WELL SUMMARY

FOR

A/S NORSKE SHELL

WELL NO. 31/2-11

ANCHOR DRILLING FLUIDS

WELL SUMMARY

FOR

A/S NORSKE SHELL

WELL NO. 31/2-11

GENERAL SUMMARY

OPERATOR	A/S NORSKE SHELL
WELL NO.	31/2-11
OPERATOR'S REPRESENTATIVES	
	FRANS VAN KAMPEN, CHRIS WESTON, HANS FECKEN
CONTRACTOR	DOLPHIN SERVICES
RIG	BORGNY DOLPHIN
CONTRACTOR'S REPRESENTATIVES	
	JOHN BUTCHART, HARALD FRIGSTAD
ANCHOR ENGINEERS	CHRIS ATKINSON, CHRIS MEYJES, JOHN SETCHEL, CHARLES BLANCHARD

WATER DEPTH	336 m
SEABED to RKB	361 m
36" HOLE DRILLED TO	470 m
30" CASING SET AT	460 m
26" HOLE DRILLED TO	810 m
20" CASING SET AT	799 m
17½" HOLE DRILLED TO	1535 m
13⅜" CASING SET AT	1525 m
12¼" HOLE DRILLED TO	1744 m
9⅝" CASING SET AT	1720 m
8½" HOLE DRILLED TO	
7" LINER SET AT	
6" HOLE DRILLED TO	

ANCHOR DRILLING FLUIDS AS
OSLO – STAVANGER

DAILY SUMMARY REPORT

WELL NAME 31/2-11

OPERATOR A/S NORSKE SHELL

ENGINEERS C. MEYJES

DATE 16 & 17.03.83

Ran Anchors 16.03.83. 1,000 bbls pre-hydrated gel mixed by WSPE John Allen.

17.03.83: Ran T.G.B. Picked up drilling assembly and spud well at 17.00 hrs.

Drilled 36" hole to 380 m. POOH to pick up core bbl.

Cut back viscosity of pre-hydrated gel by addition of 65 bbls drill water.

DATE 18.03.83

Cored from 380 m to 389.5 m. POOH and service core barrel. RIH and cored from 389.5 m to 399 m. POOH.

RIH with 26" bit and 36" hole opener. Drilled to 430 m using seawater and viscous pills with returns to seabed.

Mud engineer arrived on rig 12.00 hrs. Mixed 300 bbls pre-hydrated gel. Mud consumption higher than anticipated since 300 bbls mud spotted on each survey (50 bbls sweep and 250 bbls left in hole).

DATE 19.03.83

Drilled to 470 m. Surveyed and made wiper trip to seabed to retrieve survey. RIH - 1 m fill. Swept hole with 50 bbls pill and pumped 1070 bbls mud into hole (hole capacity 430 bbls for gauge hole). POOH and rigged up to run 30" casing.

Ran 30" casing to 460 m - no problems. Cement casing. Displaced with seawater. Waited on cement 1 1/2 hr. Backed out running tool and jetted well head.

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WELL NAME 31/2-11

OPERATOR A/S NORSKE SHELL

ENGINEERS C. MEYJES

DATE 20.03.83

POOH with running tool. Laid down 36" BHA. RIH and attempted to stab in with 14 3/4" bit and 26" hole opener. Guide frame damaged while trying to stab in bad weather. Waited on weather 9 hrs and repaired guide frame.

RIH. Stabbed in. Tagged cement at 449 m. Drilled out cement and shoe. Clean out rathole and drilled to 475 m. Swept hole with 50 bbls mud and spotted 50 bbls mud on bottom. POOH to run riser.

Mixed 350 bbls pre-hydrated gel.

Fitted shaker screens: 20/40, 20/40, 20/30, used screens which had been used on previous hole.

DATE 21.03.83

Finished POOH. Waited on weather 20 1/2 hrs. Ran riser.

Requested to mix 1 pit (300 bbls) of kill mud at 1.35 SG.

DATE 22.03.83

Finished running riser. Made up core barrel and RIH. Cored from 475 m to 476.5 m. Made no progress. POOH with core barrel.

Stabilizer hung up in diverter while POOH. Elevators opened and 1 STD DC's and core barrel dropped in hole. M/u overshot and bent joint and RIH to fish. Tagged fish at 458 m but could not latch on.

Weighted up 300 bbls pre-hydrated gel to use as kill mud.

Mixed 300 bbls pre-hydrated gel.

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OPERATOR A/S NORSKE SHELL

ENGINEERS C. MEYJES

DATE 23.03.83

POOH with fishing assembly. Unlatched and pulled riser. Made up overshot with 21 1/2" guide. RIH and tagged top of fish at 432 m. Engaged fish and POOH with same.

Restring new drilling line.

DATE 24.03.83

Restring new drilling line. Vetco inspection of blocks, crown etc. to check for damage caused when fish was dropped (see 22.03.83).

Ran and latched riser. Filled with seawater. Made up BHA for 14 3/4" pilot hole.

Requested to run the gelled seawater mud for this section at a minimum vis of 55 - 60 secs and to have all surface pits full with 120 vis mud before starting drilling. Increased pit volume and mixed gel as necessary.

DATE 25.03.83

RIH to 460 m. Tested diverter and overboard lines. Displaced hole to mud. Reamed to 475 m. Drilled to 508 m. Pump broke down. POOH to shoe to repair same. RIH and drilled to 705 m.

For hole displacement watered back pre-hydrated Bentonite with seawater. Initial viscosity very high. Lost mud over shakers. Diluted back heavily with seawater. Ran mud cleaner continuously with 120 mesh screens, plus desander and desilter as necessary.

Excess volume caused by dilution was disposed of by regularly dumping of the gumbo box and sand traps.

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WELL NAME 31/2-11

OPERATOR A/S NORSKE SHELL

ENGINEERS C. MEYJES

DATE 26.03.83

Drilled from 705 m to 815 m. Dropped survey and POOH to retrieve same at shoe. RIH - hole OK. Circulated bottoms up and spotted 338 bbls 1.35 SG viscous mud in the open hole. POOH to log.

Rigged up Schlumberger. Ran ISF, LDT/CNL. Both runs to bottom - no problems. RIH OEDP to displace hole to seawater.

Ran seawater, desilter and mud cleaner while drilling to control mud weight. Dumped 80 bbls surplus volume and gumbo box. Mixed 76 bbls extra mud at 1.35 SG while drilling. Filled all available pits with mud returns when spotting 1.35 SG mud. Dumped remaining returns (±50 bbls).

DATE 27.03.83

RIH to 450 m. Displaced 30" casing and riser to seawater. Saved 310 bbls of returns. Dumped balance (±380 bbls) and circulated until returns clean.

Open dump valve on seabed. RIH to 650 m and displaced out 1.35 SG mud with seawater. RIH to 810 m and displaced to seawater again. Observed well - static for 30 mins.

Displaced open hole with 365 bbls hivis mud (1.08 SG). POOH. Unlatched and pull riser. Made up 26" BHA and RIH.

Mixed 300 bbls pre-hydrated gel.

DATE 28.03.83

RIH with 26" bit. Stabbed into hole and RIH to 460 m. Open 14 3/4" pilot hole to 26" from 470 m to 810 m. Pumped 25 bbls high vis pill on each connection. 2 hrs washed and reamed out ledge at 515 m. Otherwise no hole problems.

Requested by Shell tool pusher to have all surface pits full of 1.35 SG high vis mud for pumping into hole before POOH to run casing. Pumped 100 bbls mud from sandtraps to active. Dumped remaining 40 bbls and cleaned pits.

Mixed 250 bbls unweighted viscous mud. Weighted up 675 bbls mud to 1.35 SG and mixed a further 375 bbls of 1.35 SG mud.

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WELL NAME 31/2-11

OPERATOR A/S NORSKE SHELL

ENGINEERS C. MEYJES/ C. ATKINSON

DATE 29.03.83

Pumped 50 bbls viscous pill and chased out of hole with 8,000 strokes seawater. Dropped survey and POOH to shoe - hole OK. Waited 1 hr and RIH. Stood up at 784 m. Reamed to bottom. Swept hole with 50 bbls hivis mud and pumped 1185 bbls 1.35 SG viscous mud into hole. POOH to run casing.

Rigged up and ran 20" casing. Stabbed into well head. Wind became too severe to run last 5 JTS of casing. Shut down waiting on weather.

Dumped and cleaned all pits and lines. (Dumped 185 bbls mud left in bottom of pits).

Mixed 150 bbls $CaCl_2$ water for cement job.

DATE 30.03.83

Waited on weather to 07.00 hrs. Pulled 3 JTS 20" casing. Ballasted down rig to 70' and pulled rest of casing. RIH with 26" bit to 459 m. Displaced hole to seawater. RIH to 628 m and displaced again. RIH to 794 m - hole tight. Washed and reamed to 810 m. Pumped 50 bbls mud to sweep hole. Displaced hole to 1.35 SG mud. Pumped 1130 bbls (hole capacity 1014 bbls). POOH to run 20" casing.

Dumped 150 bbls $CaCl_2$ water and mixed 1345 bbls mud at 1.35 SG hivis while pulling casing. After displacing hole to mud dumped balance of mud in pits (165 bbls). Started cleaning out pits and lines.

DATE 31.03.83

Ran and cement 20" casing with shoe at 799 m. Jetted well head clean. Ran stack and marine riser.

Mixed 150 bbls $CaCl_2$ water for cement job.

Dumped and cleaned all pits prior to taking on 640 bbls KCl brine from boat. Started mixing new KCl/Polymer system.

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OPERATOR A/S NORSKE SHELL

ENGINEERS C. ATKINSON

DATE 01.04.83

Ran and landed stack and marine riser. Tested BOP's. POOH with test plug. Run wear bushing.

Finished mixing KCl/Polymer system (total of 1550 bbls built) weighted up to 1.30 SG for drilling out.

Filled sand traps with mud also.

DATE 02.04.83

Unable to set wear bushing. POOH. Carried out repairs. Set wear bushing. Laid down excess HWDP at 26" BHA. Made up new 17 1/2" BHA. RIH to 771 m. Picked up kelly. Tagged cement at 781 m. Drilled cement from 781 m to 799 m with seawater. Displaced to mud and drilled 17 1/2" hole from 810 m to 820 m. Circulated bottoms up and hole clean. Carried out leak off test. Gave leak off at equivalent mud weight of 1.49 SG. Drilled ahead from 820 m to 825 m.

Took on 390 bbls brine total in pit no. 2, 3 and 4. Started mixing new volume in pit no. 2 and pit no. 3. Total of 550 bbls.

DATE 03.04.83

Drilled 17 1/2" hole from 825 m to 987 m. Dropped survey. POOH to 20" shoe (max. 100,000 lbs overpull first stand). Retrieved survey. RIH. Drilled ahead from 987 m to 1082 m. (Used Halliburton to pump also after 18.00 hrs due to lack of power for two rig pumps. Slower ROP - down to 10 m/hr.

Losses over shakers when solid cuttings too great to handle due to high ROP. Mixed new volume pit no. 4 and no. 3. (Total of 600 bbls at 1.30 SG).

Increased Ancopol polymer content while drilling (generally add 1 can per hr).

Dumped and cleaned sand trap during survey wiper trip.

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OPERATOR A/S NORSKE SHELL

ENGINEERS C. ATKINSON

DATE 04.04.83

Drilled 17 1/2" hole from 1082 m to 1120 m. Started using 2 rig pumps at 07.00 hrs. Drilled ahead from 1120 m to 1168 m. Circulated 1/2 hr. Dropped survey. POOH for wiper trip to shoe. Tight hole from 1095 m to 895 m (max. 125,000 lbs over-pull). Picked up kelly at 980 m. Circulated 1/2 hr. POOH to shoe. Retrieved survey (1/2°). RIH to 1152 m. Broke circulation Reamed and washed to bottom (2 m fill). Drilled 17 1/2" hole from 1168 m to 1285 m.

Treated system with 4 ppb KCl after some hydration of cutting starting to be noticeable.

DATE 05.04.83

Drilled 17 1/2" hole from 1285 m to 1349 m. Circulated 3/4 hr. Dropped survey (1/2°), POOH for wiper trip to shoe. Tight hole at 1190 m. Picked up kelly. Circulated 1/4 hr. Continued POOH to shoe. RIH. Reamed and washed from 1162 m to 1181 m and 1314 m to 1349 m. Continued drilling ahead from 1349 m to 1372 m. POOH to change bit. Tight at 1350 m to 1300 m. Changed bit. RIH to 1228 m. Tight hole. Washed down. Continued RIH to 1361 m.

Washed to T.D. - no fill. Drilled ahead from 1372 m to 1455 m.

Maintained K^+ at approx.40 ppb in active system. Mixed 230 bbls over mud volume in pit no. 3.

DATE 06.04.83

Drilled 17 1/2" hole from 1455 m to 1535 m (casing depth). Circulated 1/2 hr. Dropped survey (1/2°). Wiper trip to shoe. Tight at 1495 m to 1409 m. Pumped 3 JTS out of hole. Continued POOH. RIH. Tagged bottom at 1535 m - no fill. Circulated bottoms up and cleaned hole. POOH - no drag.

Ran Schlumberger logs. Made up casing hanger and hang off tool and cement head. RIH with bit for clean out trip prior to running casing.

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OPERATOR A/S NORSKE SHELL

ENGINEERS C. ATKINSON/ J. SETCHELL

DATE 07.04.83

Continued RIH for clean out trip. Hit bridge at 1523 m. Broke circulation. Washed to T.D. from 1523 m to 1535 m. Circulated hole clean. RIH. Washed well head area. Finished POOH. Pulled wear bushing. Rigged up and ran 13 3/8" casing. Landed casing with shoe at 1525 m.

Circulated 900 bbls mud - no losses. Cement casing. Full returns (515 bbls). Displaced cement with seawater. Lost returns after 242 bbls (lost total of 318 bbls mud before pumping plug).

Started dumping and cleaning pits after cementing.

DATE 08.04.83

Finished pumping plug with 1200 psi. P-tested casing to 2500 psi. No back flow. POOH with running tool. Pulled wear bushing. RIH with test plug. Tested BOP's. Laid down 17 1/2" BHA. RIH with wear bushing and set same. Made up new 12 1/4" BHA. RIH to 1504 m. Slipped and cut line. Tagged cement at 1510 m. Drilled cement from 1510 m to 1513 m.

Finished dumping and cleaning all pits, sand traps, lines and ditches. Took on $CaCl_2$ brine ±1.12 SG (57 ppb) from boat. Total 830 bbls. Diluted to 1.07 SG with drill water (38 ppb $CaCl_2$). Mixed total 1395 bbls of 1.14 SG non-damaging chalk mud with bacteriacide and 0.3 ppg Enorflo-S (active) and
1 1/2 ppb HEC and 20 ppb $CaCO_3$ N-40
and 20 ppb $CaCO_3$ N-15
and 2 ppb $CaCO_3$ N-5

DATE 09.04.83

Continued drilling cement with seawater from 1513 m to 1524 m. Circulated hole clean. Displaced to mud. Drilled out cement and17 1/2" rat hole from 1524 m to 1535 m. Drilled 12 1/4" hole from 1535 m to 1536 m. Leak off test (leak off equivalent 1.50 SG). Drilled ahead from 1536 m to 1555 m. Circulated bottoms up for sample after drill break. POOH to make up 30" core barrel. Recovered core (82 %). Made up new BHA with 60' core barrel. RIH to continue coring.

Mixed pits no. 3 and 4 new mud (total 640 bbls) after displacing hole. Bypassed sand traps until new mud volume available.

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OPERATOR A/S NORSKE SHELL

ENGINEERS C. ATKINSON/ J. SETCHEL

DATE 10.04.83

Continued RIH. Tight hole from top of rat hole (1555 m). Worked pipe to bottom (1564 m). Cut core from 1564 m to 1578 m. Barrel jammed. POOH. Recovered core (35 %). Made up new core head. RIH. Circulated and washed hole clean at 1555 m to 1578 m. Cut core from 1578 m to 1592 m. POOH. Recovered core (68 %).

RIH with core barrel. Slipped and cut drill line. Continued RIH

Increased system mud weight to 1.15 SG with $CaCO_3$. Mixed 1/4 ppb HEC to maintain vis >70 and improve fluid loss properties. Noticeable improvement in fluid loss also with additions of $CaCO_3$.

DATE 11.04.83

Finished RIH. Tagged bottom at 1592 m - no fill. Circulated 1/2 hour. Cut core from 1592 m to 1610.5 m. POOH. Recovered core (99.8 %) Serviced core barrel. RIH. Cut core from 1610.5 m to 1629 m. POOH. Recovered core (100 %). Laid out core barrel. Made up new 12 1/4" BHA. RIH with bit to 1547 m. Broke circulation. Reamed 12 1/4" hole from 1555 m to 1608 m from 8 1/2" core hole.

Maintained HEC concentration in system and pH level with Caustic.

DATE 12.04.83

Reamed from 1608 m to 1629 m (8 1/2" - 12 1/4" hole). Survey (1/2°). Wiper trip to shoe. RIH. Drilled 12 1/4" hole from 1629 m to 1735 m (T.D.). Circulated bottoms up. Survey (1 1/4°). POOH to shoe (some overpull from 1600 m to 1635 m). RIH. No fill. Circulated hole clean. POOH - no drag. Rigged up and ran Schlumberger logs. (ISF/sonic/GR/SP - LDT/CNL/CAL/NGT).

NOTE: Losses to the hole seen when starting pumps after each connection.

Also losses while logging. Kept hole full with trip tank pump.

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OPERATOR A/S NORSKE SHELL

ENGINEERS C. ATKINSON/ J. SETCHEL

DATE 13.04.83

Logged.

Dumped and cleaned out sand traps, gumbo box and shaker box and all ditches.

Dumped 25 bbls pit no. 4 and 25 bbls pit no. 2 and cleaned out both pits. Service no. 2 mixing pump.

Cleaned out all rig pump suction lines.

DATE 14.04.83

Continued logging.

DATE 15.04.83

Finished logging.

Made up casing hanger and running tool and stand in Derrick.

RIH with 9 meters of fill. Circulated hole clean. Ran CST.
RIH with 10 meters fill and reamed to T.D. 1735 m.

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OPERATOR A/S NORSKE SHELL

ENGINEERS C. BLANCHARD

DATE 16.04.83

Drilled 12 1/4" hole from 1735 m to 1744 m. Cleaned hole and POOH. Pulled wear bushing and ran 9 5/8" casing. Circulated 2900 strokes. Cemented 9 5/8" casing. Check for back flow - returns. Pressure up to 1000 psi and bled off in 30 minutes intervals 700 psi. Back flow at 300 psi. Pressure up to 500 psi and waited for cement.

DATE 17.04.83

Waited on cement. Tested BOP's. Unable to pump through kill line. Pulled riser and top package after displacing riser to seawater. Worked on BOP's.

DATE

SUMMARY OF EVENTS

OPERATOR: A/S NORSKE SHELL

WELL NO. 31/2-11

36" **HOLE/** 30" **CASING INTERVAL**

The 36" hole was drilled to 470 m. Seawater and viscous pills were used with returns going to the seabed. Cores were taken at 380 m to 389.5 m and 389.5 m to 399 m. Mud consumption was higher than expected since 300 bbls of mud was spotted on each survey. Before setting casing the hole was filled with 1070 bbls. 30" casing was run without any problems.

RECOMMENDATIONS

36" HOLE

This section was drilled according to program with no major problems.

SUMMARY OF EVENTS

OPERATOR: A/S NORSKE SHELL

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26" **HOLE/** 20" **CASING INTERVAL**
(14 3/4" PILOT HOLE)

The 14 3/4" hole was drilled to 815 m with seawater and gell/seawater mud. While running into hole the guide frame was damaged and had to be repaired. Cement was tagged at 449 m and drilled with seawater and viscous mud, the riser was then run. 350 bbls of prehydrated gel was mixed and 300 bbls of kill mud was also mixed (1.35 SG).

After the riser was run a core barrel was run in hole and drilled from 475 m to 476 m making no progress. While pulling the core barrel out of the hole the assembly was dropped in the hole, the fish was tagged at 458 m but could not be latched on to. The riser was then pulled and the fish engaged and POOH. After making rig repairs, ran in hole as requested to run gelled seawater at 55 - 60 viscosity and all surface pits full with 120 viscosity mud.

Drilled to 508 m and then made rig repairs, resumed drilling to 705 m. Solids equipments was run at all times and mud was diluted heavily with seawater. The hole was then drilled to 815 m and 338 bbls of 1.35 SG was spotted and logging was carried out with no problems. The hole was then displaced to seawater with returns saved. When the complete hole was filled with seawater the well was observed for 30 minutes.

The hole was then displaced with 365 bbls of mud (1.08 SG) and then riser was pulled.

The 14 3/4" pilot hole was opened to 26" from 470 m to 810 m with 25 bbls pills of hivis mud spotted on each connection. A ledge was washed and reamed at 515 m, otherwise no hole problems. Surface pits were kept full with 1.35 SG mud for displacement before casing. The hole was then swept clean and a wiper trip made. While running in the hole had to ream from 784 m to bottom. The hole was then filled with 1185 bbls 1.35 SG, viscous mud. 20" casing was run but had to shut down due to weather. 150 bbls of $CaCl_2$ water was mixed for the cement job. The hole was again filled with seawater and tight hole was found at 794 m. The hole was then cleaned at 810 m and displaced again to 1.35 SG viscous mud. The 150 bbls of $CaCl_2$ water was dumped and mixed again in order to have space for viscous mud. 20" casing was then run and cemented.

RECOMMENDATIONS

26" HOLE

This section was drilled with no major problems except for mechanical and weather mishaps causing an excess of mud to be mixed in order to keep the hole in shape.

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OPERATOR: A/S NORSKE SHELL

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17 1/2" **HOLE/** 13 3/8" **CASING INTERVAL**

A total of 1550 bbls of KCl/Polymer mud were mixed at a weight of 1.30 SG prior to drilling out the 20" casing shoe.

Cement in the casing was drilled out to within 1 m of the shoe with seawater, and the hole then displaced to mud with no cement contamination. After drilling the shoe and cleaning out the 26" rat hole from 799 m to 810 m, a 17 1/2" hole was drilled from 810 m to 820 m and a leak off test was taken. This gave an equivalent break down at 1.49 SG.

Drilling then continued ahead to the casing point of 1535 m, over a period of 3 1/2 days and a bit change at 1372 m.

The section from 1000 m to 1100 m approx. was drilled at a slower ROP (10 m/hr) due to reduced available pump pressure with one rig pump down and the use of the Halliburton pump required.

Trips were made for surveys approx. each 150 m and tight hole was experienced with some swabbing when POOH on each new section but RIH was no problem and a second trip through the section produced no overpull each time.

The KCl/Polymer system was run with a K^+ of approx. 40 to 42 ppb which was found necessary together with polymer (Ancopol) additions (3/4 ppb) for adequate inhibition of clays, otherwise some hydration of cuttings was noticeable.

Mud weight in the section was initially 1.30 SG and rose to 1.35 SG by T.D. and gave good stability.

Schlumberger logs were then run after a clean out trip and the 13 3/8" casing was run and cemented with shoe at 1525 m. Returns were lost (total approx. 300 bbls) during the cement displacement.

All surface mud system was then dumped and pits cleaned out prior to mixing new mud system for the 12 1/4" section.

RECOMMENDATIONS

17 1/2" SECTION

It was felt that use of 1.30 SG initially, increasing to 1.35 SG at TD resulted in much better hole stability than previous wells where 1.26 SG was started with and increased to 1.35 SG after some unstable hole had been encountered.

Therefore it is recommended to continue use of 1.30 SG as initial weight to drill out 20" casing.

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12 1/4" **HOLE/** 9 5/8" **CASING INTERVAL**

After all pits were cleaned out a total of 830 bbls of $CaCl_2$ brine at 1.12^+ SG was taken onboard to mix, after dilution with drill water, an initial batch total of 1395 bbls of "non-damaging" chalk mud ($CaCl_2/CaCO_3$/Polymer).

The composition of this mud was 0.25 - 0.30 ppb Enorflo-S (a substitute for XC-Polymer in this type of system) and 1 1/2 ppb HEC and 20 ppb N-40 $CaCO_3$ and 20 ppb N-15 $CaCO_3$ and 2 ppb N-5 $CaCO_3$. These values were used after a series of pilot tests had been run both with seawater and drill water dilutions of original $CaCl_2$ brine received.

After drilling out cement to 13 3/8" shoe, and circulating the hole clean, the hole was displaced with the new mud and drilling continued to 1536 m where a leak off test was taken, giving an equivalent break down at 1.50 SG. Drilling ahead continued to 1555 m where an ROP drill break was circulated out giving sands and it was decided to start coring the jurassic reservoir.

An initial run of 30 ft core barrel was made for coring 1555 m to 1564 m, then a 60 ft barrel was run for a furhter 4 cores to depth of 1629 m where shows were then negligable.

Reaming out of the cored section was then carried out (1555 m to 1629 m) and then 12 1/4" hole drilled to 1735 m.

A further total of 640 bbls of new mud was mixed after displacing the hole and treatments while coring and drilling were only made for maintenance of HEC concentration and fluid loss control and $CaCO_3$ levels and minimal Caustic for pH maintenance.

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12 1/4" **HOLE/** 9 5/8" **CASING INTERVAL** cont'd

As drilled clays were picked up the fluid loss dropped greatly from 38 cc down to approx. 5 cc with 10 ppb MBT. Mud weight rose from 1.15 to 1.16^{+} SG by the end of the section. The only solids control used was shaker with screens $\frac{20}{60}$, due to non possible use of hydrocyclone equipment which would have throuwn out too great an amount of $CaCO_3$. The main factor for running the system was to have clean filtrate to decrease any skin damage to reservoir prior to testing.

The mixing of the system was relatively easy with Enorflo-S coming into solution with minimal shear required as with the HEC - but order of addition was found to be vital from pilot tests, requiring Enorflo-S mixing first otherwise HEC would not shear in and form "fish eyes".

Considerable time was required though for mixing of $CaCO_3$ sacks due to the high contamination necessary to give a 1.15 SG mud weight.

The only real problem during drilling usage seemed to be "seepage" losses when turning on pumps after each connection. Total losses during drilling were approx. 100 bbls.

An extensive logging program was then carried out for a period of 3 days when running in the hole 9 m of fill was found. The hole was circulated clean and a CST was run. After running in the hole 10 m of fill was found and reamed to 1735 m and then drilling 12 1/4" hole to 1744 m T.D.

The hole was cirulated clean and 9 5/8" casing was then run and cemented.

RECOMMENDATIONS

12 1/4" HOLE

The only recommendation to be made would be to keep a small amount of Mica in the mud to stop seepage losses to the formation, although this may not be compatable with the use of a non-damaging chalk mud. Also as pointed out before the order of mixing should be carefully watched i.e. Enerflo-S should be mixed first in order to prevent fish eyes from the HEC.

OPERATOR A/S NORSKE SHELL

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MATERIAL CONSUMPTION & COST ANALYSIS

36" HOLE DRILLED TO 470 Meters ~~XXX~~ Feet 30" CASING SET AT 460 Meters ~~XXX~~ Feet

ACTUAL AMOUNT OF HOLE DRILLED 109 Meters ~~XX~~ Feet DAYS ON INTERVAL 4

DRILLING FLUID SYSTEM SEAWATER AND VISCOUS BENTONITE PILLS

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	US$ COST
BENTONITE	M/T	20	29.2	+ 9.2	11,096.00
CAUSTIC SODA	25 KG/SX	15	38	+ 23	760.00
SODA ASH	50 KG/SX	6	24	+ 18	480.00
LIME	25 KG/SX	6	0	- 6	0

COST/DAY US$ 3,084.00 TOTAL COST FOR INTERVAL US$ 12,336.00

COST/Mt. ~~or Ft~~ US$ 113.17 PROG. COST FOR INTERVAL US$ +8,056.00

ENGR. COST COST VARIANCE FOR INTERVAL $ 4,280.00

OPERATOR A/S NORSKE SHELL

WELL NO. 31/2-11

MATERIAL CONSUMPTION & COST ANALYSIS

26" HOLE DRILLED TO 815 Meters ~~Feet~~ 20" CASING SET AT 799 Meters ~~Feet~~

ACTUAL AMOUNT OF HOLE DRILLED 345 Meters ~~Feet~~ DAYS ON INTERVAL 11

DRILLING FLUID SYSTEM PILOT HOLE (14 3/4"): GELLED SEAWATER/26" HOLE: SEAWATER AND VISCOUS PILLS

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	COST
BARITE	M/T	0	203	+ 203	27,811.00
BENTONITE	M/T	30	48	+ 18	18,240.00
CAUSTIC SODA	25 KG	50	54	+ 4	1,080.00
SODA ASH	50 KG	15	28	+ 13	560.00
SPERCELL C	25 KG	0	8	+ 8	144.00
LF-5	25 KG	20	0	- 20	0

COST/DAY US$ 4,348.00 TOTAL COST FOR INTERVAL US$ 47,835.00

COST/Mt. ~~Ft.~~ $ 138.65 PROG. COST FOR INTERVAL US$ 13,740.00

ENGR. COST COST VARIANCE FOR INTERVAL $ + 34,095.00

OPERATOR A/S NORSKE SHELL

WELL NO. 31/2-11

MATERIAL CONSUMPTION & COST ANALYSIS

17 1/2" HOLE DRILLED TO 1535 Meters ~~Feet~~ 13 3/8" CASING SET AT 1525 Meters ~~Feet~~

ACTUAL AMOUNT OF HOLE DRILLED 720 Meters ~~Feet~~ DAYS ON INTERVAL 8

DRILLING FLUID SYSTEM KCl/POLYMER

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	US$ COST
BARITE	M/T	175	172	- 3	23,564.00
KCl BRINE	BBLS	1000	1030	+ 30	19,404.00
KCl SACKS	50 KG	300	399	+ 99	7,860.00
CAUSTIC	25 KG	95	87	- 8	1,740.00
SODA ASH	50 KG	35	58	+ 23	1,160.00
LF-5	25 KG	175	153	- 22	7,956.00
CMC (LOVIS)	25 KG	90	77	- 13	5,005.00
DRISPAC REG.	50 LBS	95	67	- 28	12,127.00
ANCOPOL (CANS)	25 KG	85	53	- 32	7,420.00
DRILLING DETERGENT	200 L	15	0	- 15	0
DEFOAMER (CAN)	20 L	0	1	+ 1	70.00

COST/DAY US$ 10,788.25 TOTAL COST FOR INTERVAL US$ 86,306.00

COST/Mt. or ~~Ft~~ US$ 119.87 PROG. COST FOR INTERVAL US$ 100,512.90

ENGR. COST COST VARIANCE FOR INTERVAL $ 14,206.90

OPERATOR A/S NORSKE SHELL

WELL NO. 31/2-11

MATERIAL CONSUMPTION & COST ANALYSIS

12 1/4" HOLE DRILLED TO 1744 Meters 9 5/8" CASING SET AT 1720 Meters

ACTUAL AMOUNT OF HOLE DRILLED 200 Meters DAYS ON INTERVAL 10

DRILLING FLUID SYSTEM $CaCl_2$/CaCO3/POLYMER (NON-DAMAGING CHALK)

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	US$ COST
BARITE	M/T	80	0	- 80	0
BENTONITE	50 KG	50	0	- 50	0
LIGNO	25 KG	75	0	- 75	0
CAUSTIC	25 KG	50	1	- 49	20.00
CMC /LOVIS)	25 KG	30	0	- 30	0
LF-5	25 KG	100	0	- 100	0
XC-POLYMER	50 LBS	10	0	- 10	0
DRISPAC REG.	50 LBS	40	0	- 40	0
DRILLING DETERGENT	200 L	5	0	- 5	0
HEC	25 KG	0	69	+ 69	14,997.84
ENORFLO-S	200 L	0	17	+ 17	2,482.00
GLUTARALDEHYDE (CAN)	20 L	0	1	+ 1	83.04
SODA ASH	50 KG	15	0	- 15	0
DEFOAMER (CAN)	20 L	0	2	+ 2	140.00
CALCIUM CHLORIDE	BBLS	0	1060	+1060	16,400.00
CALCIUM CHLORIDE (SX)	50 KG	0	136	+ 136	3,128.00
CALCIUM CARBONATE(SX)	50 KG	0	1108	+1108	8,864.00

COST/DAY US$ 4,611.49

TOTAL COST FOR INTERVAL US$ 46,114.88

COST/Mt. or Ft. $ 230.57

PROG. COST FOR INTERVAL US$ 32,970.00

ENGR. COST

COST VARIANCE FOR INTERVAL$ 13,144.88

OPERATOR A/S NORSKE SHELL

WELL NO. 31/2-11

TOTAL CONSUMPTION & COST ANALYSIS

TOTAL DEPTH 1744 Meters ~~Feet~~ TOTAL HOLE DRILLED 1374 Meters ~~Feet~~

TOTAL DAYS 33

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	US$ COST
BARITE	M/T	255	375		51,375.00
BENTONITE	M/T	50	77.2		29,336.00
CAUSTIC	25 KG	210	180		3,600.00
SODA ASH	50 KG	71	110		2,200.00
LIME	25 KG	6	0		0
SPERCELL C	25 KG	75	8		144.00
LF-5	25 KG	295	153		7,956.00
CMC (LOVIS)	25 KG	120	77		5,005.00
DRISPAC REG.	50 LBS	135	67		12,127.00
XC-POLYMER	50 LBS	10			0
KCl BRINE	BBLS	1000	1030		19,404.00
KCl SACKS	50 KG	300	399		7,860.00
ANCOPOL	25 KG	85	53		7,420.00
DRILLING DETERGENT	200 L	20			0
DEFOAMER	20 L	0	3		210.00
HEC	25 KG	0	69		14,997.84
ENERFLO-S	200 L	0	17		2,482.00
GLUTARALEDHYD	20 L	0	1		83.04
CALCIUM CHLORIDE	BBLS	0	1060		16,400.00
CALCIUM CHLORIDE SX	50 KG	0	136		3,128.00
CALCIUM CARBONATE	50 KG	0	1108		8,864.00

COST/DAY US$ 5,836.12 TOTAL COST FOR INTERVAL US$ 192,591.00

COST/Mt. ~~or Ft~~ $ 140.17 PROG. COST FOR INTERVAL $ 155,200.00

ENGR. COST COST VARIANCE FOR INTERVAL $ + 37,391.00

ANCHOR DRILLING FLUIDS AS

OSLO — STAVANGER

Drilling Fluid & Material Consumption Report

WELL NAME 31/2-11 AREA NORTH SEA

OPERATOR A/S NORSKE SHELL RIG BORGNY DOLPHIN

MUD SYSTEM SEAWATER + VISCOUS BENTONITE PILLS/ GELLED SEAWATER

ENGINEERS C. MEYJES

Day No	DATE 1983	ESTIMATED DAILY MUD VOLUMES: LOSSES SUB SURFACE	LOSSES SURFACE	VOLUME MUD BUILT	BULK MATERIALS: M/T BARITE	M/T BENTONITE	SACK MATERIALS: BARITE	BENTONITE	MATERIALS ADDED TO CONTROL PROPERTIES: THINNERS: DRISPAC REG.	LF-5	CMC LOVIS	HEC	POLYMERS: SPERCEL C	ENERFLO-S	OTHERS: CAUSTIC SODA	SODA ASH	CaCl2 brine bbl	CaCO3	KCl sxs	KCl brine	DEFOAMER	CALCIUM CHLORIDE SXS	ANCOPOL	GLUTARAL
1	16.03			1000		12	90**								16	8								
2	17.03			65		0.2																		
3	18.03	635		300		3									3	3								
4	19.03	1580		1550		14.0									19	13						36**		
5	20.03	110*		350		16.0																		
6	21.03																							
7	22.03			300	22	2.0									4	3								
8	23.03																							
9	24.03			110		4.0									5	2								
10	25.03		210	867		3.0									10	3								
11	26.03		175	311	16								2		6									
12	27.03	225*	380	300		4.0									4	3								
13	28.03	1403*	40	925	77	8.0							6		6	5								
14	29.03	1285	185	150																		26**		
FORWARD																								
ESTIMATED TOTALS		5238	990	228	115	66.2	90						8		73	40						62		

REMARKS * Drilled with returns to seabed

**Barite used to weight guide base - not included in mud cost for well.

***Calcium Chloride used for cement water - not included in mud cost for well.

ANCHOR DRILLING FLUIDS AS

OSLO — STAVANGER

Drilling Fluid & Material Consumption Report

WELL NAME 31/2-11 AREA NORTH SEA

OPERATOR A/S NORSKE SHELL RIG BORGNY DOLPHIN

MUD SYSTEM SEAWATER + VISCOUS BENTONITE PILLS/ KCl/POLYMER/NON-DAMAGING CHALK ENGINEERS C. MEYJES/ C. ATKINSO/J. SETCHEL

Day No	DATE 1983	ESTIMATED DAILY MUD VOLUMES: LOSSES SUB SURFACE	LOSSES SURFACE	VOLUME MUD BUILT	BULK MATERIALS: BARITE M/T	BENTONITE M/T	SACK MATERIALS: BARITE	BENTONITE	MATERIALS ADDED TO CONTROL PROPERTIES: THINNERS: DRISPAC REG.	LF-5	CMC LOVIS	HEC	SPERCEL C	POLYMERS: ENERFLO-S				OTHERS: CAUSTIC SODA	SODA ASH	CaCl2 brine bbl	CaCO3	KCl sxs	KCl brine	DEFOAMER	CALCIUM CHLORIDE SXS	ANCOPOL	GLUTARAL
15	30.03	166	* 166	1345	88	11												19	12								
16	31.03	* 1164	50	1470					35	78	39							15	28				640	1	26		
17	01.04			230	74					7	3							2	3			49					
18	02.04		55	810					12	30	16							7	12				390			9	
19	03.04	262	155	600	96				14	28	14							15	11			120				16	
20	04.04	10	24															17				70					
21	05.04		41	230					6	10	5							21	4			160				10	
22	06.04		25		2													9								4	
23	07.04	318	230			NONE			USED																		
24	08.04			1395								40		12						830	551			1			1
25	09.04	45	40	640								18		5						230	297			1	110		
26	10.04	11	20									5									116						
27	11.04	5	40									3									76						
28	12.04	94	50																		30						
FORWARD		5238	990	6228	115	66.2	90						8					73	40						62		
ESTIMATED TOTALS		7313	3955	12,948	375	77.2	90		67	153	77	66	8	17				180	110	1060	1070	399	1030	3	198	53	1

REMARKS

ANCHOR DRILLING FLUIDS AS

OSLO — STAVANGER

Drilling Fluid & Material Consumption Report

WELL NAME 31/2-11 AREA NORTH SEA

OPERATOR A/S NORSKE SHELL RIG BORGNY DOLPHIN

MUD SYSTEM NON-DAMAGING CHALK ($CaCl_2/CaCl_3$/POLYMER ENGINEERS C. ATKINSON/ J. SETCHEL

Day No	DATE 1983	ESTIMATED DAILY MUD VOLUMES: LOSSES SUB SURFACE	LOSSES SURFACE	VOLUME MUD BUILT	BULK MATERIALS: M/T BARITE	M/T BENTONITE	SACK MATERIALS: BARITE	BENTONITE	MATERIALS ADDED TO CONTROL PROPERTIES: DRISPAC REG.	THINNERS: LF-5	CMC LOVIS	HEC	SPERCEL C	POLYMERS: ENERFLO-S				CAUSTIC SODA	SODA ASH	$CaCl_2$ brine bbl	$CaCO_3$	OTHERS: KCl sxs	KCl brine	DEFOAMER	CALCIUM CHLORIDE sxs	ANCOPOL	GLUTARAL
29	13.04	15	195																		5						
30	14.04	5			N O N E			U S E D																			
31	15.04																				8						
32	16.04							3													25						
33	17.04				N O N E			U S E D																			
FORWARD		7313	3955	12,948	375	772	90		67	153	77	66	8	17				180	110	1060	1070	399	1030	3	198	53	1
ESTIMATED TOTALS		7333	4150	12,948	375	772	90		67	153	77	69	8	17				180	110	1060	1108	399	1030	3	198	53	1

REMARKS

ANCHOR DRILLING FLUIDS AS
OSLO — STAVANGER

Drilling Mud Properties Record

WELL NAME 31/2-11 AREA NORTH SEA
OPERATOR A/S NORSKE SHELL RIG BORGNY DOLPHIN
MUD SYSTEM SEAWATER + VISCOUS PILLS ENGINEERS C. MEYJES

Day No	DATE	DEPTH FEET ☐ METERS ☐	MUD PROPERTIES																						OPERATION REMARKS
			DENSITY PPG ☐ SG ☐	VISCOSITY sec/qt	A.V. cps	P.V cps	Y.P. #/100 sq.ft.	GELS 0 / 10	FLUID LOSS 30 Min cc's	CAKE 32 nds	H.T.H.P cc's	pH	Filtrate Analysis Cl⁻ ppm X 1000	Ca ++ ppm T.H.	Pf	RETORT % OIL	% SOLIDS CORR.	% SAND	BENTONITE #/BBL	POTASH #/BBL	POLYMER #/BBL	"N"	"K"	
	1983	METER	SG																						
1	16/ 3																								
2	17/ 3	380																							
3	18/ 3	430	1.04	126																					
4	19/ 3	470	1.04	108																					
5	20/ 3	475	1.04	120																					
6	21/ 3	475	1.04	120																					
7	22/ 3	476	1.04	120																					
8	23/ 3	476	1.04	120																					
9	24/ 3	476	1.04	120																					
10	25/ 3	705	1.08	67	28.5	13.0	31.0	4 / 32				9.0	14	760	.20	0.0	5.00	.25	20.00			.37	5.23		
11	26/ 3	815	1.08	61	28.5	14.0	29.0	20 / 26				9.0	16	720	.30	0.0	4.00	.25	20.00			.41	4.23		
12	27/ 3	815	1.07	127																					
13	28/ 3	815	1.08	118																					
14	29/ 3				NO MUD ONBOARD																				

REMARKS

ANCHOR DRILLING FLUIDS AS
OSLO — STAVANGER

Drilling Mud Properties Record

WELL NAME 31/2-11 AREA NORTH SEA
OPERATOR A/S NORSKE SHELL RIG. BORGNY DOLPHIN
ENGINEERS C. MEYJES/ C. ATKINSON/ J. SETCHEL

MUD SYSTEM SEAWATER + VISCOUS PILLS/ KCl/ POLYMER/ NON-DAMAGING CHALK

Day No.	DATE	DEPTH FEET □ METERS □	MUD PROPERTIES: DENSITY PPG □ SG □	VISCOSITY: sec/qt	A.V. cps	P.V. cps	Y.P. #/100 sq ft	GELS 0/10	FLUID LOSS 30 Min cc's	CAKE 32 nds	H.T.H.P. cc's	pH	Filtrate Analysis: Cl⁻ ppm X 1000	Ca ++ ppm T.H.	Pf	RETORT: % OIL	% SOLIDS CORR.	% SAND	BENTONITE #/BBL	POTASH #/BBL	POLYMER #/BBL	"N"	"K"	OPERATION REMARKS
	1983	METER	SG																					
15	30/ 3					NO		MUD	ON	BOARD														
16	31/ 3					MIXING			NEW			KCl/ POLYMER MUD												
17	1/ 4	815	1.30	54	34.0	24.0	20.0	/	5.0	1		11.0	72	160	1.60	0.0	12.00	0.00				.63	1.23	
18	2/ 4	825	1.30	53	33.0	24.0	18.0	2/4	5.2	1		11.2	71	220	1.90	0.0	13.00	0.00	2.00			.65	1.02	
19	3/ 4	1082	1.30	53	35.0	25.0	20.0	2/4	4.0	1		10.9	67	120	.60	0.0	12.00	.50	7.50			.64	1.19	
20	4/ 4	1285	1.33	53	34.0	25.0	18.0	2/5	4.9	1		10.5	67	160	.28	0.0	13.00	.75	16.00			.66	.99	
21	5/ 4	1455	1.34	52	32.0	24.0	16.0	2/10	5.7	1		10.6	70	150	.30	0.0	13.00	.75	22.00			.68	.84	
22	6/ 4	1535	1.35	52	34.0	26.0	16.0	2/14	6.3	1		10.8	72	100	.35	0.0	13.00	.75	24.00			.69	.80	
23	7/ 4							/																
24	8/ 4	1535	1.14	90	46.5	22.0	49.0	9/10	26.0	1		8.7					12.00					.39	7.71	
25	9/ 4	1564	1.13	68	43.5	21.0	45.0	6/7	38.0	1		8.5					14.00					.40	6.81	
26	10/ 4	1592	1.15	77	46.0	25.0	42.0	6/7	16.0	1		7.9					14.00					.46	4.94	
27	11/ 4	1629	1.15	74	48.5	26.0	45.0	6/7	10.0	1		7.1					13.00					.45	5.45	
28	12/ 4	1735	1.16	70	46.0	26.0	40.0	4/5	5.0	1		7.3	59				14.00					.48	4.30	

REMARKS

ANCHOR DRILLING FLUIDS AS
OSLO — STAVANGER

Drilling Mud Properties Record

MUD SYSTEM NON-DAMAGING CHALK

WELL NAME 31/2-11 AREA NORTH SEA
OPERATOR A/S NORSKE SHELL RIG. BORGNY DOLPHIN
ENGINEERS C. ATKINSON/ J. SETCHEL/ C. BLANCHARD

Day No.	DATE 1983	DEPTH FEET ☐ METERS ☐ METER	MUD PROPERTIES: DENSITY PPG ☐ SG ☐ SG	VISCOSITY sec/qt	A.V. cps	P.V. cps	Y.P. #/100 sq.ft.	GELS 0 / 10	FLUID LOSS 30 Min cc's	CAKE 32 nds	H.T.H.P. cc's	pH	Filtrate Analysis Cl⁻ ppm X 1000	Ca ++ ppm T.H.	Pf	RETORT % OIL	% SOLIDS CORR.	% SAND	BENTONITE #/BBL	POTASH #/BBL	POLYMER #/BBL	"N"	"K"	OPERATION REMARKS
29	13/ 4	1735	1.16	70	46.0	26.0	40.0	4 / 5	5.0	1		7.3	59				14.00		10.00			.48	4.30	
30	14/ 4	1735	1.16	70	46.0	26.0	40.0	4 / 5	5.0	1		7.3	59				14.00		10.00			.48	4.30	
31	15/ 4	1735	1.18	60	42.5	26.0	33.0	4 / 5	5.0	1		7.0	59				15.00		10.00			.53	2.93	
32	16/ 4	1720	1.19	65	41.5	25.0	33.0	4 / 5	5.0	1		7.0	59				15.00		10.00			.52	3.04	
33	17/ 4	1720	1.18	63	41.5	25.0	33.0	4 / 5	5.0	1		7.0	59				15.00		10.00			.52	3.04	

REMARKS

ANCHOR DRILLING FLUIDS AS
OSLO — STAVANGER

GRAPHI-CAP

OPERATOR: NORSKE SHELL
WELL NAME: 31/2-11
CONTRACTOR: DOLPHIN

PAGE NO: 1
SPUD DATE: 16/3-83
RIG: BORGNY DOLPHIN

DEPTH		COST	CASING PLAN	DENSITY	FILTRATE	RHEOLOGY
METERS ☒ FEET ☐	DAYS FROM SPUD	$ ☒ £ ☐ x 1000	30" 20" 13⅜" 9⅝" 7"	PPG ☐ SG ☒	API —— HT-HP ——	PV —— YP ——
	10 20 30 40 50 60 70 80 90	440 400 360 320 280 240 200 160 120 80 40 0		1 1.5 2	0 10 20	0 10 20 30 40
250						
500						
750						
1000						
1250						
1500						
1750	Total Cost USD 192593 Total Depth 1720 m					
2000						
2250						
2500						
2750						
3000						