Sea Ice Field Course: Field safety and BASC operational procedures
(April 14, 2008)

The Barrow Arctic Science Consortium (BASC) is a not for profit organization tasked with providing logistical support for the various research projects based out of Barrow and the North Slope of Alaska. It is BASC's responsibility to provide basic field safety training, well maintained equipment, and communications and field gear to visiting scientists.

This outline will briefly cover the topics which will be detailed in the following text.

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- Extra clothes
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- Certified personnel
- Safety: The three most important aspects of firearm safety

Emergency Travel Kit

- Contents and use

Polar bears

- Diligence
- Obscured vision – pressure ridges, blowing snow
- General behavior
- Warning shots
- Starting snow machines, moving personnel

Whaling activity, subsistence hunting

Subsistence hunting is a crucial part of Iñupiat culture and tradition. The majority of nutritional needs are met by the harvest of marine mammals, birds, fish and terrestrial mammals. Interference to hunting activities by BASC personnel or scientists is strictly prohibited. Cultural sensitivity is essential to ensure hunting activities are not impacted by scientists traveling and working on the sea ice. The majority of sea ice research is away from the more critical hunting areas but if you encounter a whaling crew or seal hunter while on the ice be respectful and courteous.

BASC Policies/Checking in and out procedures/alcohol

There is a "whiteboard" located in the BASC warehouse/shop where personnel can sign in and out. BASC requires a minimum of 2 people per field party, one of which must be a certified firearms carrier. **No solo travel is allowed**. Sign out your names and destination, and estimated time of return. Upon return be sure to erase the names of the returning members only and check back in with the appropriate personnel. BASC does not have any hard and fast rules regarding alcohol consumption. However consumption and possession is officially forbidden in building 360 (where our labs and offices are located). The village of Barrow also enforces a law limiting the amount of alcohol a visitor may bring into Barrow for personal use without an importation license. This amount is 10 cans of beer or 1 bottle of wine or 1 bottle of spirits. Anything in excess of this amount is considered illegal and subject to confiscation. Aside from these regulations, BASC expects the responsible use and consumption of alcoholic beverages by all BASC associated researches and reminds those partaking that Barrow is a Native village and discretion and safety are of utmost importance.

Travel by car

Only certified drivers from the University of Alaska are allowed to operate vehicles and transport students and instructors.

Snow machine use

Snow machines are an essential part of sea ice research. They provide an efficient and reliable means of travel. However, they also represent a potential hazard as accidents occur by improper or irresponsible use. Each operator and passenger should be familiar with the basic operation of the machine and its safety features. A hands on orientation will be provided by BASC personnel but the following guidelines should apply each time you drive or ride a snow machine. If any person is observed driving recklessly or endangering others his/her privileges will be revoked.

Prior to each outing you should check:

- Fuel and oil levels
- Throttle operation
- Kill switch
- Hitch pin, sled attachment

Towing a rigid tow bar vs. rope sled

BASC currently provides two types of sleds. One design incorporates a rigid tow bar design and the other is a rope tow. There are advantages to both designs but the rope tow sled can be particularly dangerous and requires a more skillful operator. Because the sled is not equipped with a brake a sudden stop will result in the sled ramming into the back of the snow machine. Because of this, passengers are never allowed to ride "two up" on the snow machine. It is essential for the rider of the sled to help guide it through pressure ridges and maneuver the sled if a sudden stop occurs. Rigid tow bars are easy to tow but can be hard to maneuver through pressure ridges. Never make tight turns with a rigid tow bar sled as this may result in "jackknifing" and damage to the snow machine hitch and sled.

Speed

The operator should maintain a speed appropriate for the terrain they are traveling on. The maximum speed under ideal conditions should never exceed 20 mph. If pulling a sled with a passenger the speed will be much slower (7-10 mph) especially under rough ice conditions.

Operator's responsibility: Keeping an eye on your passengers

It is the operator's responsibility to keep an eye on the passenger riding the sled. This can be done by looking back every minute or two. Hand signals should be worked out between the driver and the passenger so a "non verbal OK" can be conveyed. A "thumbs up" works well for this. A "stop" signal such as a hand held palm forward or a closed fist would also serve as a stop signal. Avoid waving as this is easily confused as either an "ok" or "stop". Make it a point to stop 1-2 miles after setting off (or every 5 miles or so on longer trips) to make sure passengers are safe on the sled, and check for frost bite, cold hands or feet. Cold hands or feet can be warmed using heat output from engine on left side of hood.

Trouble shooting mechanical problems

Generally all BASC snow machines are maintained in top working order. However, if a problem arises you should be familiar with basic trouble shooting.

If a machine won't start check all the switches. This is a common malady and usually is the result of the operator failing to turn on either the key switch or kill button after shutting down the machine. Check this first. There is also a tethered kill switch which when pulled off disables the machine. This is worth checking if a machine will not start.

Avoid over- or under-priming the machine. Depending how long the snow machine sits idle after shutting it down and how warm the ambient temperature is will dictate whether or not you will need to prime or choke the machine. If ever in doubt, try starting the machine first without either aid to avoid flooding the carburetors. Once the machine floods, it will take a significant effort to get it started. Generally this can be done by having a second person hold the throttle wide open while pull starting the machine until it fires. **It is imperative to have the second person release the throttle as soon as the machine turns over!** If this is not done, the snow machine will take off with the potential for injuries.

Parking into the wind

If windy conditions prevail be sure to park the machines into the wind to avoid damage to the windshield and cowling.

Weather

Weather plays a significant role in the safety of field parties working near Barrow. For sea ice safety considerations all parties should be aware of the ambient temperature and wind speed prior to heading out. Frostbite and hypothermia are very real dangers. There is a weather station located in the BASC theater building and shop. The display records the ambient temperature, wind speed and direction, wind chill and barometric pressure. In addition a check of the forecast is always a good idea especially if you intend on being out for an extended period of time or are traveling far from Barrow. Pay particular attention to the barometric pressure as a downward spiraling barometer means a change in the weather. Also be aware of moon and tide cycles as these have major influences on

the ocean currents. The combination of wind and tides play a significant role in ice calving events.

Navigation

Personal GPS units are recommended for all parties traveling on the sea ice. Minimally each member of the group should have a compass on their bodies which can be easily accessed. It would be a good idea to become familiar with landmarks in the Barrow area. While on the sea ice near the NARL the most conspicuous landmarks are the large hangers at the NARL airstrip. From the tundra side east of the NARL or from Elson Lagoon to the NE the DEW line site and CMDL antennas ("golf balls") are the most visible. Light beacons are on all these structures.

If whiteout conditions exist it would be in the best interest of the group to stay together and designate a lead and rear snow machine. The lead snow machine should have either a GPS or compass to navigate back to the beach area. That person should stop periodically to ensure all members of the group (including passengers on sleds) are accounted for and nobody is suffering frostbite. Travel should be slow and methodical. If travel is impossible wait out the storm and create improvised shelters. Wind blocks may be created by parking snow machines close together, or digging into a pressure ridge. Huddle together and avoid sitting directly on the snow/ice and conserve as much body heat as possible. Somebody should stand a polar bear watch.

Field Communications

Radio or telephone communications should be conducted routinely between field parties and BASC personnel at the warehouse. In the event of an emergency, first call BASC personnel either on a cell phone or BASC radio.

- Fill in information for BASC contacts
- BASC office 852-4881

If you cannot reach them by telephone use one of the radios which were issued to you. Explain clearly the problem and include your exact location, number of personnel, what assistance you need and your resources. Also include information if this is a medical emergency. Be aware of the limited lifespan of batteries, especially in the cold. Consider setting up a radio check "every hour on the hour" if an emergency situation arises, rescue personnel are delayed and you have a limited battery supply.

Cell phones/911

Cell phones will be checked out to field team leaders and other key personnel. The coverage is somewhat limited in the Barrow area but is a reliable form of communication. The phone should be left on and kept in a warm inside pocket. In the event of an emergency you can call 911 and reach a NSB Public Safety Operator.

VHF radios, channel 16, 68, 72, 8

Handheld VHF radios will be issued to field team or group leaders or other key personnel. These radios have the advantage of being continually monitored by people in the community, Search and Rescue and Public Safety. BASC also monitors channel 8 in the shop but personnel are not always available.

Channel 16 is monitored by Barrow Public Safety and is used as a "hailing frequency". Channel 68 is monitored by the residents of the village of Barrow and receives the most community traffic. Channel 72 is reserved by the whaling crews and should not be used. Almost all households have VHF radios equipped with scanners so any communications on VHF frequencies will be heard by outside parties. Radio etiquette is essential. BASC users may use channel 8.

Satellite phones are available on a limited basis by NSF users. Prior arrangements must be made for their use.

BASC Radios

BASC has a limited number of hand held radios which are used "station to station". They are not monitored by any other group and can only transit between other BASC radios. This can be monitored in the BASC warehouse.

Personal Location Beacon (PLB)

PLB's may be issued to BASC users if previous arrangements are made. These devices are for emergency situations only and require a brief orientation. Their function is to send a signal to a passing satellite which will pinpoint its location to emergency personnel. Each PLB has a unique signature thus identifying the party using it.

Search and Rescue

Barrow is fortunate to have two Search and Rescue operations. The **North Slope Borough Search and Rescue** is a professional organization made up of highly trained personnel. They fly S & R missions utilizing a variety of fixed wing and helicopter aircraft. Because the North Slope is a large area the NSB funds this department and has been instrumental in its development. Their phone number is **907-852-2822**. The US Coast Guard and Alaska State Troopers have little or no presence on the North Slope.

Barrow Search and Rescue is made up of volunteers from the Barrow community. Their base is in Browerville and is staffed daily from approximately 9am to 11 pm. They monitor VHF channel 68 and can be hailed at "Rescue Base, Rescue Base". Their phone number is **907-852-2808.**

With either organization a "callout" will be mounted in the event of an emergency. If your situation is indeed an emergency then you should follow the protocols established to

make contact with the proper authorities. However, using good judgment is paramount and cannot be over emphasized. For example a sprained ankle or even a simple fracture would not necessitate a full callout. If you are able to "self rescue" that is always the preferable first option.

First aid

Those participants trained in first aid, CPR, WFR, WEMT, EMT should identify themselves prior to the commencement of the course. BASC can provide a simple field first aid kit but the contents are limited. For most injuries, returning to the BASC warehouse is probably the most prudent thing to do unless the patient has a serious injury and/or suspected head and/or spinal injury and should be evacuated by qualified personnel. If any participant has a medical condition which could complicate matters later (example diabetes) please notify your field team leader. Confidentiality will be maintained.

Personal Gear

The following is a recommended list of personal items each field team member should carry with them. Avoid an expedition pack with every conceivable gadget. Keep it simple, light, and compact.

- Daypack
- GPS (optional)
- Compass
- Sunglasses
- Whistle
- Sheath knife and belt (optional but nice)
- Sunscreen
- Extra clothes
- Water bottle/thermos bottle
- High energy snack food

Firearms

Firearms are an essential piece of equipment and are loaned to qualified personnel, as evidenced by presenting documentation on completed firearm safety courses. The preferred weapon is a 12 ga. pump shotgun loaded with rifled slugs. These have been proven effective in defense against polar bears. The scope of firearms safety is too broad and complex to address in this forum but there are three key elements to firearm safety which everybody should practice, including non firearm bearing participants:

- Never point the muzzle in an unsafe direction
- Never load the weapon until it is ready for use
- Never put your finger on the trigger until you are ready to shoot

It is the responsibility of every individual to follow safety precautions in firearms use. They represent a great hazard to all personnel with potentially lethal consequences. **All**

accidents are preventable. If you witness an individual mishandling a firearm it is your responsibility to act. It could be your life on the line! It is BASC's policy to load weapons once you leave the warehouse/theater facility. Keeping rounds in the magazine is acceptable so long as the chamber is empty.

BASC Emergency Travel Kit

For long-distance travel, BASC can issue emergency travel kits to field parties. These are lightweight, portable sealed bags which can be kept on the handlebar of a sled or snow machine. They are intended for emergency use only and contain:

- Smoke signal
- Orange flare
- Parachute flare
- Laser flare
- Signal mirror
- Whistle
- Tarp/space blanket
- Compass
- GPS with extra batteries
- Basic first aid kit

Sea ice hazards

Other than polar bears, the major sea-ice related hazards are cracks and openings in the ice (including thin ice), pressure ridges and ice break-out events. Cracks and other smaller openings occur throughout the land fast ice (i.e., the ice attached to land for a better part of the winter) and as they may be concealed by snow you should use caution when walking or driving a snow machine over the ice. Cracks that you are likely to encounter are tidal cracks between the near shore ice and the floating land fast ice (typically few meters to tens of meters from shore) as well as cracks further out on the ice.

As you move away from shore and into sea ice that is not anchored by grounded pressure ridges, there is a significant danger of floating away with part of the ice sheet if winds and currents are (un)favorable and you have crossed onto a semi-detached piece of ice. Never travel further offshore than the main approved sampling sites without prior consultation with field group leaders. Watch for shore-parallel cracks and potential changes in their appearance as well as overall ice conditions.

Pressure ridges are impressive and provide good viewing platforms but are typically composed of unconsolidated blocks that may be subject to shifting. They also contain numerous cavities that may be concealed by snow. Exercise caution when scaling ridges. While the land fast ice itself is quite thick by mid-winter, stretches of thin ice may form on occasion as a result of ice moving out or deformation processes. Occasionally, such ice is concealed by a thick snow layer that forms as snow drifts into a depression or

opening. Watch for telltale signs in the ice topography before venturing out into areas that may contain thin ice.

Polar bears

Polar bears represent a significant hazard to scientists working on the sea ice and should never be approached. Diligence and avoidance are the first line of defense against polar bears. All members of a field party are responsible for keeping a watchful eye out for bears. If visibility is limited due to heavy ice, pressure ridges or poor weather, extra precautions should be practiced. These include a designated "bear guard" or minimizing the time spent on the ice, or keeping the shotgun at the ready. Depending on the distance a bear is encountered will determine your course of action. If ample time is available the group will have to make a determination which direction the bear is traveling and whether or not it detects your party. If the bear is more than a half mile away and moving away you could probably continue your work provided you keep an eye on it. If the bear is moving towards you the group should pack up equipment as quickly as possible, start the snow machines and leave the area. If there is not ample time to pack up equipment the group should be prepared to abandon it. **General behavior:** it is impossible to predict how the animal you encounter will behave. Polar bears are curious animals and will approach to investigate almost everything on the sea ice. The temperament, age and hunger of the bear will have an influence on how the animal will behave. If the bear approaches sniffing the air and moves downwind it is most likely attempting to identify what you are. This isn't necessarily an aggressive behavior. **An animal with a direct approach with stiffened legs or quartering gait (i.e., walking quickly) may be more aggressive.** If you elect to fire warning shots to scare off a bear do so with caution and ideally with another backup shooter. Do not fire beyond 100 yards as the accuracy of slugs and open sights is limited. Aim to the side of the approaching animal and try to shatter ice in front and to the side of the bear. Other members of your group should have started snow machines and prepared for departure. Engine sound alone has been known to deter bears as it is often associated with hunters. Report any encounters to BASC personnel.

Groups working on the sea ice at any locations other than the designated main study site at the beach at NARL, will be accompanied by an Iñupiaq bear guard/guide.

Taking proper care of scientific instruments and equipment

All instrumentation you will be using during the course is research grade equipment, which means it is expensive and has a tendency to break if it is not handled with greatest care. Before handling any kind of equipment, familiarize yourself with its operation and proper handling, and ask the instructor for guidance. The sampling procedures (especially the ice coring) are potentially dangerous, if you do not use greatest care carrying them out according to the instructions. Ask the instructors for guidance, if you are not personally familiar with an instrument or sampling device.

Seawater is highly corrosive. Hence, all equipment exposed to seawater or sea ice needs to be rinsed carefully with running freshwater and dried prior to storage (after each sampling event). Specific care should be used when handling electronic equipment in the

field, as seawater is a very good conductor and can cause shortages. Furthermore, any equipment used in the lab should either be protected against contact with seawater or melted ice and needs to be rinsed with freshwater after each use. Take particular care with the microscopic equipment.