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.brinternet.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.

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, meltwater 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.

Expedition Programme

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

Start: Hahn Glacier
Finish: Pt 660 Russell Glacier

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Kangerlussuaq Fjord
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Kangerlussuaq Museum
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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.

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.

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.
27-28 Apr - 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 2nd 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.

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 4th 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 2nd morning, rising at 5am and leaving around 7am, so as to avoid the softer snow later in the day.

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.

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°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.

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 crossings.

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 compo rations 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

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<tr>
<td>Detailed research</td>
<td>Select Team Members</td>
<td>Source and Procure Equipment</td>
<td>Book Flights</td>
<td>Apply for Permits</td>
<td>Apply for Grants</td>
<td>Arrange air freight</td>
<td>Training - Norway</td>
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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/streams 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
Reykjavik - Kulusuk
Kulusuk - Ammassalik

- Icelandair scheduled flight
- Gronlandsfly scheduled flight
- Alpha Air scheduled helicopter shuttle

1 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.

2 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.

3 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\(^4\)

**Return**

Russell Glacier (Pt660)\(^5\) - Kangerlussuaq - Kangerlussuaq Tourism 4x4 Land Cruiser\(^6\)

Kangerlussuaq - Copenhagen - SAS scheduled flight\(^{1,2}\)

Copenhagen - London - SAS scheduled flight\(^1\)

**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 Laugardalur 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.

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\(^4\) Air Alpha operate a Bell 212 helicopter from Ammassalik which can be privately chartered to take expedition parties and their equipment form 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.

\(^5\) 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.

\(^6\) 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 28 708 W) to a point (67 09 954 N, 49 04 084 W - known as Dog Camp1) 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 reportedly2 at 66 29 000 N, 46 20 000 W. 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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1 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.

2 Sara Simmons 1995 Expedition Report
Table 2 - Hans Christian Florensen Route from Dog Camp to Pt 660

<table>
<thead>
<tr>
<th>Point</th>
<th>Latitude N</th>
<th>Longitude W</th>
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<td>WP1</td>
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<td>WP2</td>
<td>67 11 710</td>
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<td>WP3 Large River</td>
<td>67 11 260</td>
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<td>WP4</td>
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<td>WP5</td>
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<td>49 45 150</td>
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<td>WP6 River</td>
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<td>49 47 450</td>
</tr>
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<td>WP7</td>
<td>67 10 850</td>
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</tr>
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<td>WP8</td>
<td>67 09 750</td>
<td>49 49 510</td>
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<td>WP9</td>
<td>67 08 950</td>
<td>49 56 020</td>
</tr>
<tr>
<td>Pt 660</td>
<td>67 08 824</td>
<td>50 03 105</td>
</tr>
</tbody>
</table>

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

<table>
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<th>Point</th>
<th>Latitude N</th>
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<tbody>
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<td>Tunnel</td>
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<td>49 41 900</td>
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<tr>
<td>Start of Icefall</td>
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<td>WP20</td>
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<td>Pt 660</td>
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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 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.

Figure 14 - The Tunnel

Figure 15 - Start of the icefall
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.

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.
### Table 4 - Expedition Log

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<th>Cum Km</th>
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<td></td>
</tr>
<tr>
<td>20 May</td>
<td>30</td>
<td>67 04 734</td>
<td>47 31 721</td>
<td>-</td>
<td>427</td>
<td>114</td>
<td>1950</td>
<td>Stormbound</td>
</tr>
<tr>
<td>21 May</td>
<td>31</td>
<td>67 07 049</td>
<td>48 07 684</td>
<td>28.4</td>
<td>454.5</td>
<td>87.7</td>
<td>1825</td>
<td></td>
</tr>
<tr>
<td>22 May</td>
<td>32</td>
<td>67 08 146</td>
<td>48 35 012</td>
<td>18.9</td>
<td>473.4</td>
<td>67.0</td>
<td>1630</td>
<td>Dog Camp</td>
</tr>
<tr>
<td>23 May</td>
<td>33</td>
<td>67 09 873</td>
<td>49 04 459</td>
<td>21.5</td>
<td>495</td>
<td>46.3</td>
<td>1425</td>
<td></td>
</tr>
<tr>
<td>24 May</td>
<td>34</td>
<td>67 09 481</td>
<td>49 38 648</td>
<td>27.2</td>
<td>522</td>
<td>17.9</td>
<td>1025</td>
<td></td>
</tr>
<tr>
<td>25 May</td>
<td>35</td>
<td>67 09 104</td>
<td>50 02 491</td>
<td>17.9</td>
<td>540</td>
<td>0</td>
<td>630</td>
<td>Arrived Pt 660</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Item</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS x 2</td>
<td>The units were waterproofed in an Aquapac and kept warm.</td>
</tr>
<tr>
<td>3 sets Alkaline batteries for GPS</td>
<td>Each unit only required one set of batteries, although pains were taken to keep the units and the spare batteries warm.</td>
</tr>
<tr>
<td>Suunto watch altimeter</td>
<td>Only 20m error over 35 days travel with no recalibration.</td>
</tr>
<tr>
<td>Pulks - Snowsled x 3</td>
<td>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 cargo (particularily fuel cans) bolts, rivets and other sharp protrusions inside the hull where filed down and covered with closed cell foam.</td>
</tr>
<tr>
<td>Pulk Repair Kit</td>
<td>Spare nuts, bolts and webbing were taken in case of trace damage. Fibreglass plastic padding to repair any damage to the pulks themselves.</td>
</tr>
<tr>
<td>Pulk pulling harness</td>
<td>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.</td>
</tr>
<tr>
<td>Tent (Terra Nova Hyperspace)</td>
<td>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.</td>
</tr>
<tr>
<td>Tent Repair kit</td>
<td>Tape, seam grip, webbing, pole sleeve, spare poles all unused. So well used, it fell to bits.</td>
</tr>
<tr>
<td>Tent snow brush</td>
<td>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.</td>
</tr>
<tr>
<td>Coleman Peak 442 unleaded petrol stoves x2</td>
<td></td>
</tr>
<tr>
<td>Spares for Peak cookers</td>
<td>3 spare burner tubes and pump washer sets were taken.</td>
</tr>
<tr>
<td>Lighters and waterproof matches</td>
<td>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.</td>
</tr>
<tr>
<td>Petrol (40 litres i.e. 1 litre per day)</td>
<td>6l plastic cans, each wrapped in a plastic bag to catch spillage and carried in a separate pulk from the food. For easy transfer to the stoves.</td>
</tr>
<tr>
<td>Petrol Containers (8x5 litres)</td>
<td></td>
</tr>
<tr>
<td>1 Litre Sigg fuel bottle</td>
<td>Essential, easily forgotten. 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.</td>
</tr>
<tr>
<td>Billy can sets x 2</td>
<td>Essential. Good morale booster in the form of cheese and cured meat sausage.</td>
</tr>
<tr>
<td>Pan scourers x 4</td>
<td>Unused. May have been required for walk off. Solid metal blade and stout shaft, essential.</td>
</tr>
<tr>
<td>Insulated Board for stove</td>
<td></td>
</tr>
<tr>
<td>3 x 40 man days Arctic rations</td>
<td></td>
</tr>
<tr>
<td>Vitamin pill supplements</td>
<td></td>
</tr>
<tr>
<td>Additional fat to supplement rations</td>
<td></td>
</tr>
<tr>
<td>Lightweight water filter</td>
<td></td>
</tr>
<tr>
<td>Snow Shovel</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Comments</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Team Medical Kit</td>
<td>See annex F</td>
</tr>
<tr>
<td>45m climbing rope 11mm</td>
<td></td>
</tr>
<tr>
<td>Spare ski and binding</td>
<td></td>
</tr>
<tr>
<td>Spare ski poles</td>
<td></td>
</tr>
<tr>
<td>Ski repair kit</td>
<td>One screw was used. see personal kit below.</td>
</tr>
<tr>
<td>Skin glue, 1 tube</td>
<td>Used the whole tube re-sticking only one pair of skins.</td>
</tr>
<tr>
<td>Ski waxes, 1Polar, 1 Blue wax, 2 tubes</td>
<td>For future trips we would only carry one pair of skins, and double the</td>
</tr>
<tr>
<td>Universal Klister</td>
<td>amount of wax and klister.</td>
</tr>
<tr>
<td>Misc repair kit</td>
<td></td>
</tr>
<tr>
<td>Maps</td>
<td>A spare set of maps were carried, water proofed and separate to the</td>
</tr>
<tr>
<td>Entertainment</td>
<td>primary set.</td>
</tr>
<tr>
<td>Jotron Tron 45S EPIRBS *2</td>
<td>(Emergency Position Indicating Radio Beacon) These dual frequency</td>
</tr>
<tr>
<td></td>
<td>(406 MHz, 121.5 MHz) beacons were hired in the UK and registered with</td>
</tr>
<tr>
<td></td>
<td>UK EPIRBS Registry, H.M. Coastguard at Falmouth.</td>
</tr>
</tbody>
</table>

**PERSONAL EQUIPMENT**

- Mountain Touring Skis
- Ski touring boots
- Spare lightweight boots (e.g. KSB)
- Ski Poles (Swix Mountain tourers)
- Skins 2 pairs
- Yeti or other snow gaiters
- 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/Salopettes
- 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.

Goretex Bivvi Bag

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.
Thermarest
Spoon and mug
Water bottle
Thermos flask
Sunscreen and lip salve/block
Head torch
Compass and whistle
Pee Bottle
Personal wash kit
Personal first aid kit
Toilet Rolls
Waterproof stuff sack for storing personal equipment in sled
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 they 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](image)

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

Figure 21 - Daily Temperatures on Expedition

**Daily Temperatures**

![Graph showing daily temperatures with AM, Noon, and PM temperatures](image-url)
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
- Paracetomol
- Voltarol

**General**
- Chloramphenicol
- Diarolyte
- Burn Cream
- Antiseptic ointment
- Deep Heat
- Antiseptic Wipes
- Mycota food powder
- Blistex
- 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.


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


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


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**


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@greennet.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 Liferat Services - Hire of EPIRBs**

Liferat 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 Kobenhavn 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

**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

**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,
Dissrthe,
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@greennet.gl

Icelandair (London) - Scheduled Flights to East Greenland
Tel 0171 874 1000

Signet Freight (Phil Vincett) - Air Freight to Greenland
Unit 3 Arganaut Park
Gallymead Rd
Colnebrook, Nr Heathrow
Tel 01753 681913

Air Alpha - Helicopter Charter from Ammassalik to Hahn Glacier
E Mail air.alpha.jav@greennet.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

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1 All expenditure shown is total expenditure for 3 man team.
2 Flights London-Reykjavik-Kulusuk and Kangerlussuaq-Copenhagen-London
3 High grade Heptane fuel purchased from Mt Sorel Expeditions in Ammassalik
4 Includes all transit accommodation, food and transfer costs incurred whilst in Reykjavik, Ammassalik and Kangerlussuaq