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# Greenland Challenge 2000

*A Ski Crossing of the Greenland Icecap*

*from Ammassalik to Kangerlussuaq*

*19 Apr - 27 May 2000*

## Expedition Report

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Note: The Annexes to this report have only been sent to those Organisations that maintain reference libraries of expedition reports. The full report and all the annexes can be downloaded from the web at [www.btinternet.com/~greenlandchallenge2000](http://www.btinternet.com/~greenlandchallenge2000)

## Expedition Summary

The objective of the Greenland Challenge 2000 Expedition was to complete a self supported ski crossing of the Greenland Icecap from the Hahn Glacier (near Ammassalik) in the East to the Russell Glacier (near Kangerlussuaq) in the West. This objective was achieved on 25 May 2000 when the 3-man expedition team reached Kangerlussuaq, having taken 35 days to complete the 540 km crossing. The trip was completed on cross-country skis, towing 3 pulks which initially weighed approximately 100 kg each.



Figure 1 - En Route

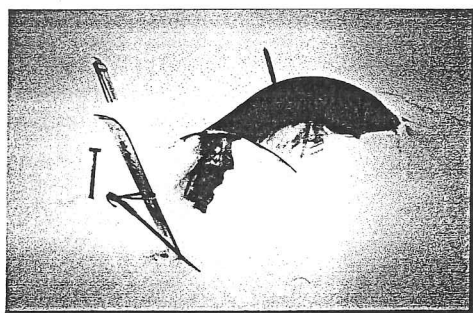


Figure 2 - Almost Buried!

The team experienced significantly colder temperatures and higher levels of precipitation than expected for the time of year. This slowed progress at the beginning of the crossing when the team was stormbound for 4 days and thick powder snow made skiing difficult. However these conditions, coupled with a late thaw, made the descent of the Russell Glacier at the end of the trip easier than expected since many of the anticipated obstacles (crevasses, melt water lakes and rivers) were still frozen and snow covered.

The expedition also encountered unexpected commercial exploitation of the icecap in the form of an ice road which is in the process of being constructed from point 660 (20km east of Kangerlussuaq) to a point 150 km inland on the icecap. It is understood that the road is being constructed for the Volkswagen car company who have apparently secured permission to establish a summer season snow and ice testing facility for their cars on the icecap. The project was still at an early stage when the team reached Pt 660 but if the road is eventually completed, it will have potentially far reaching implications for this wilderness area.



Figure 3 - An Unequal Confrontation

### Expedition Programme

10 - 19 Mar 2000	Expedition Team Training , Hardangervidda Plateau Crossing, Norway
11- 12 Apr 2000	Packing of Expedition Equipment and Food
13 Apr 2000	Equipment and Food despatched by airfreight from Heathrow
19 Apr 2000	Expedition team flies from London to Reykjavik
20 Apr 2000	Onward flight from Reykjavik to Kulusuk/Ammassalik
21 Apr 2000	Helicopter transfer to Hahn Glacier. Commence icecap crossing
11 May 2000	Reach high point on icecap
25 May 2000	Arrive Pt 660. Complete icecap crossing.
26 May 2000	Fly from Kangerlussuaq to Copenhagen
27 May 2000	Fly from Copenhagen to London

## The Team

**Clive Woodman, 42, Team Leader and Expedition Organiser** - a recently retired naval officer who now divides his time between leading expeditions, part time IT Consultancy work and serving in the Royal Naval Reserve. He has led many expeditions world-wide and has 15 seasons experience of operating in Arctic Scandinavia. This was his first expedition to Greenland

**James Mayer, 27, Logistic Support** - a freelance stage and production manager with 10 years experience of year-round arctic travel, including major expeditions to north east Greenland, Svalbard and Norway. James has led youth expeditions for BSES Expeditions and the Brathay Exploration Group and has a keen interest in the history of polar travel.

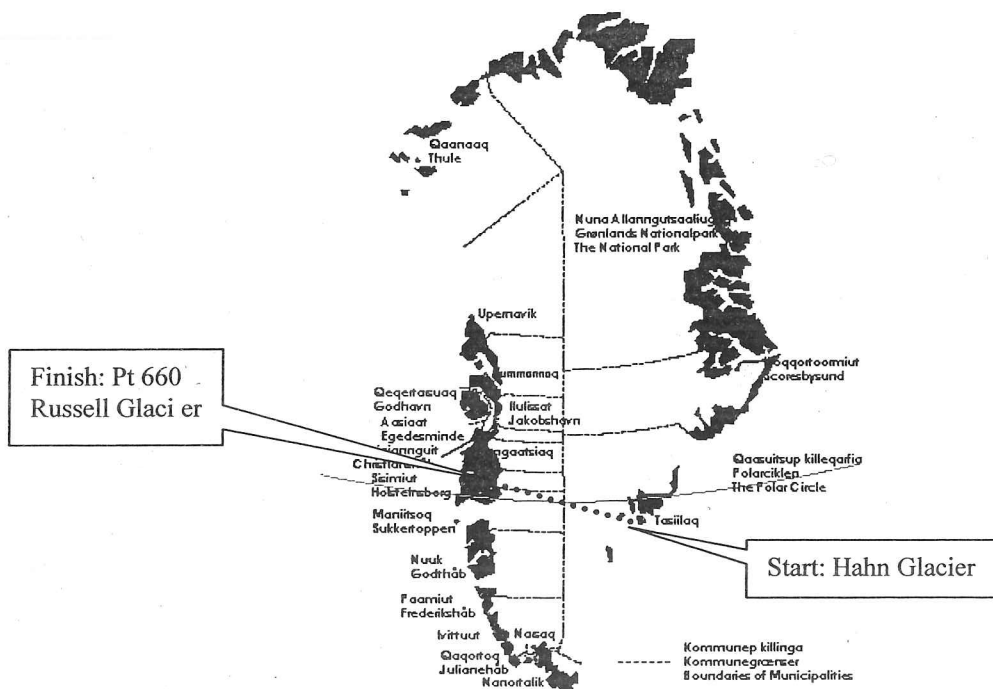
**Tim Burton, 23, Budget Manager** - a geography supply teacher who has taken part in two major expeditions to Norway and Svalbard and spent 4 months alpine ski guiding in Courmayeur, Italy as training for this expedition. He is going as a leader on a BSES expedition to the west coast of Greenland in summer 2000.



Figure 4 - The Team (from L to R) Jim, Clive, Tim

### Expedition Statistics

Total number of days on the icecap	35 days
No of days stormbound in tent	4 days
Total Distance skied	540.1 km
Average daily distance skied (ascent)	13.7 km
Average daily distance skied (descent)	21.4 km
Average daily distance skied (entire crossing)	17.4 km
Highest point reached on icecap	2795 m



## Expedition Diary

### 19 Apr - London to Reykjavik

We all arrived at Heathrow hoping desperately that we wouldn't be over the baggage limit but luckily the hand luggage (some of which weighed more than the rucksacks!) was not weighed and we passed straight through. An upgrade to Club Class made our day and the flight passed pleasantly over several drinks and good food.

### 20 Apr - Reykjavik to Ammassalik via Kulusuk

Flew out on a Dash 7 plane to Kulusuk on the East Coast with our first views of the awesome landscape to come and some coastal mountains. The transfer from Kulusuk to Ammassalik was a spectacular flight and Jim's first ever time in a helicopter – the excitement of which was apparent in his face a mile off! On arrival in Ammassalik we made our way into town for supper and to collect fuel from Hans Christian Florensen. Camped overnight by the helipad.

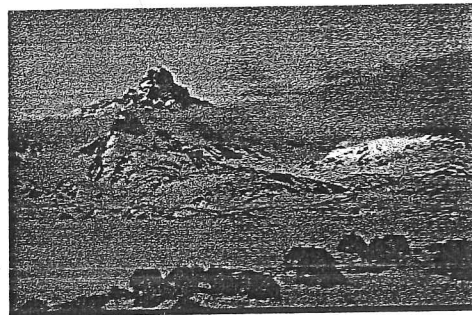


Figure 5 - Ammassalik by night



Figure 6 - Loading Up

### 21 Apr - Ammassalik to Hahn Glacier (6.5km skied)

The butterflies were in all our stomachs as we were flown onto the ice cap with spectacular views of the eastern peaks above a sea of cloud. We unloaded all the gear and watched the helicopter disappear into the distance knowing we would probably not see anyone for well over a month. After packing the sledges we set off over hard sastrugi in beautiful weather and covered a good distance in the two and a half hours before setting up our first camp on the ice.

### 22-24 Apr - A Perfect Start (14.3, 14.2 and 14.7km)

The conditions were clear and sunny with hard snow for these 3 days and pulling the sledges was almost a pleasure! Easter Sunday passed with two eggs each brought by Jim and Tim and the afternoons were beautiful – great for relaxing after a hard days skiing and drying the sleeping bags out. It started to cloud over and snow on the last afternoon but nothing more than a dusting.



Figure 7 - Approaching the ice cap

### 25 Apr - White Out (14.5km)

Beef granules, beef granules and MORE beef granules! We were already wishing that we had brought a selection of menus for our rations but after only 5 meals we knew that potentially we had another 35 beef granule nights to come – an incentive to get across quickly in itself! The weather had changed completely today with a strong wind and white out conditions.

### 26 Apr - Skiing through treacle (3.2km)

Blizzard conditions cold temperatures and deep powder made for a horrible day. The snow had drifted overnight and was thigh deep in places making trail-breaking agony. It took us a whole day to cover a distance that had previously taken a leisurely hour to complete on hard snow.



### **27-28Apr - Stormbound (0km!)**

The snow kept on falling and the wind blew so hard that skiing was out of the question. The tent had to be dug out on regular occasions and we passed the time playing Travel Scrabble and cards. On the 2<sup>nd</sup> day we only ate half rations to conserve food.

### **29 Apr - Under way again (12.2km)**

Woke to silence (at last) as the wind had finally dropped, although there was still a white out to start the day. It took us almost 2 hours to dig the tent and sledges out, but the strong winds had packed the snow enough to make skiing possible. Progress was slower in the deeper snow and after spending 2 days tentbound our muscles seemed to have forgotten how to work properly.



*Figure 8 - Sitting out the storm*

### **30 Apr-2 May - Faster Progress (14.6, 16.1 and 16.5km)**

A bit more wind helped pack the snow down enabling us to cover better distances. The overnight temperatures have dropped into the minus 30's now as we gained height but the snow was still softening up in the mid afternoon. The blisters that developed on Clive and Jim's heels early on are getting worse and having to be redressed every other day or so. These were our first days pulling for six hours (not including breaks) and the extra half an hour definitely made a large difference.

### **3-4 May - Piteraq! (10.1km and 14.8km)**

We skied for 3 hours with blue skies and the wind veering quickly from south to west but in the fourth hour it picked up and veered to the NW. When we arrived on the east coast the locals warned us that if the sky is clear and the wind starts to blow from the north-west then we should stop immediately, erect a tent, batten down the hatches and wait until the storm (known locally as a Piteraq - see Annex E for details) blew itself out. We therefore wasted no time in digging our tent in and used the sledges as a windbreak in preparation for our first storm. Spectacular high clouds developed, streaking away from the NW horizon and within one hour of striking camp the winds had picked up to gale force. We spent the rest of the day and the following morning stormbound, but by midday on the 4<sup>th</sup> the wind abated enough to allow us to set off again.



*Figure 9 - Repairing a tent seam after the storm*

### **5-7 May - Crossing the Arctic Circle (17.9, 17.2 and 18.2 km)**

The distance we covered over these 3 days showed a distinct jump due to the wind packed snow and cold temperatures. We celebrated crossing the Arctic Circle with a tot of whiskey in the evening.

### **8 May - Another Piteraq! (0km)**

The celebrations ended as we woke early to discover that a second Piteraq had blown in during the night giving us another day stormbound. Jim and Clive planned the ideal canal boat (to pass the time!) whilst Tim had to weather the storm in order to get more

food from the pulks. It had been so calm when we set camp the night before that we had not bothered to bring more than one night's food into the tent - a salutary reminder of the need to always bring emergency food and fuel into the tent with us at night!

### **9 May - Getting colder (18.1km)**

We made a move this morning but were not fully prepared for the additional wind chill at this altitude. With temps of -25°C and a strong headwind, each of us had to stop in the first half hour to put on an extra layer. Freezing condensation was causing a problem in the tent and in our sleeping bags. We tried several experiments to stop it but with no real success and had to rely on dry sunny days to dry things out. We saw our first life today - a wayward snow bunting

**10 May - Yet another blizzard! (12.2km)**

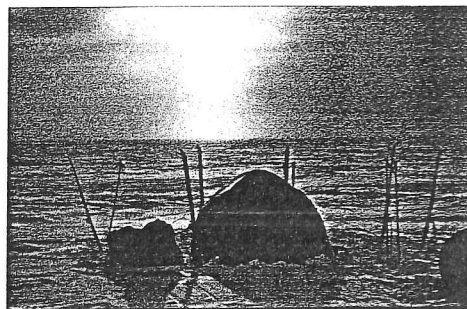
We had just got used to some clear weather and when it changed again. The weather deteriorated through the day to end in a raging blizzard. We managed 4 hours of non-stop pulling before calling it a day and erected the tent whilst we still could.

**11 May - Crossed the High Point (2795m) (22.8km)**

We passed the high point of the trip which and made the move from skins to waxes, making man hauling a lot easier. We were really praying for good weather, as the continuous storms were becoming extremely tiresome.

**12 -13 May - Sun at last (19.0 and 20.9km)**

A beautiful start to the day, but the warmer temperatures meant that the snow was a lot softer in the afternoon slowing our progress immensely. Moved everything forward 2 hours on the 2<sup>nd</sup> morning, rising at 5am and leaving around 7am, so as to avoid the softer snow later in the day.



*Figure 10 - A peaceful evening*

**14-16 May - Aches and Pains (18.9, 20 and 21.3km)**

The use of waxes generated new aches and pains as the technique is very different from using skins. However, the benefits far outweighed the disadvantages and we continued to make good progress. We found that the wax on Tim's skis, which did not have a base wax before the trip and have only a little camber, was wearing off much more quickly than the others but reapplication didn't take too much time.

**17 May - DYE II (22.4km)**

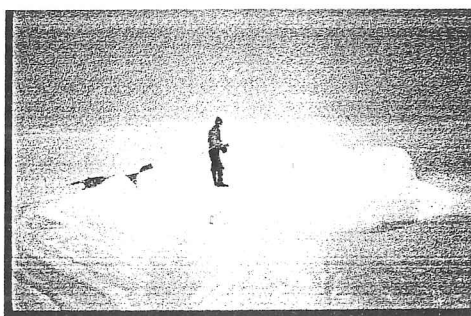
A very cold start today at -25°C but a beautiful day none the less. Saw the DYE II station – part of the now defunct US "Dewline" early warning defence system against Russian missile attack. It was over 40 km away and we were only able to see it because of a mirage lifting the distant horizon.

**18 - 19 May - Wind Assisted (22.9 and 24km)**

We had not got traction kites, but the SW tailwind picked up to the point we were able to double pole and glide along on the harder snow sections for 10m or so at a time! A bird came inside the tent this evening to shelter from the wind and actually stood on Tim's finger for a photo shoot.

**20 May - Stormbound Yet Again (0km)**

Tentbound today as the SE winds picked up to some of our strongest yet and we weren't going anywhere.



*Figure 11 - Crossing the frozen meltwater lake*

**21 May - Frustration (26.4km)**

Various changes in temperature, weather and snow conditions meant that we were continually layering and de-layering and experimenting with various combinations of waxes, klisters, skins (and even walking) in order to maintain progress. Despite the frustrating conditions we still covered an excellent distance that surprised us all.

**22 May - Frozen lakes (19.9km)**

Fresh snow last night meant that the waxes worked well today and we had the pleasure of our first "feature"- a frozen meltwater lake. We packed the

rucksacks this evening with everything we would need in case the sledges were washed away in a meltwater river or lost down a crevasse.

### **23 May - Dog Camp (21.5km)**

An even earlier start today, waking at 3 am and leaving by 5am, to avoid the increasingly soft snow of the afternoons. Reached Dog Camp, the start point for our descent of the Russell glacier, and went to bed in the afternoon ready for an early start the next day.

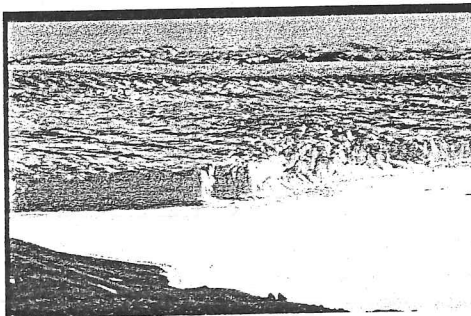
### **24 May - An unexpected encounter (27.2km)**

Rose at 11pm yesterday and left at 1am so as to ensure that the meltwater lakes and rivers that we were expecting to encounter would still be frozen over. With the temperature a bitter  $-28^{\circ}\text{C}$  and a cold easterly breeze, we were colder than at any other time on the trip. However, we were reassured by the knowledge that there would be little chance of meltwater existing at these temperatures. We were just about to pitch camp when to our amazement, 2 skidoos converged with us

carrying a survey team working for a company that we subsequently discovered were trying to build an ice road up the Russell Glacier onto the ice cap. They provided us with the co-ordinates of a route that they had already marked through the icefall with flags and informed us that we were within 8 hours skiing of land (Pt 660). Whilst this intrusion on the wilderness was not altogether welcome, the news that we could be off the icecap so quickly came as a great surprise as we were expecting to spend at least another 4 or 5 days negotiating the final 20 km through the icefall.



*Figure 12 - A welcome break*



*Figure 13 - The Russell Glacier viewed from Pt 660*

### **25 May - Point 660 (17.9km)**

We rose at 2 and left at 4am in good cold conditions. Within an hour we reached the edge of the icefall to find a set of flags and skidoo tracks to follow through the most dangerous section of the whole trip. We followed the flags up and down over small hummocks of snow covered ice, but encountered no open crevasses or meltwater features. 4 km from point 660 we came face to face with a bulldozer ploughing its way upwards through the icefall. The blue ice on the road itself forced us to remove our skis and walk the final few km to land with very mixed feelings. The new construction undoubtedly saved us a lot of effort and danger, but the ethical and environmental impact

of the project on an area of such outstanding beauty and isolation was something with which we were deeply uneasy. We were picked up from Pt 660 in a 4x4 Land Cruiser belonging to Kangerlussuaq Tourism, and by that evening we were enjoying a shower and a fantastic celebratory meal at the Airport Hotel (a double celebration since it was also Clive's 42 birthday!)

### **26 May - Kangerlussuaq to Copenhagen**

An early start and an "eat as much as you can" buffet breakfast that was eagerly devoured by the whole team! Clive managed to bring forward our return flights to Copenhagen so that we departed this morning. On arrival in Copenhagen Tim stayed with the gear at the airport and Jim and Clive spent the night sampling the delights of Copenhagen's Jazz bars.

### **27 May - Copenhagen to London**

We arrived at Heathrow by 10am, said our goodbyes and went off home looking forward to good food, our own bed and very little exercise (at least for a while!) whilst we contemplated an expedition that went more smoothly than ever we could have hoped for.

## Acknowledgements

The expedition team would like to thank the following individuals and organisations for their invaluable assistance:

**Paul Walker, Tangent Expeditions** - for advice in the initial planning stages of the expedition and for sharing the experiences of his 1999 icecap crossing attempt.

**Iris Madsen, Danish Polar Centre** - for processing our permits so efficiently and for providing much general advice.

**Andy Woodward, Wear and Tear** - for making our customised pulk harnesses which were a joy to wear and saved us from many days of unnecessary pain and chafing.

**Marina Trout, Thomas Cook Travel, Plymouth** - for her patience and perseverance in sorting out our complex travel arrangements.

**Phil Vincett, Signet Freight** - for the splendid job he did in sorting out our air freight and ensuring that it arrived in the same place and at the same time as we did.

**Al Keir** - for his detailed advice on expedition communications and satellite phones.

**Steve Bull** - for giving us the benefit of his experiences on his recent icecap crossing attempt.

**Mick Parsons - Spider Kites** - for taking the time to explain the intricacies of using traction kites for polar travel. We are sorry that our final budget did not stretch far enough to allow us to purchase traction kites for the crossing.

**Tim Sander, Friends of the Earth** - for his support during the training phase and for his kind donation of several hundred muesli bars which were a great morale booster when our appetite for Arctic compositions was waning.

**Pauline and Philip Mayer** - for allowing us to turn their house into a warehouse and for feeding us so well during the packing phase of the expedition.

**Hans Christian Florian, Mt Forel Expeditions Support** - for making the arrangements to supply us with fuel in Ammassalik and for providing us with up to date route information on how to get off the Russell Glacier.

**Crispin Day, Skanska** - for the hospitality he showed us at Point 660 and for providing us with our first taste of real coffee and fruit in 35 days.

**The Staff of Kangerlussuaq Tourism** - for coming out late in the evening at virtually no notice to collect us from Pt 660 and for donating 3 T shirts when we could not collect our clean clothes from Poste Restante.

**SAS Staff, Kangerlussuaq Airport** - for being so flexible in rearranging our return flights and getting us and our baggage back to UK so quickly and efficiently at the end of the expedition.

**Sarah White, BSES Expeditions** - for the loan of pulks, tent and specialist crevasse rescue equipment.

**Gino Watkins Memorial Fund** - for their financial support to the expedition.

**Andrew Croft Memorial Trust** - for their financial support to the expedition.

**Green Deakin Estate Agents and Venhill Engineering Ltd** - for their financial support towards Tim's personal contribution.



## **Annexes**

- A. Expedition Planning
- B. Travel, Accommodation and Air Freight Arrangements
- C. Routes, Navigation and Skiing Routines
- D. Equipment Report
- E. Weather Report
- F. Medical Report
- G. Expedition Training
- H. References
- I. Contact Addresses
- J. Expedition Budget

## Annex A - Expedition Planning

### PLANNING TIMESCALES

Although the expedition was conceived and the feasibility established many years earlier, detailed planning for the expedition took place over the period May 99 to Mar 00. The amount of work involved in organising an expedition of this nature should not be underestimated; we were fortunate in that all of the team members were self-employed and therefore had the flexibility to give large amounts of their time when required to do so. Those contemplating a similar expedition who do not have the same flexibility may wish to use the services of an agent such as Paul Walker or Hans Christian Florian (Address at Annex I), both of whom offer logistic support to independent expeditions.

*Table 1- Expedition Planning Timeline*

May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
	Detailed research			Select Team Members	Source and Procure Equipment	Book Flights	Apply for Permits	Apply for Grants	Arrange air freight	Training - Norway

### TIMING OF EXPEDITION

Expeditions are only permitted on the Greenland icecap between 1 Apr and 1 Oct. There are therefore 2 options for an icecap crossing; a spring crossing in Apr/May or a summer crossing in Jul/Aug. The first of these options carries a higher risk of storms and bad weather at the beginning of the trip but potentially offers better conditions (less crevassing and meltwater) for the descent of the lower western side of the icecap. Conversely a summer crossing carries less risk of storms at the beginning but gives much wetter and more difficult conditions for the descent. Being self employed, gave us the flexibility to choose the dates that suited us best and we opted for a spring crossing, influenced in no small measure by the leader's dislike, as a true sailor, of getting his feet wet! Things turned out much as we expected. Severe storms and thick powder snow did slow us significantly at the beginning, but the conditions for the descent were surprisingly easy. We encountered no open crevasses or meltwater lakes/rivers whatsoever, and the only real obstacle was the icefall in the final 10 km to Pt 660.

### PERMITS AND THE DANISH POLAR CENTER (DPC)

All expeditions to Greenland need a permit issued by the DPC. The regulations governing Greenland expeditions and online permit application forms are available from the DPC's excellent web site (Address at Annex I). The site contains a wealth of other useful information for expedition planners, including details of how to apply for radio licences required for the EPIRBS and any other radio equipment used by the expedition.

### EPIRBS

The DPC specifies that all expeditions on the inland ice carry at least one EPIRB as a minimum safety requirement. Given the remote location of the icecap, a 121.5MHz PLB alone does not provide realistic safety cover, and therefore we opted to take 2 dual frequency 404/121.5 MHz EPIRBs. These were hired in UK (Address of supplier at Annex I) but before we could hire them

we had to get special clearance from the UK EPIRB Registry (Address at Annex I) to use them on this particular expedition. This proved to be a routine formality.

## INSURANCE

The DPC requires that all expeditions to the icecap be insured for 900,000 DKK Search and Rescue costs and 250,000 DKK emergency/air ambulance evacuation costs. Obtaining this level of cover is not easy and several insurers declined to insure us. However, the USMIA Adventure Training Policy (Address at Annex I) provided us with the required cover at a very reasonable price. The DPC also specifies that the insurers must sign a special certificate stating that they will meet all the costs associated with a S&R claim, irrespective of any endorsements in the policy. Unsurprisingly our insurers were not prepared to sign this DPC certificate. However the DPC did subsequently accept the insurance certificate and policy issued by USMIA as evidence that we had the required amount of insurance cover.

## WIND ASSISTANCE

The question of whether to use traction kites was a source of much debate during the planning process. Most previous British icecap crossing expeditions seem to have taken some form of traction kite with them, but the benefit they have derived from them is questionable. The 1994 Evans/Harding Expedition clearly benefited from traction kites, covering a third of the total distance in 3 days when using their kites. However, the daily distances covered by other expeditions using traction kites appear comparable to those that could be covered by skiing alone. We managed to procure a kite to trial during training in Norway but the poor weather conditions did not allow us to try it out. Given the expense of purchasing kites and our unproven ability at using them, we eventually decided against taking them. This decision was vindicated on the expedition itself, as there were only 2 or 3 days when conditions were suitable for using a traction kite. Unless we had already been proficient in their use before the expedition, we would not have had the chance to gain any significant degree of proficiency whilst on the ice.

## Annex B - Travel, Air Freight and Accommodation Arrangements

### TRAVEL ARRANGEMENTS

#### Outward

London - Reykjavik	- Icelandair scheduled flight <sup>1,2</sup>
Reykjavik - Kulusuk	- Gronlandsfly scheduled flight <sup>1</sup>
Kulusuk - Ammassalik	- Alpha Air scheduled helicopter shuttle <sup>3</sup>

<sup>1</sup> A number of specialist travel operators were consulted when planning flights but in the end Thomas Cook (Plymouth) were able to come up with the cheapest quotes and they were used for booking all our international flights. After extensive research the most cost effective solution to our travel requirements proved to be purchasing 2 single tickets (London-Kulusuk and Kangerlussuaq-London). Whilst not cheap, these tickets did have the advantage of being fully flexible and fully refundable giving us the flexibility to change the date of the return flight to match the date we completed the crossing. In practice, we were able to fly out of Kangerlussuaq within 24 hours of arriving at Pt 660.

<sup>2</sup> It is not possible to fly either to Kulusuk or from Kangerlussuaq in a single day from London and therefore overnight stops were unavoidable in Reykjavik and Copenhagen.

<sup>3</sup> The Air Alpha helicopter shuttle service between Kulusuk and Ammassalik does not have to be booked in advance. Tickets were booked and paid for on arrival in Kulusuk (VISA card acceptable). The shuttle service connects with all incoming international arrivals and continues operating until all incoming passengers and their luggage/freight have been transported from Kulusuk to Ammassalik

Ammassalik - Hahn Glacier - Alpha Air privately chartered helicopter<sup>4</sup>

#### **Return**

Russell Glacier (Pt660)<sup>5</sup> - Kangerlussuaq - Kangerlussuaq Tourism 4x4 Land Cruiser<sup>6</sup>  
Kangerlussuaq - Copenhagen - SAS scheduled flight<sup>1,2</sup>  
Copenhagen - London - SAS scheduled flight<sup>1</sup>

### **AIR FREIGHT ARRANGEMENTS**

#### **Outward**

The pulks, tent and food (approx 200 kg) were sent by air freight from London to Kulusuk via Reykjavik. Personal equipment and skis were transported with us as part of our normal baggage allowance. All air freight arrangements were made through Signet Freight (see Annex I for address) who managed the process extremely efficiently and with the minimum of paperwork or hassle. We simply delivered the freight to their Heathrow office 6 days prior to our departure and it was waiting for us in the baggage hall on our arrival in Kulusuk. There were no customs clearance formalities in either Reykjavik (in transit) or in Kulusuk. The air freight was subsequently transported from Kulusuk to Ammassalik on the same helicopter shuttle service as ourselves. The payment for the freight helicopter transfer was made at the same time as we booked our own tickets.

#### **Return**

Thanks to a generous interpretation of the regulations by the SAS staff at Kangerlussuaq airport, we were able to take all our return freight back on the same flight as ourselves as personal baggage allowance at no extra cost.

### **ACCOMMODATION**

**Reykjavik.** We stayed in the Laugurdalur Youth Hostel which was clean and reasonably priced. The airport bus both drops off and picks up from the Hostel. A reservation was made in advance from the UK.

**Ammassalik.** Camping is permitted at no cost on some scrub ground just to the east of the heliport. There are no facilities but there was sufficient snow on the ground to melt for drinking water. Our freight was stored overnight in the Air Alpha hangar free of charge.

**Kangerlussuaq.** We stayed overnight in the Hotel Kangerlussuaq and ate a fabulous and reasonably priced celebratory meal in the hotel's restaurant. The "all you can eat" buffet breakfast was also eagerly devoured by the team. Although not the cheapest accommodation in town, it did provide a level of comfort that was most welcome after such a long trip.

**Copenhagen.** Those of us with sufficient energy to spare sampled the delights of Copenhagen's all night jazz and blues bars, whilst others simply slept on our luggage at the airport. No overnight accommodation was used.

<sup>4</sup> Air Alpha operate a Bell 212 helicopter from Ammassalik which can be privately chartered to take expedition parties and their equipment from Ammassalik to the Hahn Glacier (approximately 20 mins flying time each way). The helicopter was capable of transporting us (3 persons) and all our equipment (323kg) in a single flight. The helicopter was booked 6 weeks in advance by e mail from UK. The Air Alpha staff were extremely helpful and efficient and can be highly recommended to any future expeditions. Payment for the charter was not required until the day of the flight and this was done by VISA.

<sup>5</sup> The gravelled road which has previously been reported as ending at the foot of the Russell Glacier, now extends all the way to Pt 660.

<sup>6</sup> Kangerlussuaq Tourism operate 4x4 land cruisers which can be chartered to collect expedition parties and their equipment from Pt 660 to Kangerlussuaq.



## **Annex C - Routes, Navigation and Skiing Routines**

### **CROSSING ROUTE**

A direct rhumb line route was taken from the drop off point on the Hahn Glacier (65 49 026 N, 38 28 708W) to a point (67 09 954 N, 49 04 084 W - known as Dog Camp<sup>1</sup>) approximately 45 km due east of Pt 660 from where we started our descent route off the icecap (see later section for descent route). This route progressively climbs from an altitude of 1060m at the drop off point, to a high point of 2795m, before descending to 1425m at Dog Camp. However since this altitude change occurs over a horizontal distance of 500 km, the gradients are imperceptible to the naked eye.

For all practical purposes the route resembles a vast flat plain of ice, punctuated only by occasional sastrugi of up to 0.5m high. Standard metal edged cross country touring skis are ideally suited to this route and even though slightly steeper gradients were experienced on the final descent off the Russell Glacier, we encountered nothing which necessitated the use of ski mountaineering or downhill boots, skis and bindings.

There are no geographical or topographical features which justify a deviation from the rhumb line route unless one wishes to engage in some military tourism and visit the abandoned American Dewline (DYE2) radar monitoring station which is reportedly<sup>2</sup> at 66 29 000 N, 46 20 000W. The direct rhumb line route takes you approximately 40 km north of DYE 2 and taking a route which goes via DYE2 would add approximately 12 km to the overall crossing distance. We did not visit the station, but did see it on the horizon some 40 km to the south of our Day 26 camp.

We were initially led to believe that the DYE2 station was completely uninhabited but after completing the crossing we were told that a science research team now works there in the spring and summer seasons. This might make it a useful contact point in the event of an emergency. Anyone contemplating a future crossing would be well advised to check the status of the station with the DPC prior to setting out.

### **DESCENT ROUTE**

Previous expedition reports offered conflicting advice as to the best route off the icecap to Pt 660. We were therefore extremely grateful to Hans Christian Florensen of Mt Forel Expedition Support who kindly provided us with the GPS co-ordinates of the route he used when leading a party off the icecap in Spring 99. This route is summarised in Table 2 overleaf.

We had intended following the Hans Christian Florensen route, but shortly after passing dog camp we encountered a survey team working for a company who are attempting to build an ice road from Pt 660 onto the icecap (see later section for more details). This team had ascended from Pt 660 on snow scooters and provided us with the co-ordinates of a more direct route off the icecap that we actually used. This route is summarised in Table 3 overleaf. .

Although we have listed 2 possible routes off the icecap, the optimum route varies from year to year and anyone planning a future crossing is strongly advised to seek local advice as to the best route prior to setting out on the icecap.

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<sup>1</sup> Dog Camp is a semi-permanent tented camp which is used by Mt Forel Expeditions for their dog sled crossings of the icecap. It is the furthest point west to which the dog sleds go before returning to the E coast. Clients on the trip are required to ski or walk the remaining 50 km from Dog Camp to Pt 660.

<sup>2</sup> Sara Simmons 1995 Expedition Report

**Table 2 - Hans Christian Florensen Route from Dog Camp to Pt 660**

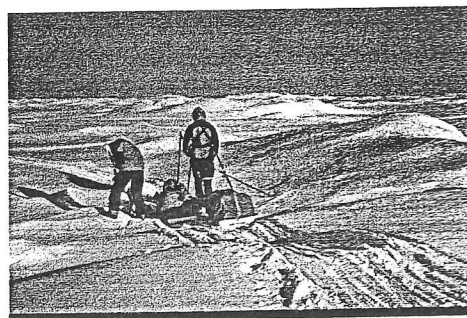
Point	Latitude N	Longitude W
Dog Camp	67 09 954	49 04 084
WP1	67 09 954	49 16 620
WP2	67 11 710	49 23 890
WP3 Large River	67 11 260	49 27 400
WP4	67 11 600	49 43 770
WP5	67 11 120	49 45 150
WP6 River	67 10 920	49 47 450
WP7	67 10 850	49 49 930
WP8	67 09 750	49 49 510
WP9	67 08 950	49 56 020
Pt 660	67 08 824	50 03 105

**Table 3 - Actual Route Taken from Dog Camp to Pt 660**

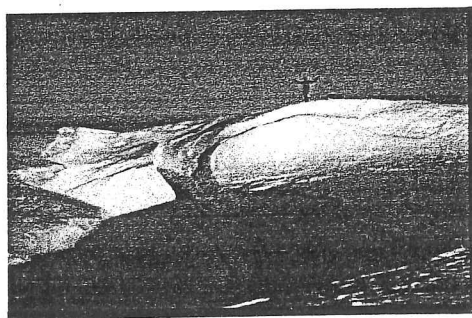
Point	Latitude N	Longitude W
Dog Camp	67 09 954	49 04 084
Tunnel	67 09 200	49 41 900
Start of Icefall	67 09 156	49 44 499
WP10	67 08 699	49 48 135
WP20	67 08 419	49 54 010
Pt 660	67 09 104	50 02 491

### DIFFICULTIES ENCOUNTERED ON THE DESCENT ROUTE

Previous expedition reports had led us to expect obstacles anywhere from between 150km to 50 km out from Pt 660. However as a result of the high precipitation levels and low temperatures, we encountered nothing to slow our progress, other than deep powder snow, until we reached the start of the icefall approximately 12 km east of Pt 660. Even then this icefall was well snow covered and provided exhilarating "mogul" style skiing rather than acting as a serious obstacle to progress. We were able to ski the entire journey from the Hahn Glacier to a point 3 km east of Pt 660 where the new ice road forced us to walk the final leg. Although we carried ice axes, crampons, rope and crevasse rescue gear, we did not have to use them at any point. Both of the



*Figure 15 - Start of the icefall*



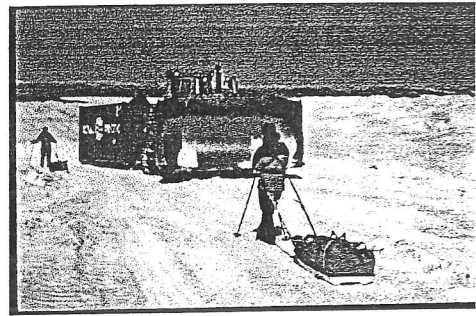
*Figure 14- The Tunnel*

rivers mentioned in the Hans Christian route were frozen over and snow covered to the point where they were almost invisible. Likewise the Tunnel (a prominent feature where a river first emerges and then submerges from the ice) was also well frozen over. However, had there been less snow cover and/or had the melt started earlier then it would have taken us considerably longer to traverse the final 50 km to Pt 660. Furthermore, had we strayed significantly from the routes that we were given, then the descent would have been a vastly more difficult affair and it was easy to see why so many expeditions fail to find a route off the icecap.

## ICE ROAD

As mentioned earlier, we encountered a survey team working for a company, Skanska, which is contracted to build an ice road from Pt 660 to a point some 150 km inland on the icecap (i.e. a point above the summer melt levels). It is understood that this road is being constructed on behalf of the Volkswagen car company who have apparently secured permission to set up a summer season snow and ice testing facility for their cars on the icecap. At the time of our crossing, the survey team had marked a route from Pt 660 through to Dog Camp with red flags at

approximately 1 km intervals (we used the far western section of this flagged route to guide us through the icefall). Construction of the ice road itself has also started using bulldozers and diggers which we first encountered on the icecap approximately 4 km due east of Pt 660. The construction team reported that they were making progress at a rate of approximately 1 km per day. They have also established a permanent camp at Pt 660 which is now linked to Kangerlussuaq by a well maintained dirt road.



*Figure 16 - The ice road under construction*

Construction of the ice road itself has also started using bulldozers and diggers which we first encountered on the icecap approximately 4 km due east of Pt 660. The construction team reported that they were making progress at a rate of approximately 1 km per day. They have also established a permanent camp at Pt 660 which is now linked to Kangerlussuaq by a well maintained dirt road.

It is not for us to comment publicly on the ethics of this project, other than to say that if the project is successfully completed then it will fundamentally change the nature of any future icecap crossings which aim to reach Pt 660. However, anyone who has actually seen the Russell Glacier cannot help but be sceptical about the prospects of either completing the road or keeping it open for any significant period of time.

## NAVIGATION

We used a portable Garmin GPS III as our primary navigation system with an older Garmin 12 unit as a backup. To conserve batteries we restricted ourselves to one fix per day which was entirely adequate given the simple nature of the route. However, towards the end of the crossing we allowed ourselves the luxury of taking additional fixes at our midday stops and for the final descent used it as required to keep to the designated route. We initially considered purchasing special cold weather lithium batteries for the GPS, but after trials in Norway concluded that standard Duracell alkaline batteries would suffice provided that the unit was kept warm. This was done by keeping the GPS units in an inside jacket pocket during the day, and inside our sleeping bags at night. By using these precautions we managed to make one set of 4 x AA batteries last for the entire 35 day trip, although we had taken the precaution of bringing several spare sets of batteries. The GPS units both worked well and invariably managed to fix our position within 30 secs. To maintain our course during the day we used standard hand held Silva compasses which were entirely adequate for the task.

Holding a straight course proved easy in good visibility, as one could normally pick a prominent sastrugi or cloud on the horizon to act as a visual reference. In poor visibility we used a variety of other techniques to maintain a visual reference, including skiing at a constant angle to the sastrugi, keeping the spindrift blowing across our skis at a constant angle and using our shadows when these were visible. In total white out conditions we resorted to skiing in single file and using the back man to keep the front man on course.

## MAPS AND AERIAL PHOTOGRAPHS

We purchased the following maps and aerial photographs prior to the expedition:

### Maps

ONC C-13 (Greenland)	1:1,000,000	Covers entire route from Ammassalik to Kangerlussuaq
Saga Tasilaq Sheet	1:250,000	Covers Ammassalik and Hahn Glacier
Saga Sondre Stromfjord	Sheet 1:250,000	Covers Kangerlussuaq and the Russell Glacier

Kort og Martik 65 0.1	1:250,000	Covers Ammassalik and Hahn Glacier
Kort og Martik 65 0.2	1:250,000	Covers Kangerlussuaq and the Russell Glacier

### **Aerial Photographs**

Aerial Photograph Nordre Stromfjord Ost 1943 1:40,000 - shows Pt 660 and Russell Glacier

Aerial Photograph Nordre Stromfjord Ost 1985 1:150,000 - shows Pt 660 and Russell Glacier

The maps were all purchased over the counter at Stamfords London without any need to pre order. The aerial photographs were ordered by e mail from Kort and Matrikelstyrelsen in Copenhagen (Address at Annex I) and took about 7 days to arrive.

We used the ONC C-13 sheet to maintain a daily plot of our position as we crossed the icecap, but the 1:250,000 maps were not used for navigation. They contain no detail relating to the icecap and only very scant detail of the glaciers coming off the icecap. However, they might have been useful had we needed to escape from the icecap by a different route to that originally intended. Likewise, the aerial photographs were of little practical use for navigation purposes. The terrain we encountered bore virtually no resemblance to that shown in the photographs.

It would be extremely imprudent for any future expedition to rely on the maps and photographs alone to get themselves off the icecap and there is no substitute for getting up to date local advice immediately prior to setting out, particularly in view of the changing situation with respect to the ice road.

### **SKIING ROUTINES**

Our initial research had shown that virtually all the expeditions that fail to cross the icecap do so in the final 50 km of the crossing when they either fail to find a route off the icecap or suffer an accident in a crevasse. To counteract this problem, we adopted a deliberate strategy of pacing ourselves in the early part of the crossing with a view to reaching the final 50 km in as good a mental and physical condition as possible. We therefore restricted ourselves to skiing no more than 6 hours per day, split into 3x2 hour sessions with 20 minute breaks between them. Since we were mostly skiing through thick powder snow, we also took it in turns to break trail and navigate with each person spending 30 minutes spells at the front. This routine appeared to work very well and by the end of the trip we were regularly covering daily distances of over 20 km without undue strain.

### **USE OF SKINS AND WAXES**

Previous expedition reports had led us to believe that skins would be needed throughout the expedition and recommended that at least 2 pairs per person be taken. We took 2 pairs and used skins for the first 19 days of the crossing before trying out waxes for the first time. An initial trial showed that waxes worked well despite the fact that we were still towing heavy pulks. Thereafter we used waxes (or klister on one day) for the remainder of the trip. This proved far more efficient and enjoyable and enabled us to ski daily distances comparable to those reported by other parties when using wind assistance. A SWIX composite touring wax (Temp range -7 to -20 C) proved particularly suitable for the conditions we encountered and much to our surprise continued working well outside its specified temperature range and in icy conditions where we would normally have expected to use klister. In retrospect, we should have switched to waxes at a much earlier point in the crossing and would probably have saved ourselves a significant amount of time and energy by doing so.

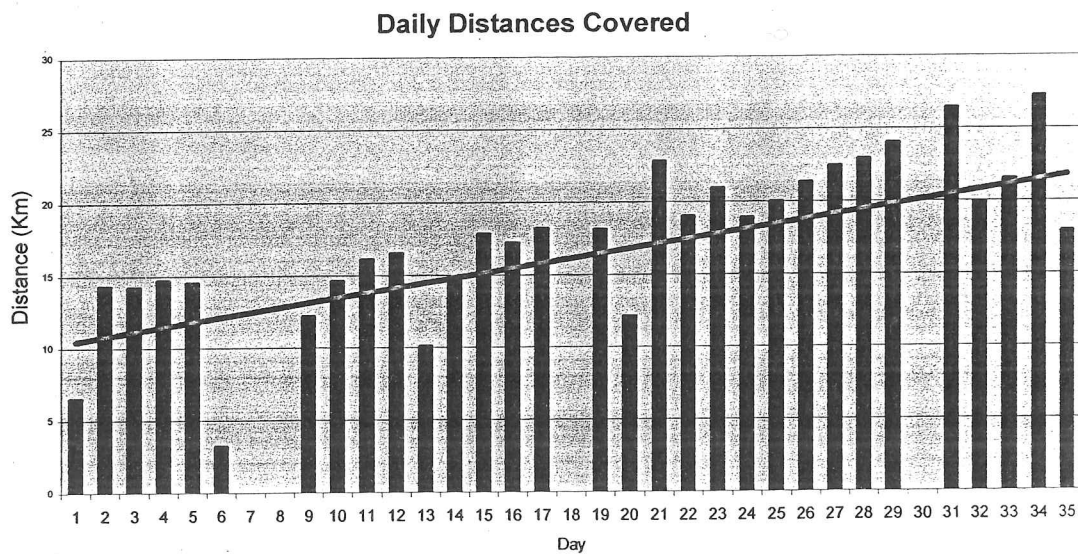


## EXPEDITION LOG

Table 4 - Expedition Log

Date	Day	Lat N	Long W	Daily Km	Cum Km	Km to Run	Alt m	Notes
21 Apr	1	65 50 697	38 36 260	6.5	6.5	534	1260	
22 Apr	2	65 55 018	38 51 758	14.3	20.8	520	1480	
23 Apr	3	65 58 516	39 08 574	14.2	35.0	506	1565	
24 Apr	4	66 02 193	39 25 774	14.7	49.7	492	1645	
25 Apr	5	66 05 453	39 43 217	14.5	64.1	477	1830	
26 Apr	6	66 06 366	39 46 914	3.2	67.4	474	1975	Deep powder snow
27 Apr	7	66 06 366	39 46 914	-	67.4	474	1975	Stormbound
28 Apr	8	66 06 366	39 46 914	-	67.4	474	1975	Stormbound
29 Apr	9	66 09 459	40 01 669	12.2	79.6	462	1965	
30 Apr	10	66 11 983	40 19 784	14.6	94.2	447	2070	
1 May	11	66 14 767	40 40 142	16.1	110	431	2160	
2 May	12	66 17 433	41 01 156	16.5	127	414	2280	
3 May	13	66 19 510	41 13 698	10.1	137	404	2435	Piteraqa
4 May	14	66 22 435	41 32 196	14.8	152	389	2450	
5 May	15	66 25 874	41 54 617	17.8	169	372	2595	
6 May	16	66 28 918	42 16 515	17.2	187	354	2650	
7 May	17	66 31 995	42 39 903	18.2	205	336	2780	
8 May	18	66 31 995	42 39 903	-	205	336	2780	Stormbound
9 May	19	66 34 824	43 03 311	18.1	223	318	2795	
10 May	20	66 37 105	43 18 672	12.1	235	306	2795	
11 May	21	66 40 451	43 48 479	22.8	258	283	2665	
12 May	22	66 43 350	44 13 287	19.0	277	267	2585	
13 May	23	66 46 833	44 40 281	20.9	298	243	2575	
14 May	24	66 50 289	45 04 623	18.9	317	225	2520	
15 May	25	66 53 653	45 30 643	20.0	337	204	2415	
16 May	26	66 57 007	45 58 569	21.3	358	183	2295	
17 May	27	67 00 481	46 28 076	22.4	380	161	2145	
18 May	28	67 02 184	46 59 246	22.9	403	138	2130	
19 May	29	67 04 734	47 31 721	24.0	427	114	1950	
20 May	30	67 04 734	47 31 721	-	427	114	1950	Stormbound
21 May	31	67 07 049	48 07 684	26.4	454	87.7	1825	
22 May	32	67 08 146	48 35 012	19.9	474	67.8	1660	
23 May	33	67 09 873	49 04 459	21.5	495	46.3	1425	Dog Camp
24 May	34	67 09 481	49 38 648	27.2	522	17.9	1025	
25 May	35	67 09 104	50 02 491	17.9	540	0	630	Arrived Pt 660

Figure 17 - Daily Distances Covered



## Annex D - Equipment Report

The following items of team and personal equipment were used on the expedition. Where relevant, comments on the utility, or otherwise, of the equipment have been added. We hired most of the group equipment from BSES Expeditions, a service they happily extend to their members providing the equipment is adequately insured. The expedition suffered no major equipment failures, due in part to careful selection and preparation.

### TEAM EQUIPMENT

Item	Comments
GPS x 2	The units were waterproofed in an Aquapac and kept warm.
3 sets Alkaline batteries for GPS	Each unit only required one set of batteries, although pains were taken to keep the units and the spare batteries warm.
Suunto watch altimeter	Only 20m error over 35 days travel with no recalibration.
Pulks - Snowsled x 3	We used 1.6m Snowsled pulks, one of an old design and two new, lighter pulks. Both types coped well with the 100kg loads whilst skiing, although did not get tested due to the easy conditions on the west side of the ice cap. The newer pulks did not ice-up around the runners as the older pulk did. We base waxed the runners in order to reduce friction and filled in the rivet holes. As a precaution against damage to the cargoes (particularly fuel cans) bolts, rivets and other sharp protrusions inside the hull were filed down and covered with closed cell foam.
Pulk Repair Kit	Spare nuts, bolts and webbing were taken in case of trace damage. Fibreglass plastic padding to repair any damage to the pulks themselves
Pulk pulling harness	Andy Woodward of Wear and Tear had made harness for many high profile expeditions and did a splendid job with our comfortable harnesses. Only the chest strap needs a little redesign to make it more easily adjustable.
Tent (Terra Nova Hyperspace)	Stood up well in all weathers. Spindrift does creep in through the top of the doors, as the Velcro is ill fitting. The zips are the most vulnerable part and must always be operated with caution. We did find the tent a little small for three big chaps for thirty-five days.
Tent Repair kit	Tape, seam grip, webbing, pole sleeve, spare poles all unused.
Tent snow brush	So well used, it fell to bits.
Coleman Peak 442 unleaded petrol stoves x2	We ran the stoves with out problem on Heptane, the only fuel available when we arrived. The stoves are prone to flaring at low temperatures and have to be allowed to warm up. Good heat output for snow melting.
Spares for Peak cookers	3 spare burner tubes and pump washer sets were taken.
Lighters and waterproof matches	
Petrol (40 litres i.e. 1 litre per day)	We used Heptane, a clear fuel which is lighter than petrol and therefore burns cleaner and at a slightly faster rate. A sensible allowance would be 0.3l per person per day, which was our approximate consumption rate.
Petrol Containers (8x5 litres)	5l plastic cans, each wrapped in a plastic bag to catch spillage and carried in a separate pulk from the food.
1 Litre Sigg fuel bottle	For easy transfer to the stoves.
Billy can sets x 2	
Pan scourers x 4	
Insulated Board for stove	Essential, easily forgotten.
3 x 40 man days Arctic rations	Despite our additions, these rations do become rather monotonous. In retrospect we would have varied the diet more and would have been happy to carry the small increase in weight. The rations required extensive repackaging prior to freighting.
Vitamin pill supplements	Essential.
Additional fat to supplement rations	Good morale booster in the form of cheese and cured meat sausage.
Lightweight water filter	Unused. May have been required for walk off.
Snow Shovel	Solid metal blade and stout shaft, essential.

Team Medical Kit	See annex F
45m climbing rope 11mm	
Spare ski and binding	
Spare ski poles	
Ski repair kit	One screw was used: see personal kit below.
Skin glue, 1 tube	Used the whole tube re-sticking only one pair of skins.
Ski waxes (Polar, 1 Blue wax, 2 tubes Universal Klister.	For future trips we would only carry one pair of skins, and double the amount of wax and klister.
Misc repair kit	Gaffa tape, housewife, super glue, Araldite.
Maps	A spare set of maps were carried, water proofed and separate to the primary set.
Entertainment	Scrabble, cards, a book each, and a SW radio receiver to listen to the BBC World Service. Very useful
Jotron Tron 45S EPIRBS x 2	(Emergency Position Indicating Radio Beacon) These dual frequency (406 MHz, 121.5 MHz) beacons were hired in the UK and registered with UK EPIRB Registry, H.M. Coastguard at Falmouth.

## PERSONAL EQUIPMENT

Item	Comments
Mountain Touring Skis	See below.
Ski touring boots	See below.
Spare lightweight boots (e.g. KSB)	These were carried along with the means to temporarily attach them to the skis should we suffer a complete boot failure. Also for the walk into town.
Ski Poles (Swix Mountain tourers)	
Skins 2 pairs	We each carried two pairs of skins, one a traditional "furry" stick-on Coletex and one an American plastic strap on skin. The plastic skins were heavier, had no glide and are not recommended. When we used waxes, not only did distance improve but technique and enjoyment also.
Yeti or other snow gaiters	Essential, require gluing to the boots and are prone to being worn away by the binding.
Crampons	
Ice Axe	
Climbing harness	
2 ice screws	
1 pulley	
6 krabs	
5 slings	
4 Prussic loops	
Balaclava/ Face Mask	
Ear Band	
Hat or similar head covering	
Lifa tops/bottoms	
Trousers	
Fleece Jacket	
Goretex Jacket/Sallopettes	
Windproof smock	
Inner gloves	
Thermal mitts	
Overmitts	
Ski Goggles	
Glacier sunglasses	
Duvet Jacket	
Dry change of clothing	
Spare socks and underwear	
Sleeping Bag and liner.	We had problems with condensation freezing on the filling in the down bags and then melting, wetting the down. The bags were laid on the top of the pulks during sunny days to dry out. A vapour barrier bag could have been used but these are uncomfortable.
Goretex Bivvi Bag	

Thermarest	
Spoon and mug	
Water bottle	"CamelBack" or similar delivery system is recommended.
Thermos flask	
Sunscreen and lip salve/block	Essential.
Head torch	
Compass and whistle	
Pee Bottle	
Personal wash kit	
Personal first aid kit	
Toilet Rolls	
Waterproof stuff sack for stowing personal equipment in sled	Would have been essential had we encountered the rivers expected.
Rucksacks (carry off)	

### Boots and skis

We each used 75mm Nordic Norm boots (Alico and Asolo)

The most worrying damage occurred on these items. From previous reports, we had read that boots were prone to splitting across the sole, just to the rear of the three binding pin holes. Indeed, Tim replaced his boots less than a week prior to departure having discovered the beginnings of such a crack. The cause is most likely to be the stress exerted on the cold (sometimes frozen) boot as it is first attached to the binding, forcing it from a walking to a skiing position.

Cracks did appear on one pair of boots, thankfully only on the last two days and the sole remained intact. Spare, lightweight walking boots were carried along with the means to temporarily attach them to the skis should we suffer a complete boot failure. Consideration should be given to a pair of boots with a 30mm thick sole if buying new for the expedition

Each of us used a different pair of skis, two Dynastar Montane Plus skis (of which one had a harder camber) and one pair Asnes Sondre Telemark skis. The bindings on one of the Dynastar pairs began to wear at the screws and will need to be replaced. The Asnes ski started to delaminate (apparently not an uncommon fault with these skis) but held together sufficiently to complete the trip. We carried a comprehensive ski repair kit including screws, bindings, heel cable, spare ski and poles.

## Annex E - Weather Report

### LOCAL WEATHER HAZARDS

The local people in Ammassalik warned us about 2 main weather hazards before we set out on the icecap:

**Piteraq** - A NW storm in which the icy cold winds can blow at speeds in excess of 200 km/hr. It is predominantly encountered on the east coast and the intensity of these storms decreases as you move further inland and as summer approaches. When the sky is clear and the wind starts to increase in strength from the NW we were strongly advised by the locals to pitch tent and dig in as soon as possible in advance of the storm hitting. This proved to be extremely well founded advice and we encountered 2 Piteraq storms on the expedition. A Finnish party who were on the ice just before us failed to heed this advice and 3 of the 4 man party died from exposure when the wind became too strong for them to erect their tent or dig a shelter.

**NE Storms** - Whilst not as dangerous as the Piteraq, these storms bring prodigious quantities of heavy wet snow. We encountered several of these storms, the first of which rendered skiing totally impossible. On the first day we attempted to keep skiing but completely exhausted ourselves and covered a mere 3.2 km in a whole day of skiing. Once we camped the snowfall was sufficient to almost bury the tent and we had to maintain a watch overnight to ensure that an air hole was



constantly kept clear at the front of the tent. The thick powder snow deposited by these storms was sufficient to slow progress for several days afterwards.

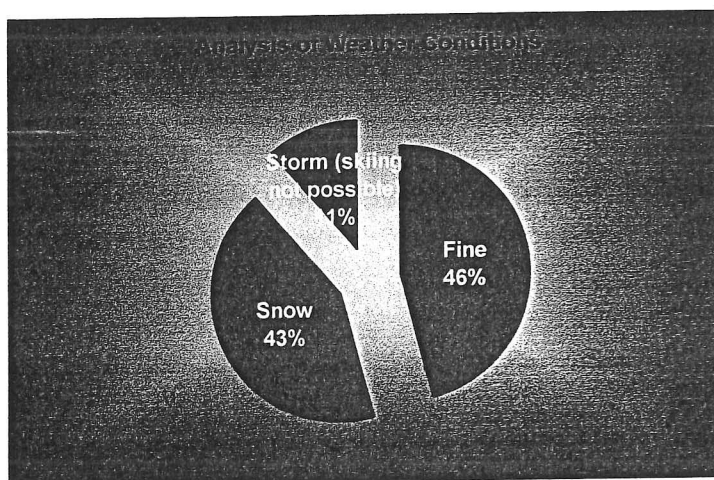
## GENERAL WEATHER PATTERNS

Although NE winds produced the heaviest snow storms, any wind from an easterly sector tended to result in heavy wet snow falls when we were on the eastern part of the icecap. As we travelled further west the E winds became drier and the westerly winds tended to be accompanied by snow. Winds from the NW were invariably dry and extremely cold. In general whenever we experienced a NW Piteraq storm, which tended to last less than 24 hours, the wind subsequently backed around to the SE giving rise to heavy snow falls.

## ANALYSIS OF WEATHER CONDITIONS EXPERIENCED

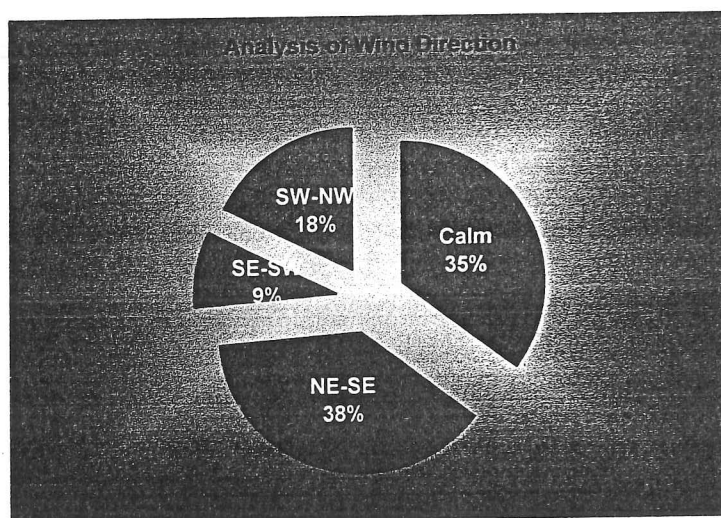
The overall weather conditions experienced on the expedition are analysed in Figure 18. Although we experienced large amounts of snow that slowed progress, skiing was still possible on 89% of the days that we were on the icecap.

*Figure 19 - Analysis of Weather Conditions*



## ANALYSIS OF WIND CONDITIONS EXPERIENCED

The analysis of wind directions in Figure 19 shows that we experienced winds from an easterly sector for 38% of the time, which in theory should favour wind assisted east to west crossings. However, when we did experience easterly winds they were almost invariably accompanied by heavy snow, white out conditions, and strong winds which would have made the use of a traction kite dangerous or impossible. There were only 2 or 3 days during the whole crossing when it would have been possible for us to safely deploy a traction kite had we taken one.



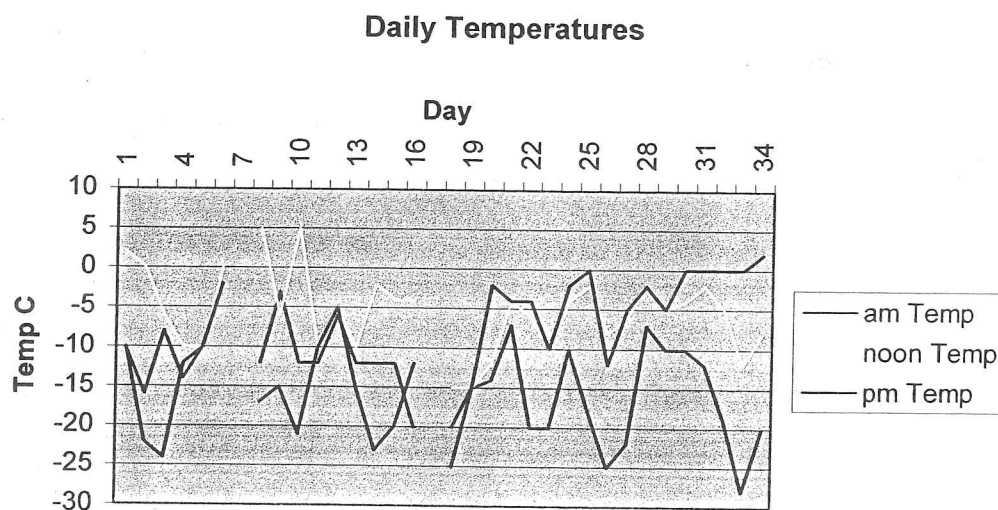
*Figure 20 - Analysis of Wind Direction*



# WEATHER LOG

Date	Day	Alt m	AM Temp C	Noon Temp C	PM Temp C	Wind Dirn	Wind Speed Knots	Weather
21 Apr	1	1260						
22 Apr	2	1480	-10	+2	-10		Calm	Sunny all day
23 Apr	3	1565	-22	0	-16		Calm	Sunny all day
24 Apr	4	1645	-24	-6	-8		Calm	Increasing cloud towards evening
25 Apr	5	1830	-12	-10	-14	NE	5-10	Light snow all day
26 Apr	6	1975	-10	-10	-10	NE	15-20	Heavy wet snow all day
27 Apr	7	1975	-2	0	-2	NE	20-30	Heavy wet snow all day
28 Apr	8	1975	No observation possible			NE	20-30	Heavy wet snow all day
29 Apr	9	1965	-12	+5	-17	NE>W	0-5	7/8 Cloud
30 Apr	10	2070	-3	-6	-15	NW	0-5	Light snow showers clearing later
1 May	11	2160	-12	+5	-21	Var	0-5	Light snow showers clearing later
2 May	12	2280	-12	-10	-10	SE>E	5-10	Snow all day clearing later
3 May	13	2435	-6	-5	-5	SE>NW	20-50	Piteraqa by late afternoon
4 May	14	2450	-12	-10	-15	NW>SE	30-10	Clear then snow by late evening
5 May	15	2595	-12	-2	-23	NE>SE	0-5	Snow showers clearing later
6 May	16	2650	-12	-4	-20		Calm	Sunny all day
7 May	17	2780	-20	-4	-12		Calm	Sunny all day
8 May	18	2780	No observation possible			NW	35-40	Piteraqa
9 May	19	2795	-25	-15	-20		Calm	Sunny all day
10 May	20	2795	-15	-15	-15	SE	35-40	Heavy wet snow, white out
11 May	21	2665	-14	-12	-2	SE	25-35	Heavy wet snow, white out
12 May	22	2585	-7	-4	-4	SW	0-5	8/8 low cloud
13 May	23	2575	-20	-6	-4	S	5-10	7/8 cloud
14 May	24	2520	-20	-10	-10	NW	5-10	Cloudy at first, sunny later
15 May	25	2415	-10	-4	-2		Calm	Snow showers all day
16 May	26	2295	-18	-2	0		Calm	Sunny all day
17 May	27	2145	-25	-8	-12		Calm	Sunny all day
18 May	28	2130	-22	-6	-5	SE	25-35	Heavy wet snow, white out
19 May	29	1950	-7	-2	-2	S	5-35	Sunny all day
20 May	30	1950	-10	-5	-5	SE	45-50	Sunny all day
21 May	31	1825	-10	-4	0	W	0-5	Snow showers later
22 May	32	1660	-12	-2	0	NW	0-5	Sunny spells and snow showers
23 May	33	1425	-19	-5	0		Calm	Sunny spells
24 May	34	1025	-28	-12	0		Calm	Sunny all day
25 May	35	630	-20	-8	+2		Calm	Sunny all day

Figure 21 - Daily Temperatures on Expedition



## **Annex F - Medical Report**

Thankfully there were few occasions when we needed to dip into the medical kit. In addition to the items listed below, we also carried the splendid book "Medicine for mountaineering and other wilderness activities." Both James and Clive had undergone wilderness medical training.

We all suffered from blisters in the early stages of the expedition. Some continued throughout. These were padded with melolin and Zinc Oxide, both of which we had in large supply. One member of the team developed an allergy to the Zinc Oxide which created difficulties in dressing the blisters as nothing else is quite as good.

Two members of the team suffered chaffing from clothing; this was relieved with Vaseline. Two members suffered from aching tendons: there is not much, short of complete rest, that can be done for this problem. Anti-inflammatory drugs were carried but used only once.

The only ailment to cause serious concern was one case of bleeding piles. Again, in the field, there is not much that can be done. Nocturnal analgesics were administered and a programme of regular washing begun. The condition continued for two weeks until the end of the expedition.

The contents of the medical kit is listed below.

### **Pain Killers**

Ibuprofen  
Co Proxamol  
Paracetamol  
Voltarol

### **General**

Chloramphenicol  
Diarolyte  
Burn Cream  
Antiseptic ointment  
Deep Heat  
Antiseptic Wipes  
Mycota food powder  
Blisteze  
Lip salve  
Sun Block

### **Dressings**

Compeed  
Zinc Oxide Tape  
First field dressing  
Crepe Bandages  
Safety Pins  
Misc Plasters  
Scholl Animal Wool  
Micropore tape  
Burn Dressing  
Moleskin  
Sterilised dressing pads

### **Antibiotics**

Floxapen  
Amoxil  
Ciproxin

## **Annex G - Expedition Training**

### **INDIVIDUAL TRAINING**

The best training for skiing with a 100kg pulk is to ski with a 100kg pulk. This is not always possible in Basingstoke and so various training methods were devised.

Clive supplemented his normal circuit training routine with 90 minute sessions on a ski machine at the gym. This was repeated 3 or 4 times a week during the three months leading up to the expedition.

Over a similar time period, James was hauling two car tyres, each filled with a sand bag, around various hills. This was combined with swimming, cycling and running during the week.

Tim undertook no specific training for the expedition. During the four month prior to the expedition he was working as a ski guide in the Italian Alps.

Mental training and preparation is important. Everyone needs to be aware of the expeditions aim, *modus operandi* and likely conditions on the icecap. We travelled with the attitude that the crossing was simply the walk in, and that we really needed to be fresh and ready for the challenges of the Russell Glacier and difficulties of coming off the ice. In the event, this proved no challenge and therefore a disappointment. That said, in another year and with different weather, the opposite could have been true.

## TEAM TRAINING

Clive and James, along with Tim Sander, completed a 7 day, 141km ski crossing of the Hardangervidda Plateau four weeks prior to the expedition. Tim Burton was unable to take part in this trip due to his ski guiding commitments in the Alps. In addition to being a highly enjoyable trip in its own right, the Norway trip gave us the opportunity to test items of equipment and confirmed our levels of fitness were adequate for the main trip. Jim suffered from an Achilles tendon in Norway but this was fixed with Ultra Sound treatment and rest.

## Annex H - References

### REPORTS

All held in the map room at the RGS. Numbers in brackets refer to the report's index number at the map room.

1996 **The Integrated Trans Greenland Expedition 1996**, Leader Steve Bull.

A summer crossing attempt, with a partially sighted team. The expedition pulled out after a few days due to injury. {3065}

1995 **Trans Greenland Expedition 1995**, Leader Dr Sarah Simmons.

A thorough report of the last successful British summer crossing, completed in 37 days with the aid of sails. {3037}

**The Adjutant Generals Corp Northern Lights Expedition**, Ldr. Maj. John Wright.

A successful spring crossing. {2897}

1994 **British Trans Greenland Expedition**. Leader Mark Evans.

With Nigel Harling, the fastest recorded British crossing, completed in July using Upski parachutes. {2857}

1993 **British Greenland Expedition 1993**. Leader Stephen Jones. {2748}

1990 **British Trans Greenland Expedition 1990**. Leader Kenneth Carslaw

Casevaced 1km from completing the crossing following a crevasse fall. {2100}

### BOOKS

Swaney, Deanna, **Iceland Greenland and the Faroe Islands, Australia**, 1997 3<sup>rd</sup> ed. Pub. *Lonely Planet* - general information on Greenland

Wilkerson, James A., **Medicine for Mountaineers and other wilderness activities**. Seattle USA, 1992, 4<sup>th</sup> ed. Pub. *The Mountaineers*. - practical medical handbook.

## **Annex I - Contact Addresses**

### **EXPEDITION AGENTS**

**Paul Walker, Tangent Expeditions International** - organises specialist climbing and skiing expeditions to Greenland. Also provides logistic support to independent Greenland expeditions.

3, Mill Beck,  
New Hutton,  
Kendal,  
Cumbria,  
LA8 0BD,  
Tel. +44 (0)1539 737757  
Fax. +44 (0)1539 737756  
Mobile. +44 (0)7887 556089  
E mail paul@tangentexp.demon.co.uk  
Website www.tangentexp.demon.co.uk

**Hans Christian Florian, Mt Forel Expedition Support** - organises specialist mountaineering and skiing expeditions to East Greenland and crossings of the icecap. Offers logistic support to independent expeditions.

Tel 00 299 981320  
Fax 00 299 981373  
E Mail florian@greenet.gl

### **PERMITS AND LICENCES**

**Iris Madsen, Danish Polar Center** - Provides clearance and permits for all expeditions to Greenland

Strandgade 100H  
DK 1401 Kobenhavn K  
Denmark  
Tel 00 45 32 88 01 00  
Fax 00 45 32 88 01 01  
E Mail dpc@dpc.dk  
Website www.dpc.dk

**Greenland Home Rule Radio Administration** - Issues radio licences for EPIRBS and any other radio equipment taken on an expedition to Greenland

PO Box 1002,  
DK-3900 Nuuk  
Greenland  
Tel 00 299 323 120  
Fax 00 299 323 130  
E Mail jp@tele.gl  
01784 266150

**Linda Goulding, UK EPIRB Registry** - Registration of EPIRBS for use by an expedition

The EPIRB Registry  
HM Coastguard Southern  
Pendennis Point  
Castle Drive  
Falmouth

Cornwall  
TR11 4WZ  
Tel 01326 211569  
Fax 01326 319264

## **EQUIPMENT HIRE/PURCHASE**

### **Premium Liferaft Services - Hire of EPIRBS**

Liferaft House  
Burnham Business Park  
Burnham on Crouch  
Essex  
CM0 8TE  
Tel 0161 784858  
Fax 01621 785934

### **Kort & Matrikelsen - National Survey and Cadastre Denmark - Supply aerial photographs of Greenland**

Retail Business Department  
Rentemestervej 8  
2400 København NV  
Denmark  
Tel 00 45 35 87 50 50  
Fax 00 45 35 87 50 51  
E Mail kms@kms.dk  
Website www.kms.dk

### **Mick Parsons, Spider Kites - Supplier of traction kites and training to polar expedition teams**

Tel 01267 237 959  
Website [www.mmstudio.com/spider/html/polar.htm](http://www.mmstudio.com/spider/html/polar.htm)

### **Al Keir - Specialist Advice on Expedition Communications**

Home 01752 813872  
Mobile 07977 502161  
Work 01752 836210  
E Mail alkeir@bigfoot.com  
Website [www.wigglyamps.com](http://www.wigglyamps.com)

### **Roger Danes, Snowsled - Pulk manufacturers.**

Market Place Mews,  
Tetbury,  
Gloucestershire,  
GL8 8DN  
Tel 01666 502731

### **Andy Woodward, Wear and Tear Repairs - Pulk pulling harness manufacturer.**

Ty Cerrig,  
Disserth,  
Howey,  
Llandrindod Wells  
LD1 6NL



Tel 01597 860515

## **TRAVEL AND AIR FREIGHT ARRANGEMENTS**

**Greenland Tourist Board** - General advice on hotels, travel arrangements, and expedition operators in Greenland

Fax 00 299 322877

E Mail [tourism@greenet.gl](mailto:tourism@greenet.gl)

**Icelandair (London)** - Scheduled Flights to East Greenland

Tel 0171 874 1000

**Signet Freight (Phil Vincett)** - Air Freight to Greenland

Unit 3 Argonaut Park  
Gallymead Rd  
Colnebrook, Nr Heathrow  
Tel 01753 681913

**Air Alpha** - Helicopter Charter from Ammassalik to Hahn Glacier

E Mail [air.alpha.jav@greenet.gl](mailto:air.alpha.jav@greenet.gl)

## **INSURANCE**

**USMIA** - Expedition Insurance

USMIA (Adventure Training)  
Garrod House  
Chaldon Rd  
Caterham  
Surrey  
England  
CR3 5YW

## **GRANTS**

**Andrew Croft Memorial Fund**

Mrs JRD Korner,  
The River House,  
52 Strand on the Green,  
London  
W4 3PD

**Gino Watkins Memorial Fund**

Mrs Gillian Renshaw,  
Scott Polar Research Institute,  
University of Cambridge,  
Lensfield Road,  
Cambridge,  
CB2 1ER

## Annex J - Expedition Budget

<b>EXPENDITURE<sup>1</sup></b>	<b>Amount £ Sterling</b>
<b>Transport and Air Freight</b>	3960.00
International Air Fares <sup>2</sup>	108.58
Helicopter Transfer Kulusuk- Ammassalik	750.74
Helicopter charter Ammassalik- Hahn Glacier	127.77
Vehicle hire Pt 660 - Kangerlussuaq	623.96
Air freight London- Kulusuk	78.89
Air freight Kulusuk - Ammassalik	
<b>Equipment</b>	54.25
Maps	65.00
Aerial Photographs	300.00
EPIRB Hire	84.26
First Aid Kit	11.90
GPS Batteries	
<b>Food , Fuel and Accommodation</b>	162.42
Expedition Food	82.59
Stove Fuel <sup>3</sup>	404.81
Transit Food and Accommodation <sup>4</sup>	
<b>Miscellaneous</b>	330.00
Insurance	70.85
Radio Permit	94.13
Postage and Admin	
	<b>7310.15</b>
<b>TOTAL EXPENDITURE</b>	
<b>INCOME</b>	1000.00
Gino Watkins Fund	400.00
Andrew Croft Memorial Fund	5910.15
Personal Contributions	
	<b>7310.15</b>
<b>TOTAL INCOME</b>	

<sup>1</sup> All expenditure shown is total expenditure for 3 man team.

<sup>2</sup> Flights London-Reykjavik-Kulusuk and Kangerlussuaq-Copenhagen-London

<sup>3</sup> High grade Heptane fuel purchased from Mt Sorel Expeditions in Ammassalik

<sup>4</sup> Includes all transit accommodation, food and transfer costs incurred whilst in Reykjavik, Ammassalik and Kangerlussuaq