SCOTTISH MOUNTAIN RESCUE
Any Hour, Any Day, Any Weather...

Røde Kors
Hindrer og lindrer nød

Looking to the North
Insights from a visit to Norwegian Mountain Rescue

Contents

Summary of key recommendations

- The setting up of Leadership Training Working Party
- Closer integration of the emergency SAR response should be pursued by the statutory authorities
- The MRCofS avalanche training group look at Avalanche practices in further depth due to their pertinence to Scottish snow conditions and incidents.
- APRS/GPS tracking systems should be investigated as a management tool during operations.
- Mechanical transport (Snow mobiles, quad bikes, polaris etc) could be of value in certain areas of Scotland and their use should be more fully investigated.
- Search Management group adopts a standard method of recording

1 Background

In February 2013, four members from Scottish Mountain Rescue Teams attended a course in Norway on "Leadership in difficult situations". The aims of the course were to develop leadership skills amongst the members of Norwegian Mountain Rescue Teams.

The reason for the Scottish attendance was to compare and contrast MR models and subsequently to assist in the development of MR training.

In the event, the two way flow of ideas has lead to positive developments on both sides of the North Sea and has proved much richer than any of the participants expected.

2 Norway

Situated between latitudes 58^0 and 71^0 North, Norway extends for over 1000 miles north to South, has a land mass of 324,000km^2 compared to Scotlands 78,500km^2 with a very similar population. The mountains rise to 2500 metres, and due to the high latitudes and the maritime climate, conditions especially in the winter can be extreme. Coupled with a low population density communities have to be self sufficient in many aspects, and one of those is of Mountain Rescue. In addition to this, Norwegians have a history of being an "outdoor " nation and many more people head to the hills than in the UK.

3 Mountain Rescue Organisation.

Very much like Scotland, the response is a multi-agency collaboration with the main organisations being the Police and Red-cross. There is an overarching coordinating organisation – 'Joint Rescue Coordination Centre' (JRCC) which runs two control centres in the North (Bodo)and South. (Stavanger) The JRCC undertakes the functions of the Police/ ARCC and MCA control centres and has the authority to involve other assets such as commercial helicopters. It incorporates both land based and maritime SAR in a single function.

On the ground, the Police are the main coordinators . The Red Cross (330 teams) and other voluntary organisations such as Norwegian Peoples aid (60teams) undertake the general search and rescue capability including Avalanche, with the Alpine Rescue teams (8 teams) undertaking technical rope rescue. It is a national agreement that all workers can get time off for rescues. Like Scotland, the use of dogs in SAR operations is embedded in the structure although there is a separate dog association much like SARDA.

The Ambulance service, especially the air ambulance assets are also integrated into the system and can fly search as well as medical missions.

In addition to these, all public organisations have a duty to assist as requested at their own cost.

Air Assets

Military provide Seaking helicopters for SAR purposes having one dedicated SAR aircraft on standby at each of the four bases. These have winch , night flying and FLIR capabilities.

In addition there are 11 Air ambulance bases around the country. Air ambulances do not have a winch but can "long line" if required. All have night flying and FLIR.

Recommendations

- Closer integration of the emergency SAR response should be pursued by the statutory authorities

4 Funding

All organisations are able to claim expenses occurred during a rescue. This can be from the volunteer MR units right up to the commercial helicopter companies which are occasionally used to supplement the SAR flights. Equipment and training are not funded and come out of the organisations pockets.

The JRCC has unlimited budget for rescue of persons although, not for body recovery.

5 Call out procedures

- A rescue is defined as when any two emergency services work together. At this point JRCC takes control and coordinates as SAR. The most recent statistics indicate 1200 SAR missions in total with 400 being dementia related.
- JRCC pass on to regional rescue control centre, these match the 27 police districts where the Police assume coordination. JRCC initially talk to local police to form plan, JRCC also provide any other national assets required.
- The Formal structure for managing SAR, is that the Police will normally take charge and there is an expectation that local police have skills to manage rescue, though Red Cross will manage incident if required. In practice this is a collaborative effort much like the Scottish model.
- Red Cross MR teams are then tasked by police depending on location, via Red Cross control rooms
- Helicopters are usually requested.

Avalanche Call out

The avalanche call out system is well developed and coordinated through the JRCC's.(see later)

6 About the course.

The Annual Red Cross Leadership course is based at Finse on the Hardangervidda plateau.

This area is used due to it's harsh winter climate allowing leaders to develop within difficult field conditions. It is seen as essential that leaders have experienced these conditions first hand assisting them to judge when to call off rescues to avoid endangering rescuers.

It is aimed at MR personnel from across the country (including Svalbard) who have completed previous local courses (at level C &B) and who are likely to be in the hot seat at some time in the future.

In addition there were a number of Police officers on the course with the senior rank being Superintendent. This was in recognition of past deficiencies relative to incident response. It was recognised that Police officers involved in the co-ordination of incidents needed to have a full appreciation of how rescuers worked and limitations in respect of communications, equipment, staff, topography and weather conditions.

Delivery was through indoor lectures and group sessions, tabletop exercises, outdoor skills stations and practical exercises both short and extended. Fortunately, the Scottish contingent had all of the input translated into English.

Course content included theoretical and practical input on

Safety
Leadership
Personal Survival skills
Norwegian SAR organisation
Search organisation
Communications
Avalanche evaluation and search
Weather
Navigation

7 Practical Exercises

There were numerous short exercises thoughout the week allowing candidates to put theory into practice. As a final learning opportunity, the last 48 hours were spent undertaking a continuous exercise involving numerous scenarios.

To allow each group to experience all functions including command and control (C2) they were rotated into the control suite on a regular basis.

The course was supported by a "cast of thousands" including comms managers, IT, snow mobile drivers, logistics managers to name but a few.

7.1 The 48 hour exercise

Particular mention must be made of the final exercise due to its "extreme " nature.

All participants are equipped and provisioned for a full 48 hours in either rucsacs or sleds (pulks). They are then deployed with one group remaining in control for each part of the exercise. When that scenario is completed, a group is brought back to base, usually by snowmobile, and the next phase unfolds.

The exercise scenarios were

Day 1 Lunchtime start

1) Ski search for missing person 2) Mass casualty exercise (19 persons) of snowmobiling group . 3) Ski to Overnight in Snowhole

Day 2

4) Continuation of search exercise 5) Large avalanche scenario including helicopter and dog logistics 6) Train crash scenario with mass casualties 7) Ski to overnight in Snowhole.

Day 3

8) Small avalanche scenario (cancelled due to weather) 9) Return to base

During the exercise, groups are GPS tracked and shadowed by staff. As in real rescue incidents, things are expected to go wrong and then participants are expected to cope. This was highlighted on the final day when the winds blew to hurricane force and a snowmobile with a group broke through ice on a lake . Unfortunately, their kit had been on another machine and they had to be rescued after a very cold wait.


Train Crash Scenario during 48 hr exercise

8 Leadership

Norwegian Red Cross have a placed a significant emphasis on Leadership training and this has its roots in business leadership practice. Aspiring leaders are encouraged to recognise that they will have individual characteristics and are encouraged to identify what type of leader they are by using the Myer Briggs Test. This assesses the type of leader someone is by a series of questions and can help a leader to understand how they react and how they are likely to respond to leadership situations.

There is emphasis placed on understanding the strengths and weaknesses of team members and using feedback and communication to assist with better team member awareness of each other's capabilities. To this end they use the JoHari window to illustrate the way that feedback and communication can improve team performance. The objective is to encourage team members to have as large an open/ free area as possible with a view to creating an effective team who are aware of their colleagues strengths and weaknesses.

Norwegian Red Cross training examines Maslow's theory of needs and how this informs leadership practise by recognising the needs of the team members and being proactive in achieving these needs to develop the team.

Team motivation is also examined as a leadership skill, with emphasis placed on correct information increasing motivation, feedback at all levels is important at all levels and it contributes to helping to improve the team. There is a great importance place on an open attitude and this is typified by the list of phases read out at the beginning of the course:

'I was wrong' - 'I am proud' 'What do you think?' 'Please' 'Thank you' 'I' (least important phrase) and 'We' (most important phrase)

This open learning approach is reinforced throughout the course and the course tutors are fiercely honest with participants. There is no room for egos!

Situational leadership is encouraged as the Leadership style will need to be able to change due to the situation and personal experience. There will be occasions when a very directing leadership is required for safety reasons, which could be modified to a more delegating style (for example) when safety is less of a risk.

Skills leadership is covered as a model to ensure that leaders are aware of the interrelationships between the different skills required to lead and run a rescue incident and where their responsibilities sit within the overall rescue scenario.
The skills identified are:

a. Technical skills. (Operational)

b. Relationship skills. (Tactical)

c. Overview 'big picture' skills. (Strategic)

The Operational level (Hill Leader) would need to have significant technical rescue skills, a good appreciation of team relationships, and a knowledge of the rescue overview.
The Tactical level (Team Leader) would need to have a good level of technical knowledge, a good level of team relationship knowledge, and a good level of overview of the rescue situation. This level is requires the broadest base of knowledge and will act as liaison between Operational level and Strategic level.
The Strategic level (Incident Commander) would have an appreciation of technical skills, a good level of team relationship knowledge and a full and broad appreciation of the overview of the rescue situation.

8.1 Evaluation of Norwegian leadership provision.

The attendance at the Norwegian MR Red Cross Leadership course (A) was a huge learning experience, the course has been running for over 30 years and has evolved and developed over that time.
Persons attending the course have already passed the C and B courses. They apply in the first instance to a regional panel. The applicant then sits a written subjective test of 35 questions. 25 of these are for practical skills.
The course is split into teams of 5, who have all already passed a written test and are expected to go back and lead their Red Cross groups in their areas. Each team has a mentor who is an outstanding candidate from previous courses, usually 2 or 3 years or more after doing the course. The main areas covered are competence, process and safety. After each activity the team reviews honestly the first acting leader for that task, then each team member, then the mentor. As the course progresses the mentor gradually steps back and gives the teams more space.

Feedback is a key element from both the mentor and their peers (group and full course). This feedback is not necessarily always positive but honesty is the focus.

The comprehensive nature of the leadership training, complete with resource materials, appear to produce confident, competent leaders who understand the leadership role and that it is as important an area for knowledge and development as the technical rescue skills.

The Norwegian course spends a significant amount of time training and evaluating the leadership performance of the candidates, and they normally send two or three candidates home midweek as they are unable to maintain the standards required.
The Norwegian course has drawn very heavily on business leadership models but has modified, developed and related them to the MR situation. This allows candidates to have a solid theoretical base for leadership practise while being able to apply the theory in real life, real time situations during the 48 hour exercise that is undertaken on the last days of the course.

Candidates must pass the course before they can be considered for the role of Team or Deputy Team Leader.

RECOMMENDATIONS
Leadership Training Working Party
Scottish MR should set up a working party of experienced and interested team members to investigate further the extent of training required throughout Scottish MR for incident and leadership training. The group should be selected and set up within 6 months and should report to the executive committee with findings and an outline syllabus for approval. The training should be incorporated into national Training within 18 months.
The syllabus should be created based on the experience from relevant best practise from around the world. The training should strike a balance between being comprehensive but not overly bureaucratic. The training syllabus should be specific to the Scottish MR environment and demonstrate relevance to systems and protocols existing in the wider Scottish Resilience setting.
In addition this could involve Police Scotland in a wider sense relative to the co-ordination of incidents and training provided to officers involved at that level.

9 Norwegian Avalanche Response

Any avalanche incident is treated as a red alert by the control room receiving the call and has a highly coordinated and nationally agreed response.

Three initial and simultaneous responses:

1. Nearest air ambulance tasked, they will take or collect dog handlers from pre arranged collection points. On arrival will usually conduct a visual search from the air before landing at nearest safe point. All personnel on board, including pilot will then be involved on the ground dealing with avalanche.
2. Military sea king tasked, it takes specialist avalanche team from helicopter base or collected en-route. Sea King then employed in moving other people up to avalanche zone.
3. Local MR (Red Cross in Norway) tasked and arrive by snow mobile or helicopter (one of helicopters has facility to search by transceiver and recco from air if appropriate)
4. Use of commercial helicopters may be utilised according to need and capability required.

The overall on site coordination and management is usually conducted by the police with a member of Red Cross handling the details of search. It is assumed that as many people as practically possible will be deployed to the site as quickly as possible.

The training exercise observed, had over 150 people involved which was considered normal. Specific tasks were allocated as appropriate with the Red Cross leader taking responsibility to direct those working in the debris field. This also included a Police officer allocated to the role of coordination of air assets.

9.1 Procedure at Avalanche site.

The search and response model is significantly different to that seen in other countries and currently taught during MRCofS courses. This was explained by the difference in snow pack which was described as maritime and therefore wetter – perhaps more similar to Scotland.

In particular there was an emphasis on detailed search rather than probe during the initial phases. Whilst no figures were presented it was explained that this was evidenced based in relation to positive results.

Initial deployment and prioritisation - Priority is given to,

- Hasty search for visual clues and spiral search around each item to 2m radius.
- Dog deployment.

During this period incident manager will try to identify areas of high priority for search. Considerable significance is put on this and resources are deployed to those areas at the expense of less likely areas of the avalanche. Training is given in identifying high priority areas and understanding of how visual clues can help. Essentially light objects travel further and stay nearer surface, so gloves and poles will travel further down an avalanche site than a body. Evaluation of finds i.e. gloves may be blown about by wind so it may not be a priority to search around such a find. Marked and move on!!

Fine surface visual search
After the initial hasty search a coordinated visual finger tip to finger tip line search is conducted of high priority areas. This is to look for objects the size of a finger tip. The people in the line will kick the snow around and turn over snow blocks as they walk to look for anything just below surface. This was repeated in different directions to take advantage of light conditions in preference to a probe search which was very much slower and with a lesser chance of success. This was universally considered an essential and frequently successful part of search although no figures were available to demonstrate success of this stage.

Probe lines
Following visual line search a probe line search was conducted similar to Scotland but with a few differences:
1 The Norwegians are extremely aggressive in identifying areas of high priority and throwing resources at them and will ignore areas of the avalanche site they consider unlikely. This may include probing those sites several times before moving to other areas.
2 Probing technique is a variation on Canadian system
Probing- Having analysed their avalanche statistics they probe to 2m, using a 50cm x 70 cm grid. This seems to have been run through the same modelling as the Canadian system but the different pattern is due to the difference in their terrain and snow pack.

The line spacing is achieved by stretching arms but with a small bend at elbow and a closed fist for spacing. Particular emphasis was given to probing vertically rather than at an angle (because of extra depth angled probing loses spacing at lowest levels) between feet then 50cm either side, 70cm step forward.

Norwegians use short lines of no more than 5 people. They are very flexible in their probing and probe up, down or across slope and sometimes both at the same time in an area depending on where they think is most likely for the victim to be.
They don't always worry about a probe master and let people probe at their own speed relying on individuals to keep spacings correct. This they say leads to a much quicker coverage of an area.

Scene Management –
As the response moves from hasty to the organised search stage the management of the site is very specific with a single gateway onto the scene and a person allocated to note details of those on site and leaving the scene. This is seen as a critical area for safety during the response.

9.2 General avalanche Observations

The avalanche site is marked following standard flag colour conventions.

Very keen on site manager drawing a sketch of avalanche site and taking photos if possible.

Extraction
Digging- Two rescuers at apex and rotate clockwise even if this results in two spells of digging - start approximately 1.5 X depth back from probe.

Casualty extraction - side lie even if hypothermic to protect airway (no other means of protecting the airway were considered unless the rescuer had additional skills from their day job). Minimise time in avalanche site for rescuers. Do CPR on skidoo stretcher whilst sat on casualty being driven down hill.

Recco - quite positive about Recco and use in helicopter along with transceiver search, any possible metal or electronic article can be detected by it, provided not blocked by body. Work 20m into dry snow and 10m in wet snow.

Transceiver – Norwegians, **very** concerned about level of interference of modern smart phones on transceivers, They believe after testing that smart phones are reducing the ability to detect a transceiver significantly, even if kept more than 30cm away. Note this may be pertinent to use of radios, particularly airwave.

Dogs – during training dogs are encouraged to interact and play with anyone as this increased the dogs liking for humans (unlike Austrians where no-one other than the handler interacted). Dogs were of larger breed such as golden retriever and could work in temperatures down to at least minus 25 deg .
During training they were encouraged to dig for the victim and play vigorously with the casualty.

RECOMMENDATIONS – The group recommends that,

- the MRCofS avalanche training group look at these practices in further depth due to their pertinence to Scottish snow conditions and incidents.
- MRCofS should highlight to Police Scotland the need for enhanced and co-ordinated repose to Avalanche rescue by area control rooms, due to the time critical nature of incidents and requirement of specialist assets such as SAR dogs as an immediate requirement.
- Additionally MRCofS should engage with partners and highlight the need for co-ordinated use of air assets. This should include both Police Scotland and SAS Helimed who should look to increase their capability in respect of carrying of passengers and SAR dogs to the locus of an incident.

10 Communications
One of the aims of the Finsekurs is to develop the organisational skills of the participants. To facilitate this, on each round of training scenarios one of the student teams was required to man a command and control centre (KO)specifically set up for the purpose.

The KO was set up with

1 x VHF base set

Laptop linked to the GPS tracking system and displaying whereabouts of operational teams

2 x internal phones linked through to the staff control centre.

Paper Maps with transparent overlays

Sufficient space to display required paperwork


Student Control Room. Leader wears yellow vest

A Staff control room was also set up to monitor all the student and staff activity. This comprised of

2 x VHF base set. 1 student frequency (fx) for monitoring and 1 staff fx for directing staff

2x Laptop linked to the GPS tracking system. 1x student teams for monitoring and 1x staff teams

2 x internal phones linked through to the staff control centre.

Internal phones were used to request and pass information concerning the scenarios, ie requests for police checks, further resources etc. staff seemed to make up most of the details and there did not appear to be a written script.

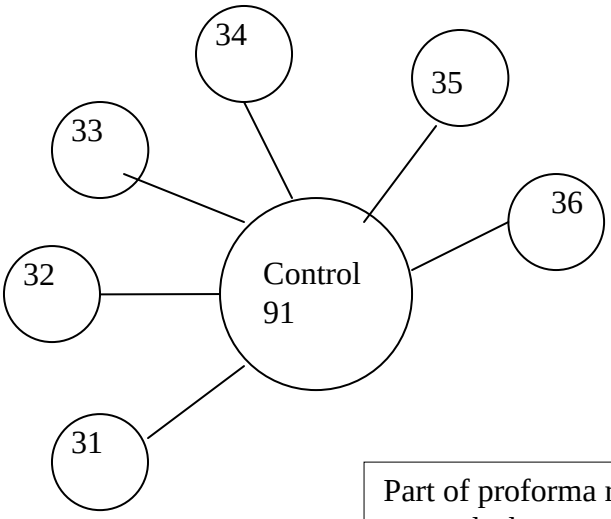
Topography dictated that there were many blind spots necessitating the deployment of Radio relay stations. These used a duplex set of frequencies These were similar in design to those used in Scotland although the batteries needed to be bigger due to the cold. They were always deployed by sledge on the back of a snowmobile.

Network.

As part of the planning phase of each scenario, students were required to state a radio network. This was usually done on a proforma to emphasise the communication routes.

All comms. from teams had to come to the control room. Teams needed to ask permission to speak to other teams directly.

3 Red cross channels were available with one was designated as the main working channel



Part of proforma radio network sheet

GPS tracking

One of the striking differences whilst on exercise was the extensive use of GPs tracking. This seems to be routinely used (at least on this course) and provides a reliable means of tracking the teams. The communications officer stated that it had reduced radio traffic by 80% since it's introduction due to the removal of the need to ask teams for a location update at regular intervals.

APRS

APRS (automatic position reporting system) is an open protocol developed by radio hams and subsequently adapted for many uses in tracking.

A small GPS and converter is fitted into the microphone slot of a radio and this then communicates with the base radio. The base radio is linked (magically) into the internet and the locations of the sender is then displayed on a google map viewed through an internet connection.

Costs of the radio devices seem to be relatively low ($40) on the internet with the gateway being $60.

A broadband connection is also required.

This system is already in use in the UK by radio hams and further investigation is required to examine if it is suitable for widespread use.

It is not known whether this would be compatible with the Mountain Map software.

One disadvantage may be that the position of assets would be widely available to the general public as it is an open website.

Other use of GPS

All Red Kors MR users are expected to be familiar with the use of map and compass. However, they are also expected to be familiar with the use of GPS and ski based groups were encouraged to use them as back up in the same way that MR teams in Scotland would be.

All snowmobiles were also fitted with a comprehensive GPS system. This usually consisted of a large format “marine” type and a smaller hand held unit (Garmin 62S). Both were linked to the vehicle electrical system although the hand held could be used separately.
The main use of the GPs was whiteout navigation. All tracks that had been previously driven were stored on the units and if visibility dropped were recalled and then accurately followed. All likely tracks were re-mapped by the snowmobile drivers at the beginning of the course to ensure they were safe.

SARLOC
Norwegian rescue organisations were unaware of the existence of the SARLOC system and how it could be used during a search incident.
Initially, the system did not seem to work in Norway, but following contact with the designer, Russ Hore, it was tweaked and now should be able to be used.
NB Since the visit, at least one successful rescue has been carried out using SARLOC.

11 Mechanised transport
In order to allow scenarios to be set up and to transport students quickly, extensive use was made of mechanised transport, especially the use of snow mobiles (or scooters).
Snow mobiles
Snow mobile drivers were trained by the Red cross, and it was their sole purpose to provide transport. Vehicles could carry one passenger as pillion and up to 3 on a trailer. Up to 5 skiers could also be towed along by a trailing rope although this occasionally ended in wipeouts even by experienced Norwegians.
Speeds were up to 40kph when not towing enabling personnel and materials to be transported quickly, although in poor visibility this dropped to a walking pace.
They were not invulnerable however and, like most mechanical things in extreme conditions, did on occasion break down or become stranded due to water or poor snow conditions.


Snowmobile towing

Some snow mobiles were police vehicles and came complete with blue lights and a police driver.

Piste Bashers
Although not used for transport, the piste bashers were used extensively for the “manicuring” of the snow to make avalanche debris. This allowed for realistic avalanche tips to be built, and for dummies and living persons to be buried up to 2 metres deep.


A Piste basher digs a casualty burial site

Recommendations

- APRS/GPS tracking systems should be investigated as a management tool during operations. This could be an affordable solution to tracking.
- Mechanical transport (Snow mobiles, quad bikes, polaris etc) could be of value in certain areas of Scotland and their use should be more fully investigated.
- Where ATVs are used then the use of GPS to mark safe trails should be considered to enhance safe practice and risk assessments

12 Search and incident Management

Candidates were given a number of inputs on the managing of incidents and searches.

Formal decision making models were used, to allow a structured approach. In particular the acronym PIKSIB was extensively used , which translated stands for Planning--Implementing--Control—Support—Inform--Evaluate/debrief.

As in Scotland, search management teams are encouraged to work through scenarios based on information received.

During training the emphasis was on getting the first steps correct as everything else follows from there. This was achieve by rotating groups into the control room at the start of each scenario.

When conducting search ops, overhead teams were required to use a standard system of information displays.

These consisted of:-

- Marked map, in paper form with overlays
- Misper information wall chart
- Timeline indicating all information for both incident, persons and assets
- Tasking chart using post-it notes
- Comms chart and log.

Search methods

Corridor searches are the norm, as most routes are marked with sticks in the winter or paint in the summer. Search teams are usually deployed on foot, or in the winter, on ski.

Snow mobiles can be used and can also carry scenting search dogs allowing a larger area to be covered.

Recommendations

- Search Management group adopts a standard method of recording

- Search Management group considers focus of scenarios in respect of the first steps and getting it right from the outset.

13 Medical

The focus of the course was not on first aid. Candidates are expected to have prior first aid skills and casualty handling ranged from excellent to basic depending on the skills of the rescuer.

Norwegian teams are unable to give any medication unless the rescuer is otherwise qualified i.e. On surface of avalanche with hurt back. handling and care excellent and very similar to UK. However, no pain relief can be given when being moved

Even the Ambulance service have limited drug protocols and have to administer most drugs under the permission of a doctor.

.

Casualty extraction - side lie even if hypothermic to protect airway (no other means of protecting the airway were considered unless the rescuer had additional skills from their day job). Minimise time in avalanche site for rescuers. Do CPR on skidoo stretcher whilst sat on casualty being driven down hill.

14 Personal skills

All candidates had previously undertaken winter training and had considerable winter experience.

Some time was spent in refreshing and evaluating these skills in the early part of the week. Information that the visitors found interesting included

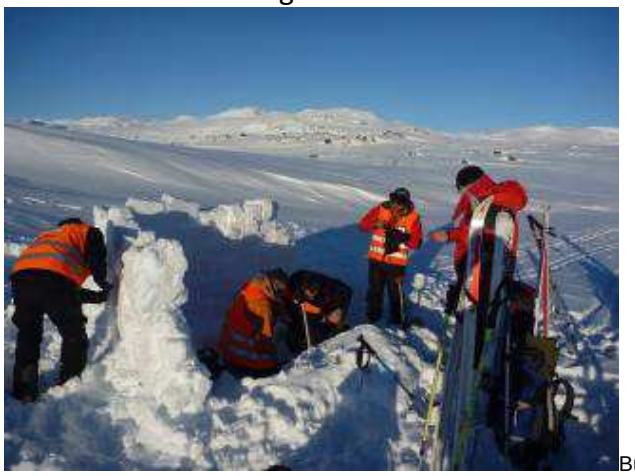
Wall building- a wall with a right angle bend is built to protect from the wind.

Snow holes- dig a central trench without a roof then dig sideways. A roof can be built later

Jarven bag-equivalent to our survival or cas bags.

Practice Tows behind skidoo- useful to go from A-B quickly

Interestingly, group shelters are not widely used. Those that did use them had mixed reviews in the Norwegian conditions.



Building a snow wall to protect against the (nil) wind

The attendees would like to express their thanks to:-
Norwegian Red Cross for inviting us.
Course Leader- Arilde Himle
Course Instructors- Endre Gronlund, Mats Hjelle

Participants and report writers
Kev Mitchell Ochils MRT (right)
Colin McDougall Tayside MRT (left)
Damon Powell Oban MRT (centre)
Mark Leyland Arrochar MRT


The good, the bad and the ugly!

Weblinks
Norwegian Red Cross
www.rodekors.no
Norwegian SAR
http://www.regjeringen.no/upload/kilde/jd/bro/2003/0005/ddd/pdfv/183865-infohefte_engelsk.pdf

Further Reading
An Information Paper on aspects of Leadership can be obtained from Kev Mitchell via MRCS project officer.

Just to show the weather wasn't always good!