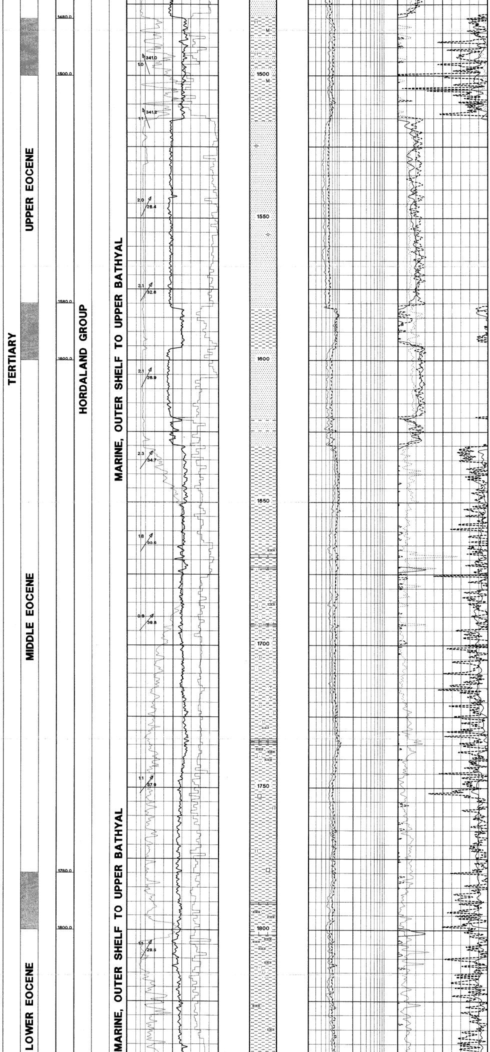
SANDSTONE: clear quartz grains, very fine to coarse, poor sorting, rounded to subrounded, traces light grey to greenish grey matrix, loose to friable, very fine to fine, well sorted, subrounded to subangular, well siliceous cemented

CLAYSTONE: olive black, olive grey to medium dark grey in parts, firm, subblocky to blocky, non calcareous, slightly silty to silty, locally micropyritic

SANDSTONE: clear quartz grains, occasionally pink translucent quartz, predominantly very fine to medium, poor to moderate sorted, rounded to subrounded, loose, good visible porosity

CLAYSTONE: olive black to dark grey to medium dark, firm, subblocky to blocky, non calcareous, slightly silty to occasionally silty, locally sandy, trace micropyritic

SANDSTONE: clear to translucent quartz grains, very fine to coarse, poor sorted, subrounded to rounded, loose, microfossils, pyritic



CLAYSTONE: medium dark grey to olive grey to dark greenish grey, firm to moderately hard, blocky, slightly micromicaceous, occasionally slightly silty, non calcareous

SANDSTONE: clear to translucent quartz grains, predominantly fine to medium, occasionally coarse, moderate to poor sorted, subangular to rounded, loose

CLAYSTONE: green grey to dark green grey, olive grey, medium grey, firm, blocky, non calcareous, trace micropyritic

SANDSTONE: clear to translucent quartz, fine to medium,occasionally coarse, moderatly sorted, predominantly subrounded, occasionally subangular and rounded, trace pyritic and glauconitic, loose, good visible porosity

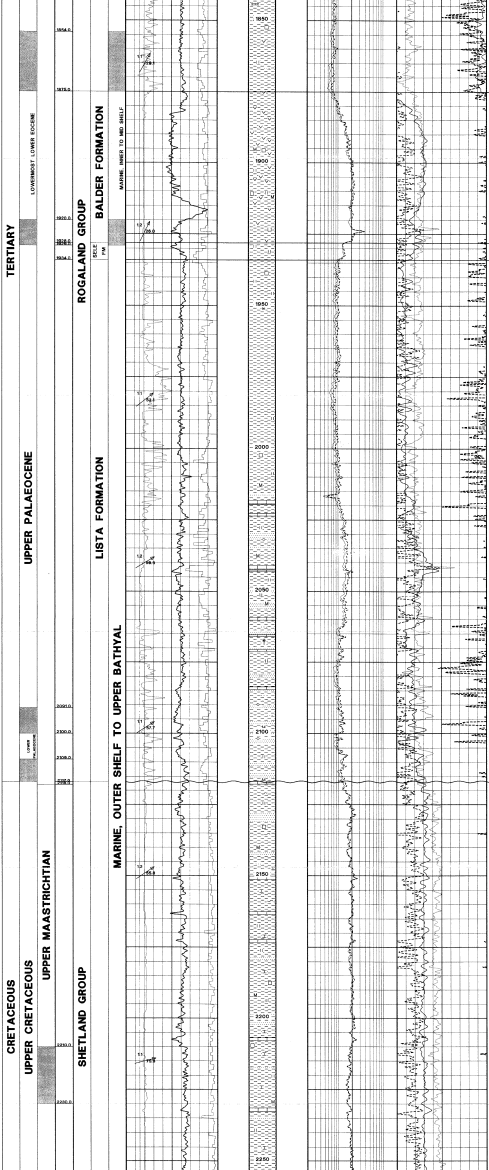
CLAYSTONE: medium grey to medium dark grey, dark greenish grey, olive grey to olive black, firm, blocky, non calcareous, trace micropyritic and glauconitic

LIMESTONE: very light grey to white, firm , blocky, microcrystalline, argillaceous in part

LIMESTONE: a.a.

SANDSTONE: a.a.

CLAYSTONE: olive grey to olive black, dusky brown, greenish black, dark greenish grey, dusky green, firm, blocky, non calcareous, micropyritic



ROGALAND GROUP
BALDER FORMATION 1875 mMD
(-1851 mTVD MSL) TWT:1.865 s

CLAYSTONE: medium grey to medium dark grey, occasionally dusky brown to greyish brown, soft to firm, amorphous to blocky, tuffaceous in parts, occasionally silty, trace micropyritic, non calcareous

TUFF: Bluish grey to medium grey, soft to firm, amorphous to grainy texture, speckled, non calcareous

SELE FORMATION 1928 mMD
(-1904 mTVD MSL) TWT:1.906 s

LISTA FORMATION 1934 mMD
(-1910 mTVD MSL) TWT:1.911 s

CLAYSTONE: medium grey to medium dark grey, firm, blocky, slightly silty and micromicaceous in parts, trace micropyritic, non calcareous

SANDSTONE: traces only

CLAYSTONE: occasionally dark green grey, else as above

LIMESTONE: yellowish white to medium light grey, firm to hard, micritic to microcrystalline, slightly argillaceous in parts

CLAYSTONE: medium dark to dark grey, occasionally brownish grey, occasionally dark greenish grey, firm, blocky, slightly silty to silty to occasionally grading to SILTSTONE, locally sandy, micromicaceous, non calcareous

SANDSTONE: light to medium grey to brownish grey, very fine to fine, occasionally medium, moderately sorted, subangular to subrounded, soft to friable, argillaceous and silty in parts, micaceous in parts, poor to fair visible porosity

SANDSTONE: fine to medium, trace coarse, moderately sorted, predominantly subrounded, loose

SHETLAND GROUP 2117 mMD
(-2093 mTVD MSL) TWT:2.071 s

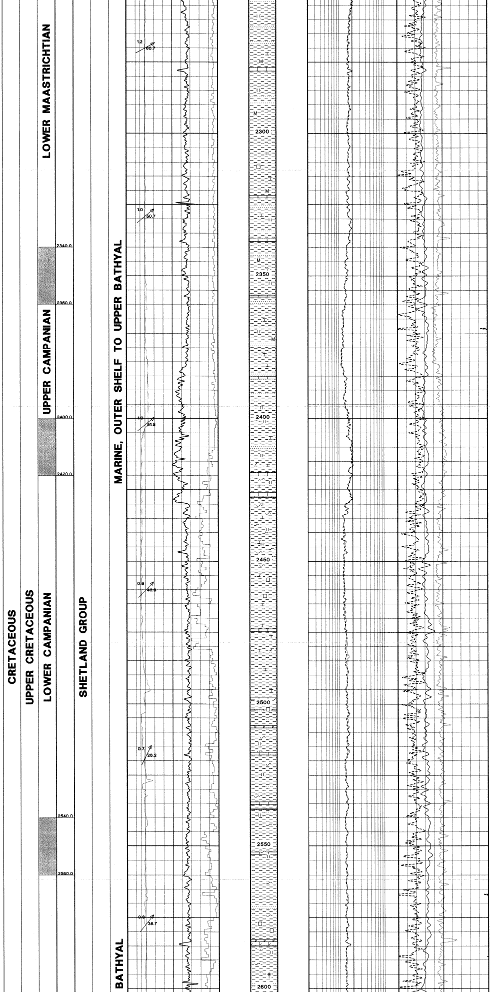
SANDSTONE: clear to translucent quartz grains, fine to occasionally medium to coarse, moderately sorted, subangular to subrounded, loose

CLAYSTONE: predominantly light to medium grey, occasionally medium dark grey, trace greenish and brownish grey, soft to firm, amorphous to blocky, sticky in parts, predominantly moderately to very calcareous, locally grading to MARL, silty, occasionally trace sand, occasionally micropyritic

LIMESTONE: white, pale yellow brown, firm, blocky, microcrystalline

CLAYSTONE: medium grey to medium dark grey, olive grey, soft to firm, amorphous to blocky, slightly silty to silty, micropyritic in parts, micromicaceous in parts, moderately to very calcareous

LIMESTONE: yellow grey to very light grey to light grey, soft to firm, micritic in parts, argillaceous in parts



SANDSTONE: clear to translucent quartz, very fine to fine, very well sorted, predominantly subrounded, loose

CLAYSTONE: predominantly medium grey, olive grey, soft to firm, amorphous, moderately silty, slightly sticky, moderately to very calcareous

CLAYSTONE: medium grey to medium dark grey, olive grey, soft to firm, amorphous to blocky, silty, micronicaceous in parts, moderately to very calcareous

LIMESTONE: yellow grey to very light grey to light grey, soft to firm, micritic in parts, argillaceous in parts

SANDSTONE: clear to translucent quartz, predominantly fine, well sorted, predominantly subrounded, loose, trace rose quartz

CLAYSTONE/MARL: predominantly moderately red brown to moderately brown, firm to moderately hard, blocky, very calcareous

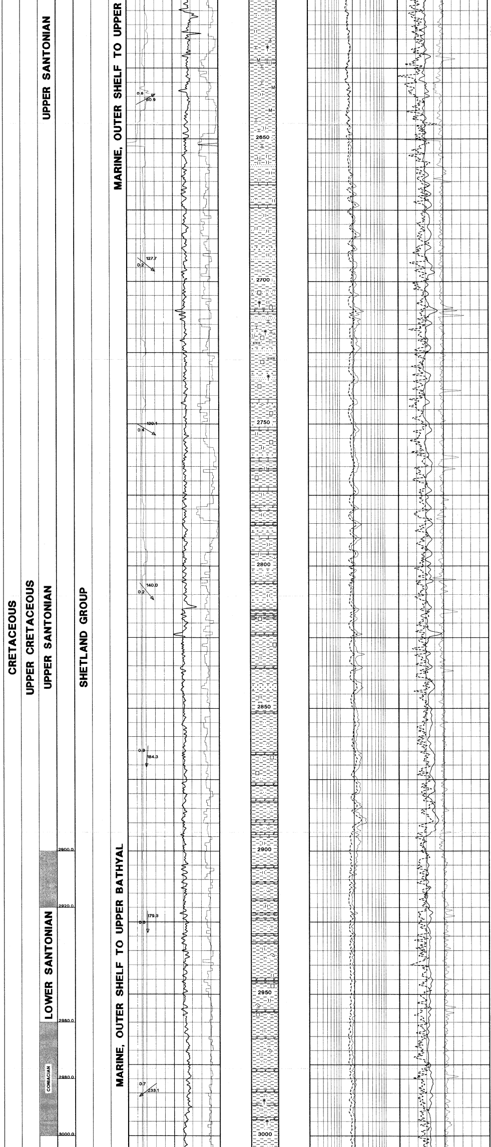
LIMESTONE/MARL: white, light grey, firm, blocky, sandy

CLAYSTONE: medium grey to dark grey, also light grey, occasionally moderately brown, firm, subblocky, silty, moderately calcareous, marly in parts

LIMESTONE: dolomitic, light brown, grey orange, angular to blocky, firm to moderately hard

SANDSTONE: clear to translucent quartz, predominantly fine, well sorted, predominantly subrounded, loose, trace rose quartz

DOLOMITE: grading to LIMESTONE, light brown, grey orange, angular to blocky, firm to moderately hard



CLAYSTONE: predominantly medium grey, also light grey, occasionally dark green grey, firm, subblocky, silty, moderately calcareous, marly in parts

SILTSTONE: argillaceous, light brown grey, firm, subblocky, non to slightly calcareous, trace glauconite

SANDSTONE: light brown, translucent quartz, very fine to fine, firm, argillaceous, slightly silica cemented

DOLOMITE/LIMESTONE: light brown, angular to blocky, firm to moderately hard, sandy

CLAYSTONE: predominantly medium dark grey, occasionally dark green grey, firm, blocky, silty to very fine sandy, non calcareous, crumbly texture

SILTSTONE/SANDSTONE: light brown grey to grey, firm, subblocky, non to slightly calcareous, trace glauconitic, also as clear to translucent quartz grains floating in matrix, predominantly very fine to fine

CLAYSTONE: predominantly medium dark grey, firm, blocky, silty to very fine sandy, non calcareous, crumbly texture

DOLOMITE/LIMESTONE: light brown, angular to blocky, firm to moderately hard, sandy

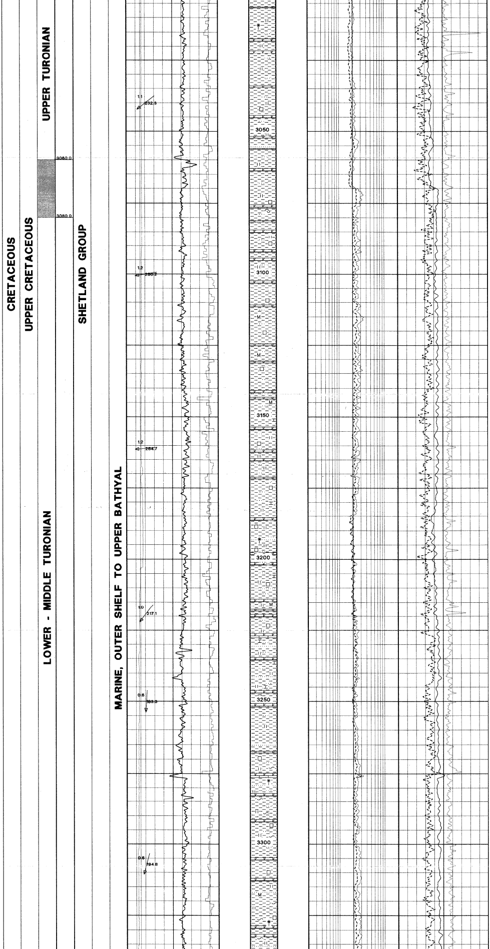
CLAYSTONE: predominantly olive grey, grading to MARL, else as above

CLAYSTONE: predominantly medium grey to medium dark grey, trace moderately brown, else as above

CLAYSTONE: predominantly medium grey to medium dark grey, firm, blocky, silty to very fine sandy, non calcareous, crumbly texture

DOLOMITE/LIMESTONE: light brown, angular to blocky, firm to moderately hard, sandy, also off white crystalline LIMESTONE

CLAYSTONE: also dark green grey, slightly to moderately calcareous, else as above



DOLOMITE/LIMESTONE: predominantly dolomitic, crystalline to fibrous

CLAYSTONE: predominantly medium grey to medium dark grey, firm, blocky, in parts silty to very fine sandy, slightly to moderately calcareous, locally crumbly texture

DOLOMITE/LIMESTONE: light brown, trace light brown translucent, angular to blocky, firm to moderately hard, also crystalline fibrous and hard

SANDSTONE: predominantly clear quartz, very fine to fine, well sorted, subrounded to rounded, friable to loose, slightly calcareous cemented

CLAYSTONE: medium grey to medium dark grey, light brown grey, firm, blocky, in parts silty to very fine sandy, generally moderately calcareous, crumbly texture, traces black microspecks

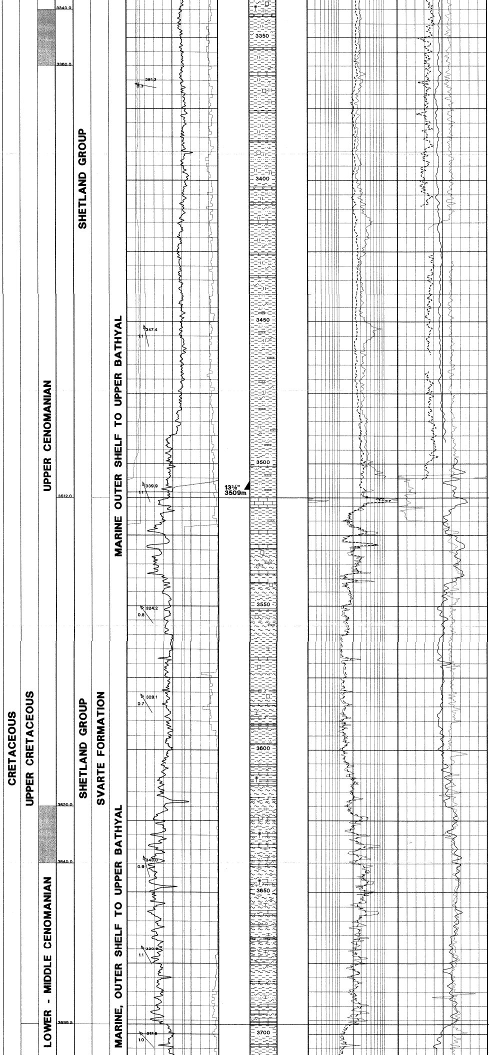
CLAYSTONE: predominantly light to medium grey, firm, subblocky to blocky, moderately calcareous to calcareous, traces black microspecks

DOLOMITE/LIMESTONE: light brown, trace light brown translucent, angular to blocky, firm to moderately hard, also crystalline fibrous and hard, also occasionally grading to calcareous cemented SANDSTONE

SANDSTONE: predominantly clear quartz, very fine to fine, well sorted, subrounded to rounded, friable to loose, slightly calcareous cemented

CLAYSTONE: in part very calcareous grading to MARL, else as above

CLAYSTONE: predominantly light to medium grey, firm, subblocky to blocky, very calcareous grading to MARL, in parts moderately silty to very fine sandy, traces black microspecks



DOLOMITE/LIMESTONE: as above

CLAYSTONE: predominantly brown grey to brown black, occasionally olive grey, very silty grading to SILTSTONE in parts

CLAYSTONE: light to medium grey, firm, subblocky to blocky, very calcareous grading to MARL, in parts moderately silty to very fine sandy, traces black microspecks, crumbly texture

LIMESTONE: white, light to dark yellow brown, cryptocrystalline to crystalline, soft to firm, subblocky, argillaceous in parts

CLAYSTONE: also dark green grey, glauconitic in part, else as above

LIMESTONE: as above

CLAYSTONE: as above

SVARTE FORMATION 3512 mMD (-3487.5 mTVD MSL) TWT:3.030 s

LIMESTONE: predominantly light brown grey, off white, microcrystalline, argillaceous in part, firm to moderately hard, subblocky to blocky

CLAYSTONE: dark grey to dark greenish grey, hard, subfissile to fissile, moderately to very calcareous

MARL: light to medium grey, soft to firm, amorphous to blocky, in parts slightly silty, occasionally less argillaceous and grading to limestone

LIMESTONE: off white to light grey, firm to moderately hard, micritic, sandy in parts and slightly glauconitic

MARL: light to medium grey, occasionally bluish grey, firm, subblocky, argillaceous microlaminations

CLAYSTONE: medium grey, occasionally light olive grey, firm, blocky, silty in parts, very calcareous grading to MARL

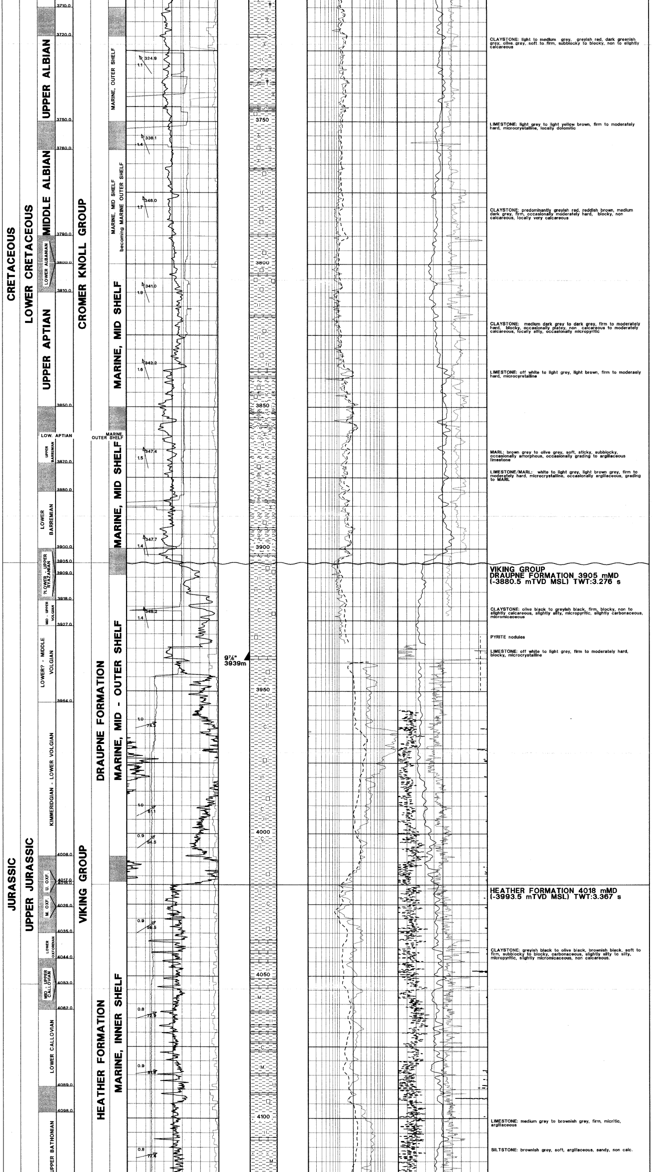
MARL: light grey to olive grey, firm, subblocky to blocky, locally silty

LIMESTONE: off white to light grey, firm to moderately hard, blocky, micritic, occasionally microcrystalline, traces sandy, traces glauconitic

CLAYSTONE: medium grey to medium dark grey, traces dark grey, firm to moderately hard, blocky to subfissile, occasionally flakey, slightly to very calcareous

LIMESTONE: off white to light grey, soft to firm, subblocky to blocky, microcrystalline, occasionally argillaceous

CROMER KNOLL GROUP 3696.5 mMD (-3672 mTVD MSL) TWT:3.138 s



CLAYSTONE: light to medium grey, greyish red, dark greenish grey, olive grey, soft to firm, subblocky to blocky, non to slightly calcareous

LIMESTONE: light grey to light yellow brown, firm to moderately hard, microcrystalline, locally dolomitic

CLAYSTONE: predominantly greyish red, reddish brown, medium dark grey, firm, occasionally moderately hard, blocky, non calcareous, locally very calcareous

CLAYSTONE: medium dark grey to dark grey, firm to moderately hard, blocky, occasionally platey, non calcareous to moderately calcareous, locally silty, occasionally micropyritic

LIMESTONE: off white to light grey, light brown, firm to moderaely hard, microcyrstalline

MARL: brown grey to olive grey, soft, sticky, subblocky, occasionally amorphous, occasionally grading to argillaceous limestone

LIMESTONE/MARL: white to light grey, light brown grey, firm to moderately hard, microcrystalline, occasionally argillaceous, grading to MARL

VIKING GROUP
DRAUPNE FORMATION 3905 mMD
(-3880.5 mTVD MSL) TWT:3.276 s

CLAYSTONE: olive black to greyish black, firm, blocky, non to slightly calcareous, slightly silty, micropyritic, slightly carbonaceous, micromicaceous

PYRITE nodules

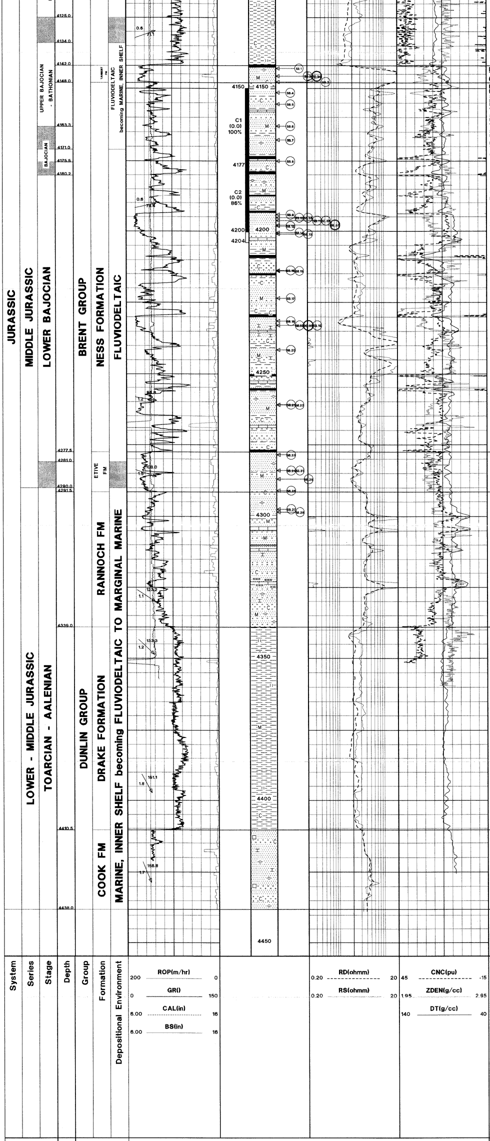
LIMESTONE: off white to light grey, firm to moderately hard, blocky, microcrystalline

HEATHER FORMATION 4018 mMD
(-3993.5 mTVD MSL) TWT:3.367 s

CLAYSTONE: greyish black to olive black, brownish black, soft to firm, subblocky to blocky, carbonaceous, slightly silty to silty, micropyritic, slightly micromicaceous, non calcareous.

LIMESTONE: medium grey to brownish grey, firm, micritic, argillaceous

SILTSTONE: brownish grey, soft, argillaceous, sandy, non calc.



BRENT GROUP
TARBERT FORMATION 4142 mMD
(-4117.5 mTVD MSL) TWT:3.453 s

NESS FORMATION 4148 mMD
(-4123.5 mTVD MSL) TWT:3.457 s

SANDSTONE: dark brownish grey to brownish black, clear light brown quartz, very fine to fine, well sorted, moderately hard to hard, silica cemented, micaceous to micromicaceous, occasionally carbonaceous, poor visible porosity.

SHOWS: trace dull yellow direct fluorescence, slow streaming to blooming dull yellow white to bright bluish white cut fluorescence, occasionally HC odour and dark brown stain.

SHALE: silty to sandy in part, brownish black, hard, micaceous to micromicaceous, carbonaceous in parts, non calcareous.

LIMESTONE: medium grey, hard, blocky, micritic, argillaceous, silty to sandy.

COAL: black, moderately hard, brittle, argillaceous.

SANDSTONE, SHALE interbedded, as above

LIMESTONE & COAL stringers, as above

SANDSTONE: dark brownish grey, light brown clear quartz, medium, partly coarse, well to moderately sorted, subangular to subrounded, hard, silica cemented, micaceous, partly argillaceous matrix, poor to very poor visible porosity, brown stain.

SHOWS: very dull yellow direct fluorescence, instant to slow streaming bright bluish white cut fluorescence, bright yellow residual fluorescence

SHALE: brownish black, moderately hard, subfissile to fissile, carbonaceous to coaly, non calcareous

COAL: black, shiny, brittle, occasionally brownish black and argillaceous.

SILTSTONE: brownish grey, sandy, firm to hard, carbonaceous, partly micaceous, non calcareous

ETIVE FORMATION 4277.5 mMD
(-4253 mTVD MSL) TWT: 3.536 s

SANDSTONE: light brown clear quartz, predominantly fine to medium, occasionally coarse, moderately to well sorted, subrounded, partly with off white argillaceous matrix, carbonaceous, friable to moderately hard.

RANNOCH FORMATION 4291.5 mMD
(-4267 mTVD MSL) TWT:3.544 s

SANDSTONE: pale brown to moderately yellow brown clear quartz, fine, partly medium to coarse, moderately sorted, subangular, hard, silica & calcareous cemented, non to very poor visible porosity

LIMESTONE: off white, hard, sandy in parts, grading to calcareous sandstone

SILTSTONE: brownish grey, sandy, firm, carbonaceous, very slightly micaceous, non calcareous.

DUNLIN GROUP
DRAKE FORMATION 4338.5 mMD
(-4314.5 mTVD MSL) TWT:3.570 s

SHALE: predominantly brownish black to olive black, greyish black, moderately hard to firm, subfissile, blocky in parts, slightly carbonaceous, slightly silty, slightly micromicaceous, non calcareous.

COOK FORMATION 4410.5 mMD
(-4386 mTVD MSL) TWT:3.615 s

SANDSTONE: light brown, clear to translucent quartz, fine to very coarse, poor sorted, subangular to subrounded, calcareous cemented, occasionally with argillaceous matrix, moderately hard, poor visible porosity

SILTSTONE: brownish grey, firm, blocky, slightly micromicaceous, carbonaceous, slightly micropyritic in parts.

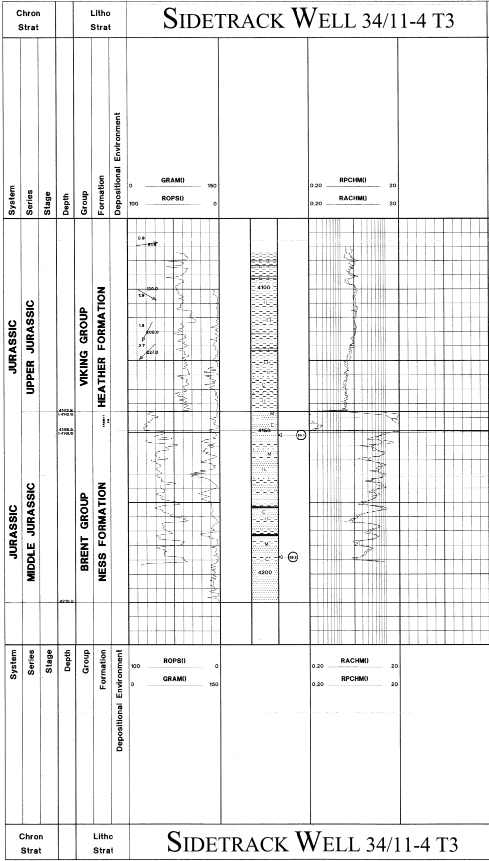
TD AT 4438 mMD (-4413.5 mTVD MSL)

WELL 34/11-4 & 4 T2

Lithological Descriptions

SIDETRACK WELL 34/11-4 T3

Lithological Descriptions



SIDETRACKED FROM 4098 mMD

LIMESTONE: brownish grey to yellowish grey, medium grey, predominantly micritic, occasionally crystalline to microcrystalline, argillaceous

CLAYSTONE: greyish black to olive black, occasionally brownish black, soft to firm, occasionally moderately hard, subblocky to blocky, silty, occasionally grading to siltstone, micromicaceous, micropyritic, non calcareous

BRENT GROUP
TARBERT FORMATION 4143 mMD
(-4118.5 mTVD MSL)

NESS FORMATION 4149.5 mMD
(-4125.0 mTVD MSL)

SANDSTONE: dark brownish grey to brownish black, clear to light brown quartz, very fine to fine, well sorted, moderately hard to hard, silica cemented, micaceous to micromicaceous, occasionally carbonaceous. poor visible porosity

SHALE: brownish black, hard, micaceous - micromicaceous, silty - sandy in parts, non calcareous, carbonaceous in parts

LIMESTONE: medium grey, hard, blocky, micritic, argillaceous, silty to sandy

COAL: black, moderately hard, brittle, argillaceous

SANDSTONE: dark brownish grey, light brown clear quartz, medium, occasionally coarse, moderately to well sorted, subangular to subrounded, hard silica cement, micaceous, partly argillaceous matrix, poor to very poor visible porosity, brown staining

SHALE: brownish black, moderately hard, subfissile - fissile, carbonaceous - coaly, non calcareous

TD OF WELL AT 4210 mMD
(-4185.5 mTVD MSL)

SIDETRACK WELL 34/11-4 T3

Lithological Descriptions