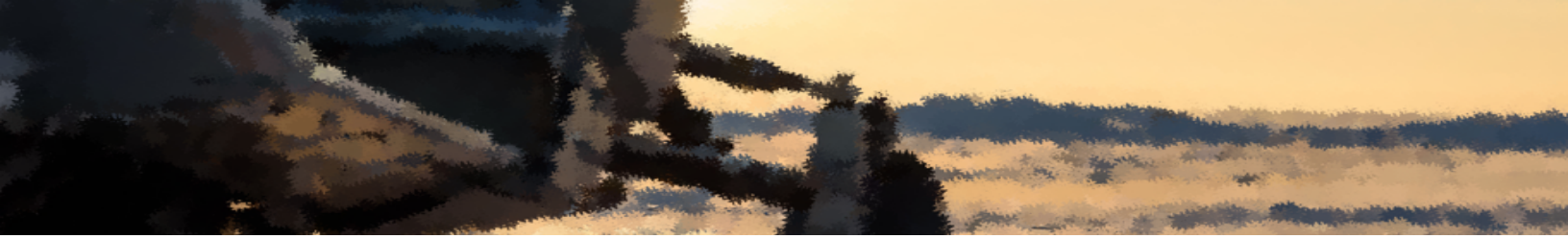
2019

Stay Safe: Guidelines for Working on Sea Ice

STRATEGIC EMERGENCY MANAGEMENT PLAN

RENE RITTER

PREPARED FOR SMARTICE BY BFA: EMERGENCY RESPONSE EDUCATION



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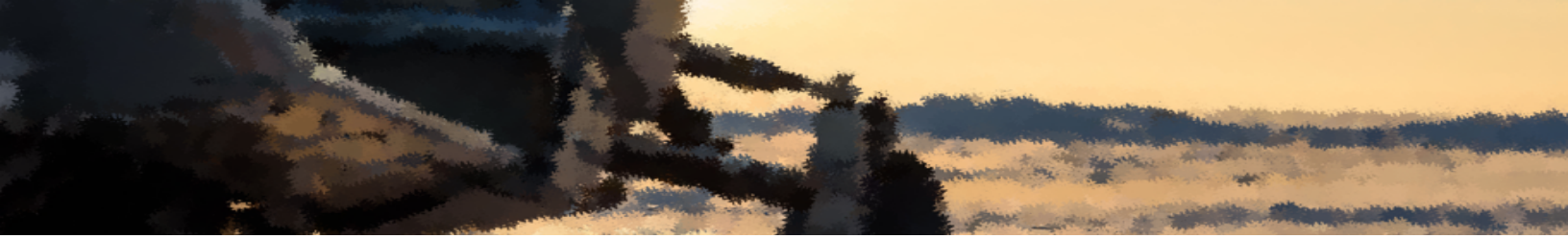

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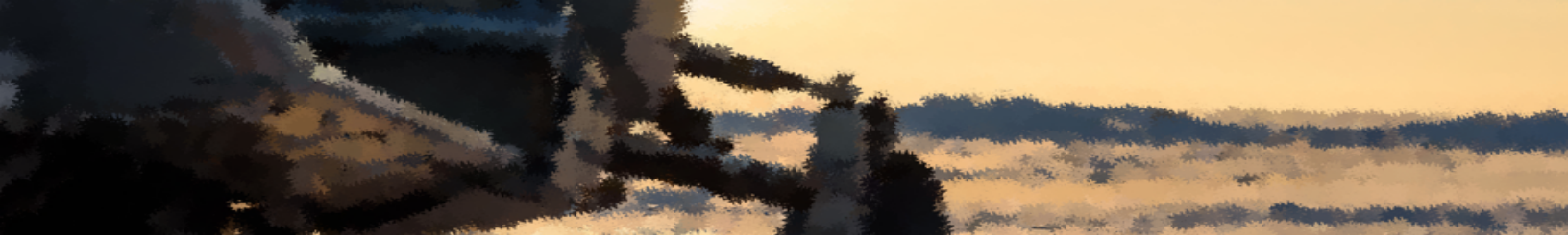
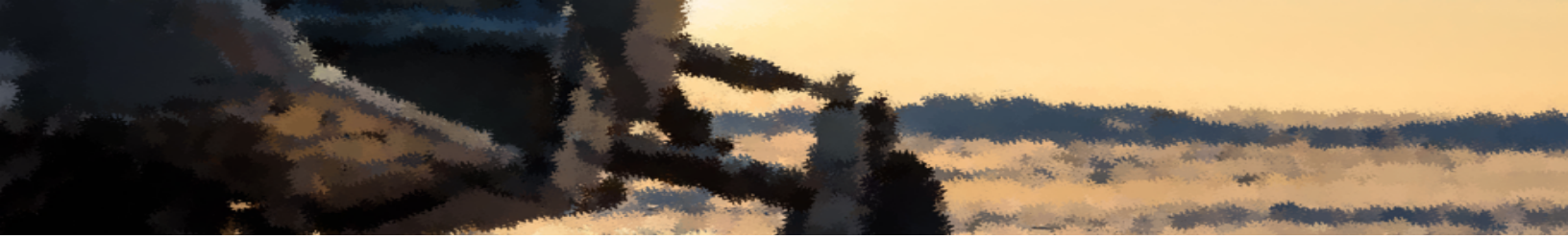
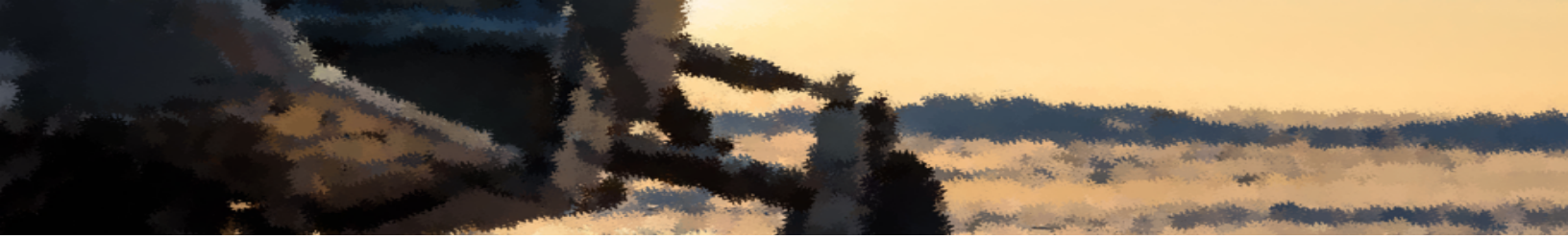




List of Abbreviations

AHRA	All-Hazards Risk Assessment
CASARA	Civil Air Search and Rescue Association
CPR	Cardiopulmonary resuscitation
CPR-C	CPR Level C
EMS	Emergency Medical Service
IQ	Qaujimajatuqangit
IRT	Ice Rescue Technician
KRPF	Kativik Regional Police Force
NFPA	National Fire Protection Agency
NL	Newfoundland
NU	Nunavut
NWT	Northwest Territory
PFD	Personal Floatation Device
PPE	Personal Protective Equipment
RCMP	Royal Canadian Mounted Police
SAR	Search and Rescue
SEMP	Strategic Emergency Management Plan
SOG	Standard Operating Guidelines



1.0 Introduction

The people of Inuit Nunangat have relied on sea ice for their survival for millennia. The circumpolar oceans have been used by Inuit as a source of food, clothing, fuel and shelter. Additionally, it has been used to facilitate trade and as a medium to access other settlements, outpost camps and traditional hunting grounds. Sea ice is part of life for Inuit and most of the 53 settlements within the four Inuit land claim regions that compose Inuit Nunangat are located along the coast.

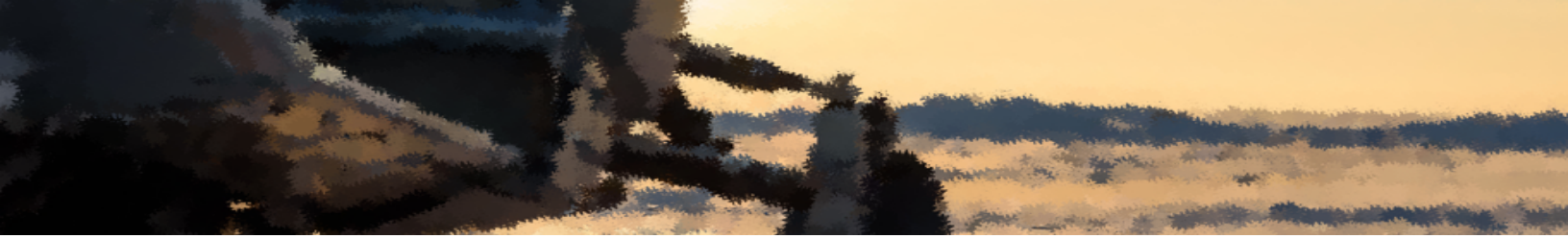
The general Inuktitut term for sea ice is Siku. It is used once the ice is thick enough to travel on and is attached to land. Inlets and bays are typically where the ice begins to form, but islands or reefs can also help anchor ice as it freezes and thickens. Once it becomes land-locked for the winter, it is referred to as Tuvaq, and is essentially an extension of the land, over the sea. It is this land-fast ice that is most often used for sea ice travel. Inuit elders and hunters are typically the members of the community who have the greatest expertise about the state of the sea ice, and if it is safe to access and travel on. Their traditional knowledge of sea ice safety is rooted in generations of oral history and is based on the observation of animals, and surface ice conditions. Inuit knowledge recognizes ice that is whiter in colour as being thicker and safer to travel on, whereas darker ice is thinner and more dangerous. If a seal is shivering, even in nice weather, it is a sign that it may start snowing soon. Clearly, traditional knowledge is valuable.

Staying safe on sea ice entails employing standard risk management practices, while being mindful of the importance of Inuit Qaujimajatuqangit (IQ) or Inuit traditional knowledge. Sadly, rates of drowning for Indigenous Canadians are significantly higher than for non-Indigenous Canadians. First Nations and Inuit peoples tend to have greater exposure to drowning hazards than the average Canadian, and their drowning rates were up to 10 times higher (Canadian Red Cross, 2003). Aboriginal peoples often travel by boat and snowmobile both as part of daily life and for recreation. Not wearing a flotation device or hypothermia protection were frequent risk factors for boating and snowmobile drownings.

The Canadian Drowning Report produced by the Lifesaving Society (2018) states that the highest proportion of rural drownings occurs in Nunavut and Northwest Territories. The average water-related fatality rate is substantially higher in the territories when compared to the rest of Canada, followed closely by Newfoundland and Labrador.

The use of a Strategic Emergency Management Plan (SEMP) involves assessing and mitigating hazards on ice sheets prior to, and during operations. It also involves utilizing Standard Operating Guidelines (SOG) that are defined in this work. Providing staff with the requisite skills, knowledge and tools to access work sites in a safe manner creates a culture of safety and reduces the incidence of injury and death.

Having a SEMP in place can prevent long lasting damage to your organization's reputation in the event of an accident or other incident. Communicating in advance with other stakeholders in the community,



particularly first responders, will build professional relationships. These groups will be able to support you more effectively if the incident you never want to happen does take place.

2.0 Hazard Identification, Assessment and Mitigation

Effective Emergency Management Planning includes the integration of mandate-specific all-hazards risk assessment (AHRA) as the planning premise. The AHRA will help identify, analyze and prioritize the full range of potential threats. One of the key SOGs relating to risk management in the ice environment is assessing and mitigating hazards before entering the ice field and analyzing incidents after they occur. Most incidents are preventable through effective hazard assessment and mitigation. Training of staff to recognize hazards and to perform self and subject rescue is essential. Employers must also provide appropriate personal protective equipment (PPE), which when used by trained personnel results in decreased morbidity and mortality on ice covered water. Staying safe entails assessing hazards prior to travel on sea ice and repeatedly keeping a lookout while advancing across an ice sheet.

2.1 Hazard 1: Ice strength and integrity

Thickness

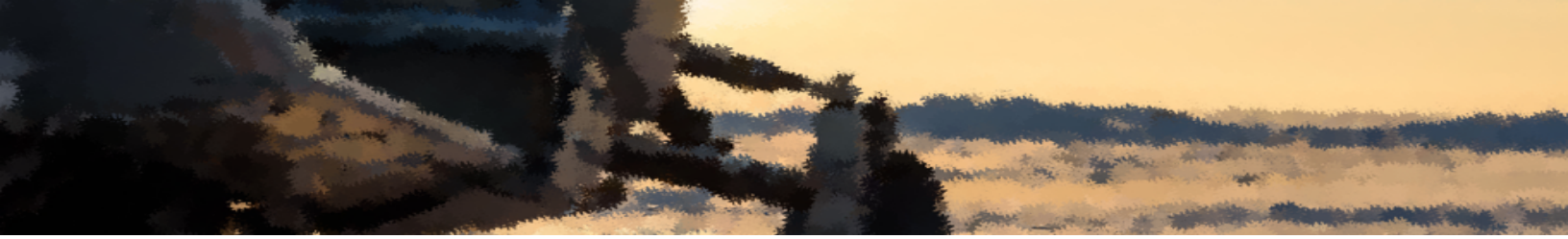
- In addition to the thickness of ice, a major concern should be the uniformity of thickness throughout a given area. The reality is that sea ice can be thin in certain areas due to factors such as strong currents, active or newly formed cracks (leads), pressure ridges, land formations (islands, coastal areas, peninsulas, estuaries), and the type of weather when the ice formed (sea state – calm versus rough water)

Snow cover

- Snow cover is relevant as one must consider the physical load of snow on the ice sheet. Snow also has insulative properties which affect the freezing and melting of sea water, depending on the time of year. Snow cover can inhibit freezing or accelerate melting of sea ice, which is a function of its albedo – how readily it absorbs or reflects sunlight. In late season, large meltwater pools have a lower albedo than snow covered ice, causing increased absorption of heat energy and a hastening of melting. This can compromise the integrity of the ice.

Depth of the water under the ice

- Because oceans are deeper than most freshwater bodies of water, it takes longer to reach the freezing point and generally the top 100 to 150 meters of water must be cooled to freezing temperature for ice to form. The freezing point of sea water is also lower than that of freshwater, with ice forming at approximately -1.8 degrees Celsius.



Assessment of Hazard:

Traditional Inuit knowledge related to ice colour informed northern people about the safety of ice for generations. The colour of ice is useful in determining whether or not it is safe to travel on. It should be noted that snow cover will impede individuals from assessing ice in this manner. Consequently, most OHS guidelines recommend that multiple test holes be drilled into the ice to check the thickness of the working area. See mitigation of hazard below.

Assessing sea ice based on colour:

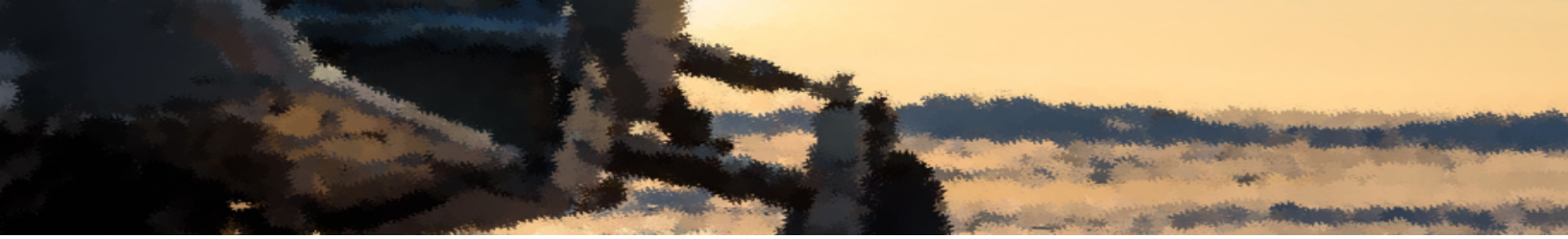
Visually check the ice, Colors range from blue, white, and grey.

- Dark Nilas[1]: less than 5 cm
- Light Nilas: 5 – 10 cm
- Grey ice: 10 – 15 cm thick
- Grey/white ice: 15 – 30 cm thick
- White ice: 30 – 70 cm thick

Mitigation of Hazard:

- **Thickness:** It is recommended that multiple test holes be drilled into the ice to check the thickness within the working area. These test holes should be checked throughout the day with any changes in thickness reported to a supervisor. Any area that does not meet the minimum thickness guidelines stated above should be off-limits and all work should cease. The worker responsible for drilling and measuring test holes must know the bearing capacity of these measurements. If drilling of test holes is not possible, it is recommended that workers check the ice on foot using an ice chisel to probe every 45 m (150 feet). If the chisel goes through, turn around and retrace the exact same steps back to safe ice. People testing the ice on foot are recommended to carry long poles, throw ropes, and wear appropriate thermal/floatation PPE in case of a breakthrough. Workers can also be securely roped together, with minimum spacing of 15 m (50 feet).
- **Colour:** Any worker assessing an ice cover should have prior knowledge of ice color, as detailed above, and what each colour represents. If ice color cannot be seen due to snow cover, snow should be removed. Once ice color can be seen workers should determine what areas of ice cover should be avoided.

[1] Nilas refers to a thin sheet of smooth, level ice that is less than 10 centimeters (4 inches) thick; appears darkest when thin



2.2 Hazard 2: Temperature

Fluctuations in air temperature affect the integrity and strength of surface ice. If the freezing process is continually reversed, due to unseasonably warm weather, more air will be present in the ice and the ice will expand and contract. Both factors will result in a weakening of ice. A sudden drop in air and ice temperatures will cause an ice sheet to contract causing leads and wet cracks to form. A sudden rise in air and ice temperatures will cause ice to expand and exert pressure on fixed structures and the development of pressure ridges in the ice. Extreme cold may affect equipment causing them to malfunction or fail. Extreme cold is also a health and safety hazard for workers.

Assessment

Workers are recommended to monitor the air temperature prior to accessing the ice and during operations in the ice field. Continual assessment is important as temperatures can rise considerably during the day. Drastic changes in the temperature (20^{o} C within 24hr) can cause stress on the ice, causing cracks or thawing of ice/surface snow.

Mitigation of Hazard

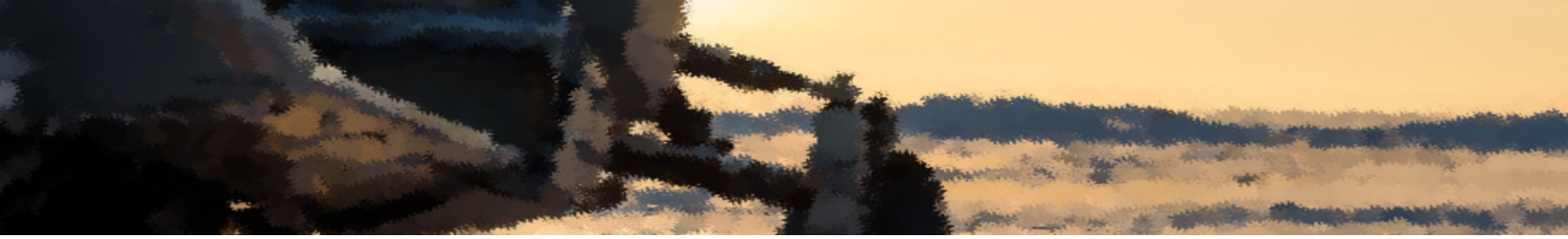
All operating sites should have a warming station for workers to go to when they feel it is needed. Workers should also be equipped with appropriate thermal protection to protect against exposure from the cold. If major fluctuations in temperature occur, workers should suspending operations if they feel their safety is compromised.

2.3 Hazard 3: Climate conditions (Sun, Fog, Snow, Rain, Tide)

Workers should be aware of impending weather and the effect of lunar cycles and tides on the work area. During a full moon cycle, tidal range can be pronounced in certain areas, which can result in overflow of sea water onto the ice. This water erodes the ice, which can pose a hazard to workers. Workers should also check the UV index prior to accessing the ice as prolonged exposure to sunlight on ice surfaces can result in eye injuries. Fog is often a sign of open water and the area should be avoided. If a blizzard or heavy snow fall is forecasted, it is advisable that operations be canceled and rescheduled. A forecast of rain can be a sign of warming temperatures and cause ice covers to thaw or become slippery, caution should be taken while walking, and test holes should be measured for ice thickness.

Assessment:

Most relevant information needed to assess hazards in this domain can be obtained from local or national environmental forecasting agencies. Workers may also wish to utilize marine forecasts, tide tables and ice maps prior to starting a trip.



Mitigation of Hazard:

Weather should be monitored prior and during operations over an ice cover. Workers should be equipped with proper PPE for any sudden or existing climate condition, as well as having the requisite training for any occurrence that may cause disorientation or harm to the worker.

- Blizzard – Workers should implement a "buddy system" prior to operations over ice. If any worker is working out-of-sight of their partner, they should plan for regular check-ins via two-way radios. All team members should be well-trained and have the ability to use a compass/GPS in the event a blizzard, fog or any other climate condition causes them to become disoriented.
- Sun– During clear working conditions all workers should be equipped with proper eye protection to minimize glare, or damage to the eye (i.e. snow blindness).
- Fog – Fog is a sign of open water; all team members should avoid entering foggy areas during operations over ice.
- Rain – If rain occurs workers should use caution while walking to avoid any slips that may cause harm. If ice cover begins to thaw, as evidenced by standing water, the entire operation should stop until ice cover is stable and safe.

2.4 Hazard 4: Cracks

Some cracks can be ignored due to the fact that they are naturally occurring and will not cause the ice to fail. Cracks in ice can be generally classified into two types:

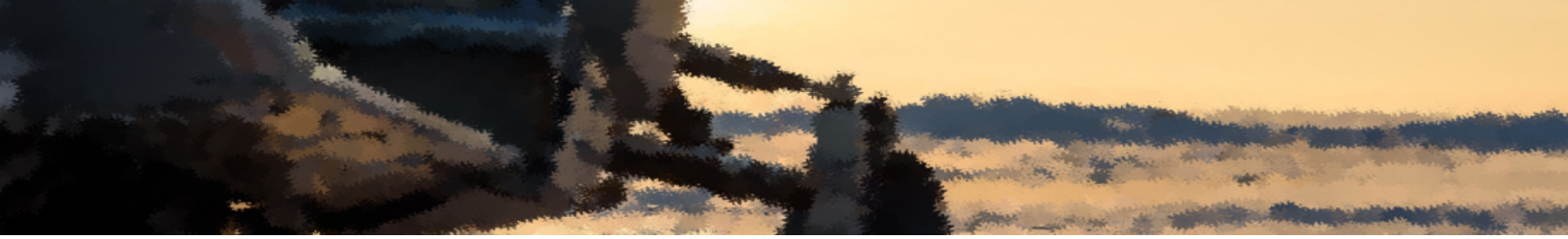
- Dry Crack – An opening of less than 1/8 inch or 0.32cm which does not penetrate very deeply into the ice cover and will not cause serious weakening.
- Wet Crack – Indicates the crack has penetrated through the entire ice cover, this can affect the ice strength. Wet cracks can re-freeze and become as strong as the ice cover A core sample should be taken to ascertain the refreezing depth.

Assessment

Visually check the ice throughout the day, many types of cracks can form, and some are more hazardous than others. Cracks can also cause a collision hazard with motorized vehicles such as snowmobiles.

Mitigation of Hazard

Ice workers should have prior knowledge of the types of ice cracks and what causes them. In areas of rough ice, where cracks and pressure ridges are common, extreme care should be taken when operating a snowmobile as each of these represent a signification collision hazard. Advise workers to reduce speed in these areas.



2.5 Hazard 5: Water flow (current)

Water currents may compromise the integrity of sea ice and should be considered prior to setting out on a trip. Natural features such as estuaries, polynias, and ocean currents are of particular importance as they accelerate the decay of ice, often leaving a surface that appears safe.

Assessment

Refer to maps, consult with local citizens about known hazards in an area where work is planned.

Mitigation of Hazard

Workers should be instructed to avoid areas where the presence of natural features, such as those indicated above, have a high probably of reducing the integrity of the ice.

2.6 Hazard 6: The use of snowmobiles on sea ice

Drownings resulting from snowmobiles going through ice are the greatest single cause of fatalities arising out of the use of these machines. However, snowmobile operations over ice can be conducted safely by using common sense and observing basic precautions.

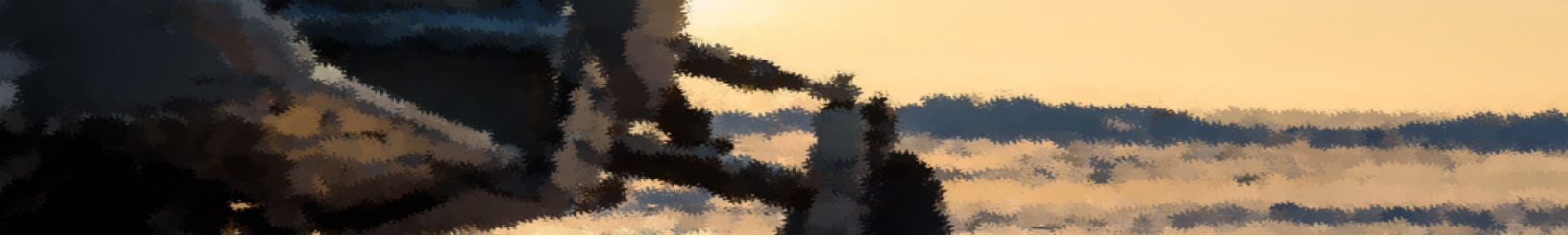
As the total load - machine, operator and ancillary gear - may weigh 500 pounds (225 kg) or more, a substantial thickness of ice is required for support. Difficulties in control, steering and stopping are increased on snow-free ice, particularly at higher speeds.

An individual operating a snowmobile on sea ice may find themselves a significant distance from the safety of shore when they go into the water. They are also more likely to have compounding traumatic injuries, and their helmets (if worn) and heavy boots can complicate extrication from the water. Additionally, fuel from the machine can pose a hazard to the victim, his/her rescuer and the environment. During such incidents, the load on the rescuer can be greatly increased.

Mitigation of Hazard:

The following is an outline of some basic precautions when operating snowmobiles on sea ice:

- Where there is an alternative, single machines should not be operated unaccompanied over ice covers.
- Should single machine operation be unavoidable, the shore base should be notified of the route to be taken, the destination and probable time of return.
- Operations should not be conducted over ice covers less than 6 inches (15 cm) thick.



- Operators should know of and avoid locations where currents or springs may cause dangerous thinning of the ice cover.
- Fog may indicate the proximity of open water; speed should be reduced, and great care When unexpectedly encountering open water, normal action is to slow down, brake gently and turn away; otherwise, turn as sharply as possible. If a turn cannot be made in time or a skid results, the operator should roll off the machine.
- Glare from the sun and ice may obscure obstacles or dangerous areas; anti-glare sun glasses should be worn under these conditions.
- Operations at night or at high speeds should be restricted to well-marked and known safe trails or crossings.
- Unless essential, snowmobiles should not be operated on ice bridges or roads with other types of traffic.
- Avoid operating over slush or water-covered ice; but if unavoidable, ensure that the tracks are cleared of ice and slush.

2.7 Summary

Work on ice covered water can be performed in a way that minimizes risk. By following basic hazard assessment and mitigation protocols, workers can reduce the incidence of injury and death.

The following summarizes the key points illustrated above, and can help prevent accidents while working on sea ice:

- work with another person at all times
- identify hazards and understanding safety precautions and basic rescue procedures
- wear PPE and dressing for the climate
- understand sea ice, its work-load capacities and ways to test it.
- note sudden and extreme changes in temperature and related ice behaviour.
- identify cracks, ice colour and signs that indicate thin or hazardous ice location.

See table 1 below for a summary of hazards, causes, and preventative measures. See also annex 1, 2 and 3 for ice cover inspection form, ice capacity data form, and ice measurement form.

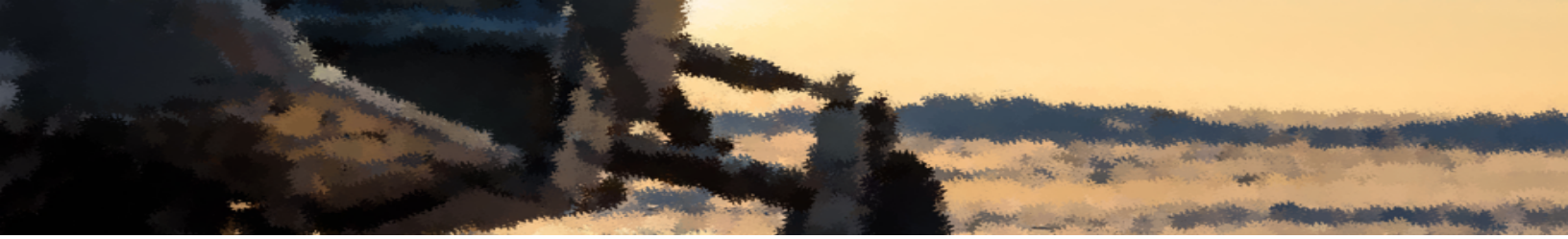
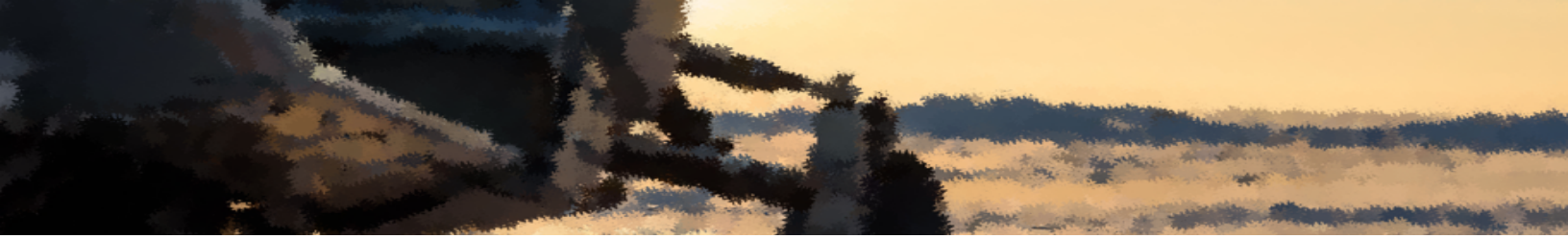


TABLE 1: ALL-HAZARDS THREAT ASSESSMENT

Hazard	Cause(s)	Prevention
Slip, Trips, Falls	Not wearing proper foot wear, inadequate lighting	Workers should wear rubber soled boots, with snow/ice cleats while in the field, if working in low/dark visibility workers should be provided with an illumination device(s) that will ensure adequate lighting.
Hypothermia, Frost Bite, Snow blindness	Inadequate clothing/PPE while working in cold environments	Workers are required to wear thermal wear along with the proper layers and over layers (i.e. hats, gloves, jackets) of clothing to protect from the elements. Work site should be equipped with a warming station where team members can take regular breaks.
Animal Encounters	Work site may be in an animal's nesting/living/ route area	Seek information regarding local fauna before going to site. Ensure workers are protected with proper devices to deter animals. (i.e. noise devices, flares, dogs, firearms)
Extreme weather changes	Blizzard, Rain, High winds	If extreme weather conditions arise and create an unsafe environment, staff should end work and retreat to shelter until safe work conditions develop.
Faulty Equipment	Not adhering to maintenance inspection protocols	All equipment (PPE, safety equipment, tools, communication devices, vehicles) should be checked and maintained on a scheduled basis. Equipment should be tested prior to, and after accessing sea ice
Falling through ice	Ice thickness wasn't checked inadequate training	Ice thickness should be checked on a regular basis. Areas of ice that may be hazardous should be marked and all team members notified of location. Hazardous areas should be noted on a map/GPS and shared with supervisor/colleagues. Anyone working on sea ice should be provided with training to identify hazardous areas, and to perform self-rescue/ subject rescue if required.
Missing Person	Disorientation due to poor visibility, falling through ice	All workers should be equipped with a two-way radio, checking in with a partner on a scheduled basis. Team members should never work alone but utilize a "buddy system" that is established prior to departure. Each team member should be briefed on what to do in the event they, or a colleague, are lost. Training in navigation with GPS and map/compass is strongly recommended.
Missing Team	Disorientation due to lack of visibility, falling through ice	Before each departure a Trip Plan should be left with two (2) or more people in the community. These people are instructed to activate emergency services when team is overdue.
Team Stranded (unanticipated delays)	Extreme Weather/Faulty Vehicle(s)	Team leader should advise persons having the Trip Plan of delay, so search and rescue (SAR) won't be called until necessary. Prior to each trip the team should pack emergency rations (i.e. food/fuel/clothing) to cover unanticipated delays in the field (at least 72-hrs of supplies, depending on seasonal climate conditions).
Minor/Major Injuries	Accidents	Team members should be fully trained to provide first aid to anyone who may need it. Team must also have a fully stocked first aid kit on site, and a larger more equipped first aid kit at base camp (if applicable)



3.0 Pre-Trip Preparations

The following sections detail the steps that should be taken prior to heading out on the ice.

3.1 Personal Protective Equipment (PPE)

Mitigating the hazards identified above involves ensuring staff are equipped with the appropriate PPE and mandating that they use it on every operation. The Emergency Management Plan mandates that anyone operating on sea ice be equipped with an approved personal floatation device (PFD), to provide buoyancy should a fall-through into the water occur. Anti-exposure suits or float coats are preferred, as they provide buoyancy and extended thermal protection.

PPE should include, but may not be limited to

Float coat or Floater suit (recommended for arctic operations)

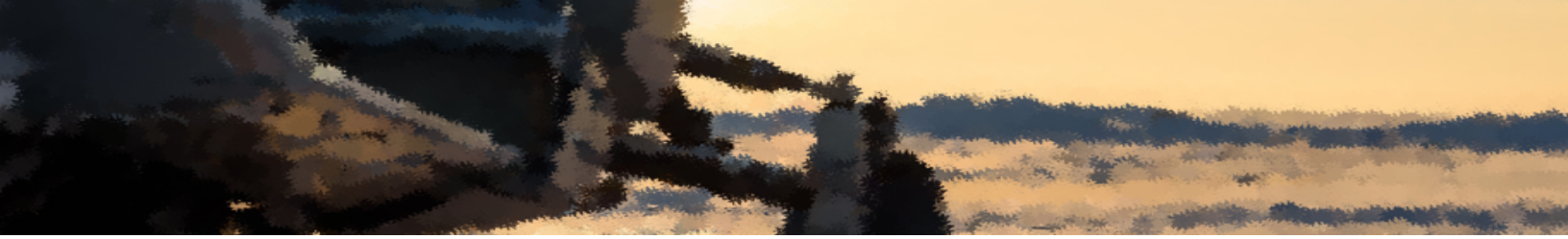
The coat or suit must be sized for the individual and worn according to manufacturer's specifications at all times when on the ice. While we do not endorse any specific manufacturer, floatation suits must be approved by Transport Canada, Canadian or US Coast Guard. Mustang Survival and Helly Hansen both manufacture appropriate suits to protect workers from exposure to cold water. Again, it is imperative that each suit fits the individual who will be wearing it and worn correctly. ***"If it fits you, it will float you"***

Ice Awls/Picks

Ice awls, or ice picks, are devices that are carried on an individual at all times. They are handheld spikes that are designed to assist a victim in crawling out of the water. Without these instruments, self-rescue is extremely difficult, so they are highly recommended. These should be considered standard (and mandatory) safety equipment to be worn AT ALL TIMES by an individual when working on the ice. We recommend "the Pick of Life" as they can be worn around the neck or strung through the sleeves of a coat. The 4" long plastic handles have a retractable sheath covering 1" long picks.

Whistle

A pealess whistle, such as the Fox 40 Classic Whistle should also be considered standard safety equipment to be worn at all times. A pealess whistle is highly recommended as there are no moving parts to freeze. Whistles should be non-metallic and carried on each person, in an easily accessible area and be of high visibility (don't purchase a black Fox 40). The whistle should be occasionally washed in a water/vinegar solution.



Extra clothing stored in a waterproof/dry bag

Individuals should carry extra insulative clothing in the event they enter the water. Clothing should be worn in layers and be made of natural (wool) or synthetic fibers. Cotton should be avoided as it does not retain heat when wet as other natural fibers do. The use of traditional clothing is also recommended, providing they can don their flotation suit over these garments.

Other essential equipment:

The general equipment list below is non-exhaustive, and care should be taken to supplement this list with whatever equipment stakeholders feel is appropriate. Regardless of the length of trip planned, it is highly recommended that these items be taken at all times.

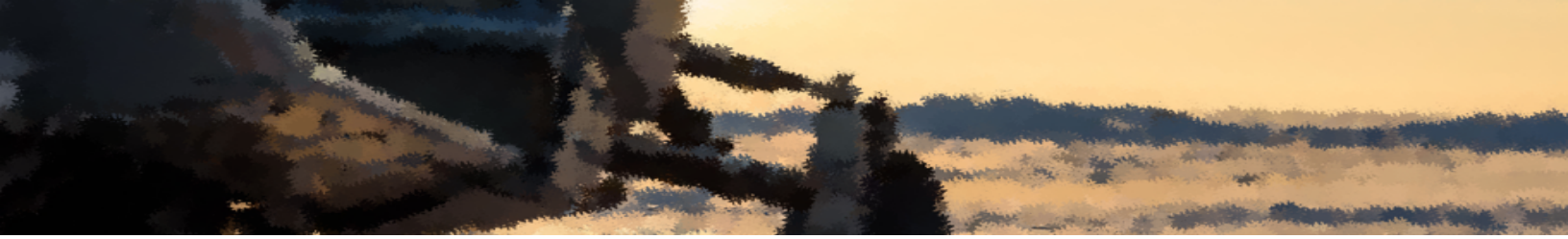
- Sleeping bags (rated to -30C, one (1) per person)
- Tent (four season) suitable size for the number of workers
- Satellite telephone and extra batteries. Iridium satellite phones are the only commercial phone that offers global service.
- Waterproof matches
- Chemical hot packs
- Tarp
- Extra fuel for stoves and snowmobiles
- Repair kit and extra parts for snowmobiles
- Extra food and drink mixes

3.2 Ice Rescue Equipment

In order to effect rescue, those accessing the ice must have appropriate rescue tools to assist a victim in self-rescue.

Large pick or probe to test ice thickness

How you chose to assess/test the thickness of ice is at your discretion. Typically, individuals will employ an extended ice chisel (a rebar sized metal rod with a flat blade welded to one end, and a handle on the other) or a test pole with a spike fixed to one end. These can be purchased commercially, or home made. These can also be used as a reaching assist should by a rescuer attempting to aid an individual who has gone through the ice. Alternatively, a cordless drill with an 18” wood-auger bit may be used to cut vertical holes. Mark the bit with tape at safe-ice depths.



Rescue rope

A rescue rope should be carried at all times when accessing sea ice. This rope is in addition to the throw bags indicated below. A rescue rope must be approved for use in water, as typical rope will not float. Parties should carry 200ft of 11mm high visibility robe in a rope bag. We recommend a rope bag for storage rather than coiling as the likelihood that the rope will become tangled is reduced. A stopper knot should be fixed at the end of the rope and secured to the outside of the bag for easy retrieval.

Throw bags

Throw bags containing 70 feet of buoyant 3/8" (9.5mm) rope (one bag per person) in an easily accessible location. Throw bags typically contain 75" of buoyant line and are deployed to a victim who has gone through the ice to assist in rescue.

MARSARS® Sling

The MARSARS sling is one of the most practical apparatus to carry when accessing sea ice. It is simple, easy to use and extended by hand to a victim in the water. As a rescue device it provides positive buoyancy to the victim and protects the head during extraction. The device is secured to the end of a rescue rope and the victim places the sling around their body and underneath their arms. It is limited in its application as the victim must be able to secure the device on their body. Proper training is recommended on the use of this apparatus.

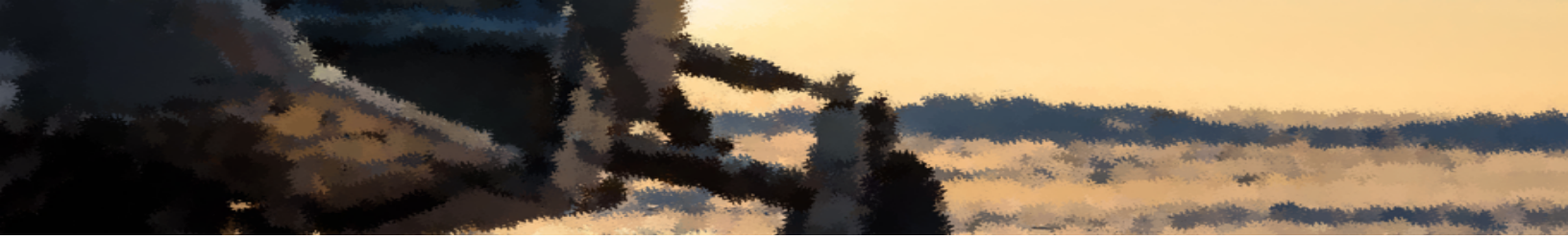
First Aid Kit

There are many options to choose from when selecting a first aid kit for field operations. Fundamentally, the kit should be appropriate for the number of people on a job site and include high quality items. Kits can be purchased preassembled with the appropriate equipment to comply with a jurisdiction's OHS legislative requirements.

3.3 Planning a Trip and Filing a Trip Plan

Whenever a team is preparing to head into the ice field, a trip plan detailing the planned route and estimated time of return should be completed. Once finalized this plan should be filed with at least two (2) reliable members of the community. These people should be contacted when the group returns. If the group does not return by a designated time, there should be a procedure in place to activate emergency services (RCMP, search and rescue, etc.). Submitting a detailed plan prior to each trip is an integral part of the SEMP and has been shown to result in positive outcomes for those who have been lost in the backcountry.

Planning an excursion entails conducting a thorough risk assessment of the planned route, as indicated previously. It is essential that teams have the recommended PPE and safety/rescue gear, and that it has been checked and in good working order. Pre-trip planning can be facilitated through the gathering of information from a variety of sources such as:



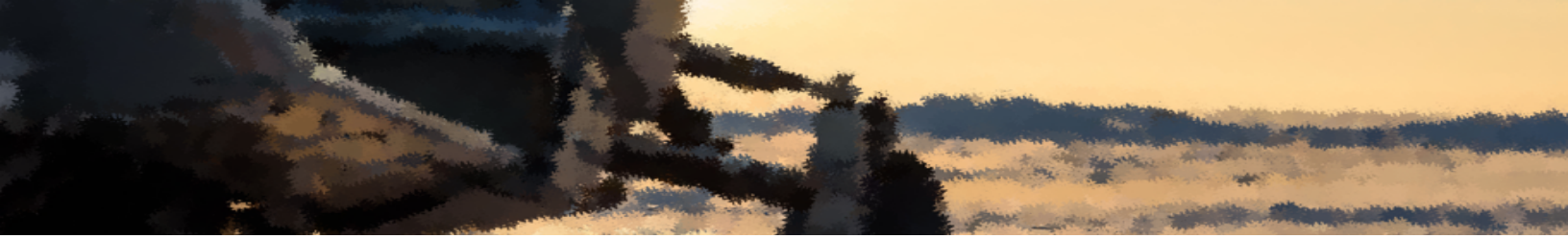
- People with recent experience in the work area
- Historical data (oral history, seasonal data, animal migration routes, areas where previous accidents have occurred)
- Nautical charts
- Topographical maps
- Satellite images
- Weather forecasts
- Historical weather data
- Tide tables

Trip plans should be as detailed as possible and include such information as:

- Names, numbers, addresses, and any pre-existing medical conditions of all people participating in the trip. (i.e. workers, contractors, visitors, etc.)
- Indicate the level of experience of each person participating in the trip (i.e. medical training, wilderness survival, ice rescue, navigational training etc.)
- Determine who will be in charge in the case of an emergency.
- Contact information of the people who have the Trip Plan.
- Contact information of local search and rescue, police, coast guard, fire dept.
- Date/time of departure; date/time of arrival to destination, date/time of return
- Make, model, and description of vehicle(s) used. If parking vehicle and continuing on foot or using another mode of transportation, include location of vehicle when not in use. Leave a copy of the Trip Plan in the vehicle as this may be used by SAR teams.
- Location of destination, description of routes, base camps (duration of stay at each camp) with coordinates or marked on a map.
- Any deviations from the route to a specific area, and the duration of stay at the specific area.
- Estimated time of arrival at the desired location.
- Team leaders may choose to schedule pre-defined calls to members of the team back in the community. These “check-ins” are useful on longer expeditions.
- List emergency equipment brought with you (i.e. GPS devices, satellite phones, InReach®

3.4 Safety, Medical and Rescue Logistics

Employees or members of the management team should be encouraged to connect with local Emergency Medical Service (EMS) agencies in the community that the organization operates in. As each community has different resources available to assist in an emergency, it is imperative that employees be aware of these resources prior to departure. Whenever possible, EMS should be aware of the type of operations you are engaging in. This may take the form of an informal meeting with the fire chief or RCMP members in the community. A comprehensive survey of all responding emergency services should be undertaken in all communities where work is done, including but not limited to:



- Police (RCMP, KRPF)
- Fire Department
- Municipal Enforcement
- Search and Rescue (SAR)
- Ground SAR (Canadian Rangers and community-based volunteer organizations)
- Air SAR (CASARA - Civil Air Search and Rescue Association)
- Emergency Medical Services
- Health Centers
- Hunter and Trappers Association
- Land Management Officials
- Canadian Critical Incident Stress Foundation: This organization has trained debriefing teams all over Canada and can provide an invaluable service to those affected by an incident.

See annex 4 for Trip Plan and Itinerary form

3.5 Training and Professional Development

In order to safely execute the rescue and first aid protocols detailed previously, it is imperative that workers have the requisite training and skills to effect rescue in the safest manner possible. Further to this, once a victim is extricated from the water, care must be taken to treat the individual for hypothermia, and other traumatic injuries or medical conditions. Considering the remoteness of field operations, evacuation by professional First Responders may be delayed due to environmental or other factors. Consequently, it is important that staff possess a diverse skill set to treat a person for an extended period of time. Taking the above into consideration, it is imperative that each member of the team be trained in basic ice rescue and wilderness & remote first aid.

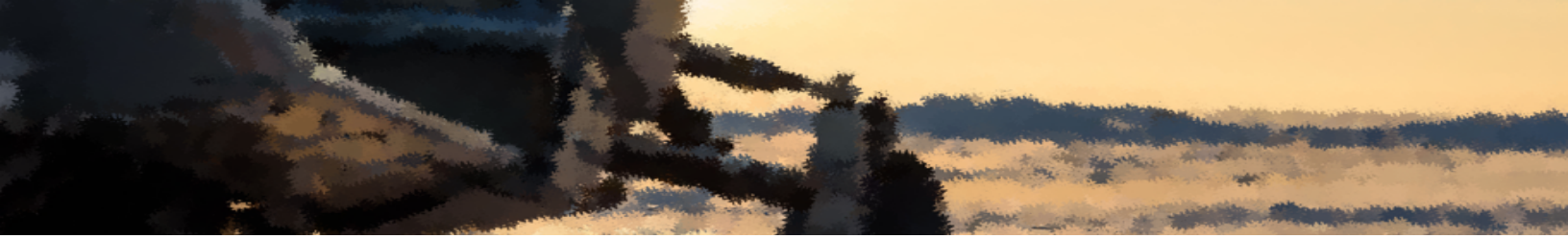
There are many providers currently operating in each discipline, and care should be used to ensure that a program meets or exceeds industry standards in their field of reported expertise. Standardization of training means that subjects are trained in the most contemporary, evidence-based interventions and are generally accepted as safe and effective. We recommend inquiring if a training provider's programming is approved by their jurisdictions Occupational Health and Safety body, or if they meet/exceed National Fire Protection Agency (NFPA) Standards for Technical Rescue (NFPA 1670).

Examples of Standardized Training Programs:

Wilderness & Remote First Aid

- Basic Wilderness & Remote First Aid (20hrs)
- Advanced Wilderness & Remote First Aid (40hrs)

The above programs are offered by organizations such as:



- BFA: Emergency Response Education (In partnership with the Canadian Red Cross)
- Wilderness Medical Associates

Certifications typically are for 3 years. Curricula is standardized among approved providers and includes learning objectives such as:

- Planning
- Your health
- Assessment
- Airway emergencies
- Breathing and circulation emergencies
- Cardiac and respiratory arrest (includes CPR-C)
- Wound care
- Head and spine injuries
- Bone, muscle and joint injuries
- Sudden medical emergencies
- Environmental emergencies
- Poisons
- Extended care
- Evacuation: transporting the ill or injured person

Ice Rescue Training

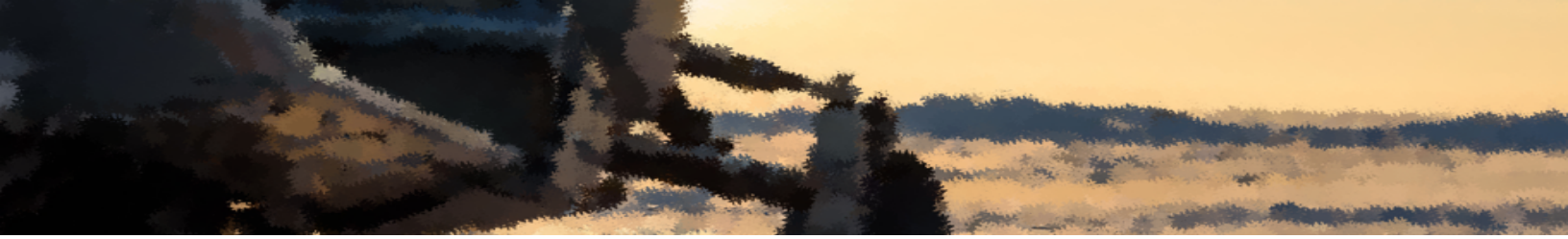
Ice Rescue Technician (IRT) Course (12-16hrs). The program is offered by organizations such as:

- BFA: Emergency Response Education (in partnership with Lifesaving Resources)
- Rescue Canada
- Rescue 3 International

Curricula is standardized among providers and includes learning objectives such as:

- The Rescue Process
- Ice Safety Principles
- Incident Command
- Cold Water Rescue and Survival
- Ice Rescue and Survival
- Recognition and Management of Hypothermia
- Use of Specialized Safety and Rescue Equipment

The IRT course is an intensive and fast-paced, educational program specifically designed to provide First Responders with the skills and knowledge required to safely and effectively respond to incidents on and



through the ice, as well as in, on and around cold water. The focus of this training program is on surface rescue for cold water and ice rescue incidents with an emphasis on personal survival and safety of the rescuer.

3.6 Establishing and Executing an Action Plan

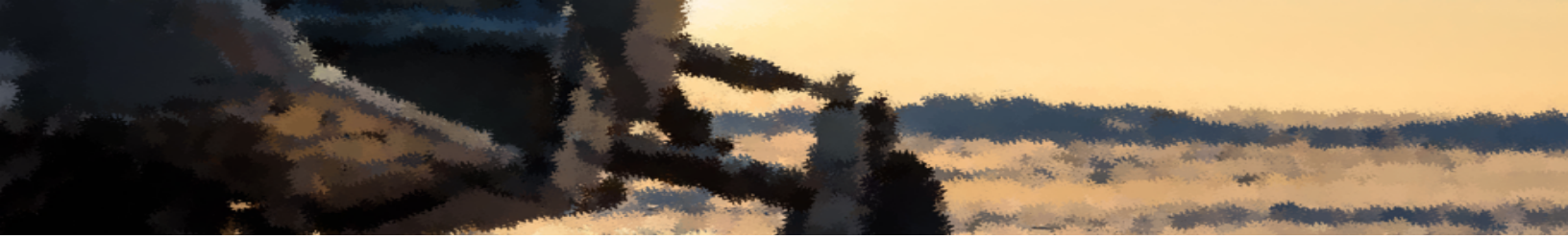
An Action Plan is a set of pre-defined activities intended to guide the response to an incident. This plan has been reviewed and pre-approved by managers and other stakeholders that may be involved. An Action Plan does the following:

- Assigns responsibilities for actions
- Pre-plans actions to be taken in different emergencies

When an unforeseen event occurs that requires professional rescuer support, there are significant resources disbursed to respond. More importantly, professional first responders place their own safety at risk when attempting to execute a rescue on land or at sea. Team members must be thoroughly briefed on the Action Plan and have the knowledge to activate the plan when an incident occurs. Unnecessarily activating Emergency Services ultimately leads to resources that are wasted and threatens the safety of others in need of help in remote areas. The Action Plan should clarify the kind of resources that will be required in an incident and will typically include those indicated in section 3.4 Safety, Medical and Rescue Logistics.

It is recommended that a copy of the Action Plan be sent to key people that may be managing an incident; invite their comments and follow up with a call/visit to inquire about what resources they have readily available (i.e. search dogs, trackers, helicopters, etc.)

The flow chart below represents a typical response to an event involving subjects through ice.



Scenario: Action Plan - Subject falls through ice

Response: Management represented by yellow. Responders are represented by gray.

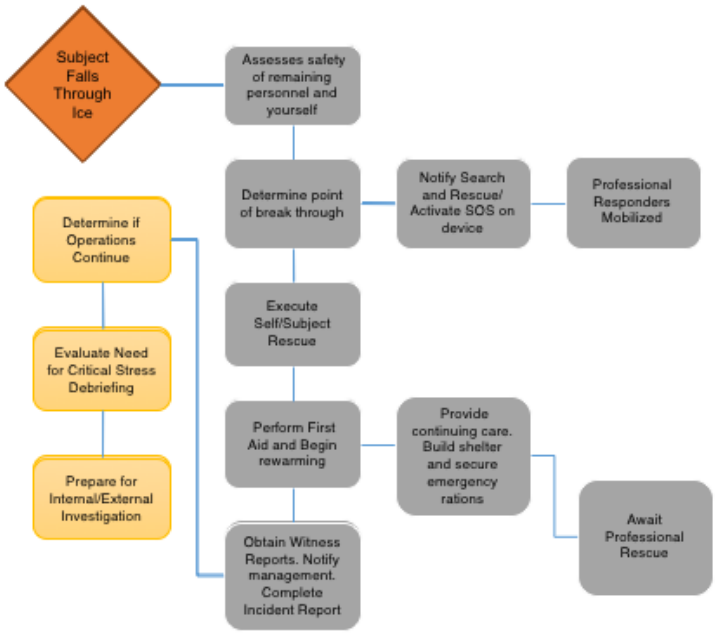
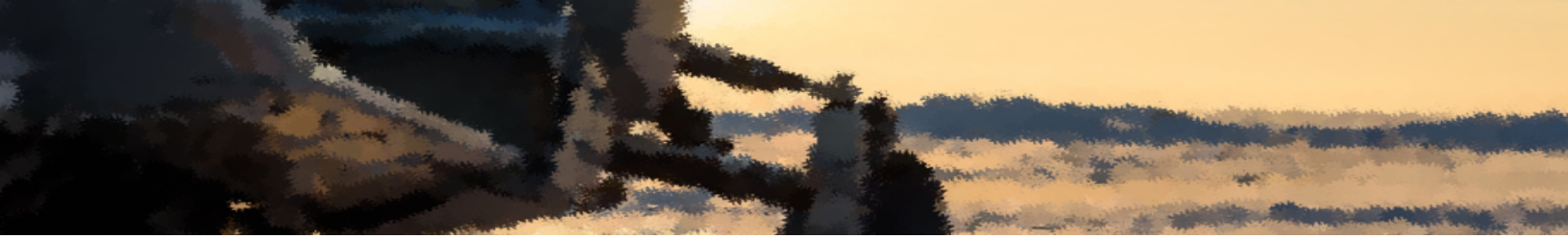


FIGURE 1: TYPICAL EMERGENCY ACTION PLAN FOR ICE INCIDENTS



4.0 Field Operations: Rescue and survival

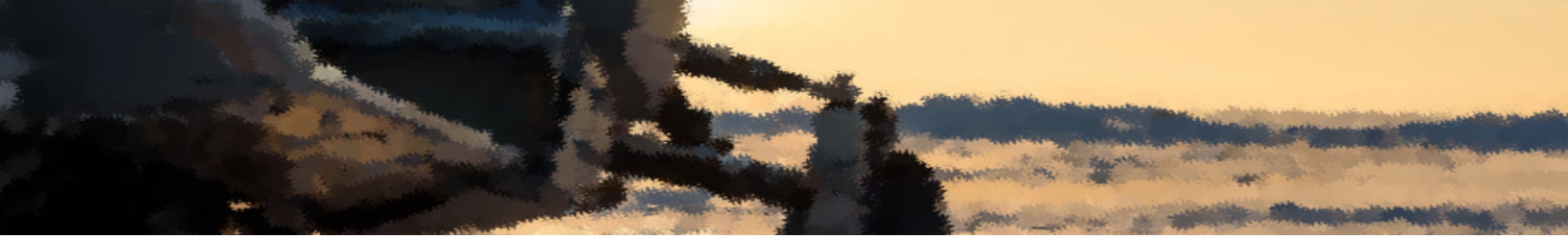
No ice should ever be considered as 100% safe, regardless of its apparent thickness. Workers should remain vigilant at all times when traveling on ice surfaces and continually assess their surroundings. If an individual has fallen through the ice, the strength and integrity of the ice should be suspect and it should be assumed that the ice has been compromised, regardless of its thickness. Effective incident management entails a rescuer making a quick scene assessment. Assessments should include the victim's physical and emotional condition, the closest point of safety, environmental conditions and equipment required, as well as the training and PPE provided to the rescue personnel. Above all else, a rescuer should not further endanger themselves to effect rescue. Most individuals who have fallen through ice into frigid water are unable to assist in their own rescue due to cold exposure, hypothermia, injury, etc. Therefore, on-site personnel must assume the person is a passive participant during the rescue operation. For those individuals capable of self-rescue, they should be encouraged to do so by their partner. The partner should verbally coach or gives commands from a safe area.

4.1 Self-rescue

People who fall through should not attempt to climb out immediately, but rather should kick to the surface and get horizontal in the water. The sudden entry into cold water will make an individual involuntarily gasp – a phenomenon referred to as Torso Reflex, or Gasp Reflex. This uncontrollable reflex can cause the person to aspirate water into his/her airway and lungs, which can lead to laryngospasm, disorientation, panic, and the loss of any physical ability to swim or remain afloat.

If a worker feels they are about to break through the ice it is important to remember the following self-rescue procedures. It is also important to recognize that these guidelines are not a substitute for formal ice rescue training, and that workers who are exposed to ice should be provided with training from an accredited organization.

- **Protect your airway:** Once you realize you are about to fall through the ice, you must protect your airway by covering your mouth and nose with your hand. This will prevent water from being aspirated if your head is submerged upon entering the water. Don't release the cover until you have re-surfaced and your mouth is clear of the water surface. Also, when entering, lean backward, which will reduce facial contact during sudden immersion into the water.
- **Keep calm:** Experiencing the physical pain and physiological changes that occur when submerged in cold water can lead to panic. By remaining calm you can control your breathing and allow yourself to think clearly and develop an action plan for self-rescue.



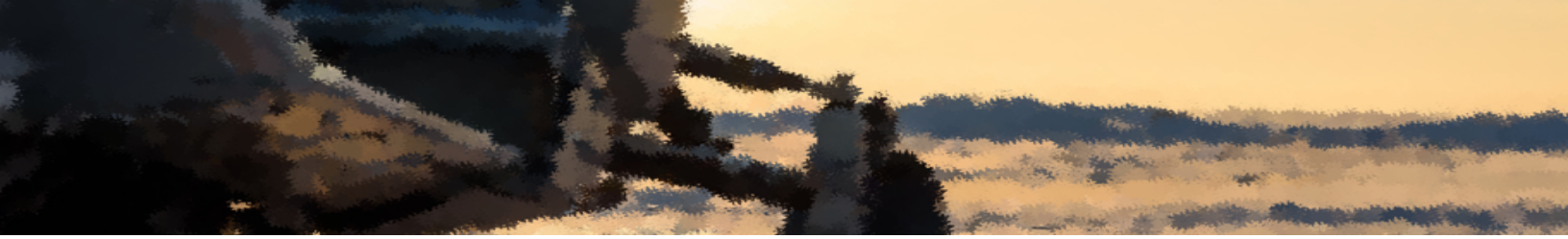
- **Focus your energy on getting out of the water:** Once you have calmed down and able to keep your head above water, you must focus on getting out as quickly and safely as possible. Treading water and waiting for help can shorten your survival time by 50%. Orient yourself and focus on getting back to where you had fallen in, as the edges should be stable enough to support you getting out.
- **Reduce weight:** If possible, remove any heavy objects you may have on, such as backpacks, heavy jackets, or helmet. Doing this will help keep you more buoyant and reduce your chances of drowning.
- **Get horizontal and kick:** Once oriented swim to the edge and grab on. Get as much of your upper body out of the water as possible. Grab onto the top of the ice and use your forearms and elbows to prop yourself up. Position the lower half of your body horizontally, kick your legs with as much force as possible and use ice picks. This will help you to propel yourself from the water and onto the ice.
- **Roll:** Roll your body across the ice once you are out. Roll back the same way you came. Resist the urge to stand and roll several body lengths away from the hole. Once you reach a safer spot on the ice slowly attempt to stand.
- **Retrace your foot steps back to safety**: Quickly retrace your steps to solid ground and begin treatment for hypothermia.

If you are unsuccessful after 10 minutes and it becomes clear that you cannot perform a self-rescue, do not panic. Conserve your energy and heat by moving as little as possible, hold on to the ice shelf, cross your legs and wait for rescue. Try to keep as much of your body out of the water as possible as your body losses heat 25 times faster in cold water as it does in air at the same temperature.

4.2 Subject Rescue

Be aware that would-be rescuers frequently become victims when they fall through the ice as well. Always have something between you and the victim – "the extended arm". You should throw or extend a long object that the victim can hold on to, such as a pole, a rope, or even a long scarf. Connecting yourself with the drowning person with a long object will keep you out of harm's way. Pull the victim out**.** Stay low, stay off the thin ice, and pull hard. If you have helpers, have them use their strength to assist with pulling and make sure they stay away from the thin ice.

When considering a subject rescue, it is important to understand the extreme hazard you are exposing yourself to. At no point should a rescuer attempt a "contact" rescue, even if they have the recommended PPE. Contact rescues occur when rescuers enter the water to extricate a victim. These types of rescues are only

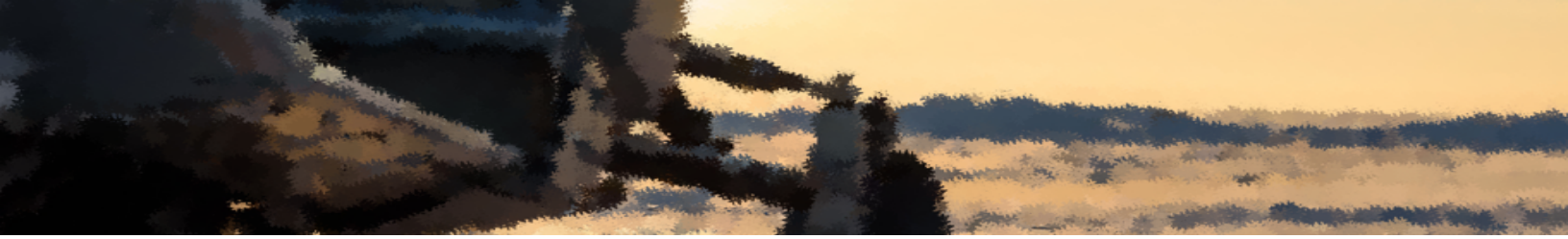


performed when there are multiple responders on site, and each have been trained in current ice rescue procedures. In the context of this work, where there are limited human resources on site, the following protocols are recommended.

- **Talk:** The rescuer remains on safe ice and verbally coaches the victim through the self-rescue process.
- **Reach:** If self-rescue is not an option, the rescuer uses objects or tools to try and extend to the victim, such as a Niksik, ice probe, or tent poles. The rescuer lays on the ice and spreads their body weight while reaching with the object. Once the victim grasps the object encourage them to kick their legs. Rescuer then pulls the object until the victim is out of the water and on stable ice.
- **Throw:** If you cannot reach the victim with a probe or similar device, throw them a line. This can include a throw rope, garden hose, jumper cables, or whatever is whatever is near-by and long enough to reach the victim. An empty jerry can that is tied to a rope makes a great buoyant lifeline. If possible, have the victim tie the rope around themselves for ease of pulling them out of the water and to safety.

Physiological effects of cold water:

- **Torso reflex:** Once exposed to cold water your body will experience "torso reflex" or "cold water shock". This automatic physiological reaction causes involuntarily gasping which can last for 1-3 minutes. It is important to remember that this gasping will subside. When falling into cold water with the face unprotected, the sudden urge to breathe deeply in response to torso reflex may cause the person to inhale with the mouth underwater. The person then aspirates water into their lungs. Torso reflex is one of the most common causes of submersion-related fatalities in the ice water environment.
- **Cardiac arrest:** The initial immersion in cold water also causes a sudden constriction of surface blood vessels that then causes an immediate jump in blood pressure and heart rate. If the heart cannot handle this jump, sudden cardiac arrest may occur. This seldom happens in healthy and fit people, but the danger is still there.
- **Dry drowning/Secondary drowning:** Individuals who have been involved in a submersion event (i.e.: their head has gone under water) should always seek treatment at a health center for possible injury to their airway or lungs. Dry Drowning or Secondary Drowning may occur in people who experience near drowning events involving the aspiration of water. The resulting damage to airway or lungs can create serious respiratory emergencies hours after being rescued from the initial event.
- **Hypothermia:** Regardless of the technique used to effect rescue, a victim will require treatment for hypothermia. Hypothermia is one of the leading causes of death in cold water incidents and occurs when your body losses heat faster than it can be produced. Hypothermia occurs when your body temperature drops below 35^{o}C, which can take between 10-45 minutes or longer, depending on



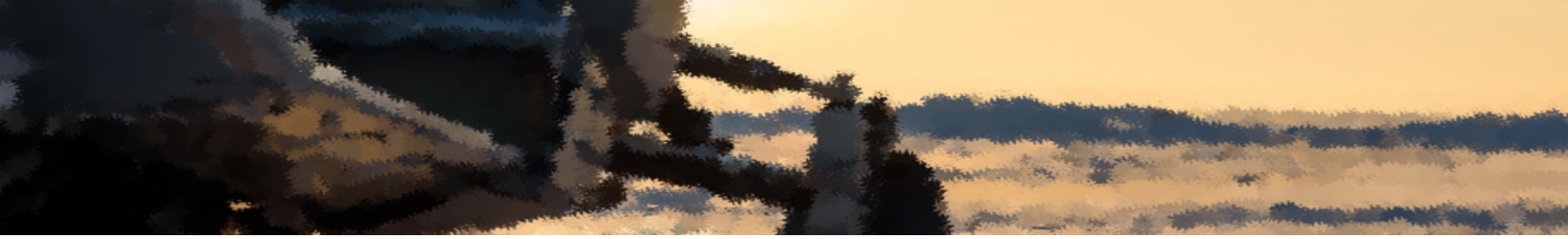
multiple factors such as climate conditions, physical conditions, amount of body fat, and the type of clothing worn. Wearing a floater suit as indicated below protects the person by providing additional buoyancy and thermal protection.

Treating Hypothermia:

Treating hypothermia requires recognizing the signs and taking corrective action. It may also require activating emergency services if the hypothermia is severe. People who are mild to moderately hypothermic will display a variety of signs and symptoms such as: shivering, dizziness, hyperventilation, increased heart rate, confusion, difficulty speaking, clumsiness, and fatigue. Severe hypothermia includes more advanced confusion, poor decision making, lack of coordination, violent shivering (or none at all), slurred speech, incoherent mumbling, weak pulse, shallow breathing, and progressive loss of consciousness.

Moderate and severe hypothermia require immediate treatment and require evacuation to a medical facility. Guidelines regarding care for a hypothermic person:

- Call local emergency services or activate SOS on personal satellite locator (SPOT®, InReach®)
- Get the person into shelter, remove any wet clothing and dry skin. Warm the victim's trunk first as warming the extremities first can lead to shock. Dress the victim in warm dry clothing, if not available wrap them in dry warm blankets. Be aware that rapid rewarming can cause cardiac arrest. If using hot water bottles or chemical hot pads rap the bottle/pad in cloth, do not place directly on the victim's skin.
- Begin CPR if necessary while warming the person, if the victim is not breathing begin CPR immediately as hypothermia can cause respiratory rates to plunge and heart rates can be difficult to detect. Continue CPR until the victim is breathing or emergency services arrive.
- Give the victim warm fluids to drink if conscious and able to swallow, avoiding caffeine and alcohol
- Once the victim's body temperature begins to rise keep them dry and wrapped in a warm blanket, wrap their head and neck as well.



5.0 Post-trip Operations

Post- trip operations are critical to ensuring continued safety of workers and for efficient work on sea ice. Conducting a post-trip inspection of equipment can help identify any defects and needed repairs before your next trip, which eliminates future delays. Documenting and reporting incidents resulting in injury to staff is required per legislation. Requiring that staff document and report near misses is also critical as it creates a culture of safety within the organization and can help predict and prevent future incidents.

5.1 Equipment Inspection and Maintenance Protocols

Equipment in the polar-regions is subjected to some of most extreme weather in the world. As a result, regular equipment inspection and maintenance protocols must be in order to ensure that PPE and rescue equipment are fully operational when needed. There would be nothing more catastrophic than opening up a first aid kit to find that everything inside had gotten wet and had frozen. It makes a bad situation so much worse.

Care and Maintenance of PPE

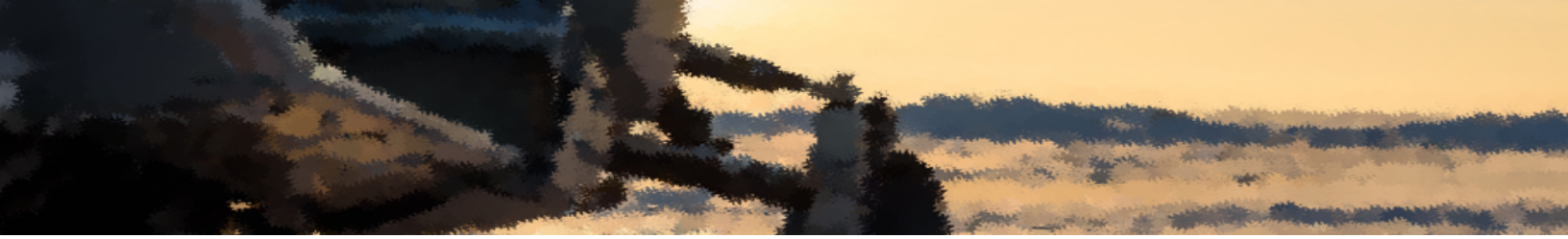
All personal protective and rescue equipment should be thoroughly inspected and tested prior starting a trip and upon return. It is also important that gear be serviced/maintained per manufacturers specifications. Any electronic device that is battery powered should be tested to ensure batteries are functioning properly prior to leaving for work. When not in use, battery powered devices should be stored in a warm area to preserve battery life. Each inspection should be documented in an inspection log that is kept in a conspicuous place, or with the equipment itself. If a piece of equipment is missing or damaged it should be brought to the attention of management immediately. Equipment that has been involved in a near miss or rescue scenario should be thoroughly inspected prior to return to the gear cache.

Any lifesaving device that is beyond its expiry date or is noticeably damaged should be retired and destroyed. Upon completion of a trip, employees should engage in a cleaning and final inspection of all gear, and properly store to reduce damage to items. For example, PFDs should not be stored in direct sunlight and float coats should be thoroughly dried prior to storage to prevent the growth of mould.

See Annex 5 for the Equipment Inspection Form.

5.2 Documenting incidents and near misses

Incident reports are required whenever there is an incident on the ice, or a near miss. It is vital that workers be aware that they are required to complete a report in as much detail as possible, after an event has occurred and when it is safe to do so. Incident reports are also required by regional Occupational Health and Safety Authorities and must be reported. In NWT, NU and NL employers must submit a fully completed incident report within three business days or will incur penalties as listed under the respective acts. Clearly, this is an integral part of any Emergency Management Plan and should be followed diligently. Workers



compensation authorities have their own accident report forms that must be filled out and submitted within the time frame above. These forms should be printed and laminated so that employees can collect the required information as soon as practical after an accident. Organizations may also consider requiring individuals to complete an “in-house” report, detailing and relevant information related to the event. This can then be evaluated by the Safety Officer for further action.

A near miss is defined as an unplanned event that did not result in injury, illness or damage – but had the potential to do so. Although near misses cause no immediate harm, they can predict events in which a loss or injury could occur. Employers that encourage the reporting of near misses gain an opportunity to prevent future incidents. Near misses must be investigated, determine the root cause and implement appropriate controls. When an employer attempts to create a culture that seeks to identify and control hazards, it will reduce risks and the potential for harm. Employee participation in this regard is vital, as they are the ones who experience these events. If possible, allow employees to report near misses anonymously and share the results of investigations with staff once complete.

See Annex 6, Incident Report Form, for an example of an internal incident/near miss report.

6.0 Case Study Analysis

Case Study 1:

A cargo run on the ice of western Hudson Bay in Nunavut ended in tragedy, with three men dead after their large snow machine fell through sea ice. On Jan. 21 at about 8:30 a.m., the Whale Cove RCMP received a call that a large snow machine, with four occupants, had fallen through the ice. The type of machine the men were using was a large vehicle with tracks, skis and enclosed cab, often marketed under the name “snow cat” or “snow bus.” The RCMP’s investigation revealed that the four men, aged 27 to 55, were travelling on the sea ice from Rankin Inlet to Arviat, when their Bombardier fell through the ice near Whale Cove. Ice was late to form that winter in Hudson Bay with ice in November at roughly 40 per cent of its usual extent, according to the Canadian Ice Service. One man survived, another man was confirmed deceased at the scene, and two others were presumed deceased and have not been located.

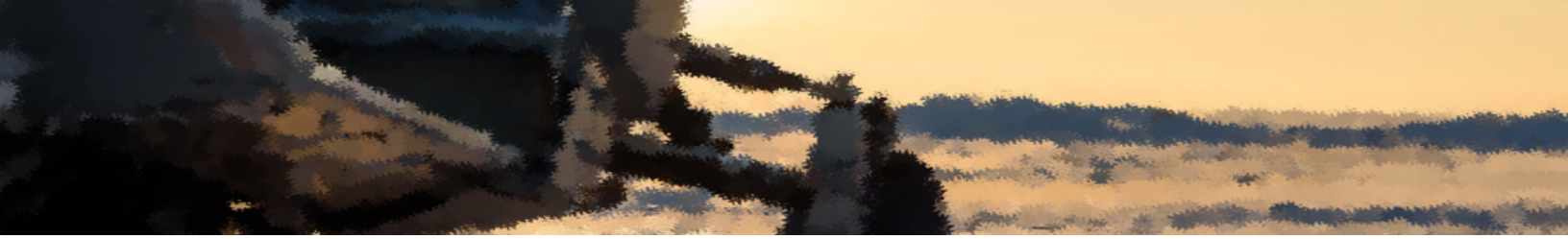
Case Study 2:

A hunter from Pond Inlet, Nunavut survives after his snowmobile fell through thin ice, plunging him into frigid water and forcing him to walk five hours back to town in wet clothes in below-freezing temperatures. The man was hunting several kilometres from the community when thin ice beneath him suddenly gave way, submerging the hunter and his snowmobile in the water below. "I brought all the necessary emergency supplies, such as a SPOT device and a flashlight. My CB radio went down with the snowmobile." At the time, the temperature was about –26 C.

The hunter tried to use his locating device without success. "I may not have pressed it long enough," he stated. "I also fired several flares, but they weren't seen”. So, the man started walking — and continued walking for about five hours. Eventually, another hunter spotted him and drove him the rest of the way home.

Analysis:

Analysis of the two cases presented above confirms the unpredictability of ice conditions, and how misjudgement can occur even among experienced hunters. Despite extremely cold air temperatures, ice can still be dangerously thin in areas where environmental influences such as current or land features affect the integrity of ice. Ice can fail on traditional routes due to overloading and variations in seasonal freeze/thaw cycles. It is also clear that having the recommended safety gear without the appropriate training can result in



tragic outcomes. Developing and implementing SOGs for workers accessing sea ice is fundamental in reducing incidents such as those above. To mitigate risk even further, employers must train their staff and equip them with the requisite tools to effect rescue should an accident occur.

7.0 Legislative requirements pertaining to working on ice

A broad survey of Occupational Health and Safety legislation across Canada regarding guidelines for safe work practices on sea ice was initiated at the inception of this project. There is little distinction in the statutes and literature between workers exposed to fresh water, or land ice, and those exposed to sea ice. Despite the inherent differences between the two, individuals who are exposed to ice covered water take a risk. When working on ice extreme caution must be used at all times, and additional safety measures should be taken to prevent subjects from entering the water. Federal, territorial and provincial statutes address worker's rights when accessing ice covered water, but again are non-specific to the type of ice accessed.

7.1 Federal guidelines: Canadian Center for Occupational Health and Safety (2005)

To protect the health and safety of employees working on ice-covered water, employers must:

- identify and assess hazards associated with working on ice-covered water
- implement adequate control measures to address the assessed hazards
- develop safety procedures for working and operating equipment safely on ice-covered water
- implement emergency and rescue procedures
- train employees adequately.

7.2 Provincial/Territorial Legislation: Newfoundland and Labrador

Occupational Health and Safety Act, 27(1, 2) (2009)

Travel over and work on ice

27. (1) where a worker is to travel over or work on ice and the water beneath the ice is more than one metre deep at any point, the employer of the worker shall ensure the ice supports the load to be placed on it.

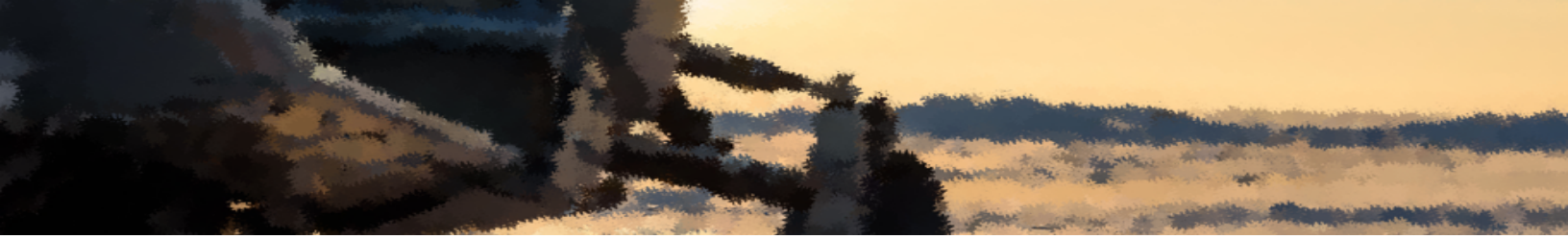
(2) The employer shall test the ice for the purpose of subsection (1)

a) before work begins; and
b) as often during the work as necessary to ensure the safety of the workers.

Occupational Health and Safety Division: General Health and Safety Requirements (2014)

Travel over and work on ice:

It is the responsibility of the employer to identify the water depth at any given location where workers may be traveling or working. Be sure to measure clear hard ice in several places. It is in the best interest of the



employer to record these depths and ice thicknesses for comparison throughout the intended period of work.

Recommended minimum ice thicknesses are as follows:

- 3" (7.5 cm) or less – do not access ice.
- 4" (10 cm) - ice fishing, walking
- 5" (12.5 cm) - one vehicle - snowmobile or ATV,
- 8-12" (20-30 cm) - one vehicle - car or small pick-up, and
- 12-15" (30-38 cm) - one vehicle - medium truck

The quality of ice, or type of ice, must be evaluated before accessing it. Clear, hard, new ice is the only kind of ice recommended for travel or work. Workers should avoid:

- slushy ice
- ice on or near moving water (i.e., rivers, currents)
- ice that has thawed and refrozen, and
- layered or "rotten" ice caused by sudden temperature changes.

Other factors that weaken or "rot" ice:

- snow on ice that acts as a blanket to prevent hardening of ice
- pressure ridges due to wind or current pressure.

7.3 Provincial/Territorial Legislation: Nunavut and Northwest Territories

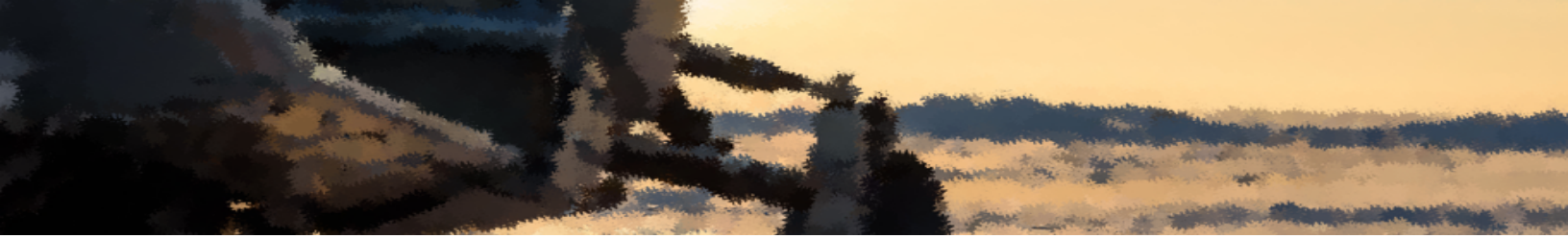
Work if Visibility Restricted Safety Act. 31(1); Work on Ice Over Water Safety Act. 32(1, 2, 3) (2015)

31(1) If visibility in an area at a work site is restricted by smoke, steam or another substance to the extent that a worker is endangered, an employer shall not require or permit the worker to work in that area unless the employer provides the worker with an effective means of communication with another worker who is readily available to provide assistance in an emergency.

32(1) This section does not apply to:

a) highways built and maintained by the Department of Transportation; or
b) roads that are built and maintained to an approved standard.

(2) Before a worker is required or permitted to work or travel on ice that is over water or over other material into which a worker could sink more than 1m, an employer shall have the ice tested to ensure that the ice will support the load that the work or travel will place on the ice.

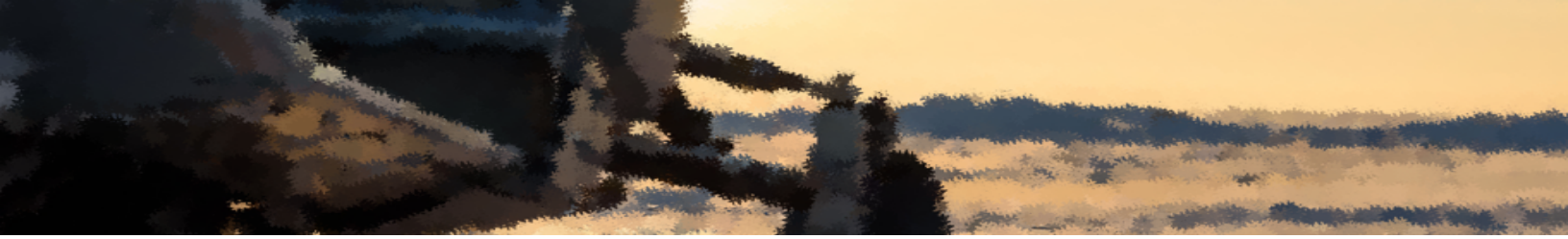


(3) The requirement of subsection (2) may be waived by the Chief Safety Officer if an employer or worker satisfies the Chief Safety Officer that other measures have been taken to eliminate or reduce the risk to the worker should the ice fail to support the load

The recommendations pertaining to ice thickness detailed in the statutes and literature above are NOT specific to sea ice, but are applicable only to static, freshwater bodies of water. A more conservative model should be considered when exposing individuals to sea ice environments. Sea ice guidelines are presented below.

7.4 Capacity of sea ice to support a load:

- 12 cm (4.7 inches) - the recommended minimum thickness for a person on foot
- 30 cm (12 inches) – the recommended minimum thickness for parties travelling by snowmobile



Glossary

Estuary: Estuaries form a transition zone between river environments and maritime environments. They are subject both to marine influences—such as tides, waves, and the influx of saline water

Polynia: a semi-permanent area of open water in sea ice. Polynyas are generally believed to be of two types. Coastal polynyas characteristically lie just beyond landfast ice. They are thought to be caused chiefly by persistent local offshore winds. Open-ocean polynyas, the larger and longer-lasting of the two types, form within the ice cover and are believed to be caused by the upwelling of deep warmer water.

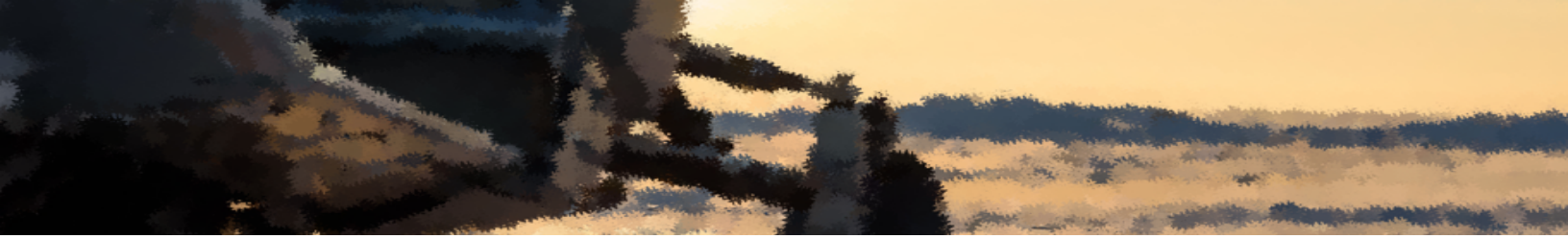
New ice: A term used to describe newly formed, thin ice (< 10 cm thick). New ice types include frazil, nilas, slush, pancake, and grease ice.

Young ice: Young ice has been defined as ice that is thicker than nilas or frazil, yet thinner than mature first year ice. Young ice is independent of type, solely dependent on thickness. To be considered young ice, the sea ice thickness must be between 10 and 30 cm. Young ice may be divided into two categories based on optical properties.

Landfast Ice: Once the land has frozen, and the sea ice has extended outwards from the shoreline, it begins to form solid ice cover over the ocean. ***Siku***, the general Inuktitut term for sea ice, is used once the ice is thick enough to travel on, and it is solidly attached to land and is no longer moving. Inlets and bays are where the ice usually begins to form, but islands or reefs can also help to anchor the ice as it freezes and thickens. Once it becomes land-locked for the winter, it is referred to as ***tuvaq***, and is really then an extension of the land, over the sea. Therefore, it is landfast ice that is most often used for sea ice travel, to access inland or sea ice hunting destinations, camps, or neighbouring communities.

Moving or Multi-year Ice: Moving ice is floating ice within open water, whereas multi-year ice is old ice (i.e. more than two years old, that does not melt through the summer) that has usually drifted from further north following the ocean currents. Around some communities, multi-year ice floes are seen throughout the summer. These have the effect of lowering the water temperature, often meaning that freeze-up will start earlier than if they were not present. Multi-year ice during the summer can also have the effect of minimizing wave action, and so as long as they are not too close together, this kind of ice is welcomed as helpful for ensuring calmer waters for boat travel.

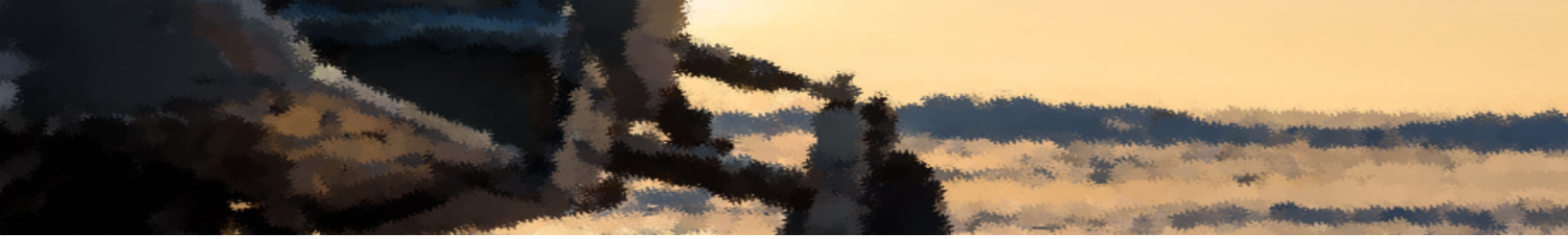
Tidal cracks: Tidal cracks are cracks that form in the ice due to the influence of daily and monthly tidal stages, as influenced by the phases of the moon. There are several different kinds of tidal cracks that are described in each community.



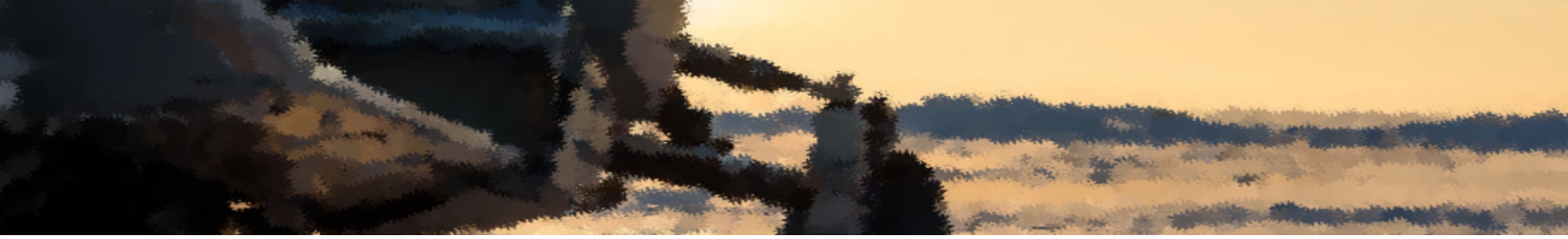
Annex 1: Ice-Cover Inspection Form

Instructions for use: This form is to be filled out when completing an assessment of current weather and visibility in an area where work is to be completed. It is part of the Hazard Identification, Assessment and Mitigation protocol and is done during field operations. Workers should ensure that all fields are completed as accurately as possible, with any concerns noted in the additional comments section. The document is submitted per operational requirements.

Date:	Location:	Temp: ^{0}C
Completed By:		
Workers Present:		
Weather Conditions: Wind Rain Snow Calm		
Additional Comments:		
Visibility Factors: Clear Fog Light Dark		



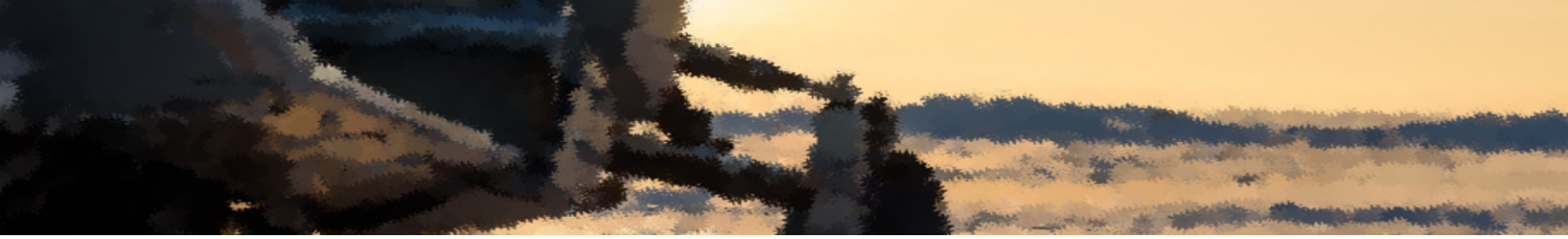
Additional Comments:



Annex 2: Ice Data Form

Instructions for use: This form is to be filled out when completing an assessment of current ice conditions in an area where work is to be completed. It is part of the Hazard Identification, Assessment and Mitigation protocol and is done during field operations. Workers should ensure that all fields are complete as accurately as possible and that the document is submitted per operational requirements.

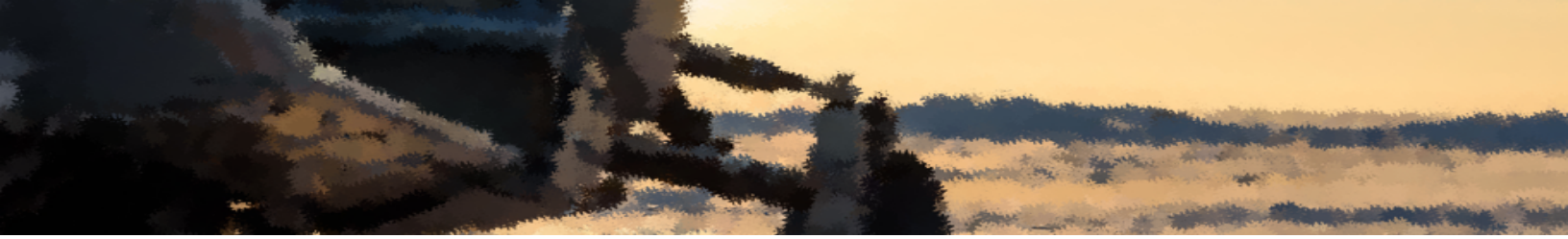
<table>
<tr><td colspan="3">Snow cover: cm</td></tr>
<tr><td colspan="3">Ice Colour and Cracks/Features of Concern:</td></tr>
<tr><td colspan="3">List Potential Problems Developing on Ice:</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td>Names of People Notified:</td><td colspan="2">Time: AM/PM</td></tr>
<tr><td rowspan="6"></td><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
</table>



Annex 3: Ice Measurement Data Form

Instructions for use: This form is to be filled out when completing an assessment of current ice thickness in an area where work is to be completed. It is part of the Hazard Identification, Assessment and Mitigation protocol and is done during field operations. Workers should ensure that all fields are complete as accurately as possible and that the document is submitted per operational requirements.

Hole Distances are measured from (circle): East/West North/South	
Test Hole #	Ice Depth



Annex 4: Trip Plan and Itinerary

Instructions for use: This form is to be filled out when planning a trip into the ice field. It is part of the Pre-Trip Planning protocol and is done prior to accessing the ice field. Workers must ensure that all fields are completed accurately and that the document is given to at least two (2) reliable members of the community, ideally those who are involved in the emergency response process. Workers may use additional paper if required.

Contact Information of Itinerary Holders

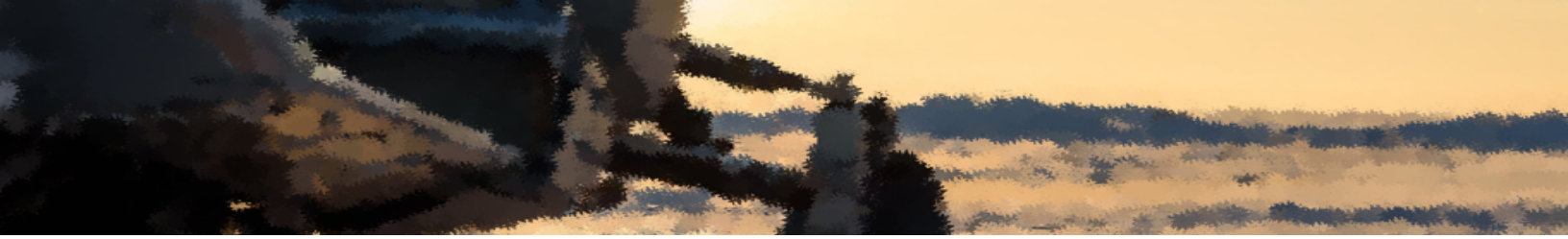
Name	Physical Address	Telephone Number

Emergency Contact Information

Search and Rescue	
Coast Guard	
Police	
Fire Department/EMS	

Participant Information – Use additional paper and attach to form if needed

Name	Address (Home Community)	Emergency Contact (phone/cell)	Pre-existing Medical Condition(s). Medications

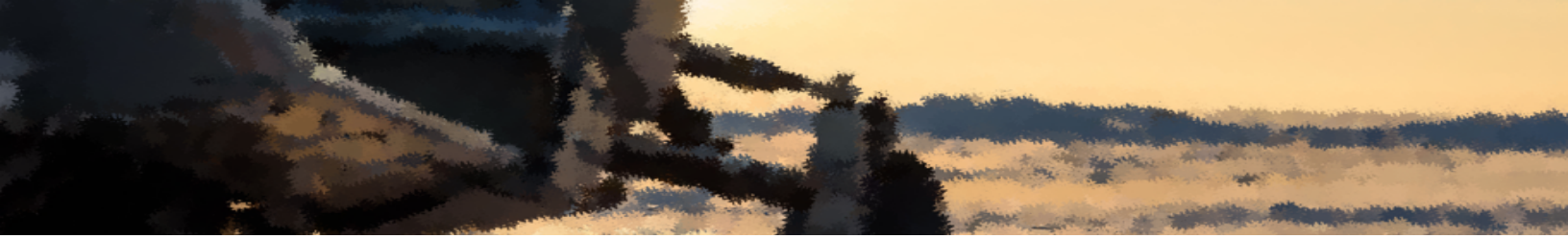


Trip information

Departure date/time	
Date/time of arrival to destination	
Planned return date/time	
Actual return date/time	

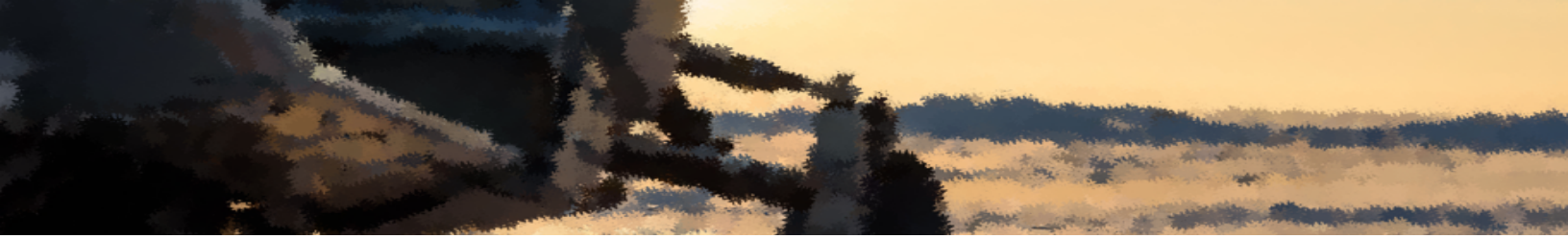
Vehicle description(s) including vehicle location (if leaving unattended during trip)

(i.e.: 2012 Ski-Doo ACE 600; black with red decals)



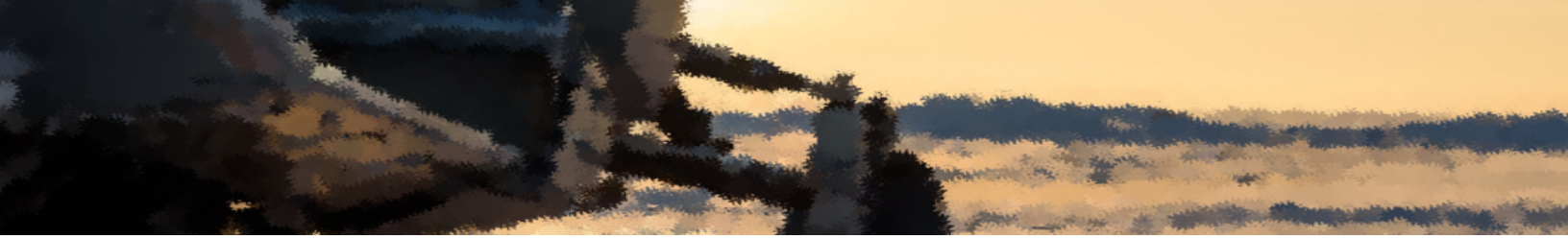
Location of destination, description of routes, location of base camps

(attach map/coordinates to form if possible)



Planned deviations from normal route

Equipment taken by group



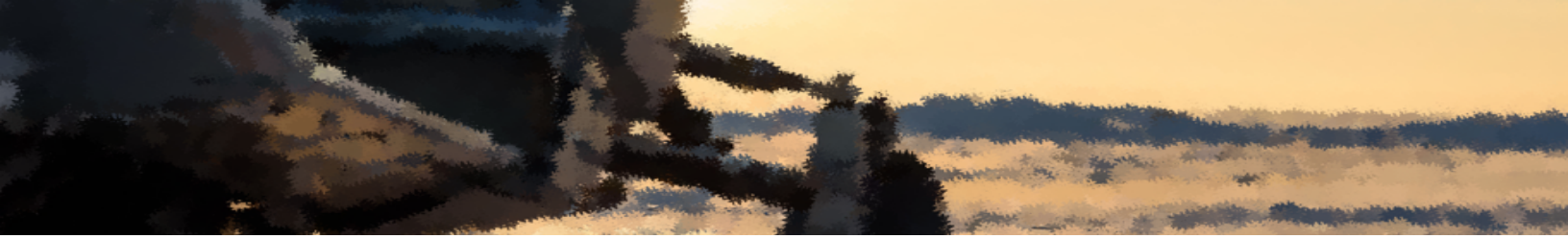
Additional Notes (Known danger zones; current ice or weather conditions)

Annex 5: Equipment Inspection Form:

Instructions for use: This form is to be filled out on a scheduled basis to ensure the functionality of all equipment. It is part of the overall SEMP and is performed every 30-days, or as recommended by the specific equipment manufacturer. Workers must ensure that all fields are completed accurately and that the document is filed in an inspection log. This log should be in a conspicuous place. Please note that ALL equipment should also be inspected by the user prior to and after engaging in work on ice covers. A form is not required in these instances.

Equipment Inspection Form	
Certificate of Inspection: (name of equipment)	
Company:	
Contact:	
Inspection Date:	Inspected By:
Next Scheduled Inspection Date:	Inspectors Signature:
Use additional paper if needed and attach to this form.	

Item Description	Manufacturer	Model Number	Serial Number	MFG Date	Defect Notes	Pass / Fail



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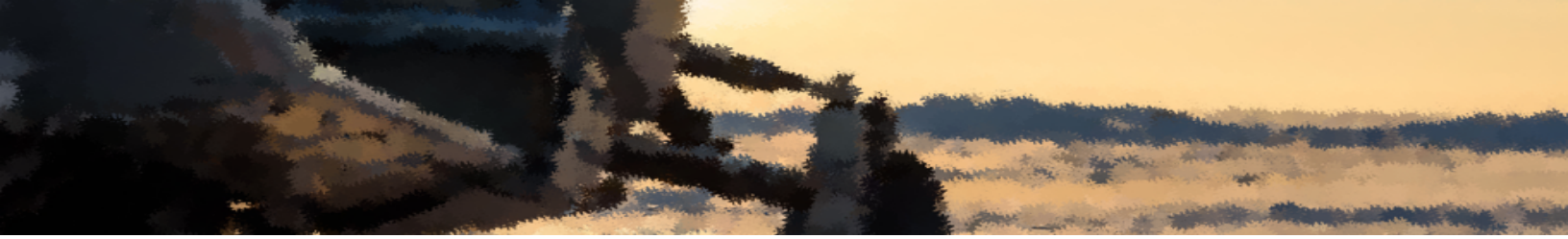
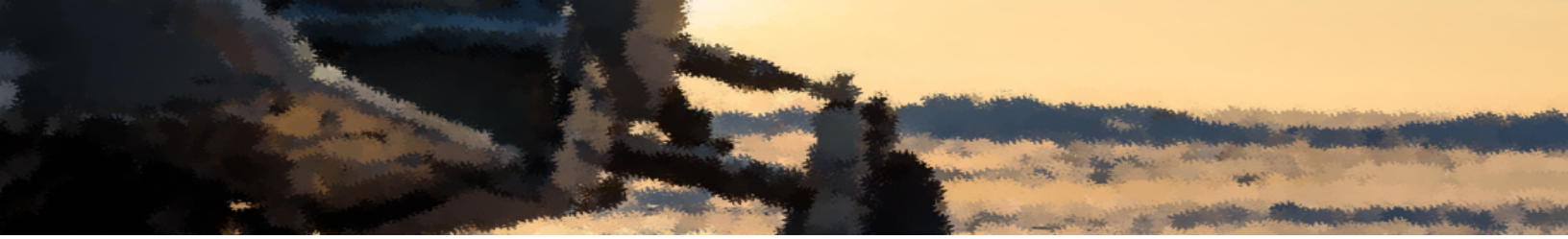




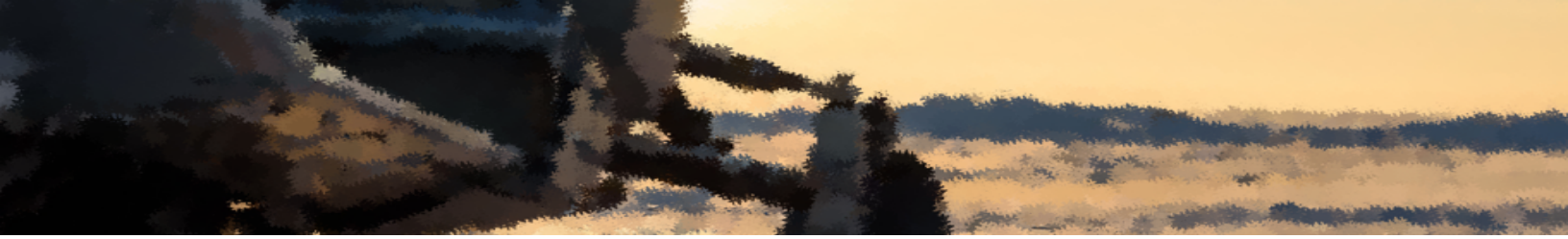
Annex 6: Incident Report Form

Instructions for use: Completion of this form is part of the Post-Trip Planning protocol and is done after return from the ice field. Workers must ensure that all fields are completed accurately and that the document is given to senior management or to the company safety officer for further action. Refer to 5.2: Documenting Incidents and Near Misses.

<table>
<tr><td colspan="3">Reported By:</td><td colspan="3">Department:</td></tr>
<tr><td colspan="3">Email:</td><td colspan="3">Phone:</td></tr>
<tr><td colspan="3">Date of Incident:</td><td colspan="3">Time of Occurrence:</td></tr>
<tr><td colspan="6">Exact Location:</td></tr>
<tr><td colspan="6">Check One That Applies:</td></tr>
<tr><td>Accident ☐</td><td>Incident ☐</td><td>Near Miss ☐</td><td>Violence ☐</td><td>Ill Health ☐</td><td>Safety ☐</td></tr>
<tr><td colspan="6">What happened? Include any details that may have contributed to the incident.

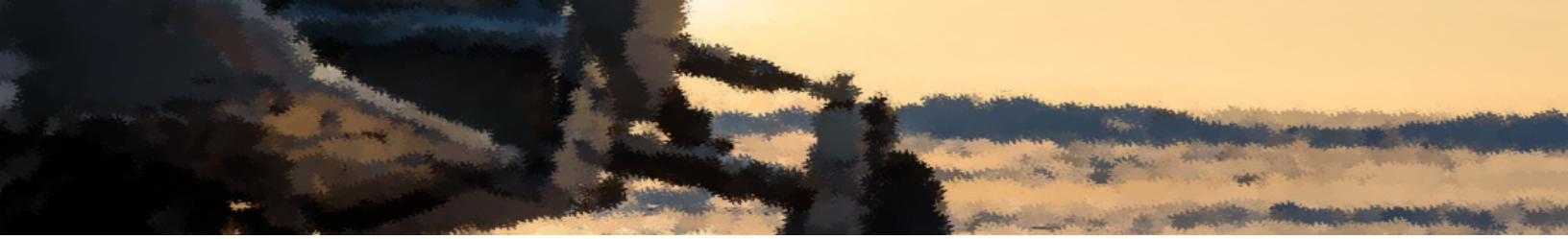
(use additional paper if needed and attach to the form)</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td colspan="6">The Outcome Harm/Health Effects/Damage

(use additional paper if needed and attach to the form)</td></tr>
</table>

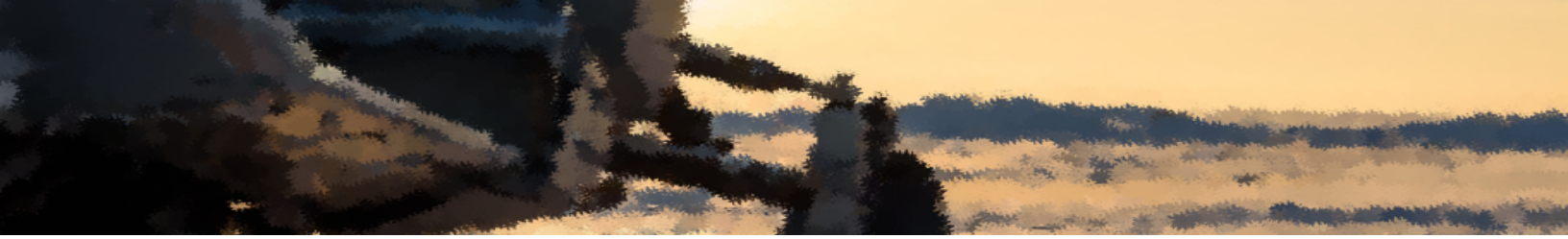


Describe corrective measures taken to address immediate hazards related to the incident. (use additional paper if needed and attach to form)
The Affected Person

Worker Title:	Name:

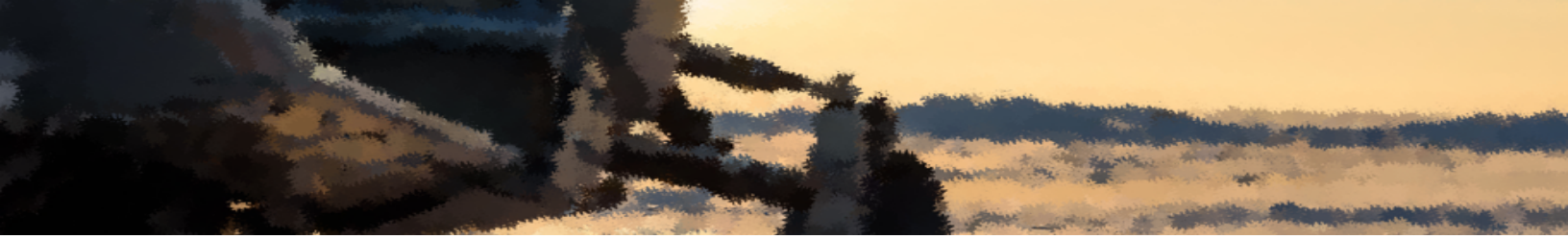


Other (i.e. visitor/contractor):			
Address:		Date of Birth	
Email-Home		Phone-Home	
Email-Work		Email-Work	
Employers name if other than worker:	Address:	Phone:	
Witness Details:			
Name/Contact Information:			
First Aid			
Was First Aid Provided:	Yes ☐	No ☐	N/A ☐
By Whom: Contact Information:		Time of Attendance:	



Details of First Aid Treatment:			
Post Incident			
Where did the person involved in the incident go next?			
Home	Hospital	Returned to Work	Other
Was a member of the Health and Safety Committee notified?	Yes ☐	No ☐	
Name:		Contact Information:	

Additional Notes:



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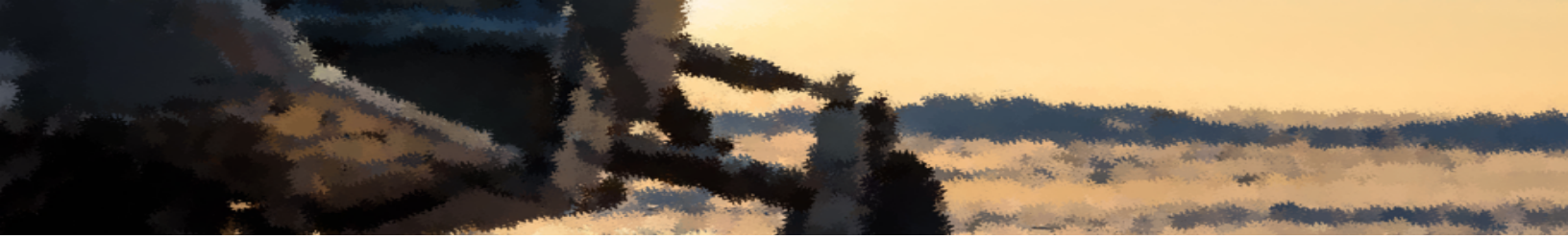

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