STATOIL, BP Norge AS, Norske Conoco AS

PARTNERS

STATOIL

WELL **6706/11-1**

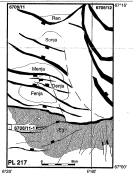
VEMA, Ægir Prospect

PROSPECT STRUCTURE

COMPOSITE LOG
1 : 500

AREA:	Vøring Basin, Vema Dome
LICENCE:	PL 217
COORDINATES:	67degr 04min 24,77sec N 06degr 27min 47,70sec E
K.B.:	26m
WATER DEPTH:	1238m
TOTAL DEPTH:	4317 mMD /4306 mTVD
FM. AT T.D.:	Lange Formation
SPUD DATE:	12th October 1997
RIG RELEASE:	22nd March 1998
WELL STATUS:	P&A, Dry Well
RIG:	Ocean Alliance
CONTRACTOR:	Diamond Offshore
GEOLOGIST:	Langset, Basset, Bjørgen, Hunnes, Bjerkenes, Kristensen, Phillips, Elkefet, Johnsen, Beyer, Furmyr, Borthen
PREPARED BY:	O. Hunnes DATE: 19th March 1998

LOCATION MAP



CASING DATA / LEAK OFF TESTS

CASING DATA		LEAK OFF TESTS
30"	1341 mMD	
20"	1641 mMD	1.15 g/cc
16"	1907 mMD	1.26 g/cc (FIT)
9 5/8"	2246 mMD	1.36 g/cc

VELOCITY SURVEY

Schlumberger run normal incident VSP from TD to 2177m with 15m spacing and with 12m spacing from 2177m to 1500m (See log runs below)

LOGS RUN

CONTRACTOR: SCHLUMBERGER/SPERRY SUN

DSI-LDT-NGT 1A: Without source 1B: 2220-1908m DSI inside casing from 1908-1641m	PEX/HALS-DSI-NGT 3A: 3320-2243m 4B: 4228.7-3200m 5C: 4315-3700m PEX/HALS logged up to 3200m	RFT-GR 2A: 2290-2288m	MDT-GR 3A: 3193-2287m 5B: 4215-3102m VSP-GR 1A: 2177-1500m 4B: Misrun 5C: Misrun 5D: 4310-3403m Aborted due to weather 5E: 3400-2045m	FMI-GR 4A: 4231-4100m 3770-3725m 3475-3370m 3200-2275m CBL-GR 4A: 1980-1550m (In 16" liner)	CST-GR 5A: 4317-3427m 5B: 3419-2266m 5C: 4276-3434.5m 5D: 4180-2266m 5E: Misrun 5F: 4142-2404.1m	MWD (Sperry Sun) See comments below PWD (Sperry Sun) See comments below

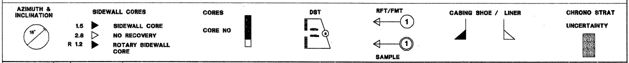
COMMENTS:

NOTE 1: The well 6706/11-1 is the second re-spud. Two attempts which failed prior to this are named 6706/11-1Z and 6706/11-1Y respectively.
NOTE 2: The log curves for the upper part of the hole are MWD logs from the first spud, well 6706/11-1Z, in the pilot hole. These logs stop at 1907mMD, 1962mMD and 1956mMD for the GR/density, resistivity and porosity logs respectively. The curves below these depths are E-logs (MWD resistivity down to 2243mMD) from the 2nd respud, well 6706/11-1. The lithology description, including the paleodatings, is entirely taken from the 2nd. respud.
NOTE 3: The chrono-stratigraphical sub-division down to 1907 m is adjusted to fit the log readings from the pilot hole in well 6706/11-1Z (1st. spud).
NOTE 4: MWD-logs: MWD including gamma ray, resistivity, neutron, density, directional and PWD (Pressure While Drilling) was run in the pilot hole for the first spud, well 6706/11-1Z. Only directional services were run in the 1st. re-spud, well 6706/11-1Y. In the 2nd. respud, well 6706/11-1, the MWD includes gamma ray, resistivity, directional and PWD services. PWD was not included for the interval 2249 mMD - 2287 mMD.
NOTE 5: 6 run of CST-GR were carried out in the 8 1/2" hole. Due to many misfires and multiple shots at the same levels, all shots are not marked on the logs. More details are given in the Final Well Report.
NOTE 6: All core depths are corrected to log depths.

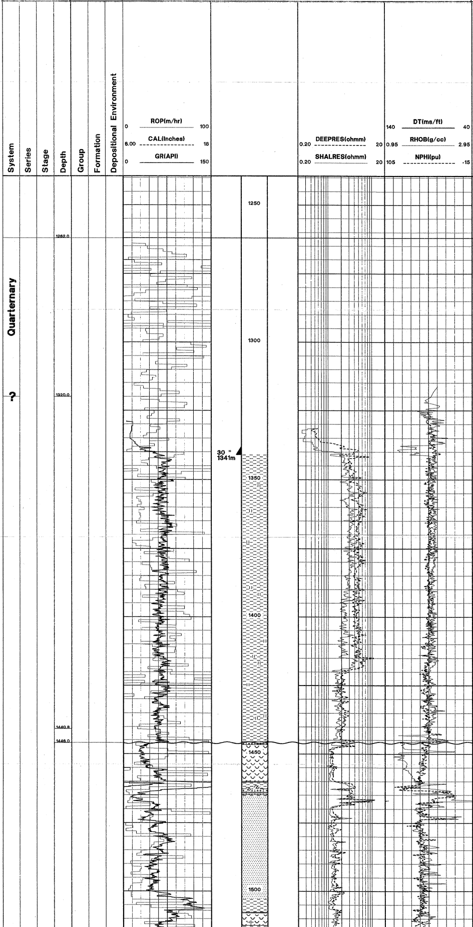
LITHOLOGICAL SYMBOLS

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
OOZE	☐	☐	☐	☐	☐

CUTTINGS/FLUORESCENCE ◇ OIL SHOW ● OIL/GAS SHOW ✸ GAS SHOW ☼



Chron Strat	Litho Strat	Well Log	Lithological Descriptions



FIRST SPUD AND FIRST RE-SPUD,
6706/11-1Z AND 6706/11-1Y:
SEABED AT 1262 m TVD RT.
RT : 26 m
WATERDEPTH: 1236 m

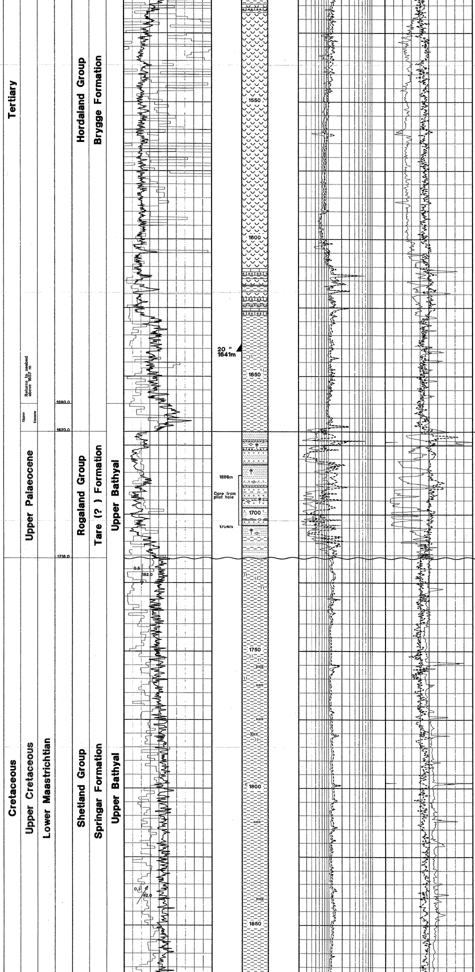
SECOND RE-SPUD, 6706/11-1:
SEABED AT 1264m TVD RT.
RT : 26 m
WATERDEPTH: 1238 m

30" casing at 1341 mMD RT

RETURNS TO SEABED DOWN TO 1657 mMD RT IN THE SECOND RE-SPUD, WELL 6706/11-1. LITHOLOGY INTERPRETED FROM MWD-LOGS ABOVE THIS DEPTH

BRYGGE FORMATION 1446 mMD
(-1420 mTVD MSL)

Intrerpretation of lithology based on MWD



Lithology interpreted as ooze layers based on logs (mainly from the density log)

The main lihology is interpreted as OOZE with beds of clay/claystone and some cemented stringers from 1610 m to 1620 m

20" casing at 1641 mMD RT

Claystone: olive grey to dark greenish grey to brownish grey, blocky, soft to firm, silty in part, slightly calcareous.

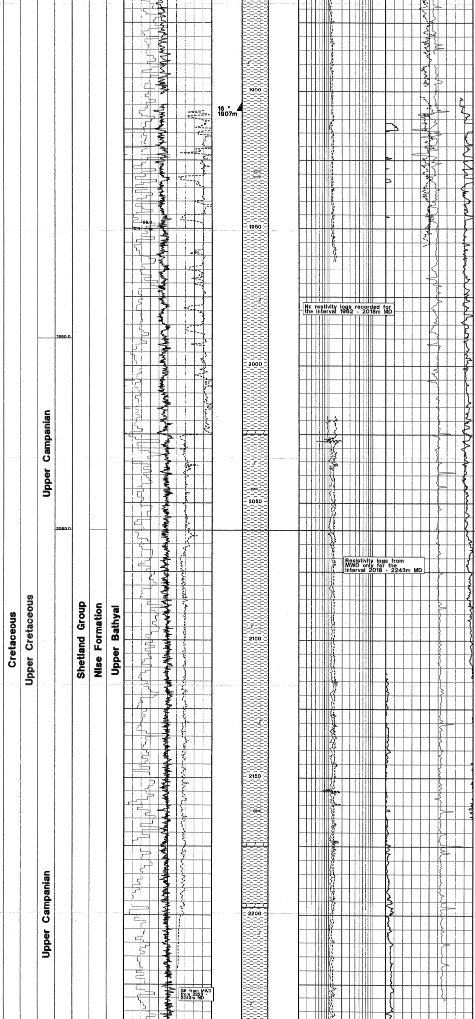
Top Tare (?) Formation 1670 mMD RT (-1644 mTVD MSL). TWT: 2.179s

Sandstone: silty to argillaceous, greenish grey, transparent to milky white quartz, silt to very coarse, poorly sorted, subangular, argillaceous matrix, friable to soft, glauconitic, noncalcareous, tuffaceous (?), micaceous.

Top Springar Formation 1716 mMD (-1690 mTVD MSL). TWT: 2.229s

Claystone: olive grey to greenish grey, soft to firm, blocky, slightly silty in part, noncalc, occasionally pyrittic.

Limestone stringers: dolomitic in part, greyish brown to brownish grey, light grey to off white, firm to hard, soft in the less dolomitic parts, blocky, argillaceous, microcrystalline in dolomitic parts, micritic in calcareous parts.



No restivity logs recorded for the interval 1962 - 2018m MD

Resistivity logs from MWD only for the interval 2018 - 2243m MD

GR from MWD from 2223 - 2243m MD

16" liner at 1907 mMD RT

Logs taken from MWD above 1907mMD for the GR and density, 1962mMD for the resistivity and 1956mMD for the porosity. MWD logs are from pilot hole in the 1st. spud, well 6706/11-1Z. E-logs (MWD resistivity down to 2243mMD) from well 6706/11-1 below these depths.

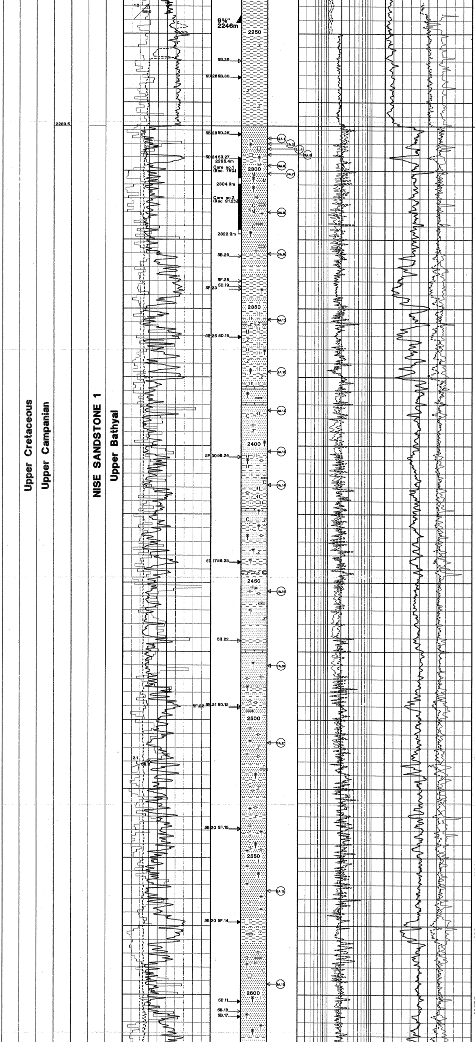
Drilled 14 3/4" hole down to 2026m, changed to 12 1/4" bit.

Top Nise Formation 2060 mMD (-2034 mTVD MSL) TWT: 2.584 s

Claystone: dark grey, firm, blockey, slightly silty, slightly micromicaceous, non calcareous

Claystone: dark grey, firm to moderate hard, blocky, non calcareous, trace glauconite

Dolomite: greyish brown, hard, blocky, microcrystalline, occasionally brown grey to light grey to off white, grading to limestone, argillaceous



9 5/8" CASING AT 2246 mMD RT

Claystone: dark grey to medium dark grey, firm to moderately hard, blocky, non calcareous

Dolomite: greyish brown, hard, blocky, microcrystalline, occasionally brown grey to light grey to off white, grading to limestone, argillaceous

Top Nise Sandstone 1 2283.5 mMD RT (-2257.5 mTVD MSL). TWT: 2.785s

CLAYSTONE: olive grey to dark grey, fissile to subfissile, slight waxy appearance, micromicaceous and non calcareous

SANDSTONE (core no. 1-2): quartz, predominantly fine to medium, occasionally very fine, subrounded, moderately to well sorted, predominantly friable to loose, occasionally slightly calcareous cemented, abundand glauconite and mica in parts, occasionally carbonaceous fragments, good visible porosity

SHOWS (in core no.1-2): no hydrocabon odour, no stain, no direct fluorescence, weak dull yellow green cut fluorescence

CLAYSTONE: greyish black, firm, silty to sandy, blocky to subfissile, non calcareous, traces of glauconite

SANDSTONE: quartz, clear to transluscent, dom very fine, well sorted, subrounded, also coarse to very coarse, rounded grains, all loose

CLAYSTONE: greyish black, silty and sandy, firm, blocky to subfissle, non calcareous, trace glauconite

SANDSTONE: quartz, light grey, clear to transclucent, very fine to fine, well sorted, predominantly loose to friable, also calcareous cemented, also medium to coarse rounded, loose grains, good traces of glauconite, traces of carbonaceous fragments, moderately visible porosity

SHOWS: weak dull yellow slow streaming cut fluorescence - mud effect

CLAYSTONE: dark greenish grey, olive grey, blocky - subfissile, firm, occasionally hard, non calcareous, waxy appearance

SANDSTONE: quartz, light grey, clear to transclucent, very fine to fine, occasionally medium to coarse, well sorted, predominantly loose to friable, also calcareous cemented, good traces of glauconite

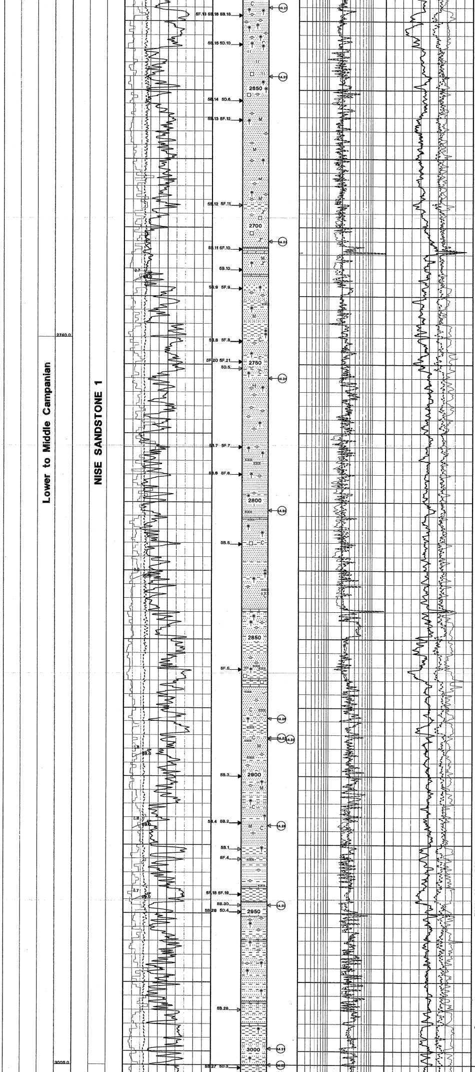
SHOWS: No direct fluorescence. None to very weak dull yellow cut flucrescence

SANDSTONE: quartz, clear to translucent, well sorted, subrounded to rounded, predominantly medium, occasionally fine and coarse, loose grains, glauconitic

SANDSTONE: quartz, clear to translucent, loose grains, medium to coarse, subangular to subrounded, moderately sorted. Also medium grey to medium dark grey, very fine, very glauconitic and very argillaceous SANDSTONE, in part grading to silty to sandy claystone, in part carbonaceous fragments

CLAYSTONE: medium dark grey, soft to firm, blocky, non calcareous, occasionally carbonaceous fragments, micropyritic and occasionally sandy

SANDSTONE: quartz, clear to translucent, loose grains, predominantly medium, subangular to subrounded, moderately sorted. Also medium grey, very fine, very glauconitic and very argillaceous SANDSTONE, in part grading to silty to sandy claystore, in part carbonaceous fragments



CLAYSTONE: medium dark grey, soft to firm, blocky, non calcareous

DOLOMITE: light brown grey, firm, argillaceous, also yellow brown, very hard, angular

SILTSTONE: olive grey, moderately hrd, calcareous, argillaceous, good traces of glauconite & carbonaceous specks

CLAYSTONE: dark medium grey to olive grey, soft, very silty to sandy, non calcareous

SANDSTONE: quartz, clear to translucent, generally fine to medium, subrounded, moderately sorted to well sorted, loose, also medium light grey SANDSTONE, very fine, friable, very glauconitic, very micaceous, light grey matrix, occasionally grading to sandy/ silty claystone, fair to good visible porosity

SANDSTONE: quartz, clear to translucent, fine to medium, subrounded, moderately sorted, loose

LIMESTONE: light grey, very sandy to silty, glauconitic, occasionally grading to calcareous sandstone

Interval 2850 - 3008 m: Interbedded argillaceous/ calcareous sandstone, sandy claystone and beds of clean sandstone. Thin beds of limestone.

CLAYSTONE: brown grey, olive brown, soft to firm, silty, non calcareous, trace carbonaceous material

SANDSTONE: quartz, clear to transluscent, fine to medium, rounded , well sorted, also very fine, friable, soft to firm, silty and calcareous matrix, good traces of glauconite assosiated with calcareous matrix, occ traces of carbonaceous fragments, no visible porosity

LIMESTONE: off white, light yellow white, very sandy, firm to hard, occasionally grading to calcareous sandstone, very glauconitic in part

SANDSTONE: argillaceous, poor visible porosity, else as above

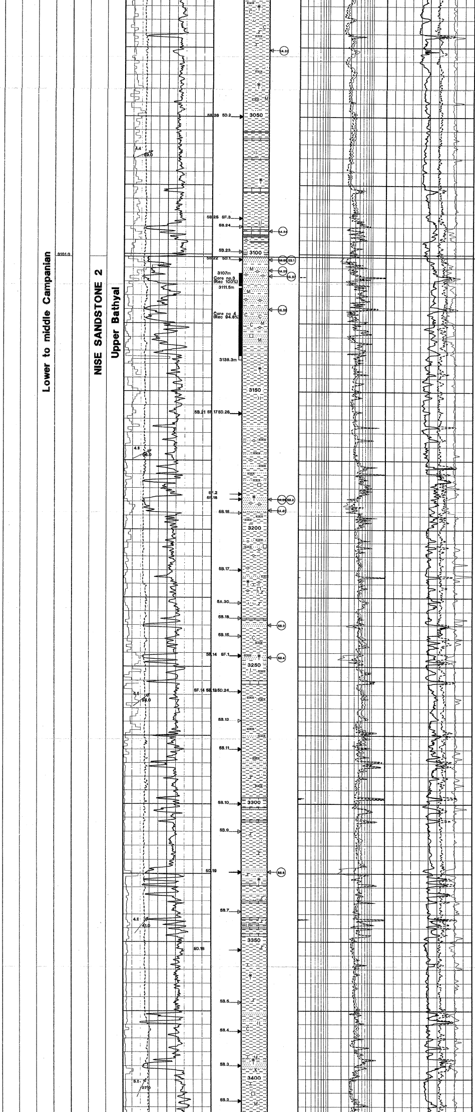
LIMESTONE: light yellow brown, light grey, firm, micritic to microcrystalline, very sandy in part, good traces of glauconite in part, occasionally grading to sandy limestone

CLAYSTONE: brownish grey, olive brown, soft to firm, silty, non calcareous, trace of carbonaceous material

SANDSTONE: quartz, predominantly dark grey to olive grey, very argillaceous, silty, very silty to argillaceous matrix, slightly calcareous in part, also light grey (kaolinite?) matrix, no visible porosity

CLAYSTONE: as above

Base Nise Sandstone 1 3005 mMD (-2978 mTVD MSL). TWT: 3.263s



CLAYSTONE: olive grey to brownish grey, soft to firm, blocky to amorphous, predominantly silty to very fine sandy, traces of carbonaceous material, micaceous, moderately calcareous

LIMESTONE: light grey to off white, firm, occasionally very sandy grading to calcareous sandstone, also light yellowish grey, slightly argillaceous, trace carbonaceous fragments, occasionally sandy

CLAYSTONE: olive grey to brownish grey, soft to firm, blocky to amorphous, predominantly silty to very fine sandy, traces of carbonaceous material, micaceous, non calcareous

Top Nise Sandstone 2 3101 mMD RT (-3074 mTVD MSL). TWT: 3.319s

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

SHOWS: No direct fluorescence. No cut fluorescence.

SHOWS: No direct fluorescence. Very weak blue white cloudy cut fluorescence - mud effect

SANDSTONE: medium light gry, clear to traslucent quartz, fine to coarse, poorly sorted, subangular to subrounded, moderately hard, calcereous cement, micaceous, common coal fragments (plant frag.), poor visible porosity

CLAYSTONE: olive black, moderate hard, blocky to subfissile, slightly micaceous, slightly carbonaceous, non calcareous

No shows

SANDSTONE: medium light grey to dark grey, clear to translucent quartz, fine to medium, occasional coarse, poor to moderate sorted, subangular to subrounded, moderately hard, calcareous cement, argillaceous, micaceous, common coal fragments (plant frag.), pyritic, poor visible porosity

Claystone with traces of sandstone and limestone

CLAYSTONE: medium dark grey, olive black, soft to moderately hard, blocky, occasionally sticky, non calcareous
SANDSTONE: clear translucent quartz, very fine to coars, poor sorted, subangular to subrounded

LIMESTONE: very light grey, white, soft to firm, argillaceous, blocky
SHOWS: No direct fluoresence. Very weak blue white cloudy cut fluorescence- mud effect.

Claystone with sandstone interbeds

CLAYSTONE: dark grey to olive black, soft to moderate hard, blocky, micromicaceous,occasional silty, slightly cabonaceous, occasional micropyritic, non calcareous

SANDSTONE: light grey, clear translucent quartz, very fine to very coars, moderate to poor sorted, angular to subrounded, occasional rounded, apperently loose to hard, silty cement in parts, slightly glauconitic in parts, silty argillaceous in parts, trace calcareous cement, non to fair visible porosity

LIMESTONE: very light grey, white, soft to firm, blocky argillaceous

SHOWS: No direct fluorescence. Very weak blue white - green yellow cut flour, dull green yellow residual fluorescence.

Claystone with traces of sandstone and dolomite

CLAYSTONE: olive black, moderate hard, blocky,slightly silty to occasional silty, micromicaceous, occasional slightly glauconitic, occasional slightly cabonaceous, trace micropyritic, non calcareous

SANDSTONE: light grey, clear translucent quartz, very fine to fine, moderate sorted, subangular to subrounded, hard, silty cement, argillaceous, slightly glauconitic, no visible porosity

DOLOMITE: light brown grey to olive grey, moderate hard micromicaceous, very argillaceous, slightly calcareous, occasional sandy

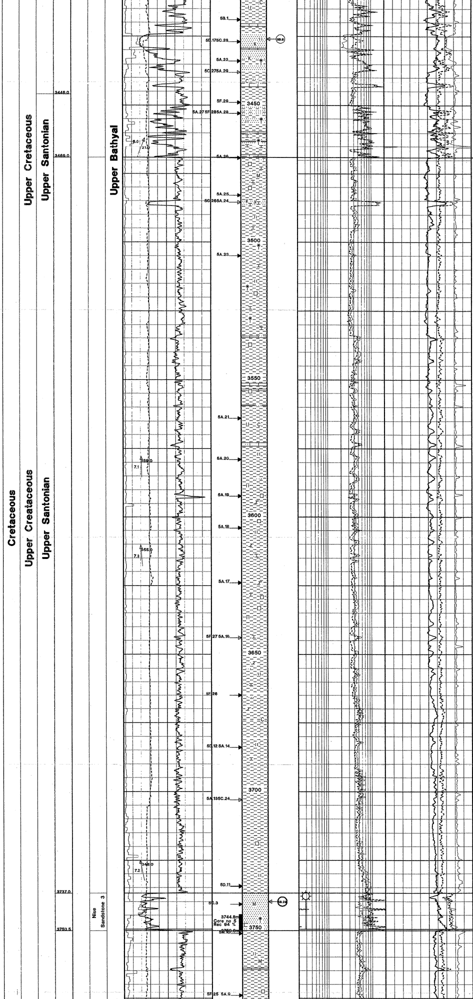
CLAYSTONE: medium dark to dark grey, olive black, soft to moderate hard, blocky,slightly silty,occationally micromica- ceous, trace glauconite, occasional slightly cabonaceous, non calcareous

CLAYSTONE: medium dark to dark grey, olive grey, firm to moderate hard, blocky,locally slightly silty, locally slightly micromicaceous, trace glauconite, occasional slightly cabonaceous, non to slightly calcareous

CLAYSTONE: medium dark to dark grey, olive grey, firm to moderately hard, blocky, locally slightly silty , locally slightly micromicaceous, trace glauconite, occasional slightly cabonaceous, non to slightly calcareous

CLAYSTONE: medium dark to dark grey, olive grey, firm to moderately hard, blocky, non to slightly silty , trace glauconite, occasional slightly cabonaceous, non calcareous

SANDSTONE: clear to translucent quartz, fine to medium, trace coarse, moderately to well sorted, subangular to subrounded, firm to very hard, calcareous matrix, locally silica cement, slightly glauconitic, apparently no visible porosity



CLAYSTONE: medium dark to dark grey, olive grey, firm to moderate hard, blocky, non to slightly silty, trace glauconite, occasional slightly cabonaceous, non calcareous

SANDSTONE: offwhite, clear to translucent quartz, very fine to medium, trace coarse, poorly sorted, subangular to subrounded, friable, dominantly argillaceous (kaolin) cement and matrix, slightly glauconitic. apperently no visible porosity

CLAYSTONE: medium to dark grey, olive grey, firm to moderately hard, blocky, non to slightly silty, trace glauconite, occasional slightly cabonaceous, slightly dissemenated pyrite, locally slightly micromicaceous, non calcareous

Base Nise Sandstone 2 3469m MD (-3440.5 m TVD MSL). TWT: 3.533s

SANDSTONE: white to off white matrix, clear to translucent quartz, very fine to medium, trace coarse, poor to moderate sorted, subangular to subrounded, firm to very hard, friable, calcareous/silica cement, slightly glauconitic, no visible porosity, abundant kaolinittic matrix

CLAYSTONE: medium dark grey to medium dark olive grey, med green grey, firm to moderate hard, blocky to subblocky, non to slightly silty , trace glauconite, traces of cabonaceous specks, slightly dissemenated pyrite, locally slightly silty, locally sandy, very fine

CLAYSTONE: medium greenish grey to medium dark grey, firm to moderately hard, blocky to subblocky, non to slightly silty, trace glauconite, traces of cabonaceous specks & disseminated pyrite, locally slightly silty, locally slightly micropyritic

LIMESTONE/DOLOMITE: off white to light brownish grey, olive grey, precominantely micritic, firm, locally crystalline to angular, hard to very hard, occasionally brittle

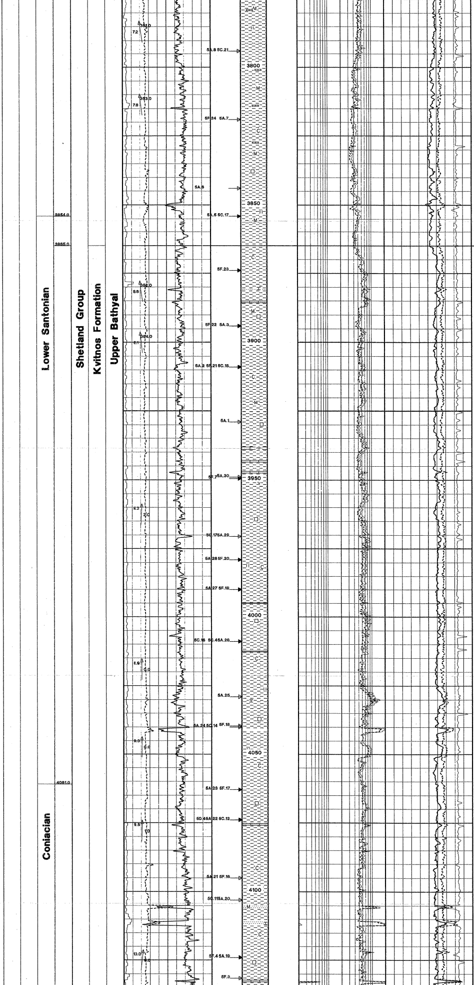
TRACES OF SANDSTONE: white to off white matrix, clear to translucent quartz, very fine to fine, moderately sorted, subangular, friable, calcareous/silica cemented, kaolinitic matrix?, traces of glauconite

CLAYSTONE: dark greenish grey to dark grey, firm, blocky to subblocky, traces of carbonaceous specks, patchey, disseminated pyrite, non to slightly calcareous, moderately silty, locally slightly micropyrite

Top Nise Sandstone 3 3737 mMD (-3706.5 mTVD MSL). TWT: 3.687s

SANDSTONE: medium to dark grey, olive grey, translucent quartz, very fine to medium, poor to well sorted, angular to subangular, moderately calcareous and siliceous cement, occasionally very calcareous and dolomitic cement, micaceous, glauconitic, poor to good visible porosity

Base Nise Sandstone 3 3750.5mMD (-3720 mTVD MSL)



CLAYSTONE: medium dark grey to dark grey, olive grey to olive black, firm to moderately hard, blocky, non to slightly calcareous, occasionally locally silty, traces of micropyrite

LIMESTONE: white to off white, amorphous micritic, firm,

CLAYSTONE: predominantly olive black,also medium dark grey to dark grey, firm, blocky, slightly calcareous, occasionally locally silty, traces of micropyrite & carbonaceous specks

Kvitnos Formation 3865 mMD
(- 3834 mTVD MSL). TWT: 3.758

LIMESTONE: predominantly white, occasionally light grey, soft to firm, blocky, micritic, slightly argillaceous

CLAYSTONE: olive black, medium dark grey occasionally dark grey, firm, blocky, non to slightly calcareous, occasionally locally silty, traces micropyrite, traces carbonaceous specks

LIMESTONE: predominantly white, occasionally light grey, soft to firm, blocky, micritic, slightly argillaceous

CLAYSTONE: olive black to light olive grey, , medium da grey occasionally sft, firm, blocky, non to slightly calcareous, occasionally locally silty, traces micropyrite, traces carbonaceous specks

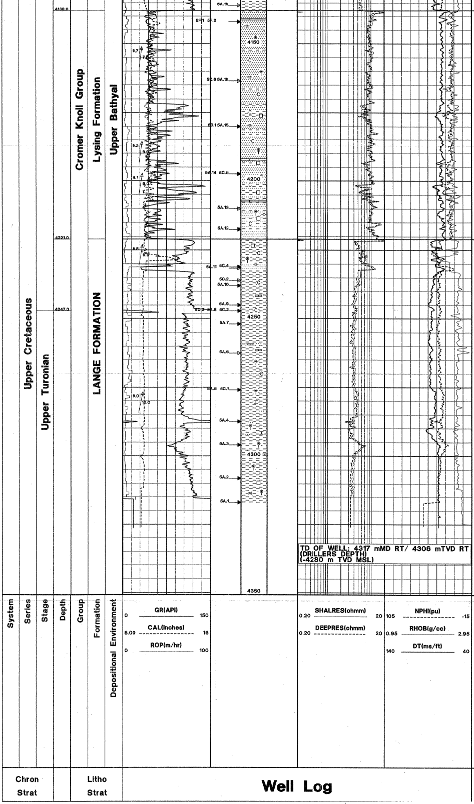
CLAYSTONE: predominantly brownish grey to brownish black, medium dark grey, traces light brownish grey, soft to firm, blocky, occasionally subblocky, non to slightly calcareous, moderately calcareous in parts, locally silty, micropyritic in parts, traces of carbonaceous specks and very fine sand

CLAYSTONE: dark grey to olive black dark olive grey, firm, blocky, non to slightly calcareous, occasionally locally silty, traces of micropyrite and carbonaceous specks

LIMESTONE: predominantly white, occasionally light grey, soft to firm, blocky, micritic, microcrystalline in parts, slightly argillaceous

SANDSTONE: light grey, clear to translucent quarz, predominantly fine, occassionally medium, well sorted, subangulare, silica cemented, trace calcareous cement, moderately hard, slightly argillaceous matrix, traces of mica, poor visible porosity

CLAYSTONE: olive black, medium dark grey, occasionally dark grey, firm, blocky, non calcareous, traces micropyrite, traces carbonaceous specks



TD OF WELL: 4317 mMD RT/ 4306 mTVD RT
(DRILLERS DEPTH)
(-4280 m TVD MSL)

Top Lysing Formation 4138 mMD (-4103 m TVD MSL). TWT: 3.904s

SANDSTONE: light grey, predominantly loose clear to translucent quartz grains, predominantly very fine to fine, traces medium, traces coarse, moderate to well sorted, subrounded to subangular, moderate siliceous cement, moderately hard, traces glauconite and shale fragments

CLAYSTONE: medium grey to olive black to dark grey, soft to firm, sublocky to blocky to subfissile, calcareous in parts

SANDSTONE: light grey, predominantly loose clear to translucent quartz grains, predominantly fine, traces medium, traces coarse, moderately sorted, subrounded to subangular, moderate siliceous cement, traces calcareous cement, slightly argillaceous matrixmoderately hard, traces glauconite

Top Lange Formation 4221 mMD (-4185 mTVD MSL). TWT: 3.945s

CLAYSTONE: olive black to olive grey, medium dark grey, firm, blocky, non calcareous, silty in parts, traces of carbonaceous specks and micropyrite

SANDSTONE: clear quartz, occasionally off white to light grey to light brownish grey, very fine to fine, moderately to well sorted, moderately silica cemented, in parts with abundant off white kolinitic(?) matrix, moderately hard to hard, slight glauconitic,fair visible porosity

CLAYSTONE: olive black to brownish black, medium dark grey, firm, blocky, non calcareous, silty in parts, traces of carbonaceous specks and micropyrite

CLAYSTONE: predominantly olive grey to dark brownish grey, also lamina of light olive grey, occasionally off-white, firm, non calcareous to calcareous, in part sandy to very sandy, traces of glauconite and black carbonaceous specks

TRACE SANDSTONE: as above

TRACE LIMESTONE: white to offwhite, firm to moderately hard, blocky, microcrystalline, occasionally micritic

Lithological Descriptions