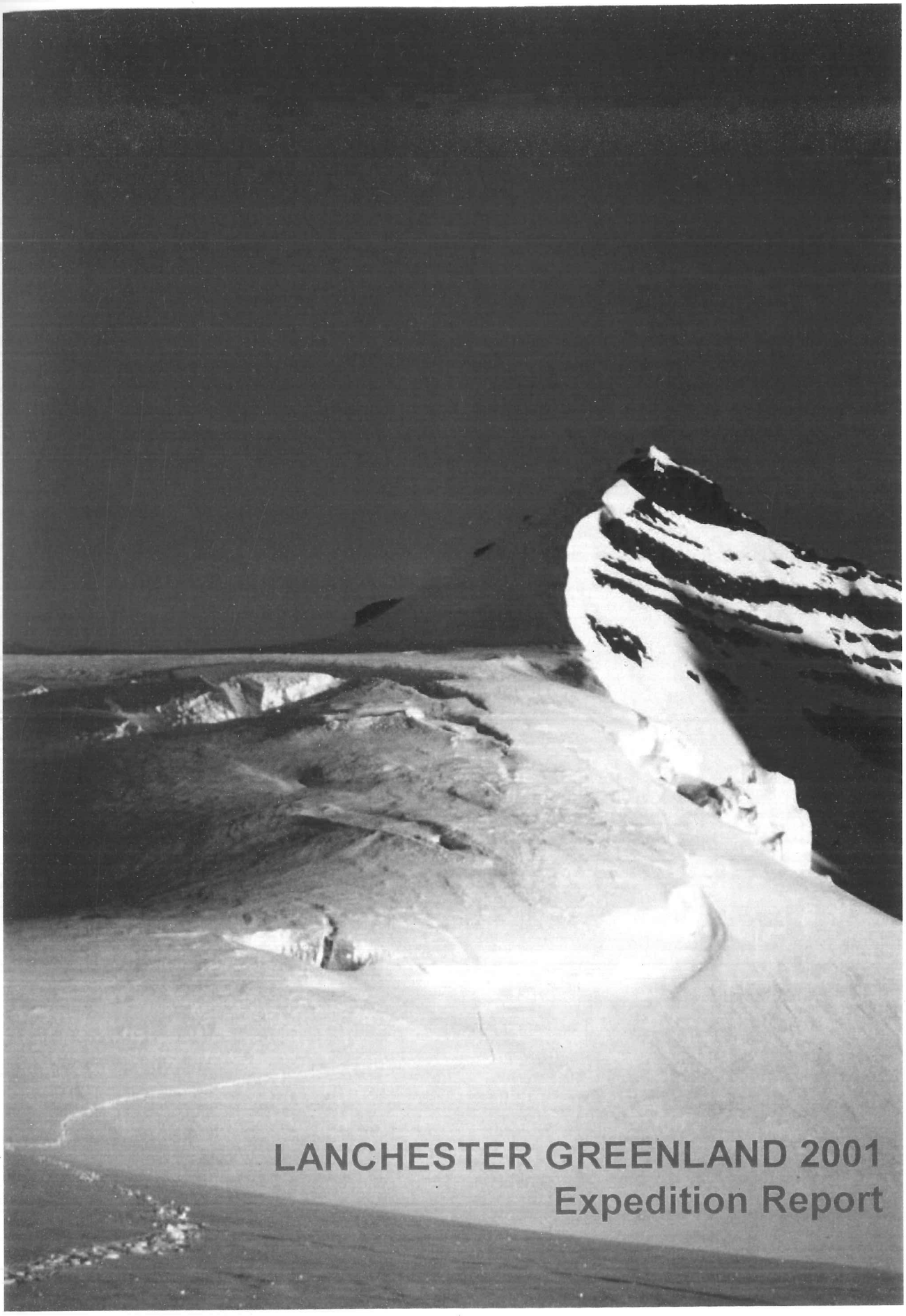

LANCHESTER GREENLAND 2001
Expedition Report

ABSTRACT

This is the Expedition Report for the Lanchester Greenland 2001 Expedition, which ran from the 20th June to 21st July 2001. The report has been prepared in order to share the team's geographical discovery and logistical knowledge with the rest of the mountaineering and exploration community, such that other teams may be assisted in preparing for future expeditions.

The team of six British mountaineers entered an area of East Greenland within the Arctic Circle, known as the Northern Lindbergh Mountains. This, and the adjoining areas, constituted an unexplored region of over 1000 square kilometres, and contained many dozens of unclimbed mountains.

During a period of 23 days 'on the glacier' the team explored much of the area, and also ventured into parts of the previously visited Southern Lindbergh Mountains. They made ascents of 25 virgin summits and repeat ascents of three summits (two via new routes). A survey pin was discovered on one of the latter peaks, and it is believed that this was placed by the 1934 British Trans-Greenland Expedition, led by Martin Lindsay.

The Lanchester Greenland 2001 team also undertook a rigorous experiment in waste impact minimisation. All solid human waste was dehydrated and removed from the glacier, for final disposal in the UK. It is believed that this is the first expedition to repatriate human waste to its 'home country'.

ACKNOWLEDGEMENTS

As is always the case with such ventures, this expedition would not have been possible without the assistance of many people. Support included: advice; training; endorsement; donations in cash and kind; generous discounts; loan of equipment; and research into a variety of subjects on our behalf. Significant assistance was received from the following:

The Arctic Club (Derek Fordham)	Endorsement, advice and financial support
Baco	Donation of zip-seal freezer bags
Brian Blessed	Advice and support
British Mountaineering Council	Endorsement, information and financial support
Paul Canapero	Financial support
Julia Cater	Financial support
Colab	Discount on film developing
Heather Coombs	Emergency contact, use of honeymoon for training
Continental Sweets UK (Clare Smiley)	Donation of large quantities of chocolate
Susan Denison	Loan of sewing machine
The Eagle Ski Club	Endorsement and financial support
Mike Endean	Major financial support
Flexifoil (Jeremy Pilkington)	Discount on traction kites
The Form Grove Centre	Disposal of human waste
David Garbett	Advice, support, patronage and references
Gino Watkins Memorial Fund	Endorsement and financial support
Lindsay Griffin	Advice, information and contacts
The Hair and Beauty Salon, Derry	Loan of computer hardware
Dr David Hillebrandt	Medical advice, training and prescriptions
Gary Hurst	Prospectus artwork, printing, website and IT support
Jordans	Donation of Frusli bars
Lanchester MC Members	Help, advice, and use of club meets for preparation
Nick Lewis	Advice and information on waste management
MAFF/DEFR (T. Wilkinson/O. Lane)	Advice on FMD food export restrictions
Anna McCormac	Advice and information on waste management
Jenny Moulder/Ardblair	Discounted Leki Poles, Coll-tex skins, Odlo thermals
Russell & Jenny Moulder	Loan of GPS, altimeter, deadman and assistance
Mount Everest Foundation (Bill Ruthven)	Endorsement, information and financial support
The Mountaineering Council of Ireland	Endorsement and financial support
John Muston MBE	Advice and information on destination
David Orton Audio Visual (David Orton)	Loan of video camera
The Outdoor Shop (John Hare)	Substantial discounts on equipment
Chris Pannell	Emergency contact, firearms advice and training
Point North	Discount on tent materials
Daphne Pritchard	Financial support
Geoff Quinn	Loan of GPS
RAB	Substantial discounts on equipment
Paul Raymond	Emergency contact, nutritional and medical advice
Sharon Raymond	Emergency contact, media advice and report editing
Red Bull Company Ltd	Donation of cans of Red Bull
Royal Geographical Society (EAC)	Advice, information, support and contacts
Solapack (Martin Bellamy)	Loan of Chargeabout solar charger
Solar Century (Duncan Wren)	Advice and information
Col. Ewen Southby-Tailyour	Copious quantities of whisky
Tangent Expeditions (Paul Walker)	Advice and information
Topcon UK (Peter Bending)	Donation/loan of stereoscopes
Tor Mountain Fabrics	Discount on tent materials
Derek Walker	Advice, support, patronage and references
Rt. Hon Robert Walter MP	Advice on FMD food export restrictions
Wessex Fare (Brian)	Donation of 60 litre freight barrels

Dominic White	Style writing, NLP and sponsorship contacts
Susanne White	Donation of fruit cakes
Jo Wood	Advice and information on database construction
Work Tool Hire (Steve Evans)	Donation of 120 litre freight barrels
UK Sports Council (via BMC)	Endorsement and financial support
United Biscuits (Nick Lambourne)	Donation of thousands of chocolate biscuits

We would also like to note the advice received from many other people and sources throughout our preparations. The list above could never be fully complete, but without the interest and time that many people offered, we would have made many more mistakes and taken other than the best of equipment. This includes such diverse examples as the many people at the Saunton Sands Kite Festival for information on traction kites, and Carillion Director Prof. Quentin Leiper for pointing us there in the first place. Also to Jeff Booth for advice and the (albeit abortive) enquiries made to TV companies on our behalf – we now have a much better understanding of how to secure interest next time.

A massive thanks must go to all of our families for their support and encouragement. Particular mention is made of the wives of two of the team: Heather Coombs and Claire Denison. Both weddings took place in the six months prior to departure, and it is only through their understanding and flexibility that we've all remained friends.

We would also like to take this opportunity to thank all the mountaineers and explorers who have gone before us and recorded their methods and findings. Without reports and books from previous expeditions to learn from, we would have achieved far less on this trip. We hope that this report will be of use to future teams in planning their expeditions: not only to this remote part of east Greenland, but also to other polar destinations. To that end we are happy to include the following statement at the request of the Mount Everest Foundation:

CONTENTS

APPENDICES

INTRODUCTION

An early piece of advice was given to us: "*if you're going to organise your first expedition, make it an easy one*". Naturally we considered this advice, and immediately disregarded it.

It is also said that expeditions are life-changing experiences – an assertion that is very true in our case. None of us had been to the Arctic, and though three of the team had been on expeditions before, none had been directly involved with their organisation. The learning curve was steep and sustained – generating a considerable amount of work – and indeed it would have been far easier if this process had been spread over a number of expeditions.

However, much as the requirements of mounting an expedition are multi-faceted, so are the reasons that people undertake them. Declared objectives at the outset were as follows:

Primary	To explore an unvisited area and enable at least one team member to make an ascent of an unclimbed peak.
Secondary	To enable all team members to make first ascents.
Tertiary	To develop our personal mountaineering and expedition experience, accepting personal and joint risks.
	To undertake a self-sufficient existence.
	To research and demonstrate an ethical model for minimum impact expeditions.
	To have a damned good time.
	To record and distribute information on what we did, and how.

Having determined "What?", the next question should perhaps be "Why?"

George Mallory's alleged 1923 sarcastic quote of "because it's there" doesn't give much of an explanation. To answer a similar question, Martin Lindsay in *Sledge* states that "one explores because, for some strange reason, one gets a kick out of doing something that is difficult". To us, that 'something difficult' may have been climbing a mountain; hauling a sledge; deprivation of the comforts of home; organising the trip itself; or combinations of these and/or other factors.

The psychological side of expeditioning has proved fascinating for some of the team, and it became clear that mental preparation was just as important to the success of the trip as the physical or logistical preparations.

Unfortunately, the psychological issues are beyond the scope of this report, but we are keen to record that six long-standing friends undertook this trip, and we have remained so throughout. At no point were there any real arguments and, whilst on the glacier, the furthest that we permitted any friction to develop was to the point where the ever-present sarcasm lost its humorous edge.

As a warning, future teams should note and avoid the greatest danger area for a dispute to develop: if you are going to take Scrabble with you make sure that, within your weight allowances, you also include a dictionary!

In addition to recording where we went and what we climbed, this report is primarily a record of the key logistics involved in organising the expedition. My LG2001 documentation extends beyond four lever arch files (to say nothing of the 1120 emails), so it is not possible to record everything in the report. We have adopted an approach of 'what do we know now that we didn't know before', but even this doesn't extend to the myriad of other elements that were used, investigated, or learnt by trial and error. Such delights as media coverage; HF radio usage; management of suppliers and subcontractors; lecture tours; etc. may perhaps make it into the next report.

To best assist future teams, we have, where applicable, admitted our problems and mistakes. This is not to imply that we encountered any more difficulties than any other team, but is in the hope that future teams can learn by our mistakes. In expeditions, as in the rest of life, there are no faultless supermen and, from time to time, the excrement will make contact with the ventilation system.

If a 'hook' is needed to encourage anyone to read further, perhaps the following extract from a magazine article on the trip will suffice:

> "I'd never expected to be discussing the fact that a Magnum 44 wasn't really up to the job; concluding that intra-muscular drug application may be a skilled task, but we'd probably wing-it alright; or weighing all my underpants, and taking the 4 lightest pairs. Neither had I ever had to get out of an aeroplane with my fellow passengers, because the plane was so (over?) loaded that even with the engines at full power, it couldn't move. Surprising, since we'd already taken the carpet and most of the seats out of it, so it wasn't like we were carrying any unnecessary weight (except maybe the barrel of human waste, but that's another story).
>
> When you've concluded that there is no way you can take enough food to sustain you, at what level do you calculate your starvation diet? You may not be at much risk through malnourishment after a month, but light-headedness on a knife-edge snow ridge could be an equal killer.
>
> One may look to government to provide a framework for those exporting and importing on the limit of society's norms, but what do you do when faced with conflicting advice on legality after approaching 4 arms of government? With luck you'll set the standards that others will follow. Without, your next trip to Dartmoor may be for longer than a weekend."

If at all possible, we would like potential explorers to be assured that although it's a big job to mount your own expedition, it is within reach. There will be hassle, stretched time, relationships and finances, plus moments of mental and physical exhaustion. However, these are more than balanced by the rewards of the time you spend in the field, and the resultant effects that your part in the success will have in your life.

It *is* worth the effort.

Jonathan White
Expedition Leader

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CHAPTER 1 : EXPEDITION SUMMARY

1.1 - Departure

As we sat in the departure lounge at Stansted, the flight for Ibiza was called. After 18 months of hard preparation and planning, we were really tempted by the idea of sun, sea and showers; but no – we were aspiring polar explorers, and Greenland was our chosen destination.

Most of our food and equipment was already there: deposited some three weeks before by a Twin Otter ski-plane operating out of Iceland. We'd put in too much money and too many late nights to reconsider. Training had been received in such diverse skills as free-heel skiing, morphine injection and short-range heavy rifle firing. With only the airline's reluctance to carry distress flares (i.e. explosives) as a possible hurdle, we departed.

A day was spent in Reykjavik *en route*, enabling us to pick up the cheese, salami, lard and butter that was missing from our rations. Owing to the restrictions on exports from the UK in light of the Foot and Mouth epidemic, we were forced to buy certain items at Icelandic prices. Thankfully, we'd managed to freight our sponsored chocolate biscuits and chocolate bars through, in the midst of a disagreement between four government departments about which dairy products were permitted.

First thing the following morning we caught an internal flight to Akureyri on the northern coast of Iceland, to rendezvous with the Twin Otter we'd chartered to take us to Greenland. Our objective was to explore the northern reaches of the Lindbergh Mountains - an area of about 1000km^2 into which no-one had ever set foot - and scale some of the dozens of unclimbed peaks in the region. The Lindberghs are at 69^{0}N 31^{0}W, about 100km inland on the edge of the Icecap - over 350km away from the nearest inhabited place. Remote, to put it mildly.

We had chosen to make the flight directly from Iceland. This pushed the Twin Otter some way past its usual range, so some modifications were required. To lighten the plane, the carpets and most of the seats were removed, and replaced by a supplementary fuel tank (connected to the fuel line by some rubber hose and a jubilee clip!). With the no-smoking signs firmly lit, we flew to Isafjordur for refuelling and then headed north.

1.2 - Arrival

Having flown for about an hour, the pack-ice came into sight below. We gazed at this strange, mottled surface beneath us, but soon had another stunning vista to tempt us as land came into view. Steep 'alpine' peaks as far as the eye could see, interspersed with broad glaciated valleys calving icebergs into the frozen Denmark Straits.

The Arctic was everything we'd expected and more. Turning inland we crossed range after range, skimming the top of Gunnbjorn's Fjeld, before dropping between the peaks to locate the glacier that was to be our home for the next 23 days.

A cheer went up as our kit dump came into view through the cockpit windscreen, and within a few seconds we'd made the heart-stopping landing on the soft snow of the glacier. You could tell by the grins from the pilots that they didn't do this every day.

With one engine still running, we rapidly offloaded the kit, shook hands with the pilots, and within a couple of minutes they were gone. As the plane disappeared from sight, the sensation of being extremely alone really sank in.

Figure 1.1 – Offloading the Twin Otter on the Lanchester Glacier

With the temperature at –8°C and dropping, there was no time to stand around in wonder, so the two days of hard graft setting up basecamp was started. Tents were dug in (including the 22m^3 frameless group tent); food and fuel stores built; and latrines and water harvesting areas established.

These two 30-hour days of preparation also served to flip our body-clocks through 12 hours. We did this to enable us to climb when the snow was at its coldest: hardening the crust and reducing avalanche risk. The down side of this is that you climb in temperatures that (allowing for windchill) can drop below –30°C, and then try to sleep in a tent acting as a solar oven that can rise above +30°C.

All such talk of day and night is largely academic from the point of view of light. That far north at mid-summer sees the sun circling overhead, sometimes dropping low enough to pass behind the higher peaks, but it is never darker than an overcast day in the UK. We didn't take torches – they couldn't be justified in our ridiculously tight weight limits. Neither did we take complete changes of clothing, emergency rations, or virtually any spare technical kit: all were eliminated as being too heavy.

1.3 - Climbing and Exploring

So, with light rucksacks, we set about climbing some mountains – our primary reason for being there. As an unexplored area, there was minimal information on our objectives. We had a 1:150,000 aerial photo taken in 1981; and some very sketchy maps we'd "acquired" from a foreign military source, dated 1968 and repeatedly printed with the disclaimer "*relief data incomplete*". There were no terrestrial photos and there are no guidebooks.

Generally, the done thing was to look at a peak from a few miles away, pick the easiest line and go for it. During the ascent you could then note how most turned out to be much bigger, steeper and harder than they'd appeared. As a rule we avoided the rock, as it varied between small and very loose to large and very loose. Snow faces and

gullies were used, and wherever possible ridges were preferred due to the reduction in objective danger.

There is an exception to every rule, which Ian admirably demonstrated when he fell through a cornice and landed astride the rock ridge beneath. A close call, as had he been three feet to the right, he could have fallen 3000 feet to the glacier below – probably dragging Dominic with him.

After a week of climbing those summits within a day's striking distance of basecamp, we embarked upon various ski-tours to adjoining glaciers. Skiing was virtually essential, as the skis give one sufficient bearing to travel on the snow without sinking through the crust. Walking in heavy boots (as we did on climbs) through 12 inches of loose snow with the crust breaking at almost every step, is a miserable alternative.

In groups of two or three, we took tents, stoves and all the kit to establish advance camps. To aid our travel, we had taken three pulk sledges. These made glacier travel much easier, and enabled us to take much heavier loads than we could carry on our backs.

Figure 1.2 – Brian pulk-hauling at the foot of the Lanchester Glacier

One does, however, have to take particular care on downhill stretches, as the pulks can suddenly provide a significant impetus from the rear. Controlling this un-braked "trailer" can be a bruising skill to master, particularly when free-heel skiing in lace-up boots!

Nevertheless, we made over a dozen remote camps on tours of up to four days from basecamp: exploring most of the Lindbergh range and traversing the crest of the Icecap. This enabled us to make a number of further ascents and photograph the range from all angles. The touring, coupled with only four days of bad weather, assisted us in making ascents of 25 virgin peaks – quite creditable for a team of six in effectively 16 days of climbing and skiing.

1.4 - Environmental Concerns

During our trip, we also aimed to make some demonstrable statements about how we felt mountaineering expeditions should operate in the wilds. We had no wish to add to the ecological disaster areas that accompany many of the world's more popular mountain destinations: waste, equipment and (in some cases) bodies, litter places which were (and should remain) pure and largely inert.

To that end, we undertook to remove all of our waste and equipment. The latter may seem obvious, but in places such as the polar regions, with extortionate transportation costs, it can be cheaper to ditch kit and replace it than to fly it home.

Our commitment to waste repatriation also extended to all solid human waste. When in basecamp we "went" directly into a freight barrel. On occasions when this wasn't in use, a chimney was erected (made from cardboard, gaffer-tape and a bin liner) to enable the faeces to dehydrate, yet prevent the ingress of snow. On the ski-tours we "went" in the snow, left it to freeze, and then placed the offending items in zip-seal freezer bags. We then carried them in the pulks back to base where they were transferred to the barrel.

Our "barrel of joy" was flown back to Iceland, where it festered in an aircraft hangar for a month before shipping back to the UK. After two further overland journeys it made its way to Dorset, where the expedition officer concerned re-hydrated it and divested of it at a sewerage disposal point. Another 'first' for the team.

1.5 - The Return

Alas, all too soon the day came when we had to depart. We waited for hours with our kit packed, playing cards and Scrabble, and listening for the plane. In the Arctic things change – primarily due to the weather - and our pick-up time was far from certain. We were due to be collected on "Sunday or Monday", so there was every chance that we'd have to unpack the tents and stay another night. However, the purr of engines was heard about 3pm, and the Twin Otter landed with its wing *over* our pile of kit. We loaded quickly. Bad weather was forecast and, if we hadn't got out fast, we would have been stuck for four days, plane and all.

The Twin Otter flew us via the Watkins Mountains back to Isafjordur, where our re-introduction to civilisation was phased in gently. Taking our first showers for 24 days was an event welcomed by both ourselves and the locals alike!

We had a few days to kill in Iceland on our return (the weather window), so tried our best to be proper tourists, visiting places like Geysir and the Blue Lagoon. Then it was on to the UK and back to work with a bump: trying to survive not only being indoors, but in 30°C heat. Harsh.

CHAPTER 2 : EXPEDITION TEAM

2.0 – INTRODUCTION

If there was one outstanding strength of this team, it was that all of us had been good friends for a number of years. We all met at Coventry University through the Mountaineering Society (CUMS) in the early to mid 1990s. Regular contact has been retained through the Lanchester Mountaineering Club (LMC) – which is in part the ex-members' club for CUMS – on meets held throughout the UK and in the Alps.

2.1 – TEAM FORMATION AND DEVELOPMENT

2.1.1 – Initial Criteria

No formal team selection took place – it was more a case of putting the word around and seeing who was interested. During early discussions (March 2000) two pre-requisites were established for any potential member:

- Members must belong to the LMC. As it was a Club expedition, any potential team members not already part of the LMC would have to join.
- Members must have at least two seasons of alpine experience. As this would be the first polar expedition for any existing LMC members, we did not feel happy 'carrying' any relative novices. Every team member needed be able to rely on the others having competence in alpine snow/ice to PD, glacier travel and crevasse rescue.

With these basics established, further training could then be sought. About 15 club members had the required level of experience (about one third of the LMC regulars). However, considerations of time, inclination and (primarily) money, brought us to a team of eight within two months of first raising the idea of the expedition. This matched perfectly with our target team size, and so the development of roles then commenced.

2.1.2 – Team Size

Optimum team size for an expedition such as this is dictated primarily by two elements: team dynamics and aeroplane size. At the range we were considering, Twin Otter aeroplanes could carry a maximum of four people and equipment out, and up to nine on the return journey. We felt four people to be too small a number to offer much flexibility from an exploring and mountaineering perspective. Between six and eight people was ideal for this aim and thus eight was selected as balancing both criteria.

2.1.3 – Changes and Reserves

Richard (one of the original eight) dropped out after about a month of his first joining owing to the complexities of getting married during the same year as the trip. His wedding had long been intended to take place in June 2001, and was subsequently arranged to take place at the start of that month – enabling the team to attend before departure on the 24th. By some feat, beyond the comprehension of the rest of the team, Richard secured from his fiancée Claire her agreement for him rejoin the expedition.

This even extended to postponing their honeymoon by a year until further leave and funds were available! How did he manage that?

A few months into the preparations (G -10 months), just prior to the first major financial commitment, two of the team of eight decided that they would step down from the expedition. In both cases the primary reasons were financial and, with none of the other peripheral candidates willing to commit to the trip at that point, we decided to continue with the remaining six – all of whom were fully committed.

Roles were re-allocated, with the sponsorship officer taking over from the departing provisions officer, and the sponsorship co-ordination to be carried out by the expedition leader. The communications officer continued his role in part as a reserve, in close liaison with the leader. Ultimately, considerable overlap between roles was encouraged where personal knowledge, contacts or experience meant that an individual was the best person to carry out a particular task.

Realising the potential for further issues to arise, we secured two reserves. One reserve had the time and money, but didn't yet possess 100% of the inclination; the other had the time and inclination, with dreams of a job move to give him the money. The latter reserve would also have been able to step in if significant external sponsorship was attained, or if a team member was forced to step down due to personal or medical circumstances after making significant personal payments. This was because any late cancellation by a team member under these circumstances would be reimbursed by insurance; therefore the reserve could find themselves with a heavily subsidised trip.

2.1.4 – The Need for Reserve Reserves

The team of six plus two reserves continued with detailed preparations for the next six months, but in February (G -4 months), it became clear that one of the team wasn't going to be able to meet the cost by some considerable margin (i.e. an 80% shortfall). The shortcomings of a 'just in time' payment schedule became rapidly apparent.

With £3,500 to £4,000 still outstanding from this particular member, joining the expedition remained beyond the means of our second reserve, whereas the first had concluded a month or so earlier that the expedition was sorted and had spent the money getting the builders in!

There thus ensued many evenings of long phone calls – initially to existing and former team members who had (most of) the required experience, and subsequently to anyone that any of the team had first, second or third hand knowledge of. We stopped short of placing adverts (in *High*, on web-sites, in phone boxes, etc.), but did give it serious thought.

It proved very difficult to explain in under an hour what was involved, the strategic decisions taken to that point, and to answer all the ensuing questions – a cheap rate telephone should be a pre-requisite for any expedition leader! After speaking with, and sometimes travelling miles to meet, prospective team members we still drew a blank. It wasn't just that other desirable skills included free-heel skiing, marksmanship and intra-muscular injecting – more that anyone who had the time, money and inclination was not sitting around waiting to be asked, but had already got themselves onto a trip.

2.1.5 – The Final Solution

After much discussion and calculation, the five solvent members of the team agreed to loan the sixth member the money to go on the trip. A number of factors brought us to this conclusion:

- The team had worked for over a year towards this goal, and a member change would alter team dynamics significantly.
- The team member concerned had certain areas of expertise, and no other team member (or substitute) was likely to be able to carry out those roles as competently and enthusiastically.
- We had, four months previously, given our freighting agent a commitment that we would go as a team of six, so all costings and logistics were based on this.
- At this stage, up to 80% of costs were fixed and not recoverable if we proceeded as a team of five. They would fall to the five anyway.
- Most of the grants received or anticipated were linked to the team members, and could be reduced/lost if the membership changed.
- The total amount of grants and sponsorship received equated to the shortfall from the individual concerned. If the remaining team members paid in the full £4,500 that would have been required had we received no sponsorship, then psychologically we could view it that we were loaning all the grant and sponsorship money to the sixth member.

Figure 2.1 – The Team (from left to right):
Richard Denison, Brian Coombs, Jonathan White,
Ian Jones, Dominic Matters, John Booth

2.2 – Details of the Team (Correct at time of departure)

2.2.1 – Jonathan White, Expedition Leader, Age: 28

Employer
Carillion Plc. Civil Engineer working in Tender Planning, Wolverhampton.

Expedition Experience
Attempt on East Face (Polish Glacier Direct), Aconcagua, Argentina. Unsuccessful due to coincidence with El Nino. High point of 6000m reached, with three nights at 5900m. Temperatures below -40°C, winds in excess of 70mph.

Alpine Experience
Three seasons: Ailefroide, plus Chamonix twice. Routes included:

• Mt Blanc	Gouter Route	PD-
• Pointe Isabelle	Northeast Ridge	PD
• Petit Aiguille Verte	Northwest Ridge	F+/PD-
• Dome de Neige Des Ecrins	North Flank	F
• Pelvoux	Coolidge Couloir	PD

United Kingdom Experience
Three Scottish visits (Nevis/Glencoe, Cuillin, Rannoch), plus 12 years of year-round walking, climbing, and mountaineering in England, Wales and Ireland. Limited chalk-climbing experience including routes to grade IV at Saltdean and Newhaven. Rock climbing: lead to VDiff, second to 4c.

Other Interests
Also a keen mountain biker and skier, he is chair of the BMC Training Advisory Group.

2.2.2 – Dominic Matters, Treasurer, Age: 25

Studying
A post-graduate doctorate in Protein Immobilisation at Coventry University.

Alpine Experience
Six seasons: Arolla, Chamonix, Ecrins, and Dolomites. Routes included:

• Mt Blanc (twice)	Maudit-Mulets & Gouter	PD & PD-
• Le Tour Noir	Southeast Flank	PD
• Aiguille de Tacul	South East Ridge	PD
• Dome de Neige Des Ecrins	Barre Noir Couloir	AD
• Pelvoux	Coolidge Couloir	PD

United Kingdom Experience
Three Scottish visits (Nevis, Glencoe, Cairngorms), plus ten years of year-round walking, climbing, and mountaineering in England, Wales and Ireland. Rock climbing: lead to S, second to E3. Via Ferrata to grade E.

Other Interests
A regular swimmer and snowboarder, Dominic is chairman of the LMC.

2.2.3 – John Booth, Sanitation Officer, Age: 25

Employer
Disaster Manager based in Dorset, awaiting a return to Africa.

Expedition Experience
Machakos Mountains, Kenya
Mount Untoto, Ethiopia

Alpine Experience
Two seasons: Arolla, plus Carpathian Mountains. Routes included:

• Par de Chevres	LH & RH Routes	PD+
• Aguille de Tsa	East Face	PD+
• Petit Dent de Veisivi	Southeast Ridge	AD-
• Pointe Vouasson	Aiguille Rouge Flank	F
• Mt Blanc de Cheilon	West-North-West Flank	PD-

United Kingdom Experience
Three Scottish winter visits (Nevis, Braemar, Rannoch), plus ten years of year-round mountaineering in England, Wales and Ireland. Limited chalk-climbing experience, including one grade III lead at Saltdean. Rock climbing: lead to S, second to 4c.

Other Interests
As well as caving, John enjoys taking things apart and 'improving' them. He has recently been elected to the Management Committee of the BMC.

2.2.4 – Brian Coombs, Provisions Officer, Age: 28

Employer
Ray Mallock Ltd. Design Engineer for a GTS racing car in the 2001 Le Mans 24-hour race.

Expedition Experience
Attempt on East Face (Polish Glacier Direct), Aconcagua, Argentina. Details as Jonathan White above.

Alpine Experience
Four seasons: Ailefroide, Arolla, plus Chamonix twice. Routes included:

• Mt Blanc	Maudit-Mulets Traverse	PD
• Pointe Isabelle	Northeast Ridge	PD
• Le Tour Noir	Southeast Flank	PD
• Dome de Neige Des Ecrins	North Flank	F
• Pelvoux	Coolidge Couloir	PD

United Kingdom Experience
Five Scottish visits: Nevis twice (incl. 2, 3, & 4 gullies), Glencoe, Cuillin twice (incl. Ridge) and Rannoch. Also nine years of year-round walking, climbing, and mountaineering in England, Wales and Ireland. Rock climbing: lead to VS, second to E2.

Other Interests
A sea-kayaker and kite flier, Brian is a past meets officer of the LMC

2.2.5 – Richard Denison, First Aid Co-ordinator, Age: 25

Employer
Shrewsbury and Atcham Borough Council. Town Planner working in Oakley Manor.

Alpine Experience
Five seasons: Chamonix three times, Silveretta Alps and Pyrenees. Routes included:

• Mt Blanc du Tacul (4 times)	North West Face	PD-
• Le Tour	South Ridge	F+
• Petit Fourche	North West Ridge	F
• Croix de Fer		
• Piz Buin		
• Pic du Midi du Bignorre		
• Gamshorn		

United Kingdom Experience
Three Scottish visits (Nevis twice, Glencoe), plus ten years of year-round mountaineering in England, and Wales and Ireland. Extensive scrambling experience to grade III. Rock climbing: lead to S, second to 4b.

Other Interests
Richard is an active mountain biker and skier, and archivist of the LMC.

2.2.6 – Ian Jones, Equipment Officer, Age: 27

Employer
AWE. Safety Analyst, Berkshire.

Alpine Experience
Five seasons: Chamonix three times, Ecrins, Grindelwald and Dolomites. Routes included:

• Aiguille de Argentiere	W Flank & NW Ridge	PD/PD+
• Pelvoux	Traverse	PD
• Tour Ronde	North Face	AD+/D-
• Mt Blanc de Cheilon	West-Northwest Flank	PD-
• Cima Picolissima	Pruss Cracks	V
• Shreckhorn	Southwest Ridge	D-/AD+
• Piz Badile	North Ridge	D

United Kingdom Experience
Eight Scottish visits: Nevis twice, Glencoe twice, Cairngorms, Storr, Cuillin (incl. Ridge), Rannoch. Also 13 years of year-round walking, climbing, and mountaineering in England and Wales. Rock climbing: extensive leading to E2, seconding to 6a. Chalk climbing to grade III at Saltdean.

Other Interests
He regularly skis and snowboards, and is the current general secretary of the LMC.

CHAPTER 3 : BACKGROUND RESEARCH

3.1 – AREA HISTORY

One amazing thing about Greenland is that, though areas of the coastline have been inhabited for millennia, virtually all the exploration of the interior has taken place during only the last hundred years.

3.1.1 – History and Settlement

Archaeologists believe that Inuit settlement of Greenland took place sporadically between 6000BC and 900AD, with approaches made from North America and Canada by what were originally Siberian peoples. All of these settlements were in the vicinity of what is now Thule in the north-east, and it wasn't until the onset of global warming in 900AD that 'Thule culture' explored further. Within the next 150 years they had spread around the coast of Greenland, establishing a number of seasonal and permanent settlements.

The European 'discovery' of Greenland also took place in 900AD which, following the strong traditions of exploration, was entirely by accident. A Norwegian by the name of Gunnbjorn Ulfsson was blown off-course whilst sailing for Iceland, and reached land at Blaserk near Ammassalik. Realising that he was in the wrong bleak, inhospitable place, he departed for Iceland.

78 years later Snaebjorn Galti fled Iceland with some companions to avoid sentencing for a revenge murder, and arrived at Blaserk. Within a relatively short period of time most of the companions were dead following a spate of murders within the group, and only a couple returned to Iceland.

At roughly the same time, Eric the Red was exiled from Norway to Iceland also following a revenge murder. Unfortunately, in 982, he was convicted of a repeat offence and so skipped Iceland and headed for the as yet unnamed country to the north-east. Moving swiftly on from Blaserk (which he considered "unlucky"), he rounded Cape Farewell and settled about 100km south of what is now Nuuk.

Upon returning temporarily to Iceland four years later he pulled-off perhaps the most audacious estate agent's over-assessment stunt in history, by naming the country "Greenland". He exaggeratedly claimed that it was rich, fruitful and ripe for settlement, and in Icelandic Saga it is recorded that "he called [it] Greenland because it would attract people if the country had a beautiful name".

Colonisation spread along the habitable areas of the west coast, peaking at a population of around 5000 inhabitants, living off both wildlife and domestic animals. Norway annexed Greenland in 1261, which was in turn absorbed by Denmark in 1380. Due to global cooling in the late 13th century, survival became harder and the last recorded event of this age in Greenland took place in 1408. Within a century the colonies had disappeared without trace, though the Inuit survived.

Interest in the country resumed in the late 16th century, in tandem with the subsequent 250-year search for the North-West Passage. Greenland was re-claimed for Denmark under the reign of Kong Christian IV in 1605, and colonisation resumed in 1721. After subsistence farming, the primary industries were those of whaling and fur.

Home rule of Greenland was established in 1979, but the country remains a Danish protectorate.

3.1.2 – Exploration of the Interior

The first icecap crossing was completed in 1888 by Fridjof Nansen, who chose a route between a point at 65°N on the east-coast and Nuuk on the west. Subsequent crossings and coastal explorations between various points of departure and arrival took place sporadically from then on, with interest peaking in the 1930s. Notable expeditions and crossings are many, and up to 1931 included the following:

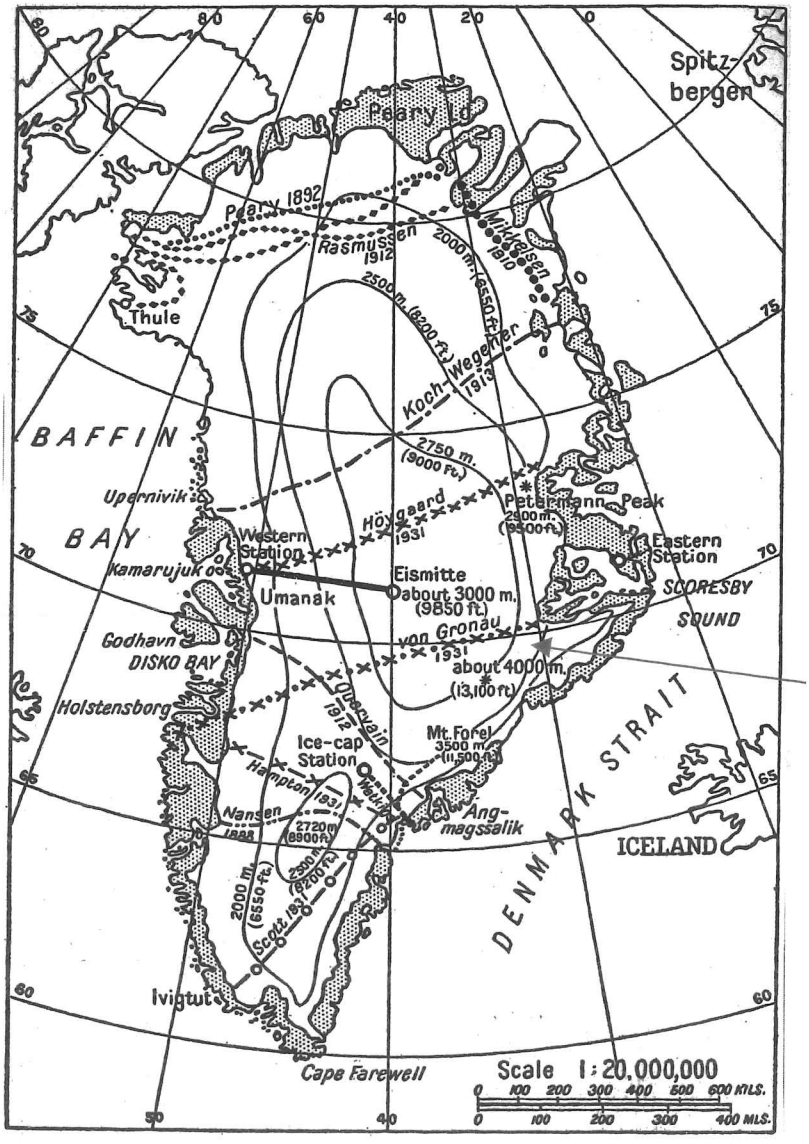


Figure 3.1 – Sketch map of Greenland – Wegener, 1932

The initial "to boldly go" and "for science" mould of objectives that typify most of the early expeditions were broken by the team lead by Gino Watkins in 1931. The British Arctic Air-Route Expedition had, as its primary objective, the goal of finding suitable sheltered re-fuelling points on the east coast of Greenland for the transatlantic sea-plane routes that were then under development.

Most of the work undertaken by the team in this year-long expedition based around Ammassalik was to this end, and included travel by ship, boat, kayak, dog-sled and sea-plane. The latter mode of transport enabled large areas to be viewed for the first time and, though the capture of hard data was limited, such excursions provided the basis for a number of future expeditions.

Other expeditions and pilots - including the American pioneering transatlantic pilot, Charles Lindbergh - also carried out aerial reconnaissance of East Greenland.

During one of Watkins's survey flights, northeast of Kangerdlugsuak and approximately 25 miles inland from the Blosseville Coast, they discovered a plateau range rising clear above the other mountains. They were flying at 10,000 feet, yet appeared to be well below the height of the summits, which would make them the highest in the Arctic.

This discovery of what are now known as the Watkins Mountains proved the inspiration for Martin Lindsay (one of Watkins's team members) to return in 1934 with the aim of carrying out a terrestrial survey to fix a trigonometric level on the highest peak. Except for small, generally abortive forays during Watkins's '31 expedition, none of the 350 mile stretch between Mt Forel and Scoresby Sound had been explored.

The biggest hurdle to exploration of the Blosseville Coast was the pack-ice that only became navigable to ships for a few brief weeks in the autumn. Thus Lindsay's team of three set off from Jakobshavn on the west coast of Greenland, crossed the Icecap and surveyed 'The Monarch' (now re-named Gunnbjorns Fjeld). They then headed south-west following mountains that mark the eastern edge of the icecap, to meet their ship at Ammassalik.

At 1030 miles, with a height gain of 10,850 feet, this was by far the longest unsupported dog-sled journey that had ever been undertaken. It was comparable in distance only with Amundsen's reaching of the South Pole, but Amundsen utilised six food and fuel dumps on the 695-mile outward journey to facilitate the return. Lindsay's expedition did not receive sponsorship from the RGS as it "did not allow a sufficient safety margin".

3.1.3 – The Lindbergh Mountains

Named after Charles Lindbergh, the Lindbergh Mountains lie to the north-west of the Watkins Mountains, on the opposite side of the 15-mile wide Kong Christian IV glacier (KCIVG). The range can most easily be divided into two areas of quite different character: north and south.

The northern Lindberghs consist of four principal mountain chains, running approximately parallel to the KCIVG, with a few easily passable cols linking the distinct glaciers. A fifth chain of peaks runs along the edge of the KCIVG, but there is not a continuous ridge linking them.

In comparison, the southern Lindberghs are far more open, with fewer linked chains and often large expanses of glacier between individual summits or small groups of peaks.

There is also a third group of peaks, approximately six miles to the north-west of the northern Lindberghs. We only became aware of these peaks shortly before departure

following the acquisition of a better map, and have subsequently been able to find no distinct nomenclature for them. They are referred to in this report as the Lindbergh Nunataks, though perhaps are sufficiently isolated to warrant their own identity.

This chain of peaks is 40km long and up to 5km deep, and delineates the edge of the icecap in this area. It is also notable that the icecap to the west of them is approximately 300m higher than the glacier to east; as a result there are a number of spectacular icefalls between the peaks.

Previous exploration of the Lindberghs was limited. The southern area had been explored in the preceding two years, with many peaks climbed primarily by two expeditions. In 1934 Lindsay's team had sledged from the Gronau Nunatakker in a south-westerly direction, to the Prince of Wales Mountains. Despite broad enquiries we were unable to ascertain the precise route. However, the considered opinion of all (bar one) of the Greenland experts we spoke to was that Lindsay's team would have passed about ten miles to the west of the Lindberghs.

Therefore, to the north of the peaks reached by the southern Lindbergh teams in 1999 and 2000, the consensus was that the northern Lindberghs were completely unvisited. However, there remained the nagging doubt that the dissenting member of the MEF screening committee could be correct, and that Lindsay's team might have passed through.

That said, our aim was to make first ascents, and Lindsay's was to survey. Apart from the occasional peaks used as survey vantage points, no others would have been climbed. With our primary objective being to enable at least one team member to make a first ascent, all additional ascents would be bonuses. Furthermore there would be, after all, no shame in a second ascent!

3.2 – ADVICE AND INFORMATION

The best thing about virgin territory is that no one has been there. The worst thing about it is finding information about the place.

Throughout the preparation for this expedition, we were very lucky to receive a great deal of advice from a number of people. We have tried to list the principal advisors in the acknowledgements at the front of this report, but we will attempt a brief résumé here of how we came to go to the Lindberghs. This will hopefully be of benefit to those who are considering 'biting off more than they can chew' for the first time – go for it!

3.2.1 – Our Inspiration

It started in January 1998 when Brian and Jonathan were lounging around the swimming pool of the Hotel Balbi in Mendoza, Argentina, at the end of an unsuccessful attempt to climb Aconcagua. We blamed our lack of success primarily on the weather: due to El Nino, the mountain had seen its worst weather for 25 years. Anyway, enough excuses...

One of the team members had a copy of *High* magazine, and in the Mountain Info section was a round up of the 1997 trips to Greenland. Having just discovered first hand the down side of a single objective, high altitude expedition, we were attracted by the idea of a trip where not all eggs are in the one basket. Sure, if you're unlucky the weather can still pin you down for the entire duration of the trip; but, with multiple smaller objectives, the chances of succeeding with at least one is greatly increased.

Greenland had many positive aspects as a potential destination, not least of which was the proliferation of unclimbed, technically easy peaks. It was worthy of further investigation.

Little happened on this front for the next two years, while careers were nurtured and expedition loans were paid off. In February 2000, fortuitously, Jonathan had just left hospital (minus the screws that had been holding his right leg together for the preceding three months), and convinced Paul and Sharon Raymond to drive him to a BMC Management Committee meeting at Plas-y-Brenin. Amongst the presentations that day was one by Lindsay Griffin, chair of the International Committee, on the BMC supported expeditions of the preceding year.

Amongst many stunning slides of peaks around the world was a selection from trips to Greenland. Thanks to these, and a brief chat with Lindsay afterwards, the spark was re-kindled. Chance (or fate, depending on your beliefs) then played its hand, and on returning home the following day Jonathan opened a piece of speculative junk mail from Tangent Expeditions – their brochure.

After a week of drooling over the pictures, he unstuck the pages and phoned Brian. He'd also got a copy of the brochure, had much the same reaction, and to cut a long story short, was also up for it. The trip was on, and the rest of the team assembled as described in Chapter 2.

3.2.2 – Choice of Destination

Many phone calls then followed with Paul Walker of Tangent Expeditions, the primary source of information on the ranges in East Greenland containing significant first ascent potential. On returning from a week in Scotland (during which the surrealness of meeting William Haig on Ben Nevis, was eclipsed only by a conversation about broken legs with Sir Jimmy Saville in the Clachaig Inn), four of the team called in to see Paul Walker at his base near Kendal.

Here we spent several hours pouring over maps and aerial photos, discussing the relative merits of a number of ranges and the logistics involved in reaching them. From the ranges considered the Lindberghs stood out for a number of reasons, not least of which was the large unvisited area. Difficulty of peaks was also a major issue. We wanted peaks that were not too difficult (ideally alpine grades F to AD), but not so easy as to be ski ascents – as mountaineers we wanted some challenge, but also a reasonable chance of success.

From the (albeit scant) reports by the teams that had been into the southern Lindberghs, the northern part of the range had as much chance of fitting this bill as anywhere. A few weeks later, after discussing with the rest of the team, we confirmed our destination as the northern Lindbergh Mountains.

3.2.3 – Guidebooks

Easy, there aren't any.

3.2.4 – Maps

A somewhat more involved issue. First port of call was Stanfords in Bristol. The best they could offer was an aeronautical chart – Global Navigation and Planning Chart (GNC) No 1. Although providing an interesting view on the world (i.e. looking straight down over the North Pole), at a scale of 1:5,000,000 it was not quite at the level of detail we were looking for.

Stanfords in Covent Garden could only do slightly better, with a poster of Greenland at 1:2,500,000. That appeared to be it on the commercial market.

A conversation with the curators of the RGS map room led us towards a range of 1:250,000 maps that cover the perimeter of Greenland, and on inspecting the index, we were able to identify the maps we needed. Unfortunately, of the 70 odd maps that make up the set, these were two of seven that the RGS had never been able to acquire. Their belief was that they had never been made. Stanfords gave much the same response.

At that point we resigned ourselves to not having maps of our destination, and though it would have been desirable to tie-in our location at a sensible scale, the aerial photos obtained from the Danish Polar Centre gave incredible detail at a scale of 1:150,000. They would suffice from a climbing point of view.

3.2.5 – JOGs

Some months later we had an example of some of the benefits (other than financial) of applying for grants – the contacts one makes and the fact that 'the establishment' knows what you're planning to do. At the MEF interview, we were told that there were better maps available that those we'd acquired: "the Americans have made some". With no further details than that, we returned to the RGS map room to see if they could shed any more light.

The curators concluded that the panel member must have been referring to the Joint Operations Graphics (JOGs). Compilation of these started during World War Two, primarily because the Allies found themselves invading various countries that hitherto had generally been little visited from a military point of view. Mapping standards around the world varied considerably, and to provide a degree of consistency (and in some cases any maps at all), the Allies set about mapping the world at 1:250,000.

We were advised that the base information was in the most part drawn from existing surveys, and in general the copyright on the data remains with the original information source. In most countries this is the respective national mapping agency. Some countries that had previously poor or non-existent mapping have converted the JOGs to civilian maps.

Being military maps, the actual JOG range does not, of course, officially exist. The only loophole in international law whereby a civilian can gain access to a JOG is via the US Freedom of Information Act. If one can convince one's Senator that one has genuine need for a copy, the Senator could, if so inclined, approach the Pentagon on one's behalf.

Despite having drawn up the original index for the JOG range during World War Two (to enable the series to be produced), the RGS had never been able to get hold of copies (through official channels). As six British 'lads' attempting to get copies, they gave us the reference numbers of the applicable maps, and wished us luck!

Luck it was that came our way three weeks later. Completely out of the blue, under cover of a simple compliments slip, was posted the following:

> *"Ref bid to Gino Watkins Trust. There is a better map than 1:1M. Copy enclosed with my compliments. Best Wishes, ..."*

And there we had them: a pair of numbered maps, bearing the US Dept. of Defense crest, that enabled us to tie-in our aerial photos to the icecap and surrounding ranges in a way we had not previously been able, despite a year of trying. The gentleman who sent us these has (for understandable reasons) asked to remain anonymous, but we would like to extend our thanks once again. Our receipt of these maps had a direct influence on where we skied and what we climbed.

Not only did they give full coverage of the Lindberghs, but they showed the full extent of the Kong Christian IV glacier; the Watkins Mountains and Ejnar Mikklesens Fjeld to the east; and the Lemon Mountains to the south west. The coastline from Watkins Fjord to Vedels Fjord was shown and this added greatly to the flight in, as we were able to follow our progress and identify the various peaks and glaciers. It is also worth noting that the pilots were also interested in the maps, as they had not seen that level of detail before.

It was with a pinch of salt that we used these maps, as the detail is far from comprehensive. The repeated use of the phrase "*relief data incomplete*" was confirmed in that we have now seen (and climbed) a number of 2500-3000m peaks that are not on the maps at all. Our provider's cautionary advice to use the maps more as 'a basis for discussion' was well given.

The most significant discovery on these maps was the Lindbergh Nunataks. At only ten miles from our base camp, these were accessible in half a day by ski and, from the point we received these maps, our plans were extended to include a visit to this group on the very edge of the icecap. This would not only enhance the exploratory element of the trip, but also satisfy the concerns of one MEF panel member, who felt we might run out of things to do.

3.2.6 – Aerial Photographs

For the benefit of anyone who hasn't discovered the full potential of aerial photogrammetry, you are strongly advised to gain access to a stereoscope. This is essentially an arrangement of lenses and mirrors that align your eyes over the same point on corresponding overlapping aerial photos. Your brain does the rest, and what you see (rarely immediately – it takes some perfecting) is what appears to be a 3D model of the subject matter.

For stereoscope virgins there are usually a few moments of disappointment until they get the eyepieces correctly aligned. There then follows an exclamation such as "gosh, that's quite amazing", or perhaps a fractionally less refined equivalent. From looking at this virtual relief model, we were able to assess the easiest lines on the mountains, and have a good idea of which cols between adjoining glaciers were likely to be passable. No map, however good, will be as effective as a 3D model.

Stereoscopes are not cheap – £800 to £1500 as a ballpark figure depending on the model and optional extras. Fortunately, some survey suppliers stock them and will hire them out at very reasonable rates. Topcon (UK) in Cardiff lent us a brand new one free of charge for the best part of three months prior to departure, and gave us a pocket stereoscope (100g) which we used at base camp. The latter was quite effective, but because of the direct viewing, it was necessary to cut one of the photos into strips to give the necessary overlap.

Another source of stereoscopes could be university Civil Engineering Departments. Most will have a number of them sitting in cupboards gathering dust for 49 weeks of the year, and may be happy to loan one to a scrounging polar explorer – particularly if you are a former student of the establishment.

3.2.7 – Satellite Imagery

A further note should be made here on the subject of satellite imagery. We had attempted to acquire copies of the Russian/Soviet satellite images of the area. They are said to be excellent, particularly for glaciated areas, as they often provide the best impressions of underlying crevasse patterns. Dave Garbett at Scott Polar did try to access copies on our behalf, but unfortunately was unsuccessful.

CHAPTER 4 : CONTINGENCIES

4.1 – INSURANCE

4.1.0 – INTRODUCTION

Believe it or not, as with many other aspects of this trip, insurance requirements for Greenland are a little out of the ordinary. Full details can be obtained from the Danish Polar Centre (DPC) web-site, but outlined below are the approaches we took - we have tried to cover the issues that we feel need to be considered when selecting expedition insurance.

If you glance over this section of the report, then glean at least the next sentence and bear it in mind when selecting your own insurance:

!!!READ THE SMALL PRINT***!!!***

As everyone will advise, in the world of insurance it is very much a case of horses for courses. There are some fantastically cheap travel insurance policies around, such as those you see advertised on London Underground hoardings offering annual cover for, in some cases, under £30 per year.

By the time anyone gets as far as planning a trip to Greenland and reading this report, one would hope that all have at least some mountaineering/exploratory experience and have grasped the difference between holiday insurance and expedition insurance. The former may be much cheaper, but will almost certainly exclude dangerous sports such as mountaineering, so will be of little use.

Only by reading the small print will you be able to tell what is covered and excluded, and only then can you make a genuine comparison. Insurance falls largely under two headings: personal and equipment, and thus the two elements will be covered separately

4.1.1 – PERSONAL INSURANCE

For comprehensive insurance advice, see *Insurance for Expeditions* by John Berridge and Mark Whittingham – a seven page leaflet available from the RGS Expedition Advisory Centre. This lists a number of expedition insurance providers. The two we looked at in detail are described below.

4.1.1.1 – BMC Insurance

Our starting point was the mountaineering standard: the BMC insurance policy. The associated *BMC Travel and Activity Insurance Guide* lists five basic policy options, each of which has a range of cover durations and bolt on cover extensions. Not surprisingly, for Greenland you will need the highest policy 'SunPeak', covering climbs and expeditions to remote, difficult and high altitude peaks anywhere in the world.

BMC insurance is one with which all the team members were familiar, having used it on numerous previous alpine trips and expeditions. The BMC have a reputation of providing quality cover i.e. if you're in trouble, they'll get you out of it. They are also aware (probably better than anyone else) of the nature of mountaineering and

expeditions, and thus can provide all the backup you're likely to need. It was also borne in mind that insurance is an important income generator for the BMC and, if given little choice between policies, to take that of the BMC will put some money back into mountaineering.

One team member had first hand experience of BMC cover in operation a few years ago when his then girlfriend broke her leg on the Argentiere glacier in the Mt Blanc massif. Following the initial rescue, hospital arrangements, return flights and transfers for the injured party and companion were arranged and paid for by the BMC, and both praise highly the standard of service.

The principal limitations of the BMC insurance are in the area of search and rescue, details of which are given below.

4.1.1.2 – Govier and Ault Insurance

We also examined the Govier and Ault "Treks, Expeditions and Safaris Travel and Insurance Scheme", which came recommended by one of our contacts and has been used previously on a number of trips to Greenland. We had no personal knowledge of this policy, and did not encounter anyone who had independent personal experience of it being to the test.

The policy did appear to cover most of the general items under the BMC insurance at similar levels, but did not have such an extensive range of bolt-ons. A detailed comparison of the cover is not provided here, as policies change year on year and it is important to make the correct comparison. We would advise starting with the *BMC Travel and Activity Insurance Guide* which lists clearly the cover provided, and compare any other policies directly to it.

The Govier and Ault policy was certainly cheaper than that of the BMC, but had some key exclusions. Of concern to one of the team was the exclusion of cancellation cover for the leader (section 4), but primarily it was the soloing clause that was the major limitation (exclusion 5). Although the team had no specific plans to climb solo, we felt strongly that the decision on when to rope-up should be a mountain/glacier safety decision only, and not influenced by insurance concerns.

4.1.1.3 – Search and Rescue Capabilities and Costs

This is perhaps the major aspect to be considered when visiting Greenland compared with other destinations around the world. Although there are other places that are more remote, most of these do not have developed/any search and rescue capabilities. Therefore in such places there is little point in insuring oneself to the eyeballs, when there is no one other than the team you are in to affect that rescue. The £20,000 standard SAR cover provided by the BMC and others is ample for most places where the facilities are available. However this is not the case in Greenland.

There are a number of helicopters and ski planes that operate around Greenland, linking the remote communities and carrying the small but increasing number of tourists that visit the country. In the event of a team requesting a rescue, any of these aircraft could potentially be called upon to assist by the DPC who would co-ordinate any actions needed upon receipt of an EPIRB signal.

At over 300km from Scorsby Sound and Ammasalik, the Lindbergh mountains are about twice out of range of the available helicopters. To reach there a helicopter would need to fly halfway out with a payload of fuel drums, deposit these, return for more, and fly out to the Lindberghs. It would then re-fuel from what it was carrying, pick up the party to be evacuated, fly back to the fuel dump, refuel from these barrels and return to the start point. In comparison, an adapted Twin Otter can make the return flight in one, so is very likely to be the chosen method of transport.

From advice received, straightforward rescues in a remote mountain area in East Greenland appear to have cost in the order of £10,000 to £15,000. However, bear in mind that Twin Otters can only land in clear visibility, and are generally not sitting around waiting to be called. Consider the following nightmare scenario.

> *19 Japanese tourists are about to be flown around on a sightseeing tour from a remote airstrip in Greenland, but you call for a rescue. Whilst the plane is coming to get you, the tourists must be put up in their hotel for extra nights, plus be given compensation for the cancellation of their tour and other events they cannot now get to. The plane is delayed due to bad weather for three days, both on the way to rescue you and on the way back to pick up the tourists. As a result, the tourists miss their flights back to Japan.*

It is possible to understand that £20,000 or even £50,000 may not be sufficient to cover the full costs of the rescue, particularly if a search element is required that perhaps requires more than one aircraft.

4.1.1.4 – Search and Rescue Cover

The DPC require the following minimum cover:

- DKK 1,000,000 (approx. £100,000) overall for a team inside the national park and for certain other activities including icecap crossings, or
- DKK 500,000 (approx. £50,000) overall for a team outside the national park (areas such as the Lindberghs)

The above must include:

- DKK 280,000 (approx. £28,000) per participant

The Govier and Ault policy does not specifically list the amount insured for SAR, but 'helicopter rescue' is covered under the £2.5m medical and other expenses clause.

The BMC offer two means of satisfying these requirements, neither of which are explained in the insurance guide – further documentation is provided by the BMC upon request. In either case, the insurers (CGU) will indemnify the DPC up to the requirement.

- The first option is that the insured takes out no extension to the insurance, and carries the risk of having to pay for those costs over and above the £20,000 standard cover.
- The second option is an extension to the SAR cover incrementally from the £20,000 basic per person to a maximum £50,000 per person.

In either case, CGU require the expedition leader to sign to say that he/she will reimburse in full all amounts not covered by the insurance within 30 days.

Should two people require rescue then a 'pot' of £100,000 would be available, but there are clearly scenarios where an individual could require SAR from the Icecap or National Park and have insufficient cover – with a shortfall to the tune of £50,000.

4.1.1.5 – BMC Fatality Limitation

The most significant failing of the BMC insurance was the wholly inadequate limitation of £5,000 for the recovery of a body. As a result, in the event of a fatality, no rescue could be called for. The body would have to be recovered by the team to base camp, to await the chartered return flight. Any rescue call for a fatality would have left the leader personally responsible for the shortfall in the insured amount, as per the details above.

This point, and the means of dealing with it, was agreed by the team prior to the insurance being taken out. The potential psychological effect on the team of having to share camp with a corpse for perhaps weeks longer than necessary was discussed. Though we agreed that decisions on actual activities could only be taken at the time, the option remained for the rest of the team to do more than just 'sit around waiting'.

This was conveyed to all immediate next of kin, but it is fair to say that discussing the subject was not welcomed by all.

4.1.1.6 – BMC 'Strings Attached'

It is noted that it is a requirement of BMC insurance that the insured are members of the BMC. All were via the Lanchester Mountaineering Club, plus some also as individuals. Only one potential problem arose here, in that LMC membership lapsed during the expedition. Thus those using it as the basis for their insurance needed to re-join before departure (a point conveyed to all).

One team member did not renew before departure, leaving the leader personally responsible for all costs should that member have required SAR during the second half of the trip. This only came to light after our return, and to say that the leader is livid is to put it mildly.

4.1.1.7 – Choice of Policy

Despite all of the above, we chose the BMC policy as it did offer the best cover for living team members. Variations included alterations to both the dates and duration of the trip, brought about by the linking-in of flights by our transportation subcontractor. The only charges made by the BMC were for the extension of cover required for the greater period out of the country.

When taking out insurance nine months or more prior to departure and using a transportation subcontractor, this flexibility is essential.

4.1.1.8 – Policy Details

SunPeak, Territorial Limit 3, Hazard Category 5, Period 38 days

Extensions – personal possessions to £3,000
Cancellation to £3,000
Rescue & Recovery to £50,000

Total Cost: £262.50 per person

We are currently working with the BMC to improve the level of cover available. Fortunately, we had no cause to put the insurance to the test.

4.1.2 – EQUIPMENT INSURANCE

4.1.2.1 - Introduction

Equipment insurance can be divided into two sections in line with the timing of travel to and from Greenland. The equipment that an individual takes out from the UK with them on the international, internal, and Twin Otter flights is covered by the personal possessions element of the personal insurance as described above.

We also had a considerable amount of equipment and food (c. 275kg) that was freighted to Iceland in advance of the team, and deposited on the glacier three weeks before our arrival. Much of this kit also returned by freight approximately one month after the team had returned.

It was therefore necessary to insure this equipment (which included hired kit) for the time during which it was unaccompanied. The schedule of coverage requirements as submitted to prospective insurers is listed in Appendix 3. We noted that all dates were approximate, particularly those where Twin Otter planes were used, as they are only flown in good weather.

4.1.2.2 – Detail Issues

Both insurers we approached asked for a list of the equipment to be insured, with the corresponding value and age of each item. Although time consuming, this was not a major problem as the equipment spreadsheet (see Appendix 4) was adapted to include this information.

However, this meant that when our skis were erroneously carried back by Air Iceland to store in Akureyri with the rest of the freight, they were uninsured from that point on until collected in the Lake District. Fortunately, no mishaps occurred. We also had a last minute change with the radio and EPIRBs, in that they were delivered to the team in the UK. This meant that they had been needlessly insured for freighting, and were not covered within the personal possessions insurance of the team during the outward journey.

4.1.2.3 – Selection of Insurer

Two insurers were approached: Perkins Slade (BMC Insurers) and the Markfield Group. The former rapidly lost interest after initial discussions, but the latter arranged cover with Norwich Union with minimal fuss and no quibbles about the varied methods and imprecise timings of our transportation. The premium was £210 (incl. IPT), which we note as less than the amounts quoted in reports by many previous teams.

Teams should note that despite its title, All Risks insurance has a number of exclusions, the only key one affecting us was the exclusion of food and drink from the cover. Some risks you just have to carry yourselves.

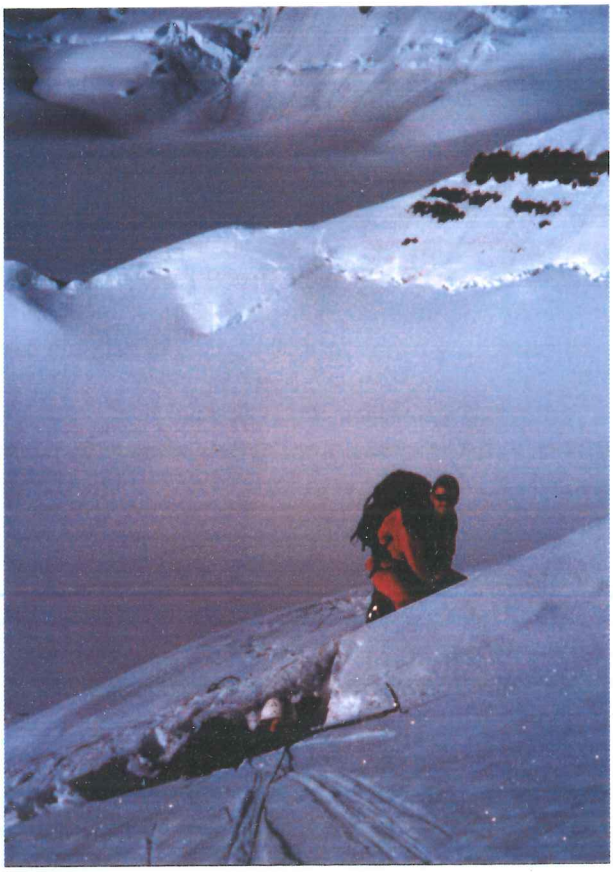


Figure 4.1 – Brian (kneeling) and Ian (taking pictures) preventing Jonathan from falling any further into a crevasse, on the abortive first attempt at Qaqaq Cater

4.2 – COMMUNICATIONS

The communications for the expedition can split into two main categories: internal and external:

4.2.1 – Internal Communications

It was decided that we only needed to communicate between climbing groups if there was an emergency. Before a group set out they would explain exactly where they were going and when they would be back. If a party failed to return they would be given an extra 24 hours before the others went to look for them, and one team member would stay at base camp in case the missing group returned.

We investigated flares, mirrors and radios as a means of internal communication in the event of an emergency. None of these two options were ideal, but after a long debate we decided that flares were preferable.

The benefits of radios are obvious in that they permit you to talk between groups. However, the small hand-held type under consideration were rejected because they need to have line of sight between users, and the range of them was only a kilometre or two at best. Radios also require batteries, which perform very poorly in sub-zero temperatures and have a habit of going flat just when you need them most.

Signal mirrors were lightweight, with no moving parts or batteries, and would enable the one member of the team who took a shaving kit to preen himself of an evening. On the down side, they were breakable, required line of sight, and none of us knew Morse Code.

Flares were taken, primarily as they would double as our secondary polar bear deterrent (see section 6.3), thus saving weight in other areas. They were also not heavy in themselves and easy to use. On the flip side flares would only be audible over short distances, requiring a sighting thereafter. We settled on one set of eight mini-flares for each pair as ample for most scenarios, plus fitting within weight and cost constraints. See Appendix 2 for our Emergency Plan.

Figure 4.2.1 – Stocktake at Basecamp

4.2.2 – External Communications

We took two EPIRBS (Emergency Position Indicating Radio Beacon): one which transmitted on 121.5mhz and the other on 406mhz. These send a line of sight SOS and homing signal which would be picked up by passing aircraft – fortunately Greenland is on the flight path from Europe to North America. The message would then be relayed from the plane to Air Traffic Control; on to the DPC and ultimately to Iceland from where a rescue could be mounted.

We looked at taking a satellite phone or a high powered radio, but these were rejected due to cost and weight.

An Emergency Plan was written for use in the event of an accident (coupled with the Communications Plan – see Appendices 1 and 2). The rescue party could take up to four days to reach us depending on the availability of aeroplanes and the weather conditions. Therefore, self-sufficiency and first aid was essential (see Chapter 8).

We had support team members in Iceland and in the UK who acted as contacts in the event of an emergency. They undertook to keep their respective mobile phones on (and charged!) for the duration of the trip, and to keep copies of the Communications Plan with them at all times. Copies of the Communications Plan were also sent to the nominated next of kin of each team member.

Figure 4.2.2 – Preparing for bed

CHAPTER 5 : WEIGHT AND OTHER HEADACHES

5.0 – Introduction

Quite simply, this was the one of the biggest issues of the whole trip. Back in the distant past when we were at university, when looking through gear catalogues, we often thought that the weight in grams placed next to the price was a pointless inclusion. Not any more...

5.1 – The Gravity of the Situation

The potential payload of an aircraft is a variable. In this case it is calculated thus: it must be such as to enable the aircraft to take off with full fuel tanks and cargo; land at our destination; and return with enough fuel to reach Iceland, land safely and refuel. However when this variable has been calculated for a journey it becomes a fixed constant. Overloading a flight will cause it to run out of fuel before it reaches its final destination on the return leg. Therefore, after calculation, the payload is fixed, but some of the team did suggest innovative ways to increase it – hacking bits off the aircraft to make it lighter was one of the best!

An added issue on calculating payloads on Arctic flights is that of the pilots' survival kit. On both of our flights the pilots had with them a full base camp, so that if they did get into a sticky situation they would have with them the means of survival. This meant that our load on the flight out had to include the aircrew, their emergency gear, and the fuel to get us there and back. We got left with the remainder, to include the six-team members, plus our gear for the duration of the trip, food and cooking fuel.

As far as the charter company was concerned, we could take as much gear as we wanted so long as it was sent in batches that equalled, or were less than, the payload maximum. More weight meant more flights and more profit for them, but with return Twin Otter flights costing around £5000, our budget meant the number of flights had to be minimised.

Objectively, our issue with weight was really an issue of budget. Our budget was small and inflexible and so we had to fit the expedition into the flights we could afford. In a perfect world we would have been able to choose our gear, then fit that gear into the requisite number of flights.

5.2 – Weight Considerations

As explained in Chapter 6, our equipment was broadly split up into group and personal kit: group kit was used by the team and included tents, stoves, climbing kit and first aid equipment; personal kit was used by individuals (clothing, skis, boots, rucksack, etc.). We didn't realise just how restricted our weight limit would be, and so initially all members were given a free hand to select as much personal equipment as they wished. This selection was largely based on our alpine climbing experience, and each of us came up with a long list of creature comforts to keep us warm and entertained during rest days. As for group equipment, our initial lists were extensive principally because of the uncertainty of the climbing conditions, and the weather that we may

encounter. Also, we were very aware that we were going to a remote location and could not visit any shops for the duration of the expedition.

An example of the compromises we had to make is that our initial climbing rope requirements were six 9mm and two 11mm ropes, but in the end our weight allowance meant that we took only two 9mm and one 9.8mm! This left no back up rope in the event that one got cut or left behind on an abseil. It also meant that, as we climbed in three pairs, two of the groups had to use a half rope (i.e. ordinarily designed to be paired with a second rope for more technical routes).

Similarly for rock protection, our initial lists included three sets of rocks, four extenders per person, a selection of pitons and three sets of hexes (size 7-9); but in the end only one set of rocks and two extenders per person were taken. As it turned out our limited rock protection wasn't restrictive, as all the rock we encountered was monumentally awfull and not solid enough to provide reliable belays.

More useful protection was ice screws – we took three screws per person giving six per climbing pair (four for the belay stances and two as running belays per pitch). Other snow protection worth their weight were the aluminium snow stakes, which proved useful protection in soft snow as well as additional tent anchors. Two deadman snow anchors were taken, but due to snow conditions they were of limited benefit. Without doubt, the most used (and most reliable) anchors were T-Axe belays – employed both at belay stances and occasionally as running belays. The down side of this is that you rapidly run out of axes, and on more than one occasion belayers buried their rucksacks, tied into them, and belayed team members and pulks over steep cols.

Throughout our preparations, Ian spent a significant proportion of his time in the company of a set of digital scales. Some outdoor equipment retailers were quite bemused as he would set up the scale on their counter and proceed to weigh a selection of items to be bought for the expedition! Choosing equipment on the basis of weight rather than durability or cheapness was a new concept to many of us.

Successive team meetings became more strained as it dawned on us all that we were going to be very limited on what we took. Reductions in group kit, although painful, were at least fair. With personal equipment it was trickier. For example, Jonathan's clothing and boots weigh significantly more than Dominic's (Jonathan weighs 100kg and has size 13 feet in comparison with Dominic at 63kg and size 8 feet). A reasonably amicable agreement was reached when we were all allocated a target weight of 27kg per person.

By way of illustration, below is just some of the equipment that we had initially planned to take, but had to ditch in order to keep our total load within the weight allowance:

Two-man tent	Five climbing ropes	Toilet seat
Two way radios	Alcohol	One snow shovel
Folding table	Spare pairs of boots	Spare clothing
Spare food	Bad weather marker flags	Folding chairs
Spare gloves	Avalanche transceivers	Zargski shelter
Avalanche probes	Body bag	

5.3 – The Weight Accountancy Solution

In the early planning stages we had no comprehension as to the magnitude of the weight limit's implications, therefore the initial approach of our equipment officer was to choose the equipment we needed and total the figures with a calculator - simple and, if you don't make a mistake, effective.

However, as time progressed it became very apparent that a more comprehensive tool was required to keep track of all the equipment and weights for the expedition. The solution came in the form of an Excel spreadsheet.

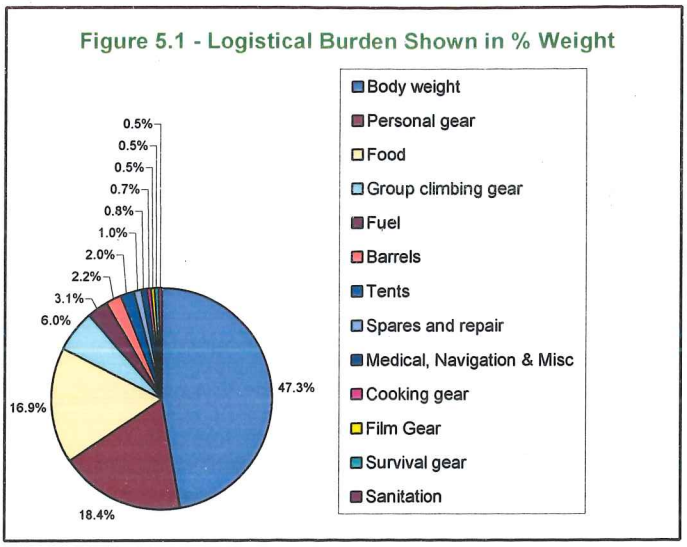
Jonathan built the spreadsheet then passed it over to John, who ran and developed it as required. As alterations and additions were made on a daily basis it soon obtained the name "the mother of all spread sheets" between team members (particularly those who, every couple of days, had to download it from their email accounts).

The spreadsheet was the only route available for us to be absolutely sure that we would not be overweight – if we were then we would incur the financial penalties of paying for an extra flight (and this has occurred in the past). Everything was weighed - from fleeces to jackets, climbing kit to cooking equipment, and even toilet rolls, tooth brushes and underpants - and each item entered into the spreadsheet as either group kit or personal kit, with various subdivisions thereafter.

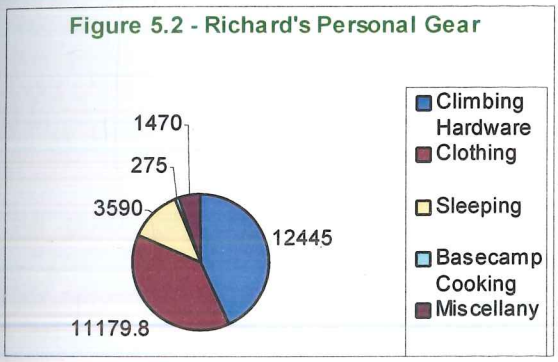
This enabled John to keep recording who was over or under the limit and what equipment hadn't been weighed and accounted for – with each team member being under the watchful eye.

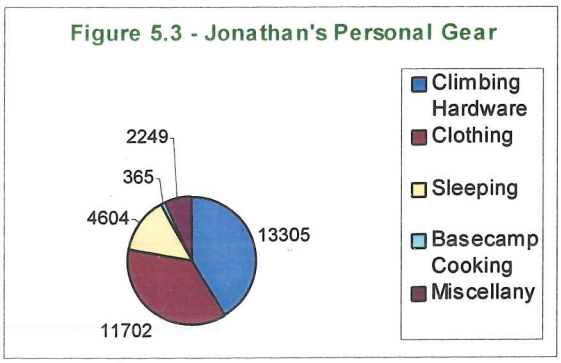
At some team meetings the dreaded Excel spreadsheet would be brought along on a laptop, so that all could see at first hand how a small adjustment in kit on one area would affect the plane's weight limits. Although complicated, this spreadsheet saved the expedition from exceeding the weight limit because it enabled us to see both individual weight limits and their method of transport out to Greenland. This latter point was significant, as we had arranged an initial equipment drop onto the glacier three weeks prior to our arrival. We needed to keep close track of what equipment went as part of this drop and what accompanied us.

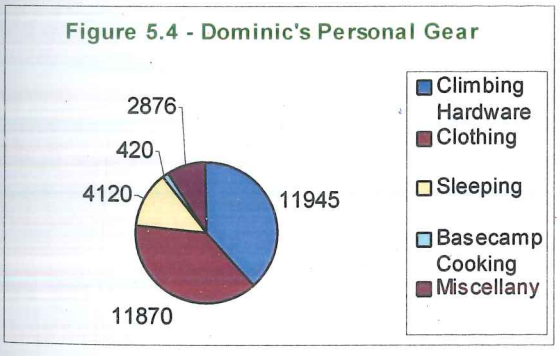
By far the largest contributing factor to weight on the expedition was the members themselves. Realistically, choosing the lightest pair of socks is going to make a small difference compared to what can be achieved by losing a bit of weight.

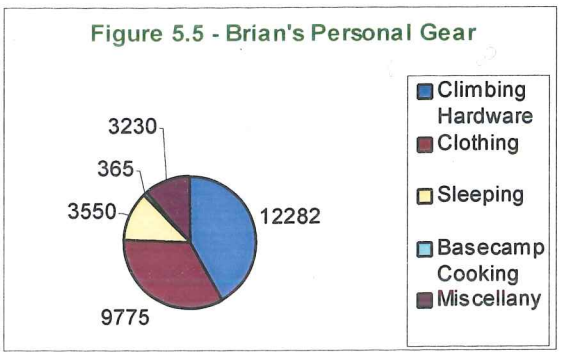


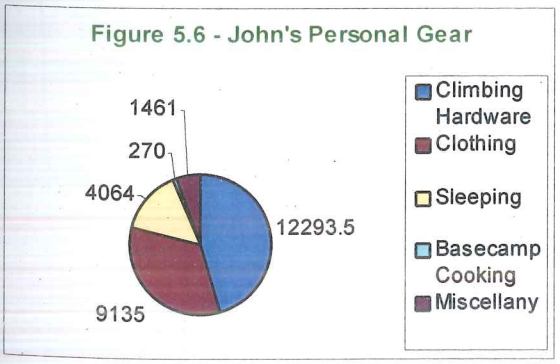
It is interesting to note how large differences in an individual's weight (and size) made little difference to the weight (grams) of the equipment (and type) taken by team members:

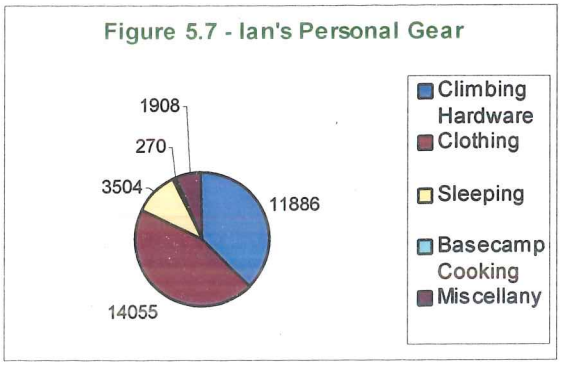












It is easy to lose sight of the safety implications of our weight limits. We took no spare tents, ice axes, ropes, sleeping bags or harnesses. We had a very limited amount of spare warm clothing for when conditions became really bad. In the event of loss or breakage of some equipment, we considered we had sufficient in reserve to survive, but certainly not to continue climbing and exploring. There is a fine line here that we managed to hit – through a combination of experience, hours of kit discussion, choosing the lightest equipment possible and lastly, of course, a certain amount of luck!

5.4 – The Incentive Scheme

Our elements of the plane payloads were split into three parts as described above: personal equipment, group equipment, and bodyweight. The latter had been declared at G-8 months when, it is fair to say, none of the team had grasped just how tight the weight limits would be. Being vain individuals, most of us declared our weight at the most flattering time of the day: first thing in the morning, before getting dressed and after visiting the lavatory. Consequently, the post-Christmas weigh-in proved to be rather alarming.

With the equipment weight allocations set, team members were forced to try and fit their personal requirements into the 27kg as mentioned above. To varying degrees, none of us managed this (it is noted that the smallest person had the biggest excess). This problem, coupled with the fact that bodyweight was by far the biggest variable, caused us to instigate drastic measures: the incentive scheme.

The personal weight allocation for each individual consisted of 27kg, plus their bodyweight as declared some months previously. If anyone wished to take more kit, they would have to lose bodyweight, or conversely if someone was overweight, they would have to leave some of their personal kit behind. Drastic, but effective.

During the final three months of preparation most of the team members engaged in crash diets, with one losing 8kg prior to departure. Hardly the best preparation for a polar expedition, when one would normally be looking to build up the fat reserves. Some team members did experience digestive difficulties in the first week in Greenland: having moved from a minimal-fat, sub 1000 calorie per day diet to a high fat 4000 calorie alternative. If anyone is considering crash dieting in advance of an expedition, we suggest that it is curtailed a couple of weeks before departure, and the increased fat intake gradually introduced.

We did receive a final partial reprieve on the weight issue: we were advised by our freighting agent that there was room to get a bit more onto the first flight. Unfortunately, this was on the same weekend that we were to drop the freight off, and some of the team had already left home to drive to the packing venue. Nevertheless, some of the team were able to collect additional items for inclusion, and we were able to take advantage of an additional 20.35kg.

5.5 – Transport Logistics

As mentioned above, we started to use the spreadsheet to keep control of the logistical effort involved in transporting the expedition from Britain to Greenland. As we started to build up lists of equipment in each stage of the logistical chain we began to see the reporting limits of Excel, and so started running the spreadsheet through an Access database. By using these tools we could see how we were maximising each of the opportunities to transport equipment. This was important, as we had a number of logistical paths and only one chance to get it right.

Some of the details addressed to ensure the expedition reached Greenland were:

- An initial equipment drop – which included food, climbing kit and tents – was sent by our freighting agent and arrived on the glacier three weeks before the team arrived.

- The hired EPIRBS, emergency radio and flares were to have been collected in Iceland. However, five days before departure Jonathan found that the radio and EPIRBS had been sent to his address in Wolverhampton. Our agent also informed us that he was unable to supply the emergency flares. These were our crisis communication tool and back-up polar bear deterrent, so had to be sourced in the UK at short notice. All of these items were thus added to our excess baggage for the international flight.

- The international flight from Stansted to Keflavik included team members and the full use of our hold baggage limit. We intended to transport the skis as excess baggage, but were lucky enough to confuse the check-in desk sufficiently, and they eventually waived any additional payment. Included in this flight were our emergency flares: the transport of flares on a domestic flight is controlled in the same way as the shipment of firearms. At the departure lounge in Stansted we watched our cargo bags go through the security-screening machine. The sensors picked up the flares and the operator immediately asked what they were. One of our support team (in her perfect Irish brogue) stated: "are they kite handles?" To our bemusement the bag containing the flares passed its initial security check, with the team wondering if it was that simple to defeat airline security. However, as the luggage came through the carousel at Keflavik it was obvious that the bag had been opened and thoroughly searched.

- In Reykjavik we purchased the high risk 'FMD' food to add to the equipment which had left Stansted and then moved to Akureyri via the city airport. At the guesthouse in Reykjavik we all left some clean clothes for the post-expedition party week.

- In Akureyri we collected our fuel, rifle and ammunition. The fuel was SBP, which must be the Icelandic equivalent to white gas. However, SBP is sold in paint tins and this required it to be poured into more durable 5-litre petrol cans for the flight. The atmospheric transference of fuel within an airport contravenes a number of international air safety regulations, so a suitable transference location was found.

- Everything was loaded onto the Twin Otter and we flew to Isafjordur where we were due to store our travelling clothes, but when we arrived it was clear

there was nowhere to store such things, so we kept them with us. After refuelling the plane by the use of a hand pump – apparently the chef in the departure lounge had broke the electric system the previous day – we took off to Greenland.

- Just to give the reader some idea of how close we were to the maximum cargo of the Twin Otter, the airline removed all the unnecessary weight from the cabin: this included all the spare seats and the carpet! They then strapped a large green fuel tank onto the cabin floor and connected it into the aircraft's fuel line with a rubber hose and a jubilee clip.

- With the weight limits in mind, the team had gone without food since breakfast and visited the toilet a number of times to reduce the cargo further still. Halfway through the flight we were beginning to feel rather hungry – knowing that we were on the exact maximum of the cargo limit made us assume that there was no trolley service on the flight. Thankfully, at a point just over the coast of Greenland, one of the pilots left the controls, lent over the in-cabin fuel tank and served a light evening repast - in the form of cans of Coke and assorted packets of sandwiches.

Figure 5.8 – Look, no hands!

On reaching the glacier we were able to immediately locate our equipment which had been dropped several weeks previously; it was half buried but marked with a red flag fixed to a bamboo cane. Two team members worked individually to count boxes/barrels and check the pulks, while the rest of the team unloaded the plane. We had to be sure everything was there: if one of the bags, barrels or boxes had gone astray then we may not have been able to continue, due to our total lack of redundancy. Once we were sure that what should be there was, we said goodbye to the pilots and watched the plane take off.

The return paths were simple as all the equipment went back to Iceland on the same plane – it having a much increased payload due to having used half of it's fuel on the way to collect us. The equipment was then either left at Isafjordur, to be returned to Britain via Akureyri and by sea to Immingham port, or was carried home on the domestic flight.

A month later our equipment arrived back to Britain, having been shipped to our freighting agent's warehouse. It was later picked up by Jonathan and Ian and transported to their houses for redistribution back to the team. Loaned equipment was returned, some of the gear was sold and the rest stored for the next trip after being thoroughly cleaned.

Figure 5.9 – Seats and carpet out; fuel, people and kit in

5.6 – And Finally...

We will do one thing differently next time, and that's to start the organisation about 12 months sooner! If we have one tip for other teams, it's this:

*****!!!***START YOUR LOGISTICS NOW***!!!*****

The spreadsheet in Appendix 4 is available in Excel format, plus the database, on the CD version of this report. We hope that this will give you some ideas for developing your own logistics management system.

CHAPTER 6 : EQUIPMENT

6.1 – GENERAL EQUIPMENT

6.1.1 - Introduction

As with all expeditions, decisions on equipment requirements were fundamental to its eventual success. For this reason equipment requirements were very much a group activity.

From the beginning we were aware that weight would be a factor in our equipment requirements. The luxury of a large amount of equipment would result in unacceptable costs for the hire of a second plane to fly it in!

Full lists of the equipment we took to Greenland can be found in Appendix 4. The equipment was easily sub-grouped in accordance with its use. The first sub division was between personal kit and group kit: personal kit consisted of clothing, sleeping kit, skis, axes, crampons, harnesses, etc; group kit consisted of those items that were shared between two or more persons, e.g. tents, ropes, sledges, stoves etc.

As part of the preparation for the expedition we approached several equipment manufacturers with requests for sponsorship or discounted equipment. This involved letters to manufacturing companies as well as retail outlets. As a result we purchased the vast majority of our equipment from The Outdoor Shop near Milton Keynes. The shop provided our equipment at very competitive prices as well as offering some invaluable advice on equipment selection and use. We also purchased sleeping bags and clothing direct from RAB Carrington Ltd. RAB provided an excellent mail order service for our orders as well as friendly customer support.

In describing the equipment arrangements for the expedition, each area of kit will be taken in turn:

6.1.2 – Personal Clothing

Personal clothing requirements were very much left up to the individual. However, most followed the basic layering principal of thermal, fleece, wind/waterproof layers. With temperatures down to -20^{0}C we had to have good hand and feet protection: in this respect most members opted for two pairs of socks (liner and thermal), warm but dextrous gloves, and a pair of mitts. Fleece hat and balaclava were generally used for head warmth – a rollable Panama and a Christie's Fedora were also worn, although some were less than convinced over their thermal efficiency!

Specific notes on clothing items are included below.

RAB Berber Tech Smock
This fibre pile jacket was worn by two team members and highly regarded by both. The jackets provided good levels of warmth, but were also easily vented (via two side zips) when the going was strenuous. They proved so universal that the wearers didn't bother with their waterproof jacket throughout the entire trip. The hood was warm and large enough to go over the top of a climbing helmet. However, there was one feature that was unsuited to this environment: the press stud fastenings on the detachable hood. If you pulled the hood on too hard or tried to remove coils, more often than not the hood would become partially detached which necessitated re-fastening with un-gloved (and

therefore cold) hands. This small point got to us so much that we almost resorted to gluing the press-studs on.

RAB Down Basecamp Booties

One member of the team took these and reported that they were very warm. However, they proved totally impractical to walk more than a couple of steps in. Nice for cosy feet in a tent provided they didn't touch the floor, but it was felt that for true general base-camp use they would benefit from a more substantial sole unit.

Figure 6.1.1 – The Team : today, we be Mostly wearing RAB kit

6.1.3 – Personal Climbing Equipment

Again, choices here were very much left up to the individual. All team members used fully adjustable harnesses so as to be compatible with whatever number of layers we were wearing. Most took two technical axes, although a couple took a walking axe and a technical hammer. Step-in crampons were used, and a spare pair of universal-fit strap-on crampons were taken in case anyone lost or broke theirs.

6.1.4 – Skiing Equipment

The world of ski mountaineering was new to all of us. A few had downhill experience, but we soon discovered that there was a bewildering array of equipment for off-piste skiing. The only free-heel ski kit we could find available to hire for the expedition was leather-booted Nordic kit - Plas-y-Brenin having declined to hire us ski-mountaineering kit on the grounds that the risk of it (and us?) not coming back was too great!

We arranged lessons and practice in the Cairngorms using leather-booted Nordic kit hired from Cairngorm Mountain Sports, but after a couple of days, had failed dismally to master it. We were therefore forced to buy our own ski equipment rather than hire it.

The choice of the particular set up we each had was largely based on cost, equipment availability and personal preferences. Two of us choose ski mountaineering skis and boots (Scarpa Denalis and Titans), three chose ski mountaineering skis in combination with plastic climbing boots (Scarpa Vegas), and one chose to use Telemark skis and boots (Garmont Liberos).

In all of these choices there were compromises. Those who had climbing boots found ski control on steep slopes to be more difficult, but had a more comfortable boot while climbing. Those who had ski mountaineering boots had good ski control, but the boots could be uncomfortable when climbing certain slope angles due to the extent to which the boot went up the calf. We suggest they are a good choice for all but those intending to do the most extreme routes after the ski in, because as well as being rock solid for skiing they provided a good solid platform and gave confidence when cramponing.

The team member who took Telemark skis and boots found them fine for the level of skiing we encountered. However, the boots were a compromise for climbing due to the flex at the toe, which crampon compatibility a tricky affair.

While on the subject of boots, it is worth mentioning the laces on Scarpa Vegas, which would stiffen up like wire cable when they froze. Not only did this make them difficult to tie, but they kept coming undone. All Vega wearers wished that Scarpa dry treated their laces.

Telescopic poles were used in conjunction with the skis. Several team members had top-of-the-range Leki Super Extreme Probe XM poles that could be converted into an avalanche probe, thus saving the weight requirement for additional probes. The baskets on these poles were particularly large and resisted being pushed through soft snow. However, the basket attachment mechanism was criticised by some, because to prevent it from falling off while skiing along it had to be rammed on the spike so hard that it could never be removed again. Richard's baskets were found to be far too small for the snow conditions as the pole would sink through the snow past the basket. He therefore used the spare pair of poles that we had taken.

Figure 6.1.2 – Brian displaying an emergency stop (note the 'Super Extreme' baskets)

6.1.5 – Group Climbing Hardware

Because of our weight restrictions it was very difficult to decide on the type and quantity of group climbing hardware to take out. These decisions were made worse by the fact that we didn't quite know what snow and rock conditions we would encounter. We were given indications that the rock was of very poor quality, therefore we took

minimal quantities of rock protection thinking that we would be sticking mainly to snow slopes colours and ridges. This choice turned out to be a wise one, partially because of the conditions but also due to the technical difficulty of the peaks we attempted (i.e. fairly easy).

For snow protection we took ice screws, deadman anchors and aluminium T-stakes. The ice screws proved useful on a few occasions. The T-stakes felt decidedly secure when driven into the snow vertically or buried as part of a T-axe belay. The deadman anchors generally didn't even leave base camp!

We took three ropes: two conventional 8.5mm x 50m, and one 9.8mm x 60m. The extra length of the 60m rope came in handy when there were three or more of us tied onto the same rope, or when lowering one of the sledges down steep cols. All ropes were dry treated and handled brilliantly.

A large amount of abseil tape was left virtually unused due to the nature of the rock encountered. None of the routes we climbed required abseil retreats. The 6mm accessory cord proved useful, but again there was still a large percentage of it left at the end of the trip.

6.1.6 – Pulks

As an expedition we took three pulks which incorporated a fibreglass base with a zip up fabric top section. The pulks were hauled via a harness system attached to solid metal tracers. These pulks proved invaluable during our expeditions away from the base camp. The extra equipment (tent sleeping bags, food, stove etc) was placed in the pulk along with the haulier's climbing rucksack. The person who wasn't hauling would carry their climbing sack on their back and ski slightly ahead on the look out for crevasses. The task of hauling the pulk would be exchanged regularly to ensure that no one person got too exhausted.

Movement with the pulks took a bit of getting used to. With each 'glide' you would haul to get the pulk moving; unfortunately it would then often accelerate faster than the haulier and the jolt would then be transferred though the metal tracers to the haulier in the harness. Another issue with the pulks involved steep slopes: up to a certain angle you could ski downhill with the pulk, but when you put in a speed controlling turn the pulk would attempt to overtake you down the hill. On very steep slopes, for example when we crossed cols between the glaciers, we would unhitch from the harness and lower the pulk on the rope. Generally one person would sit at the top of the slope at a belay paying out the rope while the others attempted to control the pulk. On more than one occasion certain team members got so frustrated with this process that they unhitched from the rope and were dragged down the remainder of the slope by the accelerating pulk!

One piece of sound advice we received during our preparations was to ensure that the pulks had solid traces. Although ropes are marginally lighter, solid traces ensure that the pulk follows the hauler without veering off-course, and mean that it is possible to direct the pulk on odd occasions when it is 'reversed' (e.g. wearing the harness backwards whilst descending steep slopes with the pulk in front).

Solid traces also prevent the pulk from running onto the back of the hauler's skis, and knocking them over. During traverses of steep slopes, it is possible to hold onto the trace ends at the harness, and prevent the pulk from overturning.

The pulks enabled the expedition to cover large distances and explore other glaciers away from base camp. This would have been difficult/impossible if we had to carry all of the equipment on our backs.

Figure 6.1.3 – Dominic and John hauling on the Honeymoon Glacier

6.1.7 – Base Camp Sleeping

Our expedition used Mountain Hardware Trango 3.1 (three man) tents for sleeping; all team members universally liked these tents and found they provided very comfortable living for two people per tent. On the occasions when we slept three to a tent on trips away from base they were cramped, but tolerable.

The inner tents had a large number of storage pockets, which helped to prevent the tents from looking like a rubbish tip. The front porch was large enough to enable wet kit to be removed before entering the inner tent. To aid this process we dug holes in the porch area so that we could remove our kit easily before sitting in the inner tent.

Numerous guy points on the tent outer meant that it could be secured very effectively. Snow pegs were used to peg-out the tent itself, but more substantial items (ice axes, snow stakes, or best of all skis) were used for the guy-ropes. When using skis to peg-out, it was important to ensure that the bindings faced away from the tent, so that the guy lines did not get cut by the metal edges.

All team members took down sleeping bags with at least 800g of fill. Temperatures ranged enormously in the tents, such that in the early evening when we were sleeping, the temperatures reached over $+20^{0}$C, while during the day (our climbing or rest periods) they dropped to nearly -20^{0}C. In this way we could take a long time to warm up if we were in the sleeping bag during the day (i.e. on a rest day), and were often far too hot for most of the night. That said, all team members found that their sleeping bags performed well in the conditions, and 800g of fill is about right.

Thermarests were used for sleeping mats by everyone. They provided excellent insulation from the snow and yet were light enough to carry on our expeditions away from the base camp. ¾ length Thermarests are not recommended.

Although we all took pee bottles none of us (except John) used them for this function, as it was always warm enough at night to go outside without freezing excessively.

6.2 – GLACIER GROUP TENT

6.2.1 - Introduction

It was agreed that a group tent would be vital for cooking, eating, general socialising and a place with a few home comforts! Large group tents are commercially manufactured which can easily accommodate six people, although the cost and weight of these tents made this option unrealistic. As part of Richard's A-level design project he constructed a cycling tent using the bike frame as its support. With this experience and with several engineers amongst us it was agreed that the expedition had the skills and ingenuity to construct its own group shelter!

Although buying raw materials and constructing the tent ourselves would vastly reduce the cost, concern was raised as to whether we could provide a tent that was strong enough to withstand Arctic conditions and also lightweight enough to be within our weight limit for the Twin Otter plane. The only realistic method of providing a tent strong enough and lightweight was to dig a hole for the tent to be placed in, away from any wind. With inspiration from the 1999 British Lemon Mountains Expedition Report, this soon developed into the idea of a constructing a tent without poles that would hang inside a trench.

The most simplistic solution would be to dig a large hole and place a sheet over the top. This is effectively what we produced, but it was glorified with side walls, peg-out points, zips, tension points, a snow valance, roof windows and storm flaps.

6.2.2 – Specification

The tent had to be large enough to accommodate all expedition members to enable people to sit/stand and have enough room to safely cook. It was agreed that the following dimensions would provide sufficient room

Ground floor area:	2m x 3m
Roof height:	2m at its lowest point
	2.5 metres at its highest point

The roof would be sloping so that in addition to assisting with the shedding of snow, any condensation on the inside of the roof would run to the seams, which would be better able to resist ice build-up than the fabric.

As the tent would be sited below ground level it was important to use a bright and visible colour, therefore fluorescent orange appeared to be the most suitable. Two clear UPVC roof windows were installed measuring 0.75m x 1.5m to provide additional light. The four sidewalls were sewn into the roof, hung vertically to the ground, and could be pegged down at each corner.

Two entrances were provided with a double zip puller, together with protective storm flaps held back with Velcro. The tent was held in place with two large snow valances on either side, with webbing-peg out points that ran the full length of the roof and could be tensioned. To get sufficient tension into this flat roofed tent prior to loading the valances, major anchorages were required at the primary peg points (the four corners). Weight restrictions prevented us from bringing snow-stakes for this purpose, so large bags with strong draw-cords were also constructed from the tent material. When filled with snow and buried, these provided absolutely solid anchor points.

The whole tent was seam-sealed with waterproof tape. A snow cover was also constructed, which would be placed over the roof and pulled off once snow had built up. This incorporated nylon loops for pegging out and pulling back.

6.2.3 – Material and Suppliers

We selected nylon-based, waterproof, 150g-weight material as a good compromise between weight and strength. A florescent orange colour was chosen which allowed sufficient light to penetrate and was highly visible whilst walking around base camp. The snow cover was constructed from white, 80g PU coated nylon and strengthened using nylon webbing to provide peg points/handles at each corner.

Most materials were sourced from the British manufacturers Tor (TW) Mountain Fabrics and Point North. These both provided an extensive range of materials in different weights, strengths, colours and sizes for a whole range of circumstances. Additional materials, such as cord and webbing, were obtained from local outdoor shops.

The total cost of the tent amounted to £173.88 and included a repair kit and stuff bag. Tor Mountain Fabrics provided a 20% discount, and therefore the majority of material was obtained from this manufacturer. A full break down of the cost, material required, quantity, size, colour, etc is shown in Appendix 5.

6.2.4 – Construction Process

The construction of the tent can be summarised as follows:

- Cut fabric into sections as illustrated on plans: two sides, two entrances, one roof, two storm flaps, two windows and one snow cover (see Appendix 5)
- Construct storm flaps and sew on Velcro tabs.
- Cut both end sections vertically in half; sew in zip and storm flap.
- Sew both sides to entrances; sew in six peg-out points along hem.
- Sew two sections of roof together; attach four webbing strengthening strips across the width of the roof and six peg-out points.
- Cut two holes 0.75m x 1.5m into roof section and sew in clear UPVC cover.
- Sew roof to sidewalls and entrances; seam seal all seams.
- Sew both sections of snow cover together; attach four webbing strengthening strips and handles.

6.2.5 – Erection Instructions

Before the tent can be erected, a hole measuring 2m x 3m must be dug. The height of one side should be 2.5m and the opposite wall should be 2m, which will provide the sloping roof. To achieve this, the floor is kept level and snow built up on one side.

We found that the easiest way to dig the hole was to remove the fresh snow with a shovel and then use a snow saw to create blocks which could be easily levered out with the back of the snow shovel. The blocks can then be retained for anchoring the snow valance and for seats inside. Unfortunately, the digging will take some time, although the final reward will be much appreciated!

After this stage you will need to create either one or two entrance corridors with steps down into the hole (two would be luxury, although one will work fine). Then:

- Drop the tent into the hole and use the nylon peg-out points to position it centrally.
- Next, peg out the four corners inside to the ground floor to keep the sides taut.
- Place the snow blocks that you earlier put to one side on the snow valance to keep the roof taut.
- Place the snow cover over the roof and make it secure with skis, poles, ice axes, etc on all four corners. Extra security can be achieved for the roof by filling the snow bags and attaching to the roof peg-out points.
- Finally, place the left-over snow blocks inside to create comfortable seats and get a brew on!

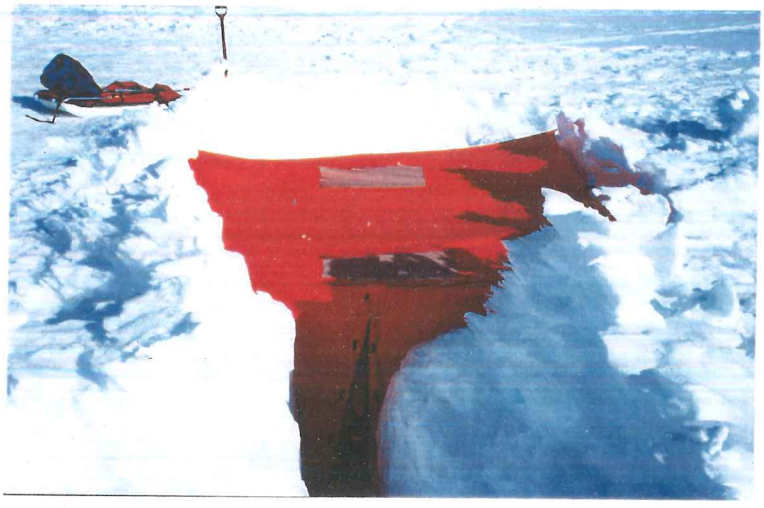


Figure 6.2 – The Glacier Group Tent in use

6.2.6 – The Tent in Use

The tent performed brilliantly and provided an excellent place to shelter from bad weather. Over the three-week period that we were camped on the glacier, the colour of the roof fabric changed considerably, from a bright fluorescent colour to a faded light red. Despite this it was noted that the strength didn't appear to become weakened, as

is sometimes the case on certain tent flysheets. Due to the very dry atmosphere on the glacier, the zips and Velcro worked well and never became frozen or locked.

The large skylights provided ample light, whilst the roof restricted enough light to provide shelter from the sun's rays during the day. The 'red hell' of the sunken tent provided a welcome escape from the constant glaring white of the glacier. The snow cover was only placed during the times when snow was anticipated or falling.

Due to the amount of time and effort that was taken digging the main hole, only one entrance was constructed. This worked very effectively, and it also allowed us to place large snow blocks as seats along the opposite entrance wall and along one of the side-walls. These were insulated with ski bags and bubble wrap, and provided a comfy place to sit.

Cooking was concentrated in the centre of the tent and it was never long before down jackets were unzipped and removed because of the warmth that was generated. This in turn caused any condensation that had frozen on the roof to melt and drip down on everyone. It was therefore important to scrap any ice from the inside of the roof before cooking, and try to keep the door open when cooking.

6.2.7 – Improvements

At the end of the trip when the tent was removed it was noted how dirty the floor had become. During cooking plates, knifes, forks, spoons, bowls, mugs, etc. tended to be placed on the floor, and this could have easily resulted in implements becoming contaminated and the group becoming ill. It was therefore suggested that side pockets would have been useful along with a mug rack in order to keep all eating and drinking implements off the floor and as clean as possible.

When digging the hole for the tent, we struggled to achieve side walls that were completely vertical, and this made the top of the hole approximately 0.5m too wide. This resulted in the snow valance not reaching as far as it should have, although the tent was kept in place with the snow bags. The snow cover was a little too small and should have been approximately 0.5m larger all around so at least there would be some overlap. The snow cover did work, although there were several times when someone nearly fell onto the roof because they had to stretch!

Also, one of the main problems was the lack of view because of the tent being buried below ground level. It provided a safe haven from the bad weather outside, but once you were inside, you never felt that you were really camping in the Arctic. It was then suggested that 'windows' could be sewn into the walls and pictures inserted. Views of the arctic, tropical beaches, pubs, civilisation, and wives could be placed within to make the surroundings feel a little more homely!

A final point to note is that after we had packed-up basecamp, the glacier reverted to its former role of a runway. As the Twin Otter came in to land, team members stood around the $22m^3$ hole left by the tent, and directed the plane: to prevent the undercarriage being ripped-off by an encounter with the hole.

6.3 – FIREARMS

On 26th June 2000 we began preparing for our first group meeting. John's individual roles were then firearms and sanitation – a strange mix, but then some would say that sums him up rather well! He was given the job of firearms as he has in the past held a firearms permit, and the other members having had little contact with firearms.

6.3.1 – The Decision to Have a Rifle

Rifles are not a common item to be taken on climbing expeditions – we understand that one was taken on the 1953 Everest trip, as was a 2-inch mortar. Quite what the intended use was for these items was we are not too sure. However, arctic expeditions do occur in the habitat of the polar bear. These are often viewed as cute and fluffy when seen on calendars, but are known to be somewhat argumentative when met face to face. The reason for having a means of protection against polar bear attack was made clear to us by our patron, Dave Garbett, who had lost a work colleague in Spitsbergen due to a bear attack. Also the Danish Polar Centre (DPC) divide Greenland in two areas with regard to polar bear risk. There is the National Park (in the northeast) where you are not permitted to go with out a firearm, and the remainder of the country where it is strongly advised.

In June 2000 we still hadn't fixed the location of our expedition, but the Lindberghs was looking likely. The risk of encountering polar bears in the Lindberghs was extremely low: there is no food there; it is much further in from the coast than they would normally travel; and they would generally have moved further north by that time of year, as the pack-ice retreats.

However, if a polar bear was in the Lindberghs it would be very hungry and we would be its only source of food. In this case the risk was small, but the potential impact if that risk occurred was so large as to be necessary to require some means of preparedness.

It was clear from this point that we needed a polar bear deterrent. John looked at what had been used as bear deterrents in North America and in the Polar Regions. In discussions with those at the Polar Regions Seminar in Explore 2000 at the RGS, Dave Garbett, and from other research on the subject, it appeared that we had a number of options:

a. Rifle
b. Shotgun (chambered & barrelled to fire solid slugs)
c. Pepper sprays (as used in the USA)
d. Verry pistol or similar projectile illumination flare
e. High powered handguns

The DPC, who authorise what they term as sport expeditions, stipulated that we needed at least one rifle capable of killing a charging polar bear. From this point it was decided to have one rifle plus another lightweight means of bear deterrent for the ski tours. Handguns such as the Magnum 44 were considered, but rejected, as they are tricky to use if unskilled; not really up to the job of killing polar bears even with lead-tipped bullets; plus handguns are not permitted by the DPC. Very pistols proved difficult to obtain and we would require a separate license from Copenhagen to take it in to Greenland. Shotguns looked like the best bet: not only were they lightweight but they could be used in conjunction with cartridge flares as a means of emergency communication.

Before the full awareness of the expedition's logistical difficulties became apparent, we were thinking along the lines of having one rifle as our main means of base camp protection, plus three lighter weight shotguns whilst ski touring away from base camp. During several internal phone calls in mid-November it may have sounded like we were preparing to invade Greenland rather than explore it! From this high point our arsenal reduced, due to common sense and weight requirements!

In the end the idea to take shotguns was quashed when we started to look seriously at the logistics – primarily the weight restrictions. The conclusion therefore was one rifle for base camp and a pack of projectile flares per two man climbing team.

6.3.2 – Logistics

The question now was what calibre of rifle we needed and where to get one. The subject of rifles was raised during the Polar Seminar of Explore 2000 at the RGS. Pen Hadow restated the need for a rifle that was capable of firing expanding ammunition of a greater calibre than .303. Also, that teams should own their own rifle and practise with it prior to going. Pen recommended a plastic stocked rifle. Paul Walker offered one of his rifles for hire, at .3066 cal with 20 rounds of expanding ammunition.

It was suggested that we look at a lightweight rifle, such as the Tikka .308 with a plastic stock instead of a wooden one to save on weight. The price for one second hand was £350 plus VAT, and a number of other costs.

For our expedition to purchase its own rifle would require one of us to get a firearms permit. This proved the stumbling block: the police were unwilling to issue John with a permit for the reason of the expedition. We believe that we had a good case and could have pushed it further, but time was short.

Eventually we decided to hire one of Paul Walker's rifles and informed him of this. However, at about G-20 days, Paul realised that all his rifles were in use. He negotiated with another expedition agent and obtained one of theirs. We were thankful for this, as during this late hour it was too late to push John's firearms permit, purchase a rifle and transport it from the UK to Iceland.

6.3.3 – Collection, Storage and Operation of the Rifle

In Akureyri, Fredrik the charter hire manager for Flugfelag signed over our rifle to us. It was a British made .308. John Booth checked the rifle and found a cleaning rod, two boxes of rounds and a canvas gun bag. Of the two types of ammunition, one was new, the other old and in poor shape.

In the tent in the Lindberghs, there was time to check the rifle over more thoroughly. It had been fired in the recent past and not cleaned. The rifle was then cleaned as well as possible, after finding that the cleaning rod was missing its wire brush. Using pull-through patches made from a first aid kit, the barrel was cleaned and, oil from the MSR maintenance kit was used to prevent the barrel rusting.

The rifle was stored outside in its gun bag, central to the sleeping tents. It was kept loaded with three rounds. The first two were new and clean; the third was from the older and misshapen set. The thinking was thus: two rounds that were reasonably on

target and a third for when the bear was on top of you. This final round would not have to be accurate but it would have to inflict a massive wound.

6.3.4 – The Decision to Train

In a bear attack the aim has to be to kill the bear, and quickly. Aim for the heart or head, empty the magazine, and make the rounds count. Obviously the time to learn how to do this is not in the life or death event of a bear attack, thus it is strongly suggested to learn how to shoot before you go. Also, one member has to be able to strip-down, check, clean and reassemble a rifle. Most sporting rifles operate in a similar fashion, so knowing how to maintain one rifle well will generally be sufficient to be able to maintain another.

We met as a team on a number of occasions to discuss the issue of training. At one point only two of the six agreed to get some training. However, when the training day arrived all those who had not used a rifle before went along.

On 21st April 2001 the team met with Chris Panell of the Derby Rifle and Pistol Club. Chris used to be an active member of the Coventry University Mountaineering Society in the early to mid 1990s. He gave us expert advice on using and storing firearms.

A number of realistic scenarios were used to develop reaction and aim, starting with smaller .22 rifles, and building up to a .303 (bolt-action short magazine Lee-Enfield). Polar bears are a highly protected species, and shooting one is seen by the WWF as about comparable to shooting a panda. Therefore, unless the bear is very close to you, you are likely to have to explain your actions in court if you shoot one. With this in mind, the .303 practice sessions were all close quarter rapid-firing, from kneeling and standing positions, and firing from the hip!

The primary aims of our training were achieved – not only we were aware of our accuracy, but we had the confidence and speed of reaction to handle the rifle in an emergency. As Dave Garbett had stressed to us: "the bear will be scary enough, you don't want to be frightened of the gun as well."

6.3.6 - Things to do Differently Next Time

- Purchase a complete cleaning and maintenance kit, including oil, brushes, solvent and rod (available at Nanok Outdoor Supplies in the Kringlan Shopping Centre in Reykjavik).
- Purchase ammo brand new; store in a polythene bag.
- Ensure that the rifle hirer can deliver on time before deciding to stop pursuing a Home Office rifle license.
- Fit a condom/balloon over the barrel of the rifle when it is stored in base to reduce water (ice) ingress.
- Take a lightweight rifle. This could have saved us a whole kilogram, and in the final weeks of packing that extra weight availability would have been very useful.

6.4 - TRACTION KITES

6.4.1 - Introduction

From a report in 'High' and descriptions in books by, amongst others, Sir Ranulph Fiennes, we were aware of the potential of traction kites. Such contraptions are more readily found on many of the larger beaches of the UK – dragging people along on three-wheeled buggies or surf-boards. The principle applies equally to skiers, and has been used with great effect on a small number of polar expeditions.

As a group, we were primarily mountaineers, and the case for their use was compelling. Assuming obliging winds, traction kites could provide the means for us to be dragged over considerable distances for a fraction of the personal energy expenditure required to walk or ski-tour that distance, and in a fraction of the time. The scope for 'getting more peaks in' could be greatly increased.

Despite this, the weight restrictions on other essential equipment meant that the chances of taking them were considered minimal. Nonetheless Brian (a keen kiter who has made some of his own) undertook research and sounded out a number of companies for sponsorship. The best response we got was from Flexifoil, who offered us trade price on their range.

6.4.2 - Kite Selection

It is essential for anyone considering kites to ensure that they get the correct type. Whereas most big kites will drag you along one way or another, many are designed for maximum lift with stunts in mind, where the primary aim is to get *'big air'* and *'look cool'*. Getting *'big air'* may indeed *'look cool'*, but to do this on skis (unless you are very good at both skiing and kiting) is likely to ensure that you subsequently *'look injured'*. The Flexifoil Blade is an example of a kite designed for lift.

About three weeks before departure (G–21 days), we started to have some confidence that sufficient bodyweight had been lost to fit a couple of kites in. Discussions resumed with Jeremy Pilkington at Flexifoil, and we were pointed in the direction of their new 4-line Viper range. The Viper is a lightweight kite designed primarily for traction, displaying smooth cruising with great upwind performance and negligible lift. In the hands of a skilled pilot it can be used to generate a potentially endless virtual ski-tow.

Size was then the next issue. Ideally one would take a number of kites of varying size, so that they could be matched to wind speed, but weight precluded more than two in total. Jonathan and Ian agreed to buy a kite each, and sought further advice from numerous people: notably the many helpful folk at the Saunton Sands kite festival on the 10th June 2001, and Prof. Quentin Leiper of Carillion.

After considering factors including the anticipated light average wind speeds, frictional resistance of skis on snow, respective bodyweight, and the possibility of hauling pulks, they opted for the following:

Ian:	a $4m^2$ Viper (red) with 135 & 90 kg, 25 metre lines, on 4 line handles
Jonathan:	a $5m^2$ Viper (gold) with 225 & 135 kg, 25 metre lines, on 4 line handles

6.4.3 - Practice Makes Perfect (eventually)

Flexifoil managed to dispatch our chosen kites to us within a couple of days but, due to the last-minute nature of the kite inclusion, this meant that they only arrived 48 hours prior to departure. As we all had to go to work on those two days, and finish packing, the maiden flights of these kites took place in Greenland, on the Lanchester Glacier.

It is also worth noting at this point that only one of the team had ever flown a 4-line kite previously, and that only for about an hour! In common with most pursuits, basic kite handling requires a little skill, and to be really good requires a lot. This became patently apparent at the end of our first week when we first attempted to use the kites at basecamp, though after a few of evenings practice we had mastered basic static handling. Two weekends of practice in the UK prior to departure would have made all the difference.

Attempts at coupling our new aeronautical capabilities with our not consistently masterful skiing proved more of a challenge. Our skiing was certainly one limitation, but so too was the ability to control a kite whilst the pilot was in motion, as the handling is quite different. Nonetheless, the majority of the team put in significant practice on suitable evenings, and two managed relatively well-controlled traction on skis. In one case, this was done 'in anger,' as part of a ski-tour.

Figure 6.4.1 – Jonathan en-route to Nunatak Barker on the Nunatak ski-tour

It would be quite inappropriate for us to omit to note also just how much fun these kites can be, and what a welcome alternative they provided of an evening to the endless games of Scrabble! By the end of the expedition, most of the team were proficient at turning the kites through tight figure eights in the centre of the power window. In all but the lightest of winds (the Viper 5 will fly in 2mph winds), this resulted in the pilot being dragged on their stomachs for hundreds of metres along the glacier, leaving beautiful 'S' trails in their wake.

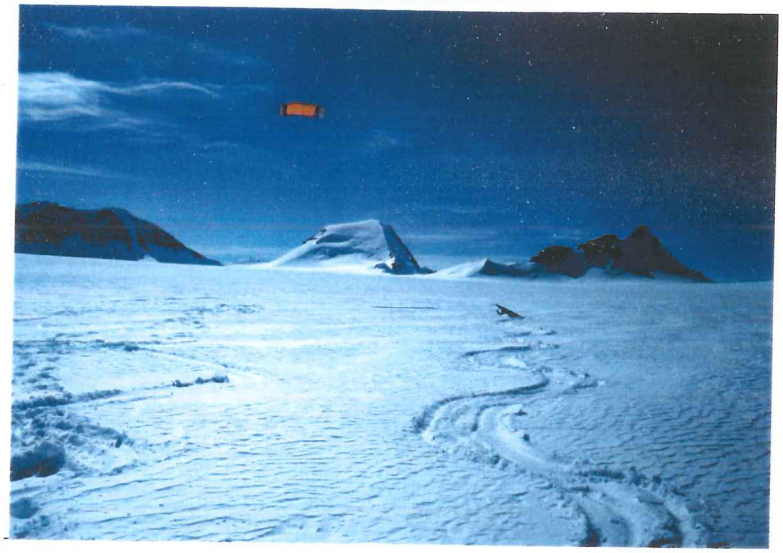


Figure 6.4.2 – Jonathan displaying expert kite control on a stomach-tour of the Lanchester Glacier

Although it would be virtually impossible on a trip of this kind to justify 1300g per kite on the grounds of entertainment, as a serious piece of mountaineering/exploration equipment they can be more than warranted. The team returned convinced that for polar and/or ski-mountaineering trips involving substantial glacier travel, the use of kites can increase a team's potential immensely.

Post-expedition practice has been significant. Despite a number of unplanned flights we are pleased to report that, as yet, no-one has suffered any broken limbs. It is inconceivable that this will be the last expedition we take traction kites on.

Figure 6.4.3 – Ian practising plough-turns under traction below Qaqaq Bethany with the Kong Christian IV Glacier & Watkins Mountains beyond

CHAPTER 7 : PROVISIONS

7.0 – INTRODUCTION

Obtaining the maximum calories for weight was the guiding factor behind our choice of provisions: sufficient to sustain six mountaineers for 24 days in sub-zero temperatures. We also wanted to select a diet that had good variety.

Background research led us to the view that in a full-on mountain day in the anticipated conditions, we would require about 5500 calories per day (though high, this is only half the quantity used by Fiennes & Stroud on their 1992-3 Antarctic crossing). We also anticipated that rest days would require 2500 calories; with perhaps one rest day in four, the average requirement would be of the order of 4750 calories per day.

By various sources, we were advised that we should aim to limit our food to 1kg per person per day, to ensure we could fit the rest of the kit on the planes. Even allowing for a goodly supply of lard, this was clearly going to be a tall order. In order to ensure that we had the most calorie:weight efficient brands of any given item of food, Brian spent a morning in his local supermarket comparing the weights and calories of all the varieties of items under consideration. This did result in questioning by the store security guard, but after explaining that this was normal behaviour for polar explorers Brian was released.

Another factor that affected the menu was that one of the team was a vegetarian. Separate cooking had to be kept to a minimum in order to reduce fuel requirements, and therefore most of the main meals were vegetarian as a result.

7.1 – MENU SELECTION

Brian compiled a questionnaire which listed all of the high calorie, lightweight foods he could think of in order to investigate the preferences of the six mountaineers. We had gained sponsorship in the way of free food from manufacturers including United Biscuits, Continental Sweets (UK) and Jordans, and so their donations were added to the list.

When the questionnaires were returned we compiled a list of foods in four main categories: main meals, breakfasts, snacks and drinks. Our weight limit for food was 160kg, so we designed a spreadsheet that would allow us to see the result of adjusting the quantities and therefore work out the optimum amount of energy obtainable. After Brian had run lots of iterations, the optimised sheets were sent out to expedition members for comment, and further revisions made.

We also looked at Poly Cose – a glucose powder which is high in calories and flavourless so it can be added to anything. We decided not to take it because it had fewer calories per gram than chocolate, and the team all said they would prefer more chocolate!

7.2 – GREENLAND MENU

7.2.1 – Main Meals

To ensure variety, the main meals consisted of two pasta dishes, one rice dish and one noodle dish. To add to these we had four puddings.

1. Curry and rice
   Hot Crunch Pudding
2. Beanfeast and pasta
   Sponge pudding
3. Pasta 'n' Sauce
   Christmas pudding & custard
4. Stir-fry and noodles
   Stewed fruit & custard

7.2.2 – Breakfast

1. Ready Brek
2. Museli
3. Pancakes with golden syrup

7.2.3 – Snacks, Lunch and Mountain Food

Some of our snack choices were dictated by the fact that they were provided free by sponsors. Jonathan's mother had also offered us some really rich fruitcake with marzipan and chocolate icing. We had been told that we would crave fat in the constant cold, so a large quantity of lard and butter were taken. Also jam, honey and condensed milk which, although heavy, could be added to all sorts of things for flavour.

We wanted to take some savoury snacks. Brian and Jonathan reported that when they were in Argentina in 1997 they had eaten and enjoyed cheese and salami with crackers, so these were added to the inventory, which is listed below:

Salami
Cheese
Crackers (Ritz & cream crackers)
Peanuts
Chocolate
Trail Mix
Assorted dried fruit
Chocolate biscuits (Ace and Penguin)
Cake
Jam
Vitamin C tablets
Frusli bars
Butter
Condensed milk
Fruit cake
Powdered milk

7.2.4 – Drinks

The old favourites of tea and hot chocolate were on the list. Whittard's fruit tea (which was new to some of us), Isostar and Redoxon vitamin C tablets were also added, to flavour the snow water, in addition to giving us energy and/or vitamins.

Drinking chocolate
Tea bags
Fruit tea

Isostar
Redoxon vitamin C tablets

7.3 FOOD WEIGHTS

Food Type	Total Weight (kg)
Vesta curry	7.1
Vesta risotto	2.3
Quick cook pasta	4.6
Beanfeast	2.8
Batchelor's Pasta + Sauce 24	4.6
Noodles	1.8
Amoy Stir Fry Veg	2.5
Bird's Hot Crunch Pudding	2.5
Auntie's Sponge Puddings	2.0
Christmas pudding	3.2
Dried fruit	1.8
Bird's Custard	0.9
Ready Brek	2.9
Museli	2.9
Pancake mix	0.5
Lard/suet	2.3
Salami	4.2
Tartex	0.8
Assorted savoury biscuits	5.1
Peanuts	5.8
Chocolate	14.4
Trail Mix	5.0
Cereal bars	10
Cheese	4.2
Assorted chocolate biscuits	21.6
Jam	4.3
Butter	6.0
Cake	4.2
Vitamin C tablets	0.4
Drinking chocolate	5.2
Tea bags	0.9
Complan	2.0
Isostar	7.0
Condensed milk	2.0
Tuna	1.0
Powdered milk	2.0

Figure 7.1 - PROPORTIONALITY OF FOOD CALORIES

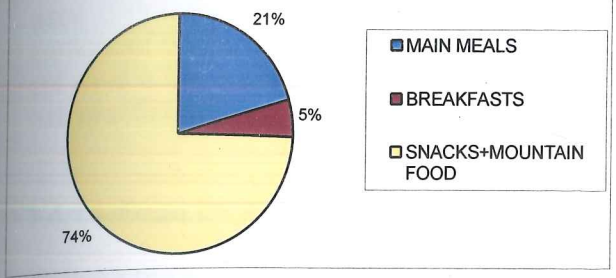
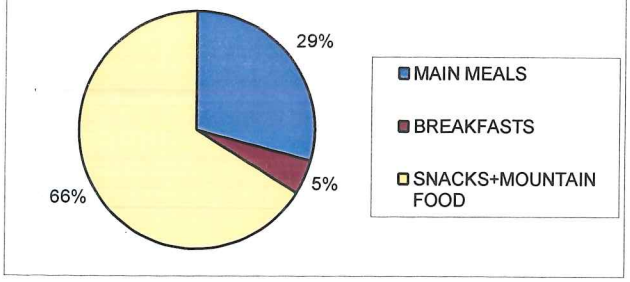


Figure 7.2 - PROPORTIONALITY OF FOOD WEIGHT



As can be seen from the graphs above, snacks and mountain food made up the majority of the food taken, with 74% of the calories and 66% of the weight. This also ensured that we would have enough food to live on if all the cookers failed.

Despite this rigorous approach, we were unable to reach our target of 4750 calories in 1kg, in a combination that we thought we could stomach. After running various permutations through the spreadsheet, and calculating our weight loss as a result of under-providing, we revised our target to 4000 calories per day. This still proved difficult to reach, and we settled on 3939 calories, at a weight of 1.1kg per person per day.

As a trade-off to incorporate this weight (and other items such as a 60m rope), we agreed to axe all emergency rations. The rationale was that if we were stranded for a few extra days it would be because the weather was bad; we would therefore not be climbing anything. We wouldn't die as a result of not eating for a few days, though we would have to improvise when it came to melting snow.

Figure 7.3 – The Naked Chefs

7.4 – PACKAGING AND FREIGHTING

All main meals and breakfasts were weighed and packed in portions for two people, to ease distribution on the glacier. The rest of the food was weighed and packed into cardboard boxes and barrels ready for shipping, removing any excess packaging which did save a few kilograms. All the food was due to be shipped to Iceland about two and a half months in advance of our departure date. But there was a crisis looming...

7.4.1 – Food Export Restrictions in the FMD Crisis

At about the same time as we were finalising our menu and packing the food, a friend of John's offered him a box of Mars bars at half price – these had come from a team of aid workers who were travelling overseas. When John asked why the Mars bars weren't going with the original aid workers, the leader of the group said that there was a chance that they could be confiscated at the port due to Foot and Mouth disease. A loud clung was heard as the penny dropped. All our food was to be/had been purchased/donated in Britain and shipped out to Iceland prior to the expedition starting. If a box of Mars bars could be confiscated then the question had to be asked, what would happen to our team's food?

So who to ask? Phoning the national FMD help-line quoted in the news only served to entertain the person on the other end of the telephone, because the hotline number was really a method of disseminating information to the farming community. The RGS Expedition Advisory Centre suggested we contact the Government departments directly. They also asked us to keep them informed of what information we received, as such information was likely to needed by other teams.

Contacting government departments is a tricky thing at the best of times, but how to do it in a national crisis? We tried a two-pronged approach: contacting the local arm of the department first, then going for the head office. The primary aim has to be to get the name of the person responsible within the department, so that it can used in all subsequent communications.

Contacting the MAFF office in Dorchester by telephone proved to be impossible, so John visited them in person. He found the team there preparing a report into the likely impact of FMD in Dorset. It is fair to say that they had not considered the likely effect of FMD on the local members of the mountaineering community, and at their suggestion we contacted the London office directly.

Another tack we tried was to raise the issue during the BMC's debate on FMD at the Annual Gathering in Cardiff. The BMC access team of Dave Turnbull and Claire Bond had been working very hard fighting the blanket restrictions and crag closures. However they fielded our questions and the meeting debated the subject. Although it had little relevance to mountaineering on British soil, there were clearly a number of people there with their own expeditions about to depart, who had not realised the problem.

Contacting MAFF HQ took some time: the automated telephone system gave a number of options, none of which related to exploring the greater ranges in any form. Eventually we found the way forward by contacting the FMD advice line a number of times until somebody took us seriously. This proved to be Tom Wilkinson, who first took our

details, then suggested we send information about the full extent of our difficulties to him via his office email address. The start of the answer was near, we thought.

Now the email to Tom had to hit the mark; a killer email had to be penned; it was one of those times when you know that you may have only one chance, so we sent Tom all we had. The email included the fact that we were supported by the RGS, BMC, MEF, Gino Watkins Foundation and had received the Arctic Club award. Also we mentioned that we were a team supported by the Sports Council who view first ascents as equitable to Olympic gold medals. We also mentioned the really important reason why we were keen to solve this problem – our 18 months of work in planning the trip might all have been in vain if we could not eat when we finally reached Greenland.

7.4.2 – Options for Overcoming the Food Export Restrictions

Tom's response suggested a number of avenues that could provide answers. These included contacting the Icelandic and Danish Embassies; the Europe, Export and International desks of MAFF; and finally to contact an MP. We decided to hedge our bets and contact them all until the right answer appeared. As the requests for help were replied to, a number of options seemed logical to the team:

1. Declare and export the vegan-friendly food; buy the meat and dairy food in Iceland
2. Buy all the food in Iceland
3. Buy food in a FMD free country such as France and export
4. Obtain certification from manufacturers that the food was FMD free
5. Starve
6. Eat Dominic – our vegetarian on the team.

Food in Iceland is expensive, but the corresponding issues were more concerning. In Iceland we would have to try to obtain food at the same calorie/weight proportions as the UK. It had taken months to optimise this from those choices available within the UK, and the chances of achieving this in a country where we were unable to understand what was written on the backs of the packets was pretty slight. Linked to this would have been the issue that we were only to have 24 hours (and no computer or spreadsheet) in which to do this on the way through, though we did look at sending a couple of team members out in advance. Another issue was that the food was to be taken to Greenland on a shared Twin Otter a few weeks before our arrival, so flight re-jigging would have been necessary.

Buying food in France (where at least some of us spoke the language) would have meant sourcing the freighting ourselves, as this would have been outside of the services of our agent. Dominic, weighing in at only 66 kg, was unsustainable, and he was unsure of option 6 being fair.

The best choice seemed to be that of jumping though an excellently placed loophole of international law surrounding the ban on food imports. Food transported for personal consumption was banned, but food transported for sale was legal. A plan soon emerged: sell our food to a third party for £1 then buy the food back in Iceland for, say,

£1.20. The snag occurred when our shipping agent said he wasn't prepared to risk testing this gap in the legislation.

The final bit of Tom's advice was to contact an MP, which we did. Unfortunately the nation's MPs were at this time somewhat more interested in retaining their jobs, being as it was a general election. However John sent a request for help to Robert Walter, MP for North Dorset, by email and followed up his request by visiting the local hustings and raising this matter in person. On 20th April 2001 the team received a letter from the House of Commons stating that Mr Walter MP had written to the Secretary of State at the Ministry of Agriculture, Fisheries and Food pressing the urgency of our case and asking him for a timely response. The response arrived on 19th May giving the names, numbers and the departments of those who needed to be contacted to raise the required paperwork to solve the problem.

7.4.2 – The Solution

Unfortunately by this point, our shipping deadline had been passed, and we had been forced to make a decision. We chose to remove from the shipment all high-risk meat and dairy products and purchase them in Iceland (e.g. cheese, salami, lard), but to export the medium and low risk items (e.g. powdered milk, chocolate, etc). It remained a risk, and if our remaining food had not got through, we would have been forced to purchase everything in Iceland at considerable expense and calorific risk. The legal implications were also considered, but our prior contact with the various arms of government gave us some confidence that we were unlikely to be 'done' for smuggling.

In the end, the food got through customs, and the pre-shipped food made it on to the first (shared) Twin Otter. When we arrived in Greenland we found that all the food had survived well in the cardboard boxes and barrels.

7.5 – HOW THE FOOD WENT DOWN

Generally the food quantities and variety worked well – in particular crackers, salami, butter and cheese were a great success. We recommend these for lunches at basecamp as they are quick and easy to prepare, and they make a pleasant change from yet more chocolate. A few things could be improved on for the next expedition:

- The rice in the Vesta meals was not quick cook and took an inordinately long time to prepare.
- Pancakes were a great success at base camp on bad weather days, but they took a long time to prepare and cook for little energy in return. They would be useless if you wanted a high calorie feed quickly, but saying that we think we would take them again purely for the novelty value. A non-stick pan would be a worthwhile investment.
- We should have taken more savoury drinks e.g. powdered soups and coffee.

7.6 – COOKING AND MELTING

7.6.1 - Cookers

Weight restrictions limited us on the number of stoves we could take. In the end we decided upon two MSR XGK's and two MSR Dragonflies. The reasoning went that if we had similar stoves we could cobble together a working stove in the event of multiple failures. Of the two stove types the Dragonflies were universally preferred for their extra stability and controllability of the flame. Because of the tendency of these stoves to flare-up when first lit, we stuck to our pre-trip agreement that we would not cook within the Trango tents.

One factor that caused us great problems through the trip was that the stoves insisted on melting their way towards the Earth's core. This meant that pans had to be expertly handled as the stove listed to one side in its melt hole. Having said this, we don't believe we lost the contents of any of the pans and this is a testament to how highly we regarded food during the expedition! After a week we brought down a couple of rocks from one of the mountains which we used as stove bases and this improved, if not eliminated, the problem. On our flight back we were recommended an ingenious and simple answer to the stove listing problem from another team: to use a piece of plywood with bungy cord attached to hold the stove and fuel bottle in place.

All the food took a long time to cook because of the low temperatures. To minimise this, insulation around the cookers and pans was essential. We used the standard aluminium heat shields that came with the cookers; these were adequate but we would look for a better solution next time.

For cooking we took six small pans (1.5 – 2 litres) for the food and one large pan (3 litres) which was reserved for melting snow and boiling water for drinks. Pans larger than 3 litres are not recommended, as in seriously sub-zero temperatures the temperature gradient from pan base to lid is too great to ensure steady cooking.

Washing up proved quite easy unless pans were left for a while: the abrasive quantity of the snow meant that a handful wiped around the inside of the pan would remove most of the muck. Washing up liquid was used when a proper clean was required.

7.6.2 – Forced Snow Melting

Two days into the trip, we had a problem: 6 litres of fuel had been used. Twice our allowance, and we had no spare. At this rate, the trip would have been over by the time we reached the halfway point, and to secure a rescue by then, we had only about three more days before we would need to pull the pin on the EPIRB.

The main problem centred around melting snow: it is a very inefficient use of fuel, but a problem we had to face as there was no running water. Melting snow into water is not an efficient means of extracting water. The air trapped inside snow is an excellent insulator. Ice, without such voids, requires less heat to melt. The approach to take was then stressed clearly to all team members: snow was only to be melted 'as dug' as a last resort to restart more efficient processes.

Therefore, the approach we then undertook was to ensure that there was either water or ice in the pan to start with, and only once it had started to warm was more snow added.

The water would fill the air voids in the snow, thus retaining the heating efficiency. Other common sense practises were adopted, such as pre-soaking rice and pasta in cold water, to reduce the cooking time.

7.6.3 – Solar Snow Melters

To further reduce the amount of fuel used to melt snow we constructed a solar snow melter. This consisted of a dark-coloured Ortlieb dry bag and a pair of large clear plastic bags, which were stood on a dark insulating item such as a haul bag or pulk. The Ortlieb bag was filled with snow; sealed up; and placed inside the clear plastic bag. The clear plastic bag acted as a greenhouse and the dark-coloured Ortlieb bag would then absorb the heat and melt the snow. On average we got around five to ten litres of water a night, depending on the weather, but on one night, we obtained 19 litres.

We also used zip seal plastic bags (donated from Baco), to achieve the same result on a smaller scale – particularly useful when we were away from basecamp. Snow would be stuffed into water bottles, and the bottles placed inside the bags which were then inflated and sealed. Temperature differentials of up to 26^{o}C were achieved, raising air temperature from –10^{o}C outside the bag to +16^{o}C inside – sufficient to melt the snow in the bottles on most nights.

Figure 7.4 – Solar Snow Melter

7.6.4 - Fuel Consumption

The above methods reduced the amount of fuel required by 75%, and by the end of the expedition, we had only used 18 of the 42 litres of fuel that we had taken. Obviously if the weather had been cloudy this method of melting snow would have been less effective and we would have had to use more fuel, but it is clear that there a ways of seriously reducing the amount of fuel required.

Added to the obvious environmental and cost savings, we could also have saved nearly 18kg by taking less fuel. This weight could have been better used in many other ways.

CHAPTER 8 : FIRST AID

8.0 – Introduction

To be, at the worst case, seven to ten days away from any form of medical help, makes you think. Richard started with the working title of medical officer, but we soon accepted his reasons for it to be changed to first aid co-ordinator. The term of medical officer was not one that could be applied to any members of the team. We had no trained medic and our first aid training – although good – was not at the point where we could be confident about stabilising a seriously injured expedition member.

Most of the team members made approaches to their GPs to request prescriptions for antibiotics and painkillers for the expedition first aid kits. Unfortunately all who we approached refused to oblige: citing that they could only prescribe medicine when there was something wrong with us. Counter pleas that by then it would be too late generally fell on deaf ears, and we found ourselves exploring the farthest recesses of bathroom cabinets for any useful 'leftovers'.

However, through the Mount Everest Foundation (MEF), a contact was provided for a doctor who provides medical advice to the British Mountaineering Council and Jagged Globe Expeditions. He advised that the 'only when ill' restriction only applied to prescriptions on the NHS, and if we were prepared to go private, a doctor can prescribe anything that they deem appropriate.

8.1 – First Aid Course

Each member of the expedition had previously undertaken a mountain first aid course that specialised in the following: assessment of the ill and injured, resuscitation, care of head and spine injuries, treatment of fractures, wound care and management of environmental extremes. A further advanced course was arranged to provide team members with the necessary skills to deal with casualties in this extreme environment. This specialised in patient care and evacuation, advanced airway management, stretchers and carrying devices, plus wound care and splintage

A number of courses had been researched and were available, lasting from a weekend through to a full week and throughout the whole year. Unfortunately, the additional cost of such a specialist course put an increased strain on the expedition finances. Courses appeared to start at around £150 - £300 and depended on the number of members attending. Plas-y-Brenin, The National Mountain Centre in North Wales, provides comprehensive courses on mountain first aid and can be contacted at www.pyb.co.uk.

Eventually we opted for a one-day Explorer Medicine course, arranged in April 2001 by Adventure Lifesigns (www.adventurelifesigns.co.uk). This reiterated all of the above-mentioned procedures and allowed the team to practice and work together on various scenarios that could be encountered in Greenland.

8.2 – Specialist Medical Training

The need for specialist medical training came to light at the MEF interview. On the panel was one of the BMC's honorary medical advisors, who questioned us as to our medical preparedness and the pain reliving drugs we were thinking of using as a means to reduce shock. Mild pain relief drugs – such as paracetamol, aspirin and

ibuprofen – can call be bought over the counter from a chemist. However, many pain relief drugs require a prescription, and controlled drugs are unlikely to be dispensed unless a medical practitioner is a team member. The easiest solution is to either have a doctor on your team, or to find a trusting doctor who is prepared to issue you with the required prescriptions.

Our conversations with this BMC honorary medical advisor initially focused on the type of pain relieving drugs we might take. At the time, as far as we could research, the suggested pain reliving drug seemed to be Sublingual Temgesic – a morphine derivative which is administered under the tongue in the form of a dissolving pill. It had a number of advantages: as it isn't covered by international treaty it could be carried as part of our first aid kit; also it doesn't require skills in intra-muscular injection. We told the medical advisor that our GPs hadn't been very helpful it supplying it to us, and his advice was to look at morphine substitute called Nalbuphine. This wasn't a controlled substance so wouldn't require any complex Home Office documentation, but it did require injection skills. He stated that Nalbuphine didn't have the side effects that occurred with Sublingual Temgesic.

A couple of months after the MEF interview, four members of the team met the doctor at his surgery. There we went through our medical plans together and received his advice upon them. He had prepared a number of simple-to-read notes to deal with the common ailments on expeditions such as stomach upsets, etc. He had also written an idiot's guide to the intra-muscular injection of drugs.

It only required the testing of these instructions by the team members. First we practised on an apple with saline solution. Then, after noting that the apple had not recovered, we looked to something a little more animate. Dominic had overlooked his tetanus booster so was duly given the news that he was to become chief guinea pig. So, with a look in his eyes, not seen since his chalk cliff climbing days, Jonathan approached Dominic with a loaded syringe. The result provoked the comment: "a few thousand drug abusers get it right every day, so why can't we?" Dominic got his jab and we got the confidence that in a situation that required it, we could do the job.

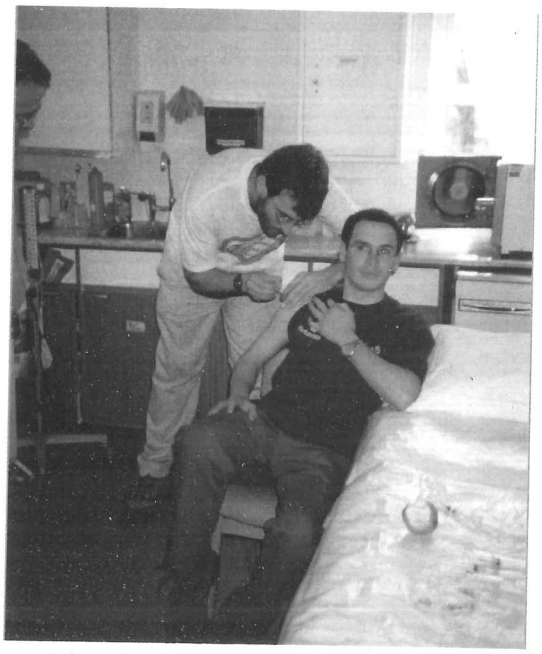


Figure 8.1 – Expert training

The final part of the drugs course revolved around the types of drug we might need in the event of a typical mountain accident. The basis was simple: start with something less potent and work up. All the drugs we took could be taken together so a staged response to pain was possible. The same was true of the antibiotics we took, so again we could manage an infection, such as can occur at a fracture site, in stages. After taking in the doctor's suggestions and thinking carefully about what we needed and were prepared to do as a team, we were privately prescribed the required drugs for the purposes of the expedition.

8.3 – Medical Supplies

So in the end a fairly comprehensive medical kit was carried by the expedition (see Appendix 7). The supplies were transported in two watertight boxes: one large base camp box and one drug box. The drug box was carried by the expedition leader as hand luggage. To simplify customs formalities; the remainder was freighted out with the main bulk of equipment.

A number of major manufactures of general medical supplies were contacted seeking either sponsorship or discounts on first aid supplies. Unfortunately no offers were obtained, although St John Ambulance Medical Supplies (www.stjohnssupplies.co.uk) provided some equipment far cheaper than high street stores. Wilkinsons hardware store provided some basic equipment at a reasonable cost, whilst promotions at Boots and Superdrug provided special offers on supplies which equated to 50% discount: i.e. buy one get one free.

We sourced some of the medication at no cost (ex-expedition drugs from other team's kits, shortly to expire) and prescriptions were used for over-the-counter antibiotics. Detailed information on the quantity, type and administration of the drugs was provided for all team members

8.4 – Drugs Import and Export Licence

All of the prescription-only medicines provided were not covered by international drug regulations, and therefore no export or import licence was required and they could be carried without any concern. To ensure no difficulties in Customs, the doctor provided us with a letter of authority.

However, there are legal requirements for the transportation of controlled drugs from Britain, Iceland and Greenland. An export and import licence would have be required for travelling in and out of each country, plus a detailed record of the type and quantity of controlled drugs for each of the embassies. This was initially researched prior to obtaining any drugs and it is expected to be a time-consuming exercise to get the relevant licences. Contacts for the relevant countries are listed below:

Home Office
Licensing Department (Drugs)
Room 239, 50 Queen Anne's Gate
London
SW1H 9AT

Tel. (02072) 733866
www.homeoffice.gov.uk

Embassy of Iceland
Licensing Department (Drugs)
2A Hans Street
London
SW1X 0JE

Tel. (02072) 593999
www.iceland.org.uk

Royal Danish Embassy
Licensing Department (Drugs)
55 Sloane Street
London
SW1X 9SR

Tel. (02073) 330270

8.5 – Pre-Trip Vaccinations and Check Up

Each team member undertook a dental check approximately seven months prior to departure to assertain if any treatment was required. A further check was undertaken one month before departure.

Team members had tetanus boosters where necessary, some opted for the Hepatitis-B vaccination as well. Although this is not a suggested vaccination for Greenland or Iceland, they felt it better safe than sorry.

8.6 – Medical History and Casualty Card

As part of the medical procedure that would be undertaken if an accident occurred we felt it important to have the detailed medical history of each team member, This was kept in the drugs box, but would be taken with team members if a rescue or evacuation took place. The information provided personal details, next of kin, doctor/dentist contact, previous vaccinations and previous injuries.

A casualty card was also produced, and each team member carried several copies. This was to be filled in if an accident occurred, and would allow a detailed record of response rates to be monitored before expert medical help arrived. It would also provide personal casualty information, together with information on the nature of the accident, time, treatment, etc.

8.7 - Expedition Injuries

Throughout the whole expedition there were no serious injuries or accidents. One of the concerns to all the team members was from the potential skiing injuries that might occur i.e. knee injuries, broken arms/leg, etc. from a fall. There were plenty of falls but luckily all were uneventful. Blisters caused a few problems and were to only be expected being in plastic boots for three weeks – a combination of Compeed and foam padding worked wonders in eliminating this problem. The base camp medical box and the drugs box were therefore hardly used. However, there were several minor injuries which hurt team member's pride more than themselves, and these are listed below:

JW	-	Took Rennie for indigestion, probably from too many pancakes and Ace biscuits.
IJ	-	Burnt eye lashes due to MSR flare up.
DM	-	Back pain from digging ten tons of snow for group tent.
BC	-	Stabbed groin with ski pole whilst skiing.
JW	-	Scalded hands pouring boiling water, luckily IJ took over and tea was served on time.
RD/JB	-	Slight red eyes from not wearing sunglasses whilst ski touring.
DM	-	Finger cut while turning the page of Monty Python's Flying Circus book.
BC	-	Little toenail fell off, rattled around boot and was never seen again.
JW	-	Old knee injury flared up after ski fall.
Most	-	Varying degrees of frost-nip in toes, due to wearing trainers, etc. on the glacier whilst drying mountain boots.

We note that all have now recovered from their aliments, with no lasting damage!

CHAPTER 9: ENVIRONMENTAL ISSUES

9.0 - INTRODUCTION

This section of the report deals with the day to day environmental issues considered by our team of six living on a glacier for 23 days. John produced a pre trip study into what was best practise using information from the RGS, various mountaineering books and his experience of setting up refugee camps.

From the outset the team realised that the expedition would have a significant impact on the environment of Greenland. The Northern Lindberghs, the area that our expedition was interested in, was one that had had no human visitation. We therefore knew that, as the first visitors, we would have a responsibility to reduce our impact to as near zero as possible.

Minimum impact expeditioning is a very touchy subject within the mountaineering community. Most agree that as a concept it is a worthy goal to aspire to, yet few actually make a real effort. It is a difficult road to take as when you claim anything in the mountaineering community you are subjected, quite rightly, to critical scrutiny. Also, the idea of handling human waste is not most people's idea of a pleasant summer holiday.

The waste from an expedition typically includes food and rubbish as well as human waste. All three are known to carry bacteria and can be a source of infection. Actively making an effort to minimise a team's impact can increase the risk to such a team of food poisoning and other illnesses.

Many teams have tales of Delhi Belly, or the variant pertinent to their continent, with many a team member either struck down or at the least below par due to illness. We were advised by the RGS that this can often be down to poor hygiene at basecamp, but that with a little forethought and planning, the risk of cross-contamination can be minimised. We therefore decided to have a base camp plan (see section 9.2).

Choosing to take the minimum impact route is one that requires careful consideration, planning and, most importantly, the whole team's agreement.

9.1 - PRIOR PLANNING

Historically, little thought was given to the subject of the impact to an environment in which climbing look place. Climbing in the greater ranges was the pastime of the few. However, as mountaineering gains popularity, so the numbers of those who explore overseas increase. It was once thought that a glacier was capable of sustaining the impact of an expedition. The reason for this was founded on the simple basis that a small amount of litter and excrement buried under the surface of a glacier cannot contaminate a huge expanse of ice. Also, there are some who state that the intense cold renders the waste inert.

During the past few years a number of experiments have been carried out in Antarctica to prove or disprove this theory - we have tried to gain access to these results, but without success. It is interesting to note that the survey teams in that particular continent are now using a system of propane-fired waste dehydration units.

As a team we decided to take the route of minimum impact and set about planning how we would do it. The plans produced to enable this to occur were the basecamp plan and the sanitation plan.

9.2 – BASECAMP PLAN

Our plan was designed to allow the basecamp to fulfil these critical elements:

- Be the focal point of the expedition where six people could eat, sleep, and prepare to climb.
- Be a place where cross-contamination of bacteria is difficult.
- Provide facilities for central water harvesting and food storage.
- Be a central treatment and storage point for waste.

The diversity of the above elements meant that most decisions were made before departure, as building the camp ad hoc when we arrived could have left us open to food poisoning.

The following plan represents the relative positions of the main items:

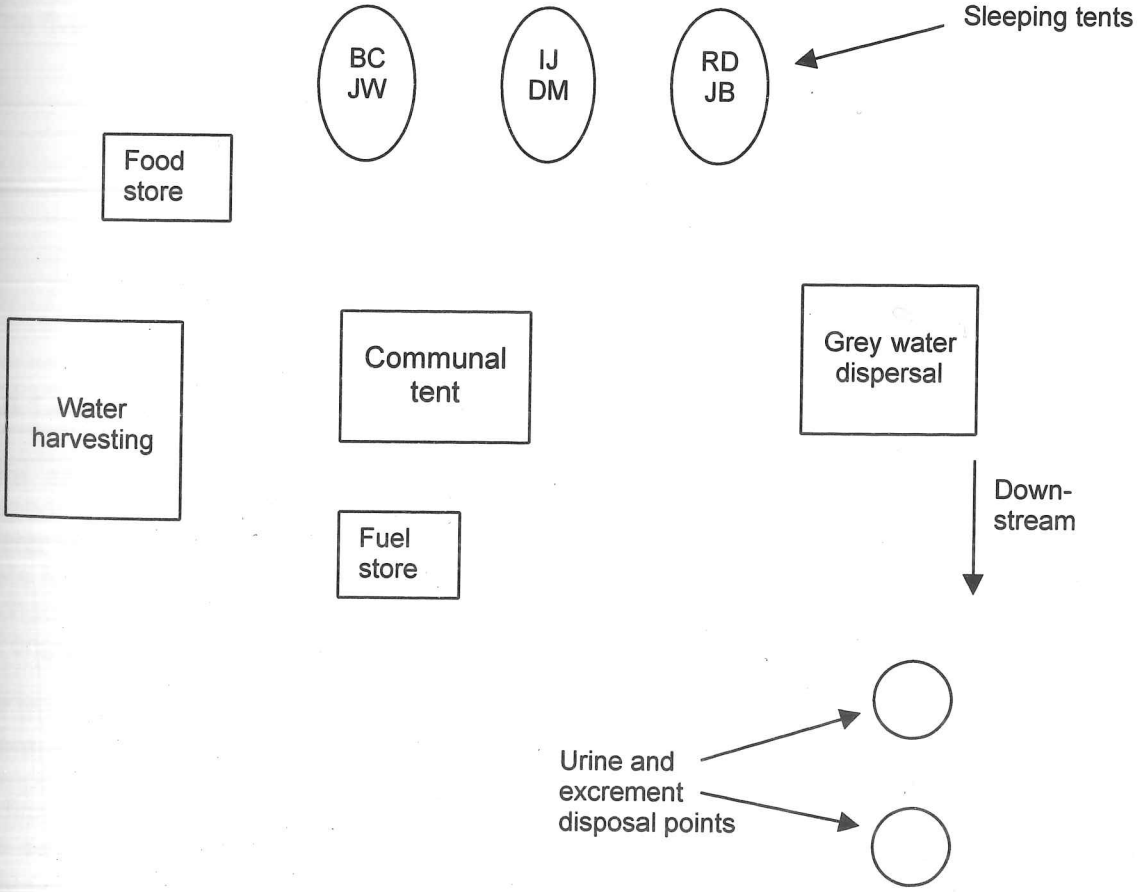


Figure 9.1 – Basecamp plan : as-built record (not to scale)

We prepared a list of actions to complete on landing on the glacier, to establish the plan above:

1. Establish what is glacier upstream and downstream.
2. Mark out snow for harvesting.
3. Clear fresh snow and set-up sleeping tents.
4. Dig in communal tent downstream of living tents.
5. Mark out area for grey water drainage, on the opposite side of the communal tent to the water harvesting.
6. Mark out an area 25m downstream of the communal tent for urine dispersal.
7. Establish the toilet/solar oven.
8. Mark clearly the fuel store.

9.3 – SANITATION PLAN

Our sanitation plan outlined how we intended to exist on a glacier without falling victim to the common ailment, basecampitis: the collection of illnesses caused by living in a tough environment, without the public health facilities that we have in our day to day lives.

The five elements of the plan are as follows:

1. Water harvesting and treatment
2. Food preparation
3. Toilet facilities
4. Waste sorting
5. Waste treatment

9.3.1 – Water Harvesting

The safe collection of water is the most critical, health-maintaining act that an expedition can do. Collecting water from a contaminated source and then using this water in food preparation is the most effective way to ensure that each team member gets food poisoning. Most of us in the team had completed a survival course with the School of Expedition and Adventure Training, in which water harvesting was an strongly emphasised part of the syllabus.

All the water we drank was to be harvested as ice or snow and then melted. As we were at altitude, the result was that we could not boil water at a high enough temperature to kill bacteria. Therefore we were going to treat all the water we used with iodine and a taste inhibitor before use. However, with advice from our expedition agent we decided that the risk of snow and ice being contaminated was as close to zero as you can get. We therefore decided that treating water was not really necessary. Indeed when we got back we found that an American team who had visited Greenland had taken a snow sample back to a lab and had tested it. The results were so low in contaminants that the lab recalibrated their test apparatus.

When on the glacier two areas were marked out: one either side of the communal tent. On one side was an area used for the disposal of grey water, such as that used for washing cooking pots and ablutions. On the other side, an area was used solely for the digging out of snow for consumption.

9.3.2 Food Preparation

It is common for members of an expedition who are unwell, maybe with the lingering effects of food poisoning, to stay at basecamp and produce the meal for the returning climbers. As a team we planned not to fall into the trap of cross-contamination.

Food storage and preparation was undertaken so as to prevent cross contamination. Most of the food we took was in sealed bags and stored in small barrels. Food preparation was shared out among the team. Brian only removed food from the store to be used on that day it was to be eaten. The exception to this was when we drew from stores the food required for a multi-day ski tour.

During the trip those members of the team who were cooking would use the evaporating soap to wash their hands. As can be seen by the injuries list (section 8.7) nobody got basecampitis. We were fastidious about hygiene, placing liquid evaporating soap by the latrines so that no bacteria returned with a person back to the tent, and keeping liquid soap with toilet rolls when away on ski tours.

The key elements in our illness avoidance were:

- All the team followed the sanitation plan
- The snow and ice used for cooking was uncontaminated
- The food was minimally handled
- We ate the food fresh, and did not re-heat any meals

9.3.3 Toilet Facilities

As seen on the basecamp plan (section 9.2) the toilet was situated downstream of the communal tent. The toilet was split into two areas: one a latrine for urine, the other a barrel for excrement. The 'barrel of joy' (as it became known) was, at the start of the trip, surrounded by snow walls running the three sides facing the tents. As the walls eroded away, users of this particular facility would suddenly find when looking behind them that the rest of the team had the telephoto lenses out.

The reasoning behind this basecamp arrangement is that of vector control. Contaminants are transferred downhill by various means, so we placed the things that needed to be kept clean at the top, and the 'dirty activities' at the bottom. Vector control has been used since biblical times and there are those that argue that the Book of Deuteronomy set out most of the basic principles used by refugee camp managers today.

9.3.4 - Waste Sorting and Treatment

We categorised our waste as follows:

- Excrement
- Urine
- Rubbish
- Toilet paper
- Food waste
- Grey water

9.3.5 - Solid Waste

See section 9.4 below.

9.3.6 - Grey Water

The grey water we produced consisted of:

- Water from the washing up including 125ml of washing up liquid
- Soap and water used during team members' daily/weekly ablutions
- Toothpaste spittle

The issue of washing needs to be explained a little further. Due to weight restrictions, team members had little spare clothing, so the 'fresh moment' that a team member felt when he had just had a strip-down wash was a wonderful "moment". Such a 'moment' would last right up to the point where the clean team member would look down at the clothing he had just removed and realised that he had to put them straight back on.

Team members used baby wipes to have mini 'fresh moments' during the trip.

9.3.7 - Urine

Urine is sterile, as long as the individuals who produce it are without serious infection. As our team consisted of healthy individuals this wasn't an issue.

Urine is a bear deterrent; it marks out your space so we all used the same spot, marked with a red flag. The hole grew at an alarming rate and became known as the yellow crevasse. After one of the snow storms it was a bit worrying approaching the smooth layer of white snow knowing how deep the hole went - this was the single biggest risk on the glacier. Urine treatment was investigated, but we concluded that a desalination plant was beyond the scope of this trip.

9.3.8 - Rubbish and Food Waste

Rubbish was collected and returned to Iceland, then disposed of into the skip at Isafjordur airport. Contained in plastic bags were such things as food packaging, wet wipes and toilet paper, the latter being treble-bagged.

9.3.9 - Things to Do Differently

It has been suggested to the team that we should have used a grease trap into which to pour the grey water. The team accepts this and is sure that by the time of the next trip John will have developed a lightweight, appropriate technology solution. Also, the sanitation officer is keen to try using the vented solar oven technique (section 9.4.4), with regard to reducing the burden of grey water and urine.

9.4 – SOLID HUMAN WASTE

9.4.1 – Existing Methods

"Crap and what to do with it" was the working title for this bit of the report. We knew that the area we were going to was virgin and we believed that, as first visitors, we should not dump our excrement down a hole. The glacier cannot break down excrement and the long-term result of a "dig a pit and fill it with -----" approach could not be quantified. Therefore we started looking at ways of dealing with the waste which would result in a quantifiable impact being determined.

There were two options open to us: one was rock frosting, the second was raking. Rock frosting involves placing excrement on a rock then smoothing it out to a thin layer. This allows the sun to dry the excrement and thus desiccate it. The logistics of doing this in the Lindberghs was such that we considered this but rejected it. The rock that was there was unsound and trying to frost a rock in that environment would have subjected us to objective danger from stonefall. We also were not sure whether it would be possible to access the rock at all, as the pictures we had of the area showed that the rock was gained only after steep ground, and there was none within a mile and a half radius of basecamp.

The second option was that of raking. It works by substituting the rock with a piece of plastic sheet onto which you place the excrement. Then the solar radiation desiccates the excrement. We rejected the idea on the grounds of health. We did not like the idea of very small bits of human faeces being blown about by the wind.

9.4.2 – A Healthier Option?

With no other tried and tested options left, John needed to innovate. The solar drying system had potential if we could just alter it so that it would not risk the health of the team. The simple thing would be to make a container into which could be placed the excrement, then for the vessel to be heated using solar power and the resulting water vapour removed.

A model was made and tested in the field next to John's house, and it worked first time. He also looked at placing a heating element in the vessel powered by a solar cell. The specification and power requirements were sent off to Solar Century: an organisation that is promoting the use of solar power in rural areas.

The reply from Solar Century's design engineer Duncan Wren is below. We have placed it in the report as an example of the help, interest and advice we received from a great many people. Two other names which stand out are: Anna McCormack (then of the RGS EAC) who encouraged us into believing that repatriating expedition waste into

a domestic system would make a worthwhile statement; and Nick Lewis, who strongly argued the subject of impact minimisation at Explore 2000.

9.4.3 - Solar Century's Reply

Good morning John,

Firstly I must point out the using solar photovoltaic materials for heating purposes is not the most economic option. Turning a high-grade energy form like electricity into a low-grade energy form such as heat does not make economic sense. But in your application I believe you may not have any choice. It is much more economical to produce thermal energy through a solar thermal collector. At this time Solar Century is not able to advise on solar thermal applications so I will work through the calculations using solar electricity.

Your requirements:
requested temperature rise (deltaT)= 22 Kelvin volume to be heated (assumed to be pure water) (V) = 0.75 m3

Calculations:
Specific heat (Cp) of water = 4186 J kg-1 K-1 Density of water (D) = 1000 kg m-3

The amount of heat (deltaQ) needed to produce the required temperature rise (deltaT) can be calculated using the following equation:

deltaQ=Cp.D.V.deltaT
i.e.
deltaQ=69 MJ

1 W = 1 J s-1

Turning this value into units of electricity (kWh) gives: 19 kWh

Considering the yearly average solar resource of the UK, it would require a PV array size of 10 kW to produce 19 kWh each day.

This size of array would be in the region of 100 m^2 !

The most significant point to consider is that the solar resource at the Arctic will be considerable less than it is here in the UK, probably requiring 2 or 3 times this size of solar array to produce the same amount of electricity.

Solar PV offers a great solution to many problems requiring electricity supply in off grid applications but I believe it is not suitable in this specific case.

I hope this has been of help.
Regards

Duncan

As you can see from Duncan's reply, a heating coil was not a feasible option but he suggested that solar thermal heating was our best bet. We had our workable design. We knew that there was sufficient solar radiation in Greenland, as the sunscreen recommendation was at least factor 25, and that the air characteristics were cold and

dry. With all of the above in mind, we were convinced that it was worth attempting to dehydrate our excrement in a vented container.

9.4.4 – The Booth Box

During our MEF interview we explained our proposed system. There was a mixed response from the panel: some thought what we were doing had merit; some thought we were being somewhat over the top; and one member pointed told our sanitation officer that: "you really are barking mad". John's response was: "quite possibly".

Our plan for the solid waste changed somewhat due to the weight restrictions we encountered after April. Our plan as discussed during the MEF interview was to have a separate waste dehydration unit away from the camp, into which the bucket used as our toilet would be emptied. As the weight issue took effect we had to drop this idea. We used a barrel as a toilet, then at time when it was not in use (such as during the day when we were sleeping or when we had left base camp on a ski tour) the vent was fixed and the toilet became a vented solar oven.

Figure 9.1 – The Booth Box

On the ski-tours we 'went' in the snow, left it to freeze, and then placed the offending items in zip-seal freezer bags. We then carried them in the pulks back to base, where they were transferred to the barrel. After deducting the weight of the barrel, we were left with 32kg of excrement. That's just over 5kg per person for the whole trip. The reason we got this weight down was by drying the excrement, and the diet played a contributory part. The total volume was only 0.31m^3.

Figure 9.2 – The product of a team of four at the end of a four-day ski tour, returned to base for transfer to the barrel

9.4.5 – Flushed with Success

Our experiment had been a success, dehydrating within a container works. Our plan was to place the contents of the barrel in the campsite toilet in Akureyri. However, at the last moment our expedition agent informed us that we were to be flying to Reykjavik direct from Isafjordur. As we were not aware of such facilities at Isafjordur, and after much discussion amongst the team (right up to our departure from the glacier), we decided to seal up the contents of the barrel and repatriate the waste to the UK. We had the barrel shipped to England, to be disposed of at a later date into the domestic waste system.

Disposing of the barrel became one of the standing jokes within the team. The journey of the barrel was not inconsiderable. Following the Twin Otter charter flight from Greenland, it hitched a ride on a scheduled flight to Akureyri, where it rested in an aircraft hangar for a month. There followed a journey by sea to Immingham, then a van ride to our agent's heated garage in Cumbria. It was swiftly rescued, and transported by car to Ian's house in Newbury where it sat outside for a number of weeks. When we realised that it was not going to get pinched, it was taken in another car to the garden of John's house in Dorset. It was some time, in fact over six months, until the final act of the sanitation plan occurred.

When the fateful day arrived, the barrel's top was removed with a wood saw and the content's re-hydrated. To improve the flow characteristics, a wetting agent was added (washing up liquid) and the contents mixed with a paint stirrer fixed to the end of a power drill. The contents did not smell too bad, considering what they were.

The idea was to place the contents into the domestic waste system by way of an inspection cover in John's garden. However after a trail run it was evident that the fall of the pipes was not great enough to convey such a burden to the sewerage plant. The then hydrated contents of the barrel were placed into a large screw-top container and carefully carried into the back of John's car. After strapping the container in with industrial cargo straps the hunt was on to find a suitable gateway to the sewerage system. John had spoken with a local caravan site manager who had offered the use of his sluice room for the same price as a caravan pitch. So, for £20 the contents were flushed into the system, and have been treated in Gillingham's sewerage treatment plant.

9.5 – THE FUTURE

As you can see, nothing we did was rocket science. In the words of a mate of the sanitation officer: "we went on holiday, shat in a tub, and brought it home."

What we did do was think about where we were going and what we were doing, then made the effort to apply some basic engineering principles to the problems that we faced. Also, it takes the will to deal with that which we ignore in our western culture.

We accept that we impacted on the environment of the Lindberghs, but we are confident of this: we kept the impact to as near minimum as we could.

All we ask of teams who read this section of the report is to do two things:

- Think about choosing the minimum impact route.
- When dismissing the above, don't do it on the grounds of it being impossible. It is possible.

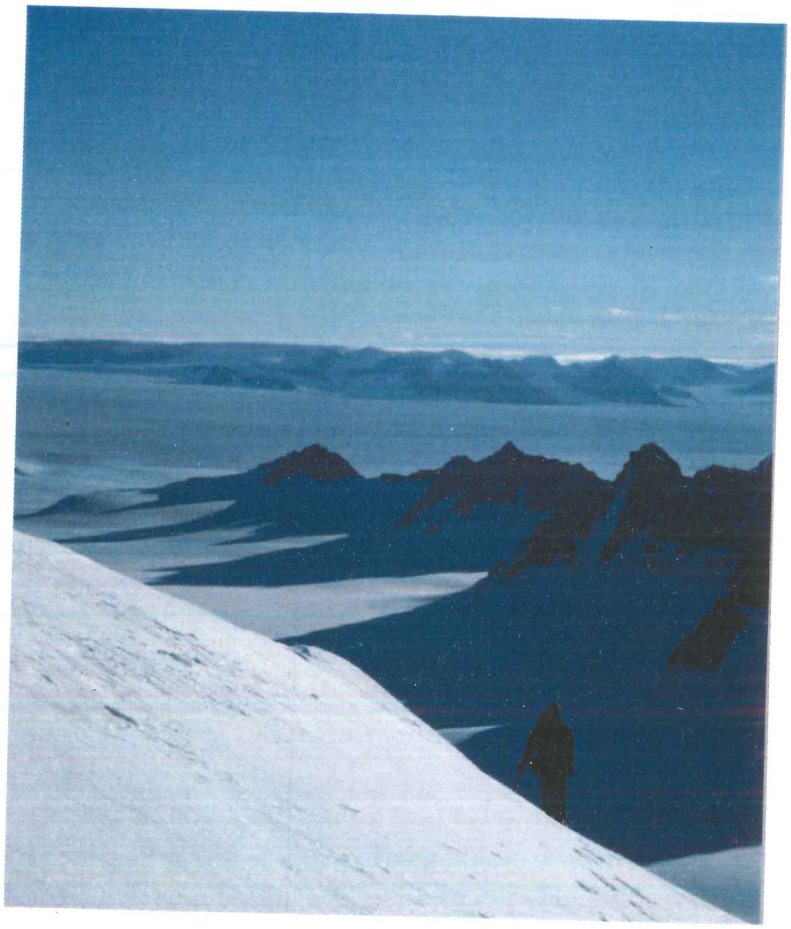


Figure 9.3 – "...leave nothing but footprints"

CHAPTER 10 : GLACIER LIVING

10.0 – INTRODUCTION

This chapter pulls together some distinct but connected issues related to living on a glacier. The weather conditions and daylight had a major impact on our climbing schedule and base camp life, and so the weather report starts this chapter.

An increasingly important element of expedition life is how to record your trip, and so we have detailed the trials and tribulations of our multi-media experiences. Then, when you have exhausted all the possibilities of discussing the weather and capturing on film the most photogenic latrine on the planet, you need something to occupy your minds during the moments of being confined to barracks. Camp entertainment concludes.

10.1 – WEATHER REPORT

During our time in Greenland it was necessary to reverse our body clocks, so that what was day became night and what was night became day. This was done because climbing conditions were at their best during the night-time hours: the snow is colder and therefore more stable. In addition to the already low avalanche risk being reduced further, the main benefit was that the suncrust was firmer, making it easier to walk/ski, and increasing the likelihood that the snow bridges over crevasses would hold.

Due to the close proximity of the North Pole, Greenland experiences 24-hour daylight during the summer months; on a cloudy night the darkest it gets is similar to an overcast day in Britain, which is still more than adequate to navigate and ski. As stated earlier, we did not take torches. Throughout this report, day is used to mean when we climbed, and night is used to mean when we slept (12 hours out from the norm).

To record the temperature, we took a fridge/freeze thermometer, the readings from which varied considerably: from +38°C to -18°C. On a clear, cloudless day with no wind, the temperature was comparable to a British summer – something which the team found strange to come to terms with considering that we were living on a glacier within the Arctic Circle. The sun's heat was very fierce and regular applications of sun tan cream were essential to prevent burning. The group shelter provided good protection from the sun's rays during the evenings and allowed a sheltered haven from the cold and wind during the day. The individual tents acted as solar ovens during the night, and at times became unbearably hot when we the team was trying to sleep. The heat generated from the sun also allowed snow to be melted and any equipment to be dried quickly and efficiently.

However during the evenings, when the sun just dipped behind the peaks and shadows were cast over the glacier, the temperature rapidly dropped below freezing. It was then essential to keep busy and add layers to keep warm. A warm drink prior to departure allowed additional intake of liquid and warmed the internal core. Even so, after an hour sorting kit before departing camp it then inevitably took another half an hour of skiing/pulk hauling before hands and feet were at a normal temperature again. On average the air temperature during the evenings would be -5°C to -10°C. It was therefore essential to keep moving, as any time taken standing around or waiting would start to lower the body temperature.

Between 05:00 hrs and 07:00 hrs the sun would protrude from behind the mountain tops with an immense array of heat. By mid morning, subject to wind conditions, skiing

in a base layer was quite pleasant together with sun hat, glasses and copious amounts of suntan cream (25 SPF and above).

Figure 10.1 – Jonathan skiing in the evening sun

The wind was rarely strong, with mild gusts most evenings. This resulted in differences in air temperature and circulated air movements up the glaciers – enough wind was even generated for kite hauling (see section 6.4). The snow was exceptionally dry and prevented any clothing becoming damp and wet – a quick shake or wipe down with a brush would remove all snow from jackets, salopettes and fleeces, plus prevent any other kit from getting wet.

It rarely snowed, and most of the snow we faced was from loose dustings blown by the wind. During our time in Greenland we only had four days of bad weather when climbing was not really a possibility, and luckily all bar one of these tied in with rest days. All in all the weather was exceptionally good and quite different from that portrayed in films of the Arctic – a direct result of Greenland's position in the anticyclone, which correspondingly brings Alaska its typically bad weather.

10.2 PHOTOGRAPHY AND VIDEO FOOTAGE

Although it was easy to spend more time behind the lens than actually taking in the sights around you, we all wanted to take back a good record of the mountains we climbed and the areas we explored. This was primarily achieved through the use of compact cameras, although two team members took SLRs. The lesson we had learned from previous climbing trips was to take lots of shots, and each member exposed at least eight rolls of 36-exposure film during the expedition. One difficulty was taking the photos at the correct time. For example, we all have brilliant shots of lazing around at

the base camp but we were all less inclined to get the camera out when on a difficult ridge of steep ice!

10.2.1 – Stills Film

We took a variety of slide films which had been bought in bulk to allow ten films per person. For most of us this was the ideal number for a 20-day trip, plus some spare for Iceland. They comprised both Fuji and Kodak films and both were good with no discernible difference to us amateur types apart from cost. Most were ISO 100 with a couple of 50s and 200s thrown in for good measure; the ISO 100s tended to give the most reliable results (at least with one team member's camera). An ISO 400 could be useful for shots inside the plane.

10.2.2 – Cameras

Everyone had their personal preference for cameras. Our arsenal included fixed focus point and shoot cameras, expensive compact cameras and SLRs with a bewildering array of attachable gadgets. It is difficult to say which is the ideal camera for these conditions as that is clearly a matter of choice. However, here are a few thoughts having seen all these cameras in action:

- Make sure your camera is free from grit – unsightly scratches on your slides are likely to cause you to grind your teeth.
- Remember to try using the camera with mitts on – most are impossible to use or you end with lots of blurry finger shots. John has the most photographed finger of the expedition!
- Can you keep it handy? The SLRs took the best photos but did seem a might awkward, as they had to be kept in a rucksack. Some people had excellent shots of the tops and bottoms of mountains, but not much in between.
- Are you are an experienced photographer? If not, then trying to use a fully manual SLR in the rather odd light you get in Greenland can lead to a number of rather too dark or too light photos, plus their fiddliness is a nightmare with cold hands.
- Consider taking a spare compact camera or two for the group, to allow SLR users to have an easily accessible camera and in case of sudden camera death.
- Weight is a constant issue here as everywhere else – a top-notch compact may produce excellent shots for only one third of the weight of a comparable SLR.
- Will your batteries die in the cold? If so, can you remove them from the camera and put them in your pocket without it having a fit?
- Keep track of what photos you took and when, as you will end up with a lot of similar photos that will take a long time to sort. Try labelling your films, and note in your diary the point at which you change films. Note down the content of the first shot of each film.
- Try to get a mixture of films or, if you decide to go for one type, try to avoid getting them all from the same batch. A batch fault could be catastrophic.

- Do not underestimate the costs of films and developing – they can be considerable. Remember that it is much cheaper to get several reprints at the time of processing and swap them with team members, than it is to get reprints at a later date.

If you can buy your films and processing as a group then you may be able to get some form of discount/sponsorship: 60 films and 2000+ slides to be developed is a pretty large order by the standards of most photography shops. Shop around and see what you can get.

10.2.3 – Video Photography

We also took with us a digital video camera kindly loaned by David Orton Audio/Visual of Hitchen in Hertfordshire. This produced some marvellous footage of our Twin Otter flight into Greenland as well as some good climbing footage. Again though, it could be difficult to get the video out during tricky sections where it would have provided the best footage.

We tried to collect as much footage as possible from the plane on the way in, to assist with providing aerial images of the area.

We took a solar panel to charge up the camera batteries, and it worked very well. However, two factors meant that we achieved very short battery life: firstly the batteries were quite old and therefore not accepting much charge; secondly the ambient temperature in which the batteries were charged and used led to poor performance.

The best performance was achieved by storing the batteries down your shirt and fishing them out to do each section of filming. Although this was awkward, it meant that the batteries were at a much more suitable operating temperature. Generally, we would charge one battery for 12 hours, and at $-15^{O}C$ get approximately three or four minutes of filming out of it.

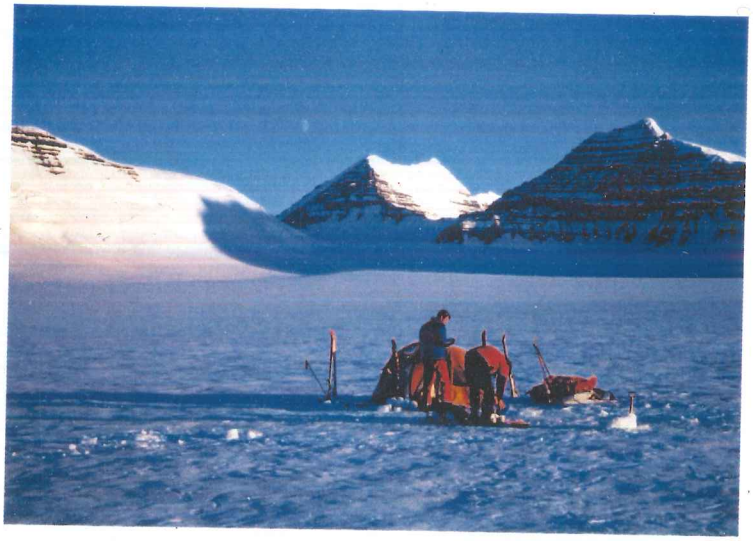


Figure 10.2 – Brian and Ian at the confluence of the Lanchester and Hurst Glaciers. Do photo-opportunities get any better than this?

10.3 – CAMP ENTERTAINMENT

We took little in the way of entertainment at base camp, primarily due to the weight restrictions. This wasn't a problem as we only had four rest/bad weather days. However, if we were forced into a prolonged stay at base, we would have started throttling each other.

Reading was the favourite pastime, with books passed between members as they were finished. One book each was taken, with an average weight of 325g, plus the Lonely Planet guide to *Iceland, Greenland and the Faroe Islands*.

The only games were cards and Scrabble, and these did receive a considerable amount of use. Physical games were very limited, again due to weight. Using the principal of dual-functionality, we were able to take three Frisbees with us. Whereas it would have been impossible to justify these in their own right, they doubled as plates for Brian, John and Jonathan. In fact, at 112g, these were lighter than the plates/bowls that would otherwise have been taken. For hygiene purposes, we ensured that they were of different colours, so easily identified. White Frisbees are not recommended.

Due to the rarity of rest days, we were never sufficiently rested to contemplate our plans for a game of ski-rounders. A detailed report would have been included, had this concept been developed.

The now widely-revered Lanchester Alpine Washing Line failed to make an appearance on this trip, for no simpler reason than at no point did we make any attempt to wash any item of clothing. Perspiration was generally dried by hanging items in or over the tents, or over skis. Another popular method was to just keep wearing the item until dried by body-warmth.

Figure 10.3 – John and Dominic enjoying an interlude between games of "Guess the Smell"

CHAPTER 11 : THE MOUNTAINS

11.1 – NAVIGATION

We used a number of navigational systems to plan and route-find in the Lindberghs. The navigation skills normally used by the team members during their mountaineering in Britain and the Alps needed some adaptation for this part of the Arctic.

11.1.1 – Advance Information

As covered in section 3.2, Greenland has been comprehensively surveyed by air and the photographs are available from the Danish Polar Centre. These photos can be obtained in stereo pairs and, with the aid of a stereoscope, can be used to produce a 3D image of the terrain.

The difference between British maps and those of Greenland are that in Britain the mapping is consistently good, whereas in the Greenland it is consistently inconsistent! As explained in section 3.2 we had two JOG maps, which coupled with the aerial photos enabled us to plan probable routes along and between glaciers to mountain objectives. Prior to departure, we used the large steroscope to mark up a copy of the photographs with the easiest routes up some of the mountains, and the most easily passable cols between glaciers. Also we were able to locate areas to avoid - where glaciers were likely to be in the most tension or compression - and thus skirt the crevasse fields that were likely to underlie the surface snow.

11.1.2 – On the Glacier

Having chosen an objective, we then used copies of the aerial photos as maps to navigate between basecamp and peaks. Also we used GPS to track our day to day travel. On the ski tours our objectives were not fixed, and it was often the case that we travelled to a peak, looked for the easiest line, climbed it (realising that it was not as easy as it first looked), then returned to camp.

We did find great difficulty judging distances in an environment where you could not estimate distances accurately by sight, as the time taken to travel between points is an important factor in any navigation. We had instances where we were totally sure that we would take three hours to get to a point, and find it actually taking over 12 hours.

Although glaciers may look as flat as a millpond, they undulate considerably. Not only did this give rise to some differences of opinion as to, for example, exactly where we had left the tent (before resorting to the GPS), it also generated substantial difficulties for separate pairs of climbers attempting to rendezvous at remote locations. The method of aiming-off was adopted successfully: aiming for a point closer to you than the expected meeting point, in order to cross the ski trails left by the others and thus be sure of where they have gone. We note that this does not work on ice!

Interpreting the available information and successfully reaching an objective was one of the things which brought home the exploratory aspect of the expedition. With the good weather and 24-hour daylight, detailed attention to navigation wasn't necessary. At all times we knew roughly where each of the groups were, and we also knew the route back to basecamp.

11.1.3 – Horizontal and Vertical Control

The team experimented with using compasses to travel on bearings. The biggest problem seem to be a lack of ability to ski in a straight line!

We took three GPS units, which all worked well. Often we reached the summits at the coldest times of the day, so waiting for the units to receive a fix could prove time-consuming. At all times they were able to gain a full fix using four satellites: this could be due to the fact that the original purpose of GPS was to navigate American projectiles over the continent of Greenland.

We used the GPS to mark waypoints such as cols and the places where we left skis before starting ascents. This ensured that, if the weather closed in, we could find the items of importance. The maps were not of a scale or standard to permit the use of conventional grid references.

With a four-fix waypoint a GPS receiver is able to give an altitude reading, but we also used three altimeters. To fit within the weight restrictions the altimeters were part of other pieces of kit: two were on watches, and one was on a penknife. We set the datum of base camp as 2400m, which was the altitude given to us by the pilots upon landing on the glacier, and the GPS units confirmed this. Therefore we set our altimeters to the datum each time prior to leaving basecamp, and recorded the closing error - produced due to barometric variance - upon returning to basecamp. Thus the difference in level between basecamp and the recently ascended peak could be averaged out to confirm the GPS reading.

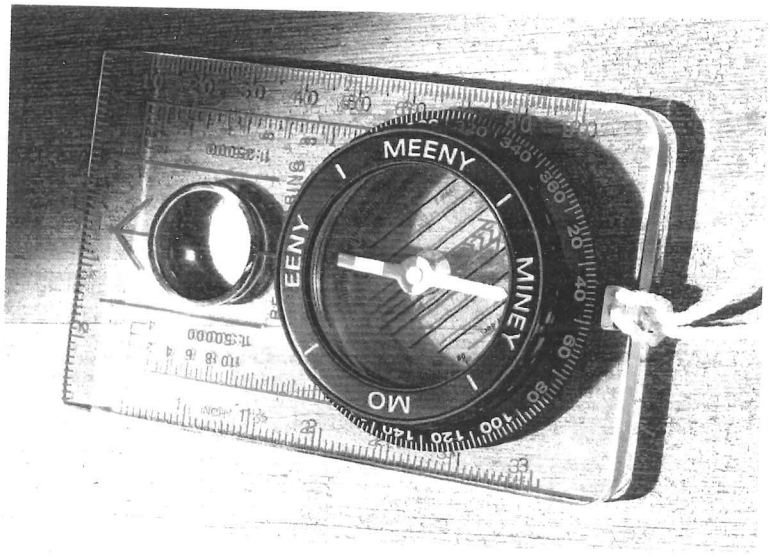


Figure 11.1.1 – What system do you use? (credit – Landrover)

11.1.4 – Maybe Next Time

Two members of the team were trained surveyors and noted that, with some small items of equipment such as a traversing compass, a considerable amount of elementary mapping could have taken place. Such activities could have occurred during the evenings after an ascent and would have been more preferable than receiving another Scrabble thrashing at the hands of the biochemist. This is something we will consider for the next trip. We just have to solve the old problem of producing an accurate base line.

11.2 – Route Descriptions

The route descriptions below should be read in conjunction with the table and peak profiles in Appendix 14. Routes are numbered sequentially as in the table, with photographs references indicated thus: A14.1. Alpine grades are used throughout, and are also given in the margin.

1 **Qaqaq Endean (2827m)** **69-05-24N, 030-58-06W**
F **Route: Northwest Col**
A14.01 D Matters, B Coombs, R Denison, I Jones, J White, J Booth on 23 June 2001

A shapely peak to the south of the obvious high col.

427m. Make an easy ski ascent heading for the obvious col but zigzagging back left to avoid two extensive crevasses. Dump the skis as the slope steepens and continue to the col. Ascend a steep snow slope 40^0- 50^0 to a rock band. Scramble through the central weakness in the rock band and ascend a short easier slope to gain the summit ridge. Ascend the mixed summit ridge (snow and loose rock) to the small rocky summit.

2 **Qaqaq Grandstand (2700m)** **69-05-14.08N, 031-01-12.9W**
F **Route: East Face**
A14.02 D Matters, B Coombs, R Denison on 25 June 2001

An easy ascent up a broad wedge shaped peak.

Ascend on ski to the middle of the east facing slope. Ascend the easy snow slope (care taken to avoid some hidden crevasses) avoiding an ice section to the left on the lower half of the slope. Ascent time 1 hr.

3 **Qaqaq Leonard (2780m)** **69-08-04.1N, 031-03-23.3W**
PD **Route: East Ridge**
A14.03 I Jones, J White, J Booth on 25 June 2001

A complex, twin-summited peak, heavily corniced along its ridge.

380m. Ascend on ski to a windy col between Qaqaq Leonard and Qaqaq Tink. Ascend the steep snow slope (icy in sections) and so gain the corniced summit ridge. The cornices are predominately on the south (left) up to the subsidiary summit. From this point descend to a dip in the ridge and move awkwardly onto the south side of the ridge (at the point where the cornices switch to the north side), avoiding some loose rock. Follow the ridge on the south (left) side more easily until the summit is reached. Use caution on the heavily corniced snow summit.

4 **Qaqaq Tink (2505m)** **69-07-24.2N, 031-02-29.6W**
F **Route: West Ridge**
A14.03 I Jones, J White, J Booth on 25 June 2001

A subsidiary peak of Qaqaq Leonard as the ridge extends out east towards the Lanchester Glacier.

A short steep ice slope leads enjoyably up to a snow ridge. Follow this (mainly on the top of the ridge) to reach the subsidiary summit after approximately 10 mins.

5 **Qaqaq Heather (2957m)** 69-05-53.9N, 031-02-29.6W
PD **Route: East Face (The Ramp)**
A14.04 J White, B Coombs on 27 June 2001

A striking feature of the Lanchester Glacier providing an enjoyable snow ascent.

Climb the large snow ramp that dominates the Lanchester Glacier keeping mostly on the right hand side to reduce exposure. Keep right on improving snow to escape from shadow onto the corniced summit ridge. Move left on easier ground and up to gain the snow-capped top. Spectacular panoramic views.

6 **Qaqaq Endurance (2888m)** 69-08-42.5N, 031-03-38.5W
F+ **Route: East Snow Face**
A14.03 R Denison, J Booth on 27 June 2001

A snow peak gained from a steep ascent up the back of the cwm.

Ski into the cwm between Qaqaq Pulse and Qaqaq Leonard. Aim for the centre of the southeast facing snow slope. Climb initial easy slope avoiding long length of ice to the right and ice bulge to left. Traverse left to avoid large crevasse near ridge, and head up short steep slope to ridge. Traverse left along wide broad ridge up to summit. Spectacular views of the southern Nunataks.

Qaqaq Polse by the Ali Couloir 69-08-42.5N, 031-03-38.5W
A14.03 I Jones, D Matters on 27 June 2001

The high, shapely summit adjoining Qaqaq Heather.

Climb the obvious couloir on the right hand side of the large south facing snow face. Deep snow makes way for easier climbing close to the shattered rocks on the right side of the couloir. Gain an exposed snow/ice arete that leads up towards the ridge on the skyline. The arete merges with a short, steep snow face leading to the summit ridge and our high point. From this thin, exposed ridge two short but steep rock walls have to negotiated to reach the summit at an estimated 3010m. High point gained at 2780m.

7 **Qaqaq Cater (2650m)** 69-08-13N, 030-52-55W
PD **Route: East Ridge**
A14.05 J White, I Jones, B Coombs on 29 June 2001

A striking line up this small but very enjoyable peak.

Traverse a steep slope on the right of the shallower but heavily crevassed ground. Move up right to climb a short, steep ice slope and gain easier ground above. Follow easy ground skirting well to the left to avoid the widest sections of two large crevasses. Cross these via the largest snow bridge you can find and ascend another easy snow slope to gain the striking, steep snow arete. Ascend this with difficulty if snow is soft. A small (10m) rock section then leads to the final snow slope and the precarious rocky summit. Spectacular views over the Lanchester Glacier.

8 **Qaqaq Whitfield (2740m)** 69-06-06.0N, 031-15-03.7W
F **Route: East Ridge**
A14.06 J Booth, R Denison, D Matters on 29 June 2001

Climb the easy snow slope up the east facing edge. Keep close to left of ridge to avoid crevasse field and hard ice. Pass easily over bergschrund to summit.

9 **Qaqaq Claire (2720m)** 69-03-53.5N, 031-19-29.7W
F **Route: East Face**
A14.07 J Booth , R Denison, D Matters on 29 June 2001
Ascend east facing slope on skis on several easy lines. Leave skis at edge of rocky summit for 10 minute scramble to summit. Easy ski down to glacier.

11 **Qaqaq Moore (2775m)** 69-03-08.3N, 031-20-31.8W
F **Route: Northwest Ridge**
A14.07 J Booth, R Denison, D Matters on 30 June 2001
Ski to col north of Qaqaq Moore and south of Qaqaq Claire. Leave skis and cross bergschrund at small rock outcrop onto ridge (melted water available in small rock pool). Follow easy ridge for 45 minutes up to summit.

12 **Qaqaq Mornington Crescent (2840m)** 69-02-09.1N, 031-20-51.6W
F+ **Route: North Face**
A14.08 J Booth, R Denison, D Matters on 30 June 2001
Climb the right hand side of the north face avoiding large crevasses on upper slope. Gradient steepens with little difficulty. Gain first rock outcrop near summit ridge. Traverse around rock outcrop to left and follow snow ridge to summit. Spectacular views over southern Lindberghs. Beware on descent if snow is slushy and soft.

13 **Qaqaq Pannell (2750m)** 69-07-16N, 031-03-24W
PD **Route: North Face and West Ridge**
A14.09 I Jones, J Booth, J White on 3 July 2001
A pleasant peak ascended through rock bands with a sound ice face leading to the exposed summit ridge.
Climb the initial easy snow slope up the north face of the peak. Cross the bergschrund and follow the steepening slope up to the rock barrier. Traverse delicately right beneath the rock wall on mixed snow and loose rock. At the end of the traverse climb a steep snow slope that eases up to a broad ridge. Follow the ridge east to an obvious ice slope. Climb the slope (hard ice) and hack through a snow bulge to gain the easy summit snow ridge. Follow the ridge for 10 minutes to the summit overlooking a deep rocky gap separating the east and west summits.

14 **Nunatak Barker (2346m)** 69-03-36N, 031-13-18W
F **Route: South Ridge**
A14.10 R Denison, D Matters, J White, J Booth on 4 July 2001
A remote outcrop resembling a Dartmoor tor in a sea of ice.
From the plateau of the Honeymoon Glacier, ascend the broad snow face to the south of the tor to reach the crest of the long snow ridge. Follow level ground, avoiding numerous crevasses, to reach the rock at the furthest point from 'the spike'. Move left along the snowline to find easy scrambling over loose rock to the summit. Panoramic views with no other peaks in a 4-6 km radius. The spike remains unclimbed.

15 **Nunatak Godfrey (2655m)** **69-09-47.9N, 031-27-53.5W**
F **Route: Northeast Ridge**
A14.11 First ascent believed to be M Lindsay, A Croft, A Godfrey in August 1934
Second ascent by R Denison, D Matters, J White, J Booth on 5 July 2001

Ascend the long but smooth icefall (25°, 2 hours with pulks) to reach low point between Nunatak Godfrey and Nunatak Garbett. Cross numerous smaller crevasses with care to reach the massive tension cracks at the crest of the icecap. The snow bridge (c. 100m across) should be avoided. Abandon pulks and traverse left on good ice along lower edge of tension cracks to point of convergence (600m). Cross crevasse with care, and ascend left over increasingly easy ground to reach small patch of clitter on summit. Survey pin in summit rock.

16 **Nunatak Garbett (2705m)** **69-10-21.4N, 031-26-17.3W**
F **Route: Southwest Ridge**
A14.12 R Denison, D Matters, J White, J Booth on 5 July 2001
Ascend to tension crack convergence as per Peak 15 above. Cross crevasse with care and traverse right over easy ground. Ascend gradually, avoiding further tension cracks to reach the snow-capped summit. Striking views of the Lemon Mountains to the south-west.

17 **Nunatak Bethselamin (2685m)** **69-10-08.1N, 031-26-17.0W**
F **Route: West Ridge**
A14.12 R Denison, D Matters, J White, J Booth on 5 July 2001

This may be used as an interesting traverse from Nunatak Garbett, and is described in descent.

Having moved purposefully down the south ridge and on to gain the vantage point at the end of the spur, descend rapidly over a convex ice slope. Follow gradually down to the right to avoid crevasse edge, then carefully cross snow-bridge to gain solid ice on the lower side of the crevasse. Follow crevasse edge to regain pulks. Ski descent to Honeymoon Glacier possible for the more adventurous ski-mountaineer.

18 **Qaqaq Spring (2800m)** **69-08-28N, 031-05-57W**
F **Route: East Face and North Ridge**
A14.09 I Jones, B Coombs on 4 July 2001

A steep snow/ice slope gives way to a broad summit ridge.

Ski up into the cwm with the obvious wedge-shaped peak on the left. Climb the middle of the east face, steep and icy with curious horizontal striations. Care should be taken crossing a couple of small crevasses that obviously open out considerably lower down. Continue up consistently steep ground (50°) to the ridge, take care as large cornices over the west face. Traverse left delicately keeping off the ridge top. Continue past a false summit and cross onto the west face where the ridge becomes cornice on the east side. The west side broadens into an easy ridge that leads up to the summit.

19 **Qaqaq Kack (2611m)** **69-11-02N, 031-06-34W**
F **Route: South Face and East Ridge**
A14.13 I Jones, B Coombs on 5 July 2001

A wedge shaped peak characterised by a large rocky cliff making up its Southwest Face.

Climb the easy slope to the east of the mountain to reach a col. Ascend the narrowing ridge to the west, corniced on the left side. Bypass two rock sections to the right but ascend the third (easy but very loose rock). Follow the continuing ridge, alternating between neve and sugar! As the ridge broadens out bypass a huge tottering ice cliff well to the right, and follow for 200m to the summit.

20 **Qaqaq Irony (2520m)** **69-11-22N, 031-17-01W**
F **Route: East Face and North Ridge**
A14.14 I Jones, B Coombs on 6 July 2001

An easy peak half way between the Northern Lindberghs and the Nunataks.

Ascend the snow slope to the right of a broad rock ridge with little difficulty. Follow the ridge above, to the summit. Laugh at the two figures toiling towards the base of the peak from the other side, and reflect on the irony that they had missed out on the first ascent by a matter of hours. Ascend smugly down the ascent face.

21 **Nunatak Gfyetbf (2770m)** **69-12-10.3N, 031-22-46.5W**
F+ **Route: East Face**
A14.15 J Booth, J White on 6 July 2001

A steep and sustained line that can prove demanding in strong winds.

Ascend diagonally left from Honeymoon Glacier to gain right-hand ridge line, and follow up on good ice (average 35^{O}) to shoulder (1 hour). Move left (75m) on exposed level crest to resume climb on further good ice (initially 45^{O}). Angle eases as top is reached after several false summits (1 further hour).

22 **Nunatak Susanne (2680m)** **69-12-57.7N, 031-20-37.0W**
F **Route: Southwest Ridge**
A14.15 J Booth, J White on 6 July 2001

Ascended only from the Icecap, and new route potential remains on the south face.

Traverse east from Peak 21 (1 hour) contouring right to stay parallel with tension cracks, until higher level ground is reached. Move right to gain south-east ridge, taking extreme care underfoot as numerous voids are present in the ice but concealed below the snow cover. Follow shallower right-hand side of ridge up to the lofty summit. Extensive views north and west over the icecap, and east to the Lindberghs. Note the innumerable unclimbed peaks, plus the two pairs of pillocks trying unwittingly to climb Qaqaq Irony from different sides.

23 **Nunatak Raymond (2789m)** 68-59-51N, 031-06-29W
F **Route: Southeast Ridge**
A14.15 J Booth, J White on 6 July 2001

An easy summit with no technical difficulty on the normal route. Descent through the icefall to the north-east is a major undertaking.

Ski north from the northern foot of Peak 22 (1.5 hours) until the ground rises towards the gentle snow top. Herring bone for as long as you can be bothered, and then either skin the last 300m, or ditch the skis and walk on firm but unreliable ground to the surprisingly narrow summit. Forget to take a GPS reading on the top as you note with alarm that the easy descent you had hoped for is in fact a corniced edge with a 400m drop. Note extensive panorama of the Gronau Nunatakker and Mountains of the Dead to the north and east.

24 **Nunatak Denison (2481m)** 69-01-33N, 031-09-48W
F **Route: Northeast Ridge**
A14.16 D Matters, R Denison on 6 July 2001

Start at northeastern ridge below thin outcrop of rocks leading towards glacier. Avoid rocks, keeping them to your right, then follow crest to small col on ridge. Avoid the direct steep ridge and traverse left onto the main east-facing snow face. Take direct line to summit avoiding two small crevasses near summit. Ascent time 1 hour.

25 **Nunatak Rotoju (2407m)** 69-01-24N, 031-10-21W
F **Route: Northeast Ridge**
A14.14 D Matters, R Denison on 6 July 2001

Ski up easy west-facing snow face onto col avoiding two large circular crevasses on left. Leave skis at col on flat area and climb directly up southwest snow arete to summit. Easy descent to skis with easy skiing to glacier.

26 ***Unknown* (2800m)** 69-12-08N, 031-20-53W
F **Route: South Ridge**
A14.17 First ascentionists unknown, 1999. Second ascent by B Coombs, D Matters, R Denison on 12 July 2001

Ski up easy angle snow slope to south col. Avoid southern facing slope which is prone to avalanche. Traverse around onto east facing slope and ski diagonally up steep slope to bergschrund 50m from summit. Cross easily and follow slope to small summit area. Beware of overhanging summit. Descend to skis for 10 minutes of adrenaline rush to the glacier below!

27 **Qaqaq Bethany (2623m)** 69-05-12.3N, 030-47-43.8W
PD- **Route: South Face**
A14.18 I Jones, J White, J Booth on 11 July 2001

An obvious snow face that is bisected by a series of horizontal rock bands.

Follow the shallow lower slope on the west of the peak to cross the bergshrund (tricky when covered in fresh snow). Follow the steepening snow slope to the bottom of the first rock step. Climb the obvious weakness in the rock step and the steep snow slope above. Pass through another rock band via a shallow gully to gain the steepening slope that leads to the summit ridge. Ascend delicately (east) along the thin snow arete to the precarious summit. Care should be taken as the ridge is corniced to the south (right).

28 AD A14.19 **Qaqaq Walker (3005m)** **69-07-54.24N, 031-02-47.13W**

Route: Northeast Ridge

I Jones, J White on 12 July 2001

The dominating peak of the Lanchester Glacier, characterised by a steep/complex west face. Other ascent possibilities include the SW ridge (from the Qaqaq Endean Col) or by gaining the first ascent route from the northwest.

Climb the easy snow slope that leads to the low point of the ridge encircling the cwm. Bypass a large rock outcrop on its left (east) side. Climb a short steep slope below an ice puddle to gain a narrow ridge. Follow the ridge southwest (on its west side) past a steep exposed section above some gaping crevasses. The ridge soon broadens, but care should be taken as there are hidden crevasses (detour to the right as soon as practicable). Climb the broad, shallow ridge ahead, through deep snow for about an hour. The ridge soon steepens and drops away over an unseen rock cliff on to the east. Traverse the steep ice slope keeping clear of the large cornices to the right (west). Care required on the steep, hard ice below the summit cornice.

11.3 – The Survey Pin

The most enthusing aspect of this expedition for each of the team members was summed up by the statement: "Isn't it amazing? Nobody's been there!"

The trip entered a new psychological dimension when Dominic, John, Jonathan and Richard reached the top of Peak 15. After 14 first ascents between the team, we had got used to the idea of treading virgin ground and - though the sense of achievement never wore off - it had become an accepted part of our venture. At the top of Peak 15, we were amazed - both by what we found, and how we reacted to it.

After confirming that the item attached to one of the stones in the summit clitter was indeed a pin of some kind, the reaction was: "Isn't it amazing? Someone's been here!"

It was a survey pin, about 10mm in diameter, and made of brass. It had been hammered/ drilled into the stone, at a point on the summit area that gave an exceptional vantage-point. From here it was possible to see in a 180^{o} arc: from the Mountains of the Dead at the far end of the Gronau Nunatakker; over the Lindberghs to the Watkins Mountains; and on to the Lemon Mountains in the south. It would be difficult to pick a better survey point than this: the last significant peak at the southern end of the Lindbergh Nunataks. The two surveyors present in 2001 insisted that the pin be left untouched: it is most unethical to disturb another surveyor's benchmark!

Figure 11.3.1 – The survey pin

The question then arose as to who might have placed this pin. We knew that we had reached the limit of the unvisited area, and that we were in the vicinity of the line that Lindsay's team had skied in 1934. Their primary objective had been to survey Gunnbjorns Fjeld (referred to by Lindsay as "The Monarch" – it had not been formerly named at that time).

Our enquiries thus far have not reached an absolute conclusion, and indeed may never. From those we have spoken to, the view is that the area has only been visited by two teams – Lindsay's and our own. It therefore must have been placed by Lindsay's team, and proves that the route they took was via the nunataks, not via the main northern Lindbergh group. We have named the peak Nunatak Godfrey - after Dan Godfrey, Lindsay's surveyor. After all, the surveyors rarely get the credit!

11.4 – FURTHER EXPLORATION AND MOUNTAINEERING POTENTIAL

Greenland is vast – make no mistake. Looking out from the Lindbergh Nunataks, it was as far from our last bit of land on the edge of the Icecap to Thule in the far northwest of Greenland, as it is from London to Gibraltar. There are mountains around much of the coast, in places 50 miles deep, and it will be decades before they are all climbed.

To focus on the region we visited, it is perhaps best to divide the review into the three areas below. Comments are restricted to those peaks that have snow/ice lines to the top, with little or nothing in the way of rock to contend with. The many peaks that have only rock lines to the top will probably remain virgin for many years – only those with a penchant for South Devon shale cliff climbing should give the rock peaks serious consideration. Many new lines exist on those peaks we have climbed, but as so many other virgin peaks abound we've not covered them here.

Where we feel able, we have estimated potential ascent grades. It goes without saying that we have nothing with which to back up these grades, but they may provide a useful relative comparison. To follow the descriptions, it may help to refer to the aerial photos in Appendix 13. Further photographs may be obtained from the team for many of the mountains described.

11.4.1 – The Northern Lindberghs

Primarily due to the proximity to our basecamp, we have climbed virtually all of the virgin peaks on the Lanchester Glacier that had snow lines to the top. The most significant of those remaining is the one 3km due north of Qaqaq Heather (Peak 5), which acquired the name Qaqaq Hyeop. This is a striking peak from all sides, and the most likely ascent route will be via the north face at approximately AD.

Along the north-west ridge from Hyeop, there are a number of smaller peaks, with ascents estimated in the PD region. There is also, of course, our piece of unfinished business: the summit between Qaqaq Heather and Qaqaq Endurance (Peak 6), of which the last 25m to the top remains unclimbed. The Ali Couloir can be climbed at AD.

Moving east to the Hurst Glacier, there are a number of worthwhile objectives available. The peak to the left of the Fenetre de Hurst (the upper col between the Lanchester and the Hurst glaciers) could be climbed via the north ridge, but there is a significant ice/serac field below the top which would present difficulties. Unlikely to be below D.

At the head of the Hurst Glacier is a trio of peaks, with various options in the AD region on their linked north faces/ridges. Little in the way of snow routes are on offer north of Qaqaq Cater (Peak 7). It was very disappointing to see the large rock step at the top of the northeast ridge of the most northerly peak on the Lanchester-Hurst chain. The northeast ridge had been looking better and better throughout our 8km descent of the Hurst from our camp below Cater.

Figure 11.4.1 – The head of the Hurst Glacier

The most significant potential on No. 3 glacier seems to be in two areas. The group at the north of the Hurst-No.3 chain would seem to have potential if access can be gained to the hanging glacier between them. There is also a stunning couloir on the north face of the northernmost peak in the group, though it did look like the ice ran out short of the top.

At the head of the No. 3 glacier is a stunning twin-topped snow face, bearing an uncanny resemblance to a mirror image of the Barre des Ecrins. Routes here will probably be in the PD region. Other routes may also be possible from the No. 3 glacier, but we cannot give a definitive view as we have only seen it from the glacier mouth. We have left the provision of a proper name for No. 3 to those who make the first ascent from it.

One significant peak remaining on the No. 4 glacier lies 3km east of Qaqaq Walker (Peak 28). Three main ascent routes seem viable, all at about AD. If care is taken to pick a route through the seracs, the north face can be climbed from the Lanchester Glacier. A more exposed but much more aesthetic line would be the north ridge: start from the rock outcrop on the col below Qaqaq Walker, and follow the ridge to the top. Lastly, there is a pair of converging couloirs to the east of the south face, and these look almost as appealing as the north ridge. It was only a fuel shortage on the tour of No. 4 that forced us to return to basecamp without trying one of the lines on this peak.

11.4.2 – The Lindbergh Nunatakker

Although we have extensively explored the southern half of this group and climbed virtually all protuberances that can be classed as peaks, the range extends north of the Raymond Icefall for over 25km. With the exception of the sledge tracks of Martin Lindsay's 1934 team, this northern section is unexplored.

We estimate that there are well over a dozen peaks available here – enough to keep a small team occupied for the best part of a fortnight. If the southern section is anything to go by, most will be attainable between the grades of F and AD.

11.4.3 – The Gronau Nunatakker

This is the range to get excited about. If the JOGs are anything to go by, the Gronau Nunatakker cover an area of up to 20km wide and 75km long. Von Gronau came past in 1931 at the end of an Icecap crossing (see Figure 3.1); Lindsay visited in 1934, climbed a few peaks to take survey readings, and skied on. So far, that's it.

Word is out that the first post-war team is intending to go in this summer, but realistically ten teams could each spend a month there without too much risk of running out of things to do. It is again difficult to be certain on grades, given the distances from our most northern camp (c. 20km), but their character seems to be more akin to the Lindbergh Mountains than the Watkins Mountains. They are certainly nothing like the Lemon Mountains.

Figure 11.4.2 – The western reaches of the Gronau Nunatakker in the distance, seen from Qaqaq Walker, looking over the lower Lanchester Glacier

With that in mind, snow and ice routes in the range F to AD should be anticipated, and it would seem sensible to counsel against using up too much of your precious weight allowance on rock protection.

CHAPTER 12 : ICELAND

12.0 – WEATHER WINDOW

From very early on in our planning, we were aware of the susceptibility of our plans to the weather. One significant consideration was that, due to the absence of all the usual airport safety features, glacier landings can only take place in good weather. The pilots need to see the mountains in order to avoid them, and to see the ground a little earlier than the moment at which the proximity siren goes off.

We were therefore advised that although our planned return flights to Iceland were to be on the "Sunday or Monday", we should allow for the possibility of an additional four day delay should a storm blow in at just the wrong time. We therefore arranged for our return international flights to be on the following Friday night.

As hoped (given that we had no emergency rations, etc.), the plane did come on time, which left us with the opportunity to have a *holiday* in Iceland, before returning home. Anticipating this, a small number of friends arranged to be in Iceland that week.

12.1 - CIVILISATION

12.1.1– Isafjordur to Reykjavik

After the rigours of the post-expedition beer up in Isafjordur (a whole two pints we'll have you know!) we, the intrepid six explorers, took the flight from Isafjordur to Reykjavik. Our only worry during the whole flight was due to the sight of our bags lying on the runway, as we accelerated past them at take-off speed. We gaped open-mouthed at our grounded bags, and asked the stewardess if they would be following us on the next flight. Her response of "probably" wasn't convincing enough, so we decided to chase up such things when we arrived at Reykjavik City Airport.

The city airport is very small – international flights land at Keflavik military airport some miles away, while the airport close to the centre of the city is used for domestic and civil flights only. We were not sure if the pilot of the twin engine Fokker chose to land with such speed or if the weather conditions demanded our power-assisted decent, but when we touched down on the tarmac we were very glad we had kept our seat belts on! The deceleration of the Fokker was abrupt, and without them somebody would have been removing our heads from the seats in front with crowbars!

12.1.2 – Getting Used to Normality

From the aircraft we looked to the departure lounge and spotted three people who looked oddly familiar. It was "the wives' club" consisting of Heather Coombs, Claire Denison and Sharon Moore (Dominic's better half). The speed at which those three men got out of the plane made the other three of us feel that we had failed in one very important aspect of the planning. After an expedition you need three things: cold beers, warm showers and hot women. John, Ian and Jonathan will remember such things next time!

After hugs and some pointed questions from Claire as to whether her new husband was frostbite free, we headed for the taxi. Some of us in the rush felt rather light and baggage free, then we remembered that our bags were still in the far north of Iceland

and we were in the south. Speaking with a representative of the airline, we were all glad to hear that our bags were "still safely on the runaway," but would indeed be put on the next available flight.

Some of our gang took the taxi with the baggage, the rest of us walked to the guesthouse. Those of us who walked felt odd walking on the hard pavements. It seems we had developed a strange gait for the soft, sponge-like consistency of the glacier. Also the sights and sounds of a city and the smell of a warm summer rainstorm felt oddly new.

During the walk our group got lost. That explorers with such recent first ascent experience as us should be questioned in navigational matters was rather grating. However, we were wrong and the wives' club was right, and soon the guesthouse loomed ahead. Some of us still argue in our defence that we were used to interpreting maps, not blindly following them!

12.1.3 – Food and Beer

After a bit of unpacking and sorting out of rooms we headed out to the city, picking up information about what to do and where to go. The waffle van just off Bankastraet had good trade as our bodies were still thinking about the 4000 calorie diets we had been on, not 48 hours previously.

After a couple of waffles as a starter we looked around for something a bit more filling – the café Solon Islandus next to the parliament building is cheap, yet chic. The rest of the day was spent picking up leaflets in the tourist information centre and checking out the beer prices in the state alcohol shop.

Iceland is very strict regarding the sale of alcohol and until recently only allowed the serving of a weak beer in pubs. Off-licences as we have them in the UK do not exist. You are allowed to purchase alcohol, but is not a pleasant experience: the shops are sombre and you are constantly watched by security guards. Sadly for a post expedition destination, the shop's atmosphere was not the only way the Icelandic government attempts to restrict alcohol – the products themselves are heavily taxed. Not that it stopped us; later that night we met up with some of Brian's work mates (the Fan Club) and headed to the Mexican restaurant on Laugavegur. An excellent night was had by all – lots of beers, good food and very weird bloke in a sombrero who was little too successful in his attempt to get Heather completely smashed on cocktails.

12.1.4 – Tourist Attractions

With two mind-bending hangover between us and the Lindberghs, the expedition may have been over but the city was yet to be explored. We found Reykjavik to be a stark and stunning city – the Icelanders are justly proud of the development that has occurred in the city over the past 40 years. Their boast is that they have a lively and vibrant culture in a harsh and unforgiving setting. The architecture is interesting and varied, from the timber framed to the concrete prefab. The two most stunning buildings have to be the two major churches. The Hallgrims-kirkja is the most easily visited being just away from the centre. It is a brilliant building using reinforced concrete in a way that could impress Prince Charles. The other must-see is the Lutheran church and bible college: it seems out of place when seen close up but the domed minarets, and

green and red colour used in its make up, add just more interest to the skyline of the city.

Another building worth visiting is Hofoi House, the building used to house the meeting between President Regan and Chairman Gorbachev in 1986. The meeting was said to be a turning point in the Cold War, and the Icelanders are proud of the fact that the Cold War began its end on their soil.

The government of Iceland occurs openly and visitors can enter the parliament building – the Alþing – to listen to the debate. Each day translators are there to enable international visitors to understand the workings of the government. In the time we visited a member of the public had entered to have his say about a farming issue that was being discussed, and the Minster openly engaged him in conversation. It was impressive demonstration of open governance in action.

The city has a number of art museums that are worth visiting, with some interesting displays of local art. The landscapes are the most striking, and show the difference brought by painting in a country which experiences 24-hour darkness and 24-hour daylight within the same year.

Swimming is the nation's leisure pastime, and each day we attempted to visit the city pool. It is cheap and the water is very warm, being geothermically heated. The Blue Lagoon is the most impressive pool to visit – it is outside the city but worth the effort.

Figure 12.1 – The Blue Lagoon: power station effluent put to good use

12.1.5 – Budgeting

There is no getting away from the fact that Iceland is very expensive, but it is worth it. You should budget on about £300 to get the most out of the city during a week's stay. Also, make full use of your duty-free allowance before you enter by picking up some spirits. Finally, Iceland has a short summer - it is measured in days of good weather - so take your Goretex everywhere you go.

12.2 – THE GOLDEN CIRCLE

Reykjavik is the perfect base for either day trips or longer voyages to explore Iceland's volcanic landscapes, with the most famous of these trips being the Golden Circle. The Golden Circle, as it name implies, is a circular trip of some 100 miles taking in the many natural features of south-west Iceland. The circuit can be undertaken in either direction, and to fully appreciate each of the sites you should allow around eight hours.

The journey starts by heading through lava-filled countryside towards Hveragerdi to view the fruits, vegetables and flowers grown in greenhouses heated by natural thermal springs. It's also a useful re-stocking point for anyone who has run low on stuffed Puffins. The next stop is Kerid – the lake-filled crater of an extinct volcano. The circuit then continues to Skalholt – the site of an ancient Bishopric with an interesting modern new church.

The next stop is Gullfoss and Iceland's star attraction, where the river Hvita (White River) drops a total of 32m in two falls. The canyon above and below is 70m deep and 2.5km long. The journey then turns towards the famed Great Geysir area, with many hot springs, mud pools, steaming vents and geysers. Strokkur is the world's most active geyser and is likely to spout up to 60m several times during the hour. It is also worthwhile climbing up the hill Laugarfjall, which is topped by a viewing disc, to get a spectacular view across this landscape.

As a contrast to the harsh, barren countryside, the route continues through fertile farmlands to Thingvellir, a great lava arena in a rift valley between the European and North American tectonic plates, where the Icelandic parliament met for centuries. Finally the circuit brings you back to Reykjavik for a well-deserved rest.

The trip can be undertaken either by booking a coach tour, which will cost between £40-50, or by hiring a car. Both of these options can be arranged at the tourist information centre on the main shopping street in Reykjavik. The use of a car will allow you more freedom and, due to the almost 24-hour daylight during the summer, will give you the option of starting your trip earlier or later to avoid the busy crowds.

12.3 - HONEYMOON ADVENTURES

The passage that follows was written by Richard, and for reasons that will become obvious, has been left in his own words.

> "I must be the luckiest man in the world - not many outdoor enthusiasts manage to find a like-minded person who enjoys the same outdoor activities, is caring and loving and has a great sense of humour. Also not many people managed to ditch their wives three weeks after getting married to go climbing for a month with the lads! I *am* the luckiest man in the world!
>
> "After three years of dating, Claire and I decided to tie the knot and get married. Unfortunately, the special day fell approximately three weeks prior to the biggest adventure of my life – a mountaineering expedition to east Greenland to conquer unclimbed peaks and explore some truly Arctic wildernesses. If it was not for Claire's enthusiasm for the great outdoors: to visit new places, explore new countries, experience different cultures, and do as much exercise as possible, then I'm sure I would have never been allowed to go, and would have spent the rest of my life cleaning dishes, hoovering and saying "yes dear". Instead, she

allowed me to experience the trip of a life-time with only one condition – that I came back.

"The lead up to the expedition was overshadowed by the preparations required for our wedding day: organising photographs, arranging seating plans, choosing dresses/suits, hiring posh cars - the list was endless. Mind you, the wedding day itself was in some ways all about mountaineering: an ice axe arch as we left the church, a wedding cake engraved with boots, ropes, ice axes, tents, etc, mountaineering references in the wedding speech.

"Once I had been given the authority to be involved in the expedition it was decided that the honeymoon would be put on hold until the following year, so we could save for a trekking holiday to the Himalayas. Little did Claire know that our friends within the mountaineering club were arranging a flight for Claire to Iceland. This would coincide with our return from Greenland so that we could spend a week of married bliss together in a truly spectacular country.

"As time grew closer to the wedding Claire's frustration in not having an exotic holiday took it is toll, and what was going to be a surprise on our wedding day was received a little early. I won't bore you too much with details of the wedding except it will be the most memorable day of my life. Claire looked stunning and to have so many close people coming to celebrate our marriage will be a memory that will be with me forever. A weekend in North Wales followed directly after the wedding with a scramble along Crib Goch up to Snowdon, touristing around Caernarfon and lots of eating and drinking.

"The start of the expedition commenced with the team saying a teary farewell to their loved ones at Stansted Airport, before embarking on numerous plane flights to get to Greenland via Iceland. Greenland has the most stunning scenery and never did I imagine how kind Arctic weather could be – I've obviously watched too many films!

"On the return to Reykjavik I was greeted by my good wife. For nearly three and half weeks we had had no contact – a testing time in any relationship. The next week together was going to be enjoyable, even more so when Mr White presented us with a little change left over from Claire's flight ticket – the princely sum £200 to spend on something exciting!

"After a day's swimming and bathing in the outflow of a thermal power station (otherwise known as the Blue Lagoon) we joined forces with Sharon and Dom for a day's trip around the Golden Circle. The following day we decided to spend the honeymoon present money on an Icelandic adventure...

"The day started at 8am when we were collected from our guest house (otherwise known as Snorri's) by an American 4x4 on steroids. A large ten-seater Ford 4x4 had been imported from America and upgraded with new suspension, tyres over a metre high and a full GPS navigation system. Many of the roads away from the main highways and towns resemble dirt tracks and the only means to get around is on off-road vehicles. For the complete nutter, these upgraded vehicles can even be taken onto the glaciers. Having left our basic guest house dressed in fleece trousers, Goretex and woolly hat, we collected from five star hotels, seven other passengers all dressed in smart trousers and shoes. The clientele on this trip certainly resembled moneyed people – at approx. £120 per person it wasn't a cheap trip, but there again you don't get married that often!

"We headed towards the Myrdalsjokull Glacier, a two hour journey from Reykjavik, where we were going to take skidoos to the Summit of Katla at 1,450m. Having left the main highway the driver stopped and released nearly all the pressure from the tyres to drive up the boulder rock field at the head of the glacier. We pulled up alongside a mountain refuge and waited while a trip returned with the skidoos. To my amazement it was 30 Japanese tourists!

"We climbed into our all-in-one weather-proof suits and helmets. Then, after a five minute instruction on how to start, turn and stop the skidoo - , which seemed no different to my dad's petrol lawn mower - we were ready to go. I jumped aboard with Claire hugging me for dear life. As I pushed the throttle down we crept forward – within five minutes we were whizzing along at 40kph. Around 30 minutes later we reached the summit in a thick mist. Claire was apprehensive at first, but eventually took over and within a minute wished she had taken over earlier. As we jumped off we both asked the question: "so how much do you think skidoos cost?" Great fun, exciting and something you can really kick-ass with! Certainly a toy for the future.

"Having boarded the truck and driven for 30 minutes we then found ourselves at the sea edge watching seals playing in the waves. What makes Iceland so fascinating is the contrast in landscape: one minute it's glaciers, mountains and rock, the next minute the sea, lava flows and boiling bubbling water pools. On the return journey we stopped off at two impressive waterfalls and visited the greenhouses of Iceland.

"The next day we brought presents, visited the penis museum and drank whisky on a yacht called the *Black Velvet* in Reykjavik harbour.

"Finally, we would both like to thank everyone who contributed to our wedding present: you helped make our honeymoon a trip to remember for many years to come. The most enjoyable part of the honeymoon for me was seeing Claire at Reykjavik Airport on our return, racing across the glacier on the skidoos and sharing a bedroom with Brian and Heather!"

Richard and Claire Denison, September 2001

Figure 12.2 – Claire Denison taking control

CHAPTER 13 : FINANCES

13.0 – INTRODUCTION

Mounting an expedition is not only a major logistical operation, it is also a major financial undertaking. Funding such a venture privately is either beyond or at the limit of the means of most individuals, and this team was no different. With one member still at university and two others having only recently left (to say nothing of the proximity of weddings), it was established from the earliest stages that a tight rein on finances would be needed if the trip was to take place at all.

Finances were the primary reason for some major difficulties that we experienced throughout the preparations, and were instrumental in the decisions of many people to either not join or withdraw from the team (as explained in section 2.1.4).

Management of the finances may be split into two key areas: the forecasting of costs and cashflow, and the day to day running of the expedition account. The former is by far the most involved element, but is of critical importance if the team is to be able to make educated judgements on if and how they will be able to afford items.

A brief summary of our approach to financial risk management is followed by an analysis of income and expenditure and the balance sheet. This should be read in conjunction with the relative parts of Appendix 12, which contains the spreadsheets used.

This report is also available on CD ROM, and the spreadsheets therein are included in a useable format. No guarantees are given as to the accuracy or comprehensiveness of these spreadsheets, but they are made available to assist future teams with their planning. It is noted that to have full confidence in the use of any spreadsheet, the user must determine the logic and limitations of the mathematical interrelationships. In essence, they helped us, they may help you .

13.1 – FINANCIAL PLANNING

13.1.1 – Initial Budget

The first questions asked by virtually all potential expedition members are 'where?', 'when?' and 'how much?' Precise costing isn't something that can be determined until the entire venture is complete, but at stages during the organisational process it is possible to make ever more accurate estimates as to the likely out-turn costs.

To overcome the initial hurdle of a first estimate, we used two main sources: previous East Greenland expedition reports, and quotes from a commercial operator. The former vary considerably, not necessarily because cost varies that much, but because all teams have elements of group expenditure and personal expenditure and different teams include different elements in their reports. Quotes from commercial operators also vary, as they may include a guide, and will incorporate business overheads, etc. Even 'fully comprehensive' commercial quotes will generally exclude insurance and some of the requisite equipment, and may also include some risk apportionment clauses.

However, a brief analysis of a number of these sources brought us to the conclusion that a trip was likely to cost in the region of £24,000 for a team of six: i.e. £4,000 per person. It was upon this basis that we were able to put the team together, with some confidence that our estimate would be accurate to +/- 20%.

From this point on, the team members undertook to underwrite the full cost of the expedition, though clearly there was considerable opportunity to seek to reduce costs and gain financial support from other sources.

13.1.2 – Detailed Forecasting

As preparations for the trip developed, so too did our appreciation of the main areas of expenditure and the variable nature of some of these items. Concern developed in the team as to the accuracy of the initial estimates, and confidence was sought that the trip was still financially within everyone's reach.

In order to best assess and manage these variables, at G-7 months, a financial risk assessment system was developed. This was then reviewed periodically as payments were made, and the status of items changed from 'estimated' to 'confirmed'. The Real and Contingency Accounts workbook is included as the first four pages of Appendix 12, with the example given from a review dated 22/04/01 (i.e. G-2 months). Individual pages in the workbook are explained in turn:

13.1.2.1 - Balance Forecasting Spreadsheet (Section A12.1)

This covers the key items of expenditure and income, and acts as a Topsheet for the supplementary calculations made on the following pages. It can be seen that many of the items remained variable at that point in time.

It should also be noted that two of the items (ski hire and firearms training) have been zeroed. This is because they were paid separately by the team members, and not through the expedition account as originally expected. The expenditure was obviously

still made, and this is highlighted as an example that few expedition financial reports are directly comparable, and in virtually every case some interpretation is required.

13.1.2.2 – Contingency and Realistic Cost Spreadsheet (Section A12.2)

This is perhaps one of the most important sections of the accounts, and enabled the team to determine a sensible level of contingency. Each variable item was listed in turn and assessed against four cost headings: Best Case, Realistic, Mildly Pessimistic, and Worst Case. For each item, any one of these cost headings could be the driving estimate (dependent on the nature of the item), and the other three headings would then be derived from it.

Using exchange rate as an example of a 'realistic' based calculation:

> As part of the conditions with our transport subcontractor (Paul Walker), we paid in Sterling, but were responsible for covering any extra costs arising from fluctuations in the exchange rate. We knew that such occasions were rare, and the contract stated that fluctuation payments would be capped at a maximum of 10%. We estimated that £12,000 of our c. £17,000 payment to the subcontractor would be affected by exchange rate fluctuations, and therefore the worst case scenario would be that an additional £1,200 would be required. A mildly pessimistic view could be that half of this would be needed, and the realistic view was that it was unlikely that we would have to pay anything extra. As there was no mechanism in our contract for improvements in exchange rate to result in a rebate, in this case the best case variance was also zero.

Using equipment as an example of a 'worst case' based calculation:

> Having assessed that the full price of our equipment requirements was £2,050 (see section 13.1.2.3 below), then this was clearly the worst case. Although some items would have to be purchased at full price, discounts were anticipated on much of the equipment, and we concluded that a 20% average discount would be achieved. This (£1,610) therefore became our realistic estimate. A 10% discount was estimated for mildly pessimistic, and 30% for best case, giving the totals and variances as shown in A12.2.

Once each cost heading had been assessed, a realistic value could be applied to each item. This realistic value was then linked back to the Balance Forecasting Spreadsheet (A12.1). With the variance per item of each cost heading calculated relative to the Realistic cost, each cost heading was then totalled.

After discussion, we concluded that there was a 50% probability of the Mildly Pessimistic total (£3,031) arising, and therefore £1,516 became the contingency to be paid into the expedition account (split equally between team members).

The Best Case total was used in the Balance Forecasting Spreadsheet to assist in the estimation of the lowest possible cost of the expedition (a good figure for the financially troubled members of the team to aspire to).

There of course remained the albeit remote possibility of everything going wrong (total Worst Case = £6,034). As the likelihood of this was minimal, it was not considered necessary to pay this money into the account. All we needed to do was ensure that the funds were available if required. Therefore, each team member ensured that if required, they were able to access from credit cards, etc. sufficient to cover a 1/6 share of the £6,034.

13.1.2.3 – Equipment Expenditure Spreadsheet (Section A12.3)

This is largely self-explanatory, and feeds into the Contingency and Realistic Cost Spreadsheet. Splits were made between discountable, non-discountable, and sponsored kit to prevent skewing of the figures. The "Total : Kit to Purchase" figures are those used in 13.1.2.2 above.

13.1.2.4 – Grants and Sponsorship Received Spreadsheet (Section A12.4)

This is also self-explanatory, and feeds into the Income (received) section of the Balance Forecasting Spreadsheet.

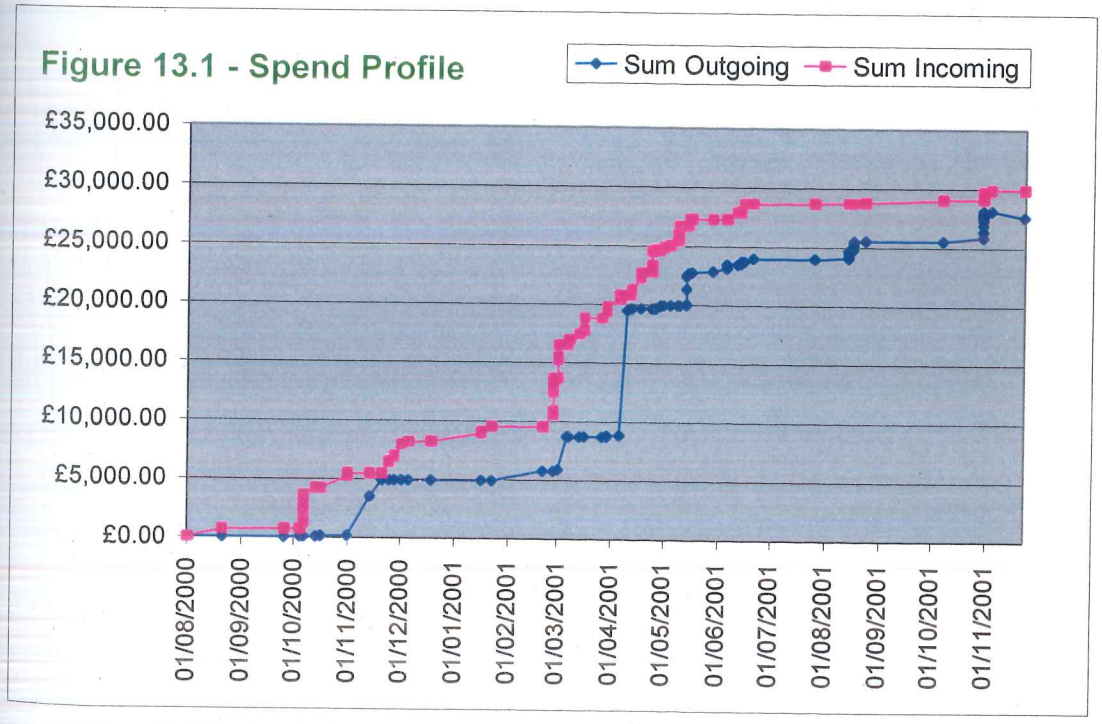
13.1.2.5 – Paul Walker Coverage Spreadsheet (Section A12.4)

A final spreadsheet was prepared to cover the separate elements of the service provided, but was unused as an all-in quote was given. Paul Walker's service covered primarily flights and freighting, plus stove fuel, permit fees, and three of the seven nights accommodation in Iceland. We also hired some specialist equipment from him (pulk sledges, rifle and EPIRBs), and all of the above were included in his quote.

13.1.3 - Cashflow

The other critical element to link with cost is time. A view was taken as to when the items of expenditure and external income were likely to arise, and a payment schedule drawn up to ensure that the personal payments of the team members would ensure sufficient balance in the account to cover the costs as they arose. This was revised in line with changing requirements, and following the decision to extend a loan from five team members to the sixth (see section 2.1.5)

The spend profile is given below:

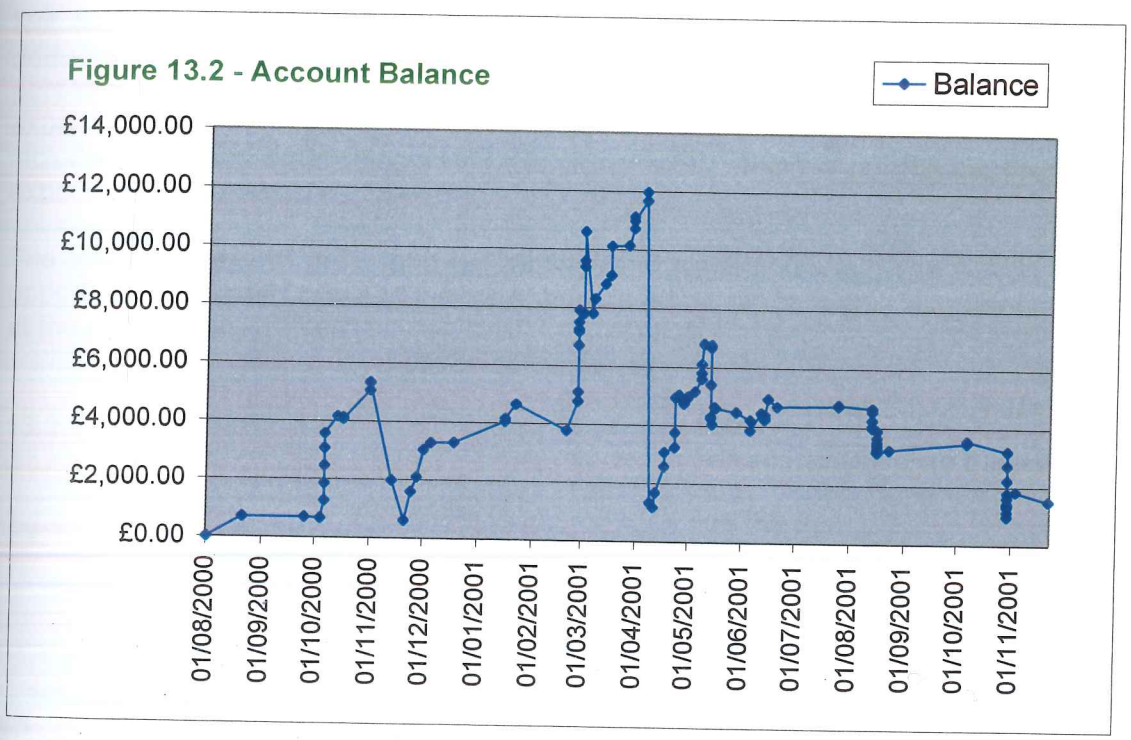


Although an attempt was made with this expedition to set the incoming payment schedule to keep just ahead of the outgoing, for many of the team it was preferable to set up a regular monthly payment into the account. If this latter method had been followed by all, it would have provided the other team members with the reassurance that all are able to meet their financial commitments which was obviously not the case with one of our team.

It is noted that those team members that initially strongly advocated the 'just in time' approach to deposits now favour evenly spread payments as the best means of providing an early warning of individual's cashflow difficulties.

A profile of the account balance is given below:

Figure 13.2 - Account Balance



13.2 – INCOME AND EXPENDITURE

13.2.1 – Gross and Net Figures

Before looking at direct and proportional costs, it is necessary to distinguish between the Gross and Net figures. At 21st April 2002:

Gross turnover = £30,139.44 (considered final, excepting the outstanding loan)

Net out-turn = £22,530.90 (including £420 additional costs expected)

Gross figures constitute all the transactions that went through the expedition account, and thus relate to the spend profiles and account balance profile above. They are also a measure of the allocation of the finances required to mount an expedition.

Net figures illustrate the final cost of the expedition. From the gross figures are deducted such items as external transactions, unused contingency, asset sales, and personal equipment. It is these figures which are comparable to those of other expeditions, although the details of item coverage will still vary. For instance, we have included films and developing in the net group costs, which is not the case with most expeditions.

The proportionality of gross and net income and expenditure is given below, and the opportunity has been taken to further subdivide some of the larger items when looking at the net figures.

13.2.2 – Income

Figure 13.3 - Gross Income

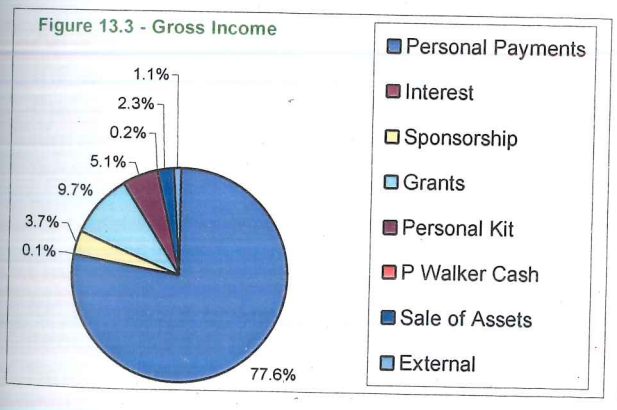
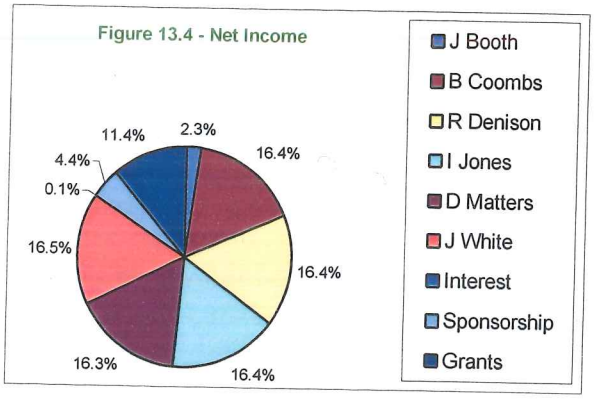


Figure 13.4 - Net Income



As can be clearly seen from the above, the vast majority of the funding for the expedition was through personal payments, constituting 77.6% and 84.3% of gross and net income respectively. Grants and sponsorship were also a significant element, but were of greatest value in overcoming the cashflow problems as described in section 2.1.5.

Grants and sponsorship were areas into which some of the team put considerable work, and if the financial return were to be measured in proportion to the time involved, then it is arguable whether it is all worth the effort. A BMC officer commented at the outset that some teams had decided that there was so little sponsorship to chase, their time would be better spent working behind a bar and at least ensuring that they got some money for the time and effort put in.

However, although there is some sense in this (it is better to spend your time earning, rather than begging), what must not be forgotten is that hard cash is only one of the potential benefits of pursuing grants and sponsorship. Particularly through grants, the expedition can gain recognition and credibility from the implied or express endorsement, and examples of the assistance that money cannot buy are given elsewhere in this report (e.g. sections 3.2.5 and 8.2).

The above figures do not reflect the effect of goods or services in kind, as their value is not captured by either the gross or net figures. We were given/loaned/discounted many items of equipment and food, which would have cost us many thousands of pounds had we had to source them at commercial rates. The acknowledgements list at the front of this report gives an indication of the level and breadth of the assistance received.

13.2.2 – Expenditure

Figure 13.5 - Gross Expenditure

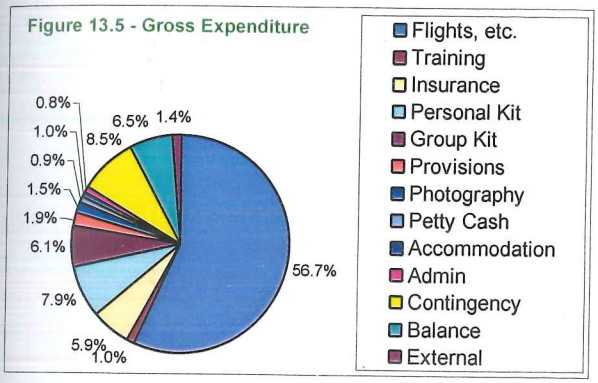
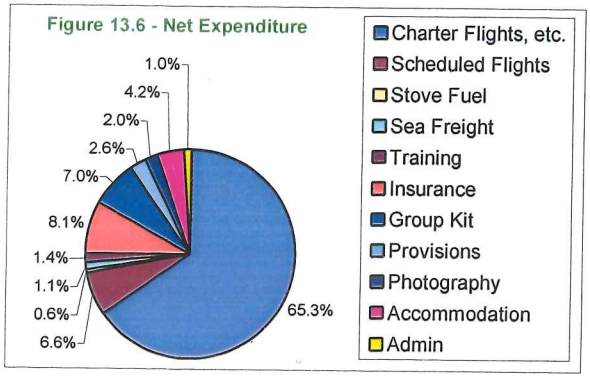


Figure 13.6 - Net Expenditure



An attempt has been made above to give as meaningful as possible an indication as to the areas of expenditure, subject to the same caveats as in 13.2.1 above. It is noted that in addition to the personal equipment purchases made through the account, a significant amount (about £3,000, including skis, kites, etc.) was purchased independently. The level of this expenditure was at least in part as a result of people buying lighter items than those that they already owned.

One major aspect that required breaking down was the payment made to Paul Walker for the array of items covered within his lump sum. As this was a mixed collection of items, an entry of "payment to P Walker" would be about as meaningful as "payment to Barclaycard".

Clearly, the vast majority of this payment was to cover the charter of the Twin Otters and the other flights, with most of the remainder overlapping with items upon which the team was independently spending (e.g. equipment, accommodation, etc.). The estimates are therefore based on a pro-rata from either our equivalent items, or from items identified in other expedition reports.

Expedition expenditure was quite tightly controlled, with all members of the team very conscious of the difficulty some members had in financing their share. The only abortive costs were in those items of food which were purchased some months before departure, and subsequently failed to make it into the weight allowance (they were eaten in the UK, so were not wasted).

Some deliberate moves were made to spend more up front to purchase higher quality items, in anticipation of a greater return at the end of the trip. A notable example is the tents, where cheaper alternatives would have given a poorer performance and would have been worth less when sold upon our return. Although the out-lay was higher, the net loss was less.

Sale of assets was undertaken on a simple basis: to ensure rapid liquidation, general sales were at 50% of recommended retail price of the given item, whereas sales to team members were at 50% of the price we actually paid. As 1/6th of the payment would be distributed back to that team member, the price to team members was actually 12% less than the 50% paid. Some less marketable items (barrels, snowshoes, glacier group tent, etc.) have been retained for future use.

With such a high proportion of expenditure on one item (the Twin Otters), some significant savings in other areas only had a minor effect on the total cost. In opting to utilise the services of Paul Walker, we considered the risks and opportunities of chartering directly. Clearly, if we had been able to link in our flights with those of other teams so that the planes were full on all outward and return journeys, we could have brought this cost down markedly. However, with the chances of not filling the planes much higher than those of filling them, we opted to minimise our risk by transferring it (and the associated opportunity) to an organisation better placed to manage it.

The costs to us were certainly less than had we chartered directly and failed to find others with whom to share the planes.

13.2.3 – Balance Sheets

PROJECTED GROSS INCOME

Personal Deposits	£23,400.30
Interest	£15.73
Sponsorship	£1,126.00
Grant Funding	£2,930.00
Personal Kit Purchases	£1,544.67
P. Walker Cash Return	£72.00
Sale of Assets	£706.46
External Transactions	£343.78
Accounting Errors	£0.50
Total	**£30,139.44**

PROJECTED GROSS EXPENDITURE

Paul Walker Payment	£17,076.00
Training	£310.00
Insurance	£1,785.10
Personal Equipment	£2,381.35
Group Equipment	£1,830.97
Provisions	£576.08
Photography	£444.47
Misc. - Petty Cash	£258.09
Accommodation	£309.81
Administration	£226.84
Contingency Returned	£2,566.70
External Transactions	£409.66
Accounting Errors	£0.82
Additional Admin.*	£400.00
Waste Disposal*	£20.00
Proj. Contingency Remaining	£1,543.55
Total	**£30,139.44**

* Awaiting final invoices

PROJECTED NET INCOME

Personal Payments	£18,459.17
Interest	£15.73
Sponsorship	£1,126.00
Arctic Club Grant	£600.00
BMC Grant	£700.00
Eagle Ski Club Grant	£150.00
Gino Watkins Grant	£600.00
MC of I Grant	£240.00
MEF Grant	£640.00
Total	**£22,530.90**

PROJECTED NET EXPENDITURE

Charter Flights	£14,446.00
Scheduled Flights	£1,470.00
Stove Fuel	£132.00
Sea Freight	£250.00
Training	£310.00
Insurance	£1,785.10
Group Equipment	£1,542.51
Provisions	£576.08
Photography	£444.47
Accommodation	£927.90
Administration	£226.84
Additional Admin.*	£400.00
Waste Disposal*	£20.00
Total	**£22,530.90**

14 : FINAL COMMENTS

14.1 – Further Top Tips

The aim of this report, as stated at the start, has been to record not only what we did, but also how we did it. In each of the subsections, the respective team members have followed our guiding principle of: "what do we know now that we didn't know before?" In doing this we have endeavoured to highlight the elements that worked, those that didn't, and to offer some suggestions as to alternatives for the future.

The general approach for disseminating information from expedition reports appears to be that the aspiring team acquires a copy, which is then split into the sections that pertain to the roles of the individual officers. The messages that we have recorded should therefore reach the correct members of any team. To prevent repetition in what is already a lengthy report, we have decided not to repeat the conclusions here.

Of course, many comments that have not yet been put into the report keep surfacing. For example, the one item of kit that we took that we would recommend leaving behind next time: bivvy bags.

> They had been included to enable lightweight excursions to be undertaken, avoiding the need to take the tents on all multi-day trips. Reasons: firstly, if you are pulk hauling, then the weight is far less of an issue compared with carrying a rucksack, and we also found that pulk hauling was preferable to skiing with heavy rucksacks.
>
> Secondly (and crucially), on a sunny night it is far too hot to lie in a bivvy bag. The protection that a tent offers from the sun is essential for a comfortable night (unless you're going into the realms of snow-holing), plus the solar oven effect mentioned previously means that without some air around you, it will be just far too hot.
>
> On many occasions we went to sleep wearing only thermals (or less), lying on top of our sleeping bags. As the sun started to fall after the middle of the night (c. 5pm), the temperature would drop markedly and the sleeping bags would then be used properly. There are obviously the nights of bad weather, but we found these to be pleasingly small overall.

There are dozens of such comments that we wish to record, but this has to be balanced by the wishes of Mr Ruthven and others, to finally see this report completed. Every member of the team is included in the 'others'.

14.2 – Motivation

We should perhaps return to the most important aspect of any venture, as alluded to in the Introduction: the people involved. At G+9 months we had the team de-brief – only the second occasion that all six had been together since returning to Stansted.

The overwhelming message that came through the general and specific points raised was this: the issues that arose were less to do with what people had done (or not done), and more to do with the way in which they had done them (or not done them). This applied equally to matters handled within the team and those that involved third parties (whether voluntary or paid).

Part of this is a matter of interpersonal skills, and we each have our natural, inherent traits, plus those that can be developed for particular circumstances. More importantly though, is the need to identify and understand our personal objectives. Each potential team member needs to work out what it is that they want out of the trip and then convey it to the others. Only then can attempts be made to draw out the common threads, and see whether there is sufficient overlap to form a team that will be happy with the destination and approach.

The pre-requisites for any mountaineering expedition member may seem obvious, but they are that they a) want to climb and b) want to be part of organising the trip. Too little of a) and you risk problems on the trip; too little of b) and you risk not getting there in the first place. For those who only aspire to b) there is a place for them in the support team, and those who only aspire to a) will find that they are courted by some of the many commercial providers operating around the world.

14.3 – Workload

Only once the commonality of aims is determined, can you consider the individual's personal skills and effectively assign jobs to people. We have already identified that, in future, some of the team would be well suited to continue with the roles that they carried this time and that others would prefer to change.

Division of work is a major issue and, though there will inevitably be some degree of imbalance, every effort must be made to share the work around evenly. Situations where some members are chained to the computer most evenings, whilst others are majoring in watching telly or going down the pub, are guaranteed to cause friction.

An expedition will be a major part of anyone's life for many months, both before and after the time away. If they wish to be sure of holding down a job, relationship and other interests alongside, a balance must be struck and an agreed minimum weekly input/output agreed – both with the team and respective families. To get all you can out of a trip you've got to give all you can. Only the individual can decide what sacrifices are worth making, and therefore the extent to which the demands that your team-mates will make on you are reasonable.

14.4 – To Conclude

We hope everyone will appreciate that certain circumstances cause one to be drawn to specific conclusions and, before taking our word for anything, people should ensure that their circumstances match those of this team. If the situations do concur we hope you will take every opportunity to learn from our ideas and mistakes, rather than feeling any compulsion to make more than the minimum of your own.

It may be that the prospective first-time expedition member reads this report and is daunted by the work involved. This may be no bad thing – there *is* a lot of work involved. However, there is a sliding scale between an Alps holiday – where you need only think about a fraction of the items covered – to the real major ventures where all this and more may be called for.

That said, many big trips run without going into too much detail, but the decision of how far to go is a matter of risk. All teams take chances, and most get away with them. All will hit problems – indeed, probably 75% of those who enter serious discussions about organising an expedition never see their ideas put into action. Problems in preparation can be handled – if the worst comes to the worst, all you've lost is time, money, and effort (and possibly an experience of a lifetime).

Problems in the field are more serious – in many such cases, your life, freedom, and livelihood are at risk. If you try to assess what can go wrong and put some contingency plans in place, you will find that you have less to worry about in the field. You then also have the option of taking the normal parameters, and pushing them further.

Those who take the time to manage the risk may find that they get less sleep, but the quality of that sleep will be so much better knowing that most of the angles are covered. And if there's any doubt whether it's worth the effort, just look at the pictures.

Figure 14.1 – 'Nuff said

APPENDIX 1 : COMMUNICATIONS PLAN

(No News is Good News!)

A1.1 – INTRODUCTION

This document sets out the itinerary for the expedition, and the means by which information will flow should an emergency incident arise.

A1.2 – ITINERARY (OUTWARD JOURNEY)

Wednesday 20th June:
Depart Stansted airport on Go Airlines Flight GO353. Flight leaves 23:10 (Ref. W2SSAL)
Team to meet and distribute equipment @ 20:30. Latest Check-in 21:40.

Thursday 21st June:
Arrive 01:20 at Reykjavik (Keflavik) airport.
Coach transfer to Reykjavik city centre coach station.
Taxi to Snorri's guesthouse. Address: Snorrabraut 61. Tel 552 0598 / 551 8945 (Christine)

Oversleep, miss breakfast, and spend day in Reykjavik purchasing dairy and animal product elements of expedition rations.
Second night at Snorri's guesthouse.

Friday 22nd June:
Get up early enough to have breakfast at 06:30
Taxi at 07:30 to Air Iceland domestic airport terminal for latest check-in at 08.00.
Fly Reykjavik to Akureyri. Depart 08.30. Arrive 09.10.
Visit Twin Otter co-ordinator Fridrik Adolfsson, Flugfelag Airlines and check that weather is suitable for Twin Otter to fly.
If weather okay, proceed, if not, hang around Akureyri until it is (may be a few days).

Locate from Fridrik 1) Rifle and 20 ammunition, 2) Cardboard box no. 17 containing eight empty 5.5 litre fuel containers, and 3) eleven 4 litre tins of SBP stove fuel.
Transfer fuel from tins to fuel containers. Leave empty tins in the hangar.
Twin Otter flies Akureyri to Isafjordur (for refuelling). Depart 10.00 (ish)
Deposit haul bags, ski-bags, shoes & fresh clothes in aircraft hangar in Isafjordur.
We will confirm Lindbergh landing position with pilots before departing (i.e. show them the aerial photo).
Fly Isafjordur to Lindbergh Mountains (basecamp position N69°07, W31°02).

As Twin Otter circles for landing, obtain copious quantities of video footage as reconnaissance for assisting route planning.
Land on glacier and check that all boxes (numbers 1-13); barrels (numbers 1-5); snow stakes; and pulks are at basecamp (sent on earlier flight).
Take pulks out of red haulage bag and put the haulage bag back on the Twin Otter.
Twin Otter returns to Isafjordur.

No planned contact with the outside world for 24 days.

A1.3 – ITINERARY (RETURN JOURNEY)

Sunday 15th or Monday 16th July:
Twin Otter arrives at Lindbergh basecamp Sunday pm/ Monday (depends on numerous factors, primarily weather forecasts. Maximum anticipated delay = 4 days for weather).
Fly Lindberghs to Isafjordur (via collection of 3 clients from the Watkins Mountains).
Leave returning freight at Isafjordur airport (to be returned to Akureyri separately by the Twin Otter later)
Change clothes and footwear

Fly Isafjordur to Reykjavik. Depart 19.50. Arrive 20.30 (presumably Monday 16th)
If we arrive back late Sunday evening, missing the flight, we will stay in Isafjordur for the night and following day (either camping, at a guesthouse, or in an aircraft hangar).
Taxi transfer from Reykjavik domestic airport to Snorri's Guesthouse.
Meet wives/friends, who will refuse to come anywhere near us until we've had showers.
Have first decent meal in weeks at a restaurant in Reykjavik.
Overnight accommodation at Snorri's.

Tuesday 17th to Friday 20th July:
General relaxation, etc. in and around Reykjavik. Staying at city camp-site.

Friday 20th July:
Taxi to coach station (coach leaves 2 hrs before flight departure).
23:30 (approx.) coach transfer from Reykjavik to Keflavik airport.

Saturday 21st July:
Depart Keflavik airport on Go Airlines Flight GO354. Flight leaves 02:15
Arrive Stansted airport at 06:15
Realise we've forgotten to arrange transport, so phone our dearly-beloved's for lift home!
Quick change, and drive to Manchester for party at Linda and Gary's.

A1.3 – EMERGENCY CONTACTS

Contacts

We as a team have approached two people in the UK to act as our contacts. If there are any changes to the itinerary we will attempt to inform them of our movements through Iceland, up until we load up the Twin Otter at Akureyri. Also, on return to Iceland we will contact Chris and pick up any messages you may have passed to him.

In Iceland, we will have Ian Jones' mobile phone with us. To conserve battery life, Ian's mobile phone will only be turned on for short periods of time in order to collect messages.

****!!!***No-one will be able to contact us once we have left Iceland****!!!****

Primary UK Contact (available throughout duration of expedition):
Chris Pannell, Nottingham

Secondary UK Contact (available throughout duration of expedition):
Paul & Sharon Raymond, Axbridge

Iceland Contact (available in Iceland from 30th June 2001:
Heather Coombs No fixed abode

A1.4 – EMERGENCY COMMUNICATIONS PROCEDURE:

Raising the Alarm:

In the unlikely event of an incident occurring in Greenland that requires the support of others, we will activate both of the emergency beacons. The beacons transmit on different frequencies (121.5mhz and 406mhz) and will send an SOS signal to all passing aircraft. They will in turn relay this signal to rescue co-ordination centres, who will instigate a rescue. Our area of exploration is under the flight path from the UK to Canada and therefore aircraft will be in range many times each day.

We are 30 miles from the coast and a military exercise is occurring in the north Atlantic during part of the time we are in Greenland. Naval aircraft can pick up the signal of our emergency beacons, and this gives another possible means of rescue.

Although travelling to our destination is easier from Iceland than from any airfields in Greenland, in the event of an emergency there is potential to be air lifted to one of two airfields in Greenland or back to Isafjordur or Akureyri in Iceland.

As soon as it is possible, calls will be made to both UK contacts.

Rescue from Greenland to Iceland will be co-ordinated by the Danish Polar Centre.

Remaining elements of the rescue will be assisted by the British Mountaineering Council, and co-ordinated through Chris Pannell in the UK. Heather Coombs will act as Iceland Liaison, and will assist any team members that are evacuated to Iceland.

The UK contacts will contact you directly with all available information. They hold photocopies of all relevant insurance information; passports; medical histories; etc.

Chris Pannell will arrange any unplanned collection of team members from Stansted airport.

Two way Communication

If during our expedition you wish to leave a message for the team to pick up on return to Isafjordur, please contact our UK contacts.

And Finally:

Hopefully none of the above emergency communications will be necessary, but the system is in place 'just in case'.

Here's looking forward to an uneventful expedition!!

A1.5 - CONTACT NUMBERS

Tangent Expeditions:	
Paul and Lucy Walker	0044 1539 737757 / 737756 fax
Danish Polar Centre:	
Iris Madsen – permits	0045 3288 0100 / 0045 3288 0101 fax
British Mountaineering Council:	
Ray Perry	0161 445 4747
Emergencies (Greenland):	
Scoresbysund Hospital (Constable Pynt)	00299 99 10 11 / 1021 (doctor at home)
Scoresbysund Police	00299 99 1022
Constable Pynt Airport Manager (Benny)	00299 99 38 50 / fax. 99 38 51
Constable Point AFIS Airport Tower	00299 99 3854
Greenland to UK dialling code	0044 or 9 0044 or 009 44
Flights:	
Airport Flybus (@ Reykjavik)	562 1011
Airport Flybus (@ Keflavik)	425 0381
British Airways GO (Stansted)	0044 1279 666 388
Icelandair @ London	0044 171 874 1000
Icelandair @ Keflavik	00354 690595 / 2 50200 ?
Icelandair @ Keflavik (telephone Check-In)	00354 5050 555
Keflavik Airport (Ticket Office)	00354 425 0222 or 422 0219
Air Iceland (Reykjavik)	00354 570 3030
Air Iceland (Akureyri)	00354 460 7000
Air Iceland (Fridrik Adolfsson) - Twin Otter	00354 894 5390 (mobile) / work 460 7080
Isafjordur Airport, NW Iceland	00354 456 3000
Constable Point Airport Manager (Benny)	00299 99 38 50 / fax. 99 38 51
Constable Point Waiting Room Payphone	00299 99 3988
Constable Point Accommodation Payphone	00299 99 3888
Accommodation:	
Guesthouse Snorri's, Snorrabraut 61	552 0598 / 551 8945

Reserve Accommodation:		
Guesthouse Flokagata 1	552 1155	(opposite corner to Snorri's)
Guesthouse Central, Bolstadarhlid 8	552 2822	(private house, good value)
Guesthouse 101	562 6101	(2/3/4 person rooms)
Guesthouse Aurora	552 5515	

APPENDIX 2 : EMERGENCY PLAN

A2.1 – Introduction

Are you safe? It's hard, but the casualty dies first! Polar medals are not given posthumously any more.

Stop and think. Two minutes thinking saves two hours hard graft, and there's going to be enough hard graft for everybody. Assess the situation, what you want to achieve and your immediate assets and limitations.

Can you locate the casualty? If not then find him, safely. Administer first aid if required.

A2.2 – Mobile Casualty

You have assessed the situation. Believe in that assessment, formulate a plan and act upon it. Discuss the plan with the casualty, but remember the extent of their injuries and factor this into how much you include their input.

Other assets in the other members of team are available. If you think you need them, you do, so raise a flare. Raise one every 30 mins until a return flare is detected, or you have only one left. If you detect a return flare, or hear a gunshot, raise another flare so those responding can pinpoint your location. If you receive no response, save your last flare until you are overdue (and thus the rest of the team will start getting worried), and fire it preferably at dusk.

Continue to assess the ability to get to your destination. A tired injured casualty can easily become an immobile or dead one. Dead casualties don't buy you beers afterwards!

A2.3 – Immobile Casualty

No hero shit – it takes 12 people to move an injured casualty, and we will have five at best (though use of a pulk will enable us to return a casualty to base). Stay where you are and apply at your efforts to keep the casualty alive. So raise a flare every 30 minutes until a return flare is detected, as above.

Severe pain is not a reason to move a casualty to base camp under any circumstance. Pain is a privilege of the living and you have pain-reliving drugs.

Get the casualty

- Out of the wind and out of the wet
- Apply first and advanced medical aid.
- Use the casualty's equipment first.

For a cold wet casualty, use the dry bag system. Put the casualty in their sleeping bag, then a breathable bivi bag, then your sleeping bag then another bivi bag.

The rest of the team will come. Believe in this totally. Start the Glasgow chart and keep at it. This information will be gold dust to the doctors on the plane.

Remember the last phase of consciousness loss is hearing. So talk to your casualty, remind them of wives, girlfriends, and shared memories – at the same time as rifling through their kit for their chocolate stash.

Your ability to keep an unconscious casualty alive is dependent upon your personal management. Keep your kit together, eat their chocolate, drink lots, keep warm and start your memoirs: you're the next Joe Simpson!

A2.4 – Actions on Detecting a Flare

Your reaction is to be one of: "a team member is in the shit". Raise one flare in response, then return to base and pick up:

- Pulk
- Tent
- H.F. Radio and EPIRBS 1&2 (do not set off signals until confirming that casualty requires evacuation)
- Snow shovels and saw
- 36 hours food, stoves, pans and fuel
- Medical kit and drugs box
- Climbing gear (screw-gates, you'll never have enough)
- Climbing tape and cord
- Games, (cards, Scrabble) and video camera
- Spare ski sticks
- Remember your personal climbing kit.

Leave a note that you have been there, another team may have passed through. Still check to see whether any of the above have already been collected. If you have had no response from either the casualties or the remainder of the team, fire a single shot from the rifle into the air (check first for passing aircraft!).

Get to the casualty or casualties and listen to their plan. Appoint a person designated to be the recorder and communicator to the casualty. Keep this person out of the decision making loop to act as a filter. This person records the drugs given, BP, BPM and temp on Glasgow chart, plus the decisions made and at what time and location.

For the first 30 minutes work with the on-the-scene plan as is. Then develop from there. Do not assume or second-guess. Remember that everybody involved with the initial incident is a potential casualty.

A2.5 – Stable Situation

Get a brew on and start up making some food.

Form a plan. You have travelled from base-camp to the casualty with an eye as to how to extract a stretcher case. Use that knowledge, break the operation down in to small bits. Communicate the plan and execute.

Continually appraise the situation develop the plan as required.

Remember the survival courses: work at half pace. The tortoise beats the hare every time.

A2.6 – Post Incident

Write up a personal report in your journal. Then get together and formulate a list of the decisions made with approximate times and locations. Use the list to talk about how you felt prior to, during and after the incident. Each do a video interview.

REMEMBER

Take lots of slides. We not want to have **"at this point all interest in photography ended"** in the expedition report.

APPENDIX 3 : INSURANCE SUBMISSION

(as submitted to prospective insurers at G-2 months)

A3.1 – Time-scales

	Goods currently in storage in the Lake District.
16th May	Transported overland in UK in transit van. Depart from Glasgow Airport as airfreight with Icelandair. Transfer at Keflavik on to Air Iceland flight to Akureyri.
18th May	Storage in secure freight/aircraft hangar at Akureyri airport.
20th June	Flown Akureyri to Lindbergh Mountains, Greenland, by Flugfelag Airlines.
22nd June	Team arrives in Lindbergh Mountains – equipment covered by existing BMC policies (from Perkins Slade) until departure from Lindbergh Mountains.
16th July	Depart Lindbergh Mountains by Flugfelag Airlines for Akureyri Storage in secure freight/aircraft hangar at Akureyri airport.
16th August	Return as sea freight with company Samskip from Akureyri port to Immingham port.
19th August	Transported overland in UK in transit van to store in Lake District.

A3.2 – Packaging

Food is stored in cardboard boxes and polypropylene food barrels.
Sledges packed in large bubble wrap and then into large padded haulage bags.
Radio equipment is stored in padded boxes.
All other equipment is tightly packed in 160 litre polypropylene barrels (UN approved or transportation of toxic waste).
All freight will go on strapped pallets.

A3.3 – Contents and Value

Hired Items:
3 x Snowsled 1.6m expedition sledges, 2 years old @ £500 each.
1 x Freight Haulage Bag for Sledges, 3 years old @ £250.
3 x Freight Haulage Tensioning Straps for above, 2 years old @ £10 each.
1 x Jotron Tron 45SX 406mhz EPIRB, brand new @ £800.
1 x Jotron Tron 1E 121.5 MHz EPIRB, 1 year old @ £200.
1 x ICOM ICA3E VHF Airband Radio, 1 year old @ £400.

Total £3,200

Group and Personal Items:
Food and other equipment (see separate spreadsheet) Total £8,800
Maximum value of any single item or pair of items is £550.

Therefore, total cover required is **£12,000**

APPENDIX 4 : EQUIPMENT SPREADSHEET

A4.1 – Background Notes

The first thing to note is that everything that went to Greenland is on the sheet. If it wasn't on the list it did not go. Each individual item is given: Item description; Individual weight; Quantity; and Logistics path (A for air or S for sea)

In this way it was easy for the weight master (John) to alter the number of things which were being taken and its effect upon the final total. As item's were sourced that were lighter than expected, the weight could then be changed.

If the item was group kit such as a tent, then it is on the 'Group' sheet. If it is an item of personal equipment such as a team member's sleeping bag it is on the relevant sheet for that team member.

There follows a weight limit analogy, using lard as the illustrator. Members of the team used a number of strategies to reach the strict limit:

- John used the alpine approach of not taking very much: just over 27kg. As an example he used a ¾ length Thermarest to save on weight (which may have had a bearing on the fact that it took two months to recover full feeling in his toes). To keep warm during the cool parts of the night, John boosted the calories by mixing the uneaten lard to his meals.
- Jonathan decided on losing 8 kilograms of bodyweight to accommodate his minimum equipment level of 32 kg's. As a result he added the uneaten lard to his hot food, to restock is low fat reserves.
- Ian took more than his limit of gear and did not make any effort to offset the balance through loss of bodyweight. He thus saw the lard as an extravagance.

The extracts from the 'mother of all spreadsheets' that follow are an illustration of the methods used. For the full effect - including age and value information as submitted to insurers - an operational copy of the spreadsheet is available on the electronic copy of this report.

A4.2 – Bodyweight and Group Equipment Totals

PERSONAL BODYWEIGHT	Weight (kg)
John Booth	80.000
Brian Coombs	80.000
Richard Denison	66.000
Ian Jones	85.000
Dominic Matters	64.000
Jonathan White	100.000
Total	475.000

GROUP EQUIPMENT	Sea Freight	Air Freight	Total	Check Total
Climbing Hardware	59077	0	59077	59077
Base Camp	271959	12616	284575	284575

A4.3 – Personal Equipment Comparison Sheet

PERSONAL EQUIPMENT	Richard	Jon W	Dom	Brian	John B	Ian	Group Total
Climbing Hardware							
Sea Freight	5315	5474	4385	5382	3924	2896	27376
Air Freight	2210	2931	3540	2900	3869.5	4568	20018.5
Items Worn	0	0	0	0	0	0	0
Excess Baggage	4920	4900	4020	4000	4500	4422	26762
Total	12445	13305	11945	12282	12293.5	11886	74156.5
Check Total	12445	13305	11945	12282	12294	11886	74156.5
Clothing							
Sea Freight	0	0	2900	0	0	0	2900
Air Freight	4995	5702	4180	3975	4170	4980	28001.8
Items Worn	2085	2600	1190	2450	1855	4941	15121
Excess Baggage	4100	3400	3600	3350	3110	4134	21694
Total	11180	11702	11870	9775	9135	14055	67716.8
Check Total	11180	11702	11870	9775	9135	14055	67716.8
Sleeping							
Sea Freight	165	200	200	125	145	105	940
Air Freight	3230	4329	3920	3350	3844	3324	21997
Items Worn	195	75	0	75	75	75	495
Excess Baggage	0	0	0	0	0	0	0
Total	3590	4604	4120	3550	4064	3504	23432
Check Total	3590	4604	4120	3550	4064	3504	23432
Basecamp Cooking							
Sea Freight	0	365	0	240	270	0	875
Air Freight	275	0	420	125	0	270	1090
Items Worn	0	0	0	0	0	0	0
Excess Baggage	0	0	0	0	0	0	0
Total	275	365	420	365	270	270	1965
Check Total	275	365	420	365	270	270	1965
Miscellany							
Sea Freight	0	0	0	0	0	0	0
Air Freight	1470	2249	2876	3230	1461	1908	13194
Items Worn	0	0	0	0	0	0	0
Excess Baggage	0	0	0	0	0	0	0
Total	1470	2249	2876	3230	1461	1908	13194
Check Total	1470	2249	2876	3230	1461	1908	13194
Total							
Sea Freight	5480	6039	7485	5747	4339	3001	32091
Air Freight	12180	15211	14936	13580	13345	15050	84301.3
Items Worn	2280	2675	1190	2525	1930	5016	15616
Excess Baggage	9020	8300	7620	7350	7610	8556	48456
Total	28960	32225	31231	29202	27224	31623	180464.3
Personal Check Total	**28960**	**32225**	**31231**	**29202**	**27224**	**31623**	**180464**

A4.4 – Typical Personal Equipment Totals: Ian Jones

ITEM	Weight/ Item (g)	QUANTITY	TOTAL WEIGHT (g)	Sea/Air/ Worn/XS
CLIMBING HARDWARE				
Belay Plate + Screw	212	1.0	212	S
Harness	401	1.0	401	A
Helmet	414	1.0	414	A
Slings (8ft)	70	2.0	140	A
Slings (4ft)	30	1.0	30	A
Crampons (& anti-balling plates)	1142	1.0	1142	S
Axe No 1	771	1.0	771	S
Axe No 2	771	1.0	771	S
Rucksack	1700	1.0	1700	A
Skis and bindings	4422	1.0	4422	X
Walking/Ski Poles	325	2.0	650	A
Skins	295	1.0	295	A
Personel screw gates	75	0.0	0	A
Ropeman+pulley+ Krab	180	0.0	0	A
Tiblocks	38	2.0	76	A
Ski Wax	105	0.0	0	A
Plastic Bags	140	0.0	0	A
Prussik Loops x 3 (on Screw gate)	150	1.0	150	A
Ice Screw (3 reqd)	134	3.0	402	A
Ice screw 2	174	0.0	0	A
Ortlebe Dry Bag	400	0.0	0	A
Pen Knife	100	1.0	100	A
Water Bottle (wide mouth)	200	1.0	200	A
Platypus	100	1.0	100	A
Thermos Flask (1/2 litre, steel)	480	0.0	0	A
Sling (2ft for Cows Tail)	50	0.0	0	A
		Total =	11976	
CLOTHING				
Footwear				
Plastic Boots (ski m'ntaineering)(pair)	4134	1.0	4134	X
Leather Boots (pair)	2968	1.0	2968	W
Gaiters (pair)	317	1.0	317	A
Outer Socks (pair)	92.5	4.0	370	A
Outer Socks Wool	90	3.0	270	A
Liner Socks (pair)	66	4.0	264	A
Down Boots (pair)	440	0.0	0	A
Base layer				
Underpants	50	4.0	200	A
Thermal Top (Long sleeve)	252	1.0	252	W
Thermal Top (Short Sleeve)	131	1.0	131	A
Tracksters	200	0.0	0	A
Fleece T shirt	200	0.0	0	A
Thermal Leggings	121	1.0	121	A

ITEM	Weight/ Item (g)	QUANTITY	TOTAL WEIGHT (g)	Sea/Air/ Worn/XS
Mid Layer				
Comfy Base Camp Trousers	440	0.0	0	A
Fiber Pile Jacket	989	1.0	989	W
Down Jacket	917	1.0	917	A
Mid Weight Fleece	261	1.0	261	A
Fleece Leggings (Salopettes)	258	1.0	258	W
Heavy Weight Fleece	474	1.0	474	W
Outer layer				
Waterproof Jacket	1059	1.0	1059	A
Lightweight Windproof Jacket	298	0.0	0	A
Waterproof Trousers (Salopettes)	707	1.0	707	A
		Total =	14325	
SLEEPING				
Basecamp Thermarest	830	1.0	830	A
Down Sleeping Bag (min' 800g fill)	1740	1.0	1740	A
Bivvy Bag	332	1.0	332	A
Sleeping Bag Liner	321	0.0	0	A
Ear Plugs	10	0.0	0	A
Passport & Insurance Docs.	75	1.0	75	W
Paperback	422	1.0	422	A
Pee Bottle	105	1.0	105	S
		Total =	3504	
BASECAMP COOKING				
Plastic Plate	96	1.0	96	A
Plastic Insulated Mug	67	1.0	67	A
Knife, fork, spoon	107	1.0	107	A
		Total =	270	
MISCALLANY ITEMS				
Carrier Bags (sturdy)	50	3.0	150	A
Contact Lenses (pairs)	10	0.0	0	A
Ski Goggles	121	1.0	121	A
Glacial Glasses	95	1.0	95	A
Sun Tan Lotion (Factor 30 min, 200ml)	225.0	1.0	225	A
Lip blam	25	0.0	0	A
Antibacterial foot powder	75	0.0	0	A
Camera, and screw gate	542	1.0	542	A
Washkit & Packtowel	500	1.0	500	A
First aid kits	275	1.0	275	A
		Total =	1908	
		TOTAL	31983	

A4.5 – Typical Personal Equipment Totals: John Booth

ITEM	Weight/ Item	QUANTITY	TOTAL WEIGHT	Sea/Air/ Worn/XS
	(g)		(g)	
CLIMBING HARDWARE				
ATC + krab	130	1	130	S
Petzl gourou Harness	515	1	515	S
Petzl Ecrin roc	455	1	455	S
Slings (8ft)	80	3	240	S
Slings (4ft)	40	0	0	A
Crampons (& anti-balling plates)	1115	1	1115	S
Axe No 1	640	1	640	S
Axe No 2	809	1	809	A
Karrimor Alpiniste	1680	1	1680	A
Mountaineering Skis and Bindings (Not inc. Carry Bag)	4500	1	4500	X
Walking/Ski Poles	191	2	382	A
Skins	295	1	295	A
Personel screw gates	75	3	225	S
Ropeman+pulley+ Krab	180	1	180	S
Tiblocks	38	2	76	S
Ski Wax	105	1	53	A
Plastic Bags	140	1	140	A
Slings (4ft)	30	0	0	A
Prussik Loops x 3 (on Screw gate)	150	0	0	A
Ice Screw 1 (3 reqd)	201	1	201	A
Ice screw 2	174	2	348	S
Ortlebe Dry Bag	400	0	0	A
Pen Knife	110	1	110	A
Water Bottle (wide mouth)	200	1	200	A
Platypus	100	0	0	A
Thermos Flask (1/2 litre, steel)	480	0	0	A
		Total =	12294	

CLOTHING

Footwear				
Vegas	3110	1	3110	X
Leather Boots (pair)	2968	0	0	A
Gaiters (pair)	317	0	0	A
Outer Socks Nylon	65	2	130	A
Outer Socks Wool	90	2	180	A
Liner Socks (pair)	40	2	80	A
Base layer				
Underpants	45	4	180	A
Helly hansen Top Ls	135	1	135	W
Dry flo top Ss	125	2	250	A
Tracksters	200	1	200	W
Fleece T shirt	200	1	200	A

ITEM	Weight/ Item (g)	QUANTITY	TOTAL WEIGHT (g)	Sea/Air/ Worn/XS
Extremites				
Balaclava	45	1	45	A
Hat	85	2	170	A
Power strech Gloves	35	1	35	A
Ski Gloves	245	1	245	A
Neck Tube	80	1	80	A
Dactstines	140	1	140	A
Mid Layer				
Comfy Base Camp Trousers	440	0	0	A
Buffalo	690	1	690	A
Rab Kinder Down	700	1	700	A
Rab Kinder Fleece	525	1	525	W
Fleece Salopettes	460	1	460	A
Outside Fleece	615	0	0	A
Outer layer				
Waterproof Jacket	995	1	995	W
Lightweight Windproof Jacket	298	0	0	A
Waterproof Trousers (Salopettes)	785	1	785	A
		Total =	9335	

SLEEPING

Basecamp Thermarest	555	1	555	A
Down Sleeping Bag (min' 800g fill)	1760	1	1760	A
Bivvy Bag	940	1	940	A
Sleeping Bag Liner	167	1	167	A
Ear Plugs	10	0	0	A
Passport & Insurance Docs.	75	1	75	W
Paperback	422	1	422	A
Pee Bottle	145	1	145	S
		Total =	4064	

BASECAMP COOKING

Plastic Plate	60	1	60	S
Plastic Insulated Mug	135	1	135	S
Knife, fork, spoon	75	1	75	S
		Total =	270	

MISCALLANY ITEMS

Carrier Bags (sturdy)	50	0	0	A
Contact Lenses (pairs)	10	0	0	A
Ski Goggles	105	1	105	A
Glacial Glasses	95	1	95	A
Sun Tan Lotion (Factor 30 min, 200ml)	225	1	225	A
Lip blam	25	1	25	A
Antibacterial foot powder	75	1	75	A
Camera, and screw gate	325	1	325	A
Washkit & Packtowel	336	1	336	A
First aid kit	275	1	275	A
		Total =	1461	

TOTAL **27424**

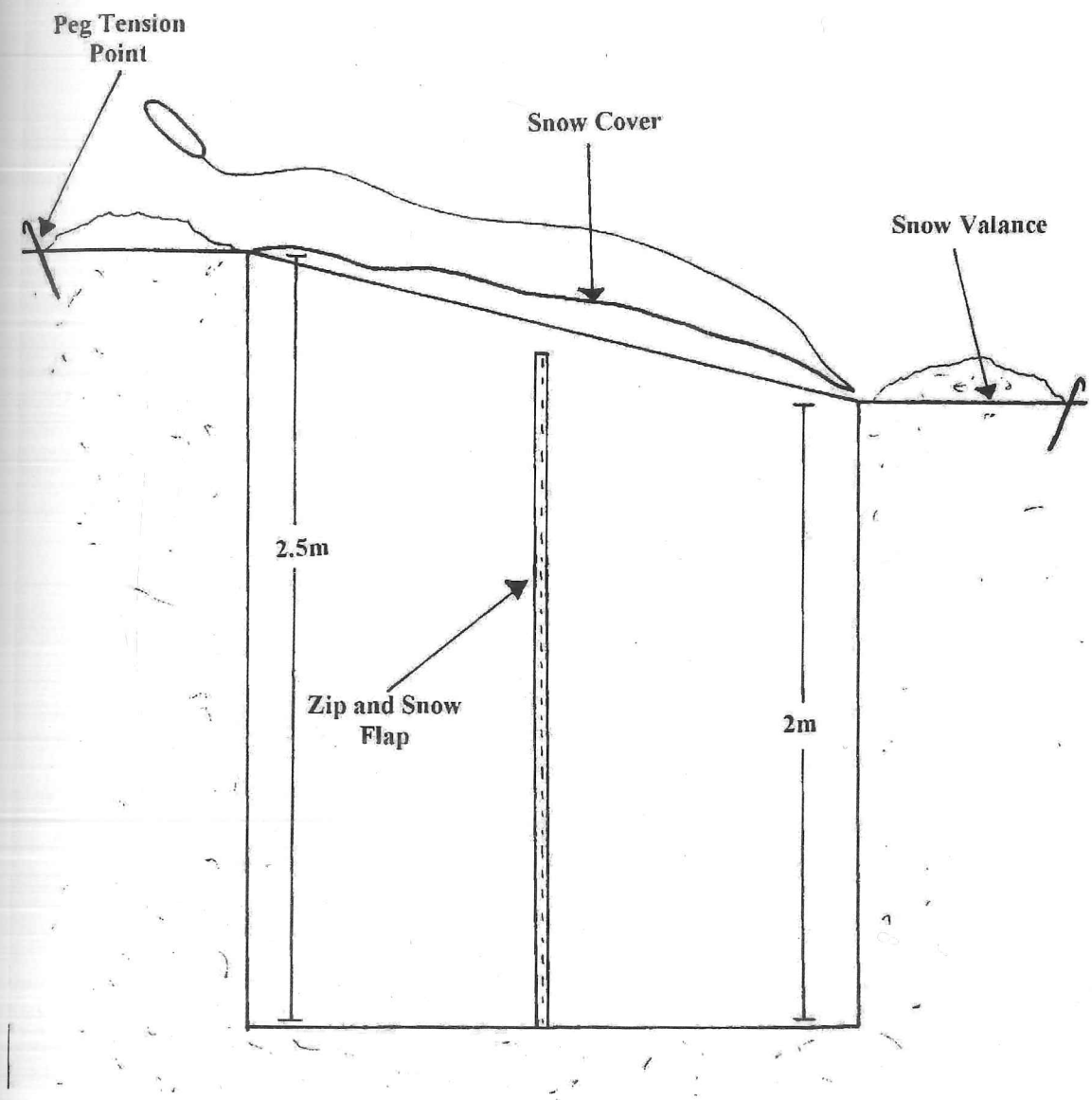
A4.6 – Group Equipment

ITEM	W/Item	QUANTITY	TOTAL W	Sea/Air
CLIMBING HARDWARE	(g)		(g)	
Extenders	102.3	12	1228	S
Rope - 9mm No1	2550	1	2550	S
Rope - 9mm No2	2550	1	2550	S
Rope - 10mm	3921	1	3921	S
Snap Gates (loose)	48.6	10	486	S
Wallnuts (1-9)	316	1	316	S
Rockcentrics (7,8,9)	603	1	603	S
Nutkey and snapgate	104	0	0	
Abseil Tat (g/m)	34.94	63	2201	S
Static Cord 6mm (g/m)	23.4	30	23	S
Screw Gates	67.6	12	811	S
Pulk sledge	14000	3	42000	S
Snow Pickets	580.5	2	1161	S
Deadman No1	329	1	329	S
Deadman No2	329	1	329	S
Mallion Rapids	56.9	10	569	S
		Total=	59077	
BASE CAMP				
Barrels (large)	5900	3	17700	S
Barrels (small)	1980	2	3960	S
Mule bags	1100	0	0	
Icelandic food	2020	1	2020	A
Food inc. packaging sent already	164000	1	164000	S
Rifle & ammunition	5000	1	5000	S
Mess Tent	5300	1	5300	S
Base Camp Tents (3 man)	4634	3	13902	S
Snow Stakes 12"	42	16	672	S
First Aid Kits (personal - not group)	500	0	0	
First Aid Kit (base camp)	2658	1	2658	S
Advanced trauma care	1400	1	1400	A
Hot Water Bottle	400	0	0	
Nail Clippers	27	1	27	S
Altimeters IJ	68	1	68	A
Altimeters JB	68	1	68	A
Altimeters BC	68	1	68	A
GPS x 3	900	1	900	A
Compasses	30	6	180	A
Binoculars	225	1	225	A
Avalanche Probes	500	0	0	
Multiband Radio (incl batteries)	395	1	395	A
AA Batteries (3 reqd)	25	3	75	A
Epirb 1 Jotron Tron 45SX 406mhz	10	1		S
Epirb 2 Jotron Tron 1E 121.5mhz	10	1		S
Icom ica3e VHF	10	1		S
EPIRBs, Flares and Radio	5000	1	5000	S
Exercise Books	75	6	450	S
Calculator	90	1	90	A
Medium Sized Cooking Pot/Kettle	1000	1	1000	S

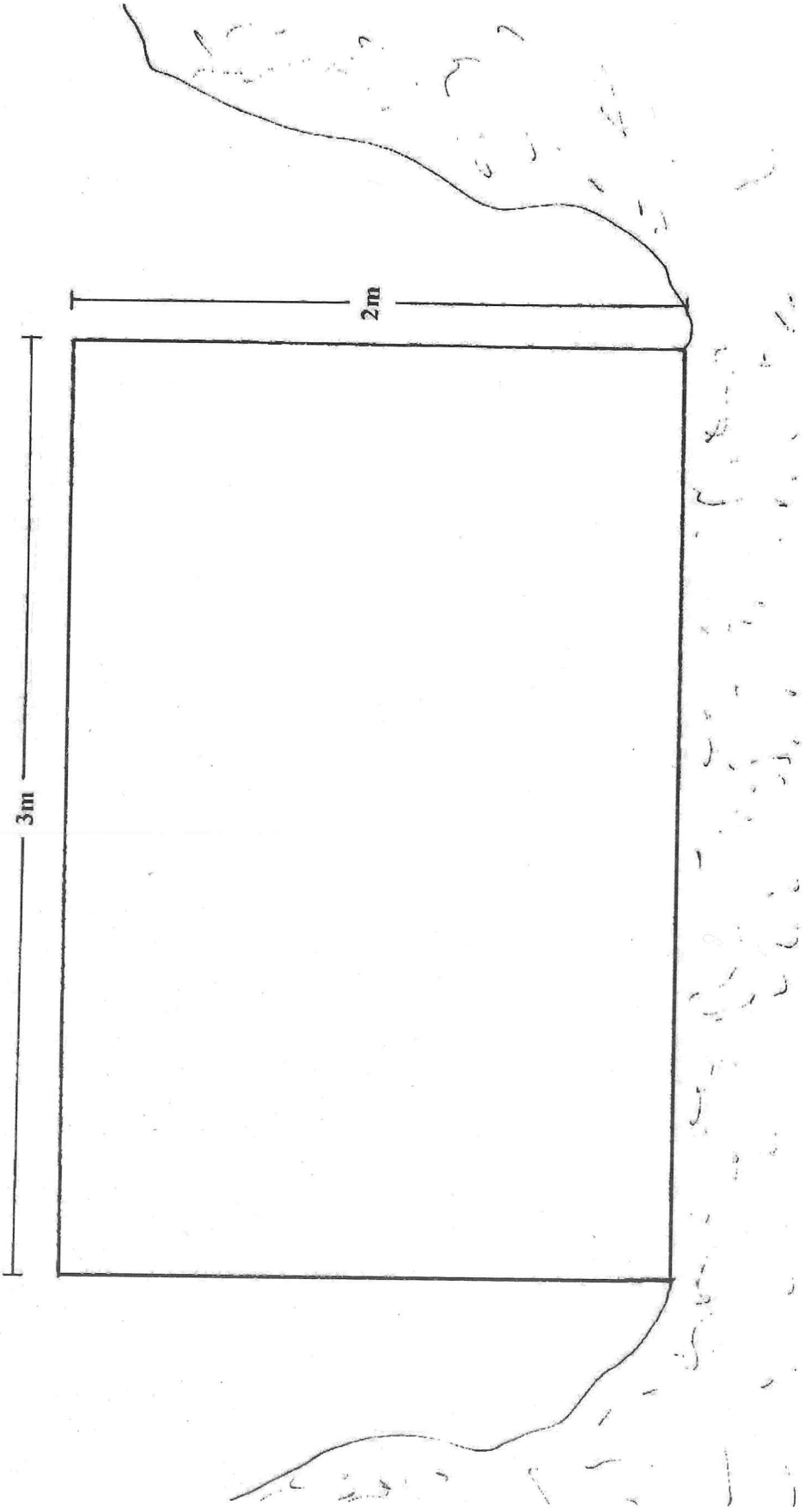
ITEM	Weight/ Item	QUANTITY	TOTAL WEIGHT	Sea/Air
	(g)		(g)	
Wooden Spoons	32	3	96	S
Pens/Pencils	5	12	60	A
Cards, Chess	500	1	500	A
Walking Poles (spare)	354	2	708	S
Crampons (spare) (pair)	900	1	900	S
Snowshoes	2156	2	4312	S
Stoves (MSR Dragonfly, Bottle & bits)	605	1	605	S
Stoves (MSR Dragonfly, Bottle & bits)	605	1	605	S
Stoves (MSR xgk, Bottle & bits)	565	1	565	S
Stoves (MSR xgk, Bottle & bits)	565	1	565	S
Matches (boxes)	5	20	100	S
Lighters	20	10	200	S
Flint and Stone	15	1	15	S
Fuel (g/l)	700	42	29400	S
Fuel Containers	200	7	1400	S
Small Pans	250	6	1500	S
Lids	228	3	684	S
Grippers	50	3	150	S
Plastic Washing up bowl	300	1	300	S
J Cloths	14	10	140	S
Scouring Pads	26	5	130	S
Washing Up Liquid (biodegradable?)	600	1	600	S
Bin Liners	13.33	30	400	S
Ortlieb sac (for melting snow)	451	1	451	S
Clear Plastic Bags (for melting snow)	130	2	260	S
Funnels	10	2	20	S
Duct Tape/Heat Insulating Tape (rolls)	33.33	3	100	S
Small Tool Kit	1500	1	1500	S
Snow Saw	334	1	334	S
Snow Shovels (Nice)	1008	2	2016	S
Camera film	30	60	1800	A
Stereoscope (pocket)	100	1	100	A
Maps & Photos	100	3	300	A
Toilet Rolls (20 sheets pp/pd)	122	12	1464	S
Hand Soap (6 squirts pp/pd)	2119	1	2119	S
Video Camera	1500	1	1500	A
Films	250	4	1000	A
Solar Panel	1000	1	1000	A
Inflatable Parrot	17	1	17	A
Flags	200	3	600	A
Waste Kit (excl. Barrel)	250	1	250	A
Plastic Bucket	116	1	116	S
Snow Brushes	150	0	0	
Toilet Seat			0	
SCRABBLE	205	1	205	S
bulldogs	165	2	330	S
Sledge Haul bag			0	S
Tension straps for sledges			0	S
		Total =	284575	

APPENDIX 5 : GLACIER GROUP TENT

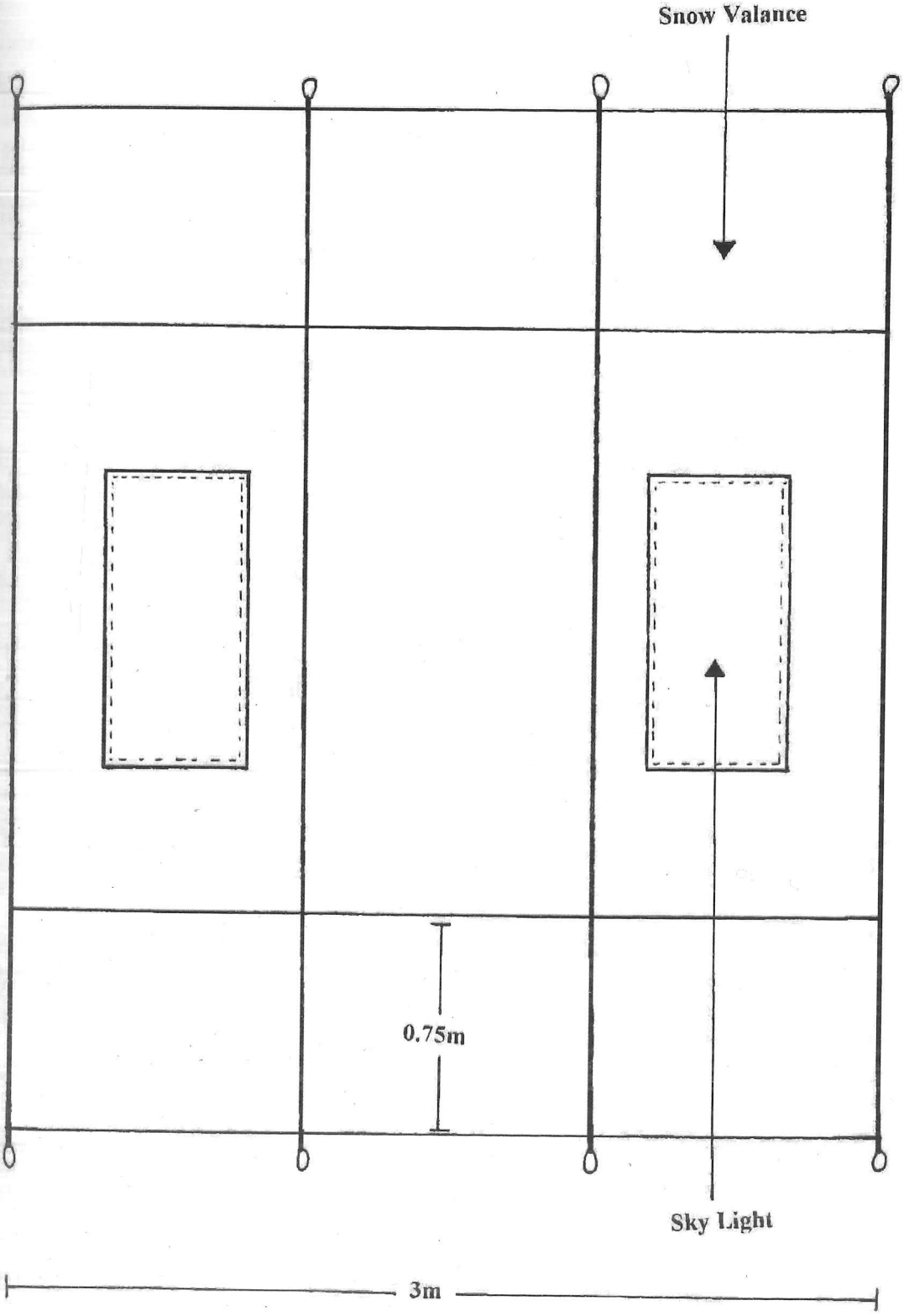
A5.1 – Section: Gable Wall



A5.2 – Section: Side Wall



A5.3 – Roof Plan



APPENDIX 6 : PROVISIONS SPREADSHEET

A6.1 – Section 1: Base Data

MASTER LIST	NOTES	WEIGHT (g)	COST (pence)	WEIGHT PER SERVING (g)	COST PER SERVING (pence)	CALORIES PER SERVING
RICE	4 bt 6	4000	400	66	6.6	264
CURRY	4 bt 6	350	150	155	66.4	310
QUICK COOK PASTA		500	95	130	24.7	520
BEANFEAST		120	89	80	59.3	249.6
SMASH		88	49	60	33.4	45.6
DOLMEO STIR IN SAUCE	4 bt 6	150	67.5	100	45.0	147
TUNA		185	49	93	24.6	372
BAKED BEANS		400	30	150	11.3	376.5
NOODLES		100	40	125	50.0	500
STUR FRY	AMOY	300	139	150	69.5	102
HOT CRUNCH PUDDING	1 OFF	144	72	72	36.0	151.2
AUNTIES SPONGE PUDDING	1 OFF	110	1.29	55	64.5	275
CUSTARD		75	45	25	15.0	25
STEWED FRUIT		250	125	50	25.0	120
ASSORTED SWEET BISCUITS	FREE	300	0	150	0.0	727.5
JAM (TUBE)		340	98	30	8.6	76.5
RICE PUDDING		150	39	150	39.0	88.5
READY BREK		750	154	60	12.3	228
MUESLI		2000	265	60	8.0	222
PANCAKE MIX		160	45	40	11.3	120
POT NOODLE	04-Jan	86	69	22	17.7	96.14
CHRISTMAS PUDDING	.1/4	350	150	87.5	37.5	43.75
SALAMI		100	130	35	45.5	182
CRACKERS		200	33	25	4.1	115
MARS	1 OFF	390	109	0	0.0	0
SNICKERS	1 OFF	390	109	0	0.0	0
PEANUTS		100	45	40	18.0	240
CHOCOLATE	FREE	400	0	100	0.0	530
TRAIL MIX		500	249	35	17.4	140
CEREAL BARS (JORDANS)	FREE	300	0	70	0.0	280
CHEESE		150	95	15	9.5	15
BUTTER		250	45	41.666	7.5	333.328
FRUIT CAKE		950	200	50	10.5	200
TEA BAGS		500		6	3.0	0
DRINKING CHOCOLATE		250		18	5.0	18
COFFEE		100	214	2	4.3	0
ROUCHE REDOXIN VITAMIN C TABLETS		20	200	3	30.0	0

OTHER FOODS REQUIRED	NOTES	CUPS PER DAY	EIGHT PER CUP	WEIGHT PER DAY	COST	TOTAL WEIGHT
DRINKING CHOCOLATE		2	18	36	466.166667	1008
TEA BAGS		2	3.2	6.4	94.6666667	179.2
COMPLAN 57g SACHET	57G	0.25	14.25	14.25	481.166667	399
FRUIT TEA		2	2.5	5	172	140
ISOSTAR/HIGH 5		4	12	48		1344
OXO CUBES (ASSORTED)				0		0
CONDENSED MILK	330			11.78	125	330
				0		0
				0		0
				0		0
						0
TOTAL		10.25	49.95		1339	3400.2

A6.2 – Section 2: Meal Composition

MAIN MEAL 1	COST	WEIGHT	CALORIES
RICE	6.6	66	264
CURRY	66.4	155	310
HOT CRUNCH PUDDING	36.0	72	151.2
TOTAL	109.0	293	725.2

MAIN MEAL 2	COST	WEIGHT	CALORIES
PASTA	24.7	130	520
BEANFEAST	33.4	80	249.6
SPONGE PUDDING	64.5	55	275
TOTAL	122.6	265	1044.6

MAIN MEAL 3	COST	WEIGHT	CALORIES
PASTA	24.7	130	520
DOLMEO SAUCE	45.0	100	147
CHRISTMAS PUDDING	37.5	87.5	43.75
CUSTARD	15.0	25	25
TOTAL	122.2	342.5	735.75

MAIN MEAL 4	COST	WEIGHT	CALORIES
NOODLES	50.0	50.0	500
STIR FRY	150.0	69.5	102
STEWED FRUIT	25.0	50	120
CUSTARD	15.0	25	25
TOTAL	240.0	194.5	747

BREAKFAST 1	COST	WEIGHT	CALORIES	
READY BREK	12.3	60	228	x
BREAKFAST 2				
MUESLI	8.0	60	222	x
BREAKFAST 3				
PANCAKES	40.0	11.3	120	

A6.3 – Totals

DAY	MAIN MEAL				BREAKFAST			SNACKS/LUNCHES		
		COST	WEIGHT	CALORIES	COST	WEIGHT	CALORIES	WEIGHT	COST	CALORIES
1	1	109.0	293	725.2	12.3	60	228	616.666	168.9	2935.468
2	2	122.6	265	1044.6	8.0	60	222	616.666	168.9	2935.468
3	3	122.2	342.5	735.75	40.0	11.3	120	616.666	168.9	2935.468
4	4	240.0	194.5	747	12.3	60	228	616.666	168.9	2935.468
5	1	109.0	293	725.2	0.0	60	222	616.666	168.9	2935.468
6	2	122.6	265	1044.6	0.0	11.3	120	616.666	168.9	2935.468
7	3	122.2	342.5	735.75	12.3	60	228	616.666	168.9	2935.468
8	4	240.0	194.5	747	8.0	60	222	616.666	168.9	2935.468
9	1	109.0	293	725.2	40.0	11.3	120	616.666	168.9	2935.468
10	2	122.6	265	1044.6	12.3	60	228	616.666	168.9	2935.468
11	3	122.2	342.5	735.75	8.0	60	222	616.666	168.9	2935.468
12	4	240.0	194.5	747	40.0	11.3	120	616.666	168.9	2935.468
13	1	109.0	293	725.2	12.3	60	228	616.666	168.9	2935.468
14	2	122.6	265	1044.6	8.0	60	222	616.666	168.9	2935.468
15	3	122.2	342.5	735.75	40.0	11.3	120	616.666	168.9	2935.468
16	4	240.0	194.5	747	12.3	60	228	616.666	168.9	2935.468
17	1	109.0	293	725.2	8.0	60	222	616.666	168.9	2935.468
18	2	122.6	265	1044.6	40.0	11.3	120	616.666	168.9	2935.468
19	3	122.2	342.5	735.75	12.3	60	228	616.666	168.9	2935.468
20	4	240.0	194.5	747	8.0	60	222	616.666	168.9	2935.468
21	1	109.0	293	725.2	40.0	11.3	120	616.666	168.9	2935.468
22	2	122.6	265	1044.6	12.3	60	228	616.666	168.9	2935.468
23	3	122.2	342.5	735.75	8.0	60	222	616.666	168.9	2935.468
24	4	240.0	194.5	747	40.0	11.3	120	616.666	168.9	2935.468
25	1	0.0	0	0	0.0	0	0	0	0.0	0
26	2	0.0	0	0	0.0	0	0	0	0.0	0
27	3	0.0	0	0	0	0	0	0	0.0	0
28	4	0.0	0.0	0	0	0	0	0	0.0	0
TOTAL		3563.0	6570	19515.3	434	1050	4560	14799.984	4053.1	70451.232

NOTE prices are in pence and weights are in grams

SNACKS + MOUNTAIN FOOD				
SNACKS		WEIGHT	COST	CALORIES
POT NOODLE	Quarter	22	17.7	96.14 x
SALAMI	Tartex for Dom	35	45.5	182
CRACKERS		25	4.1	115 x
MARS		0	0.0	0
SNICKERS		0	0.0	0
PEANUTS		40	18.0	240 x
CHOCOLATE		100.0	0.0	530
TRAIL MIX		35	17.4	140 x
CEREAL BARS (JORDANS)		70	0.0	280 x
CHEESE		15	9.5	15
ASSORTED SWEET BISCUITS		150	0.0	727.5
JAM		30	8.6	76.5 x
BUTTER		41.666	7.5	333.328
FRUIT CAKE		50	10.5	200
VITAMIN 'C' TABLETS		3	30.0	0 x
	TOTAL	616.666	168.9	2935.468

GRAND TOTAL	COST	WEIGHT	CALORIES
MAIN MEALS	3563.0	6570	19515.3
BREAKFASTS	434	1050	4560
SNACKS+MOUNTAIN FOOD	4053.1	14800.0	70451.232
TOTALS	9389.3	25820.184	94526.532

COST IS IN (p) AND WEIGHT (g)
WEIGHT INCLUDES DRINKS

AVERAGE CALORIES PER DAY = 3939

NOTE ADD 5KG TO TOTAL WEIGHT FOR PACKAGING
ie. PLASTIC BAGS AND BARELS.

APPENDIX 7 : FIRST AID EQUIPMENT

A7.1 – Box 1: Base Camp

Contents	Quantity
Life Systems Dental Kit	1
Merlin Rescuer - Emergency Face Mask & Case	1
Airway - Small, Medium & Large	3
Sam Splint - 11.5cm x 91.5cm	1
Ambulance Dressing - Flow Wrapped No.1	2
Ambulance Dressing - Flow Wrapped No.2	2
Ambulance Dressing - Flow Wrapped No.3	2
Ambulance Dressing - Flow Wrapped No.4	2
Primapora Non-woven Adhesive Wound Dressing - 12cm x 8.25cm	2
Crepe Bandage - 7.5cm x 4.5m	3
Conforming Bandage - 5cm x 4.5m	2
Triangular Bandage	2
Elasticated Tubular Stockinette	1
Pressure Point Foam Padding	1
Sore Point Moleskin	1
Elastoplast Fabric Strip - 6cm x 11cm	3
Large White Lint Pack	2
Cotton Wool Pleat - 100g	1
TCP Liquid Antiseptic - 100ml	1
Antiseptic Spray - 100ml	1
Germolene Antiseptic Cream - 30g	1
Athlete's Foot Cream	1
Vaseline Lip Therapy - 20g	1
Nivea Hand Cream - 50ml	1
Lockets Throat Lozenges	3
Eye Wash	1
Sterile Eye Pad	1
Nexcare Steri-Strip	2
Houseware's Waterproof Plasters Assorted	70
Washproof Plaster Assorted	16
Elastoplast Fabric Strapping - 2.5cm x 1.5m	1
Water Proof Cloth Tape 5cm x 4.5m	1
Insulation Tape	1
Vinyl Disposable Gloves	10
Stainless Steel Scissors	1
Nail Clippers	1
Tweezers	1
Thermometer	1
Feverscan Thermometer	1
Korbond Safety Pins	50
Assorted Needles	1
Excell Black Cotton	1
Freezer Bags - 22cm x 27cm	30
Husky Emergency Blanket	1
Mountain Rescue Council First Aid Booklet	1

A7.2 – Box 2: Drugs Box

Medicine	Contents	Quantity
Anadin Extra Soluble Tablets	Aspirin Ph Eur 300mg, Paracetamol Ph Eur 200mg	16
Nurofen Meltlets (Self Dissolving Tablets)	Ibuprofen Ph Eur 200mg	12
Paracetamol Tablets	Paracetamol BP 500mg	32
Diah-Limit Tablets	Loperamide Hydrochloride 2mg	12
Chloramphenicol Eye Ointment	BP 1.0%	1
Magnapen Capsules	Not Known	80
Metronidazole Tablets	400mg	28
Ciproxin - Ciprofloxacin Tablets	500mg	20
Codeine Phosphate Tablets	BP 30mg	40
Codeine Phosphate Tablets	BP 30mg	56
Hypodermic Needle	0.60 x 25mm BL/LB	8
Single Use Syringe	2.5ml	6
Single Use Syringe	5.0ml	1
Nubain - Nalbuphine Hyrochloride	10mg per ml injection	11
Medicine for Mountaineering & Other Wilderness Activities Book		1
Mountain Rescue Council First Aid Booklet		1
Medication Protocols, Casualty Card & Monitoring Record		1

APPENDIX 8 : ENVIRONMENTAL IMPACT ASSESSMENT

A8.1 – Introduction

On the 23rd June 2001 six British mountaineers will fly to Arctic east Greenland by ski plane. They will then spend the next 23 days climbing and exploring the northern reaches of the Lindbergh mountain range. This is a desk-based study to determine the impact upon the Arctic environment by the team. It is to be read as a live document and will continue to be updated as we reach the leaving date.

In this study I will describe the team and its chosen destination. Then describe the events of the expedition, then the effects that those events will have on the environment. Finally, I will list the actions required by the team to minimise the impact at each stage of the expedition.

A8.2 – The Team

Jonathan White	Expedition Leader
Brian Coombs	Provisions Officer
Richard Denison	First-aid Officer
Ian Jones	Equipment Officer
John Booth	Sanitation and Firearms Officer
Dominic Matters	Treasurer

A8.3 – The Destination

The Lindberghs are a range of mountains in east Greenland north of the polar circle. At 3200m in height they protrude through the Arctic glacier. From air photography it is clear that the terrain is mostly glacier ice with extensive snow cover, and comparatively little rock visible. The region that the expedition will visit is virgin and little base line detritus is expected to be present. It is for these reasons that the team have decided upon the ethical stance explained in our prospectus.

This is the first major expedition for nearly all of the team. For this reason a lot of time has been spent forming flexible plans to solve typical problems which will be faced. No plan can ever survive contact with reality, but they do serve as valuable problem solving tools when on the ground. Some of these plans are relevant to this study. It is suggested that the base camp plan and the sanitation plan be read in conjunction with this study.

On the following page is a table showing the stages of the expedition and the potential impacts that could occur.

Stage One Fly to Greenland from Iceland Unload supplies Planes take off and return to Iceland	**Actions** Barring any aeronautical disasters, the planes will leave only the marks of their ski tracks and the pollution associated with combustion of hydrocarbons	**Impact** The results of this stage will not affect the environment excessively as large airliners over fly Greenland each day.
Stage Two Site sleeping tents Dig in communal tent Activate sanitation plan	**Actions** Engineering the glacier surface to build base camp Snow walls, tunnels, and digging in communal tent. Setting out water harvesting and grey water drainage sites Siting and starting excrement treatment	**Impact** The surface engineering will decay and the glacier return to its pre-visit existence
Stage Three Live for 23 days exploring and climbing in the region	**Actions** 23 days of food, body and washing waste will be produced. Solid waste will be treated and stored outside base camp. Liquid waste will be dispersed in the urine, grey water drains when in base camp. On the mountain, liquid waste will be dispersed where it is produced	**Impact** In dispersing the urine and grey water in to points on the glacier will mark them. Yet the long-term results will be minimal.
Stage Four Pack up equipment and waste	**Actions** Washing and cleaning of all kit prior to departure. Containing all solid waste for removal to Iceland	**Impact** Grey water being placed in the drainage pit
Stage Five Return to Iceland by ski plane	**Actions** Barring any aeronautical disasters, the planes will leave only the marks of their ski tracks and the pollution associated with combustion of hydrocarbons	**Impact** As stage one

A8.4 – Actions by the Team to Minimise Impact

1) The division of waste types in to the following categories:
   - excrement
   - urine
   - toilet paper
   - food waste
   - grey water
   - packaging.
2) Disposing of only urine and grey water on the glacier
3) Use of eco-friendly evaporating soap
4) Reduction of food packaging to a minimum.
5) Removal of food, excrement and litter wastes

A8.5 – Conclusion

The above demonstrates a clear determination to leave the northern Lindberghs in a clean state, ready for the next visitor. Any future visitor will find only our two drainage areas for urine and grey water.

APPENDIX 9 : WEATHER LOG

Temperatures (max and min) are given in degrees Celsius.

Day	Date	Max	Min	Weather	Activity
1	22-Jun-01		-10	Clear and sunny	Arrived and set up Base Camp
2	23-Jun-01	22	-7	Clear and sunny	Climbed Peak 1
3	24-Jun-01	15	-6	High level cloud & wind	Climbed Peak 2, 3 & 4
4	25-Jun-01	9	-6	Spin drift & cloud high tops	Base Camp Rest Day
5	26-Jun-01	22	-7	Clear and sunny	Climbed Peak 5, 6 & 7
6	27-Jun-01	15	-10	Low cloud & light snow fall	Ski Toured
7	28-Jun-01	25	-9	Clear and sunny	Climbed Peak 8, 9 & 10
8	29-Jun-01	38	-8	Clear and sunny	Climbed Peak 11 & 12
9	30-Jun-01	19	-9	Clear and sunny	Ski Toured
10	01-Jul-01	9	-16	Dull, overcast & cloudy	Rest Day at Base Camp
11	02-Jul-01	5	-10	Dull, overcast & cloudy	Climbed Peak 13
12	03-Jul-01	15	-11	Very overcast ie. Scottish winter	Climbed Peak 14 & 18
13	04-Jul-01	20	-8	Clear and sunny	Climbed Peak 15, 16, 17 & 19
14	05-Jul-01	24	-5	Clear and sunny	Climbed PeakS 20 - 25
15	06-Jul-01	27	-7	Clear and sunny	Ski Toured
16	07-Jul-01	24	-9	Clear and sunny	Ski Toured
17	08-Jul-01	19	-7	Clear and sunny	Rest Day at Base Camp
18	09-Jul-01	4	-9	Low cloud & heavy snow fall	Tent Bound
19	10-Jul-01	29	-11	Clear and sunny	Ski Toured
20	11-Jul-01	16	-12	Dull, overcast & cloudy	Climbed Peak 26 & 27
21	12-Jul-01	21	-16	Clear and sunny	Climbed Peak 28
22	13-Jul-01	20	-7	Clear and sunny	Rest Day at Base Camp
23	14-Jul-01	11	-8	Cloudy	Dry Equipment and Pack
24	15-Jul-01	12		Cloudy	Waiting for Twin Otter Plane

APPENDIX 10 : RISK ASSESSMENT

Assessment ref. No.	Revision
IRJ/G2001/RA/001	00

Assessor's Name:	I JONES	Task reference:	N/A	Review Date (no later than):-	24/11/2001

Task Description	Location: Northern Lindbergh Mountains	
Task Risk Assessment for **Lanchester Greenland 2001** Unsupported Glacial Exploration and Mountain Climbing	Persons at Risk - Affected Groups:	
	A – Expedition Members	E –
	B –	F --
	C –	G -
	D	H -

Identified Hazard	Affected groups	Severity	Probability	Risk level before controls	Control Measures (Training, Physical controls)	Risk level with controls	Additional Controls Required to achieve ALARP	Final Risk level
Avalanche	A	C	O	N	Exposed slopes will not be approached after heavy snow fall. Assessment of Avalanche risk will be made on a slope by slope basis. Base Camp will be situated away from any potential avalanche run out area. Parties will be roped up on the mountain. Were possible rocks and ridges will be followed rather than open slopes. Belays will be used as required. Training and experience	(Cr/O) H*	Avalanche Transceivers, Avalanche probes, distress flares.	(Cr/R) M
Cravasses	A	Cr	O	H*	All travel on the glacier will be in roped parties until 'safe' routes are established. Training and experience (crevasse rescue techniques).	(S/O) M	No additional control practicable	(S/O) M
Seracs	A	C	R	H*	Base Camp will be situated away from any potential serac collapse zones. Parties will be roped up on the mountain. Routes on mountains will avoid areas of seracs. Training and experience.	(Cr/R) M	No additional controls practicable	(Cr/R) M

This risk level has been reduced as low as is reasonably practicable (ALARP)	
Assessor's Signature:	Date: 24/11/00

APPENDIX 10 : RISK ASSESSMENT

Assessment ref. No.	Revision
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Assessor's Name:	I JONES	Task reference:	N/A	Review Date (no later than):-	24/11/2001

Tent Fire	A	C	O	N	Cooking will only be undertaken in the group tent at base camp, cooking at ABC's will be done in the open.	(Cr/R) M	Snow available to smother any fires	(S/R) L
Slips, Trips and Falls	A	Cr	O	H*	Parties will remain roped up on the mountain, belays used as required, PPE (crampons, ice axes), training and experience. Ice axe arrest techniques.	(Cr/R) M	No additional controls practicable	(Cr/R) M
Cuts/Wounds	A	S	O	M	PPE (gloves, jackets, trousers etc), medical supplies, training and experience.	(S/R) L	No additional controls required	(S/R) L
Foul Weather	A	S	O	M	PPE (suitable clothing, tents and sleeping bags)	(N/O) T	No additional controls required	(N/O) T
Fuel Shortage	A	S	O	M	Fuel usage will be estimated before expedition. Extra fuel will be taken (weight permitting) to cover for any emergencies)	(N/R) T	No additional controls required	(N/R) T
Food Shortage	A	S	O	M	Food supplies will be accurately calculated before the expedition. Spare food will be brought in case of delayed departure	(N/R) T	No additional controls required	(N/R) T
Polar Bears	A	Cr	R	M	A rifle will be taken on the Expedition. Food will not be left out in the open. Polar bears are not normally found so far in land.	(S/I) T	No additional controls required	(S/I) T

This risk level has been reduced as low as is reasonably practicable (ALARP)	
Assessor's Signature:	Date: 24/11/00

APPENDIX 10 : RISK ASSESSMENT

Assessment ref. No.	Revision
IRJ/G2001/RA/001	00

Assessor's Name:	I JONES	Task reference:	N/A	Review Date (no later than):-	24/11/2001

SEVERITY OF RISK

SEVERITY		CONSEQUENCE
CATASTROPHIC	(C)	Multiple fatalities
CRITICAL	(Cr)	Single fatality and/or multiple severe injuries.
SERIOUS	(S)	Single severe injury or occupational illness; and/or multiple minor injuries
MINOR	(M)	Minor injury
NEGLIGIBLE	(N)	Trivial injury (First Aid only).

PROBABILITY OF RISK

PROBABILITY		DESCRIPTION
FREQUENT	(F)	Not surprised, will occur several times.
PROBABLE	(P)	Occurs repeatedly / an event to be expected.
OCCASIONAL	(O)	Could occur some time.
REMOTE	(R)	Unlikely though conceivable
IMPROBABLE	(I)	So unlikely that probability is close to zero.

This risk level has been reduced as low as is reasonably practicable (ALARP)	
Assessor's Signature:	Date: 24/11/00

APPENDIX 10 : RISK ASSESSMENT

Assessment ref. No.	Revision
IRJ/G2001/RA/001	00

Assessor's Name:	I JONES	Task reference:	N/A	Review Date (no later than):-	24/11/2001

RISK MATRIX

PROBABILITY / SEVERITY	FREQUENT	PROBABLE	OCCASIONAL	REMOTE	IMPROBABLE
CATASTROPHIC	*N*	*N*	*N*	*H**	*M*
CRITICAL	*N*	*N*	*H**	*M*	*L*
SERIOUS	*H*	*H*	*M*	*L*	*T*
MINOR	*M*	*M*	*L*	*L*	*T*
NEGLIGIBLE	*M*	*L*	*T*	*T*	*T*

T =	Tolerable
L =	*Low*
M =	*Medium*
H =	*High*
*H** =	*High Plus*
N =	*Intolerable*

This risk level has been reduced as low as is reasonably practicable (ALARP)

Assessor's Signature: Date: 24/11/00

APPENDIX 11 : GRANT APPLICATIONS MADE

As can be seen, we applied to many grant bodies, and were successful with a few (see Appendix 12 for details). We should point out here that two of our team are members of the MCI, and were thus eligible to apply for assistance.

Date	Organisation	Criteria
05:10:00	Mountaineering Council of Ireland	Mountain First Ascents
24:10:00	Winston Churchill Memorial Trust	Adventure/Exploration
01:11:00	Mountain Hardware	Climbing Expeditions
01:11:00	Eagle Ski Club – Georgina Travers Award	Ski Mountaineering Expeditions
30:11:00	Wilderness Award (Bristol)	Wilderness Projects
30:11:00	Lowe Alpine Adventure Award	Mountain, Environmental, PR
31;12:00	Mount Everest Foundation	Mountain Exploration
31:12:00	British Mountaineering Council	Mountain First Ascents
31:12:00	Alpine Ski Club – Kenneth Smith Scholarship	Ski Mountaineering
31:12:00	Alpine Ski Club – Memorial Adventure Fund	Ski Mountaineering
31:01:01	Edinburgh Trust No. 2	All Expeditions
01:03:00	Gino Watkins Memorial Trust (Scott Polar)	Polar Expeditions
31:03:01	Captain Scott Society (Expeditions)	Spirit of Adventure
01:05:00	Adrian Ashby-Smith Memorial Trust	1st Time Explorers

APPENDIX 12 : FINANCIAL ACCOUNTS

A12.1 – BALANCE FORECASTING SPREADSHEET

EXPENDITURE:

Item	Description	Status	Cost per Individual	Group Cost	Subtotal	Total
P Walker Independent Services	See Workup Sheet	Paid	£2,800.00		£16,800.00	£16,800.00
Insurance - Personal	BMC W'Wide + Greenland Extn	Paid	£254.25		£1,525.50	£1,525.50
Insurance - Freight (all risks)	See Contingency Spreadsheet	Estimated				£300.00
Ski hire	No Longer Reqd - Purchased	Paid	£0.00		£0.00	£0.00
Fuel bottles	Large Canisters	Estimated		£40.00	£40.00	£40.00
Equipment	See Workup & Cont. Sheets	Estimated				£1,610.00
Food (including packaging)	See Contingency Spreadsheet	Estimated				£564.00
First Aid Kits	Including medicines etc	Estimated				£200.00
First Aid Training	Specialist 1 Day Course	Confirmed	£35.00		£210.00	£210.00
UK transport	For kit/people to port/airport	Estimated		£150.00	£150.00	£150.00
Disposal of human waste	Subject to Importation Approval	Estimated				£50.00
Expedition seminar	Explore 2000	Paid		£50.00	£50.00	£50.00
Iceland accomodation	Based on 6 nights @ £25/night	Estimated	£150.00		£900.00	£900.00
Talks Given	Post-Expedition Lectures	Estimated				£120.00
Films	Including Developing	Estimated				£450.00
Books/maps/photos	Aerial Photos and Maps	Estimated		£100.00	£100.00	£100.00
Administration	Based on Lemon trip admin.	Estimated			£0.00	£600.00
Firearms Training	Paid Individually	Paid	£0.00		£0.00	£0.00
Contingency	See Contingency Spreadsheet	Estimated			£0.00	£1,515.50
					£0.00	
					£0.00	
Total Costs			**£4,197.50**			**£25,185.00**

INCOME (CUMULATIVE):

Status	Source	Amount	Individual			Total
Received:	**Grants Secured:**	**£2,937.00**				
	Sponsorship Received:	**£1,110.00**				
	Other:	**£6.58**	**£3,521.90**			**£21,131.42**
Anticipated:	**Further Grants Anticipated:**	**£0.00**				
	Further S'ship Anticipated:	**£0.00**				
	Sale of Assets:	**£660.00**				
	Other:	**£0.00**	**£3,411.90**			**£20,471.42**
Optimistic Case:	**Contingency Not Required**	**£1,515.50**	**£3,159.32**			**£18,955.92**
Best Case:	**Negative Contingency:**	**£475.40**	**£3,080.09**			**£18,480.52**

A12.2 – REAL AND CONTINGENCY ACCOUNTS SPREADSHEET

Variable Item	Best Case			Realistic			Mildly Pessimistic			Worst Case		
	Range	Total	Variance	Range	Total	Variance	Range	Total	Variance	Range	Total	Variance
	%	£	£	%	£	£	%	£	£	%	£	£
Food	90	£508	-£56	100	£564	£0	100	£564	£0	100	£564	£0
Equipment	70	£1,522	-£88	80	£1,610	£0	90	£1,874	£264	100	£2,050	£440
Flying Time	100	£0	£0	100	£0	£0	(+ 1 hr)	£1,500	£1,500	(+ 2 hrs)	£3,000	£3,000
Extra Nights	100	£0	£0	100	£0	£0	(+ 2 no)	£180	£180	(+4 no)	£360	£360
Exchange Rate	100	£12,000	£0	100	£12,000	£0	105	£12,600	£600	110	£13,200	£1,200
Administration	66	£396	-£204	100	£600	£0	133	£798	£198	166	£996	£396
Freight Insurance	66	£198	-£102	100	£300	£0	133	£399	£99	166	£498	£198
Human Waste	50	£25	-£25	100	£50	£0	200	£100	£50	300	£150	£100
Use of Ammunition	0	£0	£0	0	£0	£0	0	£0	£0	100	£50	£50
Talks Given	100	£120	£0	100	£120	£0	200	£240	£120	300	£360	£240
First Aid Kits	100	£200	£0	100	£200	£0	110	£220	£20	125	£250	£50
Films	100	£450	£0	100	£450	£0	100	£450	£0	100	£450	£0
Total			**-£475**			**£0**			**£3,031**			**£6,034**

Paid Contingency = **50 % of Mildly Pessimistic Total =** **£1,516** **This is the total to be added to the Budget total, and therefore will be paid into the account**

Reserve Contingency = **100 % of W.C Total, less Paid Cont** **£4,519** **This is what will have to be paid if everything that could go wrong does, & will be available on credit cards, etc.**

A12.3 – EQUIPMENT EXPENDITURE SPREADSHEET

Discountable Kit

Description	Status		Group Cost	Cost Before Discount		Cost After Discount
Snowshovels x2	Estimated			£80.00	25	£60.00
4 Season Tents x3	Estimated			£1,290.00	25	£967.50
Snowshoes	Estimated			£240.00	25	£180.00
Snow Pegs	Estimated			£50.00	25	£37.50
Groundsheets	Estimated			£0.00	25	£0.00
Snow Saw	Estimated			£30.00	25	£22.50
Guylines/Misc. Chord - 300m	Estimated			£30.00	25	£22.50
Ortlieb sacs	Estimated			£40.00	25	£30.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
Total : Discountable				**£1,760.00**		**£1,320.00**

Non-Discountable Kit

Description	Status		Group Cost	Subtotal	Expected Discount	Total
Snow Tent (mess tent)	Estimated		£170.00	£170.00	0	£170.00
Large Pans x1	Estimated		£20.00	£20.00	0	£20.00
Repair Kits	Estimated		£50.00	£50.00	0	£50.00
Misc Kitchen, etc. Materials	Estimated		£50.00	£50.00	0	£50.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
Total : Non-Discountable				**£290.00**		**£290.00**

Total : Kit to Purchase				**£2,050.00**		**£1,610.00**

Sponsored Kit

Description	Status	Cost per Individual	Group Cost	Subtotal	Expected Discount	Total
GPS Equipment	Estimated		£600.00	£600.00	100	£0.00
Plastic Barrels	Donated		£300.00	£300.00	100	£0.00
Stereoscopes	Donated		£50.00	£50.00	100	£0.00
Solar Panels	Estimated		£500.00	£500.00	100	£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
Total : Non-Discountable				**£1,450.00**		**£0.00**

A12.4 – GRANTS AND SPONSORSHIP RECEIVED SPREADSHEET

GRANTS

Source	Amount	Received
Eagle Ski Club	£150.00	y
MC of I	£247.00	
MEF	£640.00	
BMC	£700.00	
Gino Watkins Memorial Fund	£1,200.00	y
Total	£2,937.00	

SPONSORSHIP

Source	Amount	Received
Julia Cater Donation	£100.00	y
Mike Endean Donation	£1,000.00	y
Daphne Pritchard Donation	£10.00	y
Total	£1,110.00	

OTHERS

Source	Amount	Received
Interest	£6.58	y
Total	£6.58	

APPENDIX 12 : FINANCIAL ACCOUNTS

A12.1 – BALANCE FORECASTING SPREADSHEET

EXPENDITURE:

Item	Description	Status	Cost per Individual	Group Cost	Subtotal	Total
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Insurance - Freight (all risks)	See Contingency Spreadsheet	Estimated				£300.00
Ski hire	No Longer Reqd - Purchased	Paid	£0.00		£0.00	£0.00
Fuel bottles	Large Canisters	Estimated		£40.00	£40.00	£40.00
Equipment	See Workup & Cont. Sheets	Estimated				£1,610.00
Food (including packaging)	See Contingency Spreadsheet	Estimated				£564.00
First Aid Kits	Including medicines etc	Estimated				£200.00
First Aid Training	Specialist 1 Day Course	Confirmed	£35.00		£210.00	£210.00
UK transport	For kit/people to port/airport	Estimated		£150.00	£150.00	£150.00
Disposal of human waste	Subject to Importation Approval	Estimated				£50.00
Expedition seminar	Explore 2000	Paid		£50.00	£50.00	£50.00
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Films	Including Developing	Estimated				£450.00
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Administration	Based on Lemon trip admin.	Estimated			£0.00	£600.00
Firearms Training	Paid Individually	Paid	£0.00		£0.00	£0.00
Contingency	See Contingency Spreadsheet	Estimated			£0.00	£1,515.50
					£0.00	
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Optimistic Case:	**Contingency Not Required**	**£1,515.50**	**£3,159.32**			**£18,955.92**
Best Case:	**Negative Contingency:**	**£475.40**	**£3,080.09**			**£18,480.52**

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Extra Nights	100	£0	£0	100	£0	£0	(+ 2 no)	£180	£180	(+4 no)	£360	£360
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Human Waste	50	£25	-£25	100	£50	£0	200	£100	£50	300	£150	£100
Use of Ammunition	0	£0	£0	0	£0	£0	0	£0	£0	100	£50	£50
Talks Given	100	£120	£0	100	£120	£0	200	£240	£120	300	£360	£240
First Aid Kits	100	£200	£0	100	£200	£0	110	£220	£20	125	£250	£50
Films	100	£450	£0	100	£450	£0	100	£450	£0	100	£450	£0
Total			**-£475**			**£0**			**£3,031**			**£6,034**

Paid Contingency = **50 % of Mildly Pessimistic Total =** **£1,516** **This is the total to be added to the Budget total, and therefore will be paid into the account**

Reserve Contingency = **100 % of W.C Total, less Paid Cont** **£4,519** **This is what will have to be paid if everything that could go wrong does, & will be available on credit cards, etc.**

A12.3 – EQUIPMENT EXPENDITURE SPREADSHEET

Discountable Kit

Description	Status		Group Cost	Cost Before Discount		Cost After Discount
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4 Season Tents x3	Estimated			£1,290.00	25	£967.50
Snowshoes	Estimated			£240.00	25	£180.00
Snow Pegs	Estimated			£50.00	25	£37.50
Groundsheets	Estimated			£0.00	25	£0.00
Snow Saw	Estimated			£30.00	25	£22.50
Guylines/Misc. Chord - 300m	Estimated			£30.00	25	£22.50
Ortlieb sacs	Estimated			£40.00	25	£30.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
Total : Discountable				**£1,760.00**		**£1,320.00**

Non-Discountable Kit

Description	Status		Group Cost	Subtotal	Expected Discount	Total
Snow Tent (mess tent)	Estimated		£170.00	£170.00	0	£170.00
Large Pans x1	Estimated		£20.00	£20.00	0	£20.00
Repair Kits	Estimated		£50.00	£50.00	0	£50.00
Misc Kitchen, etc. Materials	Estimated		£50.00	£50.00	0	£50.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
Total : Non-Discountable				**£290.00**		**£290.00**

Total : Kit to Purchase				**£2,050.00**		**£1,610.00**

Sponsored Kit

Description	Status	Cost per Individual	Group Cost	Subtotal	Expected Discount	Total
GPS Equipment	Estimated		£600.00	£600.00	100	£0.00
Plastic Barrels	Donated		£300.00	£300.00	100	£0.00
Stereoscopes	Donated		£50.00	£50.00	100	£0.00
Solar Panels	Estimated		£500.00	£500.00	100	£0.00
				£0.00		£0.00
				£0.00		£0.00
				£0.00		£0.00
Total : Non-Discountable				**£1,450.00**		**£0.00**

A12.4 – GRANTS AND SPONSORSHIP RECEIVED SPREADSHEET

GRANTS

Source	Amount	Received
Eagle Ski Club	£150.00	y
MC of I	£247.00	
MEF	£640.00	
BMC	£700.00	
Gino Watkins Memorial Fund	£1,200.00	y
Total	£2,937.00	

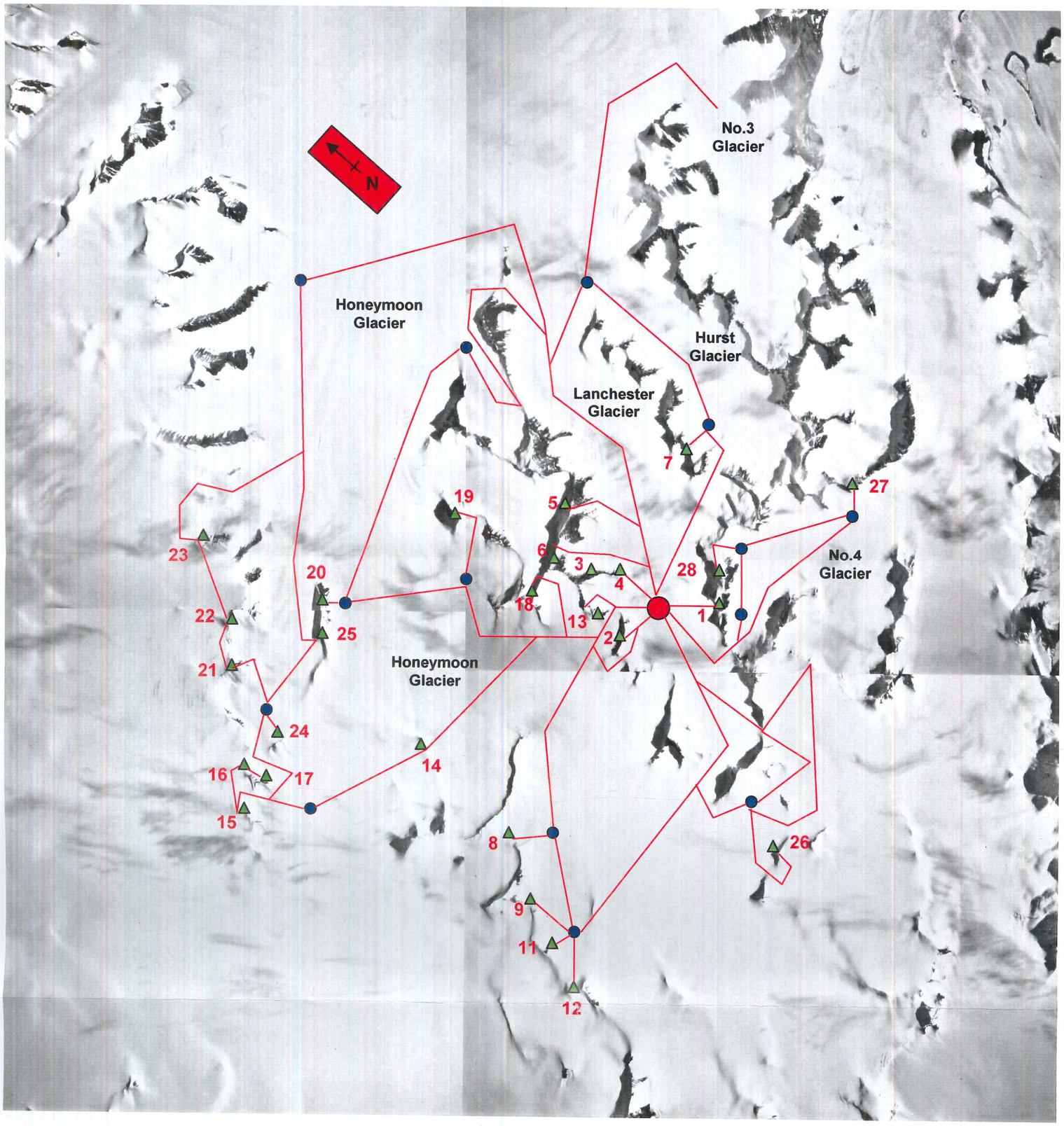
SPONSORSHIP

Source	Amount	Received
Julia Cater Donation	£100.00	y
Mike Endean Donation	£1,000.00	y
Daphne Pritchard Donation	£10.00	y
Total	£1,110.00	

OTHERS

Source	Amount	Received
Interest	£6.58	y
Total	£6.58	

APPENDIX 13 : ANNOTATED AERIAL PHOTOGRAPHS



KEY:

- Base Camp
- Advance Camp
- Summit
- Ski Trail

SCALE:

1:200,000 (approx)

10mm = 2km

Original Aerial Photos
from the DPC

APPENDIX 14 : PEAK PROFILES

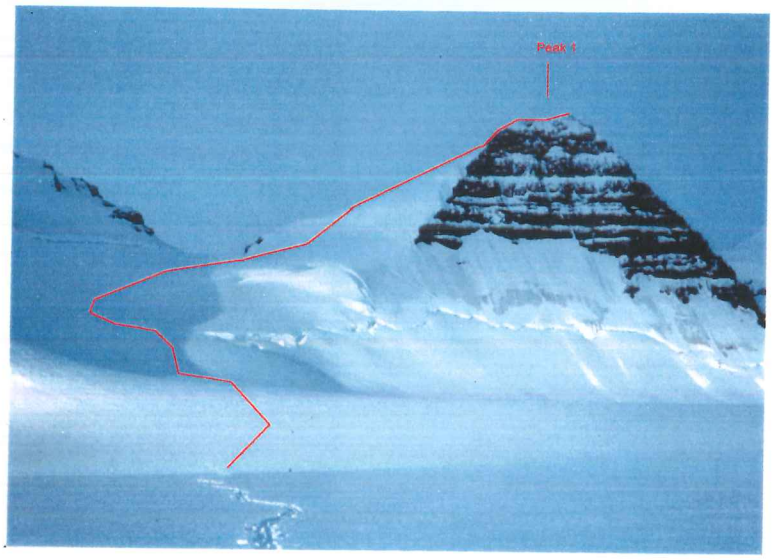


Figure A14.01 – The Western face of Qaqaq Endean (Peak 1, 2827m)

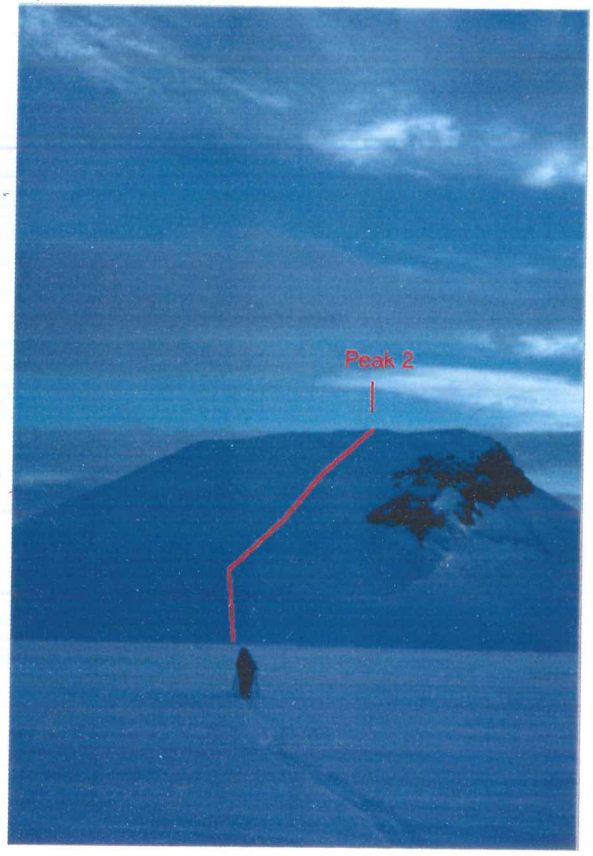


Figure A14.02 – The East Face of Grandstand (Peak 2, 2700m)
as viewed from the Lanchester Glacier

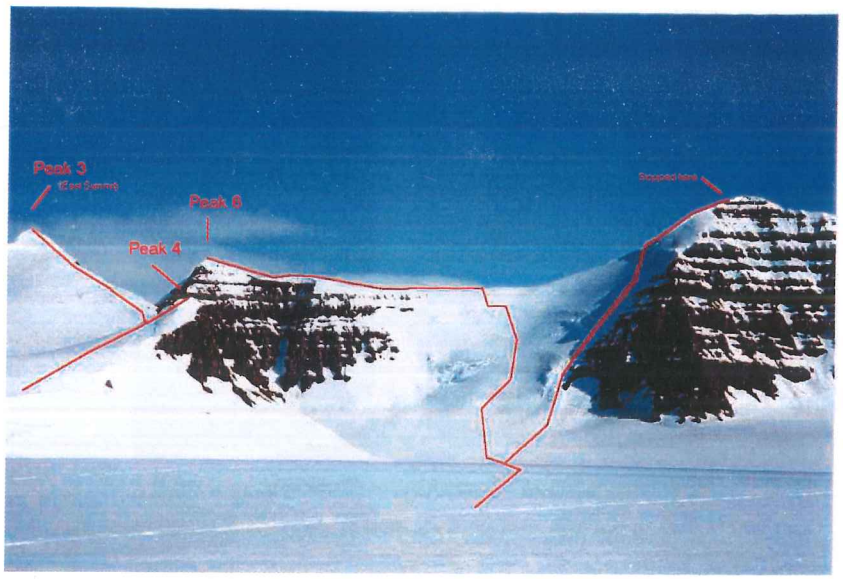


Figure A14.03 – A panorama of the central Western edge of the Lanchester Glacier. From left to right, Qaqaq Leonard (Peak 3, 2780m), Qaqaq Tink (Peak 4, 2505m), Qaqaq Endurance (Peak 6, 2888m) and attempt on Qaqaq Polse via the Ali Couloir

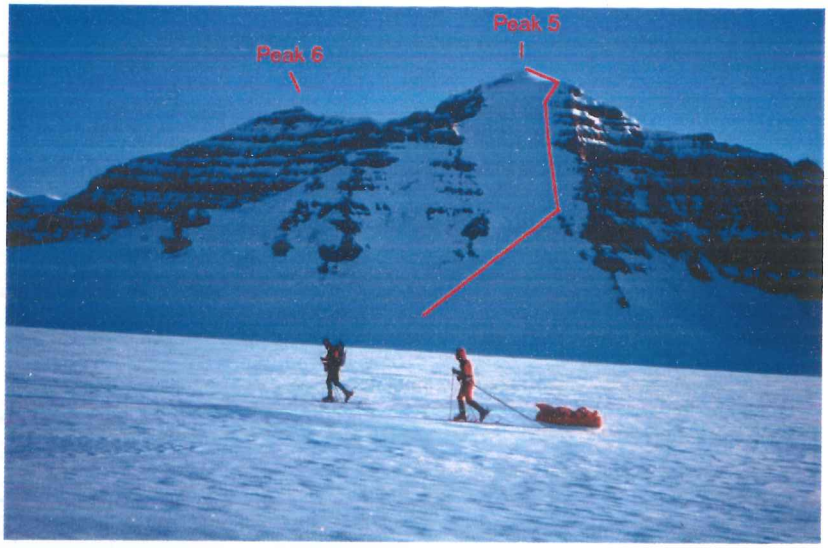


Figure A14.04 – Qaqaq Heather (Peak 5, 2957m) via the East face (otherwise known as 'The Ramp') dominates the Lanchester Glacier, with Qaqaq Endurance (Peak 6) protruding above the Eastern ridge

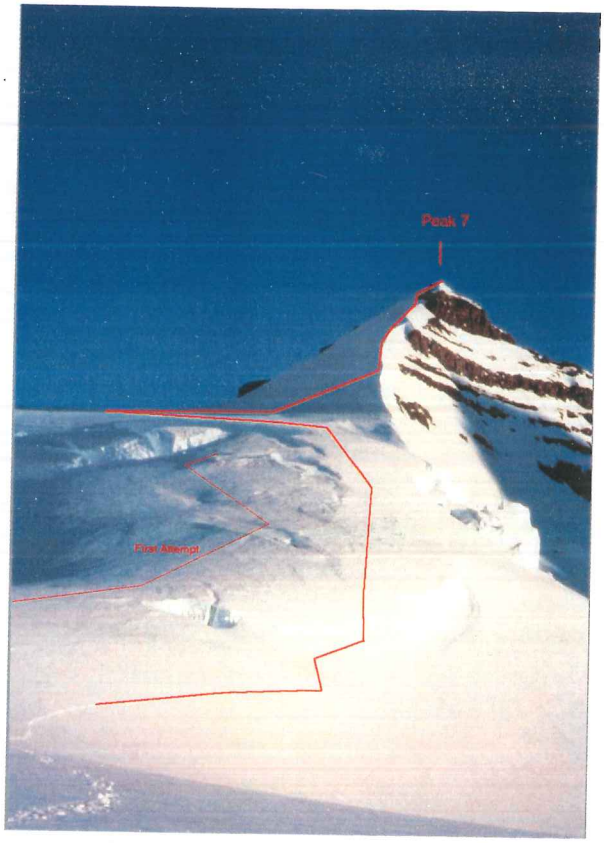


Figure A14.05 – East ridge of Qaqaq Cater (Peak 7, 2650m)
as viewed from the Hurst Glacier

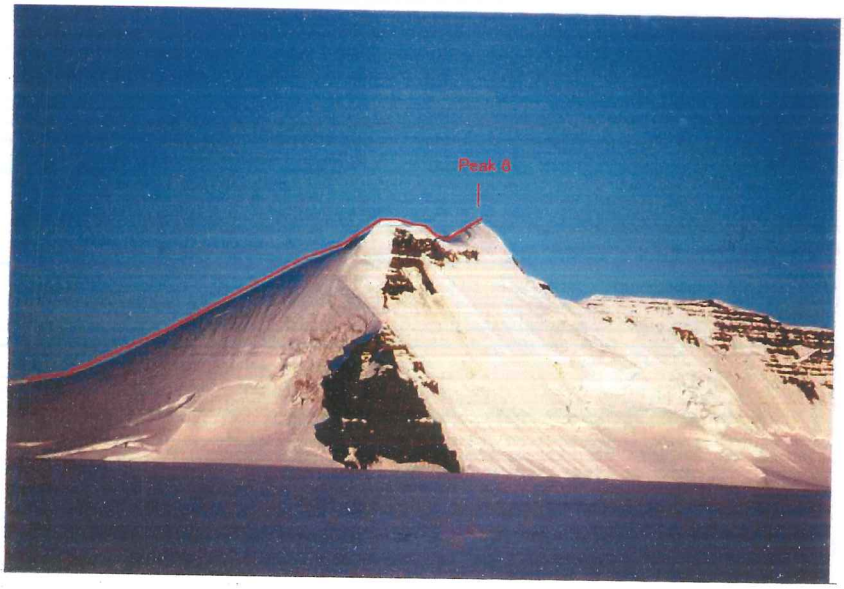


Figure A14.06 – The North face of Qaqaq Whitfield (Peak 8, 2740m)
as viewed from the top of Honeymoon Glacier

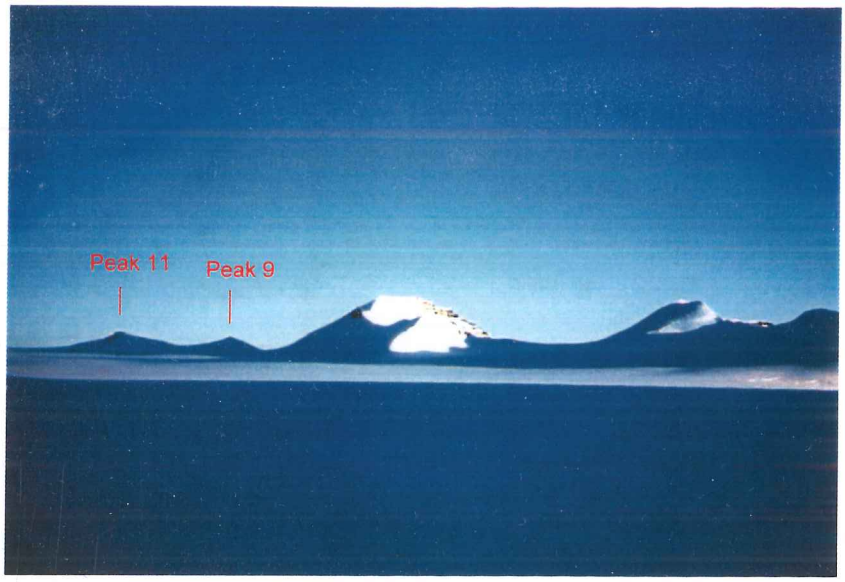


Figure A14.07 – Qaqaq Claire (Peak 9, 2720m) and Qaqaq Moore (Peak 11, 2775m)

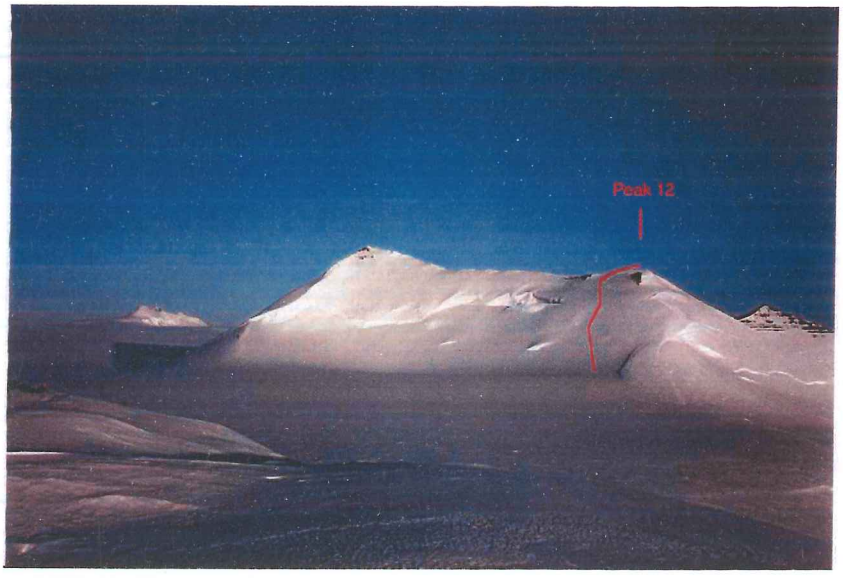


Figure A14.08 – The North face of Mornington Crescent (Peak 12, 2840m)

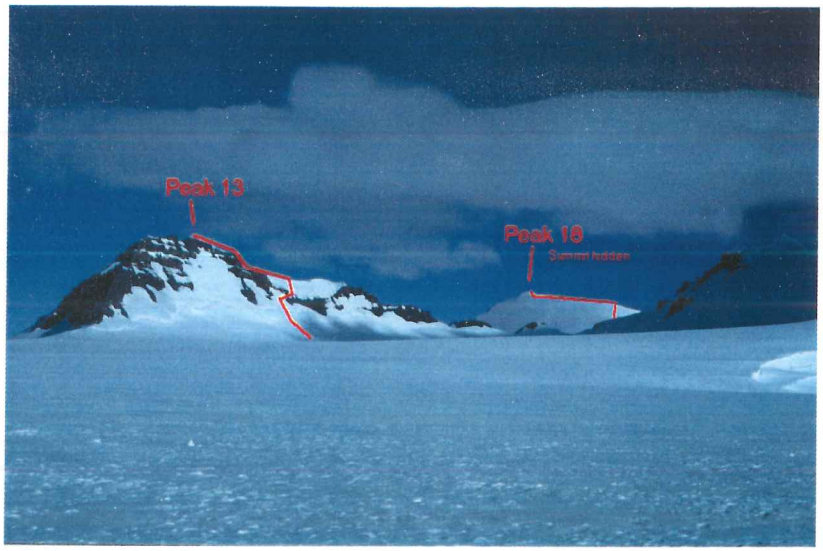


Figure A14.09 – North Eastern face of Qaqaq Pannell (Peak 13, 2750m) climbed through rock band onto steep ridge to summit. East face of Qaqaq Spring (Peak 18, 2800m) in far distance

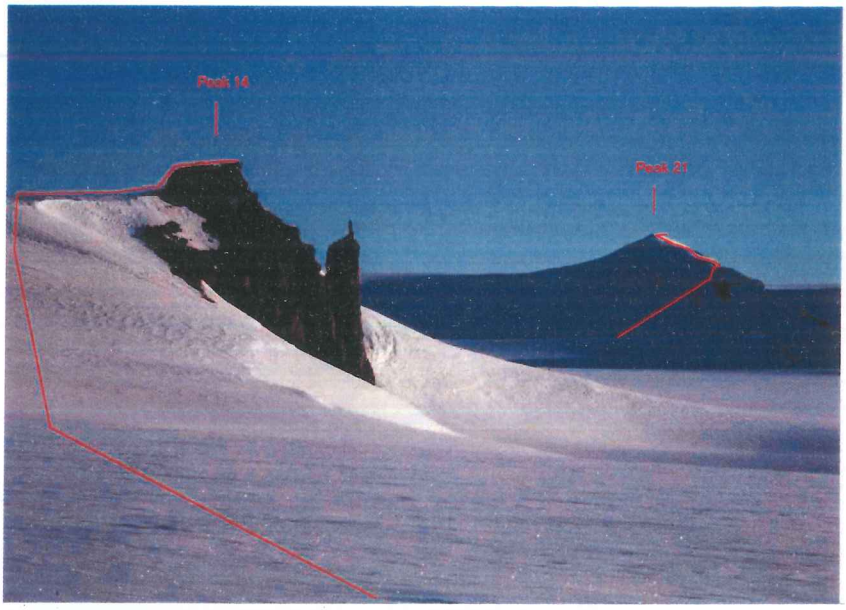


Figure A14.10 – The South East snow ramp of Nunatak Barker (Peak 14, 2346m), situated in the centre of Honeymoon Glacier, with Gfyetbf in the far distance

Figure A14.11 – South East snow face of Nunatak Godfrey (Peak 15, 2655m)

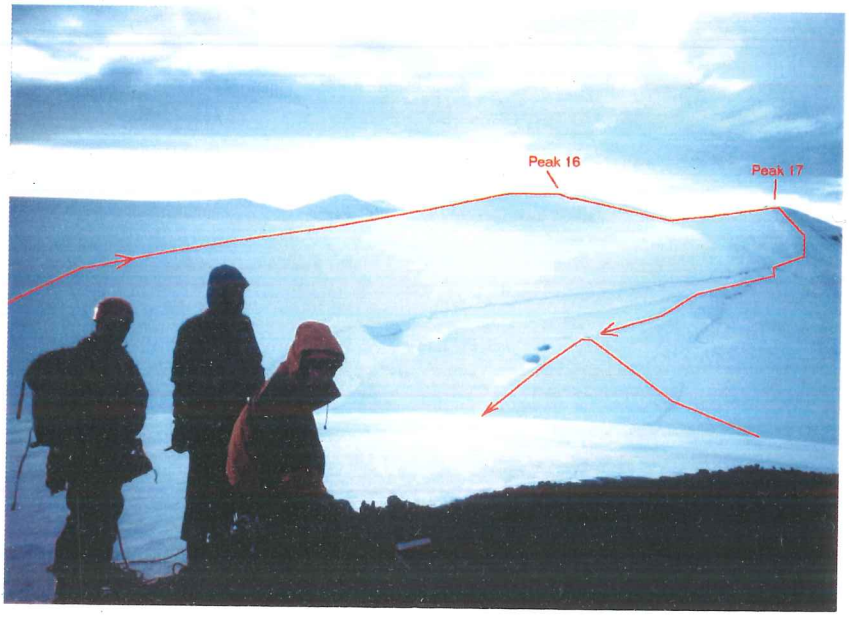


Figure A14.12 – Nunatak Garbett (Peak 16, 2705m) and Nunatak Bethselamin (Peak 17, 2685m), viewed from the Summit of Nunatak Godfrey looking North East

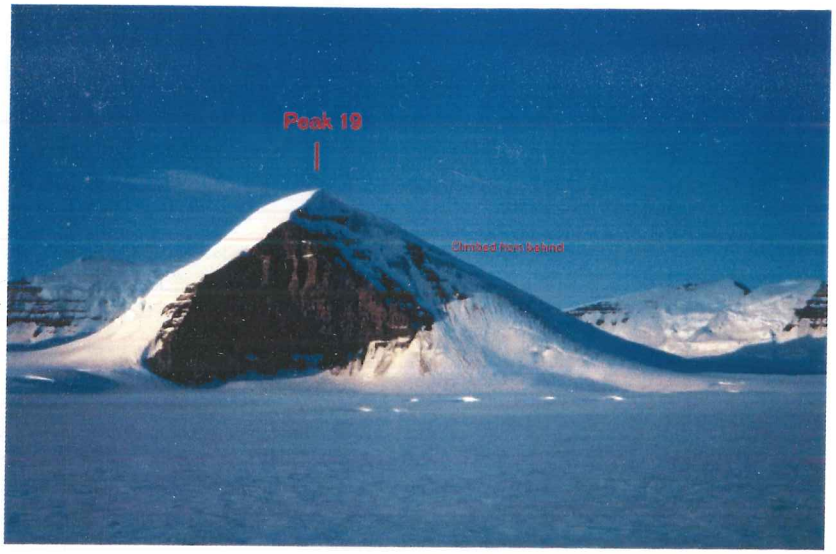


Figure A14.13 – North Western face of Qaqaq Kack (Peak 19, 2611m) as viewed from Honeymoon Glacier. Ascent via the South Eastern ridge

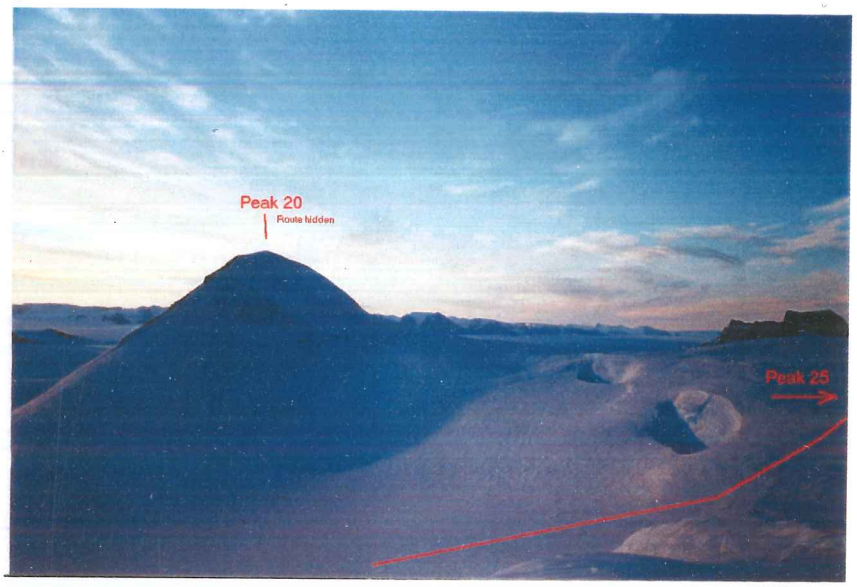


Figure A14.14 – The North West face of Qaqaq Irony (Peak 20, 2520m). Ascent from Honeymoon Glacier via the South East face. Ski ascent indicated along easy snow slope to ridge leading to Nunatak Rotoju (Peak 25, 2407m)

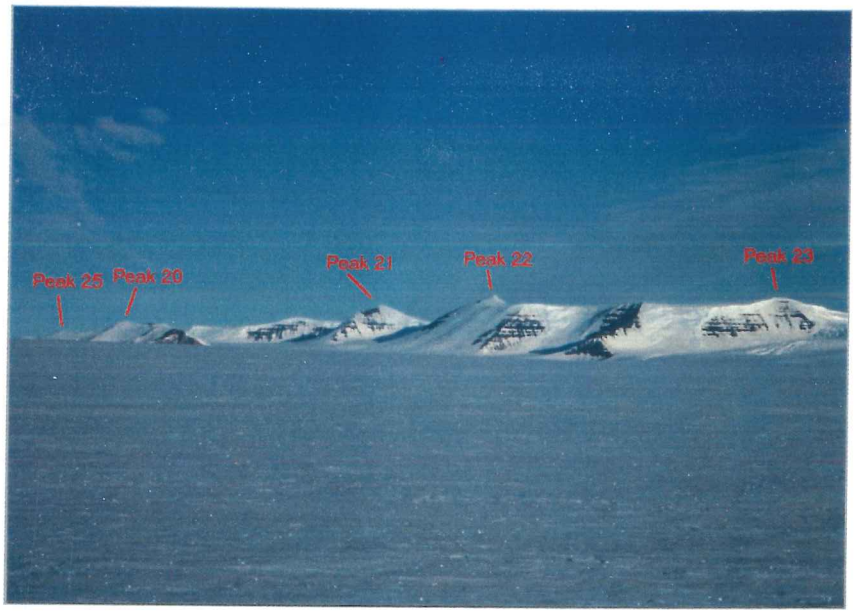


Figure A14.15 – A panorama of the peaks on the far Western edge of Honeymoon Glacier, otherwise known as the southern section of'The Lindbergh Nunataks' situated on the edge of the icecap. From left to right, Nunatak Rotoju (Peak 25, 2407m), Qaqaq Irony (Peak 20, 2520m), Nunatak Gfyetbf (Peak 21, 2770m), Nunatak Susanne (Peak 22, 2680m) and Nunatak Raymond (Peak 23, 2789m)

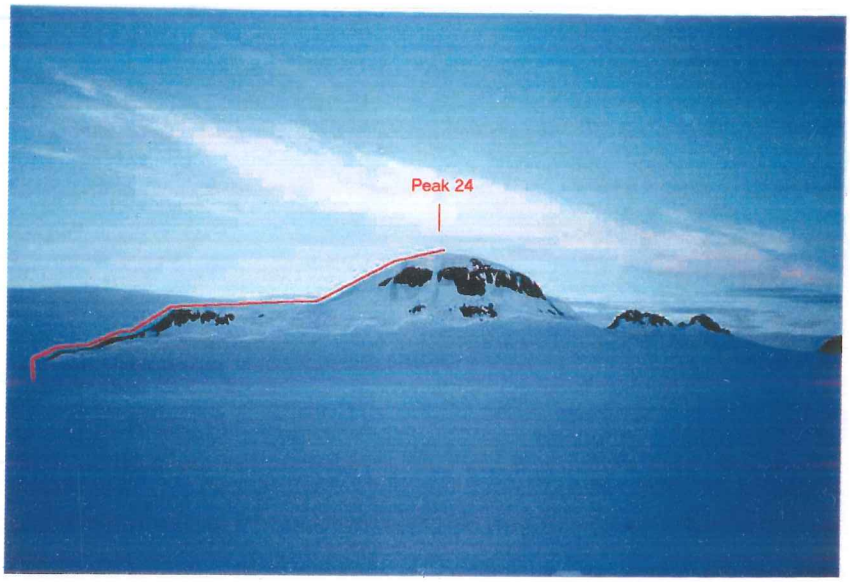


Figure A14.16 – The North East ridge of Nunatak Denison (Peak 24, 2481m)

Figure A14.17 – Second ascent via the South facing Slope of Peak 25 (name unknown), previously climbed in 1999

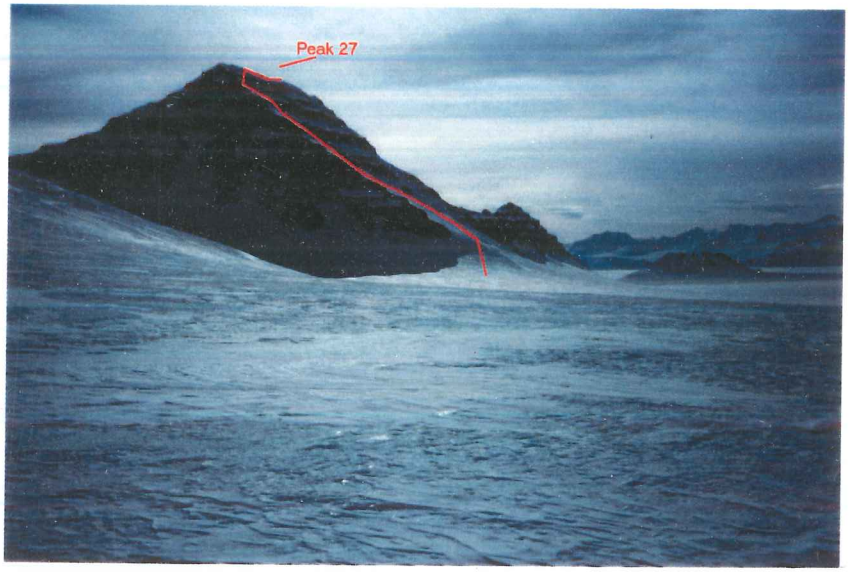


Figure A14.18 – West face of Qaqaq Bethany (Peak 27, 2623m) from the No. 4 Glacier, showing the route via the South face. The Watkins mountains are in the far distance

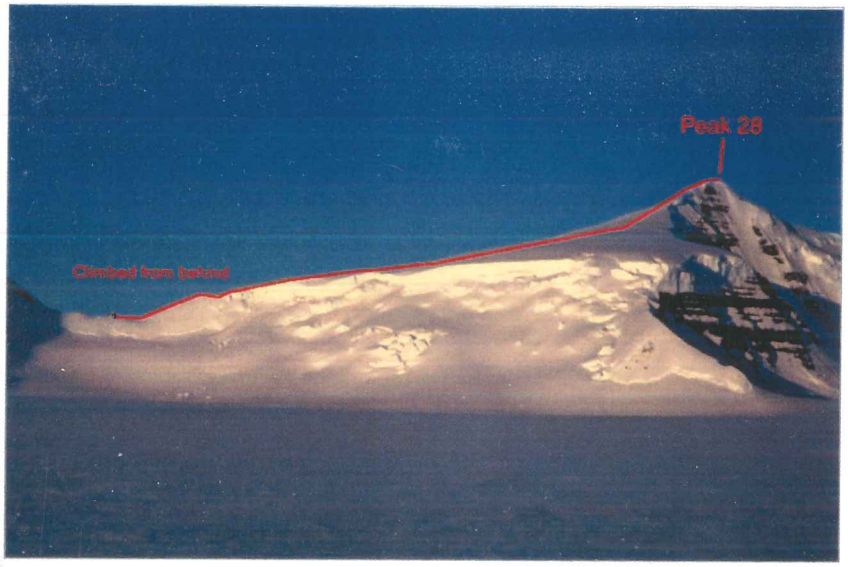


Figure A14.19 – Qaqaq Walker (Peak 28, 3005m), viewed from the Lanchester Glacier. Climbed via the Northeast ridge from an advance camp on the No. 4 Glacier

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Background information was also acquired from numerous other expedition reports, viewed primarily on a reference basis on visits to the BMC Offices, Manchester.

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Tor Outdoor Mountain Fabrics	www.toroutdoor.co.uk

GLOSSARY

Abseil	-	Method of descending a rope
AD	-	Alpine grade of climbing ('Assez Difficile' - Quite Difficult)
Arete	-	A sharp ridge
Basecampitus	-	A collection of ailments which result from existing away from public heath facilities
Bergschrund	-	Crevasse at the top or side of a glacier
Blue Lagoon	-	Geothermal heated outdoor swimming pool
BMC	-	British Mountaineering Council
Booth Box/The Barrel	-	A 60 litre plastic barrel used as the expedition toilet
CGU	-	Insurance Company
Clitter	-	Area of loose stones on ground surface, as distinct from scree
Compeed	-	Blister treatment patch
CUMS	-	Coventry University Mountaineering Society
Day	-	A subjective and variable term in the 24-hour daylight of the Arctic – usually meaning the time that we were awake and doing stuff. See also Night.
Deadman	-	Metal plate used as snow anchor to provide protection
Deuteronomy	-	Fifth book of the Pentateuch
DKK	-	Danish currency (approx. 10DKK = £1)
DPC	-	Danish Polar Centre, administrative office for G permits
EAC	-	Expedition Advisory Centre, part of the RGS
El Nino	-	A four-yearly occurring hotspot in the Pacific Ocean resulting in abnormal weather in the Americas
EPIRB	-	Device which emits an SOS signal: Emergency Position Indicating Radio Beacon
F	-	Alpine grade of climbing ('Facile' - Easy)
Fedora	-	A soft felt hat with a wide brim, the headwear of choice for the gentleman polar explorer
Flexifoil	-	British kite manufacturer
Flugfelag	-	The Twin Otter division of Air Iceland – the national domestic airline for Iceland
FMD	-	Foot and Mouth Disease
G	-	Abbreviation for Greenland also the number of days prior to departure, as in G-10 days
Geysir	-	Natural hot spring in Iceland
GPS	-	Global Positioning System
Grey Water	-	Water arising as a by-product of another process, generally not considered hazardous (e.g. washing water)
Gunnbjorn's Fjeld	-	Greenland's (and the Arctic's) highest peak at 3,708m
Herringbone	-	Method of walking up a slope leaving a V shaped pattern
High	-	British mountaineering magazine

Icecap	-	Large accumulation of compressed snow and ice
IPT	-	Insurance premium tax
JOG	-	Joint Operations Graphic
KCIVG	-	Kong Christian IV Glacier - located on the western edge of Greenland
Lanch/LMC	-	Lanchester Mountaineering Club (ex-members club for CUMS)
Magnum 44	-	Powerful hand gun, not to be mistaken with a type of ice-cream
MC of I	-	Mountaineering Council of Ireland
MEF	-	Mount Everest Foundation
Night	-	A subjective and variable term in the 24-hour daylight of the Arctic – usually meaning the time that we were asleep and not doing stuff. See also Day.
Nunatak	-	A mountain peak which protrudes as an island through a sea of ice
Pack-ice	-	Floating ice formed by frozen seawater
Panama	-	A fine straw summer hat (preferably rollable) for the refined British mountaineer
PD	-	Alpine grade of climbing ('Peu Difficile' – Bit Difficult)
Pulk	-	Type of lightweight sledge, hauled by man (as compared to a dog-sledge, or a sleigh)
Qaqaq	-	Greenlandic for mount/mountain
Reykjavik	-	Capital of Iceland
RGS	-	Royal Geographical Society
SAR	-	Search and rescue
Skins	-	Adhesive strap of mohair/manmade fibre which, when attached to bottom of skis, prevents the ski slipping backwards during uphill ascent
SLR	-	Single lens reflex: type of camera which allows the viewing of the image though the same aperture as the exposure
Smock	-	Fibrepile over-the-head jacket
Snorri's	-	Cheap and cheerful guest house in Reykjavik
Stereoscope	-	Device for the viewing of pairs of overlapping aerial photographs to produce 3D image
Telemark	-	Norwegian method of free heel skiing with flexible boots
Tink	-	Engineering term caused by the noise from a hammer hitting metal
Twin Otter	-	Sturdy plane used by Flugfelag, fitted with skis for glacial landings
WWF	-	World Wide Fund for Nature