Appendices

67-70M:
SAND (100%); clear-transl or orng-rd, m occ f grained, subrnd-subang, well srtd, sph, tr calc cemt, sl calc, v glauc, good vis por.

70-79M:
SAND (100%); clr-mlky, transl occ orng-bn, f-m and v crs, subang-ang, sph v pr srt, tr calc cmt, calc mtx, mod glau, scattered lithic fragments, sl conglm, good vis por.

79-88M:
SAND (100%); clr-mlky occ orng-bn, m to v crse, subrnd-subang, sph, pr srtd, scattered fragment of clyst and lithic fragments scattered shale debris, conglomeratic fragments of igneous material, pos glacial boulder(?).

88-97M:
SAND/CGLM (100%); A/A with pyrite and lith fragm of granite and clyst. f-crse, v pr srtd.

97-106M:
CONGLOMERATE/SAND (100%); fragments of granite, metamorphics, quartzite and sandstone, and various lithic fragments of shale/siltstone, derived from glacial boulders? No shows.

106-115M:
BOULDERS CONGLOMERATE (100%); fragments of metamorphics, dolomite, granite, pyrite, quartz, clear to orange, violet, chert, varicoloured.
SAND interbeds.
No shows.

115-120M:
CLAY (40%); lt-m gy, sft, hydratable, slty.
CNGLM (60%); lithic fragments of limestone, metamorphics, sandstone, chert, pyrite, varicolored.
No shows.

120-124M:
DOLOMITE (30%); buff, hd, brit, plty wih ang to blocky break, microxln.
DOL (50%); lt brn, hd, sucrosic, micxln to xln.
CNGM (20%); qtz, metamorphic fragments a/a.
No shows.

JR/JLT271/1

124-133M:
SAND (70%); clr-lt buff, loose, fri, f-m, subang-subrnd, mod well srt, occ well cemt, sph.
DOLOMITE (20%); buff, hd, plty, mxln.
(10%) qtz & cngm frag's.
No shows.

134-140M:
SD (80%); clr-mlky, occ lt gy grains, loose, m-crse - v crse, pr srtd, subrounded-rounded, sph, good vis por. tr dol.
CLAY (20%); lt-m gy, sft, swel, slty,
COAL (Tr); vitr, brit, splint, ghost wood fibrous texture.
No shows.

140-148M: (spot sample)
SAND (70%); A/A. (unconsolidated)
CLAY (10%); A/A tr nod pyrite, plant remains.
FE DOLOMITE (20%); buff, v hd, ang brk, hackly break, finely fractured occ calc vns, mxln, microsucr.
No shows.

148-150M:
SAND (70%); clr-mlky, m-crse, pr srt, sbrnd, sph, loose, rare dol cmt, good vis por.
FERROAN DOL (10%); (ironstone?) buff, v hd, blky-ang brk microxln-microsucr.
COAL (10%); pyritized veins within coal.
CLAY (10%); lt gy sft, swel, abnt pyr nod.
No shows.

150-155M:
SAND (80%); A/A
CLAY (10%); A/A
COAL (10%); A/A
FE-DOL (Tr)
No shows.

155-160M:
SAND (85%); A/A
CLAY (10%); A/A
COAL (5%); A/A, heavily pryritized.

(6AM M.R. depth: 161M, 6/14/89)

160-165M:
SAND (85%); clear, fine to coarse, generally medium, sph to subsph, subrnd-rnd, unconsolidated quartz grains. Sl tr calc.
CLAY (10%); A/A, tr pyr nod.
COAL (5%); A/A, w/assoc pyrite.
No shows.

165-170M:
SAND (40%); A/A.
FE-DOL (30%); buff-v lt brn occ lt grn-brn, hd-frm, blky, ang brk, occ arg, microxln-microsucr.
COAL (Tr)
CLAY (30%); lt-med gy, frm-sft, swel, occ blky, slty, non calc, tr pyr nod.
No shows.

170-175M:
CLAY (40%); lt gy, sft, swel, slty, non-calc, w/pyr nod.
COAL (20%); vit-res lust, fibr, frm-brit.
SAND (30%); clr, m-crse, pr srt, sph, subrnd loose, gd vis por.
DOL (10%); yel-brn, buff, occ grn brn, hd, ang brk, microxln, sl ferroan.
No shows. Tr min fluor on coal.

175-180M:
CLAY (40%); w/pyrite A/A.
SAND (40%); A/A.
COAL (10%); A/A.
DOL (10%); A/A.
No shows.

180-185M:
CLAY (60%); lt-m gy, sft, swel, slty, abt pyrite nod.
SAND (70%); m-crse, sph, mod srt, subrnd, gd vis por.
COAL (10%); fibrous, frm-hd, brit, vit-res lust, blk-dk brn.
DOL (10%); buff-v lt brn, hd, blky-ang brit, microxln, occ arg, tr calcite sl Fe.
No shows.

185-190M:
SAND (60%); A/A
LIMESTONE (30%); lt-m gy, hd, blky, microxln-micritic.
CLAY (10%); A/A.
No shows.

190-195M:
CLAY (70%); lt-m gy, sft, non calc, swel, abnt pyr.
SAND (10%); A/A
LST (20%); Tr.
COAL: fibrous, lignitic.
No shows.

195-200M:
CLAY (70%); lt-m gy, sft, swell, non calc, abt pyr.
COAL (10%); fibrous, vit-res lustre, firm, occ brit.
SAND (10%); 10% Dol, tr lst.
No shows.

200-205M:
SAND (50%); clr, vf-f-m, uncons, subrnd, mod srtd, sph, tr dol cmt, good vis por.
CLAY (50%); lt-m gy, sft, swel, sol, carb, slty, sl DOL tr COAL.
No shows.

205-210M:
CLAY (90%); lt-gy, sft, sol, hydratable, v slty, carb.
COAL (10%); fibrous, res lustre, frm, tr plant remains.
No shows.

210-215M:
SAND (60%); clr-mlky, loose, f-m occ crs, mod srtd, subrund, sph-subsph, tr calc cmt, tr calcite, good vis por.
CLAY (20%); A/A with abnt nod pyr and pyr plant remains.
COAL (10%); A/A with tr plant remains.
DOL (10%); buff, lt brn, hd-frm, blky-ang, microxln, ferroan.
No shows.

215-220M:
SAND (70%); clr-transl-mlky, f-m occ crs, subrnd, sph, mod srtd, tr calc cmt, uncons, good vis por.
CLAY (20%); lt gry, sft, sol, swell, slty, tr pyr.
COAL (10); blk-dk brn, frm, brit, fibrous, vit-res.
No shows.

220-225M:
SAND (40%); A/A. Tr. mica.
COAL (70%); A/A. Large cvgs.
CLAY (40%); A/A, with pyr nodules.
No shows.

225-230M:
COAL (50%); blk-occ v-dk brn, frm-brit, occ subconchoidal, splint, fibrous, vit-res lustre pyr.
SAND (50%); clr-trnsl, m-crse, mod srtd, subrnd, sph, good vis por, tr calcite, tr mica.
No shows.

230-235M:
COAL (40%); A/A.
SAND (60%); A/A. Tr nod pyr. Tr Fe-Dol.

235-240M:
SAND (80%); clr-mlky, rr lt yel org, grains pitted, m-crs-v crse. Subrnd-subang, sph-subsph, mod-well srtd, loose, tr calc cmt, v gd vis por mica.
COAL (20%); A/A.
PYRITE (TR.) Nodular, pitted.

240-245M:
SAND (100%); clear transparent-translucent, fine to med grained, predominantly fine, well sorted, subrnd, sph-subsph, unconsolidated quartz grains, tr-1% coal fragments with minor nodular pyrite, gd vis porosity.
No shows.

245-250M:
SAND (70%); A/A, predominately fine grained with tr-1% muscovite, gd vis porosity.
No shows.
COAL (30%); Black, firm, slightly subfissile to subchoncoidal, resinous luster, tr nod pyrite. Coal exhibits greenish min fluor.
No shows.

250-255M:
SAND (100%); A/A, generally fine grained, unconsolidated, good vis Ø.
Trace-1% coal A/A w/associated pyrite.
No shows.

255-260M:
SAND (100%); A/A with tr-1% coal fragments, A/A, gd vis Ø.
No shows.

260-265M:
SAND (100%); clear, gen translucent, fine-med grained, well sorted, predominantly subrounded, subsph, unconsolidated, good to very good apparent visual Ø. Tr-1% coal - some yellowish min fluor.
No shows.

JR/JLT271/5

265-270M:
SAND (90%); A/A, v good vis Ø. No shows.
COAL (10%); A/A, somewhat fissile.
SANDSTONE (Tr); white, opaque, v fine grained, hard, mod well sorted, mod well cemented with quartzose cement, non-calcareous, poor vis Ø.
No shows.

270-275M:
SAND (70%); clear, fine-med, minor vf-grain component, subang-subrnd, subsph, tr muscovite. Good vis Ø. No shows.
COAL (30%); A/A, yellowish-green min fluor.

275-280M:
Minor Change in Fm. Constituents:
SAND (50%); A/A, v good vis Ø.
CLAY (20%); dk grey, blocky, semi-hydratable, sl calcareous, earthy texture, abundant pyrite, blocky-ang.
FERROAN DOLOMITE (20%); lt grey to olive grey. Hard, blky-ang fracture micro to cryptoxstalline, nil vis Ø. Good yellow-brn min flour.
ARKOSIC(?) SANDSTONE (10%); red to reddish brown, vf-f grained, mod sorting, subang, calcareous cement, poor vis Ø.
No shows.

280-285M:
SAND (70%); A/A, rare orangish yellow, opaque, med grains, tr. muscovite, v good vis Ø.
DOLOMITE (10%); A/A.
COAL (20%); A/A, sl min fluor yellowish-green, tr-1% pyrite.
ARKOSIC SANDSTONE (TR) A/A.

285-290M:
SAND (60%); A/A, v good vis Ø, tr muscovite. No shows.
COAL (30%); A/A
DOL (10%); buff-olive, hd, ang-blky, occ varicolored.

290-295M:
SAND (60%); A/A, v good vis Ø.
COAL (40%); blk, firm to soft, subfissile-fissle, occ fibrous-elongate, vit-resinous luster, tr-1% pyrite nod.
DOLOMITE (TR) A/A. Tr-1%.
No shows.

295-300M:
SAND (60%); clear, transparent to translucent, f-c grained, gen medium grained, mod-poor sorting, subrnd-subang, subsph, v good Ø, no shows.
COAL (30%); A/A, fissile to subfissile.
CLAY (10%); grey, soft, hydratable, v silty, nod pyrite (tr-1%)
(Calcimetry Results at 300M: 0%)

JR/JLT271/6

300-305M:
SAND (60%); A/A, tr amorphous quartzose spar, pink and yellow.
SANDSTONE (20%); Grey, translucent-opaque, vf-f grained, mod hard, blky, mod sorted, calcarous cement, (at 306M rop fropped significantly), sl tr rock fragments as part of framework grains, v poor vis Ø, no shows.
COAL (20%); A/A

305-310M:
SANDSTONE (80%); A/A, grey and lt brown in color, occ fractures in elongate sections, v poor vis Ø, no shows.
COAL (10%); A/A, with abnt assoc pyrite.
DOL (10%); A/A, some min fluor (yellowish-green).
SAND (TR); A/A

310-315M:
SANDSTONE (100%); A/A, predominantly med-grey, strong calcite cement continues, slightly argillaceous to silty, v poor to nil vis Ø, Tr-1% coal.
No shows.

315-320M:
SANDSTONE (90%); A/A, continues argillaceous pyritic nodules and carbonaceous (Tr-1% coal), v poor vis Ø, no shows.
CLAY (10%); med grey, soft, semi-hydratable (generally washes out of sample).
No shows.

320-325M:
CLAY (90%); lt-m gy, frm-sft, swel, hydratable, slty, non calc, sl carb.
SANDSTONE (10%); A/A. No shows.

325-330M:
SST (60%); lt-m gy, occ dk gy, hd, v f gdg to sltst, subrnd, sph-sl elg, v well cmt, gen silic cmt, v por vis por, arg mtx.
CLAY (40%); A/A. Tr pyr, tr dol (Fe), sl carb.

330-335M:
CLAY (30%); Med gy, frm-sft, swel, non calc.
SLST (70%); Med gy, hd, v arg, occ gdg to v f sst, silic cmt, poor vis por.
No shows.

335-340M:
CLAY (70%); A/A. Tr pyrite tr Fe Dol.
SLST (30%); A/A.
No shows.

JR/JLT271/7

340-345M:
CLAY (50%); med grey, sft-hydratable, v slty, carb, non calc.
SLTST (50%); med gy, hd-frm, blky, mic, arg, gdg to v f sst
COAL (TR)
No shows.

345-350M:
CLAY (80%); med gy, frm-sft, swel, slty, carb mat, non calc, tr pyr, tr coal.
SLST (20%); med gy, frm-hd, blky, arg.
No shows.

350-355M:
CLAY (70%); w/pyrite A/A.
SLST (30%); A/A.
COAL (TR)
No shows.

355-360M:
CLAY (90%); med gy, sft, swel, abnt pyr nod, slty, non calc.
SLST (10%); A/A. No shows.

360-365M:
CLAY (90%); lt-med gy, sft, plastic.
SLST (10%); m gy, hd, blky, arg.

365-370M:
CLAY (100%); A/A. Tr coal pos cvgs. Cement contamination.

370-375M:
CLAY (100%); A/A. Slty, some cement contamination and polymer contamination.

375-380M:
CLAY (100%); lt-m gy, v contaminated with mud additive and cement. No shows.
10M samples while drilling over 25M/hr.

380-390M:
CLAY (100%); lt-med gy, sft, sol, highly dispersed, swelling, occ scattered silt. Non calcareous. Tr scat clr sand grains, tr carb mat, tr coal, loosing mud over shakers.

390-395M:
CLAY (100%); lt-med gy, speckled, sft, swelling, highly dispersed, hydratable, tr coal frags, non calc. No shows.

395-400M:
(Control Drill to 50M/hr.)
CLAY (100%); A/A with tr-1% coal fragments. Coal is black, mod firm, subfissile, and highly disseminated throughout sample in v f-f sand size fragments.

400-410M:
CLAY (100%); lt-med grey, very soft, dispersive and hydratable, trace coal. No shows.

410-420M:
CLAY (100%); A/A. Tr-1% coal fragments, (non calcareous). No shows. (PHPA mud appears to be coagulating clay well, although the clay appears to be dispersive by nature. Carbide log indicates hole to be ~400 stokes overgauge).

420-430M:
CLAY (100%); lt-med grey, very soft, dispersive and hydratable, appears massive with a lack of any bedding features, non calcareous. Tr-1% silt. No shows.

430-440M:
CLAY (100%); A/A, slightly carbonaceous, tr-1% silt. No shows.

440-450M:
SAND (80%); clear, transparent, f-med. Generally fine grained, well sorted, subrnd, subspherical unconsolidated, non calcareous quartz grains, v good vis Ø, no shows.
COAL (10%); blk, firm, blky fragments, tr pyrite
CLAY (10%); A/A

450-460M:
SAND (70%); A/A, v good vis Ø, no shows.
CLAY (30%); A/A w/trace-1% coal, sl tr nodular pyrite.

460-470M:
SAND (20%); A/A, v good vis Ø (unconsolidated), generally fine grained, no shows.
CLAY (70%); A/A, lt-med grey, soft, amorphous
COAL (10%); blk, firm, blocky fracture, some elongate fragments slightly pyritized in part.

470-480M:
CLAY (80%); A/A, non calcareous.
COAL (20%); blk, mod hard, blocky fracture, slightly planar-fissile, only sl pyritic in part. No shows.
(Appears to be interbedded coal seams within a rather homogenous claystone. Coal illustrates some woody debris. Minor sand units as well (440-460M).

480-490M:
CLAY (100%); A/A, sl tr silt, carbonaceous, no shows.

490-500M:
CLAY (80%); lt-med gy, speckled, sft, plastic, hydratable, swelling, non calcareous, tr scat qtz grns.
LIGNITE (20%); v dk brn, frm, earthy, fibrous. No shows.

500-510M:
CLAY (100%); A/A with good trace-1% lignite. Lignite is black to dark brown, generally soft, earthy. No shows.

510-520M:
CLAY (100%); A/A, generally light grey, non calcareous, sl trace lignite.
No shows.

520-530M:
CLAY (100%); A/A, slightly carbonaceous with slight trace of silt.
No shows.

530-540M:
CLAY (100%); lt grey, very soft, dispersive, hydratable, with a trace of brown fibrous plant remains. Non calcareous, no shows.

540-550M:
CLAY (100%); lt gy, rr med-gy, sft, hydratable, dispersed, non calc, sl tr silt. No shows.

550-560M: ** TOP TRIASSIC:555M **
CLYST (50%); brick red-mod red brn, occ lt grn gy, tr yel brn, frm-sft, blky-hydratable, hydrofissile, v sl dol.
CLAY (50%); lt brn-lt brn-gy tr med gy, sft, hydratable, non calc. No shows.

560-570M:
CLAYSTONE (40%); brick red-reddish brown and equally light greenish-grey in color, soft, blky, generally amorphous, hydratable, mod calcareous. The greenish colored claystone is predominately mod calcareous whereas the reddish claystone is sl calcareous/dolomitic.
CLAY (60%); lt brown-grey brown, A/A. No shows.

570-580M:
CLAYSTONE (50%); Brick red-reddish brn/lt grey grey, A/A.
CLAY (50%); lt brown to lt-med grey, A/A, remains non calcareous. No shows.
(ROP maintaining a range of 20-25M/hr.-hence sampling interval is 5M, from 580M md RKB).

580-585M: 5M SAMPLES
CLAYSTONE (50%); Predominately lt greenish-grey, with only 15-20% of sample having a reddish hue, mod calcareous, soft, blky, hydratable.
CLAY (50%); lt grey-med grey brn, v soft, amorphous, non calcareous, no shows.

585-590M:
CLAYSTONE (100%); predominantly reddish brown (70%), generally A/A, remains soft, dispersive and hydratable, no shows.

595-600M:
SAND (80%); clr, occ yel orgn grns, f-m, subrnd-rnd, well srtd, sph, unconsol, tr calc cmt, tr arg mtx, good vis por, spotty mineral fluor assoc with ls and dolomite, no shows.
CLYST (70%); lt gry-brn, occ dk rd-brn, frm, earthy, blky, occ subfiss, mod calc, tr LST.
(Drill break to ~62M/hr at ~600M MD; at 602M reversed to 46M/hr.).

600-605M:
SAND (80%); clear, occ yellow, orange, opaque grains, f-m, subang-subrnd, mod well sorted, slightly argillaceous, tr-1% limestone: white, microstalline, poor vis Ø, firm.
Sand has good vis Ø, no shows.
CLAY (20%); A/A.

605-610M:
SAND (30%); clear, org, yellow, to opaque yell-white, m-vc, subrnd, subsph, mod sorted quartz grains, tr limestone (A/A), tr anhydrite(?).
CLAYST (70%); brn, reddish brn, lt green-grey, firm to soft, blky, hydratable, slightly silty, mod calcareous.

610-615M:
SAND (70%); clear, occ org, yell, and opaque, f-c, generally med, mod well sorted, subrnd, tr limestone, white, firm. Good vis Ø, no shows.
DOL (10%); Olive green, grey, hard, blky, microxstalline, no Ø vis.
CLAYST (20%); A/A, generally brown, green.

615-620M:
CLYST (70%); lt grn-gy, occ streaked with mod grn and lt yel brn, occ brick red and red brn, frm-sft, blky, mod calc with occ ANHY streaks.
SAND (30%); clr-occ yel orng, qtz, m crse, subang, occ subrnd, sph sl subsph, mod-pr srtd, uncons, gd vis por, tr calc.
DOL; (TR) No shows.

620-625M:
CLYST (80%); lt gy brn, occ brick red, frm, blky, occ hydratable, v calc gdg to MARL.
SAND (20%); clr-org-yel, m-crs, pr srtd, subrnd, sph, uncons, gd vis por.
LST (TR); No shows.

625-630M:
MARL (90%); lt gy grn-brick red, frm, blky, swel, hydratable, no shows.
SAND (10%); clr-org-yel, m-crse, mod pr srt, sph, subrnd, gd vis por.

630-635M:
MARL (90%); lt brn-red-lt grn-gy, frm-sft, blky, swel hydratable. Tr DOL No shows.
SAND (10%); clr-orng, orng-yel, m-v crse, w rnd-subrnd, pr srtd, sph, uncons, mostly occurring as scat qtz grns.

635-640M:
CLYST (90%); mod-rd-brn, tr grn gy, frm-sft, blky, hydr, swel, tr sand, mod calc.
LST (10%); wh-lt gy, crse, hd-frm, blky, micrxln.
No Shows

640-645M:
CLYST (90%); mod red brn-occ brn red, frm, blky occ subfiss, gen hydratable, mod calc.
SAND (10%); clr occ orng-brn, med-crse, subrnd, sph, mod-pr srt, gen good vis por.
LST (TR); Wh, frm-hd, sl arg, micritic.
DOL (TR); lt yel brn, hd, mxln.
No Shows.

645-650M:
CLAYST (90%); A/A, ~5% of sample is greenish clayst which remains mod calcareous. Trace-1% limestone. Limestone is white, firm-soft, amorphous-microcrystalline.
SAND (10%); A/A, gen good vis Ø interpreted, no shows.

650-655M:
CLAYSTONE (95%); Predominantly brownish red to brown, v soft, hydratable, slightly to moderately calcareous.
LIMESTONE (5%); white, v soft, hydratable, argillaceous.
SAND (TR-1%); A/A, good vis Ø interpreted, no shows.

655-660M:
CLAYSTONE (100%); Brownish red; A/A, trace-1% limestone-marl (micritic-argillaceous). No shows (Cal. 12%, Dol 2%).

660-670M:
CLAYSTONE (100%); A/A. Remains predominantly brownish red, sl-mod calcareous, with tr-1% limestone. White, firm to mod hard, microcrystalline, blky, argillaceous, no shows.

670-675M:
SAND (50%); clr-transl, m-crs, subrnd-rnd, sph, occ subelongate, mod srtd, good vis por.
CLYST (50%); mod red-brn, lt rd-brn, frm-sft, swell-blky, mod calc. Tr LST wh-off wh, hd, mxln, blky, pos caliche.

675-680M:
SAND (60%); A/A, predominantly medium to coarse, good vis Ø, no shows.
CLAYST (40%); A/A with tr-1% limestone (Cal: 6%, Dol. 1%).

680-685M:
CLAYST (90%); reddish brown and slightly greenish grey, v soft, hydratable, amorphous, occ blky, mod calcareous, gd trace-1% limestone.
SAND (10%); clear, m-c, subrnd, subsph, mod well sorted, unconsolidated quartz. Good vis Ø. No shows.

685-690M:
SAND (70%); clear, occ varicolored orange, red, f-c, predominantly medium, subang-subrnd, mod sorted, unconsd quartz, good Ø, no shows.
CLAY (30%); lt grey to brownish red, mod calcareous, 5% limestone (as previously described), caliche(?).

690-695M:
SAND (70%); A/A. Tr med grn inclusions. (Pos tuff frags).
CLAYST (20%); Red-brn - lt gy-brn, frm, hydratable, calc.
LST (10%); Off wh, frm-sft, arg gdg to mrl, also mxln.

695-700M:
CLAYST (95%); A/A, sl trace of tuffaceous material(?), green, hard, vf, glassy texture embedded within the claystone.
LST (5%); white, hard, blky, microcrystalline, no shows. (Cal:14%, Dol:1%).

700-705M:
CLAYST (95%); A/A, predominantly brick-red, occ greenish grey, remains mod calcareous.
LST (5%); A/A.

705-710M:
CLAYST (70%); A/A, lt brown, lt reddish brown, tr-5% limestone, as previously described.
SAND (30%); clear, occ red, org, vf-med, predominantly fine, subrnd, good vis Ø interpreted, unconsolidated, no shows.

710-715M:
CLAYST (95%); Predominantly brick red, 5% green to jade colored, soft, rarely firm.
LIMESTONE (TR-5%); A/A, somewhat amorphous-marly.
SAND (TR-5%); A/A, No shows.

715-720M:
CLAYST (60%); A/A, predominantly reddish brown, tr-5% marl/ls. Marl is white, v soft, hydratable. Clayst remains mod calcareous.
SAND (40%); clear, occ greenish, red org, f-m, predominantly fine, mod well sorted, subrnd-subang, subspherical, unconsolid qtz grains, v good vis Ø, no shows. (Cal:16%, Dol:4%).

720-725M:
CLAYST (70%); A/A, good tr-5% limestone, white, occ reddish, mod hard, microcrystalline, ang, blocky fracture. Marl-white, soft, argillaceous, amorphous.
SANDST (30%); A/A, good vis Ø, no shows.

725-730M:
SAND (50%); A/A, however, gen rounded, subspherical grains, good vis Ø.
CLAY (50%); A/A, tr-5% limestone, (as previous).

730-735M:
SAND (60%); clr, occ lt yel, occ lt orng, f-m, sph subrnd-rnd, mod well srtd, gd vis por, tr dk brn incl.
CLAYST (40%); lt red-brn-occ brick red, sft-frm, hydratable, mod calc.
LST (TR); Wh, frm-hd mxln, arg occ gdg to marl.
No shows.

735-740M:
SANDSTONE (90%); clr-mlky, lt yel, lt red, f-m, subang-subrnd, sph, well-mod srtd, good vis por, tr calc cmt, tr arg mtx, tr clayst clasts.
No shows.
CLYST (10%); A/A. Tr LST. (Cal:13%, Dol:3%).

740-745M:
CLYST (90%); brick red, tr grn gy, frm-sft, hydratable, occ blky, mod calc, tr LST.
SAND (10%); A/A. No shows.

745-750M:
CLYST (90%); A/A, with lt gy slty patches.
SAND (10%); clr-mlky, occ lt yel, f-crse, sph, pr srtd, subrnd, good vis por.
No shows.

750-755M:
CLAYST (100%); Brick red, tr dusky red grey, tr med gy, tr grn gy, frm-sft, hydratable, occ blky, occ ang brk, mod calc. Tr LST. No shows.

755-760M:
CLAYST (100%); A/A, Tr dark grey colored clayst, tr limestone.
No shows. (Cal:5%, Dol:1%).

760-765M:
CLAYST (100%); Predominantly brick red, rare lt to med grey, soft, sl firm, occ blocky, (very rare brn claystone is firm), amorphous, mod calcareous.
No shows.

765-770M:
CLAYST (100%); lt to med grey (50%), reddish brown (50%) med grey clayst, firm, blky, slightly calcareous. Rare brick red clayst, firm-soft, blky, overall mod calcareous, tr limestone.

770-775M:
CLAYSTONE (100%); lt to med grey (50%), dark grey (10%), reddish brown (40%), A/A.

775-780M:
CLAYSTONE (80%); A/A.
LIMESTONE (20%); white, soft to mod hard, blky, amorphous (Cal: 18%, Dol:1%) soft material, argillaceous to microcrystalline (mod hard), sl micritic, trace-fair intergranular vis Ø.
No shows.

780-785M:
CLST(90%); lt med gy-lt red grn, frm, plastic occ blky. Sl-mod calc.
LST (10%); A/A.
No shows.

785-790M:
CLAYSTONE (100%); lt red brown, brick red (80%), grey to dk grey (10%), lt green grey (10%), gen mod calcareous. Tr-1% limestone, A/A.
No shows.

790-795M:
CLAYSTONE (95%); Reddish brown, brick red (80%), lt to dk grey (5%), greenish grey (10%), firm, occ soft, blky, generally mod calcareous.
LIMESTONE (TR-5%); White, firm to mod hard, mxstalline, occ marly, micritic, poor vis Ø in mxstalline LS.
No shows.

795-800M:
CLYST (100%); med red brn-orng brn, patches of lt green gray reduction spots (5%), frm, blocky, plastic, hydratable, mod calc, tr LST. Micritic-mxln, no vis por. No shows. (Cal:3%, Dol:2%).

800-805M:
CLYST (100%); A/A. sl-mod calc. No shows.

805-810M:
CLYST (100%); A/A. No shows.

810-815M:
CLYST (100%); med orng-red to red, dk red brn, tr gry grn, frm-sft, hydratable, mod calc.
LST (TR); Wh, hd, brit, slty, micritic. No vis por.
No shows.

815-820M:
CLYST (90%); A/A.
SAND (10%); clr-org-rd, vf-f, mod srt, subrnd, sph, good vis por.
LST (TR); A/A, tr vis intergran por, sl arg.
No shows.

820-825M:
CLAYST (100%); med orng-brn, occ dk red brn, occ lt gy grn, frm plastic, blky, mod calc, sl slty.
SAND (TR); clr-orng red, vf, subrnd, mod sft, sph.
LST (TR); Wh-med gy, hd, blky, mxln. No vis por. (Cal:6%, Dol:1%).
No shows.

JR/JLT271/16

825-830M:
CLYST (100%); A/A, Tr med gy, sl slty.
LST (TR); A/A.
SAND (TR);
No shows.

830-835M:
CLYST (100%); A/A.
LST (TR); wh-off wh, lt gy, md-frm, blky, play, mxln-micritic.
No shows.

835-840M:
CLYST (100%); lt grn gy, occ mod grn gy and lt orng brn-red brn, frm, sft, swell, blky, mod calc.
LST (TR); A/A, tr intergran por. (Cal:6%, Dol:1%).
No shows.

840-845M:
CLYST (80%); orng-brn, sft-frm, blky, mod calc, slty.
SAND (20%); clr-mlky, occ lt yel-org, f-m, mod sft, sph, subrnd, gd vis por.
LST (TR); A/A.
No shows.

845-850M:
CLYST (90%); A/A.
LST (10%); A/A.
No shows.

850-855M:
SAND (50%); clr. org yel, f-m, mod sft, well srt, subrnd, sph, gd vis por, tr arg mtx. No shows.
CLAYST (40%); org brn, red brn, sft-frm, mod calc.
LST (10%); Wh-off wh, micritic, no vis por.

855-860M:
CLYST (100%); lt orng brn-med red brn, sft-frm, blky, swel, mod calc. Tr LST (Cal:7%, Dol:0%)
CLYST (TR); Tr grn gy. No shows.

860-865M:
CLYST (100%); lt orng brn-mod rd brn, streaks and patches of lt gy grn, sft-fm, mod calc, sl slty, tr LST. No shows.

865-870M:
CLYST (100%); A/A w/tr SAND. No shows.

JR/JLT271/17

870-875M:
SAND (10%); clr-orng-red, vf-f, mod well srt, subang-subrnd, sph, gd vis por, sl arg mtx.
CLYST (90%); A/A. slty. No shows.

875-880M:
CLYST (90%); lt orng brn, tr grn gy, frm, sft, swell, sl slty, mod calc. (Cal:8%, Dol:5%).
SAND (70%); A/A. No shows.

880-885M:
CLYST (100%); lt orng brn with lt grn gy streaks and patches, sft-frm, swel, blky, v sl-non calc. No shows.

885-890M:
CLYST (100%); A/A. v sl-non calc.
SANDST (TR); clr, vf-f, subrnd, sph, well srt, well cmt, calc-sil cmt, pr vis por. No shows.

890-895M:
SAND (50%); clear, reddish-orange hue, f-m, well sorted, subang-subrnded, subspherical unconsolidated qtz grains, good vis Ø, no shows.
CLAYSTONE (50%); lt. reddish brown, soft, dispersive and hydratable, sl to mod calcareous.

895-900M:
CLAYSTONE (100%); A/A, lt greenish grey portion (25% of sample), slightly calcareous. Trace to 5% sand (as previous), no shows. (Cal:4%, Dol:1%).

900-905M:
CLAYSTONE (90%); brown, reddish brown (70%), lt greenish grey (20% of sample), soft, amorphous, slt-mod calcareous (tr limestone).
SANDSTONE (10%); clear, red, org, vf-f, well sorted, subang-subrnded, unconsolidated qtz. grains, good vis Ø, no shows (Cal:4%, Dol:1%).

905-910M:
CLAYSTONE (95%); brick red, reddish brown (80%), lt green-greenish grey (15%), soft, amorphous, occ blocky, sl to generally moderately calcareous.
SAND (TR-5%); clear, occ red, org, vf-m, however, predominantly fine, mod well sorted, subang-subrnd, unconsolidated qtz grains. Good vis Ø interpreted, no shows.

910-915M:
CLAYST (100%); brick-red, red-brn (90%), lt greenish grey/lt green (10%), sl-mod calcareous, tr sand (as previous), no shows.

915-920M:
CLAYSTONE (100%); A/A, brick red-reddish brown (95% of sample), lt green-grey (5% of sample). No shows.

920-925M:
CLAYSTONE (100%); A/A, brick red-reddish brown (95%), lt green grey (5%), clayst remain sli to mod calcareous.

925-930M:
CLAYSTONE (100%); brick red-reddish brown (85%), lt greenish grey (15%), green-grey claystone is firm, blky, mod calcareous.
LIMESTONE (TR); Off white to lt green, mod hard, blky, microxstalline, v poor vis Ø, no shows.

930-935M:
CLAYSTONE (100%); brick red-red brown (90%), lt green-grey (10%) sli-mod calcareous. Slight trace sand (?) (gritty feel to claystone).

935-940M:
CLAYSTONE (100%); brick red-red brown (60%), lt green-grey, med grey (40%), sli-mod calcareous. No shows.

940-945M:
CLYST (100%); lt orng-brn, occ brick red streaks and patches of lt gy grn, frm-sft, blky, swell, sl calc, tr mod gy grn SILT.
LST (TR); lt gy grn, hd, blky microxln-micritic. No shows.

945-950M:
CLAYSTONE (100%); A/A.
LIMESTONE (TR); A/A, nil vis Ø, no shows.

950-955M:
CLAYSTONE (100%); brick-red, reddish brwn (90%), lt grey green-lt grey (10%), gen sli calcareous, mod calcareous in part.
LIMESTONE (TR); lt grey green, mod. hard, microcrystalline, micritic.
No shows.

955-960M:
CLAYSTONE (100%); brick red (70%), lt-greenish grey-lt med grey (30%), A/A.
LIMESTONE (TR); A/A.

960-965M:
CLAYSTONE (100%); brick red (90%), lt greenish-grey, lt med grey (15%), soft, occ firm, blky, slightly calcareous.
LIMESTONE (TR)

965-970M:
CLAYSTONE (80%); brick red (65%), occ purp-red, lt grey-med grey, occ greenish (15%) sli calcareous, soft, generally amorphous, hydratable.
LIMESTONE (20%); white and lt to med grn, mod hard to hard, blky, microxstalline, argillaceous, v poor to nil vis Ø, no shows.

970-975M:
CLYST (100%); lt orng brn, tr mod gy grn, tr lt purp red, sft-frm plastic, swell, blky, sl calc.
LST (TR); med brn, occ off wh, hd, blky, ang, microxln, no vis por, no shows.

975-980M
CLYST (60%); A/A with more grn gy and brick red and lt purp red, also lt yel brn.
LST (20%); off wh-wh, hd, brit, plty-blky, microxln, no vis por.
SAND (20%); clr-lt yel orng, f-m, mod srtd, rnd-subrnd, sph, good vis por.
No shows.

980-985M:
CLYST (100%); lt orng red-brn, occ lt grn gy, sft-frm, swell, mod-v calc gdg to marl.
SAND (TR); A/A. No shows.

985-990M:
CLYST (100%); lt orng-brn, sft-frm, swell, blky, occ grn gy.
LST (TR); wh, hd-blky, microxln. No shows.

990-995M:
CLYST (100%); lt orng-brn, occ streaks and patches of lt gy-orng, rare tr of lt yel-brn, firm-sft, swell, sl calc, sl tr LST. No shows.

995-1000M:
CLYST (100%); A/A. No shows.

1000-1005M:
CLYST (100%); lt orng-brn, tr-med gy brn, tr lt gry grn, frm-sft, swell-blky, sl calc, no shows.

1005-1010M:
CLYST (100%); A/A.
SAND (TR); clr-lt yel, f-m, subrnd, sph, mod srt. No shows.

1010-1015M:
CLYST (100%); lt orng-brn, tr brick red, tr lt gy grn, firm-sft, swell, blky, sl slty, sl-non calc. No shows.

1015-1020M:
CLYST (100%); A/A. No shows.

1020-1025M:
CLYST (100%); lt orng-brn, occ brick red, occ lt gy grn, sft-frm, swell, blky, occ slty, sl-mod calc. No shows.

1025-1030M:
CLYST (100%); A/A.
LST (TR); med gy brn, sl dol, microxln.

1030-1035M:
CLYST (100%); lt orng brn-brick red, patches of grn gy (calc), frm-sft, swell, blky, mod-sl calc.
CLST (TR); lt grn gy, occurrence in streaks, frm, blky.
LST (TR); med brn, hd, blky, mxln, sl dol. No shows.

1035-1040M:
CLYST (100%); lt orng brn, rare brick red, tr lt gy brn, tr dk purp red, frm-sft, blky, swell, sl slty, mod calc.
LST (TR); off wh, hd, brit, plty, mxln, no shows.

1040-1045M:
CLAYSTONE (100%); lt orange-brown (~10%), grey, lt greenish grey, med grey (30%), A/A.
LST (TR); off white, mod hard, microcrystalline. No shows.

1045-1050M:
CLAYSTONE (100%); A/A, generally blky, mod calcareous.
LST (TR-5%); off white to green, occ brown; A/A. No shows.

1050-1055M:
CLAYSTONE (90%); A/A.
LIMESTONE (10%); green, off-white, yellow, pink, occ clear calcite spar, mod hard-hard, blky, microcrystalline, argillaceous, nil vis Ø. No shows.

1055-1060M:
CLAYSTONE (100%); orangish brown (70%), lt green grey (30%), generally soft, blky to amorphous, sli-mod calcareous, hydratable.
LIMESTONE (TR-5%); off white, occ green, hard, microxstalline.

1060-1065M:
CLAYSTONE (100%); A/A.
LIMESTONE (TR); A/A, nil vis Ø, no shows.

1065-1070M:
CLAYSTONE (100%); A/A, remains generally moderately calcareous.
LIMESTONE (TR-5%); predominantly med-green, hard, blky, microcrystalline, occ white, firm-mod hard, micritic-argillaceous, no shows.

1070-1075M:
CLAYSTONE (100%); A/A, brownish red (70%), greenish grey (30%).
LIMESTONE (TR-5%); A/A, predominantly whitish.

1075-1080M:
CLYST (100%); red-orng brn, A/A.
LST (TR); med grn gy, hd, mxln, blky. No shows.

1080-1085M:
TOP BUNTER FM., D.B. at 1084M RKB.
CLAYST (20%); A/A.
SANDSTONE (80%); clr-mlky, f-crse, mod srtd, subrnd-well rounded, sph-sub sph, v gd vis por, tr calc cmt. No shows.

1085-1090M:
SANDSTONE (90%); clear to occ opaque, occ orange stained, f-course, predominantly medium, well sorted, subrnd to rnded, subspherical-spherical, unconsolidated quartz, v good vis Ø interpreted.
CLAYSTONE (10%); A/A, with tr-2% limestone, A/A.

1090-1095.1M:
(Bottoms up sample prior to swab/condition and logging of 17½" hole.)
SANDST (100%); A/A, v good vis Ø, no shows.
CLAYSTONE (TR); tr, A/A, small fragments (cavings?)

1095-1100M:
SAND (80%); clr/transluc qtz, m/cse, sbang, good sphericity, loose.
No shows.
CLYST (15%); red (brick), soft, slty/sdy, var calc.
CLYST (5%); m gy, soft to firm/hd, sl calc, slty, sl carbonac w/wh, xtln calcite; tr pyr, sl tr dol, tan/gy, xln-microxtln.

JR/JLT271/22

1100-1105M:
SAND (100%); A/A, w/brn-red (brick) clyst, sl calc-non calc, mainly m-gn sd w/less coarse gns, tr wh calcite, xtln (no fluor or cut fluor).

1105-1110M:
SAND (85%); clr qtz, m-gn, occ cse gns, sbang, high sphericity poss w/clay mtx in pt; loose, unconsol (no shows).
CLYST (15%); gy, grn, brick red, A/A; v v thin stringers?-noncalc.

1110-1115M:
SAND (85%); clr qtz, m/cse gn, sim to ab, sbrnd, spher, loose.
CLYST (15%); brick-red, poss thin strks, noncal, poss mtrx for part of sand (?); sd bec mainly m-gn.
Tr wh xtln calc.

1115-1120M:
SAND (85%), A/A, (no show of fluor or cut fluor)
CLAYST (15%); brick red, sft, poss intbds, poss mtrx for pt of sd. Tr wh calcite, xtln.
Calcimetry: 2/0 (=calc/dol)

1120-1125M:
SAND (85%); A/A, bec fine/med, mainly med, occ cse gn (no shows).
CLAYST (15%); brick red, A/A, sft, noncalc.

1125-1130M:
SAND (95%); fn/med, clr qtz, abun gns w/brn oxide give spl lite brn appearance (no fluor. or cut fluor).
CLY/CLYST (5%); brn/tan, sft, noncalc-poss strks and/or mtx mtl?
Wh calc, xtln.

1130-1135M:
SAND (95%); clr qtz, fn-gn, sm-med r/cse gns, sbang, spher, less oxidized gns.
CLYST (5%); brn-red, A/A, sft (hydrophyllic)
Wh calc, xtln.

1135-1140M:
SAND (100%); A/A, fn qtz; rare to comm. gns have tremendous dk brn stn suggestive of asphaltic residue, but v v tenuous cut fl & no natural fl (ambiguous).
Calcimetry: 4/0

1140-1145M:
SAND (100%); A/A, fn, sm med-gn qtz (as above-v tenuous brn stn on some grns, w/v v sl dull yel fl of cut only)

1145-1150M:
SAND (100%); A/A, plus occ cse gns; v loose, A/A, blk/dk brn strs more tenuous w/ depth. (No fluor)

1150-55M:
SAND (100%); A/A, fn-med, occ cse gns (no shows) tr wh calc, xtln.

1155-1160M:
SAND (100%); A/A, (no shows).

1160-1165M:
SAND (100%); same - clr qtz, brn/red oxidized gns & cly stn give red-brn color to spls, varying in intensity, tr wh calc, xtln, (no shows).

1165-1170M:
SAND (100%); same - fn/med, occ cse gn clr qtz (no shows), tr calc, wh, xtln.

1170-1175M:
SAND (100%); A/A, but mainly med-gn, sm cse, well srtd, sbrnd/sbang, spheric, good, v loose (no shows).

1175-1180M:
SAND (100%); A/A, but sbrnd mainly; (no shows of fluor); loose.
Calcimetry: 2/0

1180-1185M:
SAND (100%); A/A, but less sorted, and m/cse-gn. Sbang, spher, loose, w/clay poss matrix - brn/brick red, soft, noncalc tr pale grn, transluc qtz grns.
No Shows.

1185-1190M:
SAND (100%); A/A, poor sorting, loose, w/little clay red/brn, A/A, soft, noncalc.
No shows.

1190-1195M:
SAND (100%); A/A, sl better srtg, med-gn, less fn & cse gns, v loose. (No shows). Some brn-red clay - noncalc, matrix??

1195-1200M:
SAND (100%); fn-gn, occ cse/med gns, otherwise sim to ab, v loose, well-srtd, in gen (no shows at all). Little brn-red clay, A/A, - matrix mtrl?
Calc: 0/0

(10 m spls - drill break, 1199m)

1200-1210M:
SAND (100%); fn, w/ occ cse & m gns, v loose, w/brn oxidized surface; little brn/red clay (matrix?); qtz, sbrnd/sbang, fair srtg & sphericity (no shows).

1210-1220M:
SAND (100%); f/m, r/cse-gn, clr qtz, sbang/sbrnd, good spher, fair/good srtg, (no shows oil fluor).
Tr dolo mtl Calcimetry: 0/8 (=calc/dol)

1220-1230M:
SAND (100%); A/A, brn colored due to clay & oxide coating of gns, (no shows).

1230-1240M:
SAND (100%); f/cse, poor srtg, otherwise sim to ab, (no shows).
Calc: 0/12

1240-1250M:
CLAY (50%); red-brn, sft, noncalc, tr pale grn.
SAND (50%); A/A.
Calcimetry: 0/26

1250-1260M:
CLAY (50%); A/A, (trace dolomite continues).
SAND (50%); A/A.

1260-1270M:
CLAY (50%); red-brn, sft, noncalc, A/A, mtrx for sand, loose.
SAND (30%); m/cse, sbrnd qtz, spher, loose.
SS (20%); f/vf, hd, silic, gy/lt grn, noncalc, brn/red from clay matrix, pt fri, noncalc, tr wh calcite, xtln.
No shows.

1270-1280M:
SS (50%); fn, qtz, firm/fri, pt hd, silc, noncalc (poros fair).
SAND (20%); cse, sbang qtz, spher fair, sm gns well rnd/sbrnd.
CLAY (30%); red-brn, A/A, soft, noncalc, tr wh calcite, xtln.
No shows.
Calcimetry: 0/16

1280-1290M:
SS (60%); A/A.
SAND (30%); A/A.
CLAY (10%); A/A.
No oil shows.

1290-1300M:
SAND (70%); f/m, occ cse, qtz, fair srtg, sbang, spher, poros good(?), brn stn, (no shows).
SS (15%); A/A, firm/hd, fn, silic, brn stn from clay.
CLAY (15%); red-brn, soft, noncalc (matrix, prob).

1300-1310M:
SS (65%); f/m-gn, firm/hd, silic, tr calc; brn stn qtz, (no shows).
SAND (10%); loose qtz, cse-gn, sbang/sbrnd, clr, brn-stn, (no shows).
CLAY (25%); brick red, sft, noncalc, hydrophyllic matrix &/or beds?

1310-1320M:
SS (70%); A/A.
SAND (20%); A/A, some v cse, transluc qtz, vein mtrl? (no shows).
CLAY (10%); (trace dolomite continues).

1320-1330M:
SS (65%); A/A, porosity prob fair only.
SAND (20%); A/A.
CLAY (15%); A/A.

1330-1340M:
SS (90%); f/m-gn, occ cse gns, poor/fair srtg, sbrnd/sbang, clr qtz, good spher; w/brick red stn fr clay; poros prob poor/fair, ss is v sl to noncalc, silic; firm/hd; cse gns, loose, generally, (no shows).
CLAY (10%); brick red, soft, noncalc, A/A.
Tr c wh calc, xtln.

1340-1350M:
SS (80%); A/A, but med/cse-gn; fri/hd, fair srtg only; sbrd/sbang, pt v tight, gen fair poros?, brn/red stn (clay; pt oxides?)
CLAY (20%); brick-red, soft, matrix (?), noncalc; sm wh clay (matrix).
Wh calc, tr dolo ls, xtln.

1350-1360M:
SS (80%); fn/v cse, qtz, brn, A/A, fri to hd, silic in pt; non-calc, (no shows), porosity prob poor/fair only.
CLAY (20%); A/A; common wh clay, soft; wh xtln calc.

1360-1370M:
SS (90%); red/brn, f/cse, firm/hd, prly srtd, silic, small pt mod calc/dolomitic cmt, (no shows), poor poros.
CLAY, red-brn, soft, non-calc - matrix &/or beds.
Wh calc, xtln, loose.

JR/JLT271/26

1370-1380M:
SS (95%); A/A, red/brick, A/A, pr srtg, firm/hd, silic, pt sl calc, (no fluor) poor vis poros.
CLAY (5%); A/A, common wh clay, soft, non-calc.

1380-1390M:
SS (90%); A/A, vis poros poor, (no oil fluor).
CLAY (10%); brick red, as ab, some wh, pt mod calc, soft, poss caliche(?) in small pt.

1390-1400M:
SS (85%); brick red, fn/cse, prly/unsrtd, sbrnd/sbang, loose to firm, silic; poor to fair (?) vis poros, (no shows).
CLAY (10%); brick red, A/A.
CLAY (5%); wh, sft, pt mod calc (caliche?).
(Minor metal shavings and lower ROP may be indicative of bit wear).

1400-1410M:
SAND (50%); clear to occ opaque, common red-orange, iron oxide stain, m-c, subrnd, spherical, well sorted unconsolidated qtz, good interpreted vis Ø, no shows.
SANDSTONE (30%); red-brown, vf to occ fine grained, mod hard to hard; well sorted, subang-subrnd, siliceous, qtz grains; poor to nil vis Ø (clayey matrix), no shows.
CLAY (20%); A/A, extremely hydratable.

1410-1415M:
SS (20%); red brn, fn-gn, qtz, sbang/sbrnd, poor poros, no shows, pt calc cem, pt mtrx of brick-red/brn clay, mod calc, soft.
SS (80%); cse, qtz, sbang/sbrnd, sphericity good (poss from SS), no shows.
CLAY (20%); brick-red, soft, mod, calc, w/abund calcite, xtln, wh, & ls, arg, off wh.

1415-1420M:
SD (60%); A/A.
SS (15%); A/A.
CLAY (20%); A/A.
LS (5%); off wh, pt micritic, soft, pt hd, microxtln; fri calcite, xtln, pt wh, pt clr.

1420-1425M:
SD (40%); A/A.
CLAY (25%); A/A.
SS (25%); A/A.
LS (10%); wh, earthy/marly, soft; w/ sm micritic, sl firm.

1425-1430M:
SAND (60%); m/cse, loose, sim to ab, sbang/sbrnd, spher, no show.
CLAY (20%); red/brn, A/A, var calc to noncalc.
SS (15%); A/A, no shows, poros prob poor.
LS (5%); noted decrease.

1430-1435M:
SAND (75%); m-gn, loose, poor/fair poros?, mtrx prob clay, no show.
CLAY (25%); A/A.
Calc, tr ls - A/A.

1435-1440M:
SAND (65%); fn/med.
CLAY (35%); red-brn, soft, poss both as mtrx & bds.
Calcite, xtln, wh & clr.

1440-1445M:
SAND (70%); qtz, red-brn/gy, f/m, sbrnd, fair/well srtd, prob good poros, no shows.
CLAY (30%); A/A.
Calc, tr ls.

1445-1450M:
SAND (65%); m-gn, sm fn, A/A, loose, prob good/fair poros, no shows.
CLAY (35%); A/A, red-brn, soft, hydrophyllic, pt sl calc.

1450-1455M:
SAND (60%); qtz, fn/cse, unsrtd, sbrnd, good spheric, no shows, prob poor poros.
CLAY (25%); A/A, brick-red.
LS (15%); off wh, sft, earthy, marly; pt bec firm, micritic w/calc, xtln, wh/clr.

1455-1460M:
SAND (65%); A/A, brick-red stained by oxide &/or clay, no shows.
CLAY (35%); A/A.
LS (30%); calc.

1460-1465M:
SAND (65%); m/gn, less fn and cse, loose, poor/fair poros? no shows.
SANDST (5%); fn, fri/firm, sl calc, no shows.
CLAY (30%); A/A.
Tr calcite; tr ls - A/A - soft, wh/off wh, earthy marly.

1465-1470M:
SAND (20%); m/cse, sbrnd, good spheric, fair poros, no shows, lithics of v fn-gn volcanics, meta(?), qtzite.
SS (30%); f/vf, rd, pt sl calc mainly silic, dk gy.
CLAY (50%); red brn, soft, A/A, tr buff gy dol, microxtln, w/calcite, tr ls, A/A.

1470-1475M:
CLAY (50%); brick-red, soft, non-calc to v sl calc mtrx (?) &/or beds.
SAND (30%); brick-red, med/cse-gn, qtz & incr abund dk gn, blk, reddish, gy, v fn-gn lithics; fair/poor Ø, no shows.
SS (20%); v fn/fn, gy-red, w/oxide stns, firm/hd, pt sl calc; poor poros, no shows.
Tr calcite; tr wh, sft, ls, arg/micritic.

1475-1480M:
CLAY (65%); A/A.
SD (30%); A/A, w/tr dol buff, microxtln, v hd, tr wh ls, sft, arg; abund ang frags of volcanics, qtz; v fn-gn, lt/med gy, gy-grn, some blk, dk grn, xtln & amorph rocks.
SS (5%); v fn gn, A/A; tr calc; sft ls, A/A.

1480-1485M:
CLAY (90%); brick red, A/A, sft, noncalc.
LITHIC FRAGS (10%); fn-cse qtz; angular/subrnd-cgl(?) w/clay matrix(?); calc mtl-porosity(?) prob poor.

1485-1490M:
CLAY (85%); A/A.
LITHIC (15%); debris & qtz, fn to cse, A/A. Tr calcite, dolo mtl.

1490-1495M:
CLAY (80%); brick red, A/A.
LITHICS (20%); debris, qtz, A/A, tr cgl w/clay matrix?

1495-1500M:
CLAY (80%); A/A.
LITHICS (20%); debris, A/A, w/qtz; cgl w/clay matrix.
Calcimetry: 3/1.

1500-1505M:
SALT-MUD (95%); (Sample heavily contaminated with salt additive).
LITHICS (5%); debris: igneous & volcanics, qtz, cse, ang to subang.
Practically no clay in spls (or shaker).

1505-1510M:
(Sample quality vastly improved - excess salt added to mud has circulated through).
LITHIC CONGLOMERATE (30%); A/A; fn to v cse-gn, igneous & volcanic debris-dk grey, occ purple, green angular fragments, aphanitic, hard, noncalcareous with occ green glassy inclusions, heavy minerals (poss magnetite/illmenite). (Clay fraction most likely matrix of congl).
CLAY (55%); brick red, sl calcareous, soft, amorphous (matrix(?)).
SANDSTONE (10%); brick red, v f, poor to nil vis Ø, siliceous, hard, occ brittle. No shows.
SAND (5%); clear to yellowish and red (stained), gen f, subang-subrnd, unconsolidated.

1510-1515M:
CGL (55%); lithic frags, A/A, w/clay matrix-var calc.
CLAY (30%); brick-red, soft, sli/mod calc in pt.
SAND (15%); ±15%, poss is part of the cgl, fn/cse qtz, subrnd, spher. No oil shows.

1515-1520M:
CONGLOMERATE (45%); A/A.
CLAY (45%); A/A.
SAND (10%); A/A, poor vis Ø interpreted.
No oil shows.
Calcimetry: 8/1.

1520-1525M:
CONGLOMERATE (40%); A/A, predominantly grey volcanic-aphanitic ign fragments.
CLAY (50%); A/A, remains gen mod calcareous in part.
SAND (10%); clr, occ orange, yellow, f-m, subang, mod sorted, unconsolidated qtz.
No shows.

1525-1530M:
CLAY (60%); A/A, brick red, soft.
SAND (25%); A/A, f/cse qtz, subrnd to subang, good spheric, poor srtg.
No shows.
CGL (15%); A/A, decr in amount of ign & volc frags, cse, ang to subrnd. Poor srtg.
Tr-comm calc, calcar mtl pt v soft, wh ls, micritic/earthy.

1530-1535M:
CLAYST (90%); brick-red, A/A; main lith-soft, sl/mod calc.
LITHIC FRAGS (10%); qtz sd, marked decr (poss 100% clayst/clay fm).
Tr-comm wh sft ls/calc.

1535-1540M:
CLAY/CLAYST (98%); A/A.
LITHIC FRAGS (2%); gns, qtz, A/A. Tr calc, wh, soft, ls, arg/earthy, wh.
Calcimetry: 6/2.

1540-1545M:
CLAYST (95%); red brick, sft, sli calc.
LITHICS (5%); debris, occ qtz gn A/A, w/tr wh, sft ls, calc mtl.

1545-1550M:
LS (35%); wh, sft, sli firm, v fn, micritic, pt bec m-lt gy, sli tr carb mtl; ls is argillac.
CLAYST (65%); A/A; Q: can clayst now be only cvgs?
Note: LS has dull yell/wh min fluor. Tenuous yellowish cut flour may be fm contam or carbonac mtl within ls. (No heavies on chrom).

1550-1555M:
LS (45%); A/A, w/ m gy more abund, sli firmer, carb mtl more abund, some on blk surfaces, laminae.
CLAYST (55%); A/A, (poss largely or in pt cvgs).
LS has dull yell/wh min fluor; tenuous yell cut fl may be spurious. (No chromatographic pick-up of oil ends).

1555-1560M
LS (100%); A/A, sm clr xtln calc (veins), abund carb mtl, incl and as thin laminae. (No oil shows). (Red clayst-cvgs).
Calcimetry: 24/8.

1560-1565M:
LS (30%); A/A, (No shows) w/tr clr, amorph anhydrite.
CLYST/SH (20%); red brn, firm-sft, mod calc, & mod gy-grn, firm-sli soft, noncalc.

1565-1570M:
LS (25%); w/clayst (and salt from supersat salt mud), tr anhyd.
(Poor sample quality).
CLAYST/SH (75%); A/A.

1570-1575M:
CLAYST/SH (95%); red brn, brick-red, A/A; less gy-grn, as ab.
LS (5%); A/A, wh-lt gy, soft, micritic/earthy & clay-red, fr uphole.

1575-1580M:
CLAYST (85%); A/A, red brn, less grn-gy, firm.
SH (10%); dk purplish-red, firm-hd, sli fiss/fiss, pt mod calc & less gy-grn, firm, noncalc.
CALC (5%); wh, sft.
Calcimetry: 8/0.

1580-1585M:
CLAYST (95%); lt reddish brn, v soft, mod calc.
SH (5%); m gy-grn, firm, sbfiss/fiss.
Tr wh calc.

1585-1590M:
CLAYSTONE (95%); A/A, sli reddish brown, v soft, amorphous, mod calcareous; trace anhydrite-white, v soft, amorphous, tr ls.
SHALE (5%); A/A, grey green, firm, subfissile, continues nil vis Ø.
No shows.

1590-1595M:
CLAYST (90%); red, A/A.
SHALE (10%); grn-gy, dk reddish-purple, sli fiss/fiss, firm.

1595-1600M:
CLAYST (90%); A/A.
SH (10%); A/A.

1600-1605M:
CLAYST (85%); A/A, mod calc, soft.
SH (15%); A/A, reddish/purple is sli calc, grn-gy non calc.

1605-1610M:
CLAYSTONE (95%); A/A, tr anhydrite, tr limestone. Limestone is lt to med grey, microcrystalline, hard to mod hard, micritic in part, nil vis Ø, no shows.
SHALE (5%); A/A.

1610-1615M:
CLAYSTONE (90%); A/A, predominantly med brown-sli reddish, with trace of anhydrite: white, soft, extremely dispersive, amorphous.
SHALE (10%); A/A, brown, sli purple, mod hard, subfissile, non calcareous.

1615-1620M:
CLAYST (90%); A/A.
SHALE (10%); A/A, w/little med gy-grn; tr slickensided. Tr anh, clr/transluc wh, sft/firm.

1620-1625M:
CLAYST (90%); A/A.
SH (10%); Incr tr to comm anhydrite, transluc/wh, amorph.

1625-1630M:
CLAYST (90%); w/tr lt gy-grn.
SH (10%); tr anhy.

1630-1635M:
CLAYST (90%); red w/less gy-grn, c/lt green, v soft.
SH (10%); A/A, but remaining purplish red, less gy-grn.

TOP OF ZECHSTEIN

1635-1640M:
DOL (50%); lt brn, v fn-gn, v hd (No oil shows).
LS (50%); off wh, lt med gy, firm to mod hd, microxtln in pt, sli carbonac; dull yell min fl only. (No cut or oil fl). Clay/clayst, - poss fr uphole? Tr-comm anh.

1640-1645M:
DOLO (75%); A/A.
LIMESTONE (25%); off white; lt brown and grey, A/A, v abundant mineral fluorescence - as in previous sample. No shows, nil to poor vis Ø. Trace calc, anhydr.

1645-1650M:
DOL (35%); A/A. Trace calc anhydrite.
LS (65%); A/A. Off wh, v sft, ang. About 50% of the ls is marly, lt gy/m gy, soft, v calc, sl carbonac in pt, v arg.
No shows.

1650-1655M:
LS (85%); m gy, less off-wh, marly, sl carb, v ang, soft.
DOL (15%); A/A. Tr calc, anhydr.

1655-1660M:
LS (95%); A/A, med gy, soft, v ang, marly; tr wh vein calc.
DOL (5%); A/A, lt tan, hd, v f-gn, xtln.
Note: small pt of LS bec dk gy, hd, v fn, xtln.
Calcimetruy: 60/6.

1920-1925M:
CLAYST (40%); A/A. No shows.
SAND (50%); A/A. No shows.
SLTST (10%); sim to ab, dk purple-red, hd, calc.

1925-1930M:
CLAYST (100%); A/A, brite brick red, soft in cuttings but shown by end bit sple to be not so.
Tr sltst, sd (no shows).

1930-1935M:
CLAYST (55%); brick red, A/A.
SD (40%); fn/m, c/cse grn, subrnd, good sphericity. Loose - good poros? No shows.
SLTST (5%); Tr/v little - A/A, dk purplish-red, hd, calc, c/anh, wh/translucent.

1935-1940M:
CLAYST (95%); A/A, plus tr lt gy-grn. Tr sd, cse qtz, tr anhydrite.
SLTST (5%); A/A.

1940-1945M:
CLAYST (95%); A/A. No shows.
SLTST (5%); A/A. No shows.
Tr sd, anhydrite, A/A. No shows.

1945-1950M:
CLAYST (75%); brick red, & incr lt gy, soft.
SLTST (15%); A/A, hd, calc, dk purple-red.
SD (10%); A/A, fn/m. No shows.
Calc: 2/0.

1950-1955M:
CLAYSTONE (90%); orange/red, soft, amorphous, mod calcareous, gd tr anhydrite, white, soft, amorphous-generally non crystalline.
SILTSTONE (10%); red/bwn to lt-med gray, grading to v f sandst in part.
SAND (GD TR); A/A.

1955-1960M:
CLAYSTONE (85%); A/A, gd tr-3% anhydrite A/A.
SILTSTONE (10%); A/A.
SAND (5%); orange, translucent, gen fine grained, occ m, mod well sorted. No shows.

1660-1665M:
LS (90%); A/A.
DOL (5%); tan, v hd, v f-gn, xtln.
ANHY (5%); transluc, gy, firm-soft, amorph.
No shows.
Note: V abund clay/clayst, m-lt gy, v sticky, hydrophyllic.

1665-1670M:
LS (95%); A/A, m-lt gy, sft, micritic.
DOL/ANH (5%); A/A.
No shows.
Note: Clay/clayst, A/A, v abund (may be fm).
Calcimetry: 43/6

1670-1675M:
LS (100%); A/A, lt gy, occ m gy, sft/sl firm, micr; and clayst, A/A.
Tr dol, anh. No shows.

1675-1680M:
LS (40%); A/A, m-lt gy, soft, marly to sl firm, micritic.
CLAYST (60%); m gy, soft, marly, mod-v calc, hydrophyllic, sticky, tr pyr incl in ls/clay.
No shows.
Calcimetry: 61/3.

1680-1685M:
CLAY/CLAYST (70%); A/A, v sft, pt v sticky, water-_____, var calc.
LS (30%); tr anh, tr dol, all as ab.
No shows.
Calimetry: 22/4.

1685-1690M:
CLAYSTONE (90%); brown/gy to med grey, v soft, mod calcareous, amorphous.
LIMESTONE (10%); white and lt to med grey, soft to sl firm, marly, rarely microcrystalline, tr dolomite, tr anhydrite, as previous, nil Ø, no shows.

1690-1695M:
CLAYSTONE (80%); A/A.
LIMESTONE (20%); A/A, tr dolomite, sl tr anhydrite, nil Ø, no shows.
(5% of sample represents red claystone L Triassic cavings).

1695-1700M:
CLAYSTONE (75%); A/A, mod calcareous, sl dolomite.
LIMESTONE (25%); A/A, dolomitic in part (based on alizarin red staining).
Nil Ø, no shows.
Calcimetry: 18/9.

JR/JLT271/34

1700-1705M:
CLAYST/CLAY (70%); lt/m gy, v soft, mod/v calc; pt sticky, hydrophyllic, sl carbonac.
LS (30%); lt/m gy, soft, v arg/marly. (V poor poros, no shows. Occ m gy, firm, v f, xtln. Calc: v little dol, transluc, tan/gy, firm, xtln. Occ fossil frags.

1705-1710M:
LIMESTONE (85%); lt to med grey, soft to v firm, generally marly, sl-mod carbonaceous, occ microcrystalline. No shows.
DOLOMITE (5%); lt buff color, mod hard, sucrosic, poor vis Ø.
CLAYSTONE (10%); A/A. V calcareous, occ banded w/carbonaceous material.
Calcimetry: 70/2.

1710-1715M:
LIMESTONE (35%); A/A, (tr goniatite fossils).
CLAYSTONE (65%); brick red, soft, mod calcareous, generally amorphous, tr siltstone, v firm, nil vis Ø, no shows. (cavings?)

1715-1720M:
LIMESTONE (40%); A/A, continue yellow min fluor, no cut, no shows, tr bivalve casts.
CLAYSTONE (55%); red brick, tr volcanic material (?) cavings? - very similar to basal Bunter sequence.
SLTST (5%); red/brn, firm, sl calc to mod calc; tr v f ss, fm, sl calc, gy.
Calc: 19/2.

1720-1725M:
SLTST/VVF SS (50%); reddish/pink, less grn-gy, firm, mod calc, tr cse qtz, red stn (cvg?/subrnd, sphr, tr wh anhy. Nil poros, min fluor. No cut or oil fl.
CLAYST (50%); red, soft A/A.
Calc: 28/3.

1725-1730M:
SILTSTONE (55%); A/A, dark red: sl cal (25%), orange-brown: mod to v cal (10% of sample).
CLAYSTONE (40%); A/A, generally light orange-brown, mod calcareous, nil vis Ø, no shows.
LIMESTONE (5%); drk grey, mod hard, marly in part, microcrystalline (cavings?).
Calc: 26/2.

1730-1735M:
SILTSTONE (75%); A/A, v mod cal tr cse quartz grains, subrnd, spherical, iron stain.
CLAYSTONE (25%); A/A. Nil vis Ø, no shows.
LIMESTONE (2-5%); white-marly, grey-microcrystalline (cavings?).
Calc: 24/2.

JR/JLT271/35

1735-1740M:
SILTSTONE (55%); A/A, remains mod calcareous, nil vis Ø, no shows.
CLAYSTONE (45%); A/A.
(Tr-2% LS cavings)
Calc: 20/2.

1740-1741M:
SILTSTONE (40%); A/A, nil vis Ø, no shows.
CLAYSTONE (60%); A/A.
(spot spl: 1742.5M: clyst, sltst, red/brn &-tr ls, gy-grn/gy, soft to hd, tr anh. Spot spl 1743M: same.
Calc: 22/1

1741-1745M:
SILTSTONE (45%); A/A, tr limestone (cavings?).
CLAYSTONE (55%); A/A, sltst - dk purplish red, mod calc.
(Spot sample: 1748M: same A/A, Clyst, little sltst, tr anhy).

1745-1750M:
CLAYSTONE (55%); A/A, tr anhydrite.
SILTSTONE (35%); generally A/A, color-dark purplish red, moderately calcareous, nil vis Ø, no shows.
(Sample contains a good amount of bit metal scrap).
Calc: 18/1.

1750-1755M:
CLAYST (70%); red-brn, sft, mod calc, hydrophyllic, A/A.
SLTST (30%); dk purplish-red, firm, mod calc yst hd tr ls, marly, gy, soft.
Calc: 26/3.

1755-1760M:
CLAYST (60%); A/A, tr ls, marly, gy, soft.
SLTST (40%); A/A, tr ls, marly, gy, soft.
Calc: 12/4.

1760-1765M:
CLAYST (70%); reddish-brn, soft, mod/sl calc.
SLTST (30%); dk reddish/purple, hd, mod calc, tr.ls, marly, gy, soft. Tr anh.
Calc: 1.

1765-1770M:
CLAYST (65%); A/A.
SLTST (35%); A/A.
Calc: 1.

1770-1775M:
CLAYST (65%); No change.
SLTST (35%); No change.
Calc: 1.

1775-1780M:
CLAYST (75%); Same.
SLTST (25%); Same.
Calc: 1.

1780-1785M:
CLAYST (60%); red/brn, A/A, mod calc, c/microfossils: dk, spherical, 0.1-0.5mm.
SLTST (40%); Same as clayst.

1785-1790M:
CLAY (75%); light reddish/brn, v soft, sl calc (less calc & less consolid than before). Marked decr in c/microfossils-spher, 0.1-0.5mm.
SLTST (25%); A/A.

1790-1795M:
CLAYST (80%); Same A/A, c/microfossils: spherical, 0.1-0.5mm .
SLTST (20%); Same A/A.

1995-1800M:
CLAYST & MARL (85%); A/A, w/abund 0.1-0.5mm spherical microfoss.
SLTST (15%); less than above.
Calcimetry: 13.6.

1800-1805M:
CLAYST & MARL (80%); Same A/A. Microfoss, A/A, decr in no.
SLTST (20%); A/A.
Calc: 11/5.

1805-1810M:
CLAYST/MARL (75%); A/A.
SLTST (25%); abund spher microfossils, A/A.
Calc: 10/5.

1810-1815M:
CLAYST/MARL (85%); A/A. (Abund microfossils). No shows.
SLTST (15%); Same A/A.
Calc: 12/8.

1815-1820M:
SILTSTONE (30%); A/A, mod to v calcareous, nil vis Ø, no shows.
CLAYSTONE (65%); A/A, mod to v calcareous, nil vis Ø, no shows.
SAND (5%); clear, occ orange, f-c, subrnd, spherical, mod sorting (?) unconsolidated quartz grains, good vis Ø, no shows.
Calc: 16/6.

1820-1825M:
SILTSTONE (30%); A/A, nil Ø, no shows.
CLAYSTONE (60%); A/A.
SAND (5%); A/A.
ANHYDRITE (5%); clear to white, crystalline, as rind and vein fill.
Calc: 16/3.

1825-1830M:
SILTSTONE (30%); A/A, good tr anhydrite, nil vis Ø, no shows.
CLAYSTONE (65%); A/A.
SAND (5%); A/A, no shows.
SILTSTONE (GD TR); off-white, occ dk gr grains, med hard, blky, mod calc, tight - nil vis Ø.

1830-1835M:
SILTSTONE (30%); purplish red-brown, A/A.
SILTSTONE (10%); off white
CLAYSTONE (55%); A/A.
SAND (5%); A/A, generally fine-med grained, crs fraction occ subangular.
Calc: 17/4.

1835-1840M:
SILTSTONE (30%); purple-red/brown, A/A.
CLAYSTONE (60%); purple-red/brown, A/A.
SILTSTONE (5%); off-white, A/A.
SAND (5%); A/A.

1840-1845M:
SILTSTONE (30%); red/brwn, non to mod calcareous, tr off-white siltstone.
CLAYSTONE (55%); A/A, gd tr anhydrite.
SAND (15%); A/A, f-c, moderately sorted, subrnd, subspherical-spherical, good vis Ø, no shows.
Calc: 9/2.

1845-1850M:
CLAYSTONE (50%); A/A.
SILTSTONE (30%); A/A.
SAND (20%); predominantly fine grained, occ m, rare crse, mod well to well sorted, subrnd, spherical to subsph, unconsolidated. No shows.
Calc: 8/2.

1850-1855M:
CLAYST (60%); A/A. Tr anh, transluc, wh, soft.
SLTST (30%); A/A. Tr anh, transluc, wh, soft.
SD (10%) loose qtz, fn, sm, m, tr cse, clear; tr red oxide stn. No shows.
Calc: 6/2.

1855-1860M:
CLAYST (65%); A/A, lt reddish/pink to brick red, v soft, sl calc.
SLTST (30%); A/A, dk purplish red, sm brn-gy; hd, mod calc.
SD (5%); clr qtz, fn/m, tr cse subrnd/rnd, spher, fairly well srtd. Tr anhydrite. No shows.
Calc: 5/1.

1860-1861M:
(B.U. - Drill break 6/8/12m/hr w/20,000 lbs less WOB).
CLAYST (50%); A/A.
SLTST (20%); A/A.
SD (20%); Fn/med, tr cse, fair srtg, subrnd/rnd, loose. No shows.
Calc: 4/1.

1861-1865M:
CLAYSTONE (50%); A/A.
SILTSTONE (15%); A/A, occ dark purple-bwn, hard, blky, non to sli calcareous.
SAND (35%); predominantly f/m, A/A, no shows.

1865-1870M:
CLAYSTONE (65%); A/A, some platy fracture to claystone (slight fissility?) good tr anhydrite (white, soft, amorphous generally).
SILTSTONE (30%); A/A, nil Ø, (very tight), no shows.
SAND (5%); A/A.

1870-1873M:
(B.U. before bit change trip).
CLAYST (65%); A/A.
SILTSTONE (30%); A/A.
SAND (5%); A/A, tr sandstone, v f grained, loosely cemented, friable.
ANHYDRITE (2-3%); white, soft, amorphous, occ clear, crystalline. No shows.

1873-1875M:
CLAYST: brick red, soft, m/sl calc. Tr anh. Tr blue-gy clyst.
SLTST: dk red/purple red, hd/firm, m calc. Nil poros. No shows.

1875-1880M:
CLAYST (60%); red/brn, brick red, soft, sl calc.
SILTST (40%); hd, dk purplish-red, mod calc sl tr qtz, cse, well-rnd. Tr anhydrite.
Calc: 18/4.

1880-1885M:
CLAYST (80%); bright brick-red, soft in sple, m calc.
SLTST (20%); A/A, m calc, hd.
Calc: 6/2.

18815-1890M:
CLAYSTONE (90%); A/A. No shows.
SILTSTONE (10%); A/A. No shows.
Tr SD.
Calc: 6/1.

1890-1895M:
(Circulate B.U. due to drill break, B.U. = 1895.1M).
(Circ. bottoms up at 1893; drill break top at 1891).
CLAYST (85%); A/A.
SAND (10%); qtz, clr/orange stns, fn-grn, tr fr grn, loose. No shows.
SLTST (5%); A/A.
Calc: 3/1.

1895-1900M:
CLAYST (75%); A/A.
SAND (20%); qtz, f/m, c/cse, subrnd, fair srtg, loose, no shows.
SLTST (5%); w/tr ss, v fn, gy/red - poor/nil porosity.
Calc: 3/1.

1900-1905M:
CLAYST (70%); brick red, tr m/lt gy & tan, soft/firm, m calc.
SLTST (10%); v fn ss, red & tr gy, frm/hd, calc, v poor poros. No shows.
SD (20%); A/A, fn/m, tr cse qtz loose. No shows.
Calc: 4/1.

1905-1910M:
CLAYST (80%); brite brick red. Tr m gy-grn, soft.
SAND (20%); A/A, loose. No shows.
Tr sltst, A/A.

1910-1915M:
CLAYST (95%); A/A, tr sltst.
SAND (25%); fn/cse, porosity, subrnd/rnd qtz, clr/transluc, no shows. Poss good poros, if discrete sand.

1915-1920M:
CLAYST (40%)
SAND (50%); A/A, but fn/m, some cse, fair srtg. No shows.
DK SLTST (10%); A/A, purple/red, hd, calc.

1960-1965M:
CLAYST (80%); A/A.
SAND (15%); A/A.
SILTST (5%); A/A.

1965-1970M:
CLAYST (70%); Same A/A. No shows.
SAND (20%); Same A/A. No shows.
SLTST (10%); Same A/A. No shows.

1970-1975M:
CLAYST (65%); A/A (brite brick red, sl/mod calc, soft/firm).
SAND (25%); fn/m, sm cse, subrnd/rnd, good spheric, well srtd. No shows. (Good poros?).
SLTST (10%); A/A (brick red/dk purplish red, hd, var calc).

1975-1980M:
CLAYST (80%); A/A (no difference). No shows.
SLTST (10%); A/A (no difference). No shows.
SD (10%); A/A (no difference). No shows.
Calc: 3/0.

1980-1985M:
CLAYST (75%); Same. No shows.
SLTST (10%); Same. No shows.
SD (15%); Same. No shows.
Calc: 6/1.

1985-1990M:
CLAYST (75%); A/A. No shows - poros prob good in loose sd.
SLTST (10%); A/A. No shows - poros prob good in loose sd.
SAND (15%); A/A. No shows - poros prob good in loose sd.
Calc: 6/0.

1990-1995M:
CLAYST (70%); brite brick red, soft, less lt gy-pink; var calc.
SAND (20%); qtz, fn/m, less cse, subrnd/rnd, spheric, good,fair srtg. No shows. Good poros.
SLTST (10%); dk purplish red, hd, mod calc. No shows.
Calc: 6/0.

1995-2000M:
CLAYSTONE (80%); A/A, tr anhydrite.
SILTSTONE (10%); A/A.
SAND (10%); A/A.
(Formation probably much more arenaceous, sample not indicative of MWD response in general).
Calc: 5/1.

JR/JLT271/42

2000-2005M:
CLAYSTONE (85%); A/A, mod calcareous.
SILTSTONE (5%); A/A, mod to v. calcareous.
SAND (10%); clear, gen medium to fine, well sorted, rnded, gen spherical unconsolidated quartz, no shows.

2005-2010M:
CLAYSTONE (65%); A/A, gd tr-5% anhydrite white, soft, amorphous and grey, crystalline, firm.
SILTSTONE (25%); A/A, varicolored, tr violet, tr black, var cal nil vis Ø.
SAND (10%); A/A, occ varicolored.
Calc: 5/1.

2010-2015M:
CLAYSTONE (50%); A/A.
SILTSTONE (20%); A/A, with ~5% lt aqua green colored (continues varicolored).
SAND (30%); predominantly med, f-c however, no shows.
Calc: 4/0.

2015-2020M:
CLAYSTONE (35%); A/A, occ banded with white amorphous anhydrite.
SILTSTONE (25%); A/A.
SAND (40%); A/A.
(MWD indicates thin distinct interbeds of sand-sandstone in a sequence that overall appears more shaly).
Calc: 4/0.

2020-2025M:
SAND (35%);
CLAYSTONE (45%); A/A, rare subfissility, tr anhydrite, sl calcareous.
SILTSTONE (20%); dk purplish red and lt to med grey.
(Limestone: up to 5% of sample, cavings(?)).

2025-2030M:
SAND (35%)
CLAYSTONE (50%); A/A, sl to mod calcareous, tr anhydrite.
SILTSTONE (15%)
(Much less cavings).
Calc: 2/0.

2030-2035M:
CLAYST (65%); brick red, soft/firm, sl calc.
SLTST (20%); dk red, firm/hd, calc.
SAND (15%); fn/m, occ cse grns, clr/transluc qtz, poor/fair srtg, subrnd/rnded, good sphericity. No shows. Poss fair poros.

2035-2040M:
CLAYST (75%); A/A.
SLTST (20%); Same as 2035M.
SAND (5%); ID - No shows.

2040-2045M:
CLAYST (60%); tan/orange-brn, sft; occ brick red; var calc.
SLTST (20%); dk red/brn, firm/hd, var calc.
ANH (& GYPSUM?) (20%); wh, soft, var calc (gypsum pt?). No shows. Tr dol, gy, hd, microxtln. Tr cse qtz, rnded; tr ang clr, v cse.

2045-2050M:
CLAYSTONE (75%); A/A, c/m, gy-grn, soft, var calc.
SLTST (15%); A/A.
SD (5%); qtz, fn/cse, unsrtd, subrnd, clr/transluc, gy. No shows.
ANH (5%); wh, soft (Gyps?).

2050-2055M:
CLAYSTONE (75%); A/A, continue common sli gn md-gy claystone (10% of sample).
SILTSTONE (10%); A/A, occ dk gray.
SAND (15%); A/A, clear to translucent, orange, red, no shows, v sl trace anhydrite.

2055-2060M:
CLAYSTONE (65%); A/A.
SILTSTONE (20%); A/A.
SAND (15%); gen A/A, well sorted, tr-3% black grains (hematite?). No shows.

2060-2065M:
CLAYSTONE (60%); orangish red/bwn, soft to firm, sli calcareous.
SILTSTONE (20%); A/A, gen sli to non calcareous.
SAND (20%); A/A. No shows. (Overall much less calcareous).

2065-2070M:
CLAYST (85%); A/A. No shows.
SLTST (10%); Same. No shows.
SD (5%); No change, less abund. Tr wh/transluc anhydrite. No shows.

2070-2075M:
CLAYSTONE (75%); M grn-gy, sh-firm, fissil/subfiss mod calc.
SLTST (15%); Same. No evidence of conglomerate. No shows.
SAND (10%); Same. No evidence of conglomerate. No shows.

2075-2080M:
CLAYST (50%); m orange-brn, brick red, less m gy-grn, soft/sl firm, var calc, occ tr hard, gy-grn & dk brn-red, subfiss.
SLTST (50%); dk purple-red, dk red brn, hd/sl soft, pt v hd, mod calc grading to v fn ss, calc cement. No porosity. No shows.
SD (TR); cse/m gn qtz, clear, loose, & tr wh/transluc anh, lt gy/off white, amorphous, non-calc.

2080-2085M:
Spot spls - 2082: same CLYST & SLTST, 2083: CLYST, SLTST, 45/50. A/A + 5% sh, firm, m gy-grn, sl calc, tr SD & tr anhydrite.
CLAYSTONE (60%); orange red, A/A, sl calcareous.
SHALE (10%); reddish brown, occ grey, firm to med hard, subfissile, non to v sli calcareous.
SILTSTONE (25%); A/A.
SAND (5%); A/A, no shows.

2085-2090M:
CLAYSTONE (30%); A/A, gd tr anhydrite.
SHALE (5%); A/A, subfissile to occ fissile.
SILTSTONE (45%); generally A/A, grey fraction (~15%), grading to vf ss, calcareous cement sl hard, nil vis Ø.
SAND (20%); clear, orange stain, occ translucent, f occ med, well sorted, rnded, spherical, no shows.

2090-2095M:
CLAYSTONE (50%); A/A.
SHALE (10%); grey, greenish-grey and lt red; A/A.
SILTSTONE (40%); A/A, grading to v f sandstone, sandstone appears to contain a small percentage of dark (lithic?) fragments, tr sand, no shows.

2095-2100M:
(B.U. at 2099.1M-drill break @ 2096.99M).
CLAYST (75%); A/A, (brite brick red, soft, sli calc).
SLTST/SS (10%); ss v fn, fri, A/A.
SHALE (10%); A/A, red-brn, less gy-grn.
SD (5%); cse qtz, subrnd/rnd, sphericity good. No shows.

2100-2105M:
CLAYST (75%); A/A.
SLTST/SS (10%); A/A.
SH. (10%); A/A.
SD (5%); A/A.

2105-2110M:
Bit change @ 2008M.
CLAYST (65%); A/A.
SLTST (15%); w/ ss, A/A.
SH (10%); A/A.
SD (5%); qtz, cse/fn, subrnd, tr dk-grn silic gns, cse, subrnd.
ANHY (5%); transluc, brittle, wh, v soft.

2110-2115M:
SLTST (60%); A/A, dk red/brn, soft/sl firm.
SS (20%); dk brn, v fn, fri/sl firm, argillac, mod calc. Poor poros. No shows.
SH (5%); brick red, firm/soft, A/A.
CLAYST (5%); red, tr gy-blue/gy, soft, sli calc. Tr/c anhydrite.

2115-2120M:
CLAY (80%); blue-gy, soft, pt sl/mod calc, sticky on shakers, v sl carb, pt sl slty.
SH (10%); brick red, soft/sl firm, subfiss.
SLTST (10%); brn-red, soft, calc argillus.

2120-2125M:
CLAY (95%); A/A, v sl carbonac, variably calcareous.
SH (5%); tr/c v firm/brittle thin strk, sli carbonous, noncalc, slickensided.
No shows.

2125-2130M:
CLAY (100%); A/A, soft, gummy/sticky on shakers, sples, tr w/blk, carbonac lam/surfaces, good part silty, w/tr tiny spherical pyritized microfossils.

2130-2135M:
CLAY (100%); A/A, pt silty.

2135-2140M:
CLAY (95%); A/A, grading to SH in small pt.
SH (5%); m/lt gy, sli firm, subfiss to massive, sl calc, pt sl silty.

2140-2145M:
CLAYSTONE (80%); med grey, soft, occ firm, amorphous to occ blocky, sl carbonaceous, sli calcareous.
SHALE (10%); med to dk grey, firm, subfissile to fissile, micromicac.
CLAYSTONE (10%); red/bwn, no shows.

2145-2150M:
CLAYSTONE (75%); lt-med grey, carbonaceous debris v finely interlaminated.
SHALE (10%); lt-dk grey.
CLAYSTONE (15%); red/bwn, no shows.

2150-2155M:
CLAYSTONE (85%); A/A, grading to siltst in part.
SHALE (10%); A/A, to dk grey-black in part.
CLAYSTONE (5%); red/bwn, no shows.

2155-2160M:
CLAYSTONE (85%); A/A, with undulating carbonaceous lamination, grading to siltst.
SHALE (10%); A/A.
CLAYSTONE (5%); red/bwn, no shows.

2160-2165M:
CLAY (55%); A/A, var silty, carbonac, calc.
SH (45%); A/A, subfiss/firm; var carbonac, slty, calc, micromicac, pt grades to v arg sltst, carbonac, calc, firm/soft. No shows.

2165-2170M:
SHALE (60%); A/A, carbonac, mtl abund. No shows.
CLAY (40%); A/A, carbonac, mtl abund. No shows.

2170-2175M:
CLAY (60%); A/A. No shows.
SHALE (40%); A/A. No shows.

2175-2180M:
CLAY (60%); A/A, soft, stky (lt gy).
SHALE (60%); slty, A/A, (m gy); micromicac. No shows.

2180-2185M:
CLAY (50%); Ident to above.
SHALE (50%); Ident to above.
Tr sltst, m gy, arg, v fri, sl calc. No shows.

2185-2190M:
CLAY (50%); A/A, sl/mod calc. No shows.
SHALE (50%); A/A, sl/mod calc. No shows. Tr sltst.

2190-2195M:
CLAY (50%); Ident to above. No shows.
SHALE (50%); Ident to above. No shows. Tr sltst.

2195-2200M:
CLAY (50%); A/A. No shows.
SH (50%); A/A. No shows.

2200-2210M:
CLAY (60%); A/A. No shows.
SH (40%); A/A. No shows.

2210-2220M:
CLAY (60%); A/A. No shows.
SH (40%); A/A. No shows.

2220-2230M:
CLAY (45%); A/A, lt/m gy, v soft, milky calc, carbonac, sl silty.
SH (55%); A/A m/lt gy, firm/sl sft, carb, calc, slty, micromicac. No shows.

2230-2240M:
CLAY (50%); A/A.
SH (50%); A/A, some v slty, grading to sltst; sh micromicac in general. No shows.

2240-2250M:
CLAY (60%); A/A. No shows.
SH (40%); A/A. No shows.

2250-2260M:
CLAY (60%); Same as overlying. No shows.
SH (40%); Same as overlying. No shows.

2260-2270M:
CLAY (75%); Same. Less calcareous.
SHALE (25%); Same. Less Calcareous. Tr sltst, A/A. No shows.

2270-2280M:
CLAY (70%); As before (lt/m gy sft, carbonac, calc, micromicac, w/slty sections, lam w/dk carb mtl).
SHALE (30%); As before (m gy, firm, sl fiss, micromicac, sl calc, variably carbonac w/microlaminae. No shows.

2280-2290M:
CLAY (65%); gy, soft, sl calc, carbonac, micromicac.
SHALE (35%); m gy, frm, subfiss, calc, carbonac, micac, tr sltst. No shows.

2290-2300M:
CLAY (80%); A/A, tr/little brick red w/gy-grn mottling (cvgs?).
SH (20%); A/A. No shows.

2300-2310M:
CLAY (75%); A/A, (little brick red, cvgs, soft, v sl calc). No shows.
SH (25%); A/A, (little brick red, cvgs, soft, v sl calc). No shows.

2310-2320M:
CLAY (40%); gy, A/A, 5% brick red, as uphole.
SH (60%); gy A/A, w/tr cse/granular qtz, & dark silic gns, rnded, good sphericity. Tr pyrite, fine xtals. No shows.

2320-2330M:
SH (60%); A/A, slty/carb/sl calc, gy, pt subfiss.
CLAY (30%); gy, little red (5%) w/2% qtz sd, fn/m, occ cse qtz, subrnd/rnd. No shows. Tr large muscovite mica flakes. No shows.

2330-2340M:
SH (60%); A/A, slty, grades to sltst. Tr ss v v fn, lt gy, fm/sl firm, v calc cem.
CLAY (40%); A/A. Tr wh/transluc anh, tr qtz, cse, clr. No shows.

2340-2350M:
SH (50%); No change. Tr sltst/v v fn gy ss, fri, calc. No shows.
CLAY (50%); No change. Tr sltst/v v fn gy ss, fri, calc. No shows.

2350-2360M:
SH (60%); A/A. Tr wh, soft, calc, clay/calc. No shows.
CLAY (40%); A/A. Tr wh, soft, calc, clay/calc. No shows.

2360-2370M:
SH (60%); Same; mod to v calc in pt. No shows.
CLAY (40%); Same; mod to v calc in pt. No shows.

2370-2380M:
SHALE (50%); No change. Tr anhy (cvg?), occ slickensides, tr pyr xtals. No shows.
CLAY (50%); No change. Tr anhy (cvg?), occ slickensides, tr pyr xtals. No shows.

2380-2390M:
SHALE (50%); No change. Tr pyr. No shows.
CLAY (50%); No change. Tr pyr. No shows.

2390-2400M:
CLAY (50%); A/A, exactly - m/v calc, sli carbonac. Tr wh, v soft anhy/gyps. No shows.
SHALES (50%); A/A, exactly - m/v calc, sli carbonac. Tr wh, v soft anhy/gyps. No shows.

2400-2410M:
CLAY (50%); A/A.
SH (45%); A/A.
SST (5%); v fn-gn, wh, fri, calc, w/ pyrite. No shows.

2410-2420M:
CLAY (50%); No change. Tr ss, A/A. No shows.
SH (50%); No change. Tr ss, A/A. No shows.

2420-2430M:
SH (65%); m/lt gy, subfiss, slty, calc, carbonaceous (lam & dissem).
CLAY (35%); lt gy, soft, calc, pt slty, carbonacous (lam & dissem).
Tr/little wh clay/gyps/anhy. No shows.

2430-2440M:
(@ 2439 circ bottoms up for short trip).
SH (65%); As overlying. No shows.
CLAY (35%); As overlying. No shows.

2440-2450M:
CLAY (60%); lt grey, occ med grey, soft, amorphous, hydratable, variable carbonaceous (finely disseminated, occ interlaminated), sl to mod calcareous, hydratable.
SHALE (40%); med to dark grey, firm, subfissile, sl calcareous, sl carbonaceous, grading to dk grey siltstone (~10% of sample), med hard, cal cement, nil vis Ø, no shows. (~5% cavings of red/bwn claystone - following wiper trip).

2450-2460M:
CLAY (70%); A/A, occ buff-tan (35%), tr anhydrite wispy carbonaceous laminations.
SHALE (30%); A/A, grading to siltstone in part (~5%). No shows.

2460-2465M:
CLAY (55%); A/A, firm in part, carbonaceous debris (anthracitic coal-hard, vitreous luster), tr sandstone - greenish, v f grained, tight cal cement.
SHALE (45%); A/A, fissile commonly, no shows.

2465-2470M:
CLAY (50%); A/A, ~15% buff to tan color with grey clay and carbonaceous interlaminations.
SHALE (50%); A/A, grading to siltstone (5%).
SANDSTONE (TR); off white, v f grained, dk grains, subang (?) to subrnd, trace vis Ø, no shows.

2470-2475M:
SAMPLE MISSED

2475-2480M:
CLAY (60%); lt grey to buff in part, A/A.
SHALE (40%); A/A, continues micromicaceous, no shows.

2480-2485M:
CLAY (55%); A/A, tr anhydrite.
SHALE (45%); A/A, occ grading to siltstone to v f sandstone (5%), off white, friable to firm, subang-subrnd, subspherical, poor vis Ø, no shows.

2485-2490M:
CLAY (50%); A/A.
SHALE (50%); A/A, no shows.

2490-2495M:
CLAY (50%)
SHALE (50%); carbonaceous debris observed. No shows.
(Sample is highly pulverized).

2495-2500M:
CLAY (50%); A/A, trace anhydrite.
SHALE (50%); A/A.

2500-2505M:
CLAY (50%); A/A, continues buff-tan in part.
SHALE (50%); A/A, grading to siltstone, no shows.

2505-2510M:
CLAY (45%); A/A.
SHALE (55%); A/A, no shows, tr v f ss.

JR/JLT271/51

2510-2515M:
CLAY (40%); A/A.
SHALE (60%); A/A, grading to siltstone (~20% of sample), nil vis Ø, no shows.

2515-2518M: (T.D. - Bottoms up).
CLAY (50%); No change.
SHALE (50%); No change.
T/ wh anh(?)/gyps(?).

2518M: MD RKB- TOTAL DEPTH.
(±4:00 AM JULY 7, 1989).

AMOCO DENMARK EXPLORATION COMPANY
SIDEWALL CORE DESCRIPTIONS
5414/7-1 (STINA-1) WELL, BALTIC SEA

RUN NO. 1 RECOVERED 50 EMPTY BULLET(S) 10 MISFIRED 0 BULLET LOST 0
DESCRIBED BY: REVILLA & FARRELLY DATE: JULY 8, 1989

NO.	RECOVERED	(M) DEPTH	LITHOLOGIC DESCRIPTION	SHOWS & REMARKS
1	3/4"	2498.	Clayst - m gy, soft/sl firm, blky, fract, mod calc.	Badly contam. (mud)
2	1/2"	2482.5	Sltst - m/lt gy, soft, argillac, mod calc, arenac, fair to poor poros.	None. Mud-contam.
3	1"	2467.5	Clayst - m gy, sft/sl firm, blky/platy fract, mod calc.	-
4	3/4"	2451.25	Sltst - m gy, soft, mod calc, arenac, pyritic.	None.
5		2432.5	(Mud w/cuttings/cvgs of clayst)	(Refused)
6	1/2"	2419.5	Clayst - m gy, soft/sl frm, blky/platy fract, mod calc, silty, carbonac.	Mud contam.
	3/4"	2404.	Clayst/sh - m gy, sl firm, blky/platy fract, mod calc w/ fine carbonac laminae.	Mud contam.
8	3/4"	2390.	Clayst - m gy, soft/sl firm, blky/platy, mod/sl calc.	Mud contam.
9	3/4"	2369.5	Clayst - m gy, soft, sl blky fract, mod calc, sl silty.	-
10	1/2"	2353.	Sltst - m/lt gy, clay matrix, v pyritic w/finely div grns/xtals dissem & in patches, abund laminae of lt/m gy clay/silt, calc.	None.
11	1"	2341.25	Clayst - m gy, platy fract, silty, mod calc.	-
12	1/4"	2327.5	Clayst - m gy, calc, soft, blky fract.	Bad mud contam.
13	3/4"	2312.75	Clayst - m gy, w/lite gy bands/laminae, mod calc, silty, w/fine carbonac laminae.	-
14	1½"	2295.	Clayst - m gy, sl firm/blky, v silty, micro-micac, mod calc.	-

R/JLT277A/1

NO.	RECOVERED	(M) DEPTH	LITHOLOGIC DESCRIPTION	SHOWS & REMARKS
15	1/2"	2275.5	Sh - m gy, firm, platy fract/subfiss, mod calc, silty.	V bad mud contam.
16	1"	2258.	Clayst - lt/m gy, soft, platy, slty in pt, micromicac, sl/mod calc.	-
17	3/4"	2242.5	Clayst - m gy, soft/sl firm, platy fract, sl calc, sl slty in pt.	-
18	1"	2227.	Clay - m/lt gy, soft, amorphous, sl calc.	V bad mud contam.
19	1"	2210.	Clayst - m gy, soft/sl firm, platy fract, sl/m calc, sl micromicac in bands.	-
20	1¼"	2195.	Clayst - m gy, soft, amorph, micromicac.	-
21	1"	2180.	Sltst - m dk gy, soft, clay matrix, platy fract, mod calc.	Bad mud contam.
22	1"	2169.5	Sh - m gy, firm, subfiss platy, fine lt gy laminae, micromicac, sl silty.	-
23	3/4"	2156.25	Sh - m/dk gy, firm, subfiss platy, lt gy laminae (as 2169.5), sl silty, micromicac.	-
24	-	2135.25	(No recovery)	
25	1/2"	2118.	Clayst - m/dk gy, w/lt gy lam & bands, platy, m/sl calc, fn carbonac lam.	Bad mud contam.
26	1"	2108.25	Conglomeratic sd w/dk brick red mtrx; sand fn to v cs, granular, sbrnd/rnd, unsorted, clay v sl calc, sticky/tough, w/ minor green reduction spots. Nil porosity.	No shows.
27	-	2104.75	(No recovery)	
28	1¼"	2100.	Clayst - dk red/brn, firm, mass, sl calc, v/sl slty.	-
29	1½"	2094.	Clayst - dk red/brn, as 2100, but w/ abund cs qtz, less fn/med, well-rnded, lithic silic grns, unsrtd. Nil porosity. Tr xtln anhyd, clear/transluc to wh amorph anhyd.	No shows.
30	-	2091.	(No recovery)	

NO.	RECOVERED	(M) DEPTH	LITHOLOGIC DESCRIPTION	SHOWS & REMARKS
	3/4"	2074.	Cgl, w/ brite brick red clay matrix, sd fn to v cs, gran, well rnded lithics & qtz, no sorting. Clay only v sl calc, stiff.	No shows. Nil poros.
32	3/4"	2018.5	Cgl, clay matrix, ident to 2074. Nil poros.	No shows.
33	1/2"	1991.	Sand, red-brown, fn/med, qtz, some cs grns, well rnded, fri, fair to good sorting, mod calc clay matrix/cem. Porosity good.	No shows.
34	1/2"	1983.	Sand, ident to 1991. Good porosity	No shows.
35	1"	1976.	Sand, as 1991 & 1983. Good porosity. V fri.	No shows.
36	2"	1973.	Sand & Clay - interbedded finely. Sand sim to 1991-1976 but fn-gn mainly, red-brown w/ red clay cem/matrix & red clay interbeds.	Poor/fair porosity. No shows.
37	3/4"	1962.	Sand, as at 1991-1976. Good porosity.	No shows.
[illegible]	3/4"	1939.75	Sand & Clay, as 1973. Fair to poor poros.	No shows.
39	1"	1927.	Sand, as at 1991-1973. Good porosity.	No shows.
40	3/4"	1915.5	Cgl sd w/ clay matrix, red, as at 2074-2018.	No shows. Poor porosity.
41	3/4"	1899.	Sand, sim to 1991 but finer, occ med-cs, v fri. Good porosity.	No shows.
42	1"	1898.	Sand, brick red, v v fn to fn-gn w/ red clay cem. & thin interbeds; mod/sl calc.	No shows.
43	3/4"	1889.75	Sand: brick red, v fine to fine grained, well sorted with red clay matrix-cement(?), mod calcareous, slightly micromicaceous. Good porosity.	No shows.
44	-	1867.	(No recovery)	-
45	1/2"	1863.5	Clay: reddish brown, soft to sl firm, mod to v calc, amorphous, good tr anhydrite. Abnd sand grains, gen v fine to fine. V poor vis porosity.	No shows.
46	1/4"	1687.	Clay: med to dark grey, firm, rarely subfissile, mod calcareous, micromicaceous.	-

NO.	RECOVERED	(M) DEPTH	LITHOLOGIC DESCRIPTION	SHOWS & REMARKS
-	3/4"	1640.5	Anhyd & Clay: Anhyd is wh to gy, transluc, firm, xtln; clay is off-wh & wh, soft, sl carbonac (dissem in rock), blocky fract.	-
48	-	1637.	(No recovery)	-
49	1/4"	1547.25	Marly limestone: lt grey-greenish, soft, amorphous, extremely micritic, nil visible porosity.	Mud contaminated.
50	-	1520.5	(No recovery)	-
51	3/4"	1491.5	Sand: crimson red, predominantly very fine, occ fine grained, sl firm, calcareous clay-rich matrix, rare green reduction spots, trace anhydrite, fair visual poros.	No shows.
52	3/4"	1465.	Sand: sim. to 1491.5 m overall. Fair to poor visible porosity.	No shows.
53	3/4"	1421.	Clayey sand: red/brown, v f to silty, firm, very argillaceous, occ green reduction spots. Clay matrix is mod calcareous, poor to nil visible porosity.	No shows.
54	-	1364.	(No recovery)	-
55	1/2"	1352.5	Sand: Red/brown, predominantly medium, fine to coarse overall, firm, mod sorting, subang-subrnded, sl clay matrix.	No shows.
56	1/4"	1320.5	Sand: Clear to translucent, red-orange (iron oxide staining), medium to occ fine grained, subrnded, subspherical, well sorted, unconsolidated quartz, good vis porosity.	No shows.
57	-	1304.	(No recovery)	-
58	1/2"	1279.25	Sand, as 1320.5. Good porosity.	No shows.
59	1"	1256.5	Sand, sim. to 1320.5 but v f/f-gn only. Good vis porosity.	No shows.
60	-	1155.5	(No recovery)	-

GEOLOGICAL REPORT NO. 1 - JUNE 13, 1989

1. **PRESENT DEPTH:** 127m

2. **PRESENT OPERATIONS:** Installing well head "A" section

3. **PROGRESS:** 40m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 67-134m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Quaternary 67m (S.B.) U. Cretaceous? - 115m

6. **LITHOLOGY (BY INTERVAL):** Samples taken from drill floor. 67-85m: Sand - 100%, f-med G.R., subang-subrnd, glauc., good vis. por. 85-115m: conglomerate - 70%, sand 30%, varicoloured frag of meta sediments. 115-124m: interbedded clay (40%) cong./sand (50%) and dolomite (10%). 124-133: Sand (80%), clr, f-m gr., subang-subrnd, dolomite (20%).

7. **SHOW SUMMARY:** None

8. **BACKGROUND GAS:** N/A

9. **MAX. GAS - DEPTH:** N/A

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 8.6

13. **DxC/TREND:** N/A

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** N/A

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** N/A

17. **DRILLING BREAKS:** Interval 67-83m, Max. Rate 60m/hr, Ave. ROP 60m/hr; Interval 83-134m, Max. Rate 60m/hr, Ave. ROP 23m/hr

18. **COSTS:** 65,401 (Daily), 542,256 (Cumulative)

19. **REMARKS:** Depths are only approximate as samples were taken from drill floor while drilling 20" conductor. Formation tops based on crude correlation with K-5 well.

JR/DAM264/37

GEOLOGICAL REPORT NO. 2 - JUNE 14, 1989

1. **PRESENT DEPTH:** 161m

2. **PRESENT OPERATIONS:** Drilling 26" hole

3. **PROGRESS:** 24m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 134-155m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Quaternary - 67.19m; Cretaceous? - 115m; Middle Jurassic - 127m

6. **LITHOLOGY (BY INTERVAL):** Sand with mnr coal and Fe-Dol. 134-155m: Sand: 80% clr-mlky, loose, m. crse-v. crse, pr srtd, rnded-subrnded, sph, rare dol cmt, uncons. Clay: 10% lt gy, sft, swel, slty, abnt pyr nodules. Ferroan Dol: tr-5%: lt brn-buff, v. hd, ang-hkly brk, minutely frac, microxln-microsucr. Coal: 5%

7. **SHOW SUMMARY:** No shows

8. **BACKGROUND GAS:** Total 0-.001%; C_1 4-5 ppm

9. **MAX. GAS - DEPTH:** N/A

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 9.0

13. **DxC/TREND:** .56-1.07/8.6 ppg/rend

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.6 ppg

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** N/A

17. **DRILLING BREAKS:**

18. **COSTS:** 197,880 (Daily), 740,136 (Cumulative)

19. **REMARKS:** Interbedded sands, coals and fe-dol is felt to be typical of Middle Jurassic in Bornholm. ROP range 4-90m/hr. 134-148m ROP av. 50m/hr. 148-161m ROP av. 7m/hr.

JR/DAM264/36

GEOLOGICAL REPORT NO. 3 - JUNE 15, 1989

1. **PRESENT DEPTH:** 360m

2. **PRESENT OPERATIONS:** Circulating hole at T.D.

3. **PROGRESS:** 200m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 155-360m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Lower Jurassic 304m KB, 268m SS (see remarks)

6. **LITHOLOGY (BY INTERVAL):** 155-225m Clay with Sand/Coal/Fe Dolomite intbds). Clay: 70%: lt-med gy, sft, swel, non-calc, slty, abnt pyr nodules. Sand: 20%: clr-mlky, uncons, f-crse, pr srt, subrnd, sph, tr calc cmt, good vis por. Coal: 10%: blk-v dk brn, frm brit, fibrous, vit-res lust, some pyr repl't. Fe Dol: <5%: lt brn occ yel grn, hd, ang-blky brk, occ microsucr, microxln, ferroan. 225-304m Sand with coal interbeds. Sand: 80%: clr-transl occ opq, uncons, f-m, w srtd, subrned, sph-subsph, tr calc cmt, sl-carb, w/ associated pyrite, v gd vis por. Coal: 20%: blk occ v dk brn, frm, brit, fibrous, vit-res, occ pyr repl't. Clay: <5%: med gy-dk gy, frm-sft, semi-hydratable, sl calc, earthy, abnt pyr. 304-360m Clay with slts and sandstone intbds. Clay: 60%: med gy, sft, occ frm, plastic, swel, slty, abnt nod pyr, non calc. Siltstone: 30%: med gy, hd-frm, blky, arg, occ grdg to v f sst, tr mica. Sandstone: 10%: med gy, hd, blky, v f, subrnd, mod srt, v arg, calc - silic cmt, v pr vis por.

7. **SHOW SUMMARY:** None

8. **BACKGROUND GAS:** Total .001-.002; C_1 10-20 ppm

9. **MAX. GAS - DEPTH:** 330m, .005%; C_1 41 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 9.1

13. **DxC/TREND:** .71-1.14/8.6 ppg

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.6 ppg

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** N/A

17. **DRILLING BREAKS:** Interval 255-260m, Max. Rate 20m/hr, Prev. Rate 6m/hr, Ave. ROP 18m/hr

JR/DAM264/34

18. **COSTS:** 93,564 (Daily), 833,700 (Cumulative)

19. **REMARKS:** The clean good porous sand with thick interbedded coals from 225-304m seems to fit quite well with the Middle Jurassic Baga Formation of Bornholm Island rather than anything observed on well K/5-1. For this reason it is felt that the Lower Jurassic occurs deeper than prognosed at 304m KB, 268m SS. Corresponding to an abrupt change to argillaceous fine sandstones/siltstones and clay of a more open marine environment. No shows observed from drilling break at 255m.

GEOLOGICAL REPORT NO. 4 - JUNE 16, 1989

1. **PRESENT DEPTH:** 360m
2. **PRESENT OPERATIONS:** Running 20" casing
3. **PROGRESS:** No new formation drilled in last 24 hrs
4. **SAMPLED INTERVAL (IN 24 HOURS):** N/A
5. **FORMATION TOPS AND/OR CORRELATIONS:** Lr Jurassic: 304m KB, 268m SS; 300m log, 264m SS
6. **LITHOLOGY (BY INTERVAL):** N/A
7. **SHOW SUMMARY:** N/A
8. **BACKGROUND GAS:** N/A
9. **MAX. GAS - DEPTH:** N/A
10. **CONNECTION GAS - MAX.:** N/A
11. **TRIP GAS - MAX.:** N/A
12. **MUD WEIGHT (PPG):** 9.5
13. **DxC/TREND:** N/A
14. **SHALE DENSITY (GM/CC)/TREND:** N/A
15. **CALCULATED FORMATION PRESSURE:** 8.6
16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** N/A
17. **DRILLING BREAKS:** N/A
18. **COSTS:** 87,892 (Daily), 921,592 (Cumulative)
19. **REMARKS:** Logging operation, suite N°1 26" hole.

Run	Log	Interval
1	GR-ISF-BHC (Excentralized)	363-137.5 GR to seabed 67m
2	GR-CAL-BHC (Centralized)	363-137.5 GR to seabed 67m

Total time from rig up to rig down = 5 hrs 18 mins.

GEOLOGICAL REPORT NO. 5 - JUNE 17, 1989

1. **PRESENT DEPTH:** 360m
2. **PRESENT OPERATIONS:** Nipple down 30" diverter
3. **PROGRESS:** N/A
4. **SAMPLED INTERVAL (IN 24 HOURS):** N/A
5. **FORMATION TOPS AND/OR CORRELATIONS:** Lower Jurassic 304m KB, 268 MSL, 300m (log) 264 MSL
6. **LITHOLOGY (BY INTERVAL):** N/A
7. **SHOW SUMMARY:** N/A
8. **BACKGROUND GAS:** N/A
9. **MAX. GAS - DEPTH:** N/A
10. **CONNECTION GAS - MAX.:** N/A
11. **TRIP GAS - MAX.:** N/A
12. **MUD WEIGHT (PPG):** 9.5
13. **DxC/TREND:** N/A
14. **SHALE DENSITY (GM/CC)/TREND:** N/A
15. **CALCULATED FORMATION PRESSURE:** 8.6
16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** N/A
17. **DRILLING BREAKS:** N/A
18. **COSTS:** 172,264 (Daily), 1,094,856 (Cumulative)
19. **REMARKS:** None

GEOLOGICAL REPORT NO. 6 - JUNE 18, 1989

1. **PRESENT DEPTH:** 363m
2. **PRESENT OPERATIONS:** Circulate to displace to new mud (PHPA mud)
3. **PROGRESS:** 3m
4. **SAMPLED INTERVAL (IN 24 HOURS):** no sample to surface
5. **FORMATION TOPS AND/OR CORRELATIONS:** Lr. Jur. 304m KB, 268m SS. Drilling Lower Jurassic
6. **LITHOLOGY (BY INTERVAL):** N/A
7. **SHOW SUMMARY:** N/A
8. **BACKGROUND GAS:** N/A
9. **MAX. GAS - DEPTH:** N/A
10. **CONNECTION GAS - MAX.:** N/A
11. **TRIP GAS - MAX.:** N/A
12. **MUD WEIGHT (PPG):** 9.5
13. **DxC/TREND:** N/A
14. **SHALE DENSITY (GM/CC)/TREND:** N/A
15. **CALCULATED FORMATION PRESSURE:** 8.6
16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** No leak off FCCT at 12.0 ppg
17. **DRILLING BREAKS:** N/A
18. **COSTS:** 78,473 (Daily), 1,173,329 (Cumulative)
19. **REMARKS:** Test BOP, drill out cement and shoe. Drill 3m of formation. Do F.C.C.T. Bit #3 17-1/2" SDGHC.

GEOLOGICAL REPORT NO. 7 - JUNE 19, 1989

1. **PRESENT DEPTH:** 645m

2. **PRESENT OPERATIONS:** Drilling ahead

3. **PROGRESS:** 282m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 363-640m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Upper Triassic (Keuper) - 555m RKB, 519m SS

6. **LITHOLOGY (BY INTERVAL):** 360-555m: Interbedded Clay (80-100%) Sand (10%) Coal (10%). Clay: med gy-light gy, sft, plastic, non-calc. Sand - clr, mlky, f-m, subrnd, w. srt, uncons., good vis por. Coal - blk, blocky, vit res lustre, with stringers of lignite. 555-595m - brick red - lt green gy-lt brown red, soft, clyst, hydrofissile, sl. dol, mod-sl-calc. tr lst, dol. 595-640m - clyst (50%) red-brn and lt gy green, mod. calc. marl (30%) minor sand, tr lst.

7. **SHOW SUMMARY:** None

8. **BACKGROUND GAS:** Total .001-003; C_1 10-30 ppm

9. **MAX. GAS - DEPTH:** 500m, .006%; C_1 55 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 9.3 (PHPA mud)

13. **DxC/TREND:** .7-1.77/8.6 ppg

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.6 ppg

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.1

17. **DRILLING BREAKS:** Interval 630-645, Min. Rate 3m/hr, Prev. Rate 15-20m/hr, Ave. ROP 4m/hr (reverse)

18. **COSTS:** 65,474 (Daily), 1,238,804 (Cumulative)

19. **REMARKS:** Abrupt change in lithology at 555m RKB from gy shales to brick red-brwn-lt green clay which could be Upper Triassic (Keuper?) clyst. Survey at 482m 1/2° N10°W.

JR/DAM264/30

GEOLOGICAL REPORT NO. 8 - JUNE 20, 1989

1. **PRESENT DEPTH:** 854m

2. **PRESENT OPERATIONS:** Drilling 17-1/2" hole

3. **PROGRESS:** 209m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 640-845m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Up Triassic 555m KB 519m SS

6. **LITHOLOGY (BY INTERVAL):** Clyst with sand intbds, tr lst
   640-740: Clyst: 70% med red brn, frm-sft, swel, mod calc. sand 30% clr-mlky, orng-red, yel-orng, vf to crse, mod-fr srtd, occ well srtd, subrnd-subang, sph, good vis por. Lst: <5%: wh-lt gy, hd-frm, sl arg, blky, mxln-micritic, rare intergran por.
   Clyst with tr Lst and tr sand
   745-845: Clyst: 100%, lt orng-brn-dk rd brn, with patches of lt gy grn, sft-frm, swel-blky, mod calc, Lst: <5% minor strngs, wh-lt-med gy, hd-frm, mxln-micritic, rare intergran por. Sand: tr rare stringers, clr-orng-red, vf-f, mod well srtd, sph, subrnd, sl arg mtx, mod gd vis por.

7. **SHOW SUMMARY:** None

8. **BACKGROUND GAS:** Total 001-002%; C_1 4-24 ppm

9. **MAX. GAS - DEPTH:** 695, 003%; C_1 23 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** 648, .074%; C_1 740 ppm

12. **MUD WEIGHT (PPG):** 9.4

13. **DxC/TREND:** .7-12/8.6 ppg

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.6 ppg

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.1

17. **DRILLING BREAKS:** N/A

18. **COSTS:** 346,460 (Daily), 1,585,245 (Cumulative)

19. **REMARKS:** Av. ROP 25m/hr 5m samples collected. On present prognosis top Bunter Sst. expected at ~1050m. Muschelkalk equiv expected ~950m. The following hot shot samples were dispatched today to Robertson's research via Ronne: 330m; 500m; 540m; 570m; and 600m.

JR/DAM264/29

GEOLOGICAL REPORT NO. 9 - JUNE 21, 1989

1. **PRESENT DEPTH:** 1095m

2. **PRESENT OPERATIONS:** P.O.O.H. for wiper trip - hole tight

3. **PROGRESS:** 241m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 845-1095m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Lr Trias (Bunter Sst) 1084m RKB 1048m SS

6. **LITHOLOGY (BY INTERVAL):** Clyst with sand intbds
   845-905m: Clyst: 80% - lt orng-brn - mod red-brn with lt gy grn strks, frm-sft; swell, blky, sl-mod calc. Sand: 20% - clr-orng-red, vf-f, occ m, well srtd, sph, swbrnd, tr arg mtl, fair-gd vis por.
   Clyst with tr Lst stringers
   905-1084m: Clyst: 100% - lt orng-brn, occ intbds of lt grn gy, rare lt purp-red, rare lt yel-brn, sft, swell, sl-mod calc, tr slt strks. Lst: <5% - thin stringers and poss caliche.
   Sst (Bunter Equiv)
   1084-1095m: Sst: 100% clr, occ lt yel, m-crse, occ f, well srtd, well-rnd-subrnd, sph, fair-gd vis por.

7. **SHOW SUMMARY:** None

8. **BACKGROUND GAS:** .001%; C_1 3-11 ppm

9. **MAX. GAS - DEPTH:** N/A

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 9.6

13. **DxC/TREND:** .7-.9/8.6

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.6

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.1 EMW at 355m

17. **DRILLING BREAKS:** Interval 1084-1095, Max. Rate 50m/hr, Prev. Rate 25m/hr, Ave. ROP 30m/hr

18. **COSTS:** 99,855 (Daily), 1,686,900 (Cumulative)

19. **REMARKS:** Muschelkalk equiv. not fully developed. The increase in occurrence of thin limestone stringers from 970m may correlate roughly with the limestone interval on K/5-1 before the Bunter equiv. Circulate bottoms up at 1095m not so much because of drill break but rather a reduction on WOB from 10-12 to 2-3 kilolbs. Bunter Sst found at 1084m KB.

GEOLOGICAL REPORT NO. 10 - JUNE 22, 1989

1. **PRESENT DEPTH:** 1095m meas. depth RKB
2. **PRESENT OPERATIONS:** Running in hole to condition for 13-3/8" csg.
3. **PROGRESS:** 0m
4. **SAMPLED INTERVAL (IN 24 HOURS):** 0m
5. **FORMATION TOPS AND/OR CORRELATIONS:** Lr. Triassic (Bunter SS) 1084m RKB; 1048m subsea
6. **LITHOLOGY (BY INTERVAL):** N/A
7. **SHOW SUMMARY:** None
8. **BACKGROUND GAS:** N/A
9. **MAX. GAS - DEPTH:** N/A
10. **CONNECTION GAS - MAX.:** N/A
11. **TRIP GAS - MAX.:** (Wiper) 1095m, 0.21%; C_1 1237 ppm
12. **MUD WEIGHT (PPG):** 9.8
13. **DxC/TREND:** N/A
14. **SHALE DENSITY (GM/CC)/TREND:** N/A
15. **CALCULATED FORMATION PRESSURE:** 8.7
16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** N/A
17. **DRILLING BREAKS:** N/A
18. **COSTS:** 97,390 (Daily), 1,785,290 (Cumulative)
19. **REMARKS:**

Run	Log	Scale	1:500	1:200	Depth Logged	Csg
1	ISF-BHC-SP-GR		X	X	1087m	355m
2	LDL-CNL-GR-CAL		X	X	1087m	355m
3	SHDT-GR			X	1087m	355m

Runs 1 and 2 on scale 1:500, Run 3 on scale 1:200.

GEOLOGICAL REPORT NO. 11 - JUNE 23, 1989

1. **PRESENT DEPTH:** 1095m
2. **PRESENT OPERATIONS:** Rigging down Halliburton after cementing 13-3/8" casing in hole.
3. **PROGRESS:** 0
4. **SAMPLED INTERVAL (IN 24 HOURS):** 0
5. **FORMATION TOPS AND/OR CORRELATIONS:** ISF log top of a SS. at 1083m may be top of the Bunter (tenatively).
6. **LITHOLOGY (BY INTERVAL):** N/A
7. **SHOW SUMMARY:** None
8. **BACKGROUND GAS:** N/A
9. **MAX. GAS - DEPTH:** N/A
10. **CONNECTION GAS - MAX.:** N/A
11. **TRIP GAS - MAX.:** 1095m, 0.01%
12. **MUD WEIGHT (PPG):** 9.6
13. **DxC/TREND:** N/A
14. **SHALE DENSITY (GM/CC)/TREND:** N/A
15. **CALCULATED FORMATION PRESSURE:** 8.6
16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15./EMW at 355m
17. **DRILLING BREAKS:** N/A
18. **COSTS:** 241,159 (Daily), 2,026,449 (Cumulative)
19. **REMARKS:** None

JR/DAM264/25

GEOLOGICAL REPORT NO. 12 - JUNE 24, 1989

1. **PRESENT DEPTH:** 1095m
2. **PRESENT OPERATIONS:** Testing BOP. Note: 13-3/8" csg. shoe at 1080.24m depth
3. **PROGRESS:** 0
4. **SAMPLED INTERVAL (IN 24 HOURS):** 0
5. **FORMATION TOPS AND/OR CORRELATIONS:** N/A
6. **LITHOLOGY (BY INTERVAL):** N/A
7. **SHOW SUMMARY:** N/A
8. **BACKGROUND GAS:** N/A
9. **MAX. GAS - DEPTH:** N/A
10. **CONNECTION GAS - MAX.:** N/A
11. **TRIP GAS - MAX.:** N/A
12. **MUD WEIGHT (PPG):** 9.6
13. **DxC/TREND:** N/A
14. **SHALE DENSITY (GM/CC)/TREND:** N/A
15. **CALCULATED FORMATION PRESSURE:** N/A
16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** N/A
17. **DRILLING BREAKS:** N/A
18. **COSTS:** 118,329 (Daily), 2,144,778 (Cumulative)
19. **REMARKS:** Faxed in summary of tentative log evaluation yesterday.

JR/DAM264/24

GEOLOGICAL REPORT NO. 13 - JUNE 25, 1989

1. **PRESENT DEPTH:** 1111m
2. **PRESENT OPERATIONS:** Drilling ahead
3. **PROGRESS:** 16m
4. **SAMPLED INTERVAL (IN 24 HOURS):** 15m
5. **FORMATION TOPS AND/OR CORRELATIONS:** Last poss. top Bunter at 1084
6. **LITHOLOGY (BY INTERVAL):** 1095-1105m Sand, clr qtz, mainly med-gn, some coarse, sbang, good sphericity; w/ traces dol. pyr. brick red clyst. med gy clyst/siltstone, var. calc. to non-calc, sft/mod hd. ROP 15 to 35m/hr, avg. 22m/hr.
7. **SHOW SUMMARY:** No fluor. or cut fluor. Negligible gas - note: both total gas and chromatographic equipment checked and calibrated at 0530 hrs. today.
8. **BACKGROUND GAS:** Total 0.0%
9. **MAX. GAS - DEPTH:** N/A
10. **CONNECTION GAS - MAX.:** N/A
11. **TRIP GAS - MAX.:** N/A
12. **MUD WEIGHT (PPG):** 10.0
13. **DxC/TREND:** 0.8-1.18
14. **SHALE DENSITY (GM/CC)/TREND:** N/A
15. **CALCULATED FORMATION PRESSURE:** 8.7
16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** N/A
17. **DRILLING BREAKS:** None
18. **COSTS:** 66,794 (Daily), 2,220,334 (Cumulative)
19. **REMARKS:** Lack of gas shows is being met by special care to check equipment frequently (see 7 above).

JR/DAM264/23

GEOLOGICAL REPORT NO. 14 - JUNE 26, 1989

1. **PRESENT DEPTH:** 1472m

2. **PRESENT OPERATIONS:** POOH to change bit.

3. **PROGRESS:** 361m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 360m (1110-1470m)

5. **FORMATION TOPS AND/OR CORRELATIONS:** Nothing new

6. **LITHOLOGY (BY INTERVAL):** 1110-1240m-Sand (85-100%), clear, occ. orange/red brn (iron oxide stained), fine to cse.-gn, gen. fn. to med.-gn, sbang to sbrnd., fair to mod. well-srtd, occ poorly srtd; poss. clay matrix; unconsol. qtz sand; v good to good vis. poros, prob. becomes fair to poor where clay matrix most pronounced. No oil shows of fluor. or fluor. of cut. ROP: 30-35m/hr. Clay (0-15%), red-brn, brick red, soft, amorph., hydrophyllic; traces of wh, xtln calcite.
1240-1260m-Clay (50%), as above, w/tr dolomitic material; Sand (50%)-as above, good vis. poros., no oil indications.
1260-1470m-Sand/Sandstone (50-95%). Sand, as above, varying only in grain size from fn/med. to med/cse, with sorting gen. good to fair; vis. poros. fair to good. and no oil indications. Sandstone dominantly brick-red/brn, occas. lit to med. gy with reddish iron oxide stains; v. fn. to fn-gn, hard, blky, well-srtd, gen. silic. w/occ. sl calc. cem; poor to fair vis. poros., no oil indications. Clay (5-35%), as above, becoming main lith. toward and at bottom; traces of white and clear xtln. calcite, becoming incr. comm. with depth; below about 1415m, up to 15% limestone (caliche?), soft, off-wh, marly/earthy, with trace of buff dolomite, hard, microxtln, esp. in last sample.

7. **SHOW SUMMARY:** No indications of oil show - no natural fluorescence, no fluoresc. of cut. Occas. very tenuous blk. to dark brown stains on qtz. sand gns., with no natural fluoresc., but giving extr. tenuous dull yell. fluoresc., could be poss. asphaltic residue, but ambiguous, doubtful.

8. **BACKGROUND GAS:** Total 0.00%

9. **MAX. GAS - DEPTH:** 1210-1230, 0.0% hotwire; C_1 28-32 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 10.4-10.5 Mud Temp (out): 53.6°C

13. **DxC/TREND:** 0.66-1.59

JR/DAM264/21

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.7

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7

17. **DRILLING BREAKS:** Interval 1128-1130, Max. Rate 40m/hr, Prev. Rate 20m/hr, Ave. ROP 40m/hr; Interval 1150-1170, Max. Rate 50m/hr, Prev. Rate 15-20m/hr, Ave. ROP 40m/hr; Interval 1201-1224, Max. Rate 60m/hr, Prev. Rate 15-30m/hr, Ave. ROP 49m/hr; Interval 1258-1273, Max. Rate 80m/hr, Prev. Rate 30-40m/hr, Ave. ROP 54.5m/hr; Interval 1318-1340, Max. Rate 60m/hr; Prev. Rate 30-40m/hr; Ave. ROP 39m/hr; Interval 1345-1360, Max. Rate 60m/hr, Prev. Rate 15-30m/hr, Ave. ROP 45.5m/hr

18. **COSTS:** 73,721 (Daily), 2,294,054 (Cumulative)

19. **REMARKS:** None

GEOLOGICAL REPORT NO. 15 - JUNE 27, 1989

1. **PRESENT DEPTH:** 1534m

2. **PRESENT OPERATIONS:** Drilling ahead

3. **PROGRESS:** 62m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 1470-1530m

5. **FORMATION TOPS AND/OR CORRELATIONS:** N/A

6. **LITHOLOGY (BY INTERVAL):** 1470-1530m: Lithic conglomerate, brick red clay matrix; fine to coarse-gn. fragments of volcanics, igneous rocks, and quartz; ign. rocks aphanitic to fine-gn. xtln, dk gy, dk grn, blk, buff. purplish and jasper red; fn-gn to cse-gn qtz and finer-gn ign. rock frag's. sbrnd to rnded; poor srtg., prob. v. poor poros. NO OIL INDICATIONS. Clay/Claystone - brick red, soft, sl. calc. in pts., matrix (&/or beds?) ROP variation 4 to 6m/hr, average 4.8m/hr.

7. **SHOW SUMMARY:** No fluoresc. and no fluoresc. of cut.

8. **BACKGROUND GAS:** Total 0.000%

9. **MAX. GAS - DEPTH:** 1490m, 0.005%; C_1 50 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** 1472m, 0.000%

12. **MUD WEIGHT (PPG):** 11.1 Mud Temp. (out): 51.6°C

13. **DxC/TREND:** 1.16-1.58

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.7

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7

17. **DRILLING BREAKS:** None

18. **COSTS:** 96,189 (Daily), 2,390,243 (Cumulative)

19. **REMARKS:** EXLOG MWD tool in hole and operative since bit change trip at 1472m. Chart attached. Reason for sudden shift in GR and Resistiv. values at 1480m unknown. One possibility, almost discounted, is that the further addition of halite salt to bring mud up to supersaturated con. could have caused the lowering of both the GR and Resistivity values of the system sensed by the MWD tool.

JR/DAM264/20

GEOLOGICAL REPORT NO. 16 - JUNE 28, 1989

1. **PRESENT DEPTH:** 1650m

2. **PRESENT OPERATIONS:** Drilling

3. **PROGRESS:** 116m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 1530-1645m

5. **FORMATION TOPS AND/OR CORRELATIONS:** 1636m - possible top of Zechstein

6. **LITHOLOGY (BY INTERVAL):** 1530-1545m lithic conglomerate angular and fine to coarse grained quartz, subrounded/round, like the finer igneous rock fragments; poor sorting; various igneous rock. Clay/Claystone matrix, some interbedded clay/claystone; porosity poor. 1545-1570m: Limestone, off-wh, light to med. grey, soft to slightly firm, argillaceous, micritic to very fn-gn xtln var. carbonac., finely div. and in fine laminae. tr. transluc./white/clear anhydrite, firm/soft, amorphous, clayst. interbeds, in part of interv. brick red, soft, mod. calc. massive. 1570-1636m: Claystone massive lite reddish-brown, soft to v. sl. firm, mod. calc.; w/minor thin interbeds of shale, dark purplish-red, firm, subfiss/fissile, var. calc. or med. grey-green, firm, subfiss/fissile, noncalc. tr. to common white v. argillaceous limestone and calc. tr. anhydrite. 1636-1645m: Limestone. v. fn-grained xtln, with dolomite; no vis. por. No shows.

7. **SHOW SUMMARY:** No shows

8. **BACKGROUND GAS:** Total 0.00 to 0.004%, C_1 12-86 ppm

9. **MAX. GAS - DEPTH:** 1637m, 0.02%; C_1 240 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 11.2 (out): 56.8°C

13. **DxC/TREND:** 1.16-1.58

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.7

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7

17. **DRILLING BREAKS:** None

JR/DAM264/18

18. **COSTS:** 104,173 (Daily), 2,494,415 (Cumulative)

19. **REMARKS:** Hot shot sample for palynological analysis in a chopper today.

GEOLOGICAL REPORT NO. 17 - JUNE 29, 1989

1. **PRESENT DEPTH:** 1690m
2. **PRESENT OPERATIONS:** Drilling
3. **PROGRESS:** 40m
4. **SAMPLED INTERVAL (IN 24 HOURS):** 1645-1690m
5. **FORMATION TOPS AND/OR CORRELATIONS:** Tentative Zechstein top at 1636m now seems firm.
6. **LITHOLOGY (BY INTERVAL):** 1645-1690m: Limestone, Dolomite and Clay/Claystones interbedded with occas. thin Anhydrite crust. Limestone: light to medium gray, very soft to slightly firm, variably argillaceous, marly, to fine/very fine-grained crystalline in small part. Vis. porosity very poor. Dolomite: minor interbeds, thin, light tan to brownish gray, very finely crystalline and fine-gn. grainstone, firm to hard; vis. porosity nil. Clay/Claystone: light to medium gray, soft, hydrophyllic, sticky, mod. calc.; part marly, slightly firm, grading to Limestone. Clay(st.) main constit. below 1676m.
7. **SHOW SUMMARY:** No fluoresc. of hydrocarbons, and no fluoresc. of cut.
8. **BACKGROUND GAS:** Total 0.00% to 0.10%; C_1 70-131 ppm
9. **MAX. GAS - DEPTH:** 1670m, 0.07%; C_1 113 ppm
10. **CONNECTION GAS - MAX.:** N/A
11. **TRIP GAS - MAX.:** 0.00%, 1676m, 0.00%
12. **MUD WEIGHT (PPG):** 11.4 Mud Temp. (out): 57.7°C
13. **DxC/TREND:** 1.47-1.50 - Steady
14. **SHALE DENSITY (GM/CC)/TREND:** N/A
15. **CALCULATED FORMATION PRESSURE:** 8.7
16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7
17. **DRILLING BREAKS:** None
18. **COSTS:** 76,397 USD (Daily), 2,570,813 USD (Cumulative)

19. **REMARKS:** (1) New MWD tool in hole since bit change at 1676m is giving "more dependable" curves of GR and Resistivity (copy attached). Prev. run of MWD log believed to be completely "undependable" and unacceptable (in the MWD operators' own words). (2) No salt observed in cuttings as yet; confirmed by no indications on Gamma Ray or Resistivity of any salt penetrated by bit-Gamma Ray should decrease noticeably, Resistivity increase, and ROP would increase also.

GEOLOGICAL REPORT NO. 18 - JUNE 30, 1989

1. **PRESENT DEPTH:** 1741m

2. **PRESENT OPERATIONS:** Running in hole with new bit no. 7 (JK SMIT, MK 171, 12-1/4").

3. **PROGRESS:** 51m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 1690-1741m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Nothing new.

6. **LITHOLOGY (BY INTERVAL):** 1690-1710m: Interbedded Ls. & Claystone, with occas. thin Dolomite and very thin Anhydrite. ROP avg. 3.6m/hr. Ls: (20-85%) light to med. gray, sft. to firm. var. argillac., marly, occas. v. finely microxtln.; rare bivalve fossils 7 goniatites (?), fragmented; sl. to mod. carbonac., & w/sl. trace Anhydrite. Very poor vis. porosity; no oil fluoresc. or cut fluoresc. Claystone: (10-80%) light to med. gray, v. soft to sft., mod to v. calc., sticky in part, variably carbonac. Dolomite: (0-5%) transluc. buff to gray, firm to mod. hard, microxtln to occ. sucrosic. Nil vis. porosity; no oil shows. 1710-1741m: Claystone and Siltstone interbedded, with minor Ls. interbeds above 1720m. Avg. ROP: 3.3m/hr. Clayst: (50-65%) brick red, soft, mod. calc., generally amorphous. Siltstone: (0-50%) red-brn, firm to mod. hard, sl to mod. calc., grading in small part to SS, very fine to fine-gn, red/brn, to occ. gray, firm, sl. calc.; trace cse. gns, sbrnd, good sphericity, qtz, w/red hematitic (?) stns. Nil vis. porosity; no oil shows.

7. **SHOW SUMMARY:** None

8. **BACKGROUND GAS:** Total 0.00-0.01%; C_1 45-50 ppm

9. **MAX. GAS - DEPTH:** 2720m, 0.02%; C_1 117 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 11.3 Mud Temp. (out): 52.0°C

13. **DxC/TREND:** 1.32-1.61

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.7

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7

17. **DRILLING BREAKS:** None

JR/DAM264/14

18. **COSTS:** 122,496 (Daily), 2,693,308 (Cumulative)

19. **REMARKS:** MWD run to bit change depth (copy enclosed) believed to be dependable unlike previous run. Some time lost due to mechanical problems of rigging up before running in hole with new bit 7.

GEOLOGICAL REPORT NO. 19 - JULY 1, 1989

1. **PRESENT DEPTH:** 1779m
2. **PRESENT OPERATIONS:** Drilling ahead with NB #8 (Smith F-1)
3. **PROGRESS:** 38m
4. **SAMPLED INTERVAL (IN 24 HOURS):** 1741-1775m
5. **FORMATION TOPS AND/OR CORRELATIONS:** N/A
6. **LITHOLOGY (BY INTERVAL):** & ROP: 1741-1775m: Claystone and Siltstone interbedded. AVG. ROP: 4.2m/hr. Claystone: (60-70%): Reddish-brown, soft, plastic/hydrophyllic, variably calcareous; part marly, grading to soft, marly limestone, v. argillac. Siltstone: (30-40%): dark purplish red, red-brown, firm to mod. hard, variably calcareous, argillac. Vis. porosity nil.
7. **SHOW SUMMARY:** No fluorescence of oil; no cut fluorescence.
8. **BACKGROUND GAS:** Total 0.000-0.001%, C_1 9-10 ppm
9. **MAX. GAS - DEPTH:** 1740m, 0.010%; C_1 85 ppm
10. **CONNECTION GAS - MAX.:** N/A
11. **TRIP GAS - MAX.:** 0.000%, 1749m
12. **MUD WEIGHT (PPG):** 11.4 Mud Temp. (out): 51.4°C
13. **DxC/TREND:** 1.52-1.62 - Steady
14. **SHALE DENSITY (GM/CC)/TREND:** N/A
15. **CALCULATED FORMATION PRESSURE:** 8.7
16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7
17. **DRILLING BREAKS:** None
18. **COSTS:** 73,175 (Daily), 2,766,483 (Cumulative)
19. **REMARKS:** No hole problems on bit change.

JR/DAM264/13

GEOLOGICAL REPORT NO. 20 - JULY 2, 1989

1. **PRESENT DEPTH:** 1873m

2. **PRESENT OPERATIONS:** Tripping out of hole to change bit.

3. **PROGRESS:** 94m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 1775-1873m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Top of Rotliegend may be indicated by quartz sand interbeds in massive red claystones, below 1815m. It is not clear, however, as Rotliegend is expected to be massive sand. (Note MWD resistivity decrease, ROP increase, opposite sands from about 1858m.)

6. **LITHOLOGY (BY INTERVAL):** 1775, 1810m, Interbedded claystone and siltstone: avg. ROP about 4.0m/hr. Claystone: brick-red-brown, sft, plastic, hydratable, gen. mod. calc., part marly. Occ. to abund. very small microfossils (dk. brn-red, spherical, 0.1 to 0.5mm diam.). Siltstone: dark purplish red, firm to mod. hard, var. calc.; occ. tr. Anhydrite; nil vis. porosity. No shows. 1815-1873m: Claystone, some siltstone, and interbedded quartz sand. ROP, 6.8-7.0m/hr above 1858m, avg. about 12m/hr below, to 1868m, 3.2m/hr to TD (dull bit, less sand). Claystone and siltstone, as in overlying unit. Sand: clear quartz, occ. orange stns (oxide, clay), fn to med.-gn., occ. cse. sbrnd to rnded, good sphericity, fair sorting, prob. good porosity, although loose, unconsolidated condition observed. No oil shows. Note that so far as may be judged from cuttings, sands are not massive, but thin interbeds in the massive red claystone section. This may indicate that the Retliegend has not, in fact, yet been penetrated, as suggested above (Section 5, Formation Tops).

7. **SHOW SUMMARY:** None (no fluorescence of oil, and no cut fluorescence)

8. **BACKGROUND GAS:** Total 0.01%; C_1 avg. 75 ppm

9. **MAX. GAS - DEPTH:** 1866m, 0.05%; C_1 560 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 11.5 Mud Temp. (out): 58.6°C

13. **DxC/TREND:** 1.28-1.81 (Normal shale trend)

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.7

JR/DAM264/11

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7

17. **DRILLING BREAKS:** 1858-1868m (see Remarks below)

18. **COSTS:** 76,695 (Daily), 2,843,179 (Cumulative)

19. **REMARKS:** (1) Hot shot samples sent out last night: 1540, 1610, 1635, 1650, and 1745m (on boat to Ronne). (2) Circ. bottoms up at 1861m in drill break topped at 1858m. Quartz sand, interbedded in Claystone/siltstone, no shows. Drilled ahead. (3) Tight hole spots encountered in trip out of hole at 7 to 10 stands off bottom (approx. at 1680 to 1596m depths).

GEOLOGICAL REPORT NO. 21 - JULY 3, 1989

1. **PRESENT DEPTH:** 1952m

2. **PRESENT OPERATIONS:** Drilling

3. **PROGRESS:** 79m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 1873-1950m

5. **FORMATION TOPS AND/OR CORRELATIONS:** N/A

6. **LITHOLOGY (BY INTERVAL):** 1873-1950m: Claystone with minor interbeds of Siltstone, occasional thin quartz sands. AVG. ROP: 4.5m/hr above 1892m; 15.5m/hr to 1898m; 6.9m/hr to T.D. Claystone (40-100%): as prev. described: bright brick red, soft (in cuttings, though apparently a hard rock in large bit sample), variably calcareous; occas. light gray-green, soft, non-calc.; Siltstone, also as in overlying intervals: dark purplish red, hard, mod. calcareous; Sand: clear qtz, some with iron-stains (oxide), fine to medium grained, some coarse, sbround to rnded, well sorted to fair sorting, good sphericity; prob. has good porosity, if in discrete beds; no shows.

7. **SHOW SUMMARY:** None

8. **BACKGROUND GAS:** Total 0.01%; C_1 30-80 ppm

9. **MAX. GAS - DEPTH:** 1913m, 0.04%; C_1 249 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 11.5, Mud Temp. (out); 52.2°C

13. **DxC/TREND:** 1.35-1.62

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.7

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7

17. **DRILLING BREAKS:** (Circ. out btms.) Interval 1893-1898m, Max. Rate 20m/hr, Prev. Rate Avg. 6m/hr, Avg. ROP 16.4m/hr

18. **COSTS:** 61,130 (Daily), 2,910,309 (Cumulative)

19. **REMARKS:** None

GEOLOGICAL REPORT NO. 22 - JULY 4, 1989

1. **PRESENT DEPTH:** 2040m

2. **PRESENT OPERATIONS:** Trip to change bit.

3. **PROGRESS:** 88m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 1950-2040m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Nothing new.

6. **LITHOLOGY (BY INTERVAL):** & AVERAGE ROP: 1950-1994m (average ROP: 10.3m/hr): Claystone, minor siltstone and occasional Sand interbeds, all identical or very similar in general to overlying sequence. Claystone (35-90%); bright brick red, rare m. gray-green; cuttings soft, but large bit sample recently showed that in fact it is a hard rock indeed; variably calcareous, becoming somewhat less calcareous with depth (as shown by calcimetry results). Siltstone (5-25%); dark purplish red & jasper red, occas. brownish red; very hard in general, moderately calcareous, occas. light to med. gray, softer, less calc. Sand (5-40%); loose, unconsolidated quartz, clear to gray translucent (or off-white), fine to medium-grained, occas. some coarse gns, sbrnd to well-rounded, good sphericity; fair to good sorting; prob. good poros. to poorer (difficult to judge in loose cuttings state). No oil shows. 1994-2025m (avg. ROP: 4.3m/hr): sequence similar to overlying interbedded claystone, siltstone and sand beds, sands less common.

7. **SHOW SUMMARY:** No oil shows (no natural fluoresc., no cut fluoresc.)

8. **BACKGROUND GAS:** Total 0.01%; C_1 50-100 ppm

9. **MAX. GAS - DEPTH:** 1990m, 0.05%; C_1 629 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** N/A

12. **MUD WEIGHT (PPG):** 11.5 Mud Temp. (out): 51.2°C

13. **DxC/TREND:** 1.22-1.74

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.7

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 19.0

17. **DRILLING BREAKS:** Interval 1962-1965m, Max. Rate 20m/hr, Prev. Rate 10m/hr, Avg. ROP 17m/hr; Interval 1984-1990, Max. Rate 18m/hr, Prev. Rate 12m/hr, Avg. ROP 14m/hr

18. **COSTS:** 67,862 (Daily), 2,978,171 (Cumulative)

19. **REMARKS:** None

GEOLOGICAL REPORT NO. 23 - JULY 5, 1989

1. **PRESENT DEPTH:** 2080m

2. **PRESENT OPERATIONS:** Drilling ahead at 1.7 m/hr

3. **PROGRESS:** 40m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 2040-2075m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Nothing new.

6. **LITHOLOGY (BY INTERVAL):** WITH AVERAGE ROP: 2040-2075m (ROP 2.9m/hr): Claystone, Siltstone and very minor Sand interbeds, with occasional thin Anhydrite; all lithologies very similar, even identical, to those of overlying sequence. Claystone (60-85%); brick red to orange red, rare greenish, medium to dark gray-green, soft to firm, rare subfissile, generally amorphous, slightly calcareous overall; occasional interlaminated thin Anhydrite: white, soft, amorphous, observed in particular abundance at 2040 to 2045m (most seems to have been converted to gypsum in cuttings at surface). Siltstone (10-20%): dark reddish-brown, occ. dark gray, firm to hard, variably calcareous, generally blocky. Sand (5-20%): clear to translucent, orange, red stained by oxides of iron; fine to coarse, generally medium gn., moderately well-sorted, subrounded to well-rounded, good sphericity; prob. with good porosity, if discrete beds (as is indicated by MWD curves--see attached).

7. **SHOW SUMMARY:** None (no fluoresc. of oil, no cut fluorescence)

8. **BACKGROUND GAS:** Total 0.01%; C_1 65 ppm

9. **MAX. GAS - DEPTH:** 2055m, 0.02%

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** 2040m, 0.01%; C_1 only

12. **MUD WEIGHT (PPG):** 11.4 Mud Temp. (Out): 50.0°C

13. **DxC/TREND:** 1.52-2.00

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.7

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7

17. **DRILLING BREAKS:** None

18. **COSTS:** 69,218 (Daily), 3,047,389 (Cumulative)

JR/DAM264/6

19. **REMARKS:** (1) MWD resistivity sensor failed at bit depth of 2045m (sensor depth is 9.8m higher than bit). Memo and log copy attached. (2) Weekly report data packages sent in mail pouch on today's crew change helicopter to Ronne (July 5th).

GEOLOGICAL REPORT NO. 24 - JULY 6, 1989

1. **PRESENT DEPTH:** 2165m

2. **PRESENT OPERATIONS:** Drilling

3. **PROGRESS:** 85m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 2075-2140m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Change of formation: top of soft gray Clay at 2115m (sample at 2120). Poss. top Carbonif.?? (Compare core descriptions and sample descriptions, well K/5-1, below 4035 & 4095m.)

6. **LITHOLOGY (BY INTERVAL):** & AVG. ROP: 2075-2116m (ROP avg. 2.4 above 2095: 21.6 below - diff. bit): Claystone with much Siltstone, rare Shale and v. thin sand interbeds. Clayst (30-80%): as above interval - brick red, soft to hd., calc.; Siltstone (10-50%): also sim. to overlying siltstones - drk. purplish red to red-brn, firm, sbfiss., calc. Shale (0-10%): thin, dark red-brn, firm, sl. calc. sbfiss. Rare sand, cse qtz, sbrnd/rnd, no shows. Tr. dk. grn silic. lithic gns., wellrnded. 2115-2140m (ROP avg. 24.3m/hr). Massive gray clay with occas. thin Shale interbed. Clay 95-100% - med. to lt. gy, v. sft, var. calc., pt sl to mod. carbonac., becomes sl. silty with depth. Sh: 0-5% - med. to lt. gy, firm, sbfiss. sl. carbonac. and silty, sl. calcar.

7. **SHOW SUMMARY:** No natural fluorescence of oil, no oil cut fluorescence.

8. **BACKGROUND GAS:** Total 0.02-0.12%; C_1 40-215 ppm. Below 2115m: Total Gas 0.12-0.15%, C_1 903-1248 ppm; C_2 81-117 ppm; C_3 9-13 ppm. No IC_4.

9. **MAX. GAS - DEPTH:** 2122m, 0.15%; C_1 1248 ppm; C_2 117 ppm; C_3 14 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** 2082m, trace

12. **MUD WEIGHT (PPG):** 11.4 Temp: 57.7°C

13. **DxC/TREND:** 1.91-0.94 (Stratapak bit)

14. **SHALE DENSITY (GM/CC)/TREND:** N/A

15. **CALCULATED FORMATION PRESSURE:** 8.7

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7

17. **DRILLING BREAKS:** Circulated out top: Interval 2096-2099m, Prev. Rate 2.4m/hr; Continued Drilling: Interval 2099-2160m, Prev. Rate 21.6m/hr

18. **COSTS:** 103,440 (Daily), 3,150,830 (Cumulative)

19. **REMARKS:** Full report by EXLOG on MWD failure will be faxed later.

GEOLOGICAL REPORT NO. 25 - JULY 7, 1989

1. **PRESENT DEPTH:** 2518m (meas. depth, RKB)

2. **PRESENT OPERATIONS:** Circulating and conditioning hole and mud for final wireline logging run.

3. **PROGRESS:** 353m

4. **SAMPLED INTERVAL (IN 24 HOURS):** 2140-2518m

5. **FORMATION TOPS AND/OR CORRELATIONS:** Based on paleo/palynological information received from Robertson Research last night, top of Silurian sediments at about 2120m.

6. **LITHOLOGY (BY INTERVAL):** & AVG. ROP: 2140-2518m (avg. ROP 30m/hr): Interbedded Clay(stone) and Shale. Clay(stone): 35-85%): light to medium gray, occas. tan/buff, soft to occas. firm, amorphous, rarely blocky, slightly to very carbonac. with thin undulatory laminae of blk. carbonac. debris and disseminated throughout; generally sl. calcareous, parts moderately so, micromicaceous, slightly pyritic below 2300m; tr. Anhydrite below 2330m. Sl. tr. Sandstone (2310-2340m), white to pale greenish, v. fn-gn, well rnded, firm to fri., strongly calcareous cem; poor vis. porosity; no shows. Shale (10-65%); light to med. gray, rarely dark gray, firm, occas. blky; subfiss. to fissile, sl. to mod. calcareous, sl. to very carbonac., micromica. Grades to siltstone in v. small part. No vis. porosity; no shows.

7. **SHOW SUMMARY:** No oil shows at all - no natural hydrocarbon fluorescence - no cut fluorescence.

8. **BACKGROUND GAS:** Total 0.02-0.12%; C_1 400-1000 ppm; C_2 25-160 ppm; C_3 3-12 ppm

9. **MAX. GAS - DEPTH:** 2290m, 0.36%; C_1 2466 ppm; C_2 373 ppm, C_3 43 ppm; NC_4 10 ppm

10. **CONNECTION GAS - MAX.:** N/A

11. **TRIP GAS - MAX.:** 2439.5m, 0.16%; C_1 1200 ppm; C_2 150 ppm; C_3 18 ppm; NC_4 7 ppm

12. **MUD WEIGHT (PPG):** 11.3 Mud Temp. (out): 63.3°C

13. **DxC/TREND:** 0.81-1.40 (increasing)

14. **SHALE DENSITY (GM/CC)/TREND:** 2.45-2.50

15. **CALCULATED FORMATION PRESSURE:** 8.7

16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** 15.7

JR/DAM264/2

17. **DRILLING BREAKS:** Entire interval was like drill break: 2165-2518m, Max. Rate 56m/hr, Prev. Rate 40m/hr, Avg. ROP 30m/hr above 2305, 20m/hr below 2305m* (*Controlled drilling int.)

18. **COSTS:** 73,759 (Daily) 3,224,589 (Cumulative)

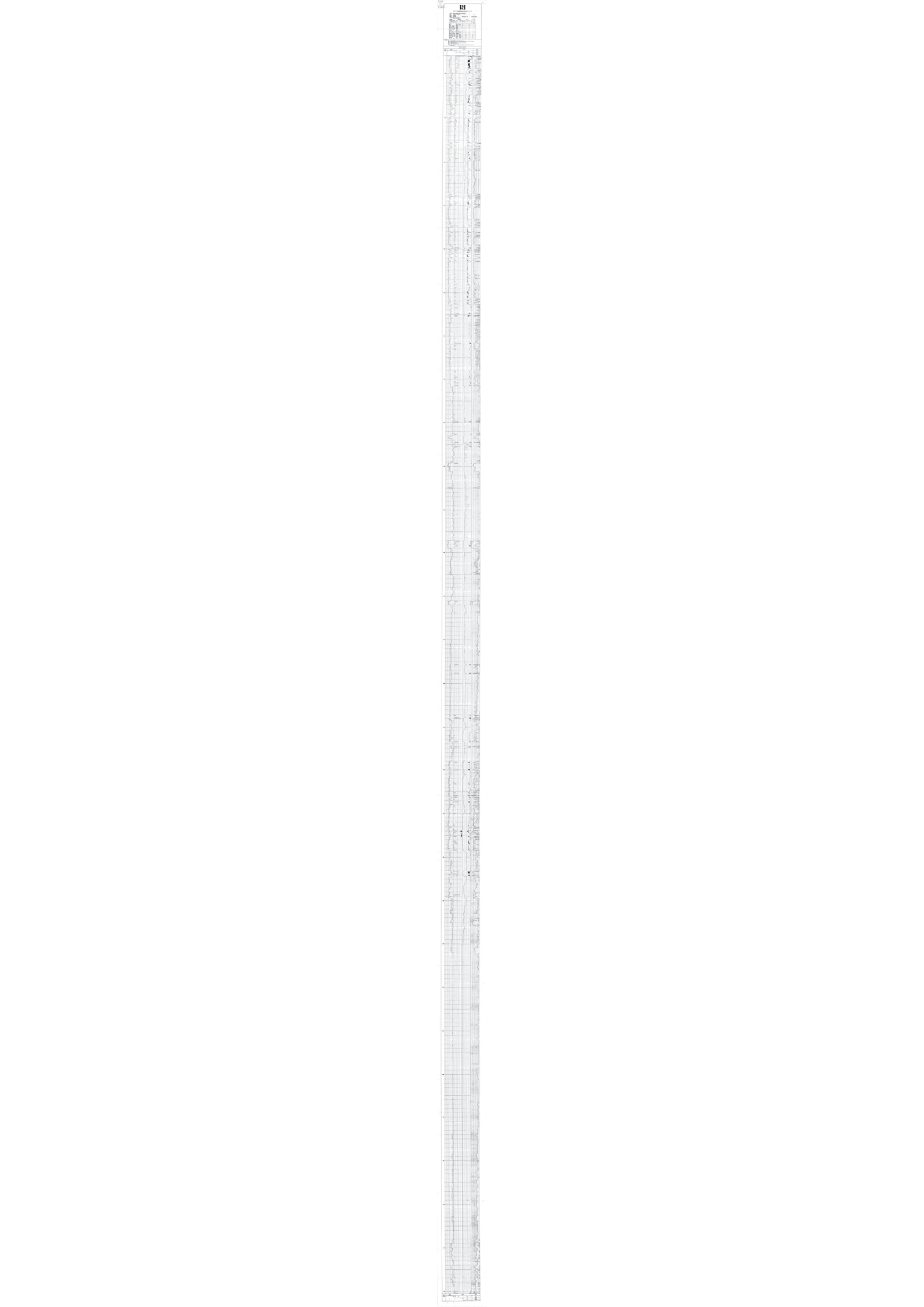
19. **REMARKS:** (1) Controlled drilling exercised below about 2305m to facilitate safer and more timely evaluation of cuttings samples. (2) Sampling interval expanded to 10m due to rapidity of drilling coupled with lack of lithological variation in drilled section. (3) EXLOG MWD logging tool continued inoperative (although data was stored in memory downhole for later playback) - see Report 25 and EXLOG special report later, July 6.

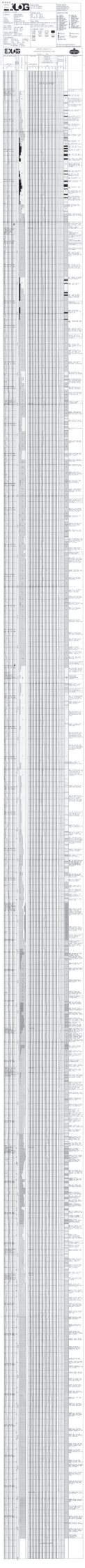
GEOLOGICAL REPORT NO. 27 - JULY 9, 1989

1. **PRESENT DEPTH:** 2510m md (Logger)/2518m md (EXLOG)
2. **PRESENT OPERATIONS:** Running Multishot Survey
3. **PROGRESS:** 0
4. **SAMPLED INTERVAL (IN 24 HOURS):** 0
5. **FORMATION TOPS AND/OR CORRELATIONS:** Not Applicable (N/A)
6. **LITHOLOGY (BY INTERVAL):** N/A
7. **SHOW SUMMARY:** N/A
8. **BACKGROUND GAS:** N/A
9. **MAX. GAS - DEPTH:** N/A
10. **CONNECTION GAS - MAX.:** N/A
11. **TRIP GAS - MAX.:** N/A
12. **MUD WEIGHT (PPG):** N/A
13. **DxC/TREND:** N/A
14. **SHALE DENSITY (GM/CC)/TREND:** N/A
15. **CALCULATED FORMATION PRESSURE:** N/A
16. **FRACTURE GRADIENT AT CASING SHOE (PPG):** N/A
17. **DRILLING BREAKS:** N/A
18. **COSTS:** 231,828 (Daily) 3,527,731 (Cumulative)
19. **REMARKS:** (1) Hand carry : SWC samples and weekly (final) data packages to Amoco Copenhagen. Geologists due to arrive CPH ~16:30 July 9, 1989, (R. L. Terry has logging package as well). (2) SWC descriptions faxed in early today.

JR/DAM264/1

Enclosures



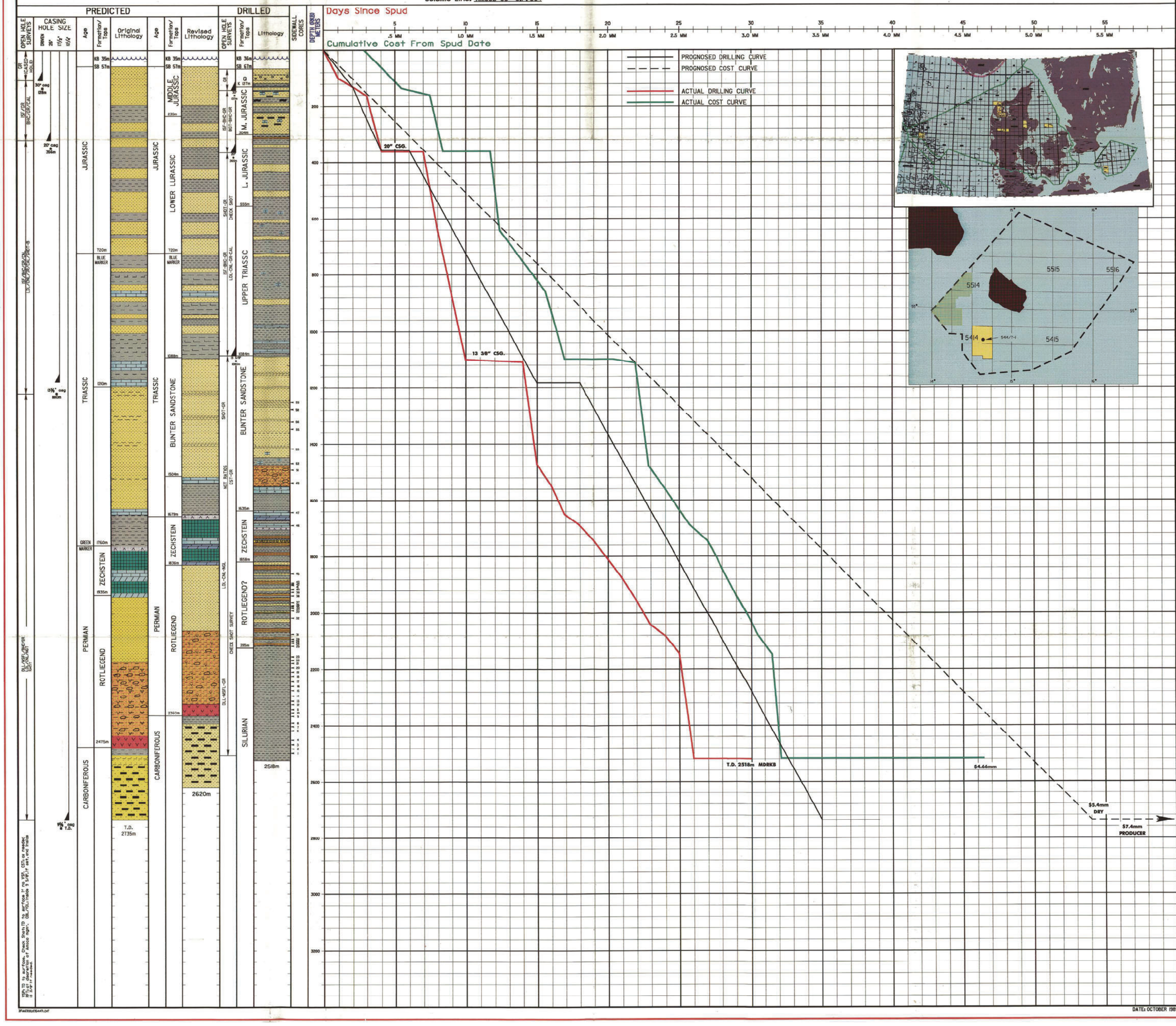


GEUS Report file no. /03

1785 (3/5)

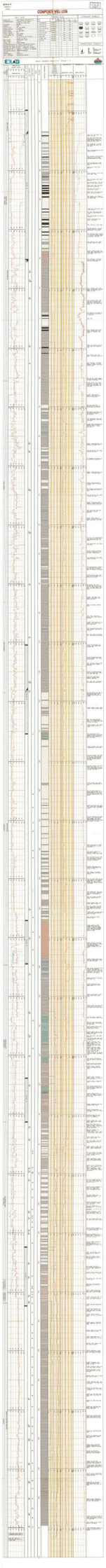
Amoco Denmark Exploration Company

WELL: 5414/7-1	Area: Offshore Bornholm Island	Spud Date: June 11, 1989	Projected T.D. 2700m
COUNTRY: Denmark	Latitude: 54° 47′ 19.92″ N	Rig Release Date: July 13, 1989	Final T.D. 2518m RKB
	Longitude: 14° 37′ 43.38″ E	Wtr. Depth/K.B. Elev.: 31m/36.2m	STATUS: P&A
	Seismic Line: AM88B-05 S.P. 394		



DATE: OCTOBER 1989

10-OCT-1989 541471 07:38 ZFB3:[PLOTS]541471.PRF;1 11ASMH HOUVAX2


COMPOSITE WELL LOG

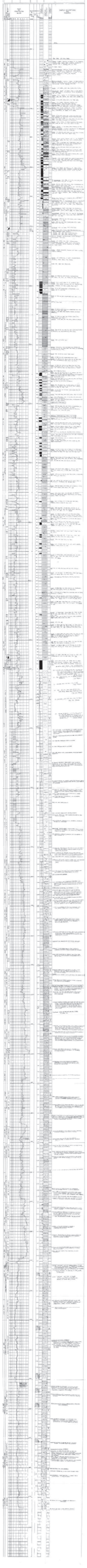
AMOCO WELLSITE LITHOLOGIC LOG

GEUS

WELL NAME:	[illegible]
COUNTRY:	[illegible]
LOCATION:	[illegible]
LATITUDE:	[illegible]
LONGITUDE:	[illegible]
OPERATOR:	[illegible]
CONTRACTOR/RIG:	[illegible]
SPUD DATE:	[illegible]
T.D. DATE:	[illegible]
TOTAL DEPTH: LOGGER:	[illegible]
DRILLER:	[illegible]
WATER DEPTH:	[illegible]
K.B. ELEVATION:	[illegible]
STATUS:	[illegible]

GEOLOGICAL TOPS

WIRELINE SURVEYS



Danish Ministry of Climate,
Energy and Utilities

Geological survey of
Denmark and Greenland (GEUS)

Øster Voldgade 10
DK-1350 Copenhagen K
Denmark

GEUS is a research and advisory institution in the Danish Ministry of Climate, Energy and Utilities