



Job #	NEXT004	Operator:	Trias Westland B.V.
API Job #		Field:	Naaldwijk
Latitude:	51° 59' 26.499" N	Well:	NLW-GT-03
Longitude:	4° 14' 23.164" E	Region:	Zuid-Holland
Rig:	Vario 370.2	Country:	Netherlands
Reason POOH:	Section TD	BHA #	1
Lead DD:	Ian Craig / Arno Janssen	Company Man:	John Boeijen

BHA Performance Report					
Run Data		Motor data		Drilling Parameters	
Date In:	10/07/2020	SN:		WOB (tons):	34.94
Date Out:	15/08/2020	Description:	No Mudmotor in BHA!	RPM:	85
BRT Hours:	105.75	Make:		Flow Rate (lpm):	3900
Start Depth (m):	133	Model:		Off Btm Press (Bar):	149
End Depth (m):	907.6	Lobes / Stages:		On Btm Press (Bar):	150
Total Drilled (m):	774.6	Bend Angle:		Tq On Btm (KNm):	30
% Slide:	0	Bit to Bend (m):		Tq Off Btm (KNm):	11
Slide Drilled (m):	0	Sleeve Stab OD (in):		Avg Diff Press (Bar):	n/a
Slide Hours:	0	Bearing Gap (in):		Bit Data	
% Rotary:	100	Stab to Bit (m):		Make / Model:	Varel / ES1G
Rotary Drilled (m):	774.6	Kickpad OD (in):		OD (in):	24
Rotary Hours:	68.37	Body OD (in):		TFA:	1.05 (3x18, 1x20)
Total Drlg / Circ Hrs:	68.37 / 94.17	Fishneck OD (in):		Bit #	1
Slide ROP (m/hr):	n/a	Length (m):		Grade In:	NEW
Rot ROP (m/hr):	11.33	Integral Float:		Grade Out:	2-4-WT-A-E-I-NO-TD
Avg ROP (m/hr):	11.33	Rev per Litre:		Drill / Circ Hrs:	68.37 / 94.17

Mud Data											
600	300	200	100	6	3	PV	YP	Wt (sg)	Chlorides	Type	%Solids
49	38	32	25	12	11	11	27	1.17	32000	KCl Polymer	%Sand
										7.49	1%
										BHT (degC)	
										60	

Sensor Offsets(m)										Directional Performance	
Svy	Gam	Res	PWD	Dens	Neu	Sonic	NB Inc	NB Azi	Gyro	Plan DLS (°/30m)	Max DLS (°/30m)
9.34										Vertical	0.57

BHA Details							
Description	OD (in)	ID (in)	TJ OD (in)	TJ ID (in)	Weight kg/m	Length (m)	Total Length (m)
24in Mill Tooth Bit 1.05 (3x18, 1x20)	24	3			607.34	0.56	0.56
23 15/16in Near Bit Stabiliser w/ NPFV	9.5	3.031			600	2.52	3.08
9 1/2in MWD Geolink	9.5	4			282.83	9.34	12.42
9 1/2in Transmitter Sub	9.5	4			283	1.67	14.09
9 1/2in Pony Non Mag Drill Collar	9.5	4			370	4.51	18.6
23 15/32in Stabiliser	9.5	2.969			600	2.56	21.16
1 x 9 1/2in Spiral Drill Collar	9.5	3			319.16	9.32	30.48
23 3/4in Stabiliser	9.5	2.969			600	2.32	32.8
3 x 9 1/2in Spiral Drill Collar	9.5	3			319.16	27.3	60.1
9in Cross Over	9	2.813			282.83	1.13	61.23
3 x 8 1/4in Spiral Drill Collar	8.25	2.813			236.28	27.5	88.73
8 Hydraulic Jar	8	3			171.41	8.55	97.28
3 x 8 1/4in Spiral Drill Collar	8.25	2.813			236.28	27.93	125.21
8in Hydraulic Accelerator	8	3			171.41	10.61	135.82
2 x 8 1/4in Spiral Drill Collar	8.25	2.813			236.28	18.91	154.73
8in Cross Over	8	2.75			229.76	1.1	155.83
12 x 5 1/2in HWDP	5.5	3.5	7	3.5	74.28	112.13	267.96
5 1/2in Drill Pipe S-135 (24.7lb/ft)	5.5	4.67	7.25	3.5	36.77	13.5	281.46

Additional Comments	
BHA Objective <ul style="list-style-type: none">•Maintain 0° inclination to 900m +/- and continue to hold and maintain zero degrees.•23" 15/16" NB, String Stabiliser 23" 15/32" for the middle and the top stab 23 ¾" was selected to hold the assembly to vertical.•Drill inside conductor to 135m and continue to drill along strategy of well path with the 24" Varel Mill Tooth (ES1G) bit, 3x18 – 1x20, TFA: 1.052	
Operational Description <p>Started picking up the 23 15/16" NB stab and layed inside rotary table. Picked up the Geo-Link MWD Non Mag collar with a 7 5/8" lifting sub. Connect the NM to the top of the NB. Continue to pick up the 24" Drill bit and set in bit breaker in Rotary table. Continue to torque up NB stab to bit and continue to RIH to the top of the Non mag.</p> <p>Started picking up the MWD Transmitter sub with lifting sub, 7 5/8" Reg to NC50. Start picking up transmitter sub while connecting batteries and electronic housing to transmitter sub. Lower connections into Non mag drill collar.</p> <p>Continue picking up the pony and then the 23 15/32" Stabilizer, 1 X Spiral drill collar then the 23 ¾" Stabilizer, 3 X 9 ½" Spiral Drill Collars, 9" Cross over, 3 X 8 ¾" Spiral Drill Collars, 8" Hydraulic Jar, 3 X 8 ¾" Spiral Drill collars and the 8" Accelerator, 2 X 8 ¾" Spiral Drill Collars, Cross -over to 12 5 ½" HW and then connected to 5 ½" Drill pipe to Surface.</p> <p>Drilling started at a depth of 135m touching bottom was not until 162.8m. At this point the HWDP's were laid out and a surface test of the MWD was operated at the shoe. The Shallow hole test was performed with 2500l/min, Depth 130m, Pressure 30 bar. Good test was performed and drilling commenced from 135m with 3 HW drill pipe, to 180m. At this depth losses occurred and the flow rate was reduced from 2000l/min to 1500l/min. No surveys were attainable at this point as there was not enough pressure in the system to attain a quality survey. Parameters were adjusted at every stand, 40RPM seem to work well as anything above this the string was erratic and bouncy. The flow rate was increased to 2500l/min at 220m. Shakers were overflowing and the rate was reduced to 2100l/m. A survey was achieved at this point. Continued drilling at an average of 15m/hr. Continued drilling down to 254m alternating parameters, more mud coming over the shakers was noted and a reduced flowrate was implemented to</p>	

1500l/hr. The shakers were overflowing at anything over and above 2100l/hr. At 2100l/hr seem to be the only alternative to drill past the sands until it was possible to add the KCL mud. Drilling ahead from 254m with 1500L/hr, changing parameters from 55RPM to 35Rpm due to bit bouncing. Continue drilling to 261m and change RPM back to 55.

At 279m the flowrate was decreased to 2000LPM. Higher flowrates began and had little impact. The shaker screens were changed but did not change the situation with overflow. The bit was bouncing with minimum RPM 30.

Drilling continued with 2000LPM to 305m MD. Higher flowrates were increased but did not change the situation. The mud at this rate was flowing over the shakers immediately.

Once out of the Oosterhout formation parameters were increased to improve drilling performance and hole cleaning.

Parameters were acting quite well at through the Breda formation which is a silty to sandy clays. Drilling ahead from 404m with 3500L/m, 55RPM and 12-14T on bit. The losses due to cuttings was averaging 2M3/hr. At 446m the flow rate was increased to 3700l/m and was controlling good at the shakers the flow rate once again was increased to 3900l/min 460m and RPM was increased to 65 and the drilling improved with an average of 16m/hr, no issues were encountered at the shakers. At 500m the samples were 100% claystone. From 500m to 520m there were some stringers layers and the drill bit was at 26T to get through these during this section. From 135m to 320m there was almost 100% of sand, including in the section was shells and mica. From 320m to 410m there was about 30% sand and greenish and silty to sandy clays. From 500m the Ekofisk at 720m it was 100% clay. Occasionally a small bounce was noticed where the WOB increased to 18 tons and torque increased from 6kNm to 12 kNm. This Section was drilled with controlled ROP of 20 m/h. WOB varied between 13 to 16 tons.

At 686.5m the 24" Drill bit entered the Basal DongenTuffite. WOB Dropped from 16 – 20 tons to 2 -6 tons with an ROP of 20m/h.

The Ekofisk was reached at 738m MD. Weight on bit required 30 tons to break through this interval an average of 10-15 m/hr was achieved with 10-15tons over the section. From 738m to 780m the formation was very erratic stalling the drill string several times. At 766m the RPM was brought up to 85 RPM to prevent the build tendency. At 784m a chert layer was observed and was 0.5m thick drilling continued past this point with reduced RPM to prevent erratic drilling. At 790m, sample reading was 35% chert, 65% Chalk. At the 800m sample Chert was 40% and Chalk was 60%. At 818m the percentage was 50/50 and the RPM and weight on bit was erratic until 823m. Parameters between 65-70RPM and weight on bit between 12-16Tons seemed to be suited for drilling through this erratic section. From 843m the Bit started bouncing again and WOB was reduced to 16tons and 74 RPM.

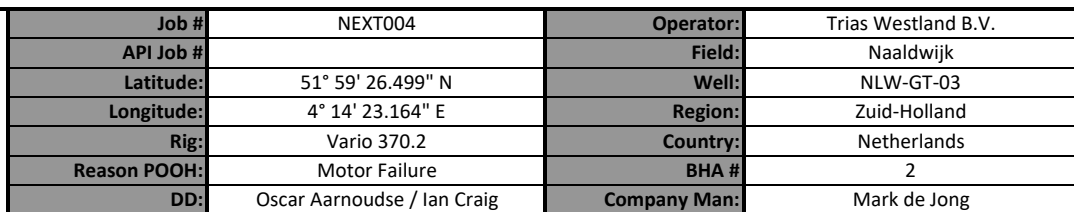
ROP reduced severely at 876.6m when the bit entered the sandstone. With 40 tons 2.7m/h. Deeper in the sandstones different parameters was used to obtain the best drilling. The RPM between 70 to 75 seem to be the appropriate number to control the bit bouncing with 30 tons WOB only 1.7 m/h, flowrate was reduced to 3000 LPM. This increased the ROP to 3.3 m/h with 35 Tons WOB. The sample at 880m contained 70% sand 12% Green sand and a small percentage of Chert. At 899m erratic torque and stalling the drill string occurred over this section and the ROP increased slightly from 2.3m to 3.6m with 35 Tons and 65RPM TD. The 900m sample contained 8% sand, 4%, flintstone and 63% chalk the rest was washed away from within the sample. TD was reached at 907.6m. A TD survey was completed before a high visc pill was pumped through the drill string. Pumping out the hole began with no hole issues.

Inspection of the BHA at surface was recorded first with the Top 23 ¾" Stabilizer had minimal wear on it and was in gauge. The second 23 15/32" Stabilizer was inspected and minimal wear was recorded. The 23 15/16"NB Stabilizer was also inspected and had also minimal wear on it.

The bit was graded as: 2-4-WT-A-E-I-NO-TD.

Learnings/Conclusions

- Overall the BHA responded well to the drilling profile. Although this was a vertical well the maximum weight on bit was 40T. The Stabilizers had minimal wear which helped dramatically from the BHA wondering off course. The maximum inclination observed over this section was 0.5°.
- Could the performance be improved by using a mudmotor?



Run Data		Motor data		Drilling Parameters	
Date In:	19/7/2020 @ 02:30	SN:	G2653	WOB (tons):	16-27
Date Out:	28/7/2020 @ 05:15	Description:	9-5/8in 7/8 4.8 Stage BICO SSS100 w/ NPFV	RPM:	40-80
BRT Hours:	281.75	Make:	BICO	Flow Rate (lpm):	3200-4000
Start Depth (m):	907.6	Model:	SSS100	Off Btm Press (Bar):	162.92
End Depth (m):	1686	Lobes / Stages:	7/8 / 4.80	On Btm Press (Bar):	175.56
Total Drilled (m):	778.4	Bend Angle:	1.15	Tq On Btm (KNm):	12.99
% Slide:	19.64%	Bit to Bend (m):	3.05	Tq Off Btm (KNm):	7
Slide Drilled (m):	152.9	Sleeve Stab OD (in):	15.75	Avg Diff Press (Bar):	10-15
Slide Hours:	14.25	Bearing Gap (in):	in: 1mm / out: n/a	Bit Data	
% Rotary:	80.36%	Stab to Bit (m):	1.17	Make / Model:	VAREL / VFSY616PPDG1HRU-T
Rotary Drilled (m):	625.5	Kickpad OD (in):	10.188	OD (in):	16
Rotary Hours:	91.74	Body OD (in):	9.625	TFA:	0.90 (6x14)
Total Drlg / Circ Hrs:	105.99 / 166.92	Fishneck OD (in):	9.67	Bit #	2
Slide ROP (m/hr):	10.73	Length (m):	11.32	Grade In:	NEW
Rot ROP (m/hr):	6.82	Integral Float:	YES	Grade Out:	2-5-BT-G-X-1/4-JD-DTF
Avg ROP (m/hr):	7.34	Rev per Litre:	0.026	Drill / Circ Hrs:	105.99 / 166.92

600	300	200	100	6	3	PV	YP	Wt (sg)	Chlorides	Type	%Solids	%Sand	BHT (degC)
58	41	34	26	14	13	17	24	1.11	32000	Envromul	8.2	0.01	80

[illegible]

Description	OD (in)	ID (in)	TJ OD (in)	TJ ID (in)	Weight kg/m	Length (m)	Total Length (m)
16in Varel PDC Bit 0.90 (6x14)	16	3			607.34	0.4	0.4
9-5/8in 7/8 4.8 Stage BICO SSS100 w/ NPV	9.625	5.3			285	11.32	11.72
14 7/8in Switchblade Stabiliser	9.5	3			330	2.43	14.15
9-1/2in MWD Geolink	9.5	4			282.83	9.34	23.49
9 1/2in Transmitter Sub	9.5	4			283	1.67	25.16
9 1/2in Pony Non Mag Drill Collar	9.5	4			319.16	4.51	29.67
15 3/4in Switchblade Stabiliser	9.5	3			330	2.52	32.19
9 1/2in PBL Sub	9.5	3.5			318.55	3.47	35.66
1 x 9 1/2in Drill Collar	9.5	3			319.16	9.34	45
9in Cross Over	9	2.813			282.83	1.13	46.13
3 x 8 1/4in Spiral Drill Collar	8.25	2.813			236.28	27.15	73.28
8in Hydraulic Jar	8	3			171.41	9.59	82.87
3 x 8 1/4in Spiral Drill Collar	8.25	2.813			236.28	27.52	110.39
8 Hydraulic Accelerator	8	3			171.41	9.58	119.97
2 x 8in Spiral Drill Collar	8.25	2.813			236.28	18.69	138.66
8in Cross Over	8	2.75			229.76	1.1	139.76
12 x 5 1/2in HWDP	5.5	3.5	7	3.5	74.28	111.92	251.68
5 1/2in Drill Pipe S-135 (24.7lb/ft)	5.5	4.67	7.25	3.5	36.77	12.73	264.41

Failed	YES	Hours Before Failure		Tripped For Failure	YES	MOTOR SN	G2653: 9-5/8in 7/8 4.8 Stage B	MWD SN	N/A
LIH	NO	NPT		Catastrophic Failure		MOTOR FAIL	YES	MWD FAIL	N/A

Tried to slide to determine functionality of PDM. Sliding not possible and zero differential pressure with 20T WOB.
Displacement to OBM which contained a high percentage of LCM material. Circulated with high flow (3700 LPM) the LCM through the PDM.
MWD tool had some washout on the pulser housing and the pulser ports (final damage to be investigated).

N/A

Bit box could turn 90 deg by hand and it was ratteling when moved by hand. Radial bearing gap could not be determined.

BHA Objective

- Maintain 0° inclination to +/- 1203m
- Drill from 907.6m – 2700m +/- and KO from 1203m, build rate of 2.4° and build up to 26° inclination and hold along the well path with the 16” Varel PDC bit (VFSY616PPDG1HRU-T), 3xBlank – 6x14, TFA: 0.902

Operational Description

Made up the BHA, measured the TFO and continued RIH. At the first 5 ½” HWDP connected to the topdrive and performed a successful shallow hole test with 2500L/min, SPP 74bar, Depth 138m. MWD was sending good pulses and detection.

Continued running the assembly in hole, cement was tagged at 896.8m, Flowrate 2000L/min, SPP 69bar, RPM 30, WOB 2-5Tons. Continued drilling cement down to top of shoe @903m, continued drilling shoetrack. The ROP never slowed down through the shoe and at 904m the WOB dropped, indicating the shoe was passed. Picked back up and rotate through the shoe 3 times before drilling 3 metres of formation from 907.6m-911m, with 2500L/min, SPP 124 bar, RPM 40, WOB 10-15. Initial ROP was incredibly low 0.6-0.8m/hr (was a part of the shoe in front of the bit?), but gradually increased.

Drilling continued through the Ommelanden formation which is a fine grained dense limestone, thick intervals of chert (50%) and sandstone. From 911m-955m the optimised parameters were used 3700L/min, WOB:20Ton, RPM:50, SPP 196 bar giving an average ROP of 3.5m/hr. The drilling parameters were stepped up to 70 Rpm with the same parameters. From 955m - 993m a drilling break was observed and the average ROP was 15.6m/hr. Slow drilling commenced again and the RPM was reduced to 40 from 1045m- 1083m to preserve the drill bit. An average of 4.6m/hr was recorded. At 1083m the ROP changed with an average of 28m/hr down to 1186m. The last survey before losses was at 1165.7m, 1.1°, 173.4 Azi.

At 1186m losses occurred, drilling was stopped at 1194.2m. A circulation program was implemented to reduce the mudweight. This went on for a total of 20 hours. A revised plan was implemented to drill ahead in rotary (KOP at 1300m), to get to the clay ASAP (would help to plaster of the sidewall). Drilling commenced again with a mud weight of 1.15sg, losses were still occurring at about 2m3/hr, water was introduced to keep the mud weight down. From 1194.2m–1239m the formation during this interval was very hard with 20 Ton on bit, Flowrate 2750L/min, RPM 60, SPP 116 Bar, TQ 11 kNm, giving an average of 5m/hr. At 1239m an increased ROP from 5m/hr to 12m/hr to 1243m. It was noted from the Geologist the formation top of the Texel Green Sand was at 1193.5m.

Drilling ahead from 1243m – 1253m averaging 6.5m/hr after 1253m the ROP dropped to an average of 4m/hr after 1257m-1262m the average ROP was below 3m/hr in the Texel Green sand. The sample contained 70% sand, Siltstone, Marl and traces of Chert made up the rest of the sample.

At 1275.4m CBU and displaced to OBM (1.08 s.g). Whilst the displacement came to surface the 3x shakers were fully covered with LCM material. It was mentioned this came from the NLW-GT-02 well, but most likely it as in the OBM. The high LCM concentration with the high flow rate (3700 LPM) would have deteriorated the inside of the PDM and MWD tool.

With 2° inclination in the hole and drilling past the original KO, it was agreed to KO at 1288.3m, with a 11m slide on a 215°Azi the well was kicked off and with a build rate of 1.35° and continuous slides were incorporated to move the drilling assembly to 26° with a lot of pump issues. Pumps parts were pre-hours failing with visible washouts (due to the LCM). Also the suction lines were found full of LCM.

Sliding continued through until 1442m where hanging was observed. At 1506m – 1514.2m was the last slide which build the assembly up to 26° which was required for the well plan. Rotating continued up to 1686m and it build at 0.7°/30m. As the assembly was building to much a slide was set up at 1685.7m and the motor did not have any differential once it arrived on bottom. A decision was made to POOH and change the BHA. During this section the mud pumps went down 7 times over this interval. Inspection of the BHA at surface was recorded first with the Switch Blade Stabilizer above the pony measured Top 15 7/8” and btm 15 1/2. Some wear was seen on the hard facing of the pads. The Switch Blade Stabiliser above the motor was 14 1/2” at the top and the stabiliser below was 14 7/8”. Slight wear was noted at the bottom and some of the face, but not drastic wear from drilling this formation. Inspection of the motor was recorded the kick pad had some wear. The PDM Sleeve Stab above the bit was in good condition and not drastically worn. The motor bearing play had very little movement and when you tried to turn the motor it was moving more than usual with approximately 13cm of play.

The bit was graded as: 2-5-BT-G-X-1/4-JD-DTF.



Job #	NEXT004	Operator:	Trias Westland B.V.
API Job #		Field:	Naaldwijk
Latitude:	51° 59' 26.499" N	Well:	NLW-GT-03
Longitude:	4° 14' 23.164" E	Region:	Zuid-Holland
Rig:	Vario 370.2	Country:	Netherlands
Reason POOH:	ROP/Torque Spikes	BHA #	3
DD:	Oscar Aarnoudse / Ian Craig	Company Man:	John Boeijen/Mark de Jong

BHA Performance Report

Run Data		Motor data		Drilling Parameters	
Date In:	28-07-20	SN:	G2652	WOB (tons):	15-25
Date Out:	5/8/2020	Description:	9-5/8in 7/8 4.8 Stage BICO SSS100 w/ NPFV	RPM:	60-80
BRT Hours:	189.83	Make:	BICO	Flow Rate (lpm):	3300-4000
Start Depth (m):	1686	Model:	SSS100	Off Btm Press (Bar):	212
End Depth (m):	2550.3	Lobes / Stages:	7/8 / 4.80	On Btm Press (Bar):	230
Total Drilled (m):	864.3	Bend Angle:	1.15	Tq On Btm (KNm):	22.45
% Slide:	14.01	Bit to Bend (m):	3.05	Tq Off Btm (KNm):	7-12
Slide Drilled (m):	121.1	Sleeve Stab OD (in):	15.75	Avg Diff Press (Bar):	10-30
Slide Hours:	17.22	Bearing Gap (in):	in: 1mm / out: 8mm	Bit Data	
% Rotary:	85.99	Stab to Bit (m):	1.17	Make / Model:	VAREL / SY616PPG2HRU-T
Rotary Drilled (m):	743.2	Kickpad OD (in):	10.188	OD (in):	16
Rotary Hours:	106.86	Body OD (in):	9.625	TFA:	0.99 (9x12)
Total Drlg / Circ Hrs:	124.08 / 147.65	Fishneck OD (in):	9.7	Bit #	3
Slide ROP (m/hr):	7.03	Length (m):	11.29	Grade In:	NEW
Rot ROP (m/hr):	6.95	Integral Float:	YES	Grade Out:	3-8-WT-G-X-3 1/4-PN-PR
Avg ROP (m/hr):	6.97	Rev per Litre:	0.026	Drill / Circ Hrs:	124.08 / 147.65

Mud Data

600	300	200	100	6	3	PV	YP	Wt (sg)	Chlorides	Type	%Solids	%Sand	BHT (degC)
54	40	34	27	16	15	14	26	1.12	32000	Enviromul	9.9	0.25	102

Sensor Offsets(m)

Svy	Gam	Res	PWD	Dens	Neu	Sonic	NB Inc	NB Azi	Gyro	Plan DLS (°/30m)	Act/Max DLS (°/30m)
19.23	17.01									2.4	2.85

BHA Details

Description	OD (in)	ID (in)	TJ OD (in)	TJ ID (in)	Weight kg/m	Length (m)	Total Length (m)
16in Varel PDC Bit 0.99 (9x12)	16	3			607.34	0.4	0.4
9-5/8in 7/8 4.8 Stage BICO SSS100 w/ NPFV	9.625	5.3			285	11.29	11.69
14 7/8in Switchblade Stabiliser	9.5	3			330	2.43	14.12
9-1/2in MWD Geolink	9.5	4.25			282.83	8.92	23.04
9 1/2in Transmitter Sub	9.5	4			283	1.66	24.7
9 1/2in Pony Non Mag Drill Collar	9.5	4			319.16	4.51	29.21
15 3/4in Switchblade Stabiliser	9.5	3			330	2.52	31.73
1 x 9 1/2in Drill Collar	9.5	3			319.16	9.34	41.07
9in Cross Over	9	2.813			282.83	1.13	42.2
3 x 8 1/4in Spiral Drill Collar	8.25	2.813			236.28	27.15	69.35
8 1/4 Hydraulic Jar	8.125	3			171.41	9.93	79.28
3 x 8 1/4in Spiral Drill Collar	8.25	2.813			236.28	27.52	106.8
8 1/4 Hydraulic Accelerator	8.125	3			171.41	10.18	116.98
2 x 8in Spiral Drill Collar	8.25	2.813			236.28	18.69	135.67
8in Cross Over	8	2.75			229.76	1.1	136.77
12 x 5 1/2in HWDP	5.5	3.5	7	3.5	74.28	111.92	248.69
5 1/2in Drill Pipe S-135 (24.7lb/ft)	5.5	4.67	7.25	3.5	36.77	12.73	261.42

Additional Comments

BHA Objective

- Maintain inclination of 26° Drill from 907.6m – 2670m +/- with the 16" Varel PDC bit (VFSY616PPDG1HRU-T), 9x12, TFA: 0.994

Operational Description

Made up the BHA and on the first HWDP a successful shallow hole test was performed with 2800L/min, SPP 75bar, Depth 146m. Tripping in hole continued to 1668.9m where the string was taking weight. Start mud pumps at 3000L/min, pressure 150bar, rotate down to 1686m with 30RPM.

Continue drilling ahead from 1680m to 1708.4m. Started sliding low side to stop the build trend. From 1708.4m – 1709.8m, sliding became difficult, hanging up after 1 1/2m with a 20 Ton overpull. Worked pipe stretching and trying to get to bottom proved to be difficult. Drilled ahead down to 1711.1m before taking a check survey.

The Survey proved to be within the limits and drilling continued down to 1888m, thou several slides were attempted down to this depth hanging continued. A slide from 1888m – 1998m was attempted and was successful with a 1.4° drop. Sliding continued and was successful until 1952m. Sliding was proving to be difficult from 1952m – 2165m. Small slides with 3-4m were occasional successful during this interval. Before sliding was no problem, but in the lower Holland and Vlieland formation hanging up started to occur.

Sliding from 2259.7m-2262m, proved to be difficult sliding, hanging up was apparent after 1.4m, working the string had no affect, so drilling ahead continued with 80RPM and 10Ton on the bit. This was incorporated to reduce the build trend. Drilling head from 2262m the assembly was becoming more erratic with torque and stalling at 47Kn. Harder formation was observed and Rop was between 5-7m.hr. From 2285m 17Tons was on the bit only to stall the drill string again as the formation was becoming more erratic. Pump 3 went down so the Flowrate was reduced from 3700l/m to 3200l/m. Working the string drilling continued down to with extra

precautions. The sample at 2265m was confirmed that the assembly was in the Berkel formation which is a sandstone fine to coarse grained. At 2292m pump 3 was back online and the flowrate was at 3800l/min, 17T on bit with 80RPM the ROP was 4m-6m/hr, erratic torque was still seen.

Projecting ahead the build rate in rotary mode was going to have the assembly 2m outside the target. A decision was made to try and slide from 2338.8m. As sliding progressed a steady increase was observed that the assembly was hanging and no sliding was achieved down to 2339.2m. A 80cm was rotationally drilled and sliding was tried again at 2340m without success. Drilling ahead continue down to 2349.4m. The pumps were recycled several times using various flowrates without success. The MWD at the beginning of the stand was having small pulses. The pulses deteriorated over the 12m single. A decision was made to drill ahead. At 2350m pulses were receiving from the MWD again but disappeared again within minutes. At this depth drilling stopped and it was attempted to retake a survey but without success. Whilst continuing drilling with 4000 LPM the MWD started pulsing again around 2359m. Picked off btm to take a successful survey. From there on the flow was varied between 3000 LPM and 4000 in steps of 200 LPM (whilst drilling) to see what the best signal would give. Found out 3300 LPM gave the best signal, although due to the erratic TQ the signal was intermittent. The GR was very intermittent, but got some datapoints. From 2387m the ROP increased (with the amount of sand in the Rodenrijs Formation) f/ 4m/hr to 5-7m/hr. Continued drilling with 20-25T WOB, 80 RPM, which seemed to hold the inclination at 31.4°. The projection to the target with 3x singles the same inclination, showed we would be within the drillers target.

From 2405m the ROP increased to 11m/hr with 20T WOB. Drilling ahead from 2413m the parameters were changed with 10Ton on bit and increase the flowrate to 3700l/m. At 2422m an increase in 20 bar was observed and a drilling break was noted at 2423m. At 2425m the 20-bar disappeared. The survey at 2406m dropped 0.6°, which kept us in track for going through the target within 1.5m. Drilling continued the delft sandstone with 11Ton on the bit, Flowrate 3400l/min, 70RPM, averaging 6m/hr. At 2433m the WOB was increased to 15T which was giving an average of 7.2m/hr. At 2448m the assembly encountered high torque of 37kNm. The string was picked up and lowered down to bottom again to continue drilling. At the bottom connection depth 2451.9m, a survey was pumped up with different flow rates, no survey was recorded at this depth. The data acquisition unit did not have enough pulse data to decode for a quality survey during the cycling of the pump. Drilling commenced forward from 2451.9m – 2473m, a pressure drop was observed with multiple pressure spikes. Pump 2 was down and was offline for the interim future. Drilling carried on with 2 pumps at 2900l/min. Rubber pieces were observed from the shaker, first indications were from the mud pump. Drilling ahead continued where a drilling break was observed at 2500.6m, flowrate: 2900l/min, RPM: 80, ROP: 8-15m/hr, WOB:15-18Ton. Drilling ahead at 2508m an increase of differential pressure of 50bar was observed, stopped drilled picked up 2 meters and checked the motor at different flowrates, drilled down to bottom with no rotation. The motor drilled off and was turning to the left. Started drilling ahead from 2508m with more than 20bar more pressure. Flowrate:2900l/min, Pressure: 232bar, RPM:80, Torque:27Kn, ROP:9.5m/hr, WOB:17T. From 2528.8m at the connection the pressure increased from drilling differential 232bar to 245bar. When touching bottom the increased pressure settled back down to 232bar. Continued drilling ahead from 2528.8m to 2544m with an average of 7m/hr. At 2544m the ROP started to slow down and the string started to stall out due to high torque over this section several times. The average ROP was 4m/hr from 2544m-2548m. Drilling ahead from 2548m -2550m the torque was too high and was hanging up. A decision was made to POOH and change the BHA.

Inspection of the BHA at surface was recorded first with the Switch Blade Stabilizer above the pony measured Top 14" and btm 14 15/16". Severe wear was seen on the hard facing of the pads. The Switch Blade Stabiliser above the motor was 14 1/4" at the top and the stabiliser below was 14 1/16". Severe wear was noted at the bottom and some of the face. The MWD tool missed a two rubber stabilisation fins, which most likely went through the PDM/bit, causing the pressure spikes.

Inspection of the motor was recorded the kick pad was slightly worn and still in good shape. The sleeve stab above the bit had severe wear on it as well, 14 3/4" on top and on bottom was 13 3/4". The motor bearing original play was 1mm, and the final play was 8mm.

The bit was graded as: 3-8-WT-G-X- 3 1/4-PN-PR

Learnings/Conclusions

- Stabilizer above the mud motor should be 15 1/4"-15 1/2" for a more hold (slight build) assembly.
- Seemed the MWD fins were sheared of, was this due to the ID of the 4 1/4" NMDC. For future reference use a 9 1/2" NMDC with 4" ID.
- Temperature and pressure towards the end became to high, review TFA so it will suit the rig specs in a better way (although on paper it should not have been any problem).



Job #	NEXT004	Operator:	Trias Westland B.V.
API Job #		Field:	Naaldwijk
Latitude:	51° 59' 26.499" N	Well:	NLW-GT-03
Longitude:	4° 14' 23.164" E	Region:	Zuid-Holland
Rig:	Vario 370.2	Country:	Netherlands
Reason POOH:	Stuck & BHA Back Off	BHA #	4
Lead DD:	Oscar Aarnoudse/Ian Craig	Company Man:	John Boeijen

BHA Performance Report

Run Data		Motor data		Drilling Parameters	
Date In:	5/8/2020 @ 22:20	SN:	G2650	WOB (tons):	15.43
Date Out:	08/08/2020 @ 18:00	Description:	9-5/8in 7/8 4.8 Stage BICO SSS100 w/ NPFV	RPM:	67.87
BRT Hours:	163.67	Make:	BICO	Flow Rate (lpm):	3600
Start Depth (m):	2550.3	Model:	SSS100	Off Btm Press (Bar):	212.07
End Depth (m):	255	Lobes / Stages:	7/8 / 4.80	On Btm Press (Bar):	230.02
Total Drilled (m):	0	Bend Angle:		Tq On Btm (KNm):	22.45
% Slide:	0	Bit to Bend (m):	3.05	Tq Off Btm (KNm):	5-7
Slide Drilled (m):	0	Sleeve Stab OD (in):	12.125	Avg Diff Press (Bar):	15
Slide Hours:	0	Bearing Gap (in):	1	Bit Data	
% Rotary:	0	Stab to Bit (m):	1.17	Make / Model:	NOV / TK66
Rotary Drilled (m):	0	Kickpad OD (in):	10.3	OD (in):	16
Rotary Hours:	0	Body OD (in):	9.5	TFA:	0.99 (9x12)
Total Drlg / Circ Hrs:	0.00 / 0.00	Fishneck OD (in):	9.67	Bit #	4
Slide ROP (m/hr):	0	Length (m):	11.33	Grade In:	NEW
Rot ROP (m/hr):	0	Integral Float:	YES	Grade Out:	LIH
Avg ROP (m/hr):	0	Rev per Litre:	0.027	Drill / Circ Hrs:	

Mud Data

600	300	200	100	6	3	PV	YP	Wt (sg)	Chlorides	Type	%Solids	%Sand	BHT (degC)
78	53	44	33	17	16	25	28	1.17	32000	Enviromul	11.6	0.1	37

Sensor Offsets(m)

Svy	Gam	Res	PWD	Dens	Neu	Sonic	NB Inc	NB Azi	Gyro	Directional Performance	
										Plan DLS (°/30m)	Act/Max DLS (°/30m)
23.62	21.4										

BHA Details

Description	OD (in)	ID (in)	TJ OD (in)	TJ ID (in)	Weight kg/m	Length (m)	Total Length (m)
16in PDC Bit 0.99 (9x12)	16	3		LIH	607.34	0.36	0.36
15 3/4in String Stabiliser	9.5	3		LIH	330	2.82	3.18
9in Cross Over	9.5	2.813		LIH	282.83	1.07	4.25
9-5/8in 7/8 4.8 Stage BICO SSS100 w/ NPFV	9.5	5.3		LIH	330	11.33	15.58
15 3/4in Switchblade Stabiliser	9.5	3		LIH	330	2.52	18.1
9-1/2in MWD Geolink	9.5	4		LIH	282.83	9.34	27.44
9 1/2in Transmitter Sub	9.5	4		LIH	283	1.67	29.11
9 1/2in Pony Non Mag Drill Collar	9.5	4		LIH	319.16	4.51	33.62
15 1/4in Switchblade Stabiliser	9.5	3		LIH	330	2.43	36.05
1 x 9 1/2in Drill Collar	9.5	3		LIH	319.16	9.34	45.39
9in Cross Over	9	2.813		LIH	282.83	1.21	46.6
3 x 8 1/4in Spiral Drill Collar	8.25	2.813		LIH	236.28	27.15	73.75
8 1/4 Hydraulic Jar	8.125	3		LIH	171.41	9.93	83.68
3 x 8 1/4in Spiral Drill Collar	8.25	2.813			236.28	27.52	111.2
8 1/4 Hydraulic Accelerator	8.125	3			171.41	10.18	121.38
2 x 8in Spiral Drill Collar	8.25	2.813			236.28	18.69	140.07
8in Cross Over	8	2.75			229.76	1.1	141.17
12 x 5 1/2in HWDP	5.5	3.5	7	3.5	74.28	111.92	253.09
5 1/2in Drill Pipe S-135 (24.7lb/ft)	5.5	4.67	7.25	3.5	36.77	12.73	265.82

Additional Comments


BHA Objective

- Maintain inclination of 26° Drill from 2550.3m – 2690m +/- with the 16" NOV (TK66) PDC bit , (9X12), TFA: 0.994

Operational Description

Made up the BHA and on the first HWDP a successful shallow hole test was performed with 3000L/min, SPP 74bar, Depth 155m. Tripping in hole continued to 1468m where the string was taking weight and was planted, Start mud pumps at 3000L/min, pressure 150bar, start rotating string using torque in pipe and work string. Operation with the jar was fired approximately 20 times. Using slow pump rate and a 150Ton overpull the string was dragged back up the hole for 10m where it was free. Back reaming from 1458m-1417m Flowrate: 3000l/min, Pressure:144Bar, 30-100RPM. POOH on elevators to 1300m. Circulate with the same flowrate. Start weighing up mud to 1.16sg and continue down to 1468m. From this depth the assembly was ream down with Flowrate: 3000l/min, Pressure:144Bar, 30-80RPM to 1738m. From 1738m the assembly was ran in the hole on elevators to 1808m, where the assembly was stuck. At 1806m meters flow entered the BHA with pressure up to 69Bar, no circulation was achieved. Jarring commenced with little impact. Several attempts more with flow and jarring did not improve the situation. The whole day and night jarring and stretching the pipe did not release the assembly from 1806m. A decision from town was made to back off the string with wireline. Before the wireline was activated, due to the reverse TQ the connection broke and the BHA came free. Pulled and rigged down the W/L and POOH with the remaining part of the BHA. At surface it became clear from the DC above the jar down, everything was LIH. No fishing attempt was made.

Official time LIH: 18:00 @ 08/08/2020

	Job #	NEXT004				Operator:	Trias Westland B.V.							
	API Job #					Field:	Naaldwijk							
	Latitude:	51° 59' 26.499" N				Well:	NLW-GT-03s1							
	Longitude:	4° 14' 23.164" E				Region:	Zuid-Holland							
	Rig:	Drilltec Vario 370.2				Country:	The Netherland							
	Reason POOH:	DTF				BHA #	5 s1							
	Lead DD:	Oscar Aarnoudse / Ian Craig				Company Man:	Mark de Jong / Chris van Vulpen							
BHA Performance Report														
Run Data				Motor data						Drilling Parameters				
Date In:	12/8/2020 @ 13:25			SN:	962-36-133					WOB (tons):	10-22			
Date Out:	19/8/2020 @ 16:40			Description:	9-5/8in 7/8 4.8 NOV Hemidril					RPM:	40-80			
BRT Hours:	147.25			Make:	NOV					Flow Rate (lpm):	3500-3700			
Start Depth (m):	1467.9			Model:	Hemi					Off Btm Press (Bar):	206			
End Depth (m):	2333			Lobes / Stages:	7/8 / 4.80					On Btm Press (Bar):	225-290			
Total Drilled (m):	865.1			Bend Angle:	1.15					Tq On Btm (KNm):	20.95			
% Slide:	23.22			Bit to Bend (m):	2.53					Tq Off Btm (KNm):	7			
Slide Drilled (m):	200.88			Sleeve Stab OD (in):	15.75					Avg Diff Press (Bar):	10-30			
Slide Hours:	51.21			Bearing Gap (in):	N/A					Bit Data				
% Rotary:	76.78			Stab to Bit (m):	1.01					Make / Model:	Smith / XZ616			
Rotary Drilled (m):	664.22			Kickpad OD (in):	10.1					OD (in):	16			
Rotary Hours:	32.02			Body OD (in):	9.625					TFA:	1.00 (5x11, 7x10)			
Total Drlg / Circ Hrs:	83.23 / 113.00			Fishneck OD (in):	9.65					Bit #	1			
Slide ROP (m/hr):	3.92			Length (m):	10.66					Grade In:	NEW			
Rot ROP (m/hr):	20.74			Integral Float:	NO					Grade Out:	1-7-WT-S-X-I-PN-DHF			
Avg ROP (m/hr):	10.39			Rev per Litre:	0.03					Drill / Circ Hrs:	83.23 / 113.00			
Mud Data														
600	300	200	100	6	3	PV	YP	Wt (sg)	Chlorides	Type	%Solids	%Sand	BHT (degC)	
63	42	33	23	12	11	21	21	1.18	40000	Enviromul	13.3	0.1	96	
Sensor Offsets(m)										Directional Performance				
Svy	Gam	Res	PWD	Dens	Neu	Sonic	NB Inc	NB Azi	Gyro	Plan DLS (°/30m)		Act/Max DLS (°/30m)		
20.35	18.13									2.05		3.09 / 6.31		
BHA Details														
Description				OD (in)	ID (in)	TJ OD (in)	TJ ID (in)	Weight kg/m		Length (m)		Total Length (m)		
16in PDC Bit 1.00 (5x11, 7x10)				16	3			700		0.4		0.4		
9-5/8in 7/8 4.8 NOV Hemidrill				9.625	5.3			270		10.66		11.06		
9 1/2 Float sub w/ NPFV				9.5	3			200		1.08		12.14		
15 1/2in NM Stabiliser				9.5	3			350		2.43		14.57		
9-1/2in MWD Geolink				9.5	4.25			320		9.6		24.17		
9 1/2in Transmitter Sub				9.5	4			330		1.66		25.83		
9 1/2in Pony Non Mag Drill Collar				9.5	4			320		4.54		30.37		
15 3/4in NM Stabiliser				9.5	3			350		2.43		32.8		
9 1/2" PBL Sub				9.5	3.5			320		2.49		35.29		
1 x 9 1/2in Drill Collar				9.5	3			323		9.16		44.45		
9in Cross Over				9	2.813			323		1.21		45.66		
3 x 8 1/4in Spiral Drill Collar				8.25	2.813			351.72		27.82		73.48		
8 1/4 Hydraulic Jar				8.125	3			255.15		9.33		82.81		
3 x 8 1/4in Spiral Drill Collar				8.25	2.813			351.72		27.93		110.74		
8 1/4 Hydraulic Accelerator				8.125	3			255.15		9.59		120.33		
2 x 8in Spiral Drill Collar				8.25	2.813			351.72		18.46		138.79		
8in Cross Over				8	2.75			342.01		1.1		139.89		
12 x 5 1/2in HWDP				5.5	3.5	7	3.5	110.57		111.97		251.86		
5 1/2in Drill Pipe S-135 (24.7lb/ft)				5.5	4.67	7.25	3.5	54.73		12.73		264.59		

Additional Comments

BHA Objective

- Time drill and side-track from NLW-GT-03, steer “around” the fish (TOF 1724m – BOF1810m), build and turn back to the same azimuth of 215deg and inclination of 26°. Drill from 2550.3m – 2690m +/- with the 16” Smith (Axeblade) XZ616 PDC bit, (7X10), (5X11), TFA: 1.001
- Main a minimum separation of 40m (below) from NLW-GT-03 through the reservoir.

Operational Description

Made up the BHA and on the first HWDP a successful shallow hole test was performed with 3000L/min, SPP 74bar, Depth 155m. Tripping in hole continued to 890m before the shoe, where the pumps were at 2500l/min, RPM 20 and SPP 104Bar. Reamed in the hole and at 1071m-1121m firmer cement was observed, reamed the spot 2x times. At 1450m the TOC was tagged (second plug), started to drill the cement with 40 RPM, 2500 LPM. The cement was softish (ROP of 20m/hr), continued to the next single (hoping to find firm cement), drilled until 1467.9m to make the decision to start from this depth with time drilling. Before the connection reamed the DP 3x up & down for 4m with 150 TF to create a trough/ledge. After the connection started with time drilling, TF 150 deg. Started with 0.3m/hr for 2 hrs and gradually increased the ROP. The time drilling was working well until 1469.3m when the joystick became an issue and the pressure increased to 18bar and TF flipped to other side (60 left). Time drilling started again, and valuable time was lost with the issue from the joystick. Normal time drilling operations continued until 1471.4m where the tool face was dropping due to soft formation or cement. After having a team talk within the Next team it was decided to continue drilling from 1471.3m with a tool face of 90-110R. As the tool face was placed inside the already drilled side-track. This time drilling was at 1.2m/hr. Due to the PDM’s reactive TQ with a PDC bit we had to control the ROP, so no SPP increase would occur, as this would turn the TF and we could fall back in the old hole.

1470m 40% formation, 1472m 45% formation, 1474m 60% formation, 1478m 95% formation. Once we had the sample confirming the 95% formation the parameters were staged up to slide toward 90R. After the new single was connected a slide was performed to 70-90R for 8m. From 1492m continued to drill as normal to build and turn as per well plan (survey at 1472m indicated strong drop of time drilling and turn away from the parent wellbore). A successful side-track was confirmed with the surveys.

Drilling ahead sliding commenced from 1506m metres concentrating mainly with the turn from 235° back to 217°. Sliding was working well turning and building with a motor output of 3.77. Continuing down to 1652m sliding and turning back to the new plan was almost complete with a 25.8°inc and an Azimuth of 217.8°. The new well plan was designed to be at 26° with a 215°Azimuth. Drilling ahead 2 slides were incorporated to turn the Azimuth to 212° which worked quite well. Drilling ahead the assembly was building between 0.2° - 0.6°/30m. This needed a bit of maintenance to keep sliding down to keep the nose down every so often. At 1785m a slide was set up to low side and was able to slide 3m and started to hang, so this slide area was aborted, the overpull was 60T at the end of the slide. Reaming of every single became normal from 1785m due to the high torque during drilling through the Vlieland Sandstone (De Lier). One other slide was attempted in this formation with a 0.2° drop. As the assembly was building too much, a slide was attempted in the Vlieland Clay that gave a possible result decreasing the inclination by 1.42° drop which helped us to keep on track with the plan. At 2152m (2) slides were performed, without any problems of hanging up (was it the higher sand content in the Vlieland Clay?). The slides produced a 1.62 drop following with a 2.08 drop and was more than expected. As drilling continued it was noted that the drop rate in rotary (-1.2°/30m in rotary) was dropping more than required and a high side slide was performed to counteract the drop. As the drop was controlled from the high side the geologist instructed that it would be quite within the planning model to drop to 17° (and still would hit the target). Drilling at 2331.7m drilling issues were apparent with high vibration at surface and pressure increases of 20-70bar. Drilling continued after altering the parameters, but the flow was too low with 2400 LPM to drill ahead in a 16” hole. The pressure kept going up and down, indicating plugged/unplugging nozzles. Some black rubber was found over the shakers (motor rubber). And at 2333m with the rate of penetration was reduced dramatically. A decision was made to POOH and replace the motor.

The trip OOH was smooth on elevators, it took longer as there were a lot of over-torqued connections.

Inspection of the BHA#5 at surface was recorded first with the Top 15 ¾” Stabilizer had minimal wear on it and was in gauge. The second 15 1/2” Stabilizer was inspected and had minimal wear. The NOV Hemidril motor had wear on the sleeve stabilizer (hard facing worn of partly) and the connection below the sleeve stab backed off partly. The bit was severely worn away on the shoulder, the probable cause of the high vibration seen at surface.

The bit was graded as: 1-7-WT-S-X-I-PN-DTF

Learnings/Conclusions:

- Overall, the BHA responded well to the drilling profile. At certain depths within the well hanging was observed. At one interval a slide of 1m needed 60T overpull to release this from the slide (Vlieland Clay). The Stabilizers had minimal wear which helped dramatically from the BHA wondering off course. The maximum inclination observed over this section was 27.5°.
- For side-tracking consider a mill tooth or insert bit. Less reactive TQ, so we would be able to “push” faster. This would have reduced the time drilling from 23 hrs to approx. 12 hrs.
- Drilling in this area select a bit (and stabs) for high abrasive formations.





Job #	NEXT004	Operator:	Trias Westland B.V.
API Job #		Field:	Naaldwijk
Latitude:	51° 59' 26.499" N	Well:	NLW-GT-03s1
Longitude:	4° 14' 23.164" E	Region:	Zuid-Holland
Rig:	Drilltec Vario 370.2	Country:	The Netherland
Reason POOH:	Well TD	BHA #	6 / 2s1
DD:	Oscar Aarnoudse / Ian Craig	Company Man:	Mark de Jong / Chris van Vulpen

BHA Performance Report													
Run Data				Motor data				Drilling Parameters					
Date In:		19/8/2020 @ 20:10		SN:		G2653		WOB (tons):		12-22			
Date Out:		22/8/2020 @ 21:20		Description:		9-5/8in 7/8 4.8 7/8 BICO SSS100		RPM:		60			
BRT Hours:		73.17		Make:		BICO		Flow Rate (lpm):		3700			
Start Depth (m):		2333		Model:		SSS100		Off Btm Press (Bar):		206.8			
End Depth (m):		2600		Lobes / Stages:		7/8 / 4.80		On Btm Press (Bar):		224.65			
Total Drilled (m):		267		Bend Angle:		1.15		Tq On Btm (KNm):		20.95			
% Slide:		n/a		Bit to Bend (m):		3.05		Tq Off Btm (KNm):		7-10			
Slide Drilled (m):		n/a		Sleeve Stab OD (in):		15.75		Avg Diff Press (Bar):		10-30			
Slide Hours:		n/a		Bearing Gap (in):		in: 1mm / out: 2.5mm		Bit Data					
% Rotary:		100		Stab to Bit (m):		1.4		Make / Model:		NOV / SKC916M-B4			
Rotary Drilled (m):		267		Kickpad OD (in):		10.3		OD (in):		16			
Rotary Hours:		23.51		Body OD (in):		9.625		TFA:		1.00 (5x11, 7x10)			
Total Drlg / Circ Hrs:		23.51 / 31.80		Fishneck OD (in):		9,625		Bit #		6 / 2s1			
Slide ROP (m/hr):		n/a		Length (m):		11.33		Grade In:		NEW			
Rot ROP (m/hr):		11.36		Integral Float:		NO		Grade Out:		1-1-WT-A-X-I-CT-TD			
Avg ROP (m/hr):		11.36		Rev per Litre:		0.027		Drill / Circ Hrs:		23.51 / 31.80			
Mud Data													
600	300	200	100	6	3	PV	YP	Wt (sg)	Chlorides	Type	%Solids	%Sand	BHT (degC)
64	42	33	23	12	11	22	20	1.19	48000	Enviromul	11.9	0.1	96
Sensor Offsets(m)										Directional Performance			
Svy	Gam	Res	PWD	Dens	Neu	Sonic	NB Inc	NB Azi	Gyro	Plan DLS (°/30m)		Act/Max DLS (°/30m)	
21.11	18.89									0.0		0.70 / 1.36	
BHA Details													
Description				OD (in)	ID (in)	TJ OD (in)	TJ ID (in)	Weight kg/m		Length (m)		Total Length (m)	
16in PDC Bit 1.00 (5x11, 7x10)				16	3			700		0.49		0.49	
9-5/8in 7/8 4.8 7/8 BICO SSS100				9.625	5.3			270		11.33		11.82	
9 1/2 Float sub w/ NPFV				9.5	3			200		1.08		12.9	
15 1/2in NM Stabiliser				9.5	3			350		2.43		15.33	
9-1/2in MWD Geolink				9.5	4.25			320		9.6		24.93	
9 1/2in Transmitter Sub				9.5	4			330		1.66		26.59	
9 1/2in Pony Non Mag Drill Collar				9.5	4			320		4.54		31.13	
15 3/4in NM Stabiliser				9.5	3			350		2.43		33.56	
9 1/2" PBL Sub				9.5	3.5			320		2.49		36.05	
1 x 9 1/2in Drill Collar				9.5	3			323		9.16		45.21	
9in Cross Over				9	2.813			323		1.21		46.42	
3 x 8 1/4in Spiral Drill Collar				8.25	2.813			351.72		27.82		74.24	
8 1/4 Hydraulic Jar				8.125	3			255.15		9.33		83.57	
3 x 8 1/4in Spiral Drill Collar				8.25	2.813			351.72		27.93		111.5	
8 1/4 Hydraulic Accelerator				8.125	3			255.15		9.59		121.09	
2 x 8in Spiral Drill Collar				8.25	2.813			351.72		18.46		139.55	
8in Cross Over				8	2.75			342.01		1.1		140.65	
12 x 5 1/2in HWDP				5.5	3.5	7	3.5	110.57		111.97		252.62	
5 1/2in Drill Pipe S-135 (24.7lb/ft)				5.5	4.67	7.25	3.5	54.73		12.73		265.35	

Additional Comments

BHA Objective

- Maintain inclination of $21^{\circ} \pm 17^{\circ}$. Drill from 2334.7m – 2690m +/- with the 16" NOV SKC916M-B4 PDC bit, (7X10), (5X11), TFA: 1.001
- Drill through the Delft Reservoir

Operational Description

Made up the BHA and on the first HWDP a successful shallow hole test was performed with 3000L/min, SPP 94bar, Depth 139m.

RIH on elevators, around the side-track depth (1467.6m) the drag increased with 8T (flicker), but BHA had no problem following the side-tracked hole.

At 2314m connected to the TD and reamed down with reduced parameters (1000 LPM & 20RPM), preventing any premature damage on the bit. At 2320m increased to 2500l/m flow, no torque increase seen. At 2331.7m the WOB started to increase, cuttings at the bottom. The flowrate was increased to 3000LPM, RPM 40, SPP 202bar. Time was taken to wash away any loose cuttings (or parts from the previous damaged Smith bit) from the bottom of the hole. The bit was softly broken in with 2T and continued drilling ahead from 2334.7m to 2377m. From 2353m the flowrate was increased to 3300l/m and then again at 3600l/m at 2363m.

As drilling continued fast ROP increased dramatically, this was the start of the Delft reservoir from 2377m-2456m. Drilling through this formation which is fine to coarse sand, shale/claystone interval with an average ROP of 16m/hr. with an average of 16T on Bit. Drilling ahead through the Alblasterdam formation from 2456m with to 2600m was 10.2m/hr with an average of 16T on bit. Low RPM was used to prevent the direction rapidly turning to the right going through the target. The RPM was change to 60RPM from 2507m where it continued turning to the right at $0.4^{\circ}/30$ and was building $0.6^{\circ}/30$ m. The geologist called TD at 2600m. CBU several times with 4000 LPM and 80 RPM (to increase the hole cleaning).

The pipe was tripped on elevators and no issues were observed to surface (only a tight spot at transition from Delft Sandstone to the Rodenrijs Claystone). Inspection of BHA#6 was observed and recorded with the Top 15 3/4" Stabilizer had minimal wear on it and was in gauge. The second 15 1/2" Stabilizer was inspected and had also minimal wear. The BICO motor was in good shape and had a movement distance of 3mm from bearing pack. The sleeve stab on the BICO motor had minimal wear on it as this section was only 267m long and would not expect this to be severely damaged at this early stage of drilling. The bit was in gauge and was in good shape with one chipped tooth on the gauge.

The bit was graded as: 1-1-WT-A-X-I-CT-TD

Learnings/Conclusions:

- Overall, the BHA responded well to the drilling profile. No sliding was observed on this run. The Drill bit performed very well over this short interval. Reduced torque spiking was noted, and relative smooth drilling was observed through the formation sections. Maximum inclination was 25.2° with an average build rate of 0.56° over the section.

- As this gauge on the bit was 6" long it was giving better control in the hole. Torque was exceptionally smooth.
- Incorporate the building tendency ($0.6^{\circ}/30$ m) of the BHA in the next well design.

Images

