

Geological daily report No.**1****Date: 02.07.2015**

Depth: - m MD Assembly: -
 Last depth: - m MD Bit : -
 Daily rate: - m Bit-on-bottom time: - h
 Last shoe: 24" In depth 220 m Mud type, weight: - - kg / l

Depth Reference =floor

Gas shows

C _{tot}			Trip gas		Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: [ppm]	C1: [%]	Ø D _{in} [l/min]	-	

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	System	Serie	Stage	Formation

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	

() = Base not yet drilled

Remarks: Rig up**Crew:** F. Hinz (day) / - (night)

Geological daily report No.**2****Date: 03.07.2015**

Depth:	-	m MD	Assembly:	DD-BHA # 01
Last depth:	-	m MD	Bit :	17½" Roller bit S/N 5229358
Daily rate:	-	m	Bit-on-bottom time:	0.0 h
Last shoe:	24"	In depth 220 m	Mud type, weight:	- - kg / l

Depth Reference =floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: [ppm]	Ø D _{in} [l/min]	-	
			C1: [%]			

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	System	Serie	Stage	Formation

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	

() = Base not yet drilled

Remarks: Continue R/U. RIH DD-BHA #01.**Crew:** F. Hinz (day) / A. Alin (night)

Geological daily report No.**3****Date: 04.07.2015**

Depth:	445	m MD	Assembly:	DD-BHA # 01		
Last depth:	224.3	m MD	Bit :	17½" Roller bit S/N 5229358		
Daily rate:	220.7	m	Bit-on-bottom time:	15.1 h		
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill	1.07	kg / l

Depth Reference =floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: [ppm]	30		
			C1: [%]	Ø D _{in} [l/min]	3000	

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	(430)		Middle Oligocene	Middle North Sea	Rupel	Rupel Clay
() = base not yet drilled		Stratigraphy preliminary				

Lithology

Top [m MD]	Base [m MD]	
220	255	Silt , sandy, light grey, unconsolidated. Sand fine grained, moderately to well sorted. Quartz grains predominantly clear, transparent to milky white; occasionally pale yellow and reddish. Frequently layers of shell fragments. Acc.: wood fragments, mica.
255	260	Sand , light grey, fine grained, well sorted, silty, micaceous, unconsolidated to moderately indurated. Quartz grains predominantly clear, transparent to milky white; occasionally pale yellow and reddish. Acc.: mica, rarely shell and wood fragments.
260	280	Silt , light grey, sandy, with fine grained, well sorted sand as previously described; moderately indurated. Acc.: mica, occasionally shell fragments.
280	300	Silt , light grey to brownish grey, argillaceous, slightly sandy and calcareous. Moderately indurated. Clay predominantly washed out from the samples. Acc.: mica, shell fragments.
300	345	Silt , medium grey to brownish grey, argillaceous, calcareous, slightly sandy, moderately indurated to firm, wet samples plastic. Acc.: mica, shell fragments.
345	360	Silt , off-white to light grey, sandy, calcareous, increasingly sandy. Sand, fine grained, white, clear to milky, well sorted. Glauconite, dark green to black.
360	390	Clay , light grey to off white, hard, very slightly calcareous. Silt, off-white to light grey, sandy, calcareous, sandy. Sand, fine grained, white, clear to milky, well sorted. Glauconite, dark green to black.
390	(430)	Clay , light grey to off white, increasingly brownish, micaceous, firm to hard. Acc.: Pyrite.

() = Base not yet drilled

Remarks: Continue RIH DD-BHA #01. Start drilling.



Client: Aardwarmte Vierpolders

Wellsite: BRI – GT - 01



Crew: F. Hinz (day) / A. Alin (night)

Geological daily report No.**4****Date: 05.07.2015**

Depth:	731	m MD	Assembly:	DD-BHA # 01		
Last depth:	445	m MD	Bit :	17½" Roller bit S/N 5229358		
Daily rate:	286	m	Bit-on-bottom time:	32.5 h		
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill	1.10	kg / l

Depth Reference = Rigfloor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: [ppm]	40		
			C1: [%]	Ø D _{in} [l/min]	3500	

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	458		Middle Oligocene	Middle North Sea	Rupel	Rupel Clay
458	592		Eocene - Oligocene			Vessem
592	634		Eocene	Lower North Sea	Dongen	Asse
634	(730)		Early to Middle Eocene			Brussel Sand
() = base not yet drilled				Stratigraphy preliminary		

Lithology

Top [m MD]	Base [m MD]	
390	465	Claystone , light grey to off white, increasingly brownish to the base, silty, micaceous, firm to hard. Acc.: Pyrite, occasionally shell fragments.
465	490	Siltstone , light brownish grey, argillaceous, sandy, firm with sand, light grey, fine to medium grained, moderately sorted with clear and milky quartz grains, subrounded, strong silty and argillaceous, glauconitic; clay light brown to light brownish grey, firm. Acc.: glauconite, pyrite, rarely shell fragments.
490	495	Argillaceous marlstone , grey white, silty, sandy. Sand fine to medium grained, poorly sorted, glauconitic. Quartz grains predominantly clear, transparent, subrounded to rounded. Acc.: mica, glauconite.
495	515	Siltstone , light brownish grey, argillaceous, sandy, friable to firm. Additionally argillaceous marlstone a.p.d..
515	565	Siltstone , light greenish grey, argillaceous, sandy, friable to firm, strongly glauconitic. Acc.: glauconite, pyrite, mica.
565	590	Claystone , brownish grey to greenish grey, silty, glauconitic, in alternate bedding with siltstone, greenish grey, argillaceous, glauconitic, slightly sandy. Acc.: fine grained sand, glauconite, mica, pyrite.
590	610	Claystone , olive-green to light brownish grey and light ochre, silty, firm to moderately hard. Acc.: glauconite.
610	620	Claystone , olive-green to light brownish grey and light ochre, silty, firm to moderately hard. Marlstone, off-white, hard, splintery.

Lithology		
Top [m MD]	Base [m MD]	
620	630	Claystone , olive-green to light grey, firm to moderately hard.
630	650	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Glauconite, dark green to black. Huge amount in foraminiferas, decreasing to the bottom. Claystone, a.p.d, probably cavings.
650	695	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Glauconite, dark green to black. Lime stone, off white, reddish, splintery, very hard. Shell fragments.
695	720	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Some claystone and limestone a.p.d. Glauconite, dark green to black. Sponge needles.
720	(730)	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Increasingly argillaceous, grey, firm to brittle. Acc. pyrite and less glauconite than before. Samples possibly polluted by cavings.

() = Base not yet drilled

Remarks:

Crew: F. Hinz (day) / A. Alin (night)

Geological daily report No.**5****Date: 06.07.2015**

Depth:	731	m MD	Assembly:	DD-BHA # 01
Last depth:	731	m MD	Bit :	17½" Roller bit S/N 5229358
Daily rate:	0	m	Bit-on-bottom time:	32,5 h
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill kg / l

Depth Reference = Rigfloor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: [ppm]	Ø D _{in} [l/min]		
			C1: [%]			
CH-tot – carbon hydrogen total						

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	458		Middle Oligocene	Middle North Sea	Rupel	Rupel Clay
458	592		Eocene - Oligocene			Vessem
592	642		Eocene	Lower North Sea	Dongen	Asse
642	(730)		Early to Middle Eocene			Brussel Sand
() = base not yet drilled				Stratigraphy preliminary		

Lithology

Top [m MD]	Base [m MD]	
695	720	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Some claystone and limestone a.p.d. Glauconite, dark green to black. Sponge needles.
720	(730)	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Increasingly argillaceous, grey, friable to brittle. Acc. pyrite and less glauconite than before. Samples possibly polluted by cavings.

Remarks: Repair and maintenance work. POOH to clear bit. RIH to conductor shoe.Bit sample: **Silt**, light grey to brownish grey, argillaceous, slightly sandy and calcareous. Probably from Oosterhout formation**Crew:** F. Hinz (day) / A. Alin (night)

Geological daily report No.**6****Date: 07.07.2015**

Depth:	731	m MD	Assembly:	DD-BHA # 01
Last depth:	731	m MD	Bit :	17½" Roller bit S/N 5229358
Daily rate:	0	m	Bit-on-bottom time:	32,5 h
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill kg / l

Depth Reference = Rigfloor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: [ppm]	Ø D _{in} [l/min]		
			C1: [%]			
CH-tot – carbon hydrogen total						

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	458		Middle Oligocene	Middle North Sea	Rupel	Rupel Clay
458	592		Eocene - Oligocene			Vessem
592	642		Eocene	Lower North Sea	Dongen	Asse
642	(730)		Early to Middle Eocene			Brussel Sand
() = base not yet drilled				Stratigraphy preliminary		

Lithology

Top [m MD]	Base [m MD]	
695	720	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Some claystone and limestone a.p.d. Glauconite, dark green to black. Sponge needles.
720	(730)	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Increasingly argillaceous, grey, friable to brittle. Acc. pyrite and less glauconite than before. Samples possibly polluted by cavings.

() = Base not yet drilled

Remarks: Repair and maintenance work.**Crew:** F. Hinz (day) / A. Alin (night)

Geological daily report No.**7****Date: 08.07.2015**

Depth:	734	m MD	Assembly:	DD-BHA # 01		
Last depth:	731	m MD	Bit :	17½" Roller bit S/N 5229358		
Daily rate:	3	m	Bit-on-bottom time:	32.9 h		
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill	1.08	kg / l

Depth Reference = Rigfloor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: [ppm]	Ø D _{in} [l/min]		
			C1: [%]			
CH-tot – carbon hydrogen total						

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	458		Middle Oligocene	Middle North Sea	Rupel	Rupel Clay
458	592		Eocene - Oligocene			Vessem
592	642		Eocene	Lower North Sea	Dongen	Asse
642	(730)		Early to Middle Eocene			Brussel Sand
() = base not yet drilled				Stratigraphy preliminary		

Lithology

Top [m MD]	Base [m MD]	
695	720	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Some claystone and limestone a.p.d. Glauconite, dark green to black. Sponge needles.
720	(730)	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Increasingly argillaceous, grey, friable to brittle. Acc. pyrite and less glauconite than before. Samples possibly polluted by cavings.

() = Base not yet drilled

Remarks: Repair and maintenance work. RIH DD-BHA #01. Drilling to 734 m. POOH due to pulser failure.**Crew:** F. Hinz (day) / A. Alin (night)

Geological daily report No.**8****Date: 09.07.2015**

Depth:	869	m MD	Assembly:	DD-BHA # 02		
Last depth:	734	m MD	Bit :	17½" Roller bit S/N 5229358		
Daily rate:	135	m	Bit-on-bottom time:	42.9 h		
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill	1.11	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas		Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: [ppm]		55		
0.005	0.011	835	C1: 0.002 [%]	Ø D _{in} [l/min]	3000		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	458		Middle Oligocene	Middle North Sea	Rupel	Rupel Clay
458	592		Eocene - Oligocene		Rupel	Vessem
592	642		Eocene	Lower North Sea	Asse	
642	749		Early to Middle Eocene		Dongen	Brussel Sand
749	(865)		Early Eocene (Ypresian)			Ieper

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
695	720	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Some claystone and limestone a.p.d. Glauconite, dark green to black. Sponge needles.
720	735	Calcareous Sandstone , very fine grained, white, reddish white, milky, well sorted, in white calcareous matrix. Increasingly argillaceous, grey, firm to brittle. Acc. pyrite and less glauconite than before. Samples possibly polluted by cavings.
735	745	Claystone , greenish grey to light grey, sandy, silty, friable to firm, occasionally moderately hard, with intercalated layers of calcareous sandstone, light grey, fine grained, silty, argillaceous, moderately sorted. Acc.: glauconite, pyrite, shell fragments, sponge needles.
745	845	Claystone , greenish grey to light grey, sandy, silty, friable to firm, occasionally moderately hard, with interconnected layers of calcareous sandstone, light grey, fine grained, silty, argillaceous, well sorted. Acc.: Rarely pyrite.
845	(860)	Claystone , greenish grey to light grey, sandy, silty, friable to firm, occasionally moderately hard, with interconnected layers of calcareous sandstone, light grey, fine grained, silty, argillaceous, well sorted. Acc.: Rarely pyrite, wooden fragments.

() = Base not yet drilled



Client: Aardwarmte Vierpolders

Wellsite: BRI – GT - 01



Remarks: RIH DD-BHA #02. Drilling.

Crew: F. Hinz (day) / A. Alin (night)

Geological daily report No.**9****Date: 10.07.2015**

Depth:	1071	m MD	Assembly:	DD-BHA # 02		
Last depth:	869	m MD	Bit :	17½" Roller bit S/N 5229358		
Daily rate:	202	m	Bit-on-bottom time:	58.0 h		
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill	1.15	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	50	-	-
0.019	0.039	1065	C1: - [%]	Ø D _{in} [l/min] 4000	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	458		Middle Oligocene	Middle North Sea	Rupel	Rupel Clay
458	592		Eocene - Oligocene			Vessem
592	642		Eocene	Lower North Sea	Asse	
642	749		Early to Middle Eocene		Brussel Sand	
749	(1070)		Early Eocene (Ypresian)		Ieper	
*	*				Basal Dongen Sand	
*	*		Late Paleocene		Landen	Landen Clay
() = base not yet drilled				Stratigraphy preliminary		

Lithology

Top [m MD]	Base [m MD]	
745	845	Claystone , greenish grey to light grey, sandy, silty, glauconitic, friable to firm, occasionally moderately hard, with interconnected layers of calcareous sandstone, light grey, fine grained, silty, argillaceous, well sorted. Acc.: Glauconite, rarely pyrite.
845	870	Claystone , greenish grey to light grey, sandy, silty, glauconitic, friable to firm, occasionally moderately hard, with interconnected layers of calcareous sandstone, light grey, fine grained, silty, argillaceous, well sorted. Acc.: Glauconite, rarely pyrite, wood fragments.
870	890	Claystone , greenish grey to light grey, silty, glauconitic, moderately hard to hard. Acc.: Fine grained sand, glauconite, pyrite.
890	980	Claystone , greenish grey to light grey, silty, moderately hard to hard with coarse cuttings > 1 cm on the shakers. Acc.: pyrite.
980	1040	Claystone , greenish grey, grey, increasingly brownish grey, silty, moderately hard to hard, slightly micaceous. Acc.: Pyrite.

Lithology		
Top [m MD]	Base [m MD]	
1040	(1070)	Claystone , predominately brownish grey, subordinately greenish grey, grey, silty, moderately hard to hard, slightly micaceous. Acc.: Pyrite.
() = Base not yet drilled		

Remarks: Drilling.

Crew: F. Hinz (day) / A. Alin (night)

Geological daily report No.**10****Date: 11.07.2015**

Depth:	1090	m MD	Assembly:	DD-BHA # 02 / DD-BHA # 03		
Last depth:	1071	m MD	Bit :	17½" Roller bit S/N 5229358		
Daily rate:	19	m	Bit-on-bottom time:	59.4 h		
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill	1.15	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	52.6	0.02	-
0.023	0.039	1089	C1: - [%]	Ø D _{in} [l/min] 3830		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	458		Middle Oligocene	Middle North Sea	Rupel Clay	
458	592		Eocene - Oligocene		Vessem	
592	642		Eocene	Lower North Sea	Asse	
642	749		Early to Middle Eocene		Brussel Sand	
749	(1090)		Early Eocene (Ypresian)		Ieper	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
980	1040	Claystone, greenish grey, grey, increasingly brownish grey, silty, moderately hard to hard, slightly micaceous. Acc.: Pyrite.
1040	(1090)	Claystone, predominately brownish grey, subordinately greenish grey, grey, silty, moderately hard to hard, slightly micaceous. Acc.: Pyrite.

() = Base not yet drilled

Remarks: Drilling. POOH DD-BHA #02 for motor change. Gas test FID: ok. RIH BHA # 03.**Crew:** F. Hinz (day) / A. Alin (night)

Geological daily report No.**11****Date: 12.07.2015**

Depth:	1255	m MD	Assembly:	DD-BHA # 03		
Last depth:	1090	m MD	Bit :	17½" Roller bit S/N 5229358		
Daily rate:	165	m	Bit-on-bottom time:	74.9 h		
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill	1.15	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	60	-	-
0.065	0.284	1200	C1: - [%]	Ø D _{in} [l/min] 4000	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	458		Middle Oligocene	Middle North Sea	Rupel	Rupel Clay
458	592		Eocene - Oligocene			Vessem
592	642		Eocene	Lower North Sea	Asse	
642	749		Early to Middle Eocene		Brussel Sand	
749	1155		Early Eocene (Ypresian)		Ieper	
1155	1170				Basal Dongen Sand	
1170	1202		Late Paleocene		Landen	Landen Clay
1202	(1240)		Paleocene	Chalk	Houtem	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
980	1040	Claystone , greenish grey, grey, increasingly brownish grey, silty, moderately hard to hard, slightly micaceous. Acc.: Pyrite.
1040	1105	Claystone , predominately brownish grey, subordinately greenish grey, grey, silty, moderately hard to hard, slightly micaceous. Acc.: Pyrite.
1105	1110	Claystone a.p.d. with low content of fine grained sand and silt. Quarz grains colourless clear to milky-translucent, subangular to rounded, well sorted. Acc.: pyrite, mica.
1110	1180	Claystone , brown grey, occasionally light greenish grey to grey, silty, blocky to platy, occasionally splintery, slightly micaceous. Acc.: pyrite.
1180	1200	Claystone , light greenish grey to grey, silty, blocky to platy, occasionally splintery, slightly micaceous. Marlstone, light brownish grey, blocky to platy, hard. Acc.: Pyrite.

Lithology		
Top [m MD]	Base [m MD]	
1200	1210	Marlstone , grey, light grey, brittle, silty, spotty. Claystone, light greenish grey to grey, silty, blocky to platy, occasionally splintery, slightly micaceous. Acc.: Pyrite.
1210	1220	Marlstone , grey, light grey, brittle, silty, spotty. Claystone, light greenish grey to grey, silty, blocky to platy, occasionally splintery, slightly micaceous. Calcareous marlstone, off white, brittle to firm, increasing to the bottom. Acc.: Pyrite.
1220	(1240)	Calcareous marlstone , off white, brittle to firm. Marlstone, grey, light grey, brittle, silty, spotty. Claystone, light greenish grey to grey, silty, blocky to platy, slightly micaceous, decreasing to the bottom. Acc.: Pyrite.

() = Base not yet drilled

Remarks: Drilling.

Crew: F. Hinz (day) / A. Alin (night)

Geological daily report No.**12****Date: 13.07.2015**

Depth:	1364	m MD	Assembly:	DD-BHA # 03		
Last depth:	1255	m MD	Bit :	17½" Roller bit S/N 5229358		
Daily rate:	109	m	Bit-on-bottom time:	90.2 h		
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill	1.15	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	Ø D _{in} [l/min]	-	-
0.146	0.486	1339	C1: - [%]			

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	458		Middle Oligocene	Middle North Sea	Rupel	Rupel Clay
458	592		Eocene - Oligocene			Vessem
592	642		Eocene	Lower North Sea	Asse	
642	750		Early to Middle Eocene		Brussel Sand	
750	1134		Early Eocene (Ypresian)		Ieper	
1134	1142				Basal Dongen Sand	
1142	1202		Late Paleocene		Landen	Landen Clay
1202	*		Paleocene	Chalk	Houtem	
*	(1360)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
1210	1220	Marlstone , grey, light grey, brittle, silty, spotty. Claystone, light greenish grey to grey, silty, blocky to platy, occasionally splintery, slightly micaceous. Calcareous marlstone, off white, brittle to firm, increasing to the bottom. Acc.: Pyrite.
1220	1245	Calcareous marlstone , off white, brittle to firm. Marlstone, grey, light grey, brittle, silty, spotty. Claystone, light greenish grey to grey, silty, blocky to platy, slightly micaceous, decreasing to the bottom. At the base limestone, white to yellowish white, crystalline to amorphous, brittle. Acc.: Pyrite.

Lithology		
Top [m MD]	Base [m MD]	
1245	1335	Limestone , white to yellowish white, fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; occasionally microcrystalline, splintery, dense, hard. Marlstone, light grey to medium grey, occasionally brownish grey, silty, slightly micaceous, spotted, decreasing to the bottom. Interbedded thin layers of claystone, light to medium grey, rarely brownish grey, platy, firm to hard . Acc.: Pyrite.
1335	(1360)	Limestone , white to yellowish white, fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; occasionally microcrystalline, splintery, dense, hard. Marlstone, light grey to medium grey, occasionally brownish grey, silty, slightly micaceous, spotted, decreasing to the bottom. Interbedded thin layers of claystone, light to medium grey, rarely brownish grey, platy, firm to hard. Flint, off white to light grey, very hard, platy, splintery, slowly increasing to the bottom. Acc.: Pyrite.
() = Base not yet drilled		

Remarks: Drilling.

Crew: F. Hinz (day) / A. Alin (night)

Geological daily report No.**13****Date: 14.07.2015**

Depth:	1364	m MD	Assembly:	DD-BHA # 03		
Last depth:	1364	m MD	Bit :	17½" Roller bit S/N 5229358		
Daily rate:	0	m	Bit-on-bottom time:	90.4 h		
Last shoe:	24"	In depth 220 m	Mud type, weight:	Glycodrill	1.15	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas		Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: -	[ppm]	-	-	-
-	-	-	C _{tot} :	0.25 [%]	Ø D _{in} [l/min]	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
211	345	Tertiary	Late Miocene/Pliocene	Upper North Sea	Oosterhout	-
345	360		Miocene		Breda	
360	458		Middle Oligocene	Middle North Sea	Rupel	Rupel Clay
458	592		Eocene - Oligocene		Rupel	Vessem
592	642		Eocene	Lower North Sea	Asse	
642	750		Early to Middle Eocene		Brussel Sand	
750	1134		Early Eocene (Ypresian)		Ieper	
1134	1142		Late Paleocene		Basal Dongen Sand	
1142	1202		Paleocene		Landen	Landen Clay
1202	*		Upper Cretaceous to Early Paleocene	Chalk	Houtem	
*	(1360)	Cretaceous			Ommelanden	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
1335	(1360)	Limestone , white to yellowish white, fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; occasionally microcrystalline, splintery, dense, hard. Marlstone, light grey to medium grey, occasionally brownish grey, silty, slightly micaceous, spotted, decreasing to the bottom. Interbedded thin layers of claystone, light to medium grey, rarely brownish grey, platy, firm to hard. Flint, off white to light grey, very hard, platy, splintery, slowly increasing to the bottom. Acc.: Pyrite.

() = Base not yet drilled



Client: Aardwarmte Vierpolders

Wellsite: BRI – GT - 01



Remarks: Section depth at 1364 m. Clean hole. Pump HV pill and carbide bomb. POOH DD-BHA # 03.

Preparation for 13.375" casing run.

Crew: F. Hinz (day) / A. Alin (night)

Geological daily report No.**14****Date: 15.07.2015**

Depth:	1364	m MD	Assembly:	13.375" Casing run		
Last depth:	1364	m MD	Bit :	-		
Daily rate:	0	m	Bit-on-bottom time:	- h		
Last shoe:	24"	In depth 225 m	Mud type, weight:	Glycodrill	1.16	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas		Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: -	[ppm]	-	-	-
-	-	-	C _{tot} :	< 0.01 [%]	Ø D _{in} [l/min]	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1202	*	Tertiary	Paleocene	Chalk	Houtem	
*	(1360)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
1335	(1360)	Limestone , white to yellowish white, fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; occasionally microcrystalline, splintery, dense, hard. Marlstone, light grey to medium grey, occasionally brownish grey, silty, slightly micaceous, spotted, decreasing to the bottom. Interbedded thin layers of claystone, light to medium grey, rarely brownish grey, platy, firm to hard. Flint, off white to light grey, very hard, platy, splintery, slowly increasing to the bottom. Acc.: Pyrite.

() = Base not yet drilled

Remarks: 13.375" casing run.**Crew:** F. Hinz (day) / A. Alin (night)

Geological daily report No.**15****Date: 16.07.2015**

Depth:	1364	m MD	Assembly:	-
Last depth:	1364	m MD	Bit :	-
Daily rate:	0	m	Bit-on-bottom time:	- h
Last shoe:	13 3/8"	In depth 1360 m	Mud type, weight:	Glycodrill 1.16 kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	-	-	-
-	-	-	C _{tot} : - [%]	Ø D _{in} [l/min] -	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1202	*	Tertiary	Paleocene	Chalk	Houthem	
*	(1360)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
1335	(1360)	Limestone , white to yellowish white, fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; occasionally microcrystalline, splintery, dense, hard. Marlstone, light grey to medium grey, occasionally brownish grey, silty, slightly micaceous, spotted, decreasing to the bottom. Interbedded thin layers of claystone, light to medium grey, rarely brownish grey, platy, firm to hard. Flint, off white to light grey, very hard, platy, splintery, slowly increasing to the bottom. Acc.: Pyrite.

() = Base not yet drilled

Remarks: Cement job. POOH cement stinger. WOC.**Crew:** F. Hinz, F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**16****Date: 17.07.2015**

Depth:	1364	m MD	Assembly:	-
Last depth:	1364	m MD	Bit :	-
Daily rate:	0	m	Bit-on-bottom time:	- h
Last shoe:	13 3/8"	In depth 1360 m	Mud type, weight:	Glycodrill 1.16 kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	-	-	-
-	-	-	C _{tot} : - [%]	Ø D _{in} [l/min] -	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1202	*	Tertiary	Paleocene	Chalk	Houthem	
*	(1360)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	
() = base not yet drilled				Stratigraphy preliminary		

Lithology

Top [m MD]	Base [m MD]	
1335	(1360)	Limestone , white to yellowish white, fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; occasionally microcrystalline, splintery, dense, hard. Marlstone, light grey to medium grey, occasionally brownish grey, silty, slightly micaceous, spotted, decreasing to the bottom. Interbedded thin layers of claystone, light to medium grey, rarely brownish grey, platy, firm to hard. Flint, off white to light grey, very hard, platy, splintery, slowly increasing to the bottom. Acc.: Pyrite.

samples of the conductor pipe run:

0	25	Sand , predominantly fine to medium grained with a fining upwards trend, Quartz, clear and angular (fine sand) apart from that milky, reddish, yellowish and grey, subrounded to well rounded, poorly sorted, partly with clay matrix, poorly compacted. Acc.: rare Glauconite and Mica, plant remains, at the top 15 m abundant microfossils (benthic foraminifers, ostracods, spines of echinoids, shell debris).
25	30	Sand , medium to coarse grained, Quartz, milky, reddish, yellowish and grey, subrounded to well rounded, poorly sorted. Gravel, polymictic. Acc.: rare Glauconite, Mica, shell debris.

() = Base not yet drilled

Remarks: WOC.**Crew:** F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**17****Date: 18.07.2015**

Depth:	1364	m MD	Assembly:	-
Last depth:	1364	m MD	Bit :	-
Daily rate:	0	m	Bit-on-bottom time:	- h
Last shoe:	13 3/8"	In depth 1360 m	Mud type, weight:	Glycodrill 1.16 kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	-	-	-
-	-	-	C _{tot} : - [%]	Ø D _{in} [l/min] -	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1202	*	Tertiary	Paleocene	Chalk	Houthem	
*	(1360)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	
() = base not yet drilled				Stratigraphy preliminary		

Lithology

Top [m MD]	Base [m MD]	
1335	(1360)	Limestone , white to yellowish white, fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; occasionally microcrystalline, splintery, dense, hard. Marlstone, light grey to medium grey, occasionally brownish grey, silty, slightly micaceous, spotted, decreasing to the bottom. Interbedded thin layers of claystone, light to medium grey, rarely brownish grey, platy, firm to hard. Flint, off white to light grey, very hard, platy, splintery, slowly increasing to the bottom. Acc.: Pyrite.

samples of the conductor pipe run:

0	25	Sand , predominantly fine to medium grained with a fining upwards trend, Quartz, clear and angular (fine sand) apart from that milky, reddish, yellowish and grey, subrounded to well rounded, poorly sorted, partly with clay matrix, poorly compacted. Acc.: rare Glauconite and Mica, plant remains, at the top 15 m abundant microfossils (benthic foraminifers, ostracods, spines of echinoids, shell debris).
25	40	Sand , medium to coarse grained, Quartz, milky, reddish, yellowish and grey, subrounded to well rounded, poorly sorted, increasingly slightly better sorted towards base. Gravel, polymictic. Acc.: rare Glauconite, Mica, shell debris.
40	45	Silt , grey to abundantly brownish grey, often argillaceous and calcareous, with thinly reddish streaks, brittle to soft, partly plastic, sandy (fine grained); abundant sand, as described above; with traces of glauconite and mica; fossiliferous; sample wash out often argillaceous to silty.
45	75	Sand , milky, translucent, light grey to occasionally yellowish, reddish, fine to medium grained, subrounded to seldom rounded, fairly sorted; with some Quartz, clear, subangular; partly glauconitic, scarcely micaceous, predominantly poorly elongated grains, fossiliferous, partly coal fragments.

75	80	Clay , grey, brownish, plastic to friable, silty, sandy. Subordinate sand, as previously described. Acc.: Mica, coal.
80	120	Sand , fine to medium grained, with clear to milky, yellowish and grey translucent Quartz, subangular to rounded, fairly sorted, glauconitic. Furthermore clay, grey, brownish, plastic to firm, silty, sandy. Acc.: Glauconite, mollusc shell debris (bivalves, rare gastropods) and sparse benthic foraminifers.

() = Base not yet drilled

Remarks: WOC. Making up BOP. Pressure test BOP. Pick up DPs. Standpipe pressure test.

Crew: F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**18****Date: 19.07.2015**

Depth:	1364	m MD	Assembly:	DD-BHA 04		
Last depth:	1364	m MD	Bit :	12 1/4" Insert S/N: 5252210		
Daily rate:	0	m	Bit-on-bottom time:	- h		
Last shoe:	13 3/8"	In depth	1360 m	Mud type, weight:	Glycodrill 1.16	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	124	-	-
-	-	-	C _{tot} : - [%]	Ø D _{in} [l/min] 2800	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1202	*	Tertiary	Paleocene	Chalk	Houthem	
*	(1360)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	
() = base not yet drilled				Stratigraphy preliminary		

Lithology

Top [m MD]	Base [m MD]	
1335	(1360)	Limestone , white to yellowish white, fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; occasionally microcrystalline, splintery, dense, hard. Marlstone, light grey to medium grey, occasionally brownish grey, silty, slightly micaceous, spotted, decreasing to the bottom. Interbedded thin layers of claystone, light to medium grey, rarely brownish grey, platy, firm to hard. Flint, off white to light grey, very hard, platy, splintery, slowly increasing to the bottom. Acc.: Pyrite.

samples of the conductor pipe run:

0	25	Sand , predominantly fine to medium grained with a fining upwards trend, Quartz, clear and angular (fine sand) apart from that milky, reddish, yellowish and grey, subrounded to well rounded, poorly sorted, partly with clay matrix, poorly compacted. Acc.: rare Glauconite and Mica, plant remains, at the top 15 m abundant microfossils (benthic foraminifers, ostracods, spines of echinoids, shell debris).
25	40	Sand , medium to coarse grained, Quartz, milky, reddish, yellowish and grey, subrounded to well rounded, poorly sorted, increasingly slightly better sorted towards base. Gravel, polymictic. Acc.: rare Glauconite, Mica, shell debris.
40	45	Silt , grey to abundantly brownish grey, often argillaceous and calcareous, with thinly reddish streaks, brittle to soft, partly plastic, sandy (fine grained); abundant sand, as described above; with traces of glauconite and mica; fossiliferous; sample wash out often argillaceous to silty.
45	75	Sand , milky, translucent, light grey to occasionally yellowish, reddish, fine to medium grained, subrounded to seldom rounded, fairly sorted; with some Quartz, clear, subangular; partly glauconitic, scarcely micaceous, predominantly poorly elongated grains, fossiliferous, partly coal fragments.

75	80	Clay , grey, brownish, plastic to friable, silty, sandy. Subordinate sand, as previously described. Acc.: Mica, coal.
80	160	Sand , fine to medium grained, with clear to milky, yellowish and grey translucent Quartz, subangular to rounded, fairly sorted, glauconitic. Furthermore clay, grey, brownish, plastic to firm, silty, sandy. Acc.: Glauconite, mollusc shell debris (bivalves, rare gastropods) and sparse benthic foraminifers.
160	165	Sand , grey, milky, translucent, fine to medium grained, fairly sorted, micaceous, glauconitic, fossiliferous; with subordinated siltstone, grey, brownish grey, argillaceous, soft, friable, partly semiplastic; additional coal (charcoal) fragments, very abundant especially in the coarse fraction.
165	170	Sand , grey, milky, fine to medium grained, moderately sorted, micaceous, glauconitic, fossiliferous; with a reasonable amount of marlstone, brownish grey, argillaceous, silty, partly sandy, brittle, friable, crumbly, occurring predominantly in the coarse fraction.
170	175	Sand , milky, grey, seldom yellowish, fine to medium grained, subrounded to rounded, fairly sorted, micaceous, glauconitic, fossiliferous; just occasionally marlstone, brownish grey.
175	180	Marlstone , grey to brownish grey, silty, partly sandy, frequently very calcareous, soft to firm, crumbly, blocky; with intercalated claystone concretions (nodules), brownish to brownish grey (with limonitic rims at the edges), calcareous; with some Sand, grey, milky, fine to medium grained.
180	195	Sand , milky, grey, seldom yellowish, partly translucent, fine to medium grained, subrounded to rounded, moderately sorted, micaceous, glauconitic, fossiliferous (partly with intersected beds of shell debris).
195	205	Argillaceous Marlstone , brownish grey, silty, partly sandy, soft to firm, crumbly, blocky, with lots of shell debris and a decent amount of sand, milky, grey, fine to medium grained, fairly sorted.
205	220	Sand , consisting of clear, milky, grey, yellowish, fine to medium grained, subrounded to rounded Quartz, fairly sorted, micaceous, glauconitic. Furthermore argillaceous marlstone, a.p.d. and silt, light to medium grey. Acc.: Mica, Glauconite, shell debris.

() = Base not yet drilled

Remarks: Making up BHA and RIH. Cut-off drilling line. Circulation.

Crew: F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**19****Date: 20.07.2015**

Depth:	1542	m MD	Assembly:	DD-BHA 04		
Last depth:	1364	m MD	Bit :	12 1/4" Insert bit VM-C09 S/N: 5252210; IADC:		
Daily rate:	178	m	Bit-on-bottom time:	13,8 h		
Last shoe:	13 3/8"	In depth	1360 m	Mud type, weight:	Glycodrill 1.15	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	Ø D _{in} [l/min]	0,05	-
0,05	0,1	1452	C _{tot} : - [%]	3283		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1202	*	Tertiary	Paleocene	Chalk	Houthem	
*	(1542)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
1335	1360	Limestone , white to yellowish white, fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; occasionally microcrystalline, splintery, dense, hard. Marlstone, light grey to medium grey, occasionally brownish grey, silty, slightly micaceous, spotted, decreasing to the bottom. Interbedded thin layers of claystone, light to medium grey, rarely brownish grey, platy, firm to hard. Flint, off-white to light grey, very hard, platy, splintery, slowly increasing to the bottom. Acc.: Pyrite.
1360	1365	Cement , grey to light grey, black particle spotted, hard, blocky, partly crumbly, slightly silty; with very few (< 1%) formation material (limestone, white).
1365	(1542)	Limestone , cherty, white, off-white, yellowish, micro to fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; partly silicified, splintery, dense and hard; rarely glauconitic. Variable amounts of Flint (up to > 50 % of the sample volume), off-white to light grey, very hard, dense, platy, splintery.

() = Base not yet drilled

Remarks: Circulation. DOC and formation (1367 m). FIT. Drilling.**Crew:** F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**20****Date: 21.07.2015**

Depth:	1741	m MD	Assembly:	DD-BHA 04		
Last depth:	1542	m MD	Bit :	12 1/4" Insert bit VM-C09 S/N: 5252210; IADC:		
Daily rate:	199	m	Bit-on-bottom time:	32.1 h		
Last shoe:	13 3/8"	In depth	1360 m	Mud type, weight:	Glycodrill	1.16 kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	30.6	0.04	-
0.04	0.07	1649	C _{tot} : - [%]	Ø D _{in} [l/min] 3505		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1245	1366	Tertiary	Paleocene	Chalk	Houthem	
1366	(1735)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
1365	1675	Limestone , cherty, white, off-white, yellowish, micro to fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; partly silicified, splintery, dense and hard; rarely glauconitic. Variable amounts of Flint (at the top Ommelanden up to > 50 % of the sample volume), off-white to light grey, very hard, dense, platy, splintery. Acc.: rare marlstone, grey, silty, sandy, brittle to firm; occasional fossil debris.
1675	(1735)	Limestone , white, off-white, yellowish, micro to fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle, frequently glauconitic. Decreasing Flint, off-white to light grey, very hard, dense, platy, splintery. Occasionally marlstone, grey, silty, sandy, brittle to firm. Acc.: rare Pyrite; fossil debris.

() = Base not yet drilled

Remarks: Drilling. Top Houthem revised by wellsite geologist.**Crew:** F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**21****Date: 22.07.2015**

Depth:	1931	m MD	Assembly:	DD-BHA 04		
Last depth:	1741	m MD	Bit :	12 1/4" Insert bit VM-C09 S/N: 5252210; IADC: 437		
Daily rate:	190	m	Bit-on-bottom time:	50.3 h		
Last shoe:	13 3/8"	In depth	1360 m	Mud type, weight:	Glycodrill	1.16 kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	34.7	0.05	-
0.05	0.07	1819	C _{tot} : - [%]	Ø D _{in} [l/min] 3497		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1245	1366	Tertiary	Paleocene	Chalk	Houthem	
1366	(1920)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
1365	1675	Limestone , cherty, white, off-white, yellowish, micro to fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle; partly silicified, splintery, dense and hard; rarely glauconitic. Variable amounts of Flint (at the top Ommelanden up to > 50 % of the sample volume), off-white to light grey, very hard, dense, platy, splintery. Acc.: rare marlstone, grey, silty, sandy, brittle to firm; occasional fossil debris.
1675	(1920)	Limestone , white, off-white, yellowish, micro to fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle, frequently glauconitic. Decreasing Flint, off-white to light grey, very hard, dense, platy, splintery. Occasional marlstone, grey, silty, sandy, brittle to firm. Acc.: rare Pyrite; fossil debris.

() = Base not yet drilled

Remarks:**Crew:** F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**22****Date: 23.07.2015**

Depth:	2090	m MD	Assembly:	DD-BHA 04		
Last depth:	1931	m MD	Bit :	12 1/4" Insert bit VM-C09 S/N: 5252210; IADC: 437		
Daily rate:	159	m	Bit-on-bottom time:	69.3 h		
Last shoe:	13 3/8"	In depth	1360 m	Mud type, weight:	Glycodrill	1.18 kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas		Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S:	- [ppm]	38.2	0.05	-
0.05	0.07	2076	C _{tot} :	- [%]	Ø D _{in} [l/min]	3499	

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1245	1366	Tertiary	Paleocene	Chalk	Houthem	
1366	(2080)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
1675	(2080)	Limestone , white, off-white, yellowish, micro to fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle to firm, at the top frequently glauconitic, towards the base with less Glauconite but partly pyritic. Decreasing Flint, off-white to light grey, very hard, dense, platy, splintery. Occasionally interbedded marlstone, grey to brownish grey, silty, scarcely sandy, brittle to firm, crumbly, often very calcareous. Acc.: rare Pyrite, from 2045 m more frequently present; sparse benthic and planktonic foraminifers, ostracods, fossil debris.

() = Base not yet drilled

Remarks: ROP is not documented correctly, average is about 7-8 m/h.**Crew:** F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**23****Date: 24.07.2015**

Depth:	2107.5	m MD	Assembly:	DD-BHA 04		
Last depth:	2090	m MD	Bit :	12 1/4" Insert bit VM-C09 S/N: 5252210; IADC: 437		
Daily rate:	17.5	m	Bit-on-bottom time:	71.5 h		
Last shoe:	13 3/8"	In depth 1360 m	Mud type, weight:	Glycodrill	1.18	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas		Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]		Ø D _{in} [l/min]	3505	-
0.06	0.08	2076	C _{tot} : - [%]		0.06		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1245	1366	Tertiary	Paleocene	Chalk	Houthem	
1366	(2105)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
1675	(2105)	Limestone , white, off-white, yellowish, micro to fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle to firm, at the top frequently glauconitic, towards the base with less Glauconite but partly pyritic. Occasionally interbedded marlstone, grey to brownish grey, silty, scarcely sandy, brittle to firm, crumbly, often very calcareous. Acc.: rare Pyrite, from 2045 m more frequently present; sparse benthic and planktonic foraminifers, ostracods, fossil debris.

() = Base not yet drilled

Remarks: Drilling to 2107.5 m. POOH for bit change (partly backreaming due to overpulls).**Crew:** F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**24****Date: 25.07.2015**

Depth:	2227	m MD	Assembly:	DD-BHA 05		
Last depth:	2107.5	m MD	Bit :	12 1/4" PDC, Type:HCD 606 S/N: 7033277, IADC: M323		
Daily rate:	119.5	m	Bit-on-bottom time:	6.2 h		
Last shoe:	13 3/8"	In depth	1360 m	Mud type, weight:	Glycodrill 1.19	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas		Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S:	- [ppm]	41.4	0.06	-
0.06	0.10	2178	C _{tot} :	0.01 [%]	Ø D _{in} [l/min] 3498		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1245	1366	Tertiary	Paleocene	Chalk	Houthem	
1366	(2215)	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	

() = base not yet drilled

Stratigraphy preliminary

Lithology

Top [m MD]	Base [m MD]	
1675	(2215)	Limestone , white, off-white, yellowish, micro to fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle to firm, at the top frequently glauconitic, towards the base with less Glauconite but partly pyritic. Occasionally interbedded marlstone, grey to brownish grey, silty, scarcely sandy, brittle to firm, crumbly, often very calcareous. Acc.: rare Pyrite, from 2045 m more frequently present; sparse benthic and planktonic foraminifers, ostracods, fossil debris.

() = Base not yet drilled

Remarks: Assembly and RIH DD-BHA 05. From ~1994 m (stand 62) RIH under circulation. Drilling.**Crew:** F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**25****Date: 26.07.2015**

Depth:	2554	m MD	Assembly:	DD-BHA 05		
Last depth:	2227	m MD	Bit :	12 1/4" PDC, Type:HCD 606 S/N: 7033277, IADC: M323		
Daily rate:	327	m	Bit-on-bottom time:	23.1 h		
Last shoe:	13 3/8"	In depth 1360 m	Mud type, weight:	Glycodrill	1.16	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	45.9	0.50	-
0.50	1.99	2493	C _{tot} : [%]	Ø D _{in} [l/min] 3500		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member	
1245	1366	Tertiary	Paleocene	Chalk	Houthem		
1366	2320		Upper Cretaceous to Early Paleocene		Ommelanden		
2320	2321				Texel / Plenus Marl		
2321	2333				Texel / Texel Marlstone		
2333	2350				Texel / Texel Greensand		
2350	(2530)		Lower Cretaceous	Rijnland	Vlieland Sandstone / De Lier Sandstone and IJsselmonde Sandstone undif.		
() = base not yet drilled				Stratigraphy preliminary			

Lithology

Top [m MD]	Base [m MD]	
1675	2325	Limestone , white, off-white, yellowish, micro to fine crystalline, arenitic (lime-grainstone texture), porous, friable, brittle to firm, at the top frequently glauconitic, towards the base with less Glauconite but partly pyritic. Occasionally interbedded marlstone, grey to brownish grey, silty, scarcely sandy, brittle to firm, crumbly, often very calcareous. Acc.: rare Pyrite, from 2045 m more frequently present; sparse benthic and planktonic foraminifers, ostracods, fossil debris.
2325	2335	Marlstone , medium grey to darkish, silty, sericitic, partly very calcareous, firm to moderately hard, blocky, brittle, sometimes also platy and laminated. With abundant limestone (chalk), off-white, as described above, additionally limestone, white, yellowish, spotted with pierced-in Glauconite grains, rounded, finegrain size; at the base some loose sand, translucent, fine to medium grained.
2335	2350	Sand , clear, translucent, fine to medium grained, subrounded to rounded, fairly sorted, with abundant Glauconite, green, darkish green to greenish black, fine to medium grain size, often well rounded. Furthermore some marlstone and limestone, as described above.

2350	2440	Sand , clear, translucent, light grey, fine to very fine grained, subrounded to rounded, poorly sorted (intercalations of medium to coarse grained Quartz, well rounded); at the top with minor contents of Glauconite, fine grained, some Pyrite, scarcely fossiliferous, towards the base Glauconite-rich with nodular aggregates.
2440	2450	Clay(stone) , dark grey, plastic to firm, silty, slightly carbonaceous. Sandstone, light grey, fairly sorted, moderately compacted, firm to hard, strongly glauconitic and pyritic, carbonaceous matrix, with clear to milky, fine grained Quartz, subangular to subrounded. Somewhat argillaceous marlstone, grey, plastic to firm (as well as the clay(stone) for the most part washed out). Limestone, white, off-white, yellowish, micro to fine crystalline, arenitic (lime-grainstone texture), partly glauconitic, friable, brittle to firm. Acc.: Glauconite, Pyrite.
2450	2505	Sand , light grey, fine to medium grained Quartz, clear, milky, angular to subangular, well sorted, glauconitic. Decreasing limestone, white, off-white, micro to fine crystalline, friable, firm to moderately hard, partly glauconitic. Occasional marlstone, grey, friable, firm, seldom with thin carbonate laminae, silty. Acc.: Glauconite, Pyrite.
2505	2525	Claystone , grey to dark grey, platy, brittle to firm, slightly silty, sericitic, partly glauconitic and sandy, calcareous. Sand, clear and milky Quartz, fine to coarse grained, splintery to subangular, poorly sorted, partly as fine to medium grained, glauconitic sandstone with calcareous matrix. Coal, dark brown to black, brittle, glossy. Limestone as previously described. Acc.: Glauconite.
2525	(2530)	Sand , light grey, fine to medium grained Quartz, clear, milky, angular to subangular, well sorted, glauconitic. Acc.: limestone, Glauconite.

() = Base not yet drilled

Remarks: Drilling.

Crew: F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**26****Date: 26.07.2015**

Depth:	2784	m MD	Assembly:	DD-BHA 05		
Last depth:	2554	m MD	Bit :	12 1/4" PDC, Type:HCD 606 S/N: 7033277, IADC: M323		
Daily rate:	230	m	Bit-on-bottom time:	35.3 h		
Last shoe:	13 3/8"	In depth	1360 m	Mud type, weight:	Glycodrill	1.15 kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	51.6	0.26	-
0.26	0.84	2766	C _{tot} : [%]	Ø D _{in} [l/min] 3117		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member	
1245	1366	Tertiary	Paleocene	Chalk	Houthem		
1366	2320		Upper Cretaceous to Early Paleocene		Ommelanden		
2320	2325				Plenus Marl		
2325	2349				Texel / Texel Marlstone		
2349	2445				Texel / Texel Greensand		
2445	2532		Lower Cretaceous	Rijnland	Vlieland Sandstone / De Lier Sandstone		
2532	2616				Vlieland Sandstone / IJsselmonde Sandstone		
2616	2625	Triassic	Middle to Upper Triassic	Keuper	Upper Keuper Claystone		
2625					Dolomitic Keuper		
					Red Keuper Claystone		
					Upper Röt Fringe Claystone		
			Lower Triassic	Röt	Röt Fringe Sandstone		
					Lower Röt Fringe Claystone		
	(2784)				Solling Claystone		
() = base not yet drilled				Stratigraphy preliminary			

Lithology		
Top [m MD]	Base [m MD]	
2525	2615	Sand , light grey, fine to medium grained Quartz, clear, milky, angular to subangular, well sorted, glauconitic. At the base coal, black, dark brown, charcoal/ lignite, brittle. Acc.: limestone, Glauconite, Pyrite.
2615	2640	Claystone , greenish to medium grey, slightly calcareous and micaceous, firm, flaky. Somewhat sandstone, white to off-white, fine grained, predominantly grain supported, partly mud supported.
2640	2690	Sand , light grey, clear and milky Quartz, fine to coarse grained, splintery to subangular, poorly sorted, partly as fine to medium grained, glauconitic sandstone with calcareous and/ or dolomitic matrix. Acc.: Coal, Glauconite, Pyrite.
2690	2710	Claystone , 1) green, grey, firm, glossy, platy, splintery, and 2) red, silty, micaceous, firm, crumbly, slightly calcareous and micaceous. Sand, a.p.d..
2710	2720	Sand , light grey, fairly sorted, with predominantly fine to medium grained Quartz, clear, milky, rarely orange, angular to subangular and coarse grained, rounded, matt Quartz grains. Occasionally as poorly sorted sandstone with calcareous matrix, seldom haematitic/ sideritic. Acc.: Glauconitic marlstone, Glauconite (cavings from Texel and Vlieland Sandstone).
2720	2740	Claystone , green, grey, firm, glossy, platy, splintery, and red, silty, micaceous, firm, crumbly, slightly calcareous and micaceous (a.p.d.). Furthermore sand and sandstone a.p.d.. Acc.: Glauconitic marlstone, Glauconite (cavings from Texel and Vlieland Sandstone), limestone, off-white, micritic, friable, firm to moderately hard.
2740	(2784)	Sand , light grey, fairly sorted, with fine to medium grained Quartz, clear, milky, orange, subangular and rare coarse grained, rounded to well rounded, matt Quartz grains. Sandstone, off-white, fine to medium grained, poorly sorted, calcareous, rarely with orange hypidiomorphic Calcite. Occasional green and red claystone, a.p.d.. Acc.: Glauconitic marlstone, Glauconite (cavings from Texel and Vlieland Sandstone), Pyrite, limestone.

() = Base not yet drilled

Remarks: Drilling to Casing Point @ 2784.1 m (Basal Solling-Sandstone Formation). Bottoms-up. Carbide test and pill pumped. Annular volume according to carbide test ~176 m³. Stratigraphy partly revised.

Crew: F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**27****Date: 28.07.2015**

Depth:	2784	m MD	Assembly:	9 5/8" Liner run		
Last depth:	2784	m MD	Bit :	-		
Daily rate:	-	m	Bit-on-bottom time:	- h		
Last shoe:	13 3/8"	In depth 1360 m	Mud type, weight:	Glycodrill	1.15	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	-	-	-
-	-	-	C _{tot} : [%]	Ø D _{in} [l/min]	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member	
1245	1366	Tertiary	Paleocene	Chalk	Houthem		
1366	2320		Upper Cretaceous to Early Paleocene		Ommelanden		
2320	2325				Plenus Marl		
2325	2349				Texel / Texel Marlstone		
2349	2445				Texel / Texel Greensand		
2445	2532		Lower Cretaceous	Rijnland	Vlieland Sandstone / De Lier Sandstone		
2532	2616				Vlieland Sandstone / IJsselmonde Sandstone		
2616	2625	Triassic	Middle to Upper Triassic	Keuper	Upper Keuper Claystone		
2625					Dolomitic Keuper		
					Red Keuper Claystone		
					Upper Röt Fringe Claystone		
			Lower Triassic	Röt	Röt Fringe Sandstone		
					Lower Röt Fringe Claystone		
	(2784)				Solling Claystone		
() = base not yet drilled				Stratigraphy preliminary			

Lithology

Top [m MD]

Base [m MD]

2740	(2784)	Sand , light grey, fairly sorted, with fine to medium grained Quartz, clear, milky, orange, subangular and rare coarse grained, rounded to well rounded, matt Quartz grains. Sandstone, off-white, fine to medium grained, poorly sorted, calcareous, rarely with orange hypidiomorphic Calcite. Occasional green and red claystone, a.p.d.. Acc.: Glauconitic marlstone, Glauconite (cavings from Texel and Vlieland Sandstone), Pyrite, limestone.
------	--------	---

() = Base not yet drilled

Remarks: POOH (in backreaming mode to the actual casing shoe). Pick up 6 3/4" DCs. Assembly 9 5/8" Liner run.**Crew:** F. Schamberger (day) / M. Kramer (night)

Geological daily report No.**28****Date: 29.07.2015**

Depth:	2784	m MD	Assembly:	9 5/8" Liner run		
Last depth:	2784	m MD	Bit :	-		
Daily rate:	-	m	Bit-on-bottom time:	- h		
Last shoe:	13 3/8"	In depth 1360 m	Mud type, weight:	Glycodrill	1.12	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	-	-	-
-	-	-	C _{tot} : [%]	Ø D _{in} [l/min]	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member	
1245	1366	Tertiary	Paleocene	Chalk	Houthem		
1366	2320		Upper Cretaceous to Early Paleocene		Ommelanden		
2320	2332				Texel / Texel Greensand		
2332	2420		Rijnland	Holland / Spijkenisse Greensand			
2420	2446			Holland / Lower Holland Marl			
2446	2532			Vlieland Sandstone / De Lier Sandstone			
2532	2616			Vlieland Sandstone / IJsselmonde Sandstone			
2616	2625	Cretaceous	Lower Cretaceous	Keuper	Upper Keuper Claystone		
2625	2649				Dolomitic Keuper		
2649	2652,5				Red Keuper Claystone		
2652,5	2657			Muschelkalk	Middle Muschelkalk Marl		
2657	2659				Muschelkalk Evaporite		
2659	2693				Lower Muschelkalk		
2693	2708	Triassic	Middle to Upper Triassic	Röt	Upper Röt Fringe Claystone		
2708	2719				Röt Fringe Sandstone		
2719	2730				Lower Röt Fringe Claystone		
2730	2732		Lower Triassic	Solling	Solling Claystone		
2732	(2784)				Basal Solling Sandstone		

() = base not yet drilled

Stratigraphy preliminary

Lithology		
Top [m MD]	Base [m MD]	
2740	(2784)	Sand , light grey, fairly sorted, with fine to medium grained Quartz, clear, milky, orange, subangular and rare coarse grained, rounded to well rounded, matt Quartz grains. Sandstone, off-white, fine to medium grained, poorly sorted, calcareous, rarely with orange hypidiomorphic Calcite. Occasional green and red claystone, a.p.d.. Acc.: Glauconitic marlstone, Glauconite (cavings from Texel and Vlieland Sandstone), Pyrite, limestone.
() = Base not yet drilled		
Remarks: RIH 9 5/8" Liner run. Stratigraphic column revised by well site geologist. Temporary seepage losses.		
Crew: F. Schamberger (day) / M. Kramer (night)		

Geological daily report No.**29****Date: 30.07.2015**

Depth:	2784	m MD	Assembly:	9 5/8" Liner run		
Last depth:	2784	m MD	Bit :	-		
Daily rate:	-	m	Bit-on-bottom time:	- h		
Last shoe:	13 3/8"	In depth 1360 m	Mud type, weight:	Glycodrill	1.15	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	-	-	-
-	-	-	C _{tot} : [%]	Ø D _{in} [l/min]	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member	
1245	1366	Tertiary	Paleocene	Chalk	Houthem		
1366	2320		Upper Cretaceous to Early Paleocene		Ommelanden		
2320	2332				Texel / Texel Greensand		
2332	2420		Rijnland	Holland / Spijkenisse Greensand			
2420	2446			Holland / Lower Holland Marl			
2446	2532			Vlieland Sandstone / De Lier Sandstone			
2532	2616			Vlieland Sandstone / IJsselmonde Sandstone			
2616	2625	Cretaceous	Lower Cretaceous	Keuper	Upper Keuper Claystone		
2625	2649				Dolomitic Keuper		
2649	2652,5				Red Keuper Claystone		
2652,5	2657			Muschelkalk	Middle Muschelkalk Marl		
2657	2659				Muschelkalk Evaporite		
2659	2693	Triassic	Middle to Upper Triassic	Röt	Lower Muschelkalk		
2693	2708				Upper Röt Fringe Claystone		
2708	2719				Röt Fringe Sandstone		
2719	2730			Solling	Lower Röt Fringe Claystone		
2730	2732				Solling Claystone		
2732	2767	Lower Triassic	Hardegsen		Basal Solling Sandstone		
2767	(2784)						
() = base not yet drilled				Stratigraphy preliminary			

Lithology	
Top [m MD]	Base [m MD]
2740	(2784)

2740	(2784)	Sand , light grey, fairly sorted, with fine to medium grained Quartz, clear, milky, orange, subangular and rare coarse grained, rounded to well rounded, matt Quartz grains. Sandstone, off-white, fine to medium grained, poorly sorted, calcareous, rarely with orange hypidiomorphic Calcite. Occasional green and red claystone, a.p.d.. Acc.: Glauconitic marlstone, Glauconite (cavings from Texel and Vlieland Sandstone), Pyrite, limestone.
() = Base not yet drilled		

Remarks: RIH 9 5/8" Liner run, additional revision of the stratigraphic column by the well site geologist.

Crew: F. Schamberger (day) / F. Hinz (night)

Geological daily report No.**30****Date: 31.07.2015**

Depth:	2784	m MD	Assembly:	Cementing
Last depth:	2784	m MD	Bit :	-
Daily rate:	-	m	Bit-on-bottom time:	- h
Last shoe:	9 5/8"	In depth 2779 m	Mud type, weight:	Glycol drill 1.15 kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	-	-	-
-	-	-	C _{tot} : [%]	Ø D _{in} [l/min]	-	-
CH-tot – carbon hydrogen total						

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member	
1245	1366	Tertiary	Paleocene	Chalk	Houthem		
1366	2320		Upper Cretaceous to Early Paleocene		Ommelanden		
2320	2332				Texel / Texel Greensand		
2332	2420		Rijnland	Holland / Spijkenisse Greensand			
2420	2446			Holland / Lower Holland Marl			
2446	2532			Vlieland Sandstone / De Lier Sandstone			
2532	2616			Vlieland Sandstone / IJsselmonde Sandstone			
2616	2625	Cretaceous	Lower Cretaceous	Keuper	Upper Keuper Claystone		
2625	2649				Dolomitic Keuper		
2649	2652,5				Red Keuper Claystone		
2652,5	2657			Muschelkalk	Middle Muschelkalk Marl		
2657	2659				Muschelkalk Evaporite		
2659	2693	Triassic	Middle to Upper Triassic	Röt	Lower Muschelkalk		
2693	2708				Upper Röt Fringe Claystone		
2708	2719				Röt Fringe Sandstone		
2719	2730			Solling	Lower Röt Fringe Claystone		
2730	2732				Solling Claystone		
2732	2767	Lower Triassic	Hardegsen		Basal Solling Sandstone		
2767	(2784)						
() = base not yet drilled				Stratigraphy preliminary			

Lithology	
Top [m MD]	Base [m MD]
2740	(2784)

2740	(2784)	Sand , light grey, fairly sorted, with fine to medium grained Quartz, clear, milky, orange, subangular and rare coarse grained, rounded to well rounded, matt Quartz grains. Sandstone, off-white, fine to medium grained, poorly sorted, calcareous, rarely with orange hypidiomorphic Calcite. Occasional green and red claystone, a.p.d.. Acc.: Glauconitic marlstone, Glauconite (cavings from Texel and Vlieland Sandstone), Pyrite, limestone.
() = Base not yet drilled		

Remarks: Cementing job. POOH cementing equipment. BOP-test.
Crew: F. Schamberger (day) / F. Hinz (night)

Geological daily report No.**31****Date: 01.08.2015**

Depth:	2784	m MD	Assembly:	8 1/2"-Autotrack-drilling-BHA		
Last depth:	2784	m MD	Bit :	8 1/2 " PDC-microcore bit / S/N: S4m3634; Type: MR616M; IADC: m423		
Daily rate:	-	m	Bit-on-bottom time:	4 h		
Last shoe:	9 5/8"	In depth 2779 m	Mud type, weight:	Glycol drill / Drill Carp	1.15	kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	63	-	-
-	-	-	C _{tot} : 0.01 [%]	Ø D _{in} [l/min] 1950	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member	
1245	1366	Tertiary	Paleocene	Chalk	Houthem		
1366	2320		Upper Cretaceous to Early Paleocene		Ommelanden		
2320	2332				Texel / Texel Greensand		
2332	2420		Cretaceous	Rijnland	Holland / Spijkenisse Greensand		
2420	2446				Holland / Lower Holland Marl		
2446	2532				Vlieland Sandstone / De Lier Sandstone		
2532	2616				Vlieland Sandstone / IJsselmonde Sandstone		
2616	2625				Upper Keuper Claystone		
2625	2649	Triassic	Middle to Upper Triassic	Keuper	Dolomitic Keuper		
2649	2652,5				Red Keuper Claystone		
2652,5	2657				Middle Muschelkalk Marl		
2657	2659		Muschelkalk		Muschelkalk Evaporite		
2659	2693				Lower Muschelkalk		
2693	2708				Upper Röt Fringe Claystone		
2708	2719		Röt		Röt Fringe Sandstone		
2719	2730				Lower Röt Fringe Claystone		
2730	2732				Solingen Claystone		
2732	2767	Lower Triassic	Solingen		Basal Solingen Sandstone		
2767	(2784)				Hardegsen		

() = base not yet drilled

Stratigraphy preliminary

Lithology		
Top [m MD]	Base [m MD]	
2740	(2784)	Sand , light grey, fairly sorted, with fine to medium grained quartz, clear, milky, orange, subangular and rare coarse grained, rounded to well rounded, matt quartz grains. Sandstone, off-white, fine to medium grained, poorly sorted, calcareous, rarely with orange hypidiomorphic calcite. Occasional green and red claystone, a.p.d.. Acc.: Glauconitic marlstone, glauconite (cavings from Texel and Vlieland Sandstone), pyrite, limestone.

() = Base not yet drilled

Remarks: Changing mud, cleaning pits, RIH . DOC to 2777 m. Displace to Drill Carp; circulating.

Crew: F. Schamberger (day) / F. Hinz (night)

Geological daily report No.**32****Date: 02.08.2015**

Depth:	2902	m MD	Assembly:	8 1/2"-Autotrack-drilling-BHA		
Last depth:	2784	m MD	Bit :	8 1/2 " PDC-microcore bit / S/N: S4m3634; Type: MR616M; IADC: m423		
Daily rate:	118	m	Bit-on-bottom time:	11 h		
Last shoe:	9 5/8"	In depth	2779 m	Mud type, weight:	Drill Carb	1.13 kg / l

Depth Reference = Rig floor

Gas shows						
C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	60,5	0,1	-
0,07	0,23	2869	C _{tot} : 0,1 [%]	Ø D _{in} [l/min] 1961		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate						
Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
1366	2320	Cretaceous	Upper Cretaceous to Early Paleocene		Ommelanden	
2320	2332				Texel / Texel Greensand	
2332	2420		Lower Cretaceous	Rijnland	Holland / Spijkenisse Greensand	
2420	2446				Holland / Lower Holland Marl	
2446	2532				Vlieland Sandstone / De Lier Sandstone	
2532	2616				Vlieland Sandstone / IJsselmonde Sandstone	
2616	2625	Triassic	Middle to Upper Triassic	Keuper	Upper Keuper Claystone	
2625	2649				Dolomitic Keuper	
2649	2652,5				Red Keuper Claystone	
2652,5	2657			Muschelkalk	Middle Muschelkalk Marl	
2657	2659				Muschelkalk Evaporite	
2659	2693				Lower Muschelkalk	
2693	2708		Röt		Upper Röt Fringe Claystone	
2708	2719				Röt Fringe Sandstone	
2719	2730				Lower Röt Fringe Claystone	
2730	2732		Solling	Solling Claystone		
2732	2767				Basal Solling Sandstone	
2767	(2890)		Hardegsen			
() = base not yet drilled				Stratigraphy preliminary		

Lithology		
Top [m MD]	Base [m MD]	
2740	2784	Sand , light grey, fairly sorted, with fine to medium grained quartz, clear, milky, orange, subangular and rare coarse grained, rounded to well rounded, matt quartz grains. Sandstone, off-white, fine to medium grained, poorly sorted, calcareous, rarely with orange hypidiomorphic calcite. Occasional green and red claystone, a.p.d.. Acc.: Glauconitic marlstone, glauconite (cavings from Texel and Vlieland Sandstone), pyrite, limestone.

2784	2790	Samplings completely contaminated with cement .
2790	(2890)	Sand(stone) , off white, grey white, fine grained, well sorted, carbonatic, completely milled to loose grains without coarse fraction: quartz clear, translucent to milky white, rarely orange, pale red, sub-rounded to rounded. Acc.: claystone (light reddish brown), rarely glauconite, pyrite.

() = Base not yet drilled

Remarks: Displace to Drill Carb; circulating. DOC to shoetrack. Drilling formation. LOT. Continue drilling.

Crew: F. Schamberger (day) / F. Hinz (night)

Geological daily report No.**33****Date: 03.08.2015**

Depth:	3101	m MD	Assembly:	8 1/2"-Autotrack-drilling-BHA		
Last depth:	2902	m MD	Bit :	8 1/2 " PDC-microcore bit / S/N: S4m3634; Type: MR616M; IADC: m423		
Daily rate:	199	m	Bit-on-bottom time:	21.4 h		
Last shoe:	9 5/8"	In depth	2779 m	Mud type, weight:	Drill Carb	1.14 kg / l

Depth Reference = Rig floor

Gas shows						
C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	57.8	0.2	-
0.24	0.9	3047	C _{tot} : - [%]	Ø D _{in} [l/min] 2187		

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member	
2616	2625	Triassic	Middle to Upper Triassic	Keuper	Upper Keuper Claystone		
2625	2649				Dolomitic Keuper		
2649	2652,5				Red Keuper Claystone		
2652,5	2657			Muschelkalk	Middle Muschelkalk Marl		
2657	2659				Muschelkalk Evaporite		
2659	2693				Lower Muschelkalk		
2693	2708		Röt	Röt	Upper Röt Fringe Claystone		
2708	2719				Röt Fringe Sandstone		
2719	2730				Lower Röt Fringe Claystone		
2730	2732		Lower Triassic	Solling	Solling Claystone		
2732	2767				Basal Solling Sandstone		
2767	2869			Hardegsen			
2869	2884			Detfurth		Lower Detfurth Sandstone	
2884	3028.5			Volpriehausen	Upper Volpriehausen Sandstone		
3028.5	3088.5	Permian - Triassic			Lower Volpriehausen Sandstone		
3088.5	(3101)	Lower Buntsandstein		Rogenstein			

() = base not yet drilled

Stratigraphy preliminary

Lithology		
Top [m MD]	Base [m MD]	

2740	2784	Sand , light grey, fairly sorted, with fine to medium grained quartz, clear, milky, orange, subangular and rare coarse grained, rounded to well rounded, matt quartz grains. Sandstone, off-white, fine to medium grained, poorly sorted, calcareous, rarely with orange hypidiomorphic calcite. Occasional green and red claystone, a.p.d.. Acc.: Glauconitic marlstone, glauconite (cavings from Texel and Vlieland Sandstone), pyrite, limestone.
2784	2795	Samplings completely contaminated with cement .
2795	2870	Sand(stone) , off white, grey white, fine grained, well sorted, carbonatic, slightly dolomitic, completely milled to loose grains without coarse fraction: quartz clear, translucent to milky white, rarely orange, pale red, subrounded to rounded. Acc.: claystone (light reddish brown), rarely glauconite, pyrite.
2870	2885	Sand(stone) , grey white, fine grained, well sorted, with white, brittle, carbonatic matrix, also slightly dolomitic, completely milled to loose grains a.p.d. Acc.: claystone.
2885	3030	Sand(stone) , grey white to light brownish white, predominantly fine to medium grained, moderately sorted, with intercalated layers of very fine grained, well sorted sandstone; carbonatic, slightly dolomitic matrix, decreasing to the bottom. Quartz grains clear, translucent to milky white, occasionally pale red, light orange and light yellow, subrounded to rounded. Acc.: claystone, rarely calcite in the upper part.
3030	3090	Sand(stone) , grey white to light brownish white, predominantly fine to medium grained, occasionally coarse grained, moderately to poorly sorted. carbonatic, slightly dolomitic matrix, increasing at the base with a stronger cementation. Quartz grains a.p.d.. Acc.: claystone, rarely pyrite.
3090	(3101)	Claystone , redbrown, blocky, platy, friable to moderately hard, partly silty; occasionally light greenish grey, platy, often with greasy surface, partly sericitic and silty. Also sandstone, light brownish white, fine- to coarse grained, poorly sorted, a.p.d.. Acc.: rarely iron oolites, dark brown and pyrite.

() = Base not yet drilled

Remarks: Continue drilling. Final depth at 3101 m. Circulating. PO to shoe. Flow check. Circulating. Continue PO.

Crew: F. Schamberger (day) / F. Hinz (night)

Geological daily report No.**34****Date: 04.08.2015**

Depth:	3101 FD	m MD	Assembly:	6 5/8" liner run	
Last depth:	3101	m MD	Bit :	-	
Daily rate:	-	m	Bit-on-bottom time:	- h	
Last shoe:	9 5/8"	In depth	2779 m	Mud type, weight:	Drill Carb 1.14 kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	-	-	-
-	-	-	C _{tot} : < 0.01 [%]	Ø D _{in} [l/min]	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
2616	2625	Triassic	Middle to Upper Triassic	Keuper	Upper Keuper Claystone	
2625	2649				Dolomitic Keuper	
2649	2652,5				Red Keuper Claystone	
2652,5	2657			Muschelkalk	Middle Muschelkalk Marl	
2657	2659				Muschelkalk Evaporite	
2659	2693		Röt	Lower Muschelkalk	Lower Röt Fringe Claystone	
2693	2708			Röt Fringe Sandstone		
2708	2719			Lower Röt Fringe Claystone		
2719	2730			Solling	Solling Claystone	
2730	2732				Basal Solling Sandstone	
2732	2767	Lower Triassic	Hardegsen			
2767	2869			Detfurth	Lower Detfurth Sandstone	
2869	2884		Volpriehausen			Upper Volpriehausen Sandstone
2884	3028.5				Lower Volpriehausen Sandstone	
3028.5	3088.5			Lower Buntsandstein	Rogenstein	
3088.5	(3101)	Permian - Triassic				Stratigraphy preliminary

() = base not yet drilled

Lithology		
Top [m MD]	Base [m MD]	
3090	(3101)	Claystone , redbrown, blocky, platy, friable to moderately hard, partly silty; occasionally light greenish grey, platy, often with greasy surface, partly sericitic and silty. Also sandstone, light brownish white, fine- to coarse grained, poorly sorted, a.p.d.. Acc.: rarely iron oolites, dark brown and pyrite.

() = Base not yet drilled

Remarks: POOH. Start RIH 6 ½" liner. RIH stinger and 2 7/8" inner string. Continue RIH 6 ½" liner.

Crew: F. Schamberger, A. Alin (day) / F. Hinz (night)

Geological daily report No.**35****Date: 05.08.2015**

Depth:	3101 FD	m MD	Assembly:	6 5/8" liner run		
Last depth:	3101	m MD	Bit :	-		
Daily rate:	-	m	Bit-on-bottom time:	-		
Last shoe:	9 5/8"	In depth	2779 m	Mud type, weight:	Drill Carb	1.14 kg / l

Depth Reference = Rig floor

Gas shows

C _{tot}			Trip gas	Ø Lag time [min]	Ø CH-tot [%]	H ₂ S [ppm]
Ø [%]	Max [%]	Depth [m MD]	H ₂ S: - [ppm]	-	-	-
-	-	-	C _{tot} : < 0.01 [%]	Ø D _{in} [l/min]	-	-

CH-tot – carbon hydrogen total

Last formations – after samples and drilling rate

Top [m MD]	Base [m MD]	Period	Epoch	Group	Formation	Member
2616	2625	Triassic	Middle to Upper Triassic	Keuper	Upper Keuper	Claystone
2625	2649				Dolomitic	Keuper
2649	2652.5				Red Keuper	Claystone
2652.5	2657			Muschelkalk	Middle Muschelkalk	Marl
2657	2659				Muschelkalk	Evaporite
2659	2693		Röt	Lower	Muschelkalk	
2693	2708			Upper Röt	Fringe Claystone	
2708	2719			Röt Fringe	Sandstone	
2719	2730			Lower Röt	Fringe Claystone	
2730	2732	Lower Triassic	Solling	Solling	Claystone	
2732	2767			Basal Solling	Sandstone	
2767	2869		Hardegsen			
2869	2884		Detfurth		Lower Detfurth	Sandstone
2884	3028.5		Volpriehausen	Upper Volpriehausen	Volpriehausen	Sandstone
3028.5	3088.5			Lower Volpriehausen		Sandstone
3088.5	(3101)	Permian - Triassic	Lower Buntsandstein		Rogenstein	

() = base not yet drilled

Stratigraphy preliminary

Lithology		
Top [m MD]	Base [m MD]	
3090	(3101)	Claystone , redbrown, blocky, platy, friable to moderately hard, partly silty; occasionally light greenish grey, platy, often with greasy surface, partly sericitic and silty. Also sandstone, light brownish white, fine- to coarse grained, poorly sorted, a.p.d.. Acc.: rarely iron oolites, dark brown and pyrite.
() = Base not yet drilled		
Remarks: Continue RIH 6 ½" liner. Mud change. 1000 g iron washed from the magnet. GeoService personnel leaving the site according to client's order.		
Crew: A. Alin (day) / - (night)		