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UMIIVIK-1

Well summary Umiivik-1, Svartenhuk Halvø, West Greenland

Bate, K.J.

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DANMARKS OG GRØNLANDS GEOLOGISKE UNDERSØGELSE RAPPORT 1996/27

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Geological Survey of
Denmark and Greenland

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1.0 PERTINENT WELL DATA, INTRODUCTION AND SUMMARY

1.1 Pertinent well data

Well:	Umiivik –1
Well profile:	Vertical hole to 1200 m.
Location:	Southern coast of Umiivik bay, close to shot point 86 on seismic line GGU SVA 94-01 (Fig. 1).
Coordinates:	71° 36' 42" N, 54° 02' 31" W.
Elevation:	Ground level approximately 5 m above mean sea level.
Depths:	All depths are measured from drill floor. Elevation of drill floor above ground level approximately 2 m.
Total depth:	Umiivik–1, 1200 m.
Hole diameter:	Umiivik–1: 114.3 mm (HW) from surface to 32 m, 96.0 mm (HQ) from HQ hole to 180 m, 75.7 mm (NQ) from HQ hole to 1200 m.
Core diameter:	Umiivik–1: 63.6 mm (HQ) from surface to 180 m, 47.6 mm (NQ) from HQ hole to 1200 m.
Casing:	Umiivik–1: HW conductor casing to 35 m, O.D. 114.3 mm, I.D. 101.6 mm, NW surface casing to 180 m, O.D. 88.9 mm, I.D. 76 mm.
Drilling mud, fuel and additives:	Fresh water from nearby stream (Sample 439303) Quik-trol polymer (Sample 439305) Diesel (Sample 439308) Jet Fuel (Sample 439307) Glycol (Sample 439306).
Objective:	Stratigraphic hole to penetrate a marine Cenomanian – Turonian sedimentary succession within which an oil prone source rock was anticipated.

DRILLING PROGRAMME

Date arrival Umiivik–1:	18th August, 1995
Date spudded:	21st August, 1995
Date drilling:	21st August, 1995
Date of TD:	13th September, 1995
Date released:	15th September, 1995
Days on location:	29
Well status:	Plugged and abandoned.
Conventional cores:	The hole was cored throughout with close to 100% recovery.
Drilling problems:	Drilling proceeded with minimal problems. However intermittent problems were experienced with vibration of the drill rods against the sidewall of the hole occasionally resulting in twisting-off and shearing of the drill rods. Overcome by the use of polymer mud system. From a depth of 950 m the core barrel repeatedly jammed due to heavily fractured formation.
Operator:	Geological Survey of Denmark and Greenland.
Operational contractor:	grønArctic energy inc.
Drilling contractor:	Petro Drilling Limited.
Drilling rig:	Diamond drill Longyear fly-in 50
Personnel on site during drilling:	Cam Hanna, operations manager, grønArctic Rod McCuaig, drilling supervisor Albert Strongman, drilling supervisor Kevin Bate, wellsite geologist, GEUS John Boserup, geotechnician, GEUS Kim Zinck-Jørgensen, GEUS Helge Silvurberg, pilot, Greenland Air Sivert Olsen, mechanic, Greenland Air Finn Lennard, mechanic, Greenland Air Barry Mathews, foreman, Petro Drilling Patrick Lyvey, driller, Petro Drilling Brian Payne, driller, Petro Drilling

	Ted Heath, helper, Petro Drilling
	Jerome Hynes, helper, Petro Drilling
	Jakob Knudsen, cook, Arctic Contractors
	John Olsen, captain Viking Naja
	Hans Andersen, engineer Viking Naja
Company names and addresses:	GEUS, The Geological Survey of Denmark and Greenland,Thoravej 8, DK–2400 Copenhagen NV, Denmark
	grønArctic energy inc., Suite 800, 407 – 2 nd Street, SW Calgary, Alberta T2P 2Y3, Canada
	Petro Drilling Company Ltd., P O Box 1021, Armdale, Halifax, Nova Scotia B3L 4K9, Canada
	Greenland Air, 3900 Nuuk, Greenland
	Arctic Contractors, Kristianiagade 1, DK–2100 Copenhagen Ø, Denmark
External communications:	Inmarsat B portable.
Internal communications:	VHF radio.

1.2 Introduction

1.2.1 Location

The location of the Umiivik–1 well is on the southern coast of Umiivik bay, Svartenhuk Halvø (Figs 1 and 2). The well is positioned close to shot point 86 on seismic line GGU SV94-01 (Fig. 5), and is 500 m inland from the coast at an elevation of approximately 5 m above mean sea level. It is also approximately 2.0 km from GGU shallow borehole 400712 drilled in 1992. The coordinates are 71° 36' 42" N, 54° 02' 31" W.

GEUS, The Geological Survey of Denmark and Greenland, proposed the drilling of the borehole. Operational services were performed by grønArctic energy inc. of Regina, Saskatchewan, Canada as part of a turnkey contract entered into between the Government of Greenland and the Mineral Resources Administration for Greenland (MRA) and grønArctic energy inc. GEUS were responsible for the wellsite geological services at the well which included the preliminary geological description of the core and collection of samples. This is being followed by detailed analysis in Copenhagen of all samples of rock and gases collected at the wellsite, along with storage of all core and samples taken.

1.2.2 Objective

Svartenhuk Halvø area is one of the few areas within which Upper Cretaceous and Lower Tertiary marine sediments are exposed onshore West Greenland (Fig. 1) and therefore it has been of interest to both stratigraphers and petroleum explorationists for many years. Thus as part of the ongoing programme to assess the prospectivity of the Disko–Nuussuaq–Svartenhuk Halvø area and the adjacent offshore basins, the Umiivik–1 stratigraphic borehole was drilled to test for the presence of a Cenomanian–Turonian oil prone source rock. If such a source rock could be proved to exist it would be the first sampled oil prone source rock in West Greenland and would enhance the prospectivity of both offshore southern West Greenland and Melville Bugt. The well would also provide information concerning the sedimentological controls, thermal maturity and pressure regime of the area.

1.3 Results

A total of 1200 m of core was recovered from Umiivik–1 with recovery close to 100%. Almost the entire core consists of dark grey, firm and non-calcareous mudstone with abundant silty interbeds. This general lithology was maintained until the contract termination depth was reached at 1200 m (Fig. 4). Such a thick accumulation of mudstone was unexpected and it has had the result of changing the model of basin development for the Svartenhuk Halvø area.

Several significantly large intrusions were intersected throughout the well; these appear to have had the affect of raising the local thermal maturity of the mudstones to such a level that little generative potential remains. However, the character of the mudstone in the lowermost 100 m may indicate that the thermal affects of these intrusions were diminishing.

Indications of hydrocarbons were initially encountered from a depth of 245 m. Gas was audible escaping from the core and impacting against the aluminium foil in which the core was wrapped. The frequency and rate at which gas was escaping from the core increased with depth and over certain intervals gas formed a white froth on the core as soon as it was removed from the core barrel. Indications of gas were persistent throughout the mudstone sections of the hole, with only the intrusive sections not exhibiting any indications of gas. Unfortunately no indications of liquid hydrocarbons were seen in the hole.

Drilling proceeded to termination depth with only minor technical problems. These were chiefly related to vibration of the drilling rods against the sidewall of the borehole. This problem appeared only to occur when the hole had reached a depth at which the rotation of the drill rods combined with the length of the string introduced a harmonic displacement on the string leading to repeated knocking of the drill rods against the sidewall. This problem was overcome by the use of a polymer drilling fluid additive which had the effect of lubricating the string. A further problem was jamming of the core barrel by heavily fractured formation leading to poor core recovery. This was particularly evident when drilling through a large fault over the depth range 950 m to 1027 m.

2.0 OPERATIONS

2.1 Previous work and drilling history

Svartenhuk Halvø area is one of the few areas in which Upper Cretaceous and Lower Tertiary marine sediments are exposed onshore West Greenland (Henderson *et al.*, 1976) and has been the site of palaeontological and stratigraphic studies (Birkelund, 1956, 1965; Ehman *et al.*, 1976; Croxton, 1978). Early results were summarised by Rosenkrantz & Pulvertaft (1969) and Rosenkrantz (1970). Later, a 1:100 000 coloured map, sheet 71 V.1 nord, Svartenhuk, was published (Larsen & Grocott, 1991).

In 1992 five shallow holes were drilled in eastern Svartenhuk Halvø (GGU 400708–400712) as part of a systematic shallow coring project in the Disko–Svartenhuk Halvø area (Christiansen, 1993) (Fig. 2), the cores retrieved forming the basis for renewed palynological and source rock studies (Nøhr-Hansen, 1994; Christiansen *et al.*, 1994). The drilling programme was performed using a helicopter-portable wire-line rig. Total depth for these holes ranged between 66 m and 86 m.

In 1994 a geophysical programme was carried out along the south western coast of Umiivik bay to obtain information on the total thickness of the marine mudstone succession and depth to basement (Christiansen *et al.*, 1995). This programme involved the acquisition of 11.5 km of refraction and reflection seismic and transient electromagnetic data. These data have been compiled in conjunction with surface geological data to locate the optimum position for the borehole.

2.2 Position of drill site

The borehole was positioned close to shot point 86 on seismic line GGU SVA 94-01. A number of criteria were taken into consideration in the positioning of the drilling rig at this site. These criteria include interpretation of the seismic data, availability of water for drilling, and logistical factors such as availability of adequate containment facilities.

Interpretation of the seismic data appeared to indicate that a hole drilled at this position would intersect the maximum thickness of what was predicted to be a Santonian–Cenomanian/Turonian mudstone section in the broad synclinal attitude seen on the seismic data (Fig. 5). This position would also allow the hole to reach a significant depth prior to intersecting a large fault interpreted on the seismic data. Prominent reflectors identified on the

south-eastern part of the seismic line were thought to represent thick igneous intrusions and an effort was made to locate the well remote from these potential intrusions.

Further major considerations in the positioning of the drilling rig were the availability of water for drilling and adequate containment facilities adjacent to the drill site for the control of potential oil spills. The positioning of the rig close to shot point 86 allowed the placing of the drill rig on a firm substrate and close to a free-flowing fresh water stream for water supply. A gradual sloping of the ground away to the south east allowed the installation of oil containment booms.

2.3 Drilling programme

The drilling of the Umiivik–1 well took place between the 21st August and 13th September 1995 (Fig. 3) (Appendix I) with Petro Drilling Limited as the drilling contractor and grønArctic energy inc. providing the operational services. A modified wire-line diamond drilling rig (Longyear Fly-in model 50) was used, enabling rapid helilifting of the rig to the drilling location. The rig has a theoretical capacity to drill to a depth of 1500 m; however the capacity of the BOP system used at the wellsite restricted drilling to a maximum depth of 1250 m. In the event drilling was terminated upon reaching the turnkey contract depth of 1200 m.

The drill was operated by four drillers working continuous twelve hour shifts of two men. Accommodation was provided by the *Viking Naja* support vessel moored 500 m offshore in Umiivik bay. Crew changes were facilitated by the use of Zodiac rubber boats. Helicopter support was provided by Greenland Air using a Bell 212 under contract to grønArctic. Fuel and supplies were stored on the *Viking Naja*. A small logistics camp was established adjacent to the drill site for the geologist and engineer.

The well was spudded at 15:00 hours on August 21st 1995. The HW conductor casing was drilled to a depth of 32.5 m and was set in poorly consolidated bedrock. The casing was not cemented into place due to the poorly consolidated formation. Drilling proceeded with NW surface casing and steady progress was made through a predominantly mudstone lithology. At a depth of 180 m high torque values on the drill string reached such a level that the rods sheared-off. At this point it was decided to terminate the NW section of hole and the NW casing shoe was cemented-in at depth of 180 m. Following the cementing of the casing the BOP, manifold and flare-lines were rigged-up and the BOP pressure tested. The drilling of

the NQ section of hole began with the drilling of 1.5 m of new formation prior to the performing of a formation integrity test. The leak-off pressure recorded at surface reached 2100 kpa with a formation leak-off gradient of EMW 2200 kg/m^3.

The NQ section of hole progressed steadily. Over the depth interval 245 m to 258 m gas was identified escaping from the slightly sandy lithology of the core. At this point the drill rods were pulled from the hole to change the sleeve of the core catcher. On resumption of drilling the penetration rate was maintained at a steady rate through a predominantly mudstone dominated succession, with occasional thin silty interbeds. From a depth of 507 m gas was again identified escaping from the core within a dominantly mudstone section.

Drilling proceeded through a mudstone section with occasional intrusions. On retrieval of the core barrel at a depth of 621 m it was discovered that the core barrel was empty and an attempt to fish for the lost core proved unsuccessful. The drill string was then pulled out of the hole and 3 m of core was recovered and inspection of the drill bit revealed that it was 100% worn. A new bit was placed on the rods and the string run back into the hole.

Drilling resumed through a predominantly mudstone section with persistent gas shows continuing to a depth of 670 m. Gas was again identified escaping from the core at 720 m and from a depth of 780 m. At a depth of 790 m a section of the core was placed in a plastic bag and the bag sealed. Following a period of one hour a small hand-held gas detector was inserted into the bag and it indicated the presence of flammable gases escaping from the core. However the detector did not have the capability to provide a break-down of the gas components.

Drilling progressed but the rate of penetration was reduced due to persistent vibration of the drill rods against the sidewall of the hole. A possible explanation could be that the length of the pipe in the hole in conjunction with the rate of rotation of the string induced a harmonic vibration onto the string. This harmonic oscillation may have produced the constant knocking of the string against the sidewall resulting in stress-fracturing of the rods. At a hole depth of 857 m the rods twisted-off at 251.5 m. The string was successfully retrieved from the hole with a bowen spear.

Drilling resumed and continued to a depth of 864.4 m at which point the bolts on the transmission torque converter sheared-off. On completion of the repairs it was evident that the rods had become stuck in the hole. This was overcome by the pumping of (and retrieval of) 100 liters of jet fuel around the hole and by rotation of the drill rods.

To overcome the harmonic vibration of the drill string it was decided to add a polymer gel to the drilling fluid. A further two metres were drilled when the mud mixing motor failed. Following completion of the repairs drilling resumed in a mudstone section with a number of intrusions. Severe vibration and torque continued to be a problem and an attempt to overcome this problem was made by the pumping of 5 gallons of diesel. At a hole depth of 948 m the vibration resulted in the drill rods parting at a depth of 222.5 m; the rods were recovered by use of a bowen spear.

Drilling continued and at a depth of 952 m a heavily fractured 75 m thick intrusion was intersected. The drilling rate through this fractured formation was very slow due to the core barrel becoming repeatedly jammed with broken rock. This also resulted in very poor recovery and required re-running of the core barrel. This remained a problem for the duration of the drilling through the fractured intrusion. This would suggest that this interval represents the large fault identified on the seismic line (Fig. 5) with the volcanic rock possibly intruded along the fault plane.

On drilling through the fault the formation returned to a mudstone dominated succession with gas continuing to escape from the core. Drilling progressed to a depth of 1134 m at which point the rate of penetration decreased to an ineffecient level and it was decided to pull the string out of the hole to replace the drillbit.

Drilling continued to a depth of 1148 m when it became evident that the core was dropping out of the core barrel during retrieval of the core barrel. The core catcher was repeatedly replaced but the problem continued during the drilling of the remainder of the hole. Attempts were made to modify the core catcher with some success.

The turnkey contract depth of 1200 m was reached at 16:30 hours on the 13th September. At this point it was decided to terminate the drilling of Umiivik–1 and not to continue to the maximum depth of 1250 m allowed by the well control system used at the wellsite. This decision was made based on the results of RockEval analysis of two samples taken from 650 m and 704 m which demonstrated that both samples are overmature. The T_{max} for the sample at 704 m is 499°C which is higher than the upper limit of the oil window. This would suggest that the immediate area of the well is overmature for oil generation.

The drill rods were pulled to a depth of 1145 and a cement plug was set between 1145 m and 1200 m. The drill rods were subsequently pulled from the hole and broken down. A second cement plug was set from 250 m to surface. The rig was then demobilised and

helilifted to the *Viking Naja* and the site cleaned. The site was eventually abandoned at 16:00 hours on the 15th of September.

3.0 GEOLOGY

3.1 Setting and Stratigraphy

The West Greenland margin is a rifted continental margin, developed during the opening of the Labrador Sea in late Mesozoic–early Cenozoic time (Chalmers *et al.*, 1993). In response to this break-up a number of rift basins developed along this margin (Chalmers & Pulvertaft, 1993), in which a succession of Early Cretaceous–Tertiary sediments was deposited (Dam & Sønderholm, 1994; Dam & Sønderholm submitted). Onshore exposures of these sediments occur at Svartenhuk Halvø in the north and on the Nuussuaq peninsula and Disko island to the south (Fig. 1). The outcrops are bounded to the east and north-east by a faulted contact with Precambrian basement (Rosenkrantz & Pulvertaft 1969; Pedersen & Pulvertaft 1992). Precambrian gneiss and metasediments form the subsurface to these sediments. Maximum thickness of these sediments is more than 1500 m at Svartenhuk Halvø and more than 8 km on Nuussuaq, the latter figure based on the interpretation of the results of seismic data acquired in 1994 (Christiansen *et al.*, 1995). The sediments are overlain by hyaloclastic volcanic breccias and plateau basalts.

Field mapping has identified a north-west–south-east structural trend in the Svartenhuk area (Fig. 2). On the south-western coast of Umiivik bay the marine sediments dip to the south-west at an average dip of 5° but the dip swings slightly to a more westerly direction to the north around Firefjeld. Marine palynomorphs have been recorded from nine localities and five subsurface sections provided by the shallow wells drilled in the area in 1992 (Nøhr-Hansen, 1994). The dinoflagellate assemblages indicate an age range from the Coniacian to Early Campanian. Croxton (1978) identified Campanian dinoflagellates and pollen in the same area. Birkelund (1965) identified early Turonian–Campanian ammonites in the area. It can be concluded therefore on the basis of these previous samples that the sediments exposed on the southern side of Umiivik bay are most likely Coniacian to Santonian in age. The lithology of the sediments exposed at surface is predominantly dark grey to black mudstones

which are likely to have been deposited in a deep marine environment. A number of intrusions can be identified intruding through these sediments in exposed cliffs.

3.2 Lithology

At the wellsite a preliminary geological/sedimentological description was performed. Logging of the core was performed at a scale of 1:50 and subsequently redrawn to a scale of 1:500 (reproduced at 1:1250 in Fig. 4). Indications of any gases escaping from the core and drilling fluids were noted by the drilling crew and/or GEUS personnel when the core was removed from the core barrel. The formation intersected in Umiivik–1 broadly consists of mudstones and silty mudstones which have been intruded by igneous sheets at a number of levels. A detailed formation description is provided in Appendix II.

The uppermost 80 m consists of soft to firm dark grey black mudstone which is heavily bioturbated, however with increasing depth the degree of bioturbation decreases (Fig. 4). Over the depth range 120 m to 128 m the formation has highly chaotic bedding and soft sediment deformation which may indicate rapid deposition in a higher energy flow regime. This may also be supported by the presence of an increased silty sandstone content. The percentage of siltstone is high again over the interval 175 m to 182 m. The NW casing was set in this more arenaceous interval.

Over the depth interval 248 m to 271 m a fine grained argillaceous sandstone was intersected. It is pyritic and micaceous with a degree of porosity evidenced by the escape of gas from the core. This poorly developed sandstone represents the unit with the highest reservoir properties in Umiivik–1.

Over the interval 271 m to 401 m the formation consists predominantly of dark grey, firm to hard mudstone which is blocky and non-swelling, interbedded with occasional siltstones which are generally grey to dark grey, slightly to highly argillaceous, tight and non-calcareous. Both the mudstones and siltstones are generally parallel laminated with occasional ripple lamination.

Below a depth of 400 m the lithology changes to a darker grey mudstone with an increased percentage of carbonaceous and pyritic material. This was noted during the drilling of the well and was tentatively interpreted as reflecting an increase in source rock qualities. However the initial results of the geochemical analysis of samples taken below this depth are disappointing in that in fact they indicate a decrease in Total Organic Carbon (TOC) content

from an average of 5 % to 4 %, with the Hydrogen Indices (HI) dropping from 70 to close to 1 indicating an absence of heavier (wetter) hydrocarbons. This would suggest that the gas is predominantly methane. Further, below 400 m the T_{max} values increase to above 500°C which in general terms indicates post maturity for oil generation. Thus below a depth of 400 m the source potential of the mudstone decreases along with increasing thermal maturity to a level that is post mature for oil generation.

The increase in thermal maturity can probably be attributed to the local heating affects of intrusions which are present from a depth of 420 m. The negative effects of thermal alteration by intrusions have been documented in the Svartenhuk Halvø area by Schiener & Perregaard (1981). Most of the intrusions have resulted in thermal alteration of the host mudstones. There may be an association between the occurrence of gas escaping from the core and proximity to intrusions. This is clearly demonstrated in reference to the intrusion over the interval 550 m to 598 m (Fig. 4). Gas escaping from the core occurs in a zone 50 m to 60 m above and below the intrusion.

Below a depth of approximately 750 m the characteristics of the gas escaping from the core change. Geochemical analysis of the gases contained in the tinned core samples demonstrate an increase in the percentage of ethane (up to 7%), propane (up to 1.2%) and butane (trace) as compared to the predominant methane gas above. This is further supported by observations at the wellsite when a sample of core from a depth of 790 m was placed in a plastic bag and the bag sealed. Following a period of one hour the bag was opened and a small hand-held gas detector inserted which indicated the presence of flammable gases other than methane.

Over the depth interval 952 m to 1027 m a heavily fractured and mineralised intrusion was intersected. This resulted in drilling problems such as slow penetration rate, jamming of the core barrel by the fractured lithology and poor core recovery.

Below this intrusion and continuing until TD at a depth of 1200 m, the formation is dominated by dark grey to black, firm, non-calcareous and non-swelling mudstone. However this interval has abundant pyrite bands (1–2 cm thick) which distinguishes it from the non pyritic mudstones intersected above. Gas was consistently identified escaping from the core. Between a depth of 1150 m and 1170 m the character of the mudstone changes slightly, becoming softer and more sticky. At a depth of 1200 m the mudstone is dark grey, firm to

hard, non-calcareous and non-swelling. The mudstone is also parallel laminated with thin interbeds of siltstone.

3.3 Lateral correlation

An attempt has been made to make a lithological correlatation of well Umiivik–1 with GGU shallow borehole 400712 drilled approximately 2000 m to the north-west in 1992 (Christiansen *et al.*, 1994) which penetrated 80.48 m of Coniacian to early Santonian mudstones. However the only marker horizon intersected in borehole 400712, a lava flow present at a depth of 40 m, was not intersected in well Umiivik–1. Thus such a correlation is not possible. However, upon completion of the palynological analysis, it may be possible to correlate the two holes in respect to the dinoflagellate species identified in the core. The results of this work will be presented at a later stage.

3.4 Synthesis

Prior to the drilling of Umiivik–1, the deepest borehole in the area was GGU shallow borehole 400709 which reached a depth of 84.24 m and is situated 15.5 km to the north-west. Shallow borehole GGU 400712 drilled 2 km north-west of Umiivik–1 reached 80.48 m. At the time of drilling, these boreholes intersected the oldest known rocks in the Svartenhuk Halvø area, namely Coniacian to early Santonian in age. (The age of the ammonites believed by Birkelund (1965) to be Turonian may have to be reconsidered).

In an attempt to obtain a greater understanding of the geology of the area, a reflection and refraction seismic line, GGU SVA 94-01, was acquired along the southern shoreline of Umiivik bay (Fig. 5). Upon completion of the final processing of these data, an interpretation suggested that the strong reflector extending across the section between 250 to 400 msec Two Way Time (TWT) may represent the base of the deep marine mudstones. It was estimated that this TWT may represent a depth of approximately 800 m. What was below this reflector was unknown. Borehole Umiivik–1 was positioned at approximately shot point 86 on seismic line GGU SVA 94–01.

The results of the drilling of Umiivik–1 have resulted in a significant re-evaluation of the geological development of the Svartenhuk Halvø area. The mudstone section that extends to a depth of 1200 m is greater than was predicted. Furthermore, the position of the base of the

mudstone section remains conjectural as no obvious basement reflector is evident on the seismic line below the TD of the hole.

An attempt has been made to tie the results of the drilling of Umiivik–1 to the seismic data on line GGU SVA 94-01. However, an accurate tie is not possible due to the lack of a sonic petrophysical log in the well. Instead major lithological contacts were identified and the prominent changes in reflection coefficient at such contacts were tentatively related to prominent reflectors seen on the seismic line at the drill site. The strong acoustic impedance contrast that is likely to be present at the contact of a mudstone with an intrusion is likely to result in a strong reflection on the seismic line. Therefore, a tie was made by trial and error by tying the tops of various intrusions to the strongest reflections on the section until consistent velocities to the various intrusions were obtained. A plot of depths to the intrusions versus the *assumed* TWT on seismic line is shown (Fig. 6). A relatively high degree of confidence in the tie can be held due to the low degree of scatter of all the points. An average velocity of 2875 m/sec to the base of the mudstone section can be calculated based on this tie.

The series of strong reflectors at 250 to 400 msec TWT which was predicted to represent the base of the mudstones in fact relates to the intrusions intersected at depths of 420 m, 480 m and 550 m. Further intrusions were intersected at depths 850 m and 912 m. The diffraction pattern seen with an origin at shot point 109 at around 200 msec TWT was predicted to represent a large fault. A highly fractured intrusion was intersected over the depth interval 952 m to 1027 m. This has been interpreted to represent a sill or dyke situated along the fault plane. Whether this intrusion is synchronous with, or predates the fault movement is uncertain. Prior to the drilling of Umiivik–1 it was envisaged that basement would be present in the footwall of this fault. However a further 173 m of mudstone section were intersected on drilling through the fault. This mudstone has a different character to that in the hanging wall in that it has abundant pyrite bands and is in places softer than the mudstone in the hanging wall.

In summary it can be concluded that the results of the drilling of Umiivik–1 have demonstrated a much greater thickness of mudstone than was predicted from the seismic data. In general the source rock quality of these mudstones is poor and has been thermally degraded by the numerous intrusions to such a level where they are post mature for oil generation. However the increasing abundance of ethane, propane and butane in the samples from a depth of 750 m may indicate a decreasing thermal degradation of the samples. A well that was

drilled through similar mudstones but that did not intersect any large intrusions might produce more encouraging results as to the prospectivity of the Svartenhuk Halvø area.

3.5 Summary of hydrocarbon shows

248–254 m	Gas observed bubbling from porosity and laminations, forming white foam (sandy siltstone).
507–526 m	Gas bubbling from laminae and microfractures in core forming white foam silty mudstone).
531–549 m	As above (silty mudstone).
608–612 m	As above (silty mudstone).
620–622 m	Gas bubbling from laminae and microfractures in core forming white foam (silty mudstone).
626–666 m	As above (silty mudstone and mudstone).
721–733 m	Gas bubbling from core forming white foam (mudstone).
779–835 m	As above (mudstone). Hand-held gas detector indicates presence of flammable gas.
910–916 m	As above (mudstone).
1055–1067 m	Gas bubbling from core forming white foam (mudstone).
1076–1200 m	As above (mudstone).

3.6 Cores

A total of 1167.5 m of conventional core was recovered from Umiivik–1 with recovery close to 100%. Poor recovery over certain intervals was the result of heavy fracturing of the formation resulting in jamming of the core barrel and loss of core. Further, towards the basal section of the hole, the core catcher in the core barrel repeatedly failed to hold the core within the barrel. This may have been due to the core catcher becoming plugged up with soft clay thereby failing to grip the core, resulting in slipping of the core from the barrel. Attempts to modify the core catcher were made but the problem persisted to the termination of drilling.

3.7 Samples

The sample routine was approximately 2 samples every 3 m, which included one sealed tin sample (8 cm core piece wrapped in aluminium foil) for later gas analysis and detailed

petrography, and one chip sample (2 cm core piece) for reference/lithology. In addition to these routine samples, further samples were occasionally taken for specific analysis such as micropalaeontological and source rock analysis. A list of core samples taken at the wellsite is shown in Appendix IV.

Gas samples were taken directly into a steel cylinder or via plastic bags. Additional samples were taken of any potential and actual contaminants such as rod grease, jet fuel, diesel, and additives to the drilling fluid (Appendix V). A summary of the samples taken at the wellsite are listed in Table 1.

Table 1. Summary of samples taken at wellsite Umiivik–1

Umiivik–1	
Core box no.	367
Number of chip samples	387
Number of tin samples	361
Number of gas samples	1
Number of miscellaneous samples	10

3.8 Analytical methods

Part of the sample material has been analysed at GEUS. The following analytical techniques have been used.

1) Leco/RockEval pyrolysis
2) Vitrinite reflectance
3) Extraction with subsequent desalphating and column separation into saturated and aromatic hydrocarbons and NSO compounds
4) Gas chromatography/mass spectrometry of saturated hydrocarbons
5) Head space gas composition, C and H isotopes
6) Conventional core analysis: porosity, permeability and grain density
7) Water geochemistry, pH and alkalinity

At this time the techniques listed above have not been completed for all samples. However the preliminary organic geochemical results show moderate to high (2.5–6.5%) values of TOC (Total Organic Carbon) throughout the mudstone section. In the uppermost 390 m of the core in which the sediments are immature (T_{max} below 438°C, R_O below 0.63%), the Hydrogen Index values are typically between 75 and 125 suggesting only a minor, if any, potential for oil, but a significant gas potential. In the deeper part of the core, from 405 m to 1200 m, the sediments are post mature (T_{max} above 500°C, R_O above 2.0 %); this is most likely due to localised thermal alteration associated with the often thick intrusions (Schiener & Perregaard, 1981). Hydrogen Index values are below 35, in many cases below 5, and it is not possible to interpret the original generative potential prior to heating by the intrusions.

Head space analyses from tin cans containing the core samples often show very high gas concentrations (more than 50% hydrocarbons). Most of the gas is relatively dry (mainly methane), but below 750 m, most samples indicate a rather wet gas with high concentrations of ethane and propane and significant amounts of butane and pentane. These data suggest that this mudstone succession, prior to heating from the intrusions, also had a significant generative potential for condensate, perhaps also for oil.

The completed results of these analyses and the implications thereof will be presented in a separate report in conjunction with the micropalaeontological age dating of the succession and a more in depth geological assessment of the well.

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5.0 FIGURES

Fig. 1

Geological map of central West Greenland showing the position of the Umiivik–1 well and other wells drilled in 1993-1995. Map based on Henderson *et al.* (1976) and Pedersen & Pulvertaft (1992).

Fig. 2

Map of the Umiivik area showing location of wellsite, shallow boreholes and 1994 seismic line (simplified from Larsen & Grocott, 1991).

Fig. 3

Plot of time vs. progress of drilling, Umiivik–1.

Fig. 4

Simplified geological log of Umiivik–1. Scale 1:500. (In pocket inside back cover).

Fig. 5

Part of seismic line GGU SVA 94-01 showing interpretation based on drilling results and time to depth relationship in Fig. 6.

Fig. 6

Two Way Time verses depth plot using intrusions to tie depth to time.

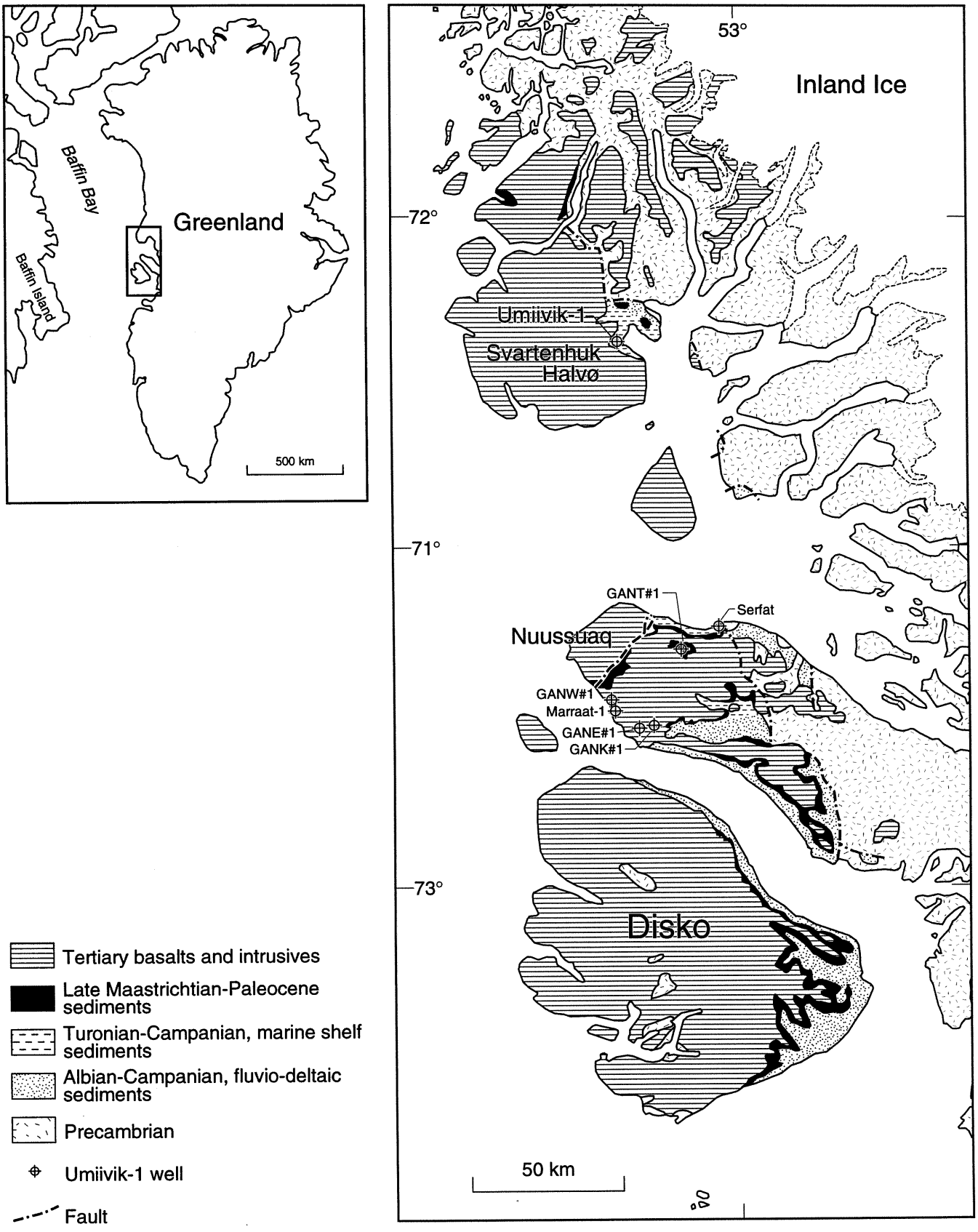

Fig. 1. Geological map of central West Greenland showing the position of the Umiivik - 1 well and other wells drilled in 1993-1995. Map based on Henderson *et al.* (1976) and Pedersen & Pulvertaft (1992).

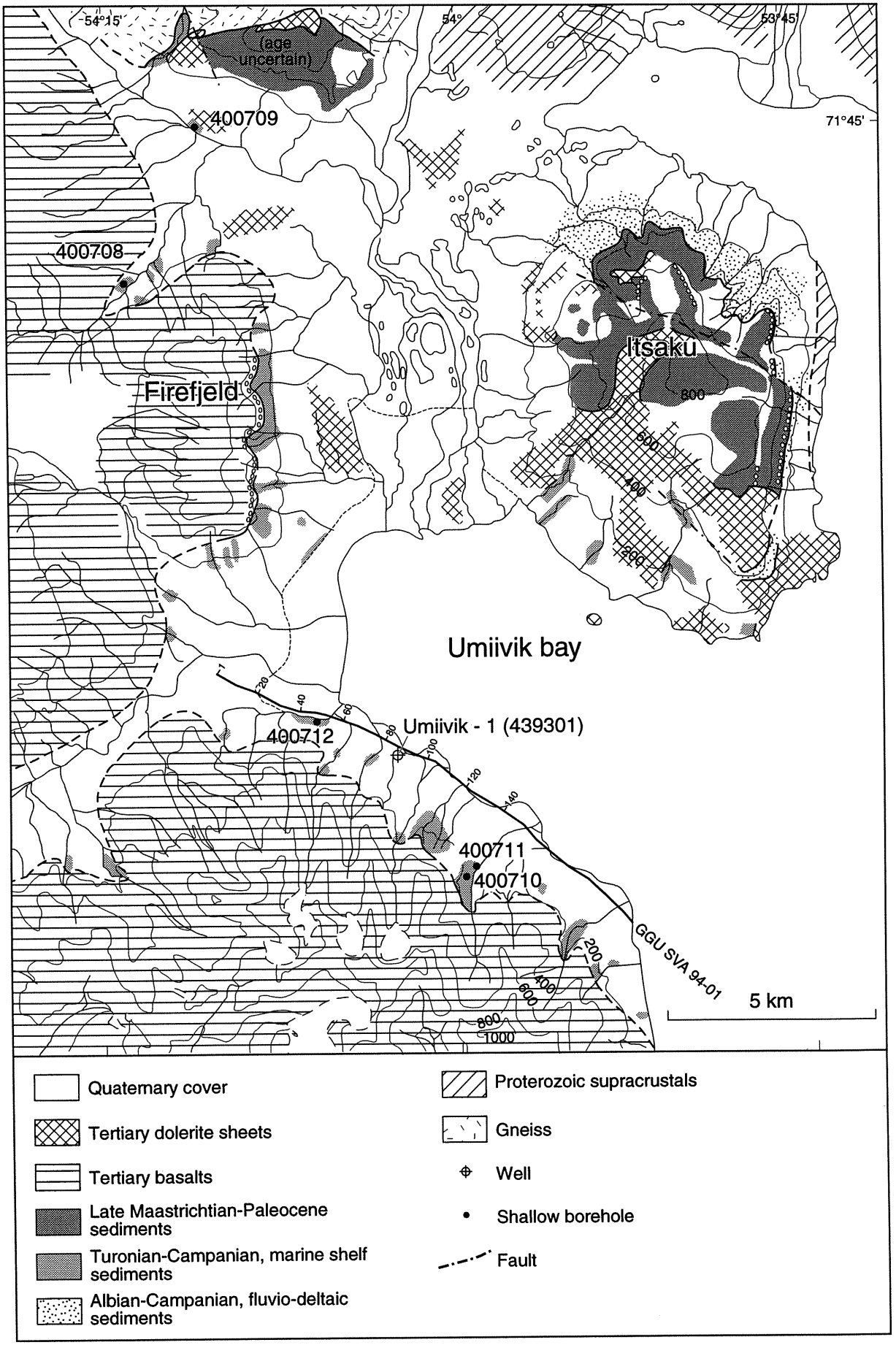

Fig. 2. Map of the Umiivik area showing location of wellsite, shallow boreholes and 1994 seismic line (simplified from Larsen & Grocott, 1991).

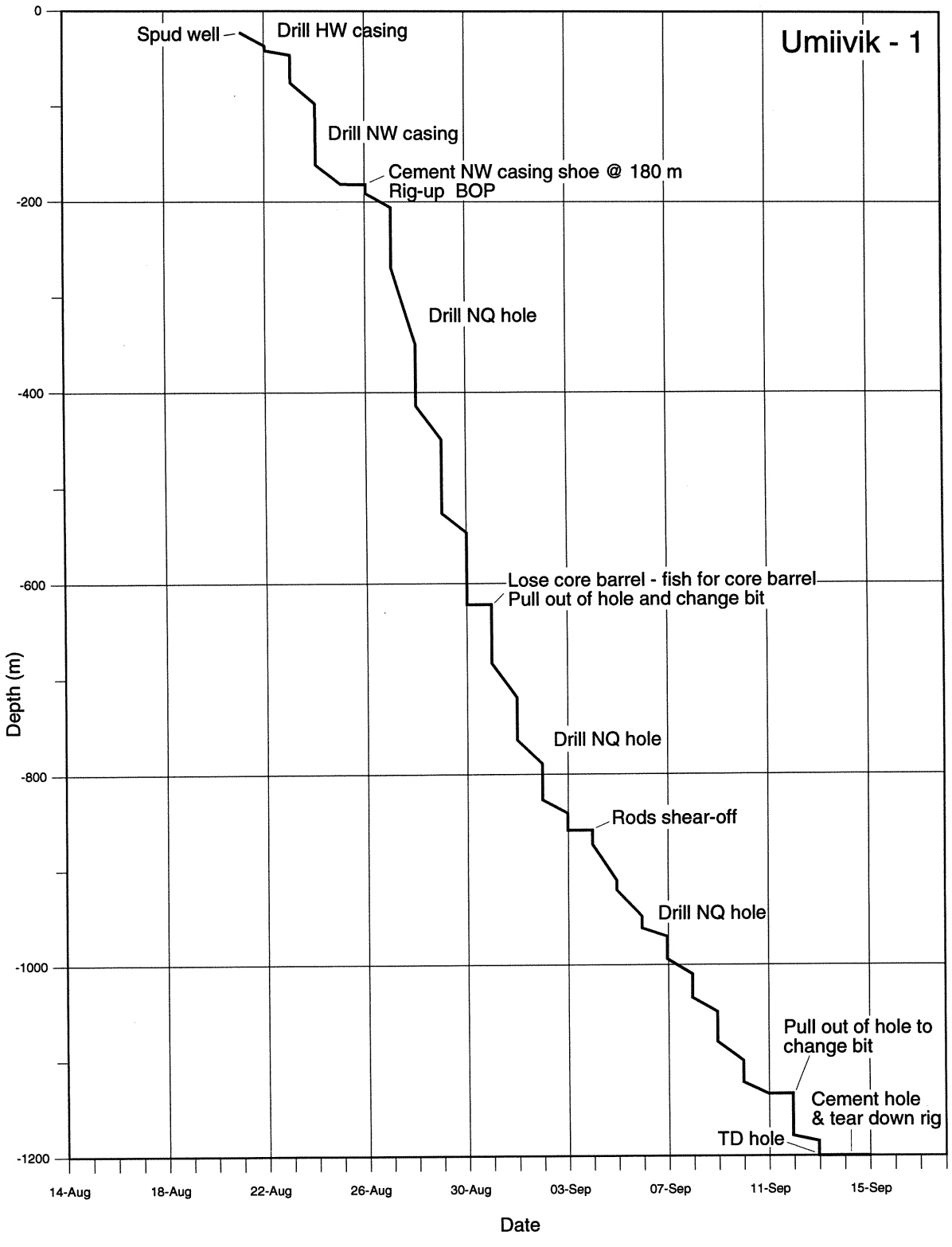

Fig. 3. Plot of time vs. progress of drilling, Umiivik - 1.

UMIIVIK - 1

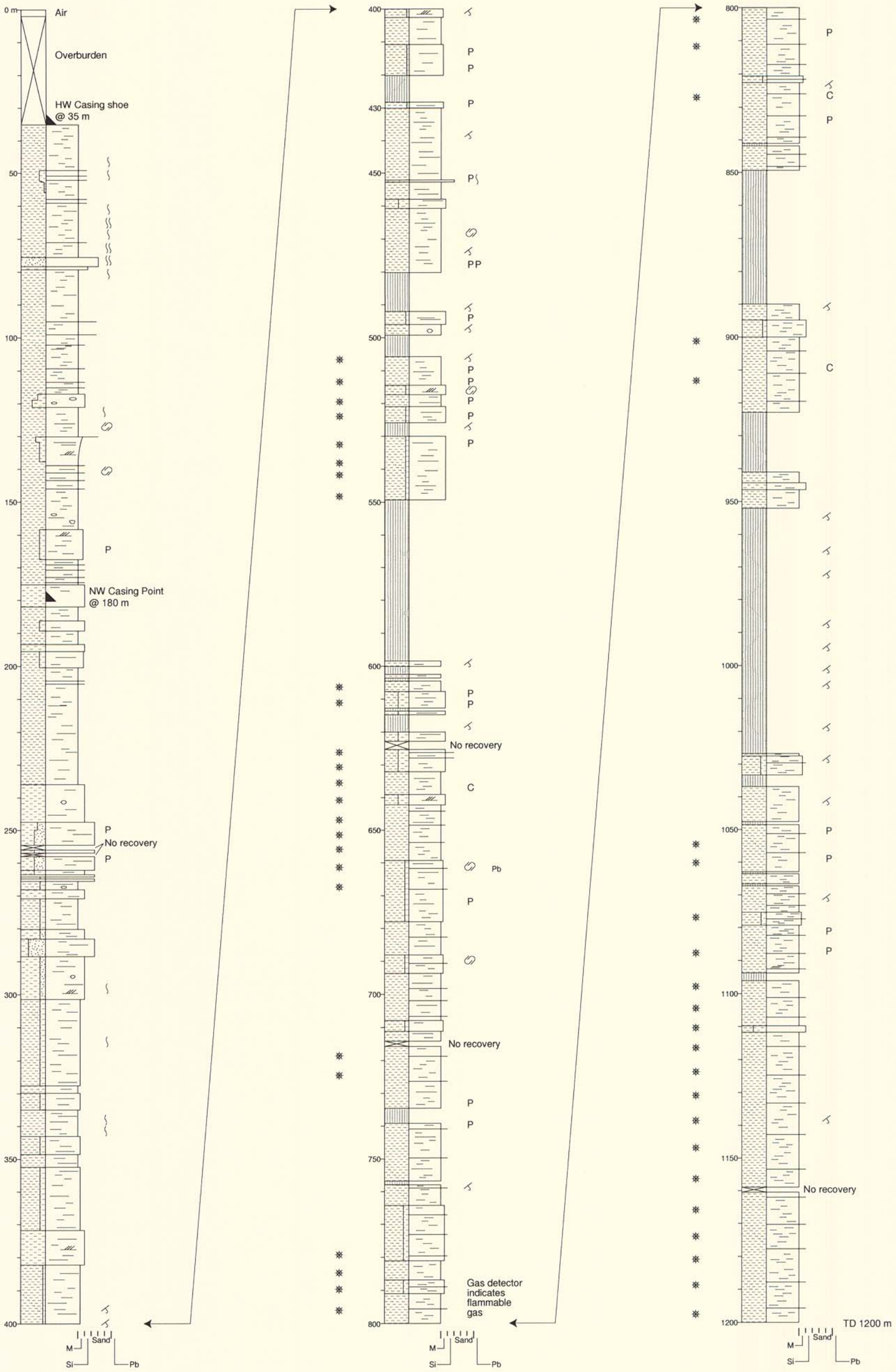

Fig. 4. Simplified geological log of Umiivik - 1.

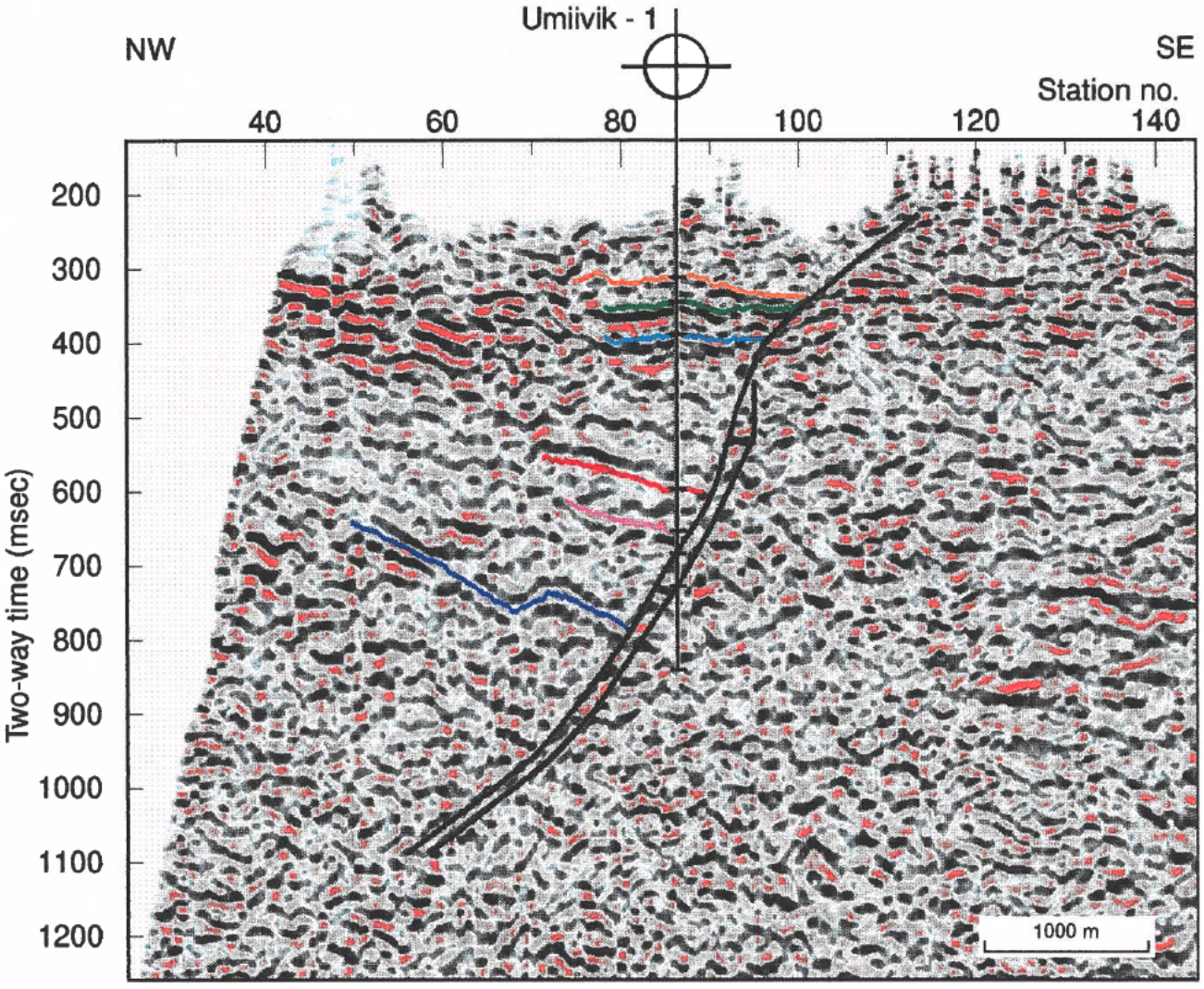

Fig. 5. Part of seismic line GGU SVA 94-01 showing interpretation based on drilling results and the time to depth relationship in Fig. 6.

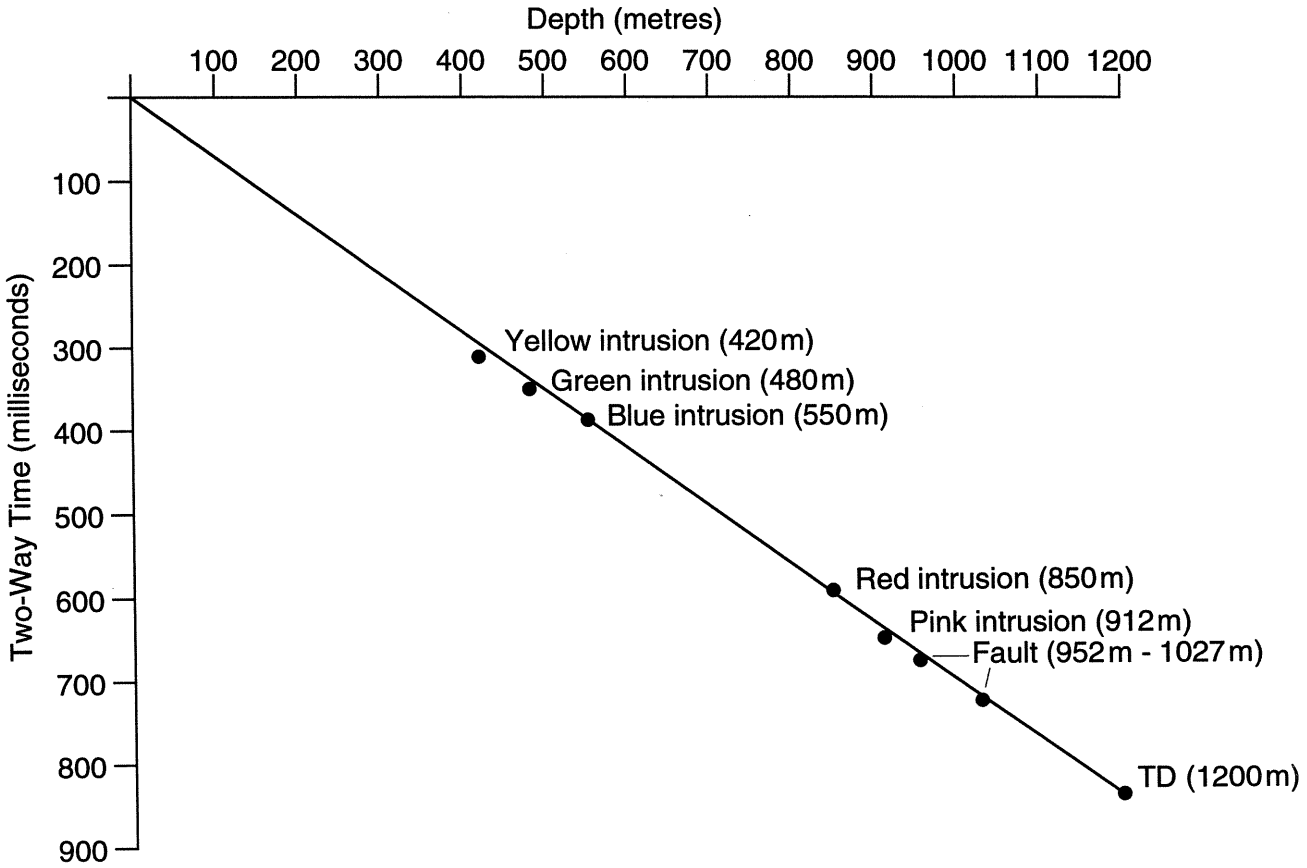

Fig. 6. UMIIVIK - 1. Time versus depth plot using intrusions to tie depth to time

Appendix I

Drilling programme

Date	Time	Activities
18–Aug	14:30–20:00	Arrive Svartenhuk and prepare to helilift rig
	20:00–24:00	Wait on daylight
19–Aug	00:00–10:30	Wait on daylight
	10:30–20:00	Helilift rig from *Viking Naja*
	18:00–20:00	Begin to assemble rig
	20:00–24:00	Wait on daylight
20–Aug	00:00–10:30	Wait on daylight
	10:30–18:00	Helilift rig
	18:00–20:00	Assemble rig
	20:00–24:00	Wait on daylight
21–Aug	00:00–09:30	Wait on daylight
	09:30–15:00	Rig-up water lines, drill shack and guide-lines
	15:00–20:00	Spud well Umiivik–1 and drill HW conductor casing to 5m
	20:00–24:00	Drill HW casing to 21 m
22–Aug	00:00–07:00	Drill HW casing to 30 m
	07:00–20:00	Drill NW casing to 35 m
	20:00–24:00	Drill NW casing to 40 m
23–Aug	00:00–07:00	Drill NW casing to 45 m
	07:00–20:00	Drill NW casing to 62 m
	20:00–24:00	Drill NW casing to 74 m
24–Aug	00:00–07:00	Drill NW casing to 96 m
	07:00–20:00	Drill NW casing to 148 m
	20:00–24:00	Drill NW casing to 161 m
25–Aug	00:00–07:00	Drill NW casing to 180 m High torque on rods.

	07:00–13:00	Rods twist-off. Fish rods.
	13:00–18:00	Run NW casing to 180 m
	18:00–19:00	Circulate casing at 180 m
	19:00–20:00	Circulate cement. No returns
	20:00–24:00	Wait on cement
26–Aug	00:00–11:00	Wait on cement
	11:00–19:30	Fit BOP. Pressure test BOP, mud and choke manifold to 7000 kpa for 15 min
	19:30–20:00	Run NQ rods in hole
	20:00–20:30	Drill NQ hole to 181.5 m
	20:30–21:00	Perform leak-off test to 2100 kpa.
	21:00–24:00	Drill NQ hole to 190 m
27–Aug	00:00–07:00	Drill NQ hole to 205 m
	07:00–19:00	Drill NQ hole to 258 m
	19:00–20:00	Pull rods to change core catcher sleeve
	20:00–20:30	Run drill rods in hole
	20:30–24:00	Drill NQ hole to 268 m
28–Aug	00:00–07:00	Drill NQ hole to 350 m
	07:00–20:00	Drill NQ hole to 392 m
	20:00–24:00	Drill NQ hole to 414 m
29–Aug	00:00–07:00	Drill NQ hole to 447 m
	07:00–20:00	Drill NQ hole to 499 m
	20:00–24:00	Drill NQ hole to 526 m
30–Aug	00:00–07:00	Drill NQ hole to 545 m
	07:00–23:00	Drill NQ hole to 621 m
	23:00–24:00	Loose core barrel. Fish.
31–Aug	00:00–01:30	Fish core barrel
	01:30–03:00	Pull drill rods out of hole Bit 100% worn
	03:00–05:00	Run in hole with new bit
	05:00–20:00	Drill NQ hole to 675 m
	20:00–24:00	Drill NQ hole to 682 m

01–Sep	00:00–08:00	Drill NQ hole to 718 m
	08:00–20:00	Drill NQ hole to 752 m
	20:00–24:00	Drill NQ hole to 763 m
02–Sep	00:00–07:00	Drill NQ hole to 788 m
	07:00–20:00	Drill NQ hole to 819 m
	20:00–24:00	Drill NQ hole to 826 m
03–Sep	00:00–07:00	Drill NQ hole to 839 m
	07:00–20:00	Drill NQ hole to 857 m
	20:00–22:00	Rods break-off in hole at 825 m
	22:00–24:00	Pull rods out of hole
04–Sep	00:00–00:30	Pull rods out of hole
	00:30–02:30	Make-up Bowen Spear
	02:30–04:30	Pull fish from hole
	04:30–05:30	Run rods in hole
	05:30–06:30	Drill NQ hole to 864.4 m
	06:30–10:30	Repair transmission
	10:30–12:30	Rods stuck
	12:30–13:30	Work pipe free
	12:30–15:00	Mix and pump polymer mud system
	15:00–16:30	Drill NQ hole to 866.5 m
	16:30–18:00	Repair mud mixing motor
	18:00–20:00	Mix Quik-trol polymer gel
	20:00–20:30	Mix Quik-trol polymer gel
	20:30–24:00	Drill NQ hole to 872 m
05–Sep	00:00–16:30	Drill NQ hole to 910 m
	16:30–17:30	Change pump liners for high pressure
	17:30–20:00	Drill NQ hole to 917 m
	20:00–24:00	Drill NQ hole to 920 m
06–Sep	00:00–12:00	Drill NQ hole to 948 m
	12:00–17:00	Drill rods part at 222.5 m. Fish
	17:00–20:00	Drill NQ hole to 949 m. Highly fractured formation resulting in jamming of core barrel.

	20:00–24:00	Drill NQ hole to 960 m
07–Sep	00:00–07:00	Drill NQ hole to 968 m
	07:00–20:00	Drill NQ hole to 987 m
		Core barrel jamming due to fractured formation
	20:00–24:00	Drill NQ hole to 992 m
08–Sep	00:00–07:00	Drill NQ hole to 1007 m
	07:00–20:00	Drill NQ hole to 1027.5 m
	20:00–24:00	Drill NQ hole to 1033 m
09–Sep	00:00–07:00	Drill NQ hole to 1047.5 m
	07:00–20:00	Drill NQ hole to 1075 m
	20:00–24:00	Drill NQ hole to 1079 m
10–Sep	00:00–07:00	Drill NQ hole to 1098.5 m
	07:00–20:00	Drill NQ hole to 1120 m
	20:00–24:00	Drill NQ hole to 1122 m
11–Sep	00:00–07:00	Drill NQ hole to 1134 m
	07:00–12:00	Pull rods out of hole
	12:00–14:00	Change drill bit
	14:00–20:00	Run rods in hole
	20:00–22:00	Ream to bottom
	22:00–24:00	Ream to bottom
12–Sep	00:00–02:00	Mill sheared-off bit face
	02:00–03:15	Drill NQ hole to 1148.2 m
	03:15–05:00	Core dropping out of core barrel. Replace core catcher
	05:00–09:00	Drill NQ hole to 1154 m
	09:00–11:15	Drill NQ hole to 1161 m
	11:15–15:15	Modify core barrel
	15:15–17:30	Drill NQ hole to 1168 m
	17:30–20:00	Modify core barrel
	20:00–21:00	Drill NQ hole to 1172 m
	21:00–24:00	Drill NQ hole to 1179 m
13–Sep	00:00–07:00	Drill NQ hole to 1184 m

	07:00–16:30	Drill NQ hole to 1200 m (TD)
	16:30–17:30	Circulate well prior to pulling rods
	17:30–18:30	Pull rods to 1145 m
	18:30–19:30	Mix and pump 0.5 m3 (660 kg) of class A cement weighted to 1900 kg/m3. Displace cement to form plug between 1145 m to 1200 m
	19:30–20:00	Pull rods out of hole
	20:00–24:00	Pull rods out of hole
14–Sep	00:00–07:00	Wait on daylight to tear down rig
	07:00–20:00	Tear down rig
	20:00–24:00	Wait on daylight to tear down rig
15–Sep	00:00–07:00	Wait on daylight to tear down rig
	07:00–16:00	Tear down rig and clean-up site
	16:00–20:00	Depart Svartenhuk

Appendix II

Lithological summary

The following is a summary of the core description

0–32.6 m Overburden.

Overburden. Soft grey mudstone with angular sandstone clasts (< 8 cm).

32.6–46 m Mudstone Interval.

Very dark grey to black, firm to hard, non-swelling, non-calcareous.

46–75 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, firm occasionally soft, non-swelling, finely laminated, carbonaceous in parts, bioturbated.

Siltstone. White to light grey, clean, non-calcareous.

75–78 m Sandstone Interval.

Sandstone. Grey to black in parts, very fine grained, very argillaceous, well sorted, sub-angular to sub-rounded, tight, bioturbation (worm burrows filled with white siltstone).

78–105 m Mudstone Interval.

Mudstone. very dark grey to black, firm to hard, carbonaceous in parts, non-swelling, occasional bioturbation.

105–130 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, firm to hard, blocky, non-swelling, finely laminated, occasional chaotic interbeds.

Siltstone. Light grey to brown, argillaceous, micaceous, non-calcareous, bioturbation.

130–175 m Mudstone Interval.

Mudstone. Dark grey, hard, non-calcareous, non-swelling, blocky to platey, parallel laminated, light brown concretions. Rare thin (1 mm) Siltstone interbeds.

175–180 m Siltstone Interval.

Siltstone. Very dark grey to black, very argillaceous, very hard, blocky, non-calcareous, non-swelling, well sorted.

180–200 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, firm to hard, block, non-calcareous, non-swelling.
Siltstone. Light grey to grey, clean to slightly argillaceous, non-calcareous, hard.

200–236 m Mudstone Interval.

Mudstone. Dark grey to black in parts, hard, brittle, non-calcareous, non-swelling. Rare thin (1–2 mm) interbeds of siltstone.

236–246 m Siltstone Interval.

Siltstone. Dark grey, hard, non-calcareous, argillaceous, blocky, micaceous, parallel laminated.

246–265 m Sandstone Interval.

Sandstone. Light grey to light brown, very fine grained (grades to siltstone), well sorted, clean, tight to slightly porous. Heavily interbedded with Siltstone (as above), parallel ripple laminated.

265–271 m Siltstone Interval.

Siltstone. Dark grey, hard, non-calcareous, micaceous, parallel laminated. Grades to very fine sandstone.

271–281 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black in parts, hard, non-calcareous, non-swelling.

Siltstone. Dark grey, hard, non-calcareous, micaceous, parallel laminated.

281–288 m Sandstone Interval.

Sandstone. Medium grey, very fine grained (grades to siltstone), firm to hard, well sorted, non-calcareous, micaceous, finely laminated.

288–301 m Siltstone Interval.

Siltstone. Dark grey to black, firm to hard, argillaceous, (grades to very sine sandstone), well sorted, micaceous, non-calcareous.

301–326 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black in parts, firm to hard, non-calcareous, non-swelling.

Siltstone. Light to medium grey, clean to slightly argillaceous, slightly porous, hard, non-calcareous, micaceous, parallel laminated, bioturbation.

326–352 m Mudstone Interval.

Mudstone. Dark grey, firm to hard, non-calcareous, non-swelling, blocky. Thin (1 mm) interbeds of siltstone.

352–372.5 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black in parts, firm to hard, non-calcareous, non-swelling.

Siltstone. Light grey to brown, clean to slightly argillaceous, hard, non-calcareous, micaceous, parallel laminated.

372.5–382 m Siltstone Interval.

Siltstone. Light grey to brown, (grades to very fine sandstone), argillaceous, micaceous, non-calcareous, hard, parallel laminated.

382–401 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, hard, blocky, micaceous, non-swelling, non-calcareous.

Siltstone. Light grey to grey, very fine grained, hard, occasional chaotic beds. Occasional fracturing.

401–420 m Mudstone Interval.

Mudstone. Dark grey to black, firm to hard, blocky, non-calcareous, non-swelling, finely laminated, pyrite in parts, (grades to siltstone in parts).

420–428 m Intrusion

Intrusion. Grey, very hard, microcrystalline, vesicular, green (chlorite) veining.

428–480 m Mudstone Interval.

Mudstone. Black, firm to hard, blocky to platey, non-calcareous, carbonaceous, non-swelling, finely laminated, occasionally micaceous, very pyritic in parts.

480–492 m Intrusion

Intrusion. Dark blue to grey, microcrystalline increasing crystal size to centre, hard, brittle, chlorite veining, strong odour of H_2S when HCl added.

492–499 m Mudstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, micaceous, pyritic.

499–505.5 m Intrusion.

Intrusion. Dark blue to grey, microcrystalline increasing crystal size to centre, hard, brittle, chlorite veining, strong odour of H_2S when HCl added.

505.5–512.5 m Mudstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, micaceous, pyritic.

512.5–517 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey, hard, blocky, non-calcareous, non-swelling, occasional pyrite laminae.

Siltstone. Grey, hard, micaceous, non-calcareous, non-swelling, argillaceous, well sorted, disseminated pyrite, chaotic bedding in parts.

517–522 m Mudstone Interval.

Mudstone. Dark grey to black, firm, platey to blocky, micaceous, pyritic, non-calcareous, non-swelling, finely laminated.

522–526 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey, hard, blocky, non-calcareous, non-swelling, occasional pyrite laminae.

Siltstone. Grey, hard, micaceous, non-calcareous, non-swelling, argillaceous, well sorted, disseminated pyrite, chaotic bedding in parts.

526–531 m Intrusion.

Intrusion. Green, microcrystalline, very hard, brittle, vesicular.

531–548.5 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Very dark grey to black, firm to occasionally soft, platey to blocky, non-calcareous, non-swelling, micaceous, finely laminated.

Siltstone. Grey, hard, micaceous, non-calcareous, argillaceous, well sorted, pyritic.

548.5–598 m Intrusion.

Intrusion. Light grey, hard, microcrystalline chilled margins with increasing grain size (up to 3 mm) to centre, quartz, chlorite and mafics, occasional zones with abundant dark neddle-like crystals up to 3 mm long, occasional white phenocrysts, occasional xenoliths.

598–600 m Mudstone Interval.

Mudstone. Very dark grey to black, firm to occasionally soft, platey to blocky, non-calcareous, non-swelling, micaceous, finely laminated.

600–601.5 m Intrusion

Intrusion. Grey, hard, brittle, microcrystalline, vesicular.

601.5–602.5 m Mudstone Interval.

Mudstone. Highly metamorphosed, light grey, very hard, non-calcareous, brittle, heavily brecciated, calcite veining.

602.5–603 m Intrusion.

Intrusion. Grey, hard, brittle, microcrystalline, vesicular.

603–608 m Mudstone Interval.

Mudstone. Grey to light grey, hard, brittle, blocky, finely laminated, non-calcareous, non-swelling.

608–613.75 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Grey to light grey, hard, brittle, blocky, finely laminated, non-calcareous, non-swelling.

Siltstone. Grey, hard, micaceous, non-calcareous, argillaceous, well sorted, pyritic.

613.75–614.25 m Intrusion.

Intrusion. Grey, hard, brittle, microcrystalline, vesicular.

614.25–619.5 m Intrusion.

Intrusion. Light brown grey, microcrystalline, hard, brittle, heavily bracciated, quartz and pyrite veining, occasional xenoliths.

619.5–632 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Very dark grey to black, firm, blocky, non-calcareous, non-swelling, micaceous.

Siltstone. Light grey to grey, hard, clean to slightly argillaceous, very fine grained, non-calcareous, micaceous.

632–639 m Mudstone Interval.

Mudstone. Black, soft to firm, non-calcareous, non-swelling, very finely laminated, very carbonaceous in parts.

639–642 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Very dark grey to black, firm, blocky, non-calcareous, non-swelling, micaceous.
Siltstone. Light grey to grey, hard, clean to slightly argillaceous, very fine grained, non-calcareous, micaceous.

642–659 m Mudstone Interval.

Mudstone. Very dark grey to black, firm, blocky, carbonaceous, non-calcareous, non-swelling, finely laminated.

659–678 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, finely laminated.
Siltstone. Grey to brown, hard, clean to slightly argillaceous, well sorted, micaceous, ripple laminated.

678–688.5 m Mudstone.

Mudstone. Very dark grey to black, firm, blocky, carbonaceous, non-calcareous, non-swelling, finely laminated.

688.5–694.5 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, finely laminated.
Siltstone. Grey to brown, hard, clean to slightly argillaceous, well sorted, micaceous, ripple laminated.

694.5–707.5 m Mudstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, finely laminated.

707.5–712 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, finely laminated.

Siltstone. Brown, hard, argillaceous, non-calcareous, non-swelling, finely laminated.

712–734 m Mudstone Interval.

Mudstone. Dark grey, hard, brittle, non-calcareous, non-swelling, finely laminated.

734–739 m Intrusion.

Intrusion. Dark grey to green, very hard, microcrystalline, occasional crystals up to 2 mm.

739–756.25 m Mudstone Interval.

Mudstone. Dark grey, hard, brittle, non-calcareous, non-swelling, finely laminated.

756.25–757.25 m Intrusion.

Intrusion. Dark grey to blue, hard, microcrystalline, white phenocrysts up to 3 mm.

757.25–764.5 m Mudstone Interval.

Mudstone. Dark grey, hard, brittle, non-calcareous, non-swelling, finely laminated.

764.5–781 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, blocky, finely laminated.

781–787 m Mudstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, blocky, finely laminated.

787–791 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, blocky, finely laminated.

Siltstone. Brown, hard, argillaceous, pyritic, non-calcareous, micaceous.

791–820.25 m Mudstone Interval.

Mudstone. Very dark grey to black, firm, non-calcareous, non-swelling, very micaceous, carbonaceous in parts, finely laminated.

820.25–822.5 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, blocky, finely laminated.

Siltstone. Brown, hard, argillaceous, pyritic, non-calcareous, micaceous.

822.5–841.5 m Mudstone Interval.

Mudstone. Very dark grey to black, soft to firm, non-calcareous, non-swelling, slightly micaceous, finely laminated. Breaks into plates.

841.5–842.5 m Intrusion.

Intrusion. Grey green, very hard, microcrystalline, thin quartz veins.

842.5–846 m Mudstone Interval.

Mudstone. dark grey to black, hard, brittle, non-calcareous, non-swelling, finely laminated.

846–849 m Mudstone interval.

Mudstone. Very light grey, firm, soapy/waxy, non-calcareous, finely laminated.

849–890 m Intrusion.

Intrusion. Dark grey, microcrystalline, very hard, abundant quartz and mica (black and green). Increasing crystal size with increasing depth (up to 3 mm). Occasional cream to white coloured layers.

890–895 m Mudstone Interval.

Mudstone. Light grey to grey, hard, soapy/waxy, non-calcareous, non-swelling, finely laminated.

895–898 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Grey, firm to hard, non-calcareous, non-swelling, finely laminated, micaceous.

Siltstone. Light grey to grey, clean, hard, non-calcareous, micaceous.

898–899 m Siltstone Interval.

Siltstone. Grey, hard, clean, non-calcareous, non-swelling, micaceous.

899–923 m Mudstone Interval.

Mudstone. Very dark grey to black, firm to hard, brittle, non-calcareous, finely laminated, carbonaceous in parts.

923–941 m Intrusion.

Intrusion. Dark grey to blue, micro - mesocrystalline, hard, mafic crystals up to 1 mm, abundant blue crystals up to 1.5 mm, occasional light blue phenocrysts.

941–944 m Mudstone Interval.

Mudstone. Light grey, hard, non-calcareous, non-swelling, waxy/soapy, heavily altered, heavily brecciated.

944–952 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey, hard, non-calcareous, non-swelling, heavily altered.

Siltstone. Grey, hard, non-calcareous, very fine grained, clean, fractured, silver/grey mineralisation (sphalerite), heavily altered.

952–1027 m Intrusion.

Intrusion. Dark grey to blue, microcrystalline, occasional black and white phenocrysts up to 2 mm, very hard, very heavily fractured, abundant green mineralisation along fractures, soft/soapy (talc/serpentine).

1027–1033 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey, firm to hard, non-calcareous, waxy/soapy, highly altered.

Siltstone. Light grey, hard, non-calcareous, micaceous, heavily fractured, heavily altered.

1033–1037 m Intrusion.

Intrusion. Grey to dark grey, microcrystalline, occasional small (0.5 mm) dark phenocrysts.

1037–1047 m Mudstone Interval.

Mudstone. dark grey to black, hard, non-calcareous, non-swelling, blocky, brittle, massive. Very broken.

1047–1048 m Intrusion.

Intrusion. Grey, microcrystalline, hard, cream/brown chilled margin.

1048–1063 m Mudstone Interval.

Mudstone. Dark grey, hard, blocky, brittle, non-calcareous, non-swelling, micaceous, finely laminated, abundant pyrite.

1063–1063.5 m Intrusion.

Intrusion. Dark grey to blue, microcrystalline, hard, brittle.

1063.5–1067 m Mudstone Interval.

Mudstone. Dark grey to black, hard, brittle, non-calcareous, non-swelling, micaceous, massive.

1067–1067.5 m Intrusion.

Intrusion. Grey, microcrystalline, hard, cream/brown chilled margin.

1067.5–1076 m Mudstone Interval.

Mudstone. Dark grey to black, hard, brittle, non-calcareous, non-swelling, micaceous, massive.

1076–1080 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, hard, brittle, non-calcareous, non-swelling, carbonaceous, massive.

Siltstone. Grey to silver, hard, clean, very fine grained, micaceous, very calcareous in parts, abundant lenses of detrital pyrite.

1080–1094 m Mudstone Interval.

Mudstone. Very dark grey to black, hard, brittle, non-calcareous, non-swelling, carbonaceous, finely laminated.

1094–1096.5 m Intrusion.

Intrusion. Grey, hard, microcrystalline, pale grey phenocrysts up to 1 mm.

1096.5–1110 m Mudstone Interval.

Mudstone. Very dark grey to black, hard, brittle, non-calcareous, non-swelling, carbonaceous, finely laminated.

1110–1112 m Interbedded Mudstone and Siltstone Interval.

Mudstone. Dark grey to black, hard, brittle, carbonaceous, non-calcareous, non-swelling, micaceous.

Siltstone. Light grey to grey, clean, hard, non-calcareous, micaceous.

1112–1133 m Mudstone Interval.

Mudstone. Dark grey to black, hard, non-calcareous, non-swelling, carbonaceous in parts, generally massive, occasionally parallel laminated.

1133–1155 m Mudstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, carbonaceous in parts, micaceous in parts, finely laminated. Thin (1–2 mm) interbeds of siltstone.

1155–1170 m Mudstone Interval.

Mudstone. Dark grey to black, soft to firm, non-calcareous, non-swelling, micaceous in parts, finely laminated. Thin (1–2 mm) interbeds of siltstone.

1170–1200 m Mudstone Interval.

Mudstone. Dark grey to black, firm to hard, non-calcareous, non-swelling, micaceous, generally massive, occasional parallel lamination.

Appendix III

Core box list

UMIIVIK-1		
Box no	Top of Box	Bottom of box
1	24,71	27,71
2	28,29	31,47
2	29,14	32,60
3	32,61	35,88
3	32,76	35,99
3	32,79	36,02
4	37,19	40,51
4	37,11	40,40
5	40,03	43,20
6	43,21	46,43
7	46,10	49,25
8	49,26	52,42
9	51,95	55,08
10	55,22	58,45
11	58,31	61,57
12	61,66	64,82
13	64,76	68,08
14	68,39	71,68
15	71,59	74,84
16	74,69	77,79
17	77,66	80,72
18	80,72	83,76
19	83,76	87,05
20	87,18	90,40
21	90,53	93,79
21	90,31	93,57
22	93,78	96,39
23	96,39	96,62
23	99,67	99,67
24	99,56	102,72
25	102,27	105,55
26	105,14	108,35
27	109,02	112,26
28	111,78	114,92
29	114,80	117,97
30	117,87	121,04
31	120,90	124,17
32	124,07	127,27
33	127,17	130,43
34	130,36	133,53
35	133,41	136,63
36	136,74	139,97
37	139,92	143,20
38	143,11	146,36
39	146,37	149,56
40	149,54	152,85
41	152,73	155,99
42	155,93	159,18
43	159,24	162,41
44	162,33	165,60
45	165,59	168,93
46	168,73	172,01
47	171,85	175,05
48	174,97	178,21

UMIIVIK-1		
Box no	Top of Box	Bottom of box
49	178,17	179,84
50	179,83	183,76
51	183,76	187,06
52	187,06	189,90
53	189,90	193,23
54	193,23	196,31
55	196,31	199,59
56	199,59	202,68
57	202,68	205,97
58	205,97	210,24
59	210,24	212,55
60	212,55	216,36
61	216,36	219,59
62	219,59	222,74
63	222,74	225,96
64	225,96	229,40
65	229,40	232,68
66	232,56	235,82
67	235,71	239,10
68	239,13	242,38
69	242,30	245,57
70	245,47	248,78
71	249,32	252,40
72	254,40	257,21
72	258,17	258,43
73	258,55	261,83
74	261,72	264,98
75	265,11	268,38
76	268,26	271,46
77	271,72	274,97
78	274,94	278,13
79	278,09	281,34
80	281,32	284,49
81	284,62	287,89
82	287,75	291,03
83	291,11	294,34
84	294,30	297,52
85	297,61	300,87
86	294,84	303,84
86	303,89	304,05
87	303,97	307,19
88	307,24	310,54
89	310,55	313,55
90	313,74	316,97
91	316,92	320,19
92	320,18	322,17
93	323,37	326,59
94	326,51	329,79
95	329,88	333,20
96	333,04	336,29
97	336,39	339,67
98	339,63	341,95
99	342,76	346,08
100	346,08	349,31

UMIIVIK-1		
Box no	Top of Box	Bottom of box
101	349,26	352,55
102	352,33	355,57
103	355,84	358,95
104	358,71	361,97
105	362,24	365,42
106	365,11	368,30
107	368,82	372,07
108	371,83	375,11
109	375,39	378,68
110	378,65	381,85
111	381,82	385,10
112	385,03	388,34
113	388,46	391,73
114	391,41	394,68
115	395,17	398,40
116	397,93	401,09
117	400,83	404,02
118	404,54	407,83
119	407,99	411,28
120	411,13	414,35
121	414,35	417,90
122	417,90	421,05
123	421,05	424,14
124	424,14	427,24
125	427,24	430,28
126	430,28	433,27
127	433,27	436,79
128	436,79	440,47
129	440,47	443,74
130	443,74	446,79
131	446,79	449,91
132	449,91	453,11
133	453,11	456,23
134	456,23	459,51
135	459,51	462,60
136	462,60	465,82
137	465,82	468,81
138	468,81	472,14
139	472,14	475,04
140	475,04	478,26
141	478,37	481,37
142	481,37	484,71
143	484,71	487,23
144	487,23	490,54
145	490,54	493,70
146	493,70	496,77
147	496,77	499,88
148	499,88	503,06
149	503,06	505,72
150	505,72	508,99
151	508,99	511,90
152	511,90	515,06
153	515,06	518,10
154	518,10	521,39

UMIIVIK-1		
Box no	Top of Box	Bottom of box
155	521,39	524,42
156	524,42	527,68
157	527,68	530,68
158	530,68	533,82
159	533,82	536,93
160	535,93	539,71
161	539,71	543,04
162	543,04	546,07
163	546,07	549,29
164	549,29	552,48
165	552,48	555,81
166	555,81	558,75
167	558,75	562,09
168	562,09	565,43
169	565,43	568,70
170	569,72	572,00
171	572,00	575,38
172	575,38	578,58
173	578,58	581,91
174	581,91	585,09
175	585,09	588,37
176	588,37	591,57
177	591,57	594,93
178	594,93	598,28
179	598,28	601,23
180	601,23	604,33
181	604,33	607,47
182	607,47	610,81
183	610,81	614,49
184	614,49	616,68
185	616,68	620,13
186	620,13	623,20
187	623,20	629,01
188	629,01	632,28
189	632,28	635,53
190	635,53	638,42
191	638,42	641,57
192	641,57	645,07
193	645,07	648,32
194	648,32	652,17
195	652,17	655,27
196	655,27	658,36
197	658,36	661,29
198	661,29	664,57
199	664,57	667,79
200	667,79	671,22
201	671,22	674,79
202	674,79	678,94
203	677,94	681,48
204	681,48	684,58
205	684,58	687,83
206	687,93	691,17
207	691,17	694,33
208	694,33	697,64

UMIIVIK-1		
Box no	Top of Box	Bottom of box
209	697,64	700,88
210	700,88	704,15
211	704,15	707,36
212	707,36	710,81
213	710,81	714,04
214	714,04	718,87
215	718,87	722,19
216	722,19	725,50
217	725,50	728,81
218	728,81	732,08
219	732,08	735,36
220	735,36	738,38
221	738,38	741,53
222	741,53	744,79
223	744,79	747,93
224	747,93	751,22
225	751,22	754,62
226	754,62	757,69
227	757,69	760,93
228	760,93	763,84
229	763,84	767,11
230	767,11	769,55
231	770,55	772,48
232	772,48	777,30
233	77,30	780,26
234	780,26	783,72
235	783,72	786,94
236	786,94	789,90
237	789,90	793,08
238	793,08	796,25
239	796,25	799,59
240	799,59	802,91
241	802,91	806,15
242	806,15	809,48
243	809,48	812,71
244	812,71	815,97
245	815,97	818,76
246	818,76	822,47
247	822,47	825,27
248	825,27	828,90
249	828,90	832,26
250	832,26	835,58
251	835,58	838,54
252	838,54	841,29
253	841,29	843,91
254	843,91	847,26
255	847,26	850,33
256	850,33	853,31
257	853,31	856,29
258	856,29	859,86
259	859,86	862,58
260	862,58	865,88
261	865,88	869,03
262	869,03	872,81

UMIIVIK-1		
Box no	Top of Box	Bottom of box
263	872,81	875,75
264	875,75	879,60
265	879,60	882,54
266	882,54	886,20
267	886,20	889,26
268	889,26	892,36
269	892,44	895,10
270	895,10	898,36
271	898,36	901,43
272	901,43	904,03
273	904,03	907,32
274	907,30	910,56
275	910,56	914,25
276	914,25	917,36
277	917,36	920,68
278	920,68	923,09
279	923,04	926,21
280	926,21	929,76
281	929,76	932,60
282	932,60	935,92
283	935,92	939,22
284	939,22	942,56
285	942,56	944,68
286	945,29	947,89
287	947,89	951,35
288	951,35	953,91
289	933,91	957,68
290	957,68	960,41
291	960,41	963,64
292	963,64	966,83
293	966,83	970,08
294	970,08	972,96
295	972,96	975,59
296	975,59	978,04
297	978,04	980,54
298	980,54	983,79
299	983,79	987,08
300	987,08	989,96
301	989,96	993,21
302	993,21	996,36
303	996,36	999,96
304	999,96	1003,27
305	1003,27	1006,30
306	1006,30	1009,10
307	1009,10	1012,10
308	1012,10	1015,06
309	1015,06	1018,33
310	1018,33	1021,53
311	1021,53	1024,43
312	1024,43	1027,64
313	1027,64	1029,39
314	1029,39	1032,50
315	1032,50	1035,65
316	1035,65	1039,00

UMIIVIK-1		
Box no	Top of Box	Bottom of box
317	1039,00	1042,30
318	1042,30	1044,55
319	1044,55	1047,59
320	1047,59	1050,83
321	1050,83	1053,65
322	1053,65	1056,97
323	1056,97	1059,79
324	1059,79	1062,80
325	1062,80	1066,08
326	1066,08	1069,60
327	1069,60	1072,98
328	1072,98	1075,93
329	1075,93	1079,17
330	1079,17	1082,48
331	1082,48	1086,11
332	1086,11	1089,42
333	1089,42	1092,21
334	1092,21	1095,14
335	1095,14	1098,49
336	1098,49	1101,81
337	1101,81	1105,10
338	1105,10	1108,01
339	1108,01	1111,30
340	1111,30	1114,58
341	1114,58	1117,80
342	1117,80	1121,08
343	1121,08	1124,26
344	1124,26	1126,92
345	1126,92	1130,26
346	1130,26	1133,52
347	1133,52	1136,76
348	1136,76	1139,98
349	1139,98	1142,92
350	1142,92	1146,08
351	1146,08	1149,33
352	1149,33	1152,66
353	1152,66	1155,95
354	1155,95	1159,25
355	1159,25	1163,69
356	1163,69	1166,65
357	1166,65	1170,05
358	1170,05	1173,20
359	1173,20	1176,46
360	1176,46	1179,76
361	1179,76	1183,20
362	1183,20	1186,24
363	1186,24	1189,41
364	1189,41	1192,73
365	1192,73	1195,14
366	1195,14	1198,41
367	1198,41	1200,05

Appendix IV

Core sample list

UMIIVIK-1 GGUnr 439301					
Sub no	Depth	Date	Time	Type	Core box
-1	48,04	23-aug	14.20	Canned	7
-2	49,71	23-aug	16.05	Canned	8
-3	53,15	23-aug	17.20	Canned	9
-4	56,05	23-aug	18.30	Canned	10
-5	60,05	23-aug	19.00	Canned	11
-6	62,67	23-aug	19.30	Canned	12
-7	65,94	23-aug	21.30	Canned	13
-8	68,08	23-aug	22.30	Canned	14
-9	71,41	23-aug	23.00	Canned	14
-10	73,87	23-aug	23.45	Canned	15
-11	78,30	24-aug	01.50	Canned	17
-12	80,62	24-aug	02.15	Canned	17
-13	84,33	24-aug	04.40	Canned	19
-14	85,92	24-aug	05.30	Canned	19
-15	90,30	24-aug	06.15	Canned	20
-16	93,69	24-aug	06.45	Canned	21
-17	93,65	24-aug	07.30	Canned	22
-18	99,87	24-aug	08.15	Canned	23
-19	99,84	24-aug	09.30	Canned	24
-20	104,65	24-aug	10.00	Canned	25
-21	107,79	24-aug	10.40	Canned	26
-22	110,50	24-aug	12.05	Canned	27
-23	113,24	24-aug	13.00	Canned	28
-24	117,18	24-aug	13.50	Canned	29
-25	120,30	24-aug	14.30	Canned	30
-26	122,84	24-aug	15.10	Canned	31
-27	126,26	24-aug	15.40	Canned	32
-28	129,46	24-aug	16.30	Canned	33
-29	132,81	24-aug	17.00	Canned	34
-30	135,94	24-aug	17.30	Canned	35
-31	139,29	24-aug	18.00	Canned	36
-32	142,26	24-aug	18.40	Canned	37
-33	145,31	24-aug	19.15	Canned	38
-34	146,28	24-aug	20.00	Canned	38
-35	151,29	24-aug	21.00	Canned	40
-36	153,62	24-aug	21.45	Canned	41
-37	157,42	24-aug	22.30	Canned	42
-38	160,20	24-aug	23.30	Canned	43
-39	164,10	25-aug	00.20	Canned	44
-40	166,61	25-aug	01.30	Canned	45
-41	169,49	25-aug	02.30	Canned	46
-42	172,89	25-aug	04.50	Canned	47
-43	178,51	25-aug	05.45	Canned	48
-44	178,84	25-aug	06.40	Canned	49
-45	179,84	27-aug	01.00	Canned	50
-46	187,90	27-aug	03.15	Canned	52
-47	193,38	27-aug	04.30	Canned	54
-48	199,74	27-aug	06.45	Canned	56
-49	207,18	27-aug	08.15	Canned	57
-50	208,47	27-aug	08.20	Canned	58
-51	211,62	27-aug	10.15	Canned	59
-52	214,84	27-aug	10.15	Canned	60
-53	188,21	27-aug	10.25	Canned	51
-54	191,12	27-aug	10.30	Canned	53

Umiivik-1
GGUnr 439301
Sample list

-55	197,21	27-aug	10.20	Canned	55
-56	218,55	27-aug	11.05	Canned	61
-57	220,69	27-aug	11.05	Canned	62
-58	223,43	27-aug	11.50	Canned	63
-59	226,22	27-aug	11.50	Canned	64
-60	229,52	27-aug	13.00	Canned	65
-61	232,25	27-aug	13.00	Canned	65
-62	235,72	27-aug	14.15	Canned	66
-63	238,67	27-aug	14.15	Canned	67
-64	241,72	27-aug	15.10	Canned	68
-65	243,91	27-aug	16.25	Canned	69
-66	246,31	27-aug	18.55	Canned	70
-67	250,12	27-aug	21.00	Canned	71
-68	253,62	27-aug	22.00	Canned	72
-69	250,65	27-aug	22.20	Canned	71
-70	261,27	27-aug	22.40	Canned	73
-71	263,32	27-aug	23.00	Canned	74
-72	264,83	27-aug	23.30	Canned	75
-73	268,33	28-aug	00.45	Canned	76
-74	271,35	28-aug	00.45	Canned	77
-75	274,82	28-aug	01.30	Canned	78
-76	277,56	28-aug	02.30	Canned	79
-77	281,04	28-aug	08.50	Canned	79
-78	283,28	28-aug	03.00	Canned	80
-79	286,68	28-aug	03.00	Canned	81
-80	289,71	28-aug	04.00	Canned	82
-81	294,12	28-aug	04.00	Canned	83
-82	296,42	28-aug	04.30	Canned	84
-83	299,78	28-aug	04.30	Canned	85
-84	301,68	28-aug	05.20	Canned	86
-85	306,09	28-aug	06.15	Canned	87
-86	307,68	28-aug	06.15	Canned	88
-87	310,44	28-aug	06.15	Canned	88
-88	313,52	28-aug	07.30	Canned	89
-89	316,46	28-aug	07.30	Canned	90
-90	319,19	28-aug	08.20	Canned	91
-91	322,24	28-aug	08.20	Canned	92
-92	327,69	28-aug	09.15	Canned	93
-93	328,89	28-aug	09.15	Canned	94
-94	331,94	28-aug	10.15	Canned	95
-95	334,99	28-aug	10.15	Canned	96
-96	338,45	28-aug	11.15	Canned	97
-97	340,78	28-aug	11.15	Canned	98
-98	344,74	28-aug	11.50	Canned	99
-99	348,09	28-aug	11.50	Canned	100
-100	351,14	28-aug	13.45	Canned	101
-101	354,49	28-aug	13.45	Canned	102
-102	357,85	28-aug	14.40	Canned	103
-103	360,89	28-aug	14.40	Canned	104
-104	364,25	28-aug	15.40	Canned	105
-105	367,60	28-aug	15.40	Canned	106
-106	370,95	28-aug	16.30	Canned	107
-107	374,00	28-aug	16.30	Canned	108
-108	377,35	28-aug	17.30	Canned	109
-109	380,71	28-aug	17.30	Canned	110
-110	383,75	28-aug	18.45	Canned	111

-111	387,09	28-aug	18.45	Canned	112
-112	391,64	28-aug	20.30	Canned	113
-113	393,57	28-aug	20.50	Canned	114
-114	397,15	28-aug	21.10	Canned	115
-115	397,43	28-aug	22.10	Canned	116
-116	403,56	28-aug	22.45	Canned	117
-117	406,74	28-aug	23.30	Canned	118
-118	408,54	28-aug	23.30	Canned	119
-119	410,57	29-aug	01.00	Canned	120
-120	414,68	29-aug	01.30	Canned	121
-121	417,99	29-aug	02.10	Canned	122
-122	420,95	29-aug	02.10	Canned	122
-123	422,76	29-aug	03.00	Canned	123
-124	425,84	29-aug	03.45	Canned	125
-125	430,08	29-aug	03.45	Canned	125
-126	431,98	29-aug	06.00	Canned	127
-127	435,65	29-aug	06.30	Canned	128
-128	440,37	29-aug	06.30	Canned	128
-129	443,95	29-aug	07.20	Canned	129
-130	446,69	29-aug	07.20	Canned	130
-131	447,19	29-aug	08.50	Canned	131
-132	450,50	29-aug	08.50	Canned	132
-133	451,11	29-aug	10.10	Canned	134
-134	456,91	29-aug	10.10	Canned	135
-135	460,33	29-aug	11.15	Canned	135
-136	463,92	29-aug	12.10	Canned	136
-137	463,97	29-aug	14.00	Canned	137
-138	470,61	29-aug	14.00	Canned	138
-139	473,43	29-aug	15.25	Canned	139
-140	476,71	29-aug	15.25	Canned	140
-141	479,76	29-aug	17.00	Canned	141
-142	483,11	29-aug	17.00	Canned	142
-143	486,46	29-aug	17.45	Canned	143
-144	489,51	29-aug	17.45	Canned	144
-145	492,86	29-aug	20.00	Canned	145
-146	493,49	29-aug	20.00	Canned	146
-147	498,96	29-aug	21.10	Canned	147
-148	504,12	29-aug	22.10	Canned	148
-149	507,19	29-aug	23.15	Canned	150
-150	510,20	29-aug	00.00	Canned	151
-151	514,96	29-aug	00.40	Canned	152
-152	516,30	29-aug	01.50	Canned	153
-153	518,13	29-aug	02.20	Canned	154
-154	521,23	29-aug	03.00	Canned	155
-155	523,34	29-aug	03.15	Canned	156
-156	527,58	29-aug	03.15	Canned	156
-157	530,86	29-aug	04.40	Canned	158
-158	533,60	29-aug	05.45	Canned	159
-159	535,74	29-aug	06.30	Canned	160
-160	540,29	29-aug	07.00	Canned	161
-161	542,23	29-aug	07.00	Canned	161
-162	544,68	29-aug	08.00	Canned	162
-163	546,81	29-aug	08.00	Canned	163
-164	549,86	29-aug	09.30	Canned	164
-165	550,16	29-aug	09.30	Canned	165
-166	556,26	29-aug	10.30	Canned	166

-167	559,61	29-aug	10.30	Canned	167
-168	562.66	30-aug	11.30	Canned	168
-169	566,20	30-aug	11.30	Canned	169
-170	569,36	30-aug	12.30	Canned	170
-171	572,63	30-aug	12.30	Canned	171
-172	575,76	30-aug	13.30	Canned	172
-173	579,28	30-aug	13.30	Canned	173
-175	582,17	30-aug	14.30	Canned	174
-176	585,59	30-aug	14.30	Canned	175
-177	588,56	30-aug	15.35	Canned	176
-178	591,99	30-aug	15.35	Canned	177
-179	595,27	30-aug	17.15	Canned	178
-180	599,85	30-aug	19.30	Canned	179
-181	603,17	30-aug	19.40	Canned	180
-182	610,01	30-aug	20.50	Canned	182
-183	612,31	30-aug	21.30	Canned	183
-184	618,49	31-aug	03.30	Canned	185
-185	622,26	31-aug	06.30	Canned	186
-186	629,80	31-aug	06.30	Canned	188
-187	630,07	31-aug	08.20	Canned	188
-188	633,53	31-aug	08.20	Canned	189
-189	636,45	31-aug	10.30	Canned	190
-190	639,47	31-aug	10.30	Canned	191
-191	642,52	31-aug	12.15	Canned	192
-192	645,17	31-aug	12.15	Canned	193
-193	648,92	31-aug	14.50	Canned	194
-194	652,34	31-aug	14.50	Canned	195
-195	655,38	31-aug	17.30	Canned	196
-196	658,67	31-aug	17.30	Canned	197
-197	661,72	31-aug	18.20	Canned	198
-198	665,05	31-aug	18.20	Canned	199
-199	669,75	31-aug	20.00	Canned	200
-200	671,53	31-aug	20.00	Canned	201
-201	675,60	31-aug	20.50	Canned	202
-202	681,06	31-aug	20.50	Canned	203
-203	682,49	31-aug	22.00	Canned	204
-204	687,73	31-aug	22.00	Canned	205
-205	688,99	31-aug	23.50	Canned	206
-206	691,07	31-aug	23.50	Canned	206
-207	694,96	01-sep	02.30	Canned	207
-208	700,10	01-sep	02.30	Canned	209
-209	700,96	01-sep	04.00	Canned	210
-210	706,12	01-sep	04.00	Canned	211
-211	707,17	01-sep	06.00	Canned	211
-212	710,71	01-sep	06.00	Canned	212
-213	712,34	01-sep	07.30	Canned	213
-214	718,45	01-sep	07.30	Canned	214
-215	721,09	01-sep	10.00	Canned	215
-216	724,20	01-sep	10.00	Canned	216
-217	727,53	01-sep	12.00	Canned	217
-218	730,60	01-sep	12.00	Canned	218
-219	733,68	01-sep	14.00	Canned	219
-220	737,00	01-sep	14.00	Canned	220
-221	739,04	01-sep	17.00	Canned	221
-222	742,20	01-sep	17.00	Canned	222
-223	747,83	01-sep	19.40	Canned	223

-224	748,89	01-sep	19.40	Canned	224
-225	752,49	01-sep	21.15	Canned	225
-226	757,82	01-sep	21.15	Canned	227
-227	762,68	01-sep	23.00	Canned	228
-228	763,74	01-sep	01.30	Canned	228
-229	767,00	01-sep	01.30	Canned	229
-230	769,39	01-sep	03.15	Canned	230
-231	772,38	01-sep	03.15	Canned	231
-232	777,96	01-sep	05.00	Canned	233
-233	781,38	01-sep	05.00	Canned	234
-234	784,75	01-sep	07.50	Canned	235
-235	787,60	01-sep	07.50	Canned	236
-236	791,08	01-sep	10.43	Canned	237
-237	794,00	01-sep	10.43	Canned	238
-238	797,39	01-sep	13.04	Canned	239
-239	800,52	02-sep	13.04	Canned	240
-240	33,51	02-sep	16.00	Canned	241
-241	807,11	02-sep	16.00	Canned	242
-242	810,12	02-sep	18.20	Canned	243
-243	813,20	02-sep	18.20	Canned	244
-244	816,25	02-sep	21.45	Canned	245
-245	819,91	02-sep	21.45	Canned	246
-246	823,12	03-sep	00.30	Canned	247
-247	826,70	03-sep	00.30	Canned	248
-248	829.68	03-sep	04.00	Canned	249
-249	832,60	03-sep	04.00	Canned	250
-250	836,06	03-sep	06.40	Canned	251
-251	838,89	03-sep	06.40	Canned	252
-252	841,45	03-sep	17.00	Canned	253
-253	843,77	03-sep	17.00	Canned	253
-254	847,10	03-sep	20.00	Canned	254
-255	850,23	03-sep	20.00	Canned	255
-256	853,44	03-sep	21.30	Canned	257
-257	859,86	03-sep	21.30	Canned	258
-258	860,15	04-sep	18.00	Canned	259
-259	862,58	04-sep	18.00	Canned	260
-260	868,07	04-sep	22.00	Canned	261
-261	871,73	04-sep	22.00	Canned	262
-262	874,55	05-sep	00.08	Canned	263
-263	878,43	05-sep	00.08	Canned	264
-264	882,54	05-sep	02.20	Canned	265
-265	884,97	05-sep	02.20	Canned	266
-266	887,97	05-sep	04.30	Canned	267
-267	891,24	05-sep	04.30	Canned	268
-268	891,88	05-sep	05.50	Canned	269
-269	895.74	05-sep	10.20	Canned	270
-270	898,55	05-sep	10.20	Canned	271
-271	901,19	05-sep	13.50	Canned	271
-272	903,88	05-sep	13.50	Canned	272
-273	907,12	05-sep	14.30	Canned	273
-274	910,37	05-sep	14.30	Canned	274
-275	913,59	05-sep	18.30	Canned	275
-276	916,56	05-sep	18.30	Canned	276
-277	921,41	05-sep	22.30	Canned	277
-278	923,09	06-sep	00.00	Canned	278
-279	928,12	06-sep	02.15	Canned	280

-280	931,16	06-sep	04.30	Canned	281
-281	933,80	06-sep	04.30	Canned	282
-282	937,56	06-sep	06.45	Canned	283
-283	940,92	06-sep	06.45	Canned	284
-284	945,07	06-sep	10.40	Canned	285
-285	948,47	06-sep	17.00	Canned	287
-286	951,77	06-sep	22.30	Canned	288
-287	955,48	06-sep	22.30	Canned	289
-288	958,24	07-sep	02.20	Canned	290
-289	961,72	07-sep	04.30	Canned	291
-290	965,30	07-sep	04.30	Canned	292
-291	968,87	07-sep	06.10	Canned	293
-292	970,79	07-sep	07.50	Canned	294
-293	973,06	07-sep	09.11	Canned	295
-294	975,59	07-sep	11.18	Canned	296
-295	979,13	07-sep	14.20	Canned	297
-296	983,69	07-sep	18.00	Canned	298
-297	986,98	07-sep	18.00	Canned	299
-298	988,48	07-sep	19.30	Canned	300
-299	989,00	07-sep	20.45	Canned	300
-300	994,87	07-sep	23.30	Canned	302
-301	998,85	08-sep	01.50	Canned	303
-302	1001,06	08-sep	04.00	Canned	304
-303	1004,09	08-sep	04.00	Canned	305
-304	1006,52	08-sep	06.05	Canned	306
-305	1011,63	08-sep	09.05	Canned	307
-306	1013,46	08-sep	10.15	Canned	308
-307	1017,83	08-sep	13.45	Canned	309
-308	1020,00	08-sep	15.00	Canned	310
-309	1023,82	08-sep	16.40	Canned	311
-310	1027,48	08-sep	18.00	Canned	312
-311	1030,99	08-sep	21.30	Canned	314
-312	1033,56	08-sep	23.30	Canned	315
-313	1038,15	09-sep	03.15	Canned	316
-314	1041,50	09-sep	03.15	Canned	317
-315	1044,55	09-sep	06.15	Canned	318
-316	1047,34	09-sep	06.15	Canned	319
-317	1049,51	09-sep	08.42	Canned	320
-318	1052,47	09-sep	08.42	Canned	321
-319	1054,55	09-sep	10.40	Canned	322
-320	1057,11	09-sep	13.20	Canned	323
-321	1060,32	09-sep	13.20	Canned	324
-322	1065,56	09-sep	16.25	Canned	325
-323	1068,76	09-sep	16.25	Canned	326
-324	1071,77	09-sep	21.45	Canned	327
-325	1075,03	09-sep	21.45	Canned	328
-326	1078,07	09-sep	22.09	Canned	329
-327	1081,13	09-sep	22.09	Canned	330
-328	1084,17	10-sep	01.15	Canned	331
-329	1086,20	10-sep	01.15	Canned	332
-330	1092,10	10-sep	04.00	Canned	333
-331	1095,15	10-sep	06.50	Canned	335
-332	1098,39	10-sep	06.50	Canned	335
-333	1101,93	10-sep	11.50	Canned	337
-334	1101,63	10-sep	11.50	Canned	336
-335	1111,14	10-sep	15.30	Canned	339

-336	1104,99	10-sep	15.30	Canned	338
-337	1113,60	10-sep	19.00	Canned	340
-338	1117,70	10-sep	22.15	Canned	341
-339	1123,19	10-sep	22.15	Canned	343
-340	1127,76	11-sep	00.30	Canned	345
-341	1130,81	11-sep	05.20	Canned	346
-342	1134,37	11-sep	05.20	Canned	347
-343	1139,88	11-sep	09.30	Canned	348
-344	1140,87	11-sep	09.30	Canned	349
-345	1148,01	12-sep	05.00	Canned	351
-346	1151,37	12-sep	09.00	Canned	352
-347	1154,48	12-sep	09.00	Canned	353
-348	1157,06	12-sep	15.30	Canned	354
-349	1163,59	12-sep	18.30	Canned	355
-350	1165,59	12-sep	19.30	Canned	356
-351	1167,28	12-sep	22.00	Canned	357
-352	1171,85	12-sep	22.00	Canned	358
-353	1174,91	13-sep	02.50	Canned	359
-354	1177,85	13-sep	02.50	Canned	360
-355	1182,53	13-sep	07.23	Canned	361
-356	1184,65	13-sep	10.00	Canned	362
-357	1187,47	13-sep	14.00	Canned	363
-358	1191,38	13-sep	14.00	Canned	364
-359	1194,03	13-sep	17.11	Canned	365
-360	1196,87	13-sep	17.11	Canned	366
-361	1199,69	13-sep	17.11	Canned	367
-501	34,76	23-aug	07.25	Chip	3
-502	38,72	23-aug	07.35	Chip	4
-503	41,77	23-aug	08.00	Chip	5
-504	44,82	23-aug	09.00	Chip	6
-505	47,86	23-aug	14.25	Chip	7
-506	50,91	23-aug	16.10	Chip	8
-507	53,26	23-aug	17.25	Chip	9
-508	56,16	23-aug	18.35	Chip	10
-509	60,16	23-aug	07.30	Chip	11
-510	62,78	24-aug	08.00	Chip	12
-511	66,05	24-aug	08.15	Chip	13
-512	68,19	24-aug	08.30	Chip	14
-513	71,39	24-aug	08.35	Chip	14
-514	73,98	24-aug	08.50	Chip	15
-515	78,28	24-aug	09.20	Chip	17
-516	80,60	24-aug	09.30	Chip	17
-517	84,31	24-aug	10.30	Chip	19
-518	86,03	24-aug	10.35	Chip	19
-519	90,28	24-aug	10.50	Chip	20
-520	87,05	24-aug	10.55	Chip	20
-521	93,67	24-aug	11.15	Chip	21
-522	93,63	24-aug	11.45	Chip	22
-523	99,54	24-aug	12.25	Chip	23
-524	99,95	24-aug	12.40	Chip	24
-525	104,76	24-aug	12.55	Chip	25
-526	107,77	24-aug	13.10	Chip	26
-527	110,48	24-aug	13.35	Chip	27
-528	113,22	24-aug	14.30	Chip	28
-529	117,16	24-aug	15.00	Chip	29
-530	120,28	24-aug	15.25	Chip	30

-531	122,82	24-aug	16.00	Chip	31
-532	126,24	24-aug	17.00	Chip	32
-533	129,44	24-aug	17.15	Chip	33
-534	129,54	24-aug	17.55	Chip	33
-535	135,92	24-aug	18.30	Chip	35
-536	139,27	24-aug	18.45	Chip	36
-537	142,24	25-aug	08.00	Chip	37
-538	145,29	25-aug	08.15	Chip	38
-539	146,26	25-aug	08.20	Chip	38
-540	151,27	25-aug	08.50	Chip	40
-541	153,60	25-aug	09.00	Chip	41
-542	152,85	25-aug	09.05	Chip	41
-543	157,40	25-aug	09.20	Chip	42
-544	160,18	25-aug	09.40	Chip	43
-545	164,08	25-aug	10.00	Chip	44
-546	166,59	25-aug	10.15	Chip	45
-547	169,47	25-aug	10.50	Chip	46
-548	172,87	25-aug	12.30	Chip	47
-549	172,82	25-aug	13.00	Chip	47
-550	175,87	25-aug	13.30	Chip	49
-551	179,82	27-aug	08.00	Chip	51
-552	187,88	27-aug	09.25	Chip	52
-553	193,36	27-aug	09.45	Chip	54
-554	197,22	27-aug	10.00	Chip	55
-555	191,23	27-aug	10.20	Chip	53
-556	199,72	27-aug	10.45	Chip	56
-557	205,24	27-aug	11.05	Chip	57
-558	208,58	27-aug	11.20	Chip	58
-559	211,73	27-aug	11.45	Chip	59
-560	214,95	27-aug	12.00	Chip	60
-561	218,66	27-aug	12.10	Chip	61
-562	218,68	27-aug	12.15	Chip	61
-563	220,80	27-aug	12.30	Chip	62
-564	223,54	27-aug	12.45	Chip	63
-565	226,33	27-aug	13.00	Chip	64
-566	229,63	27-aug	14.45	Chip	65
-567	232,36	27-aug	14.20	Chip	65
-568	235,70	27-aug	14.35	Chip	66
-569	238,78	27-aug	14.50	Chip	67
-570	241,83	27-aug	16.00	Chip	68
-571	244,02	27-aug	16.15	Chip	69
-572	246,42	27-aug	16.25	Chip	70
-573	250,16	27-aug	17.30	Chip	71
-574	253,72	27-aug	22.15	Chip	72
-575	261,26	27-aug	22.30	Chip	73
-576	263,31	27-aug	23.30	Chip	74
-577	264,82	27-aug	23.45	Chip	75
-578	268,32	28-aug	00.45	Chip	76
-579	271,34	28-aug	00.45	Chip	77
-580	274,81	28-aug	01.40	Chip	78
-581	277,55	28-aug	02.30	Chip	79
-582	283,27	28-aug	03.00	Chip	80
-583	286,67	28-aug	03.00	Chip	81
-584	289,70	28-aug	04.00	Chip	82
-585	294,11	28-aug	04.00	Chip	83
-586	296,41	28-aug	04.30	Chip	84

-587	299,77	28-aug	04.30	Chip	85
-588	301,67	28-aug	05.20	Chip	86
-589	306,08	28-aug	06.20	Chip	87
-590	307,67	28-aug	06.20	Chip	88
-591	310,43	28-aug	06.20	Chip	88
-592	313,50	28-aug	07.30	Chip	89
-593	316,53	28-aug	07.55	Chip	90
-594	301,92	28-aug	09.00	Chip	86
-595	319,17	28-aug	09.20	Chip	91
-596	324,65	28-aug	09.35	Chip	92
-597	327,67	28-aug	10.00	Chip	93
-598	329,00	28-aug	10.10	Chip	94
-599	332,05	28-aug	10.30	Chip	95
-600	335,10	28-aug	10.40	Chip	96
-601	338,34	28-aug	11.25	Chip	97
-602	340,89	28-aug	11.40	Chip	98
-603	344,85	28-aug	12.35	Chip	99
-604	348,20	28-aug	12.45	Chip	100
-605	351,25	28-aug	14.05	Chip	101
-606	349,98	28-aug	14.10	Chip	101
-607	354,60	28-aug	14.40	Chip	102
-608	357,96	28-aug	14.50	Chip	103
-609	361,00	28-aug	15.05	Chip	104
-610	364,36	28-aug	15.45	Chip	105
-611	367,71	28-aug	15.55	Chip	106
-612	371,06	28-aug	16.55	Chip	107
-613	374,11	28-aug	17.05	Chip	108
-614	377,46	28-aug	17.45	Chip	107
-615	380,82	28-aug	17.50	Chip	110
-616	383,86	28-aug	18.50	Chip	111
-617	387,08	28-aug	19.20	Chip	112
-618	391,63	28-aug	20.30	Chip	113
-619	393,56	28-aug	20.50	Chip	114
-620	397,25	28-aug	21.30	Chip	115
-621	397,53	28-aug	22.10	Chip	116
-622	397,35	28-aug	22.10	Chip	116
-623	403,55	28-aug	22.50	Chip	117
-624	406,73	28-aug	23.30	Chip	118
-625	408,53	28-aug	23.30	Chip	119
-626	410,67	29-aug	01.00	Chip	120
-627	414,67	29-aug	01.30	Chip	121
-628	417,98	29-aug	02.15	Chip	122
-629	420,94	29-aug	02.15	Chip	122
-630	422,86	29-aug	03.00	Chip	123
-631	425,94	29-aug	03.45	Chip	125
-632	430,07	29-aug	03.45	Chip	125
-633	431,97	29-aug	06.00	Chip	127
-634	435,64	29-aug	06.30	Chip	128
-635	440,36	29-aug	06.30	Chip	128
-636	443,93	29-aug	07.50	Chip	129
-637	446,67	29-aug	07.55	Chip	130
-638	447,30	29-aug	09.35	Chip	131
-639	450,61	29-aug	10.00	Chip	132
-640	453,66	29-aug	10.25	Chip	133
-641	454,58	29-aug	10.35	Chip	134
-642	451,25	29-aug	11.45	Chip	132

-643	460,44	29-aug	11.55	Chip	135
-644	464,03	29-aug	12.10	Chip	136
-645	467,05	29-aug	14.40	Chip	137
-646	470,71	29-aug	14.50	Chip	138
-647	473,45	29-aug	15.50	Chip	139
-648	476,81	29-aug	16.10	Chip	140
-649	479,86	29-aug	17.05	Chip	141
-650	483,21	29-aug	17.25	Chip	142
-651	486,56	29-aug	17.55	Chip	143
-652	489,61	29-aug	18.10	Chip	144
-653	492,96	29-aug	20.00	Chip	145
-654	493,59	29-aug	20.00	Chip	146
-655	497,74	29-aug	21.00	Chip	147
-656	499,06	29-aug	21.10	Chip	148
-657	504,11	29-aug	22.15	Chip	149
-658	505,05	29-aug	22.15	Sample	149
-659	506,61	29-aug	23.00	Sample	150
-660	507,29	29-aug	23.15	Chip	150
-661	510,30	30-aug	00.00	Chip	151
-662	514,95	30-aug	00.40	Chip	152
-663	516,35	30-aug	01.50	Chip	153
-664	518,12	30-aug	02.20	Chip	154
-665	521,22	30-aug	03.00	Chip	155
-666	523,44	30-aug	03.15	Chip	156
-667	527,57	30-aug	03.15	Chip	156
-668	530,85	30-aug	04.40	Chip	158
-669	533,70	30-aug	05.50	Chip	159
-670	535,73	30-aug	06.30	Chip	160
-671	541,63	30-aug	07.30	Chip	161
-672	542,33	30-aug	07.35	Chip	161
-673	545,40	30-aug	08.55	Chip	162
-674	546,92	30-aug	09.25	Chip	163
-675	549,97	30-aug	09.45	Chip	164
-676	553,32	30-aug	10.00	Chip	165
-677	556,37	30-aug	10.45	Chip	166
-678	559,72	30-aug	11.00	Chip	167
-679	562,76	30-aug	11.30	Chip	168
-680	566,30	30-aug	11.45	Chip	169
-681	569,46	30-aug	12.50	Chip	170
-682	572,73	30-aug	13.00	Chip	171
-683	575,86	30-aug	13.40	Chip	172
-684	579,38	30-aug	13.50	Chip	173
-685	582,27	30-aug	14.35	Chip	174
-686	585,69	30-aug	14.55	Chip	175
-687	588,66	30-aug	16.00	Chip	176
-688	592,09	30-aug	16.10	Chip	177
-689	595,37	30-aug	17.25	Chip	178
-690	599,95	30-aug	19.30	Chip	179
-691	600,37	30-aug	19.30	Extra	179
-692	603,27	30-aug	19.40	Chip	180
-693	610,11	30-aug	20.50	Chip	182
-694	612,41	30-aug	21.30	Chip	183
-695	615,28	30-aug	23.00	Chip	184
-696	618,59	31-aug	03.30	Chip	185
-697	622,36	31-aug	06.30	Chip	186
-698	626,05	31-aug	07.30	Chip	187

-699	538,58	31-aug	08.00	Extra	160
-700	629,90	31-aug	08.30	Extra	188
-701	630,17	31-aug	08.35	Extra	188
-702	635,53	31-aug	10.25	Extra	189
-703	636,55	31-aug	10.50	Chip	190
-704	639,52	31-aug	13.20	Chip	191
-705	642,62	31-aug	13.30	Chip	192
-706	645,27	31-aug	13.40	Chip	193
-707	649,02	31-aug	15.05	Chip	194
-708	650,60	31-aug	15.10	Extra	194
-709	652,44	31-aug	15.25	Chip	195
-710	655,48	31-aug	17.30	Chip	196
-711	658,77	31-aug	17.30	Chip	197
-712	661.82	31-aug	18.20	Chip	198
-713	665,15	31-aug	18.20	Chip	199
-714	669.85	01-sep	07.30	Chip	200
-715	671,63	01-sep	08.30	Chip	201
-716	675.70	01-sep	08.40	Chip	202
-717	681,16	01-sep	09.00	Chip	203
-718	682,59	01-sep	09.10	Chip	204
-719	685,35	01-sep	09.45	Chip	205
-720	689,09	01-sep	10.05	Chip	206
-721	691,06	01-sep	10.15	Chip	206
-722	694,03	01-sep	10.30	Chip	207
-723	695,06	01-sep	10.40	Chip	208
-724	700,12	01-sep	10.55	Chip	209
-725	701,06	01-sep	11.05	Chip	210
-726	706,11	01-sep	11.25	Chip	211
-727	707,27	01-sep	11.35	Chip	211
-728	704,25	01-sep	11.45	Extra	211
-729	710,69	01-sep	12.00	Chip	212
-730	712,44	01-sep	12.15	Chip	213
-731	718,55	01-sep	12.30	Chip	214
-732	721,19	01-sep	12.45	Chip	215
-733	724,51	01-sep	13.35	Chip	216
-734	727,63	01-sep	14.00	Chip	217
-735	730,70	01-sep	14.10	Chip	218
-736	733,78	01-sep	14.20	Chip	219
-737	737,10	01-sep	16.00	Chip	220
-738	739,14	01-sep	17.30	Chip	221
-739	742,30	01-sep	17.45	Chip	222
-740	747,93	02-sep	07.45	Chip	223
-741	748,99	02-sep	08.35	Chip	224
-742	752,59	02-sep	08.50	Chip	225
-743	751,22	02-sep	09.15	Extra	225
-744	754,98	02-sep	09.30	Chip	226
-745	757,92	02-sep	09.45	Chip	227
-746	762,67	02-sep	10.00	Chip	228
-747	763,73	02-sep	10.05	Chip	228
-748	766,99	02-sep	10.20	Chip	229
-749	769,49	02-sep	10.30	Chip	230
-750	772,37	02-sep	10.50	Chip	231
-751	775,10	02-sep	11.30	Chip	232
-752	777,95	02-sep	11.45	Chip	233
-753	781,50	02-sep	12.00	Chip	234
-754	784,85	02-sep	12.45	Chip	235

-755	787,70	02-sep	12.50	Chip	236
-756	791,18	02-sep	13.10	Chip	237
-757	794,10	02-sep	13.25	Chip	238
-758	797,49	02-sep	14.00	Chip	239
-759	800,62	02-sep	16.00	Chip	240
-760	804,18	02-sep	16.15	Chip	241
-761	801,13	02-sep	16.25	Extra	240
-762	807,21	02-sep	18.35	Chip	242
-763	810,22	02-sep	18.50	Chip	243
-764	813,30	03-sep	07.40	Chip	244
-765	816,35	03-sep	07.50	Chip	245
-766	820,01	03-sep	08.10	Chip	246
-767	823,22	03-sep	08.50	Chip	247
-768	826,80	03-sep	09.10	Chip	248
-769	829,78	03-sep	09.25	Chip	249
-770	832,69	03-sep	09.35	Chip	250
-771	836,16	03-sep	09.55	Chip	251
-772	838,98	03-sep	17.25	Chip	252
-773	841,55	03-sep	17.35	Chip	253
-774	843,87	03-sep	17.40	Chip	253
-775	847,20	03-sep	21.30	Chip	254
-776	849,50	03-sep	21.50	Chip	255
-777	850,22	03-sep	22.00	Chip	255
-778	853,54	03-sep	22.40	Chip	257
-779	859,66	04-sep	07.25	Chip	258
-780	860,80	04-sep	07.30	Chip	259
-781	851,28	05-sep	07.25	Extra	256
-782	862,68	05-sep	07.35	Chip	260
-783	868,17	05-sep	08.00	Chip	261
-784	871,82	05-sep	08.20	Chip	262
-785	874,64	05-sep	08.30	Chip	263
-786	878,53	05-sep	08.40	Chip	264
-787	882,64	05-sep	08.45	Chip	265
-788	885,07	05-sep	09.05	Chip	266
-789	888,07	05-sep	09.20	Chip	267
-790	891,93	05-sep	09.35	Chip	268
-791	892,15	05-sep	11.05	Chip	269
-792	895,84	05-sep	11.20	Chip	270
-793	898,65	05-sep	18.30	Chip	271
-794	901,29	05-sep	18.50	Chip	271
-795	903,98	05-sep	18.55	Chip	272
-796	907,21	05-sep	19.00	Chip	273
-797	910,46	06-sep	08.30	Chip	274
-798	913,68	06-sep	08.40	Chip	275
-799	916,66	06-sep	08.50	Chip	276
-800	921,51	06-sep	09.10	Chip	277
-801	923,19	06-sep	10.00	Chip	278
-802	928,21	06-sep	10.10	Chip	280
-803	931,26	06-sep	10.30	Chip	281
-804	933,90	06-sep	11.05	Chip	282
-805	937,66	06-sep	11.15	Chip	283
-806	941,01	06-sep	11.25	Chip	284
-807	945,16	06-sep	11.55	Chip	285
-808	898,69	06-sep	16.00	Extra	271
-809	948,57	07-sep	07.45	Chip	287
-810	951,67	07-sep	08.00	Chip	288

-811	955,58	07-sep	08.15	Chip	289
-812	958,34	07-sep	08.30	Chip	290
-813	961,81	07-sep	08.40	Chip	291
-814	965,40	07-sep	08.45	Chip	292
-815	968,97	07-sep	09.00	Chip	293
-816	948,84	07-sep	10.00	Extra	287
-817	970,88	07-sep	10.15	Chip	294
-818	913,85	07-sep	10.40	Extra	275
-819	973,16	07-sep	11.45	Chip	295
-820	975,69	07-sep	17.30	Chip	296
-821	979,23	07-sep	17.40	Chip	297
-822	983,68	07-sep	18.00	Chip	298
-823	986,97	07-sep	18.25	Chip	299
-824	988,57	08-sep	07.25	Chip	300
-825	989,10	08-sep	07.30	Chip	300
-826	994,96	08-sep	07.45	Chip	302
-827	998,94	08-sep	07.50	Chip	303
-828	1001,16	08-sep	08.00	Chip	304
-829	1004,19	08-sep	08.30	Chip	305
-830	1006,62	08-sep	09.20	Chip	306
-831	1011,73	08-sep	11.05	Chip	307
-832	1001,44	08-sep	13.05	Extra	304
-833	1013,56	08-sep	14.05	Chip	308
-834	1017,93	08-sep	14.20	Chip	309
-835	1020,09	08-sep	17.25	Chip	310
-836	1023,92	08-sep	19.00	Chip	311
-837	1027,58	09-sep	07.30	Chip	312
-838	1031,09	09-sep	08.00	Chip	314
-839	1033,66	09-sep	08.20	Chip	315
-840	1038,24	09-sep	08.40	Chip	316
-841	1041,60	09-sep	08.55	Chip	317
-842	1044,54	09-sep	09.00	Chip	318
-843	1047,48	09-sep	09.10	Chip	319
-844	1049,60	09-sep	11.00	Chip	320
-845	1052,57	09-sep	11.20	Chip	321
-846	1054,65	09-sep	11.30	Chip	322
-847	1053,71	09-sep	11.35	Extra	322
-848	1057,21	09-sep	13.35	Chip	323
-849	1060,42	09-sep	16.40	Chip	324
-850	1065,66	09-sep	17.10	Chip	325
-851	1068,86	10-sep	07.40	Chip	326
-852	1071,87	10-sep	07.50	Chip	327
-853	1075,13	10-sep	08.10	Chip	328
-854	1078,17	10-sep	08.20	Chip	329
-855	1081,22	10-sep	08.45	Chip	330
-856	1084,27	10-sep	08.55	Chip	331
-857	1086,30	10-sep	09.00	Chip	332
-858	1092,19	10-sep	09.20	Chip	333
-859	1095,15	10-sep	10.20	Chip	334
-860	1098,37	10-sep	10.50	Chip	335
-861	1101,72	10-sep	13.25	Chip	336
-862	1099,09	10-sep	13.30	Extra	336
-863	1113,70	11-sep	07.10	Chip	340
-864	1123,28	11-sep	07.35	Chip	343
-865	1127,86	11-sep	07.55	Chip	345
-866	1134,46	11-sep	09.50	Chip	347

-867	1140,96	11-sep	14.00	Chip	349
-868	1148,11	12-sep	09.10	Chip	351
-869	1151,42	12-sep	09.20	Chip	352
-870	1148,50	12-sep	16.00	Extra	351
-871	1154,58	12-sep	16.05	Chip	353
-872	1157,16	12-sep	18.35	Chip	354
-873	1163,58	12-sep	18.45	Chip	355
-874	1165,86	13-sep	07.15	Chip	356
-875	1167,38	13-sep	07.25	Chip	357
-876	1171,95	13-sep	07.35	Chip	358
-877	1175,00	13-sep	07.50	Chip	359
-878	1177,95	13-sep	08.00	Chip	360
-879	1182,62	13-sep	08.50	Chip	361
-880	1163,73	13-sep	10.15	Extra	356
-881	1164,75	13-sep	12.30	Chip	362
-882	1187,56	13-sep	15.00	Chip	363
-883	1191,47	13-sep	15.05	Chip	364
-884	1187,99	13-sep	17.00	Extra	363
-885	1194,13	13-sep	17.30	Chip	365
-886	1196,97	13-sep	18.05	Chip	366
-887	1199,73	13-sep	18.10	Chip	367
-888	1199.96	13-sep	18.15	Extra	367

Appendix V

Additional samples, water and contaminants etc.

ADDITIONAL-SAMPLES
UMIIVIK-1

GGU no	Depth	Date	Time	Ini	Type	Cont	Description
439301		23-aug-95					UMIIVIK-1
439302		24-aug-95	18.00	JBo	cont	Tin	KLEEN-FLO Diesel-fuel oil conditioner
439303		31-aug-95	10.30	JBo	Water	Flask	Water, clean from supply tank
439304		31-aug-95	10.40	JBo	Water	Flask	Water/sludge from return line
439305		05-sep-95	17.00	KJB	Water	Tin	Quik-Gel and Water taken from supply tank
439306		07-sep-95	10.00	KJB	Glycol	Flask	Glycol
439307		08-sep-95	09.00	KJB	Jet fuel	Tin	Jet fuel
439308		08-sep-95	09.00	KJB	Diesel	Tin	Diesel
439309		08-sep-95	09.00	KJB	Quik Gel	Tin	Quik-Gel (Viscosifier) Dry powder
439310		08-sep-95	09.00	KJB	Xanvis	Tin	Polymer
439311		11-sep-95	09.00	KJB	Sludge	Tin	Black sludge taken from return tank