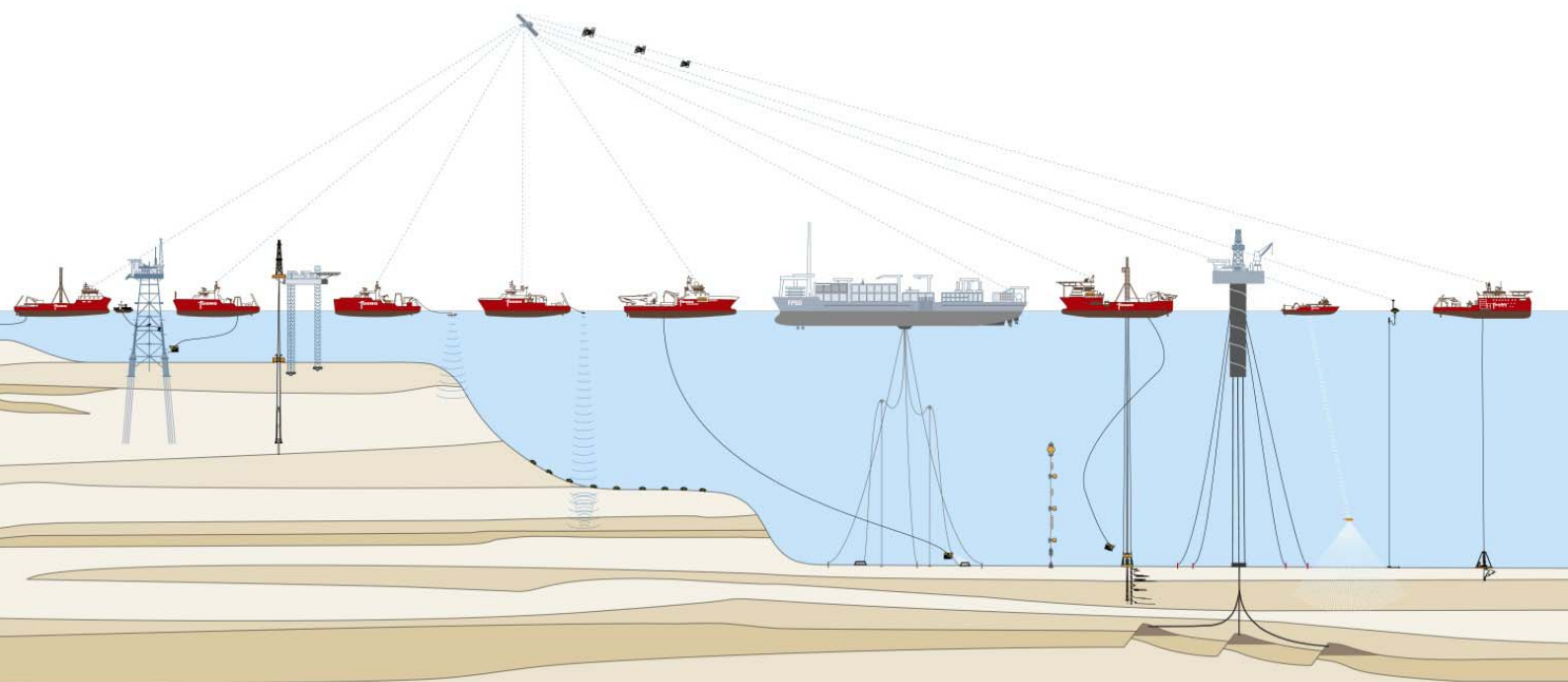


FUGRO GEOCONSULTING LIMITED

NPD Shallow Drill Holes 2015 Shallow Gas Hazard Assessment Sheets Kvitøya / Sentralbanken High

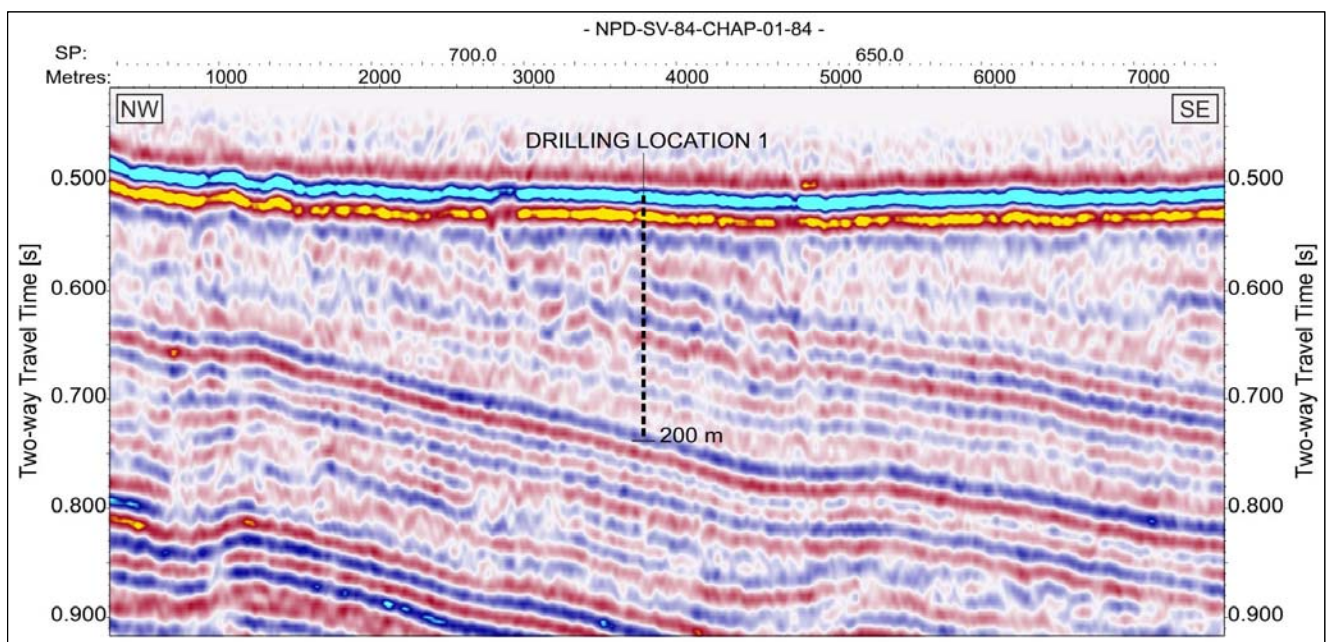
Fugro Project No.: J11293

Norwegian Petroleum Directorate



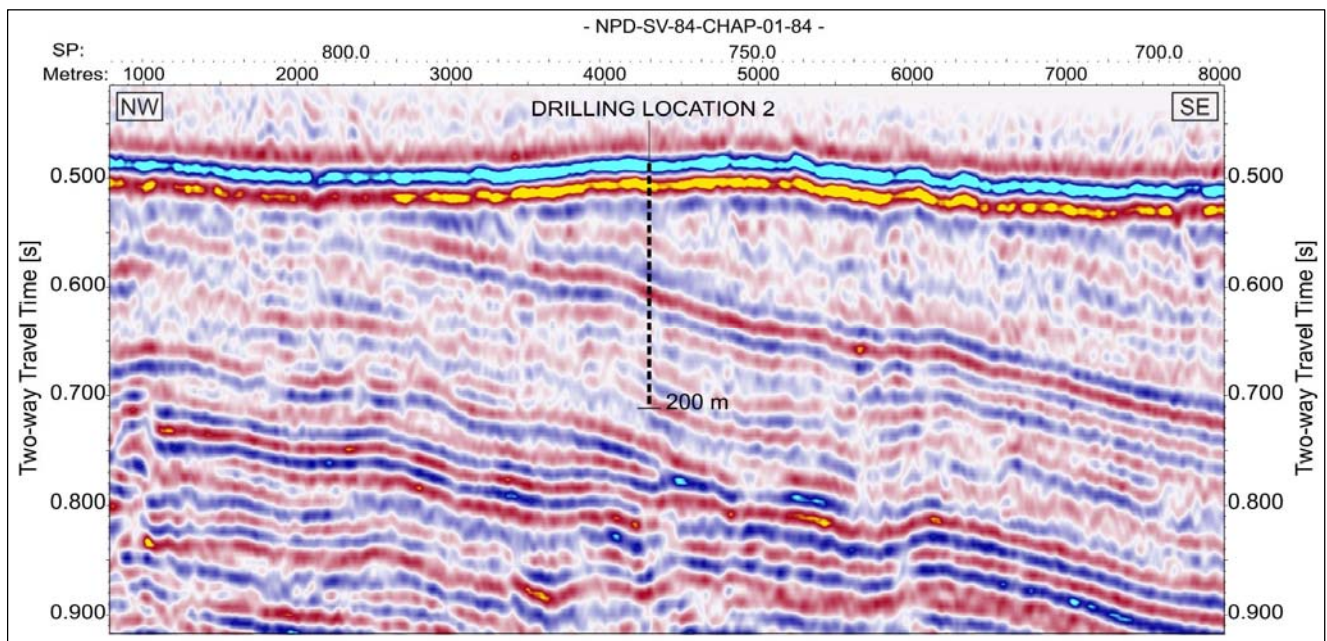
1. DRILLING LOCATION 1

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))			
Latitude:	79° 41' 46.00" N	Easting:	504 943.67 m
Longitude:	33° 14' 51.00" E	Northing:	8 847 929.62 m
Water Depth	380 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)			
Drilling Location 1 7933/4-U1	Depth below seabed [m]	Lithology	
Seabed	0	Unconsolidated mud. Thickness of Quaternary cover is uncertain (1-20m). Unconsolidated mud at top and possible more consolidated glacial moraine further down. Boulders may occur. There may occur glacial dropstones in the mud. Start coring when harder shale in Tschermakfjellet FM is reached. IntVel:2000m/s	
Tschjermakfjellet Carnian	18	Black consolidated shale, occasional with thin sandstringers. Red shale with siderite nodules may be present close to the Botneheia FM. May represent a drilling concern. IntVel: 3200m/s	
Botneheia Ladinian	68	Botneheia consists of black consolidated organic-rich shale. The uppermost third part of the formation is anticipated to include numerous small phosphate nodules. At the top of Botneheia FM chert nodules may be present and represent a drilling concern. IntVel: 3200m/s	
Vikinghøgda Induan	172	This part of Vikinghøgda FM is probably developed as black consolidated shale. IntVel: 3300m/s	
TD Intra Induan	200		
Potential for Shallow Gas			
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Drilling Location 1. The probability of encountering shallow gas at Drilling Location 1 is considered to be negligible.			



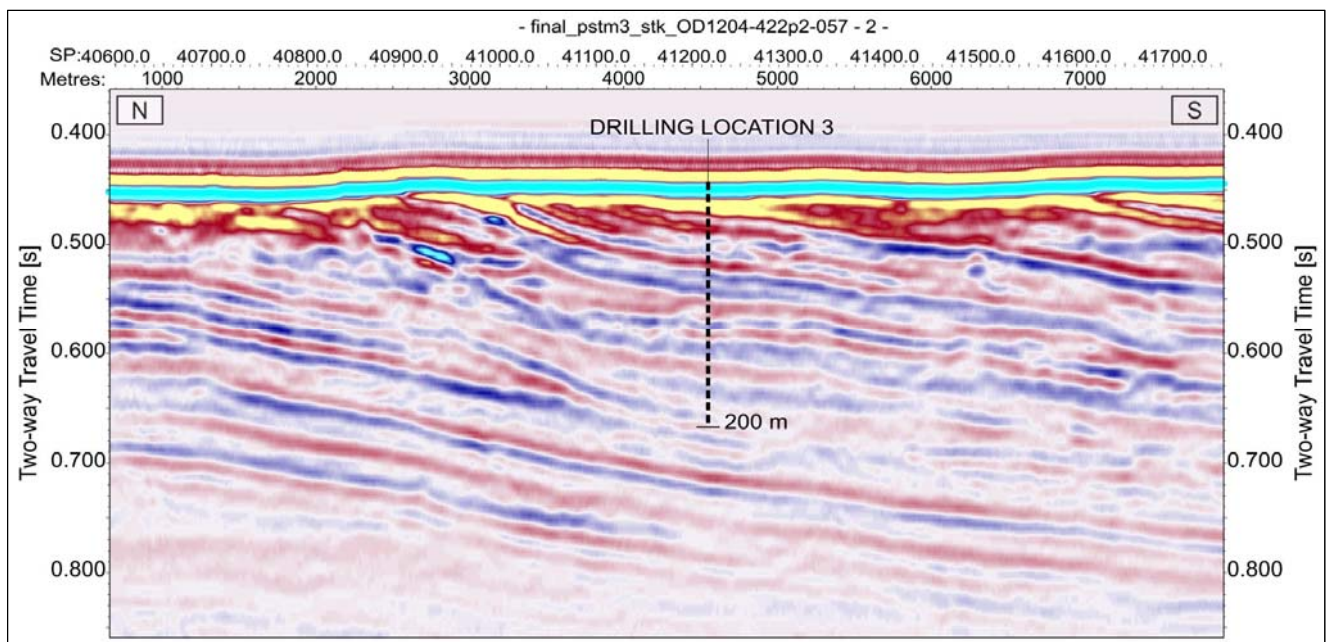
2. DRILLING LOCATION 2

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))			
Latitude:	79° 43' 26.00" N	Easting:	501 508.16 m
Longitude:	33° 04' 33.00" E	Northing:	8 851 023.79 m
Water Depth	363 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)			
Drilling Location 2 7933/4-U2	Depth below seabed [m]	Lithology	
Seabed	0	Unconsolidated Mud. Thickness of Quaternary cover is uncertain (1-18m). Unconsolidated mud at top and possible more consolidated glacial moraine further down. Boulders may occur. There may occur glacial dropstones in the mud. Start coring when harder Induan shale is reached. IntVel: 2000m/s	
Intra Induan	16	Black consolidated shale. Some carbonate-cemented sandstones may occur. IntVel:3300/m/s	
T Permian	145	Permian Carbonates with chert may be very hard to drill. If drilling progress is reduced dramatically the drilling will be stopped shortly after reaching the top of the carbonates. IntVel: 3800m/s	
TD Intra Permian	200		
Potential for Shallow Gas			
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Drilling Location 2. The probability of encountering shallow gas at Drilling Location 2 is considered to be negligible.			



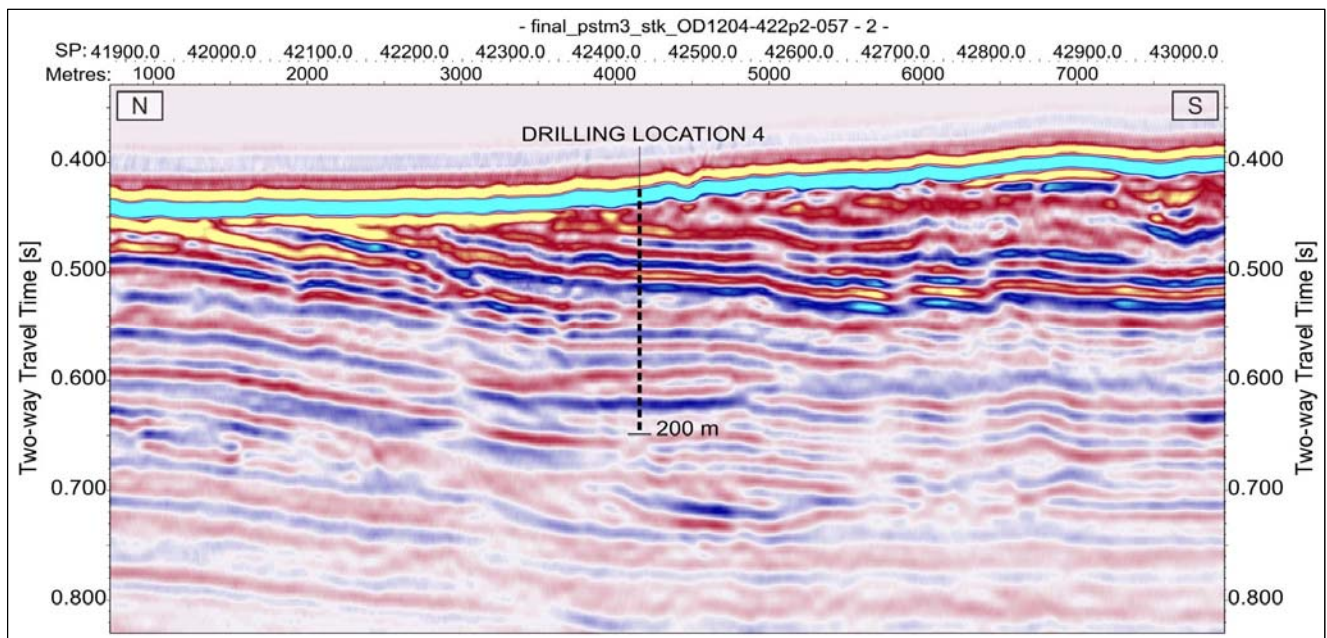
3. DRILLING LOCATION 3

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))			
Latitude:	79° 34' 49.00" N	Easting:	553 880.88 m
Longitude:	34° 40' 42.00" E	Northing:	8 835 488.00 m
Water Depth	333 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)			
Drilling Location 3 7934/6-U1	Depth below seabed [m]	Lithology	
Seabed	0	Unconsolidated mud. Thickness of Quaternary cover is uncertain (1-10m). Start coring when harder shale or sandstone in the Triassic is reached. There may occur glacial dropstones in the mud. IntVel; 2000m/s	
Flatsalen	7	The dominant lithology in the lower part of Flatsalen FM is dark grey silty shale interrupted with some finegrained sandstones. At the boundary between the Flatsalen and De Geerdalen formations a thin conglomerate (Slottet bed) may occur. IntVel:3000m/sek	
Intra Flatsalen	39		
Top De Geerdalen	106	The main lithology of the De Geerdalen FM is expected to vary between shale, siltstone and sandstone deposited in shallow marine to fluvial conditions. Fluvial channels may contain coarser sandstone, but on average the sandstone will be fine to medium grained. IntVel: 3200m/s	
TD Intra De Geerdalen	200		
Potential for Shallow Gas			
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Drilling Location 3. High amplitude reflectors are identified at this location however these are interpreted to be the result of lithological factors. The probability of encountering shallow gas at Drilling Location 3 is considered to be negligible.			



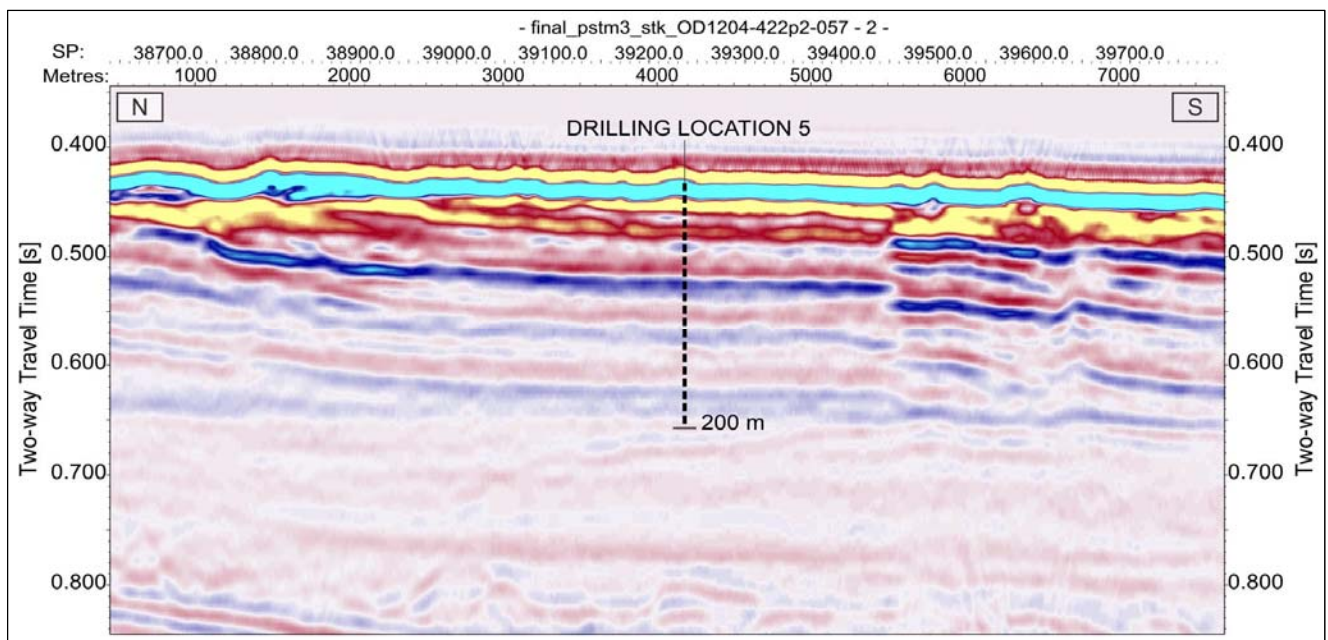
4. DRILLING LOCATION 4

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))			
Latitude:	79° 30' 44.00" N	Easting:	534 139.88 m
Longitude:	34° 40' 49.00" E	Northing:	8 827 889.00 m
Water Depth	320 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)			
Drilling Location 4 7934/6-U2		Depth below seabed [m]	Lithology
Seabed		0	Unconsolidated mud. Thickness of Quaternary cover is uncertain (1-10m). Start coring when the sands in the Sjøgrenfjellet is reached. There may occur glacial dropstones in the mud. IntVel:2000m/s
Sjøgrenfjellet Mbr		7	The main lithology of the Sjøgrenfjellet Mbr in the area is expected to consist of relatively low consolidated sandstone or sand with some thinner shale between the sand units. Grainsize fine to medium sand.IntVel: 2800ms
T. Triassic (T Flatsalen)		65	The upper part of Flatsalen FM is expected to contain upward coarsening shale silt and sandstones. The grainsize for the sandstones are belived to be very fine to fine. IntVel:3000m/s
TD Flatsalen		200	
Potential for Shallow Gas			
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Drilling Location 4. High amplitude reflectors are identified at this location however these are interpreted to be the result of lithological factors. The probability of encountering shallow gas at Drilling Location 4 is considered to be negligible.			



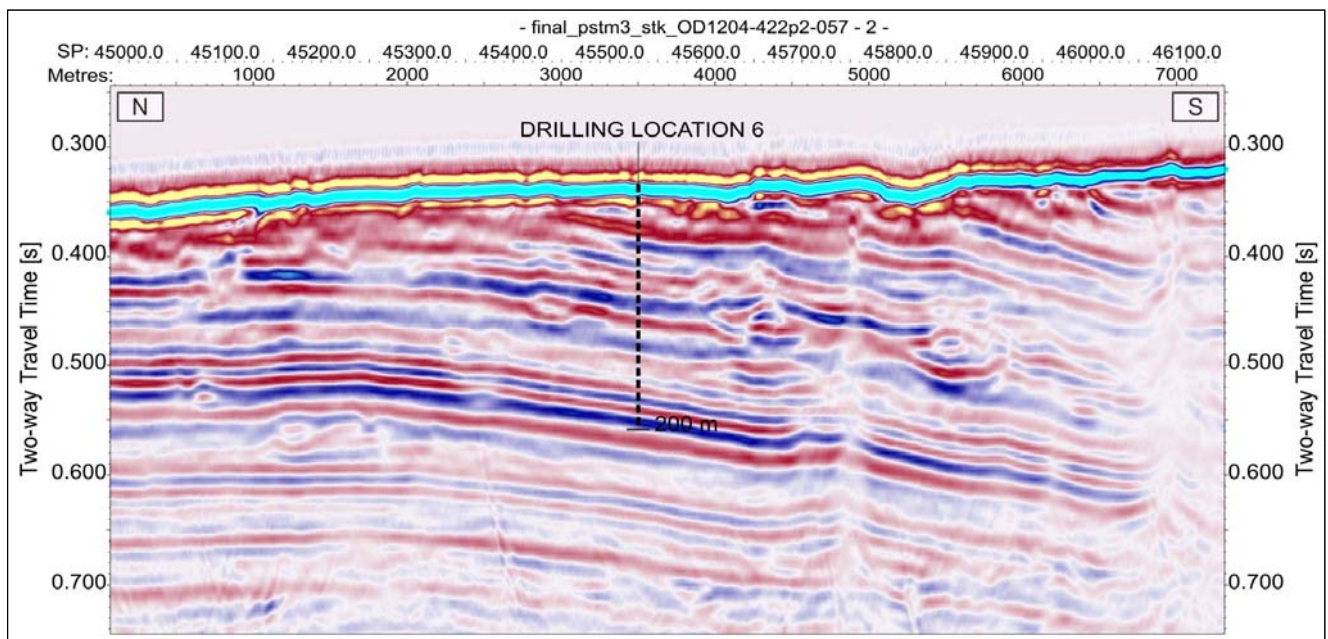
5. DRILLING LOCATION 5

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))			
Latitude:	79° 41' 28.00" N	Easting:	533 457.44 m
Longitude:	34° 40' 29.00" E	Northing:	8 847 851.00 m
Water Depth	325 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)			
Drilling Location 5 7934/6-U3	Depth below seabed [m]	Lithology	
Seabed	0	Unconsolidated mud. Thickness of Quaternary cover is uncertain (1-13m). There may occur glacial dropstones in the mud. Start coring when harder shale or sandstone in De Geerdalen is reached. IntVel:2000m/s	
De Geerdalen	11	The main lithology of the De Geerdalen FM is expected to vary between shale, siltstone and sandstone deposited in shallow marine to fluvial conditions. Fluvial channels may contain coarser sandstone, but on average the sandstone will be fine to medium grained. IntVel: 3200m/s	
Intra De Geerdalen	131		
TD Intra de Geerdalen	200		
Potential for Shallow Gas			
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Drilling Location 5. High amplitude reflectors are identified at this location however these are interpreted to be the result of lithological factors. The probability of encountering shallow gas at Drilling Location 5 is considered to be negligible.			



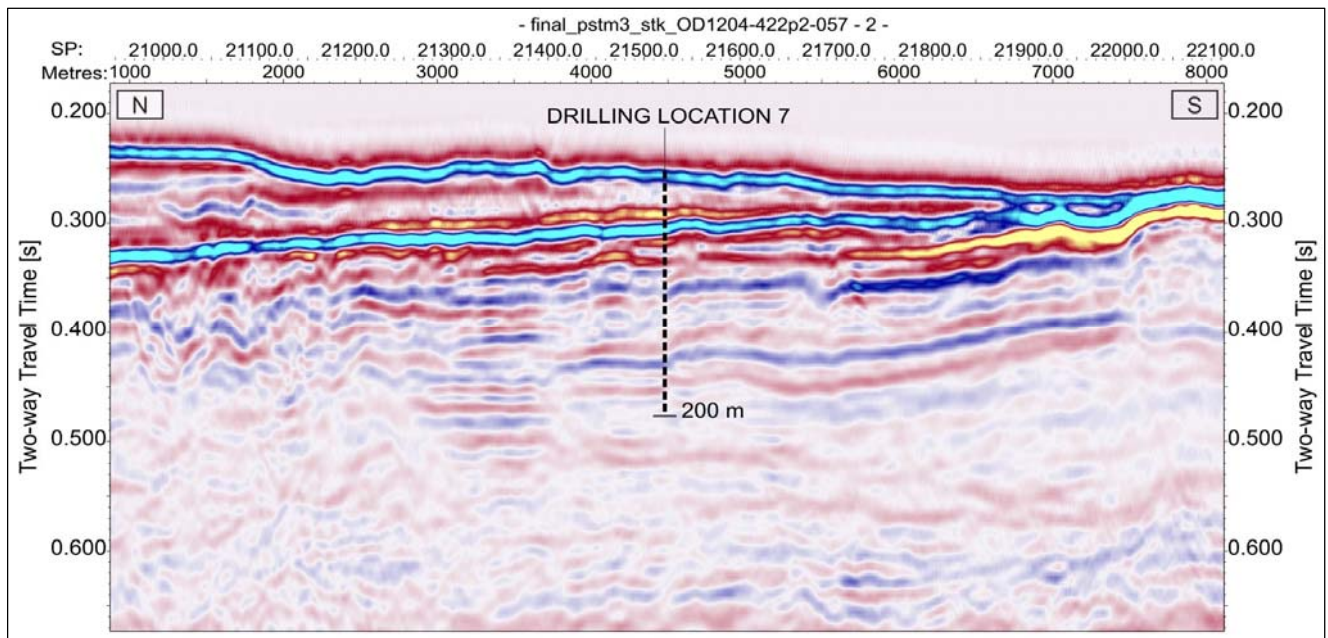
6. DRILLING LOCATION 6

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))			
Latitude:	79° 20' 20.00" N	Easting:	534 812.94 m
Longitude:	34° 41' 09.00" E	Northing:	8 808 559.00 m
Water Depth	250 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)			
Drilling Location 6 7934/9-U1	Depth below seabed [m]	Lithology	
Seabed	0	Unconsolidated mud. Thickness of Quaternary cover is uncertain (1-10m). There may occur glacial dropstones in the mud. Start coring when the expected Jurassic rocks are reached. IntVel:2000m/s	
Agardhfjellet FM	8	Black shale and siltstone. Large uncertainties around the stratigraphic level. IntVel: 2800m/s	
Kongsøya FM	65	The formation is complex and consists of mudstone sandstone and conglomerate. Large siderite nodules and siderite beds may occur and may represent a drilling concern. Top of the formation contains the Brentskardhaugen bed (conglomerate) which may contain large amounts of Bellemnites and phosphate nodules. IntVel: 3200m/s	
Svenskøya FM	145	The main lithology of the Svenskøya FM in the area is expected to consist of low consolidated sandstone with some thinner shale between the sand units. Grain size: fine to medium sand. IntVel: 2800ms	
TD Intra Svenskøya FM	200		
Potential for Shallow Gas			
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Drilling Location 6. High amplitude reflectors are identified at this location however these are interpreted to be the result of lithological factors. The probability of encountering shallow gas at Drilling Location 6 is considered to be negligible.			



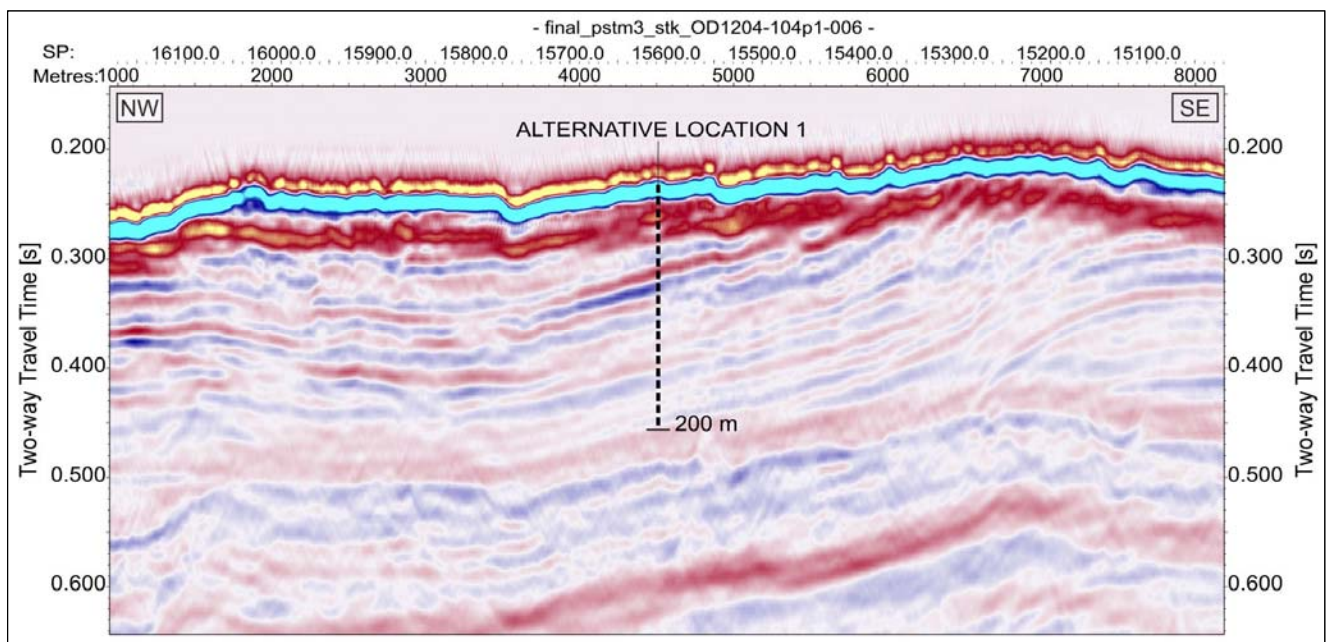
7. DRILLING LOCATION 7

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))				
Latitude:		80° 40' 57.00" N	Easting:	529 629.50 m
Longitude:		34° 38' 22.00" E	Northing:	8 958 460.00 m
Water Depth		189 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)				
Drilling Location 7 8034/5-U1		Depth below seabed [m]	Lithology	
Seabed		0	Unconsolidated Mud. Thickness of Quaternary cover is uncertain (1-12m). There may occur glacial dropstones in the mud. Start coring when the mud is penetrated. IntVel:2000m/s	
Paleogen-Pleistocene		10	Relative low consolidated sandstone and/or mudstone. Age unknown. IntVel stipulated: 2800m/s	
Unconformity		63	Distinct unconformity below young sediments	
TD		128	Probably well consolidated sediments of unknown age. Triassic-Late Precambrian. The velocity may be much higher if the rocks below the unconformity turns out to be older than Triassic. IntVel stipulated: 3600m/s	
Potential for Shallow Gas				
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Drilling Location 7. High amplitude reflectors are identified at this location however these are interpreted to be the result of lithological factors. The probability of encountering shallow gas at Drilling Location 7 is considered to be negligible.				



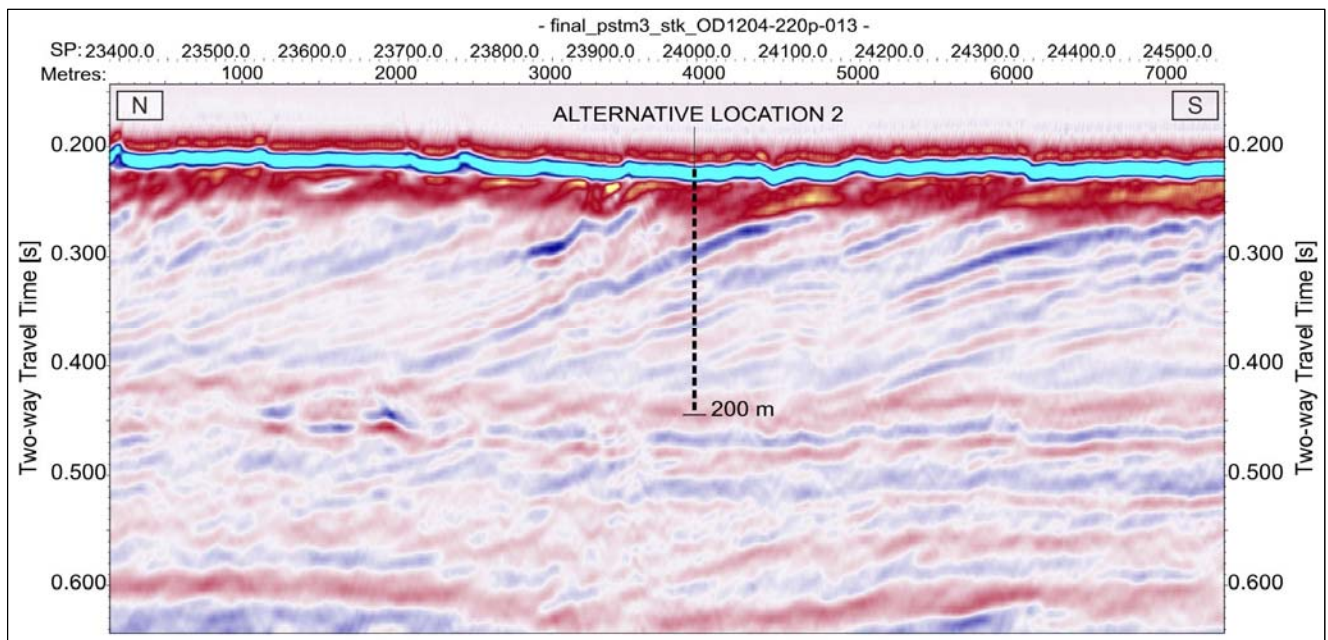
8. ALTERNATIVE LOCATION 1

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))			
Latitude:	75° 38' 00.00" N	Easting:	545 135.55 m
Longitude:	34° 37' 47.00" E	Northing:	8 395 133.26 m
Water Depth	190 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)			
Alternative Location 1 7534/5-U1	Depth below seabed [m]	Lithology	
Seabed	0	Unconsolidated mud at top and more consolidated glacial moraine. Boulders may occur. Thickness of Quaternary cover is uncertain in the range 1-10 m. Start coring when the drill bit hits a harder shale or sandstone in the Ladinian. IntVel; 2000m/s	
E Ladin	10	The dominant lithology in the Early Ladin in the area expects to contain dark shale, silt and possibly some thin sandstone beds. IntVel:3000m/sek	
T Anis	56	Lithology and top of the prognosed Anisian succession is uncertain. The interval assumes to contain shale and sandstones in an upward coarsening succession. T. Anis may occur one amplitude sequence further down than put forward on the seismic interpretation. IntVel: 3200m/s -	
Intra Anis reflector	123	The Interval expects to contain an upward coarsening sequence from shale to sandstone at the top. A hard carbonate cemented sandstone may occur at the top of the sequence. IntVel: 3200m/s	
TD Intra Anis	200		
Potential for Shallow Gas			
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Alternative Location 1. High amplitude reflectors are identified at this location however these are interpreted to be the result of lithological factors. The probability of encountering shallow gas at Alternative Location 1 is considered to be negligible.			



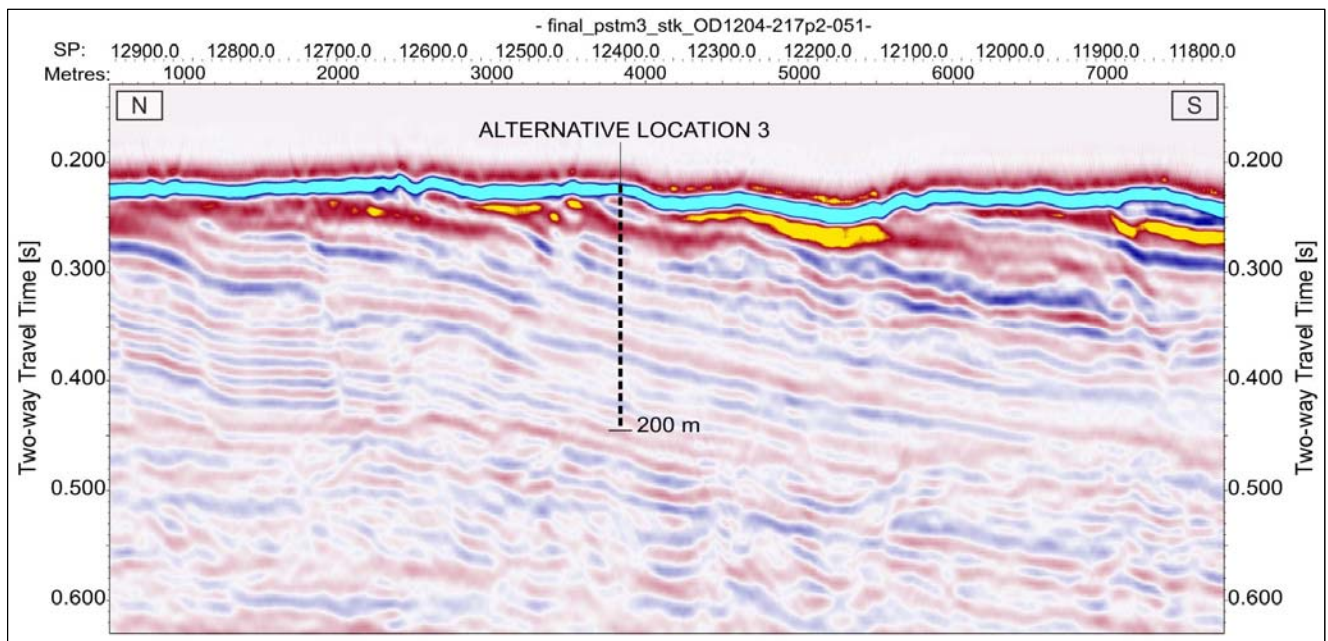
9. ALTERNATIVE LOCATION 2

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))			
Latitude:	75° 35' 34.00" N	Easting:	560 360.75 m
Longitude:	35° 10' 24.00" E	Northing:	8 391 131.60 m
Water Depth	165 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)			
Alternative Location 2 7535/4 U-1	Depth below seabed [m]	Lithology	
Seabed	0	Unconsolidated mud at top and more consolidated glacial moraine. Boulders may occur. Thickness of Quaternary cover is uncertain in the range 1-10 m. Start coring when the drilling bit reach harder shale or sandstone in the Olenekian. IntVel; 2000m/s	
Olenekian	7	The lithology of this Olenekian interval is uncertain, but expects to contain grey to dark shale and sandstones in a shallow marine environment. IntVel:3200m/sec	
Intra Olenekian	113	The Interval from 296ms to TD is expected to contain an upward coarsening sequence from shale to sandstone and end up with a hard carbonate layer at the top. IntVel: 3200m/s -	
TD Intra Olenekian	200	TD at 200m below sea Bottom expects to have a position very close to a positive amplitude reflector at 354ms, which may represent top of a softer shale below	
Potential for Shallow Gas			
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Alternative Location 2. The probability of encountering shallow gas at Alternative Location 2 is considered to be negligible.			



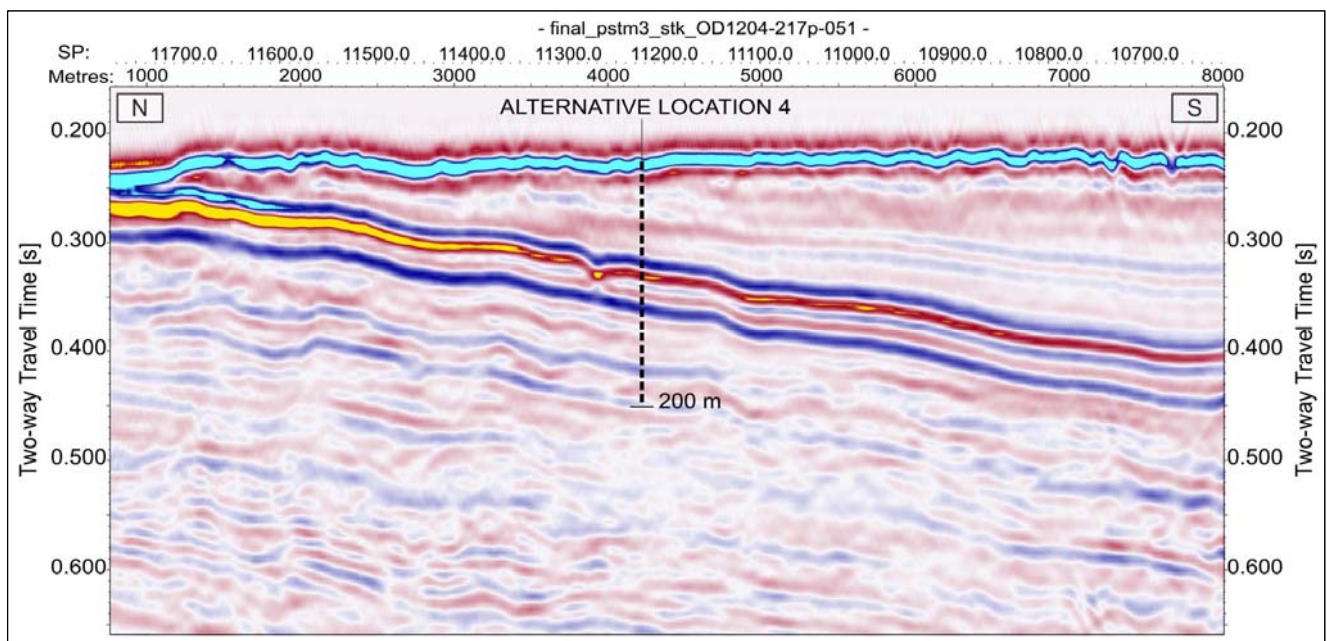
10. ALTERNATIVE LOCATION 3

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))			
Latitude:	75° 07' 17.00" N	Easting:	576 164.84 m
Longitude:	35° 39' 27.00" E	Northing:	8 339 071.43 m
Water Depth	168 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)			
Alternative Location 3 7535/11-U1	Depth below seabed [m]	Lithology	
Seabed	0	Unconsolidated mud at top and more consolidated glacial moraine. Boulders may occur. Thickness of Quaternary cover is uncertain in the range 1-10 m. Start coring when the drill bit hits harder shale or sandstone in the Realgrunnen. IntVel; 2000m/s	
Realgrunnen	7	The dominant lithology in the Realgrunnen in the area is expected to contain low consolidated sandstones and thinner beds of dark shale. IntVel:2800m/sek	
T. Trias	85	Lithology and top of the prognosed T. Trias succession is assumed to contain consolidated shale IntVel: 3000m/s -	
Carnian 6	130	The Interval in Carnian is interpreted to contain an upward coarsening sequence from shale to sandstone at the top in Carnian 6 and sandstone in Carnian 5. A thin conglomerate may occur at top of Carnian 6. IntVel: 3200m/s	
Carnian 5	197		
TD	200		
Potential for Shallow Gas			
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Alternative Location 3. The probability of encountering shallow gas at Alternative Location 3 is considered to be negligible.			



11. ALTERNATIVE LOCATION 4

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))			
Latitude:		75° 03' 18.00" N	Easting: 576 546.57 m
Longitude:		35° 39' 35.00" E	Northing: 8 331 697.34 m
Water Depth		169 metres (based on supplied information)	
Shallow Succession (reproduced from supplied NPD information pack)			
Alternative Location 4 7535/11-U2	Depth below seabed [m]	Lithology	
Seabed	0	Unconsolidated mud at top and more consolidated glacial moraine. Boulders may occur. Thickness of Quaternary cover is uncertain in the range 1-10 m. Start coring when drilling has reached the harder shale or sandstone in the Cretaceous. IntVel; 2000m/s	
Cretaceous	9	The lithology of the lower Cretaceous in the area is uncertain, but interpreted to contain gray shale, marl and sandstones. IntVel:2800m/sek	
IntraCretaceous	78	Positive amplitude at 287 ms may contain a sandstone IntVel:2800m/sek	
B.Cretaceous	126	An unconformity between Cretaceous and Jurassic is expected at level 321 ms.(White hard reflector). The Interval between BCU and TD is expected to contain black organic rich shale in the Late Jurassic. IntVel: 3000m/s -	
TD Late Jurassic	200	The drilling is prognosed to end in the Late Jurassic black shale, but dependent on the velocity the Realgrunnen may be reached.	
Potential for Shallow Gas			
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Alternative Location 4. High amplitude reflectors are identified at this location however these are interpreted to be the result of lithological factors. The probability of encountering shallow gas at Alternative Location 4 is considered to be negligible.			



12. ALTERNATIVE LOCATION 5

Location Information (Geodetic Datum: ED50, Grid: UTM Zone 36N (CM: 33°E))				
Latitude:		75° 00' 00.00" N	Easting:	576 889.10 m
Longitude:		35° 39' 42.00" E	Northing:	8 325 562.43 m
Water Depth		169 metres (based on supplied information)		
Shallow Succession (reproduced from supplied NPD information pack)				
Alternative Location 5 7535/11-U3		Depth below seabed [m]	Lithology	
Seabed		0	Unconsolidated mud at top and more consolidated glacial moraine. Boulders may occur. Thickness of Quaternary cover is uncertain in the range 2-15 m. Start coring when the drilling has reached the harder shale or sandstone in the Cretaceous. IntVel; 2000m/s	
Cretaceous		12	The lithology of the lower Cretaceous in the area is uncertain, but interpreted to contain gray shale, marl and sandstones. IntVel:2800m/s	
IntraCretaceous		83	Positive amplitude at 291ms may define a sandstone	
TD Intra Cretaceous		142	TD is probably situated in a shale	
Potential for Shallow Gas				
No anomalous amplitudes, gas blanking or velocity draw-down have been identified at Alternative Location 5. The probability of encountering shallow gas at Alternative Location 5 is considered to be negligible.				

