Safety instructions for Fieldwork in the Arctic

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Content

1. Introduction

The purpose of this field guideline for employees and persons affiliated with the Department of Biology, Aarhus University, is to:

- Ensure the necessary theoretical background to be able to work safely in the field
- Ensure common high standards for safety related activities during field work regardless of the location
- Increase the general awareness of safety during field work

in order to prevent accidents to the greatest extent possible.

This manual is a collection of materials relating to safety in connection with our (hereafter called BOIS) activities:

- The Arctic parts of - and in desolated mountains and bird cliffs in both Europe, Canada, US and Russia
- Everywhere in Greenland and Svalbard
- Moreover, wherever occurring polar bears

All employees on work-related travel to the above areas are required to familiarize themselves with the contents of this safety manual and follow its guidelines as well as the general safety instructions and follow the instructions given.

At research stations run by BIOS, the logistics manager or station manager is responsible for all safety equipment belonging to the station as well as initiating an evacuation, but the project manager must immediately notify his/her supervisor at BIOS in case of accident, injury or illness, see the general procedure above.

It is important to familiarise you with the legislation of the country in question about the work you intend to carry out in the country.

Be aware that some of the materials you need to use in connection with fieldwork in the Arctic regions may be 'dangerous goods' in connection with transport to and from the country. See the general instructions for field work.

2. Especially for Greenland

If there are local regulations at relevant job sites and stations in Greenland, e.g. Greenland Institute of Natural Resources, Zackenberg Research Station and Station Nord, these must, of course, be observed by employees of BIOS. In case of any discrepancies, it is the rules of the individual research station that primarily must be enforced. BIOS OHS must approve safety rules at the stations operated by BIOS.

Greenland is autonomous and, thus, has its own 'Act on the working environment' (unfortunately only available in Danish or Greenlandic):

- Act on working environment in Greenland, executive order no. 1048 of 26 October, 2005 and Act to amend the act on working environment in Greenland, act no. 1382 of 23 December, 2012

Employees on work-related stay in Greenland are required to familiarize themselves with this act, with amendments, prior to beginning work in Greenland. Greenland's health and safety legislation can normally be seen on this link (however, there may be delays on updating the page):

- https://at.gl/da/regler/love/lov-om-arbejdsmiljoe-i-groenland/

The Working Environment Act and related regulations generally apply to all work. Exempt from this is work carried out in respect to navigation or flight. For these activities, maritime law and aviation law apply, respectively:

- Maritime law: https://www.dma.dk/SikkerhedTilSoes/Arktis/SejladsGroenland/Sider/default.aspx#
- Aviation law: http://www.trafikstyrelsen.dk/da.aspx

The so-called travel notice applies to access to and work in remote areas of Greenland and, furthermore, the so-called National Order is relevant in relation to work in the National Park of North and Northeast Greenland. Both these orders and other important information can be found on home page for Greenland's Self-Government: https://naalakkersuisut.gl/da/Kundgoerelser in Danish (choose language on the top left – some parts are translated into English).

You need a special permit to work with isotopes in Greenland. You can get this permit by contacting Greenland's Self-Government, Department of Health, with the following information:

- How much (e.g. ^{14}C and ^{35}S) do you need to use (with specifications)
- Where do you plan to carry out the studies
- When do you plan to carry out the studies
- Who is the person in charge

3. In case of illness

For example, in Greenland, you may be exposed to tuberculosis. You are moderately protected, if you've been Calmette-vaccinated in childhood. But please under all circumstances, keep an eye on the symptoms of tuberculosis http://www.netdoktor.dk/sygdomme/fakta/tuberkulose.htm. Check out this page, what the recommendation is currently (it is updated on an ongoing basis, but in Danish).

4. Safety at sea

4.1 General rules for using small boats (including dinghy, inflatable boat, canoe and kayak)

BIOS often uses small boats in connection with work. Regarding safety, the following rules must always be observed:

- When sailing in small boats, field workers must wear a survival suit, life jacket, flotation suit or something equivalent. If you only use a survival suit or flotation suit, the boat must have life jackets.
- During studies conducted along the coast, flares must be easily accessible on the boat.
- A signal pen with shots or something equivalent must be in the pocket of all survival suits.
- Field workers using an inflatable boat in remote areas (excluding small lakes) without a backup boat must bring an emergency transmitter (PLB/EPIRB). The transmitter must be located so

that it can be easily activated in case of an accident.

- Grapnels and oars must be easily accessible on the boat.
- If circumstances demand it, the boat being used must be equipped with an auxiliary motor that can be used in case the main motor fails. If a dead-man control has been mounted to the motor, it should be connected. You should also bring an extra split for the propeller.
- Field workers who go ashore islets and reefs must bring communications equipment (at a minimum cell or satellite phone, preferably supplemented by a VHF radio), emergency equipment and emergency flares with them ashore.
- Yarn, rope and similar equipment must be stored in a plastic bag or box in order to reduce the danger of a field worker becoming entangled in case the boat capsizes.
- Field workers must be particularly careful when using a portable inflatable boat (PVC boat). The boat must at least have a separate bottom and two flotation chambers.
- You must always take along a satellite phone and a PLB / Spot Satellite Messenger when working in remote areas. You may supplement these with a VFH radio for local communication. Be aware that the range of a VHF radio is only 20-25 km, even if it has a strong signal and conditions otherwise are optimal (unless it has been equipped with a special amplifier or relay stations). A VHF radio has a limited function as safety equipment and, therefore, a satellite phone and PLB / Spot Satellite Messenger is required for field work in remote parts of Greenland. In case of prolonged field work, you must bring along necessary extra batteries for the satellite phone.
- When working in remote areas where there is a risk of encountering polar bears, walrus and musk oxen, there must always be a rifle and a flair gun in the boat. But the weapon must be emptied of ammunition when on board.
- In connection with BIOS' work, from time to time small boats are required to solve certain assignments. The outboard motor and number of passengers must be proportionate to the size of the boat.

4.2 Prior to sailing

- The field workers must ensure that the motor and other equipment are in order prior to sailing.
- The field workers must ensure that there is plenty of fuel for the trip. You may only refuel the boat when the motor is switched off.
- Smoking is strictly forbidden when refueling or changing fuel tanks.
- You must always bring extra spark plugs, oars, bailer and an extra propeller with you in the boat. In addition, inflatable boats must be equipped with a repair outfit and a pump.
- The outboard motor must be secured with a chain or rope.

4.3 During sailing

- You must be at least two people on board when sailing on open sea or in remote areas.
- Always wear a survival suit when sailing in a dinghy or inflatable boat.
- Always use a life jacket too, if the survival suit is not approved for use without a life jacket.
- If the outboard motor is equipped with a dead-man control, it must be connected to the person sailing the boat, e.g. tied around the wrist.
- Field workers must look for rocks, reefs, ice floes, etc. and adjust the speed according to the conditions.
- If work is being done from the boat, there must be at least two people on board.
- Use a lifeline if possible when sailing (I) in remote areas, (II) in waters with many reefs, and/or (III) near large whales. When working with specific tasks it is not possible to use a lifeline. But

ask station manager or project manager for the rules in the area you are working in.

- Avoid sailing near icebergs and calving glaciers.
- For longer trips, you need to bring an extra fuel tank rather than refueling using a container.
- At least one person on board must be able to operate the motor safely, including making simple repairs and changing sparkplugs.
- Always keep a safe distance of a least 75 m from swimming walruses. Walruses may attack small boats.

5. Safety in fieldwork in remote areas

Prior to initiating fieldwork in the wilderness, be aware that the weather changes quickly, that the Arctic is very desolate and that help may be very far away. It is, therefore, necessary to plan field work far in advance in order to achieve the maximum safety margin.

”Encounters with wildlife in Greenland,” by Henning Ting gives an excellent overview of how to behave in relation to animals in Greenland. This little book can be found on the homepages of the Zackenberg Research Station: http://www.zackenberg.dk under access.

All fieldwork in remote areas (kilometers from other people) – regardless of the scope – must be carried out by at least two people, unless you bring sufficient communication equipment as described in the general instruction for field work. All field workers must have **proven** knowledge of first aid with CPR and must be able to use radios, satellite phones, weapons and emergency and camp equipment in a safe manner. First aid courses may be taken at other institutions but must be approved by the BIOS OHS.

Field workers must always carry emergency/safety equipment, adapted to the nature of the task, local conditions and the time of year (see e.g. box 2 on the next page). If you are working from a chartered ship, helicopter or plane, the vessel’s operator is responsible for safety and the field workers must always follow the operator’s instructions. However, you should always bring a polar sleeping bag when flying by helicopter or small fixed-wing aircraft in remote areas.

If a team is left alone in the wilderness, they must always bring camping equipment and at least one week’s emergency rations or more, if the field work is planned to take one week or more.

If tasks need to be performed in remote areas, you have to plan on extra days in the tent caused by possible bad weather. Plan your work so that you can return to your tent relatively quickly in case of sudden bad weather.

Please check the general instructions for field work.

6. Notification of accidents/emergency

The field supervisor must arrange a contact procedure with ’main base’ or BIOS in advance, if you are planning to camp for more than three days, but as a rule a contact procedure should always be agreed upon. Normally, two mandatory times will be set for checking in, e.g. 8 a.m. and 8 p.m., and at minimum a contact time should be set at least once a day.

Immediately upon reaching the campsite - and **prior to** the helicopter/aircraft/ship leaving – you must contact main base or BIO in order to make sure that contact can be established. Not until contact has been made can the helicopter/aircraft/ship leave. If contact ***cannot*** be established, **plans to camp must be abandoned**.

Emergency equipment required for assignments in the wilderness is listed on the next page, as are minimum requirements for camping gear.

Required equipment:	**Minimum requirements for camping equipment:**
1. Medicine and bandage box. See appendix B. 2. Emergency kit with the following items: - Flare gun and cartridges (min. 4 shots) - Whistle - GPS, extra batteries and manual - Compass - Map - Astro carpet 3. Satellite telephone 4. Emergency beacons (PLB / EPIRB etc.) when working in remote parts of Greenland 5. Possibly VHF-radio(s) 6. Possibly a rifle (min. 8 shots).	1. Tent (at least 1) 2. Trangia cooking set with alcohol or MSR burner 3. Sleeping mats (at least 2) 4. Sleeping bags (at least 2) 5. Matches in waterproof casing / storm lighter 6. Emergency rations for at least one week. 7. Distress signal and flares/smoke 8. Possibly weapons and ammunition 9. Bear alarm (if there is a risk of bears and you are camping in a tent). See appendix C.

7. Mountain climbing

When travelling in the mountains, to the extent possible avoid travelling to and staying at:

- Glaciers and snow bridges. If an assignment involves work on a glacier, you need to use special equipment and complete special training by authorized instructor.
- Steep massifs, where rocks may fall or rockslides may occur.
- Terrain under overhanging snow where there is a risk of avalanches.
- Thin and unsafe ice, e.g. in the spring and early summer, and ravines with water logged snow in the spring.
- Terrain at risk of mudflows, e.g. near glaciers and glacial deposits.

Climbing and working in bird cliffs and mountains is normally considered dangerous work and should only be done by fieldworkers who have the necessary training, and you should only do so, if you use helmet and necessary equipment, i.e. rope, bolts.

9 good rules for travelling in the mountains:

1. Never travel without prior training
2. Always let others know where you are going and when you are planning on coming back.
3. Respect the weather and the weather forecast.
4. Always listen to local people's advice.
5. Be prepared for bad weather – even on short trips
6. Remember maps and compass.
7. Never travel in the mountains on your own.
8. Return in time. It's never a shame to return.
9. Save your strength and seek shelter in time.

As a starting point for traffic in remote mountain areas, the Scandinavian mountain rules be useful to remember. See here.

7.1 Equipment for use in the mountains

- When working near the main camp, you should at minimum carry a VHF radio (to contact colleagues equipped with a VHF radio).
- When working far away from the main camp, you must at minimum bring a satellite phone with you.
- When working in remote areas and far away from the main camp, you must also bring with you an emergency locator transmitter (PLB – emergency beacon etc.) that can be activated in case of a serious accident.
- In areas at risk of avalanches, you must bring an avalanche beeper or something similar.
- As a rule, you must bring a shovel, extra ski points, avalanche probe, flare gun and bivouac equipment.

8. Camps

Due to fire hazard, tents must be placed at least 15 meters apart and you are not allowed to smoke in the tent. In as far as possible, all cooking should be done outdoors at a safe distance from the tent or in a designated cooking tent. See 13. and Appendix C re. setting up camp in areas with polar bears.

Supplies, emergency equipment etc. must be securely packed in waterproof boxes so they are protected from the weather. In areas with polar bears, supplies should be placed at least 30 meters from the camp site.

In connection with drop offs and pickups by helicopter or fixed-wing aircraft (e.g. Twin Otter), make sure that the pilot knows the camp's position (both for departure and return).

9. Safety on glaciers

Travel on glaciers should only be done by fieldworkers who have the necessary training (or with a guide if you are a novice). You should only travel on glaciers if you are secured by an alpine rope and bring emergency equipment so that you can call for assistance in case of an accident. If you can anticipate that it will be necessary to climb glaciers in connection with field work, fieldworkers must have completed a course on glacier hiking prior to initiating field work (search the net well in advance), and necessary equipment, i.e. rope, Steig-iron, ice ax etc. must be procured.

10. Crossing rivers

Crossing rivers by foot can be very risky for several reasons. The water is cold, and there may be a strong current or eddies that cannot be seen from shore. Therefore, always be at least two people. Bring a stick for checking the water level and support. Never cross barefoot, as you will quickly lose feeling in your feet and it will be difficult to maneuver where there are rocks on the bottom. Either wear neoprene socks or gaiters over your boots. Waders should not be worn. When crossing large rivers, tie a rope around each other's waist while crossing. Never cross a river if you are not sure it is feasible. When the snow melts and there may be deep waterlogged snow, never cross the waterlogged snow as you risk sinking through the snow and drowning.

Remember to always loosen the straps on you backpack before crossing a river so that you can quickly take it off in case you fall.

11. Weapons/deterrents and work in areas with dangerous wildlife

Due to the danger related with meeting polar bear, aggressive animals like musk oxen and arctic fox with rabies, flare gun and rifle must be carried in connection with all land based field work and if one is to live in tent camps in Greenland, Svalbard and other parts of the Arctic where polar bears and/or musk oxen are occurring. One is to bring a sufficient number of weapons and deterrent so there is at least one rifle and one flare gun in each sub group at any given time.

As a main rule a hunting rifle of caliber 30-06 SPRING is used as shooting weapon. In case of special type of field work, it can be allowed by the deputy head of institute that alternative shooting weapons such as revolver, shotgun with rubber bullets or Brennike slugs or other types are used. All weapons meant for shooting at an attacking animal with the intention to kill it must be used with soft nosed expanding hunting ammunition. One cannot be certain that local stores in for instance Greenland has soft nosed hunting ammunition in the correct caliber in store, so this should be brought from home. Contact the person responsible for weapons and ammunition regarding shipping or travel with weapons and ammunition. Weapon must normally be emptied of ammunition and be partly disassembled during transport and shipping but it may be agreed with the captain of smaller aircrafts that one does not disassemble the weapons if this is more practical.

Use of alternative types of weapons must always be approved by the relevant Deputy Head of Department before the field work and a set of rules on the use must be agreed upon, if no rules already exist in these safety instructions. Any legal permits and dispensations to ship or carry into, acquire, carry and use the weapon and ammunition, including special ammunition, must be obtained for the relevant country. Movement out of Denmark of all ammunition not being ordinary hunting ammunition (as for instance rubber bullets) requires a permit from the Danish Ministry of Justice and such permit must be obtained.

All field workers must go through a course in safe weapon handling with the relevant type of weapon. The course must be refreshed at least every second year and may be taken at another institution, but must be approved by the BIOS OHS.

Safety instructions for handling of weapons must be taken very seriously. One must not hesitate in addressing it if one witnesses others handling weapons in an unsafe way. Everybody can make mistakes, but some mistakes can have very serious consequences. We can all help each other in working with weapons in a safe manner.

Always treat weapons with care and respect. Otherwise, they can turn out to be much more dangerous than the animals in the Arctic. Do not mix alcohol and weapons (see section 20).

On the next pages, safety instructions are found in particular to:

- Flare gun
- Rifle
- Revolver
- Shooting tests and weapons demonstrations
- Caliber 12 shotguns with non-fatal contact ammunition

11.1 Specific for using flare gun:

A flare gun is used for two purposes. 1) To signal others in an emergency situation. 2) To deter potentially dangerous animals. A flare gun is potentially very dangerous and must be handled with utmost care and respect.

1. **Never let a flare gun point at anyone or anything important, no matter whether it is loaded or not.** Always keep the weapon pointed in a safe direction. A safe direction is one in which nobody or nothing important can get hit, if the weapon is fired unintentionally. A signal flare can ignite hit objects and may even penetrate skin at close range.
2. **Never carry the flare gun loaded.** Keep the chamber empty until immediately before intending to shoot.
3. **Check that the chamber is empty by opening the weapon and looking through it**. Do this every time you pick up a flare gun or receive it from someone else. Do not trust anyone but yourself, as you are responsible for the weapon when you are carrying it.
4. Carry the flare gun and ammunition for it easily accessible – in a belt or attached outside a backpack.
5. Always take 3-4 cartridges with an extra supply back at camp or station.
6. In case of outside sub-zero temperatures, take care that water vapour does not condensate on the flare gun when it is taken inside. It may freeze if the weapon is taken out again before it has evaporated. This can possibly cause malfunctioning. Either, store the weapon in a cool and preferably well ventilated place (to avoid condensation altogether) or in a dry and warm place to speed up the complete drying.
7. Keep your trigger finger away from the trigger until you have aimed and is ready to shoot.
8. Look away from the flare gun while firing to avoid getting sparks and residual hot material in your eyes.
9. Be careful not to shoot further than the animal you intend to scare, as you may make the animal move in your direction. In quiet weather, a signal flare can travel up to 80 m. Make the animal associate the flare with you by first yelling or in another way making noise. If the animal is relatively close by and you decide to try and scare it, you can shot the flare towards the ground. Be careful with ricochets though.

11.2 Specific for using Specific for using rifle:

Rifles are meant as a lethal last option if a dangerous animal like a polar bear or aggressive musk ox cannot be avoided or scared off. Also, a rifle can be used to kill a rabies infected arctic fox.

1. Never let the rifle point at anyone or anything important, no matter whether it is loaded or not. Always keep the weapon pointed in a safe direction. A safe direction is one in which nobody or nothing important can get hit, if the weapon is fired unintentionally. This is easily accomplished by always handling and carrying the weapon with the barrel pointing upwards.
2. Always carry the rifle with the chamber empty and the magazine full. This state of a rifle is also known as half-loaded. Keep the chamber empty until immediately before intending to shoot in a self-defence or practice situation.
3. Check that the chamber is empty by feeling with a finger and looking up into the open chamber while pointing the barrel upwards. Do this every time you pick up a weapon or receive it from someone else. Do not trust anyone but yourself, as you are responsible for the weapon when you are carrying it.
4. Always make sure that the weapon is ready for use. Snow, ice, sand, soil or other objects may enter the barrel or chamber. This may block the functions of the rifle and even cause damage to both weapon and shooter. Therefore, look through the barrel to check that it is not blocked by any objects. A piece of clear tape can be used on the barrel tip to help avoid getting objects into the

barrel, but you will still be able to see through it. Regularly inspect the weapon and verify the functionality without ammunition, pointing in a safe direction. Be careful your ability to get the weapon ready for action is not obstructed by backpack shoulder straps or items carried in straps around your neck.

5. In case of outside sub-zero temperatures, take care that water vapour does not condensate on the rifle when it is taken inside. It may freeze if the weapon is taken out again before it has evaporated. This can possibly cause malfunctioning. Either, store the rifle in a cool and preferably well ventilated place (to avoid condensation altogether) or in a dry and warm place to speed up the complete drying.
6. The rifle must always be handled and carried with the barrel pointing upwards – unless it is in use for shooting or carried empty in a case or bag in connection with shipping. Indoors the bolt must be in the open and back position. Use a rifle bag if the rifle is carried in an open vehicle on snow or in a boat to protect it against snow and water.
7. Always keep the rifle magazine empty and the bolt action detached when the rifle is in a bag or case for shipping.
8. Half loading is accomplished by pushing the upper round into the magazine while moving the bolt forward over it (making sure that the upper cartridge does not enter the chamber). Point the weapon up into the air in a direction where nobody or nothing important is present and pull the trigger to make it click. The rifle is now half loaded. One must go through the loading motions in order to load the weapon.
9. Make sure that you use the right ammunition. The calibre will be at the end of the shell and on the barrel. It is extremely dangerous to use wrong ammunition.
10. Keep extra ammunition easily accessible in an outside pocket of your clothes or backpack or in a cartridge holster. Always carry at least 4 extra cartridges and have an extra supply at the camp or station.
11. Do not use the safety device. Half-load and keep the chamber empty until immediately before intending to shoot.
12. If possible, use ear protection. Warn people around you before shooting.
13. Keep your trigger finger away from the trigger until you have aimed and are ready to fire.
14. Take care of what is behind the target. Try to avoid shooting at hard objects like rocks or ice or water surfaces. The bullet can change direction after hitting hard surfaces or water surfaces and can then travel in an uncontrolled direction.
15. If you need to put down the weapon, place it carefully so that it will point in a safe direction, will not fall or get damaged or dirty. Keep the weapon close by and no longer than 10m away from you.
16. Emptying the rifle of ammunition is to be accomplished this way: 1) Point the barrel upwards in a safe direction. 2) Open the bolt and make sure the chamber is empty (feel and look). 3) Open the latch at the bottom of the magazine and let the ammunition fall into your hand while still pointing the barrel upwards.

11.3 Specific for using revolvers:

Revolvers may only be used on field work as an alternative to rifles after approval from the Deputy Head of Department.

1. Never let the revolver point at anyone or anything important, no matter whether it is loaded or not. Always keep the weapon pointed in a safe direction. A safe direction is one in which nobody or nothing important could get hit, if the weapon is fired unintentionally.

2. **Only receive or pass a revolver with the cylinder opened, so you can visually check that it is unloaded.** Do not trust anyone but yourself, as you are responsible for the weapon when you are carrying it.
3. The revolver must always be carried loaded pointing downwards in a holster in a belt– unless it is in use for shooting, examined for functionality or carried empty and separated for shipping.
4. Always make sure that the weapon is ready for use. Snow, ice, sand, soil or other objects may enter the barrel. A small obstruction can cause a dangerous increase in pressure and may damage your gun and cause injury to yourself and others. Therefore, look through the barrel to check that it is not blocked by any objects. Regularly inspect the weapon and verify the functionality without ammunition, pointing in a safe direction.
5. In case of outside sub-zero temperatures, take care that water vapour does not condensate on the revolver when it is taken inside. It may freeze if the revolver is taken out again before it has evaporated. This can possibly cause malfunctioning. Either, store the revolver in a cool and preferably well ventilated place (to avoid condensation altogether) or in a dry and warm place to speed up the complete drying.
6. Make sure that you use the right ammunition. The calibre will be at the end of the shell and on the barrel. It is extremely dangerous to use wrong ammunition.
7. Load the revolver with a cartridge in all holes of the cylinder. The revolvers we use have a hammer block making it impossible for a shot to go off without the hammer being first cocked, by a double or single action.
8. Keep extra ammunition easily accessible in an outside pocket of your clothes or backpack. Always carry an extra cylinder load (normally 6 cartridges). Keep a stock of extra ammunition in the camp or station.
9. If possible, use eye and ear protection. Warn people around you before shooting.
10. Only cock the revolver and place it in the single action mode when you are fully prepared to fire.
11. Do not put your trigger finger near the trigger before you have aimed and are ready to fire.
12. Take care of what is behind the target. Try to avoid shooting at hard objects like rocks, ice or water surfaces. The bullet can change direction after hitting hard surfaces or water surfaces and can then travel in an uncontrolled direction.
13. Always keep your fingers away from the area between the cylinder and the barrel during firing. Particles and hot gas will be forced out from between the barrel and cylinder in any revolver during normal use. Failure to follow this warning will cause serious personal injury.
14. Be extremely careful if deciding to de-cock the revolver and always do this with the barrel pointing in a safe direction. Should the hammer slip and the revolver go off, no harm will be done. Practice de-cocking with an empty and unloaded weapon.

11.4 Shooting practice and weapon demonstrations handling:

Always test your weapon in the field. Use a check list in connection with weapon demonstration to ensure that all subjects get covered and that all instructions are introduced. It may be used after the demonstration as a reminder on things one might have forgotten.

1. Always bring an extra set of flare gun and shooting weapon with corresponding expanding hunting ammunition in case of surprise appearances of dangerous wildlife during the practice or demonstration.
2. Always warn others not participating in the shooting practice or demonstration that shooting is taking place and in which direction so traffic in this area can be avoided.
3. Define a shooting line from which shooting will take place perpendicular to this line. Alle persons not shooting must be behind this line and behind the shooter (or shooters).
4. Use a butt to catch the bullets if possible. If it is not possible to find a suitable place where the bullets can be caught, you should be extra careful and only shoot in a direction in which there are no persons or houses/installations within 5 km.
5. Use ear protection and warn others before shooting.
6. Use approved safety glasses if possible.
7. Weapon demonstrations should take place outdoors. However, if the weather is too bad, demonstration with blank ammunition or entirely without ammunition can take place indoors if a "safe wall" parallel to the shooting line has been appointed beforehand, against which weapons can be pointed without pointing on persons or important things outside. Sharp ammunition must under no circumstances be present in the room.
8. The ordinary safety instructions for the relevant weapons must be followed during practice shooting or demonstration.

11.5 Calibre 12 shotguns with non-fatal contact ammunition

A 12 gauge shot gun loaded with non-lethal contact deterrence ammunition can be a useful polar bear deterrent. Preferably, a side by side shot gun should be used, as it has a very simple mechanism and it is easy to check the barrel for obstacles. A pump action shotgun can also be used but they often need special permits if they can load more than two rounds in the magazine. Use of the weapon must follow these instructions:

a) The weapon must have 3" chamber(s), have smooth bore barrel(s), have open or cylinder choke(s) (no narrowing of the barrel at the muzzle).
b) The weapon must only be used with single rubber slugs, single round rubber pellets or bean bags. Rounds with multiple pellets must not be used.
c) A person using this weapon with non-lethal contact ammunition must be backed up by a second person with a lethal weapon.
d) When using non-lethal contact ammunition, aim for the hind quarters of the bear and try to avoid hitting the head, chest and stomach. A wounded bear may be dangerous later.
e) Although this weapon and ammunition is meant to be nonlethal, it can cause considerable damage at close range. Therefore, the same safety rules as those for rifles apply. Do not let point. Check (by feel and sight) the status of the weapon. Keep the chamber empty and so forth.
f) Prior to firing a non-lethal contact deterrence projectile the shooter must:

- Have a person with a loaded lethal firearm as backup.
- Determine what you want the bear to do.
- Make sure the bear has a clear and obvious path of escape.
- Let the bear know your location before firing.
- Aim at the large muscle mass of the bear's rump.

12. Working in areas with dogs and foxes

Some field work takes place in areas with dogs. They may be aggressive. You should be aware that loose dogs normally are more 'peaceful' than dogs that are tied or chained.

A couple of rules to follow:

- Try to ignore dogs. Do not look them in the eye, as it scares them.
- Bring a suitably long solid stick/rod that you can use to defend yourself from attacking dogs.
- If you feel insecure, find out if someone else, who is less afraid of dogs, can take on the assignment.

If an accident occurs and you are bitten by a dog, seek professional help as soon as possible.

Also be aware of foxes**.** Avoid direct contact with them, as they may have rabies.

13. Working in areas with musk oxen

Musk oxen are found mainly around Kangerlussuaq (Sdr. Strømfjord) and Ivittuut in West Greenland and in North and East Greenland. Generally, there is no need to be afraid of musk oxen. Musk oxen are generally peaceful animals and are not affected by the presence of humans. However, do not ignore or underestimate the risk. Musk oxen can be provoked to exhibit threatening behavior or attack in self-defense – especially if you get too close. Therefore, always bring a flare gun as a deterrent and perhaps a rifle for emergencies.

Here are some simple precautions to limit confrontations with musk oxen:

- Always keep a safe distance from musk oxen and pay attention to their behavior.
- Do not camp near to paths frequented by musk oxen.
- Never get closer to the ox than is necessary. If it is in your way, walk around it. Exhibit quiet and calm behavior in order to avoid stressing the ox.
- Do not walk through a herd of oxen.
- Never come between a mother and her calf.
- When an ox starts snorting, scraping its horns against its front legs, making huffing sounds, or scraping a front leg or horn on the ground, it is trying to tell you that you have overstepped its boundaries and that you should not get any closer. Retreat till the animal exhibits normal behavior.
- You cannot outrun a musk ox, either up or down a hill. It is the natural reflex of a musk ox to seek higher grounds if it feels threatened, do not prevent it from doing so.

Use your flare gun if the musk ox gets too close anyway. If a musk ox attacks, it may be necessary to kill it in self-defense. In this case, aim at the top part of the animal's chest – never at the head.

14.1 Working in areas with polar bears

Polar bears are found all over the circumpolar area. However, in the central part of West Greenland the chance of encountering a polar bear is relatively small.

Polar bears are most common in areas with permanent pack ice and in coastal areas around the Arctic Ocean in North and Northeast Greenland. They primarily live on sea ice or in areas within a couple of kilometers from the coast.

In the fall, winter and spring, polar bears hunt for seals along the edge of the ice near open water and areas with ice that has been pushed up. They also hunt for seals in areas with thin or cracked sea ice, e.g. by crevices during high tide or at the foot of glaciers. During the summer, polar bears may be forced up on land when the sea ice melts. During these periods, they live on birds, eggs and small mammals that live along the coasts, beaches and rocky islands near the coast. They also live on left-overs from other wild animals and litter left by humans.

During summer, polar bears are often seen wandering along the coastal areas, but they can also be seen as much as 100 km inland. With the reduction in the permanent sea ice in the Arctic, more and more polar bears are being observed in the summer period, until the sea ice once again covers the coastal areas. Polar bears can also follow the pack ice along the east coast of Greenland, around Kap Farvel and up the west coast.

If you travel in areas where there is a high risk of confronting a polar bear, you should not travel alone. Make noise to communicate your presence. As a rule, only be outdoors during daylight and always be aware of your surroundings. Polar bears can be difficult to spot. Scan the area with binoculars on a regular basis. Avoid areas with low visibility caused by ice that has been pushed up, large rocks, driftwood or high vegetation. Keep an eye out for tracks and excrement. Never approach a polar bear. Polar bears defend their territory and may feel threatened by you.

Remember, in Greenland you may only shoot bears in self-defense. You may not provoke a bear or kill it as a 'preventive' measure. After killing a bear, you must document that the bear was killed in self-defense.

You can encounter a polar bear by chance or because it has been attracted by your activity. Polar bears are curious and often will want to explore unknown objects, smells or noises. Always act calmly and assess the situation. Every encounter with a polar bear is unique. Good judgment, common sense and familiarity with the polar bear's behavior are important. Never run! A polar bear can easily catch up with a running human being.

When it comes to polar bears, the best way to be safe is to avoid them. If you observe a bear and it has not gotten the scent of you, retreat calmly paying attention to the wind direction, so that it continues not to get the scent of you. If you are equipped with a VHF radio, warn others of the presence of the bear, giving as accurate a position and course as possible.

During field work where you are unable to focus on your surroundings, either designate a bear scout or surround the work area by a trip wire.

When confronting polar bears, you may come across three different types of behavior: Curiosity, hunting or defending.

The curious polar bear is characterized by inquisitive behavior. The bear will move slowly and often stop up, stand on its hind legs and sniff the air (bears that attack never stand on their hind legs). The bear will hold its head high with its ears pointing forward or to the side, will move its head from side to side, or will try to catch your scent by circling in the wind direction and approaching from behind. Let the bear do this. Help the bear identify you as a human being by speaking in deep tones. **Do not run**.

You might approach the bear slowly with the wind against the bear so it can pick up your scent. Often this is enough to make the bear leave.

A bear should always have an escape route. Give the bear the opportunity to withdraw on its own. If the only way to get away from the bear is to move in its direction, let the bear create a distance first. The best behavior you can exhibit when meeting a bear is to slowly move away from it while not losing it from sight. Never run from a bear. Remain visible to the bear.

The hunting bear will approach "the prey" directly. It may follow you or circle around you and may return after having been scared off. It may fake attack – but that does not mean that it is bluffing. It may show signs of being injured, old or thin.

In these cases, the same rules apply as above. Show calm determination. Do not try to run away from the bear. Stay together in a tight group and try to scare the bear away with noise. Be prepared to use scaring tactics as well as possibly having to shoot the bear. **Do not run**.

The defensive polar bear feels threatened, either because it has been surprised, because its escape routes are limited, or it is a mother with cubs. It will approach you directly, intensely and unflinching, and often its mouth will be open and it will emit huffing sounds. If a bear is caught off guard up close or shows signs of being excited or threatened, e.g. makes moaning, hissing or growling sounds, rattles it jaws, stamps its feet, stares directly at a person or lowers its head with its ears back, do not run. Withdraw slowly. Do not shout or make sudden movements. Avoid direct eye contact and threatening behavior. Be prepared to use scaring tactics. **Do not run**.

A bear with cubs: Avoid coming between the mother and her cubs. If you get near to a bear with cubs, do not run. Stay together and leave the area immediately. Be prepared to defend yourself if the bear attacks.

Confronting bears: If the bear gets close, exhibit calmness and determination. This means stand still and wave your arms slowly up and down while speaking with a clear and authoritative voice. If you are several people, stay close together to create the illusion of being as big an object as possible.

Go indoors if at all possible. Bears do not attack houses – they explore, scratch and break into houses if they can smell something edible or just out of curiosity. There is a good chance of scaring the bear away by making lots of noise.

If the bear comes closer, try to scare it away with flares or loud shots. Make sure not to fire behind the bear so that you scare it into coming even closer. Rifle shots rarely work as a deterrent. In addition, you should save as many shots as possible in case the situation escalates and you need to kill the bear. You do not have time to reload your rifle when a bear attacks**.**

If it becomes necessary to kill the bear, only wait to do it as long as you feel safe. Then aim for the top part of its chest region and try to avoid hitting its head. Remember, you are shooting in self-defense, so wait till the bear is at close range. Keep shooting, even after you have hit the bear and it has collapsed.

When trying to escape from a bear, you can try to throw equipment and clothing at it. This will probably not stop the bear, but it might buy you some time. It is not recommended that you try to play dead. If you are unable to get away from the bear and end up in a direct confrontation: kick it, hit it with your arms or use any available tool as a weapon, e.g. a firearms, pieces of rock, blocks of ice, knives, skis or ski poles, and try to hit its head.

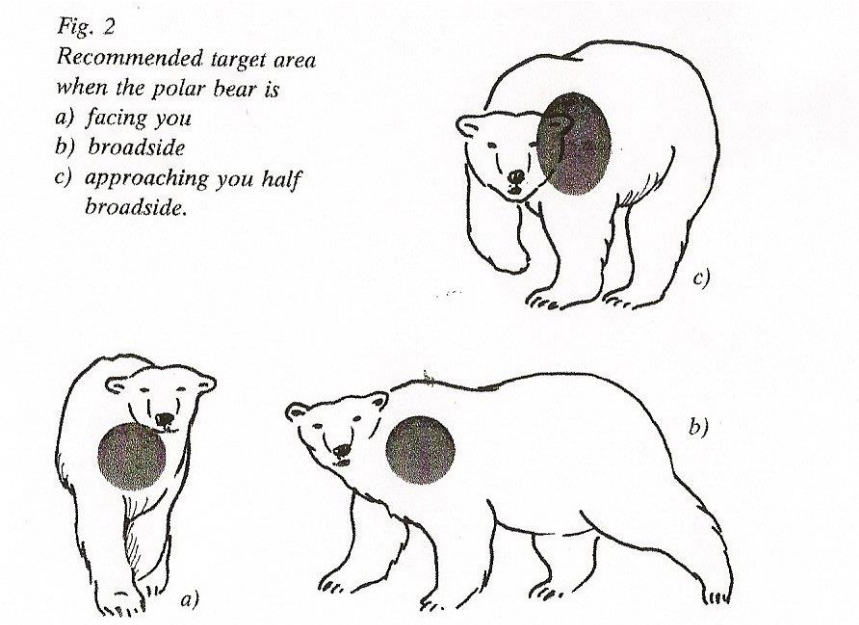
If you are in areas with a high probability of meeting a polar bear, it may be advantageous to practice the above mentioned procedures and, if possible, an entire team of field workers should do this together. It is good to know the procedure by heart in order to better be able to react instinctively, if things get serious.

Good precautions:

- Do not camp in areas showing signs of fresh activities of polar bears.
- Avoid camping on beaches and coasts. Polar bears usually are found in coastal areas.
- Avoid as far as possible to place the camp in narrow valleys and passports. These are often used as travel routes.
- Place the campsite somewhere with a good view, so any bears can be seen in good time.
- Do not leave out edibles or things with a strong odor. A bear that associates people with food is dangerous. If possible, use bear-resistant containers.
- Burn your trash in the morning – if a bear smells smoke (often from several kilometers distance), it will at least show up during the daytime.
- Never sleep outdoors without a tent.
- Place tents in a row at least 5 meters apart – so that the bear does not feel trapped between them.
- Use a trip wire alarm around your camp – remember, the alarm should not scare the bear, but should wake the campers. Different ways of setting up the trip wire are described in Appendix C.

A detailed manual on precautions against polar bears can be downloaded here:
http://digitalcommons.unl.edu/i cwdmhandbook/31/

The figure below shows where to hit a bear, if you intend to shoot it with a rifle:



14.2 Reporting of interactions with polar bears

If you have specific interactions with polar bears, it should be reported to the Department. This applies if, for example, you need to scare a bear away from an area with sound (shouts, pot lids, etc.) or weapons (bang, scare shots), the bear has damaged equipment and/or camp or you have to defend yourself by shooting the bear.

Subsequent interaction, the international PBHIMS template is used to report the event in a standardized way. The template is primarily drop-down and only takes a few minutes to complete, but

will give the Department an opportunity to follow the development of interactions (increasing, decreasing, seriousness, etc.) just as it also functions as a communication to Greenland.

The template can be found on LAMU's web page here: Microsoft Word - PBHIMSv7A.docx (au.dk)

15. Use of snowmobile

A snowmobile is an efficient means of transportation and it should always be used with caution. In general, a snowmobile can drive very fast, but it is a good idea to adjust the speed to the surroundings and your own expertise. E.g. it is difficult to see bumps in the snow – especially if the light is in your eyes. The following rules must be observed:

- It is mandatory to use a crash helmet when driving a snowmobile in Greenland.
- If there is a dead-man control, it must be hooked to the driver.
- Do not open the engine compartment or remove the chassis, which shield the moving parts when the engine has started.
- You should bring skiing equipment or snowshoes for at least one person.
- When driving a snowmobile in the Arctic, due to safety concerns you should at least travel in pairs.

16. Safety re. helicopters and other fixed-wing aircraft

In connection with fieldwork in Greenland, you often need to approach and leave a helicopter while the rotor is running, either while loading or unloading or because you need to travel as a passenger yourself. When this happens, the pilot of the craft is responsible for safety and you must always follow his or her instructions. A helicopter has emergency equipment, and the minimum requirements for camping equipment has already been mentioned earlier in the text and can, therefore, be omitted as long as the helicopter does note leave the site while work is being completed. You should always bring a sleeping bag.

Always approach the helicopter in a stooping position and within the pilot's field of vision. All operations must be cleared with the pilot.

It is forbidden to approach the helicopter from behind due to the tail rotor, which is placed very low. Remember, the main rotor is most dangerous when it rotates at slow speed.

When flying (non-commercial) at low altitude over water, e.g. when counting birds, use safety suits year-round in Greenland. Life jackets are mandatory during bird counts from fixed-wing aircraft. During flight, loading and unloading aircraft etc., all decisions made by the pilot/load master must be respected. Never try to convince the pilot to do things that he or she has deemed unsafe. – You may have to board or disembark a C-130 helicopter while the propellers are running. If this happens, follow the instructions given by the crew.

Generally, the captain of the aircraft has the same authority as the captain of a ship, so he or she is always the supreme authority on board.

17. Using gasoline-driven power generators

Small gasoline-driven generators are often required during fieldwork to charge batteries etc.

Safe operation:

1. When operated, the generator must be placed at least one meter from buildings or other structures. The

exhaust contains carbon monoxide. For this reason, the generator may not run in enclosed spaces.

2. The generator must be grounded in order to prevent shock from any defective devices that may be connected. (NB! be aware that it may be difficult to find good grounding in Greenland).
3. If you use the generator incorrectly, it may cause electric shock. Do not touch the generator with wet hands or use the generator outdoors in rain or snow. You can protect the generator from rain/dampness by placing it in a wooden box or the like, placed sideways.
4. Only fill gasoline or diesel when the generator is stopped/off.
5. Smoking and the use of open fire are prohibited while refueling.
6. When starting the generator, make sure the AC/DC switch is 'off' and that no device is hooked up.
7. The user must know how to quickly stop the generator and may not let anyone use it without proper training.
8. You should read the instruction manual for the generator prior to starting it.
9. **Storing the generator:** Generators can be readily stored. Make sure: To empty the fuel tank as much as possible, remove the spark plug, clean and refit it. If possible, wrap the generator in tin foil and store it in a box (make sure in advance that the box is completely dry).
10. You should at least bring two spark plugs with the generator.

18. Diving operations

Re. working under water, you distinguish between snorkeling and actual diving. Snorkeling takes place on the surface of the water. When talking of diving, it is normally understood to be scuba diving. This means diving with compressed air cylinders.

- Any employee of BIOS who will be diving must have a valid Nordic commercial diving certificate.
- When diving with air cylinders, the general Danish diving rules must be observed, e.g. a trained line holder must be present and resuscitation equipment is required.
- When diving, you must communicate with people who are on the surface.
- Employees can snorkel without external authorization. When snorkeling, you should wear a wetsuit, a mask and a snorkel. In addition, you should wear a floating vest. Snorkeling is risky and, therefore, you must always be at least two people.

18.1 Hiring diving assistance

- When hiring any type of diving assistance, you must make sure that the diver has a legitimate certificate. According to the Diving Act, the diver may influence the choice of the line holder, as this person, of course, must be familiar with the work (training etc.) and his or her job is vital.
- The client should inform the diver well in advance of what kind of work he/she will be performing. Additionally, make sure that other vessels do not intentionally cross the diving area.

18.2 Responsibilities of the diving supervisor

The diving supervisor is responsible for:

- Planning the dive in detail and obtaining the required permits from the landowners etc.
- Maintaining a diving log.
- Staying informed as to local conditions that may impact safety, e.g. current, waves, surf, visibility and boat traffic.
- Ensuring that each diver's equipment is in order.
- Ensuring access to proper communications equipment in case of an accident, possibly the address of the nearest phone (alternatively VHF or HF radio or a satellite phone) and a list of important telephone numbers (doctor, ambulance, etc.).

19. Fuel etc.

Instructions for using portable liquefied gas in tent camps, residential containers etc.

1. If you use cylinder gas (LPG) for cooking etc. in camps, the gas cylinder must always be placed outside the tent and a fire extinguisher must be nearby.

2. All gas storage tanks, including empty containers, must be secured when transported by road or off-road, and valves should be tightly closed and protected from harm. LPG tanks for heating the cabin etc. must be stored outside the cabin.

3. Only use LPG for heating and lighting in residential containers and other rooms measuring at least 15 m^3 and are well ventilated.

4. Installations may max. be hooked to an 11 kg LPG cylinder and the set-up may only include a gas stove and two devices. Appliances that use gas must be equipped with a thermoelectric flame failure device.

5. You must handle LPG with due caution and keep in mind the risk of fire and explosion that can be caused by possible leaking gas.

6. In connection with gas leaks, remember:
    - LPG is heavier than air and seeks low areas.
    - Do not use open flames in rooms that smell of gas.
    - Open windows and doors to create a draft and close the cylinder valve.
    - If possible, remove the LPG cylinders in case of fire.

20. Alcohol

Weapons, ammunition, pyrotechnics, vehicles and other heavy and potentially hazardous equipment may not be handled under the influence of alcohol or any type of controlled substances.

If alcohol is consumed and weapons are brought on field trips, an absolutely sober person must be designated to be responsible for weapons and ammunition.

Appendix A

Acknowledgement

I, the undersigned, hereby confirm that I have read the "Safety instructions for fieldwork in the arctic" as well as the general safety manual for fieldwork. I am aware of the fact that I am required to know and follow the rules and also follow the directions given by the field supervisor, project supervisor or any other supervisor at the Department of Biology.

Place/Date .....

Name (capital letters) .....

Signature .....

Closest relative (write legibly)

Name .....

Address .....

Phone number .....

This acknowledgement must be handed in/sent to the vice head of department

Appendix B

EFAK – Emergency First Aid Kit

It is recommended that all field workers in the Arctic carry an EFAK containing the following items:

- 5 tablets Temgesic (buprenorphine)* 0.2 mg (for severe pain, consult a doctor)
- 10 tablets Ibuprofen 600 mg (for moderate pain)
- 1 SWAT-T tourniquet (to stop heavy bleeding)
- 2 ideal elastic bandages, 8cm x 5m (for bleeding and dressing)
- 1 fabric scissors (for cutting clothing)
- 1 role sports tape 2.5cm x 4m (to attach dressings etc.)
- 1 role tensile tape 2.5cm x 4m (for small band-aids etc.)
    - alu-blanket (to prevent hypothermia)
- 1 disposable syringe 20ml (for cleansing wounds)
- 1 disposable needle (for blisters etc.)
- 1 splint (for stabilizing fractures etc.)
- 1 pair of nitrile gloves
- 1 emergency whistle
- 1 mirror compass

EMBAK - Emergency Medical Base Kit

It is recommended that all field groups bring an EMBAK with the following items for storage at camp:

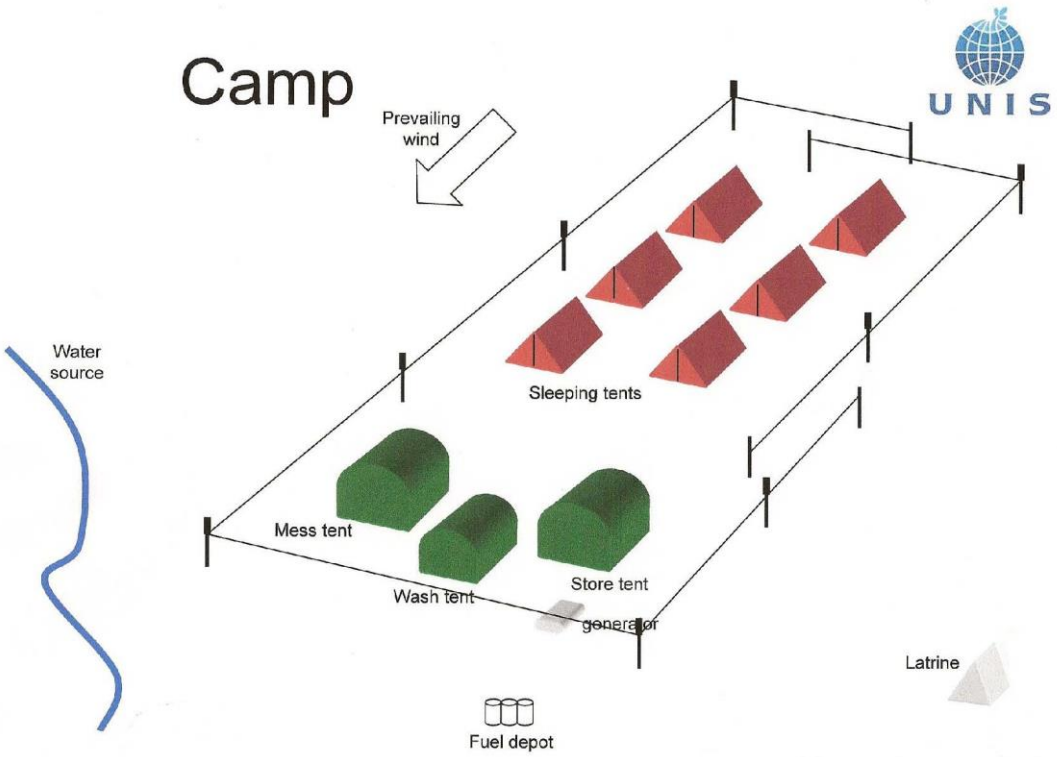
- 1 tube Xylocaine (Lidocaine) gel 20mg/g (local anesthetic, sooths itching)
- 40 tablets Pamol (Paracetamol) 500mg (analgesic)
- 30 tablets Ibuprofen* 600mg (OBS normal dose: 400 mg, analgesic)
- 50 tablets Temgesic (Buprenorphine)* 0.2 mg (analgesic)
- 20 tablets Cetirizine* 10 mg (allergic reactions)
- 10 tablets Marzine (Cyclizin) 50 mg (motion sickness)
- 30 tablets Primcillin 800 mg (for infections)
- 20 tablets Ciproxacin (Ciprofloxacin)* 500 mg (for infections)
- 10 tablets Doxycykline 100 mg (for a fat finger (spækfinger))
- 2 tubes Flamazine (silver sulphadiazine)* cream 10 mg, 50g (burns/frostbite)
- 1 tube locoid cream Hydrocortisone (Glukokortikoid grp. II)* (rash, sunburn, etc.)
- 30 tablets Motilium (Domperidom)* supp. 10 mg (gastrointestinal tract, nausea)
- 60 tablets Imodium (Loperamide) 2 mg (gastrointestinal tract, diarrhea)
- Diclofenac eye drops, 1g/ml, 5 ml (snow blindness/foreign body)
- 1 tube Fusitalmic (Fusidic Acid)* 1 %, ointment (eye infection)
- 2 Alu-blankets (hypothermia)
- 1 SWAT-T Tourniquet (heavy bleeding)
- 2 Sterile vacuum-packed gauze roles
- 2 Ideal elastic bandages 8cm x 5m
- 2 Ideal elastic bandages 8cm x 10m
- 2. Coban latex free, 7.5cm x 4.6m
- 2 Flex Splints
- 2 Triangular scarves
- 1 Sports tape 4cm
- 5 pairs of gloves– vinyl
- 1 Plaster set, assorted sizes
- 1 Tensoplastic tape, 2.5cm x 4m
- 1 Glueless band-aid – narrow, blue
- 2 Finger dressings

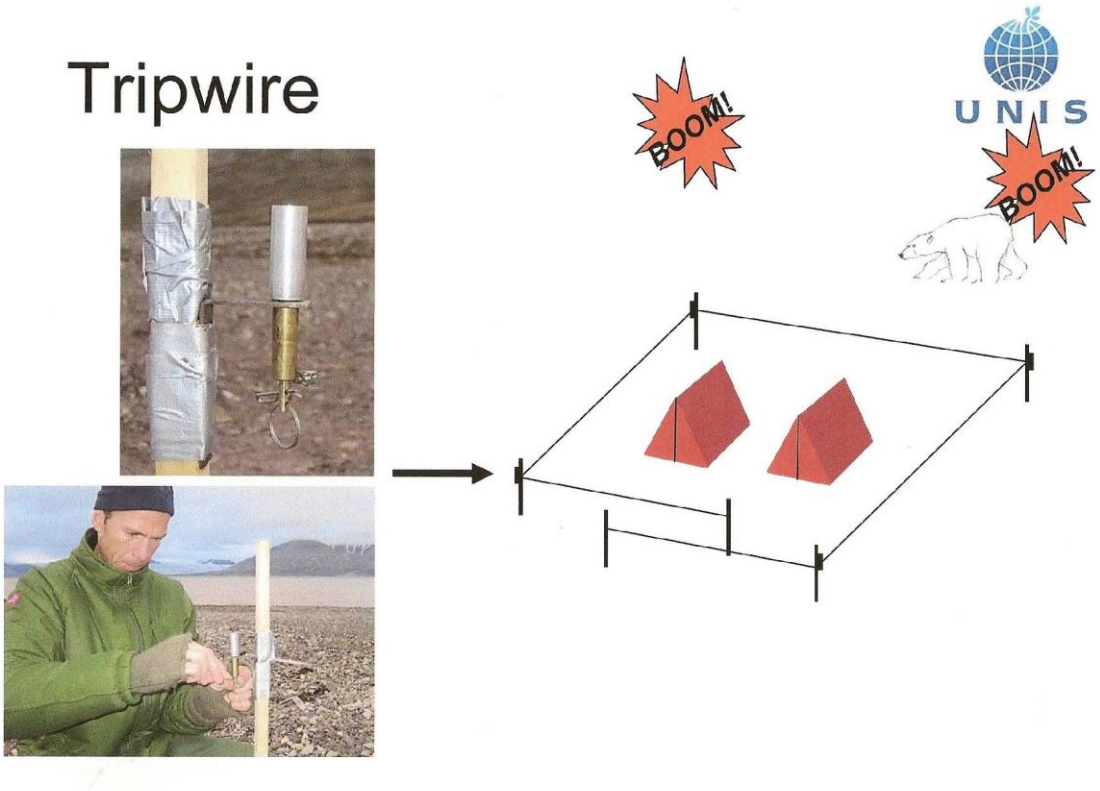
- 2 Eye patches
- 2 Sterile eye compresses
- 2 Sterile compresses 10cm x 10cm
- 1 Sterile compresses 7.5cm x 7.5cm
- 2 Medi-scrub wound brush with chlorhexidine
- 4 disposable bags, zipper, 8 liters (washing, rinsing wounds, waterproof dressing)
- 1 bag soap suds
- 2 Syringes, disposable 20, ml (cleansing wounds)
- 4 Needles, green (blisters etc.)
- 1 Instrument, Nurse scissors with cap, 14cm
- 1 Fabric scissors
- 1 Tweezers Adzon (pointy)
- 2 Scalpels, disposable
- 12 Safety pins
- 1 Hypothermic Thermometer

* Consult a doctor

Appendix C

Suggested way to build camps in areas with polar bears. Contact the person in charge of logistics for further guidance and to get appropriate equipment.





Appendix D

Kulde-skema

** Ved kuldefaktore under -30 °c må al undendøres ophold indskrænkes til et absolut minimum af tid.*
** Ved kuldefaktore under -60 °c må al udendøres ophold absolut frarådes/forbydes*

Vindhastighed Knob/m pr. sek	Udendørstemperatur målt / °c Kulde - faktor (kølingsvirkning som ved -°c i vindstille)										
Stille 0 / 0	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
5 / 2,5	8	4	-3	-9	-14	19	-24	-30	-36	-41	-46
10 / 5	6	2	-6	-13	-18	-23	-27	-35	-42	-47	-52
15 / 7,5	4	0	-9	-17	-22	-27	-31	-40	-48	-53	58
20 / 10	2	-3	-12	-21	-26	-31	-35	-45	-54	-59	-64
25 / 12,5	0	-6	-15	-25	-30	-35	-39	-50	-62	-56	-70
30 / 15	-2	-9	-18	-29	-34	-39	-43	-55	-68	-71	-76
35 / 17,7	-4	-12	-21	-33	-38	-43	-47	-60	-74	-77	-82
40 / 20	-6	-15	-24	-37	-42	-47	-51	-65	-80	-83	-88

Vindhastighed større end 40 knob / 20 m pr. sek. har kun lidt ekstra effekt	MINIMAL FARE: - (for korrekt på-klædte personer) MEN: fare for falsk følelse af sik-kerhed ved ophold af længere varig-hed.	TILTAGENDE FARE: for forfrysning af blottet hud	STOR FARE

WIND CHILL