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HEALYINST 16170.1
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USCGC HEALY INSTRUCTION 16170.1

Subj: CGC HEALY ON-ICE OPERATIONS PLAN

Ref: (a) Boat Crew Seamanship Manual, COMDTINST M16114.5(series)
(b) CGC HEALY Polar Bear Interaction Program, HEALYINST 16151.1
(c) Manual of Ice Seamanship, H.O. Pub. No. 551

1. PURPOSE. This instruction defines CGC HEALY's on-ice operations plan. It provides a systematic process for the evaluation and continuous re-assessment of risks of on-ice activities. It also provides the policy for personnel protection equipment and practices while on the ice.

2. ACTION. This instruction is intended for CGC HEALY crewmembers supporting on-ice deployments, Chief Scientists, and Principle Investigators deploying personnel to the ice.

a. The decision to deploy people to the ice is made by the Commanding Officer. A risk assessment and operations briefing will be conducted by all those personnel leading the on-ice activities. A mission briefing should be attended by all persons going to the ice and supporting the deployment. A re-assessment of both the risks and operations will conducted if the activities change.

b. The bridge watch, deck personnel, and everyone on the ice are responsible for monitoring the situation during the entire operation and communicating changes that influence the risks of the activities. Boredom or fixation on a task may lead to a dangerous situation.

c. Internet release authorized.

3. BACKGROUND. On-ice operations entail putting people (crew and embarked passengers) onto sea ice. This can be done using the cutter's boats; a personnel basket via crane; by portable brow; by primary brow or gangway from the quarterdeck; or by helicopters. The primary activities while on the ice are science, logistics, and training. A secondary activity is morale and recreation. Both are the primary and secondary activities are desired activities – they are not required activities; therefore, the potential gains from being on the ice must be balanced with the risks involved. Search and Rescue (SAR), Law Enforcement, Marine Environmental Protection, and the other traditional Coast Guard missions are not covered by this plan but the general concepts of this instruction do apply and should be used in managing risk.

4. DISCUSSION. In general some of the risks associated with going to the ice can be evaluated from the cutter, more become better known during an initial assessment once on the ice, and others require close observations of the environment over a few hours. The risk management approach is to begin operations with a conservative posture using greater safety practices and

equipment. Any subsequent relaxing the safety requirements must be supported by evidence of lower risk. Using more experienced persons from the science party to assist in the analysis of risk is encouraged.

a. On-ice operations expose personnel to many hazards. Persons may be injured simply reaching the ice on a steep brow. Persons may be exposed to sea water by falling in a crack or breaking through thin ice. Ice blindness, frostbite, hypothermia are all dangers even if ice is stable and thick. Tools used for assessing ice conditions or scientific work may become cutting hazards, dislocate joints, or break bones (e.g. drills, augers, chisels, saws, knives, etc.). The cutter may be unable to maintain station along an ice floe leaving people stranded. The ice floe may break apart and strand people from the cutter, helicopter, or boat. Ice movement may cause the floe to submerge or crumple causing an unsafe condition. Persons may be injured by slips, trips, and falls due to the ice or by snow covered air pockets.

b. There are basic prerequisites prior to considering putting people onto the ice. For deployments using a brow or basket, the cutter must be able to maintain position alongside or in an ice floe. The forecasted weather must allow Visible Meteorological Conditions (VMC) throughout the operational period when using a helicopter. The ice concentration for boat operations must not put the boat at risk for being beset by ice.

c. Many of the risks cannot be assessed prior to being on the ice and other risks, like the movement of ice and the tendency of the weather, can only be validated by close observation over time. Therefore, only those persons directly connected to completing mission related work, safety, and mission support are authorized onto the ice initially.

d. Re-assessment of the ice begins when the first person is put to the ice and continuously thereafter. With more information about the ice and the environment after a period of time, a revised risk assessment can be made to reduce or stop the activities, begin new activities, or change the requirements for persons on the ice.

e. The above discussion does not address activities near ice floe edges. Activities near an ice floe edge may be more hazardous and require special attention and a separate risk assessment than the typical on-ice activities.

f. This plan does not address periods of darkness or ice affected by sea swells – these conditions should be avoided.

g. Alcohol consumption is not permitted on the ice.

h. Recreational swimming (i.e. Polar Bear Plunges) is never permitted from the ice.

5. DIRECTIVES AFFECTED. None.

6. RISK EVALUATION AND OPTIONS. The following policies should be used in planning and preparing for operations. Situations not covered should be addressed to the command in ample time to analyze and mitigate risks.

a. A risk assessment is required prior to every on-ice activity. Continuous evaluation of the risks during the activity based upon new and changing information should be stressed during operational briefings.

b. A new risk assessment is required when on-ice activities change, including modification of ongoing activities such as additional science or new activities like general recreation.

c. Options that mitigate risks must always be considered, including shortening or delaying the event, restricting the area or moving to a new location, reducing the number of people involved, selecting an alternative deployment method, reducing the goals for the activity, etc.

7. ASSIGNMENTS. All crew members on the bridge watch, working on deck, and deployed to the ice are responsible for looking out for unsafe conditions and communicating hazards to crew members supporting the activity. Likewise, the embarked science party is responsible for following safety practices set by the command and looking out for risks during their work. The command is inescapably responsible for the safety of autonomous groups; that is, any group deployed beyond the immediate vicinity of the cutter. Thus, a thorough review of operational plans for autonomous groups, including assignments of personnel will be addressed as part of the planning and risk assessment on a specific event basis.

a. The specific duties of the bear watch are provided in reference (b).

b. Rescue Swimmer and Swimmer Tender. The Rescue Swimmer and Swimmer Tender, along with the Bear Watch, will generally always be the first persons to, and the last from, the ice. Once on the ice, the swimmer and tender will make a quick initial assessment of ice conditions near the on-ice deployment point. From there, a brief expanding area search for hazards will be made. An experienced member of the group from the embarked passengers or crew may participate in this assessment. Once it is determined safe for mission related activities, the swimmer and tender may assist in getting personnel and equipment to the ice, and likewise from the ice at the conclusion of the operation. However, if the tender is also the Bear Watch, then that person must not be distracted from their primary duty of scanning for Polar Bears. During the initial assessment and throughout the operational period, the swimmer and tender will use the tactics provided in Enclosure (3) to continually re-assess the ice.

c. Bridge Watch. The bridge watch is responsible for accounting for personnel on the ice, scanning the operations area for hazards, and closely monitoring the cutter's position within or alongside the ice floe. Marking the cutter's position in some way to detect creep in position is encouraged. The bridge watch should periodically review actions needed in case a person falling into the water, loss of propulsion, loss of visibility or communications, and break up of the ice floe.

d. Deck Division. Personnel in the Deck Division are responsible for the safe preparation, direction, and securing of the means to deploy and recover personnel onto the ice (by boat, personnel basket, helicopter, or brow). Deck personnel will assist lowering and raising science and support equipment to the ice. When a brow is used, a crewmember will be stationed at the gangway to communicate to the bridge the arrival and departure of personnel to the ice.

Accountability for people on-ice will be by name for small groups and by numbers of person in all-hands events. A complete crew muster will follow all-hands events.

e. Engineering Watch. The bridge watch must inform the engineering watch when there is an on-ice deployment and subsequent limitations on maintenance and training. While not specifically a restricted maneuvering situation, on-ice deployments from the cutter require uninterrupted power to the propulsion motors.

8. TRAINING. All action groups listed previously shall periodically review this instruction. Chief Scientists of science missions should review and provide to the Principle Investigators (PIs) who desire to have work done on the ice. All personnel must receive a safety training relating to this instruction before going to the ice for any reason. Deck division will ensure training is provided to on-ice support personnel on the use of on-ice equipment (e.g. hazards, ice pole, chisel, auger, flag markers, etc.)

9. EQUIPMENT. The minimum equipment for persons going onto the ice is discussed below. Personnel Protective Equipment (PPE) and other required tools for rescue swimmers are listed in reference (a). Other equipment used by the bear watch is addressed in reference (b). Autonomous groups deploying from CGC HEALY are required to have the following equipment. Relaxing of PPE requirements during an on-ice operation is authorized by the Commanding or Executive Officer, and should coincide with a re-assessment of the operational risks.

a. Additional equipment used by Coast Guard safety personnel on the ice include a shovel, ice poles, and a hand-auger or ice chisel.

b. Minimum PPE for helicopter pilot and passengers not working on the ice include anti-exposure coveralls, and suitable cold weather exposure under and outer garments. Dry suits are strongly encouraged.

c. Minimum PPE for mission related activities (see Figure 1.) is a dry suit outer shell. The ship provides a limited number of dry suits for use by science passengers. The wearer of Coast Guard supplied dry suit outer shells shall provide thermal undergarments appropriate for the water, air, and wind chill temperatures.

d. Special consideration is needed with regard to minimum PPE requirements for recreation on the ice. If on-ice recreation is to be allowed, specific guidelines will be established during the planning and risk assessment for required PPE, taking into consideration air temperature, wind, size and thickness of the ice floe, etc. As a general rule, anti-exposure coveralls are recommended as the minimum PPE for recreation on the ice.

e. Boat crew helmets are required for all persons deploying to the ice via the personnel basket while in the vicinity of the basket and area where gear is craned to the ice.

f. Handheld radios must be carried by groups operating beyond the immediate vicinity of the cutter, boat, or helicopter. This possibly includes a handheld radio for each group near the cutter but separated by distances as short as a ship length, and groups deployed from the boat to

the ice. Signal flares and a personal locator beacon and handheld satellite phone should also be considered for autonomous groups. A communications schedule must be prepared prior to deployment.

g. The boat shall be equipped with grapnel hooks and sufficient line to enable mooring to an ice floe.

10. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS. Environmental considerations were examined in the development of this Instruction and have been determined not to be applicable.

11. FORMS/REPORTS. A locally generated basic mission planning form must be used to plan and evaluate the risks for every deployment to the ice. A sample form is included as Enclosure (1). Enclosure (2) should be used to evaluate specific environmental risks within the GAR assessment of the basic mission planning form.

F. J. Sommer, CAPT

Enclosures: (1) Sample On-Ice Basic Mission Planning Form
(2) On-Ice Risk Assessment Tool
(3) Tactics for Re-Assessment of Ice Conditions

CGC HEALY (WAGB 20) (Rev. 11-07)	**Basic Mission Planning Form**	
Mission title	HLY-09-01 On-Ice Deployment	
Dates and times (normally 3-4 hours)		
Location		
Communications Frequencies, channels, call-ins, schedule, station IDs	All stations will use channel 81A. The OOD will check in with CG "Bear Watch" every 15 minutes.	
Environment Wind, sea, swell, temperatures, precipitation, visibility, tides, currents, sunrise/sunset, etc.	(see attached)	
Assignments (cross out if not participating)	**Science Party** **Coast Guard** Deck Supervisor: Brow Watch: Rescue Swimmer: Swimmer Tender: CG Bear Watch: Other:	
Protective equipment and practices	Personnel will be dressed in MSD-900/901s with appropriate undergarments for the environmental conditions. Swimmer Tender and CG Bear Watch will be dressed in MSD-900/901s. The Swimmer Tender will be carrying the tending line and the swimmer's float. The Bear Watch will carry an appropriate weapon. Rescue Swimmer will be wearing an Ice Commander drysuit and will be carrying mask, snorkel and fins. All personnel will wear boat crew helmets during transit to the ice (if using the personnel basket)	

1. Define the mission What is the sequence of steps? What steps are simultaneous (or occur in parallel)? What do we have to do, and when do we have to do it? Are there other ways to do this?	A. Prior to on-ice briefing. Crane(s) will be warmed and exercised. Lifting straps and tending lines will be rigged. Brow will be made ready to lift. B. On-ice briefing. A brief will be held prior to all on-ice activities either on the bridge or in the aviation workshop. C. Weapons & pyrotechnics breakout. Following the on-ice briefing, any weapons or pyrotechnics will be issued. D. Deck division will prepare the crane and equipment for putting people and equipment to the ice. Science and Coast Guard personnel will put on their protective equipment. Dry suits (MSD-900s) are provided in the hangar. E.1. Personnel Basket Deployment: 1. All personnel and gear will be staged in the hangar. 2. The Deck Supervisor (as briefed above) will direct the loading, unloading and movement. 3. The first and last people on the ice will be the CG Bear Watch, Swimmer and Swimmer tender. 4. The order other people and gear are sent to the ice will be determined by the chief scientist or an assigned representative in the science party. E.2. Ice Brow Deployment 1. The ice brow will be attached on the forecastle (01 Deck) 2. The forecastle area must remain clear until the brow is in place 3. Personnel should dress out in the hangar. 4. Small gear can be staged just aft of the brow in the aircastle (the covered area of the 01 deck) just aft of the forecastle. Transit space must be left. Larger gear will be staged on the flight deck for transport by crane to the ice. (Cross out if not using crane to transport gear) 5. The first and last people on the ice will be the CG Bear Watch, Swimmer and Swimmer tender. F. Once on the ice, the CG personnel will evaluate the deployment location. Once determined safe, they will probe the operation area with and ice pole (or chisel) and test suspect areas with an auger (to a maximum depth of 18”) G. Once the brow is declared open, science personnel will be free to transit to and from the ice with their gear.

H. All personnel will check in/out with the brow watch who will keep the OOD informed of the numbers of scientists, media personnel and Coast Guard Members on the ice.

Note: Personnel must have a work related reason to be on the ice.

Note: On-ice science party will be confined to an area generally forward of the brow and to one side of the bow within 150 yards of the cutter. All work will be performed on one side of the vessel, and never under the flare of the bow. All science party members shall be visible to the Bear Watch and Rescue Swimmer.

Note: Meals are not 'saved' for the entire on-ice group. Individual group are required to call the Galley and reserve 'saved' meals by name of the individual.

2. Identify hazards
What can go wrong?

3. Assess risks
What is the potential impact of the hazards (severity)?

What is the likelihood of the hazards (probability)?

How many times will the hazard be faced (exposure)?

What can go wrong?	Severity	Probability	Exposure
Someone Falls in the Water	Major	Remote	Below Average
Scientific Equipment Malfunction	Minimal	Likely	Average
Bear Arrives in the Area	Significant	Unlikely	Below Average
Exposure to Extreme Cold	Significant	50-50	Average
Loss of Visibility	Minimal	50-50	Below Average
Loss of Radio Communications	Significant	Remote	Average
Somewhat gets injured	Varies	Probable	Average

4. Identify options
Can the hazards (2.) or risks (3.) be reduced?

Can someone else do this (transferring)?

Can this be canceled or delayed (avoiding)?

Can we spread this evolution out?

The above list is not meant to be all inclusive. Please bring up any important hazards you believe have not been discussed.

1. If someone falls in the water, work will stop and the victim will be recovered by the CG Rescue swimmer. Once the victim is stable on the ship, the possibility of continuing work will be reevaluated.

2. If equipment malfunctions, affected scientists may return to the ship to attempt repairs or to get replacement gear. Delays due to equipment malfunction may lead to accomplishing less than planed at a particular station.

3. If a bear arrives in the area, word will be passed over the radio. The ship's horn will also serve as a signal for a bear sighting – the collision alarm will be the backup if the ship's horn is inoperative. All personnel will return to the ship, equipment will be left on the ice. The retreat will be covered by the bear watches. The bear watches will be the last people to return to the ship. Once the bear clears the area, personnel will be allowed to return to the ice with CO permission. If the bear gets close during the retreat, non-lethal deterrence will be attempted before resorting to lethal deterrence.

	4. All personnel are to dress appropriately before transiting to the ice. Layers and the minimization of exposed skin will be the guiding principles. Should symptoms of hypothermia or frostbite develop the victim will cut off work and return to the ship for treatment. 5. In the event of a personal injury, the name and type of injury will be communicated over the radio to the bridge. The bridge will contact medical response personnel as appropriate. Depending upon the nature of the injury and the location of the injured person, the disposition of the patient and the number and type of personnel responding will be directed by medical staff. That direction will be passed back to the on-ice party.

5. Evaluate the GAR Risk Assessment

Element	0 – 10	Description
Supervision		How qualified is the supervisor? Is the supervisor distracted by performing some of the evolution or by other evolutions?
Planning		How much information is available, how clear it is, and how much time is available to plan the evolution or evaluate the situation?
Crew selection		How experienced are the persons performing the specific event or evolution? Are they capable? Will individuals be replaced during the event or evolution; if so, what is the new team members' experience?
Crew fitness		What are the team members' physical and mental states, including how much rest they have had (length and quality), and external physical or mental stressors? Is there complacency?
Environment		What factors are affecting personnel, unit, or resource performance, including time of day, lighting, temperature, precipitation, sea state, chemical hazards, and proximity to other external and geographic hazards (e.g. icy decks) and barriers.
Event complexity		How long is this event, how many people and units are being coordinated, how many simultaneous tasks are being performed, how many repetitive tasks are being performed? Is the environment changing?
Equipment		Is the reliability of equipment uncertain? Are there operating limits, jury-rigs, or work-around solutions imposed?
Total		0 – 27 Green (low risk) 27 – 51 Amber (caution) 51 – 70 Red (high risk)

Note: Team discussion to understand the risks and how they will be managed is what is important; not the ability to assign numerical values or colors to risk elements.

6. Execute the mission or task

7. Monitor the mission or task

8. Re-assess performance and risk

Encl: (1)

Enclosure 2. On-Ice Risk Assessment Tool

This tool is intended to assist in evaluating some of the environmental risks associated with deploying personnel to the ice. The table provides a means to assess measurable factors using the Coast Guard's Green-Amber-Red (GAR) point value nomenclature. It has not been validated by experiment. The below list is a non-comprehensive checklist of other factors that should be considered. Note that a high value in any one category should be specifically analyzed as a justification for either delaying or cancelling a non-emergent on-ice deployment.

Item	Considerations	0	1	2	3	4	5	6	7	8	9	10
Ice thickness alongside hull[1]	Thinner ice, ice that is near its freezing point, ice that is heavily fractured, etc. increase the risks to personnel.	17.5 IN					7.9 IN			5.7 IN		
Water temperature	Ordinary sea water freezes at 28.6ºF; however, less salty water sinks faster causing the water churn to prevent freezing. Temperature must be evaluated over time (3-10 days for a specific area).				28.6º F			29.5º F			31.0º F	
Air temperature	Temperature must be evaluated over time (3-10 days for a specific area). Thicker ice requires cooler temperatures for a longer period than thin ice.	0ºF				28ºF			31ºF		33ºF	
Wind speed	Greater wind speeds increase the pressure of the cutter on the ice floe and increased the chances for the ice floe deformation (from ridging, buckling, etc.)	0 KTS			10 KTS			25 KTS				40 SRPM
Current speed	Water speed influences the interaction of the cutter with the ice and subsurface ice keels.	0.0 KTS			0.5 KTS			1.0 KTS				2.5 SRPM
Snow depth	Snow acts as an insulator to prevent freezing air to increase ice thickness and prevents visible assessment of ice thickness, ridging, melt pools, etc.	clear		snow blanket			snow drifts			snow drifts & blanket		
Visibility	Horizontal and vertical visibility influence the ability to assess ice conditions and keep the on-ice party safe	clear		over-cast			1.0 nm vis			0.25 nm vis		
Station keeping	Larger forces required to keep the cutter stationary alongside an ice floe increases the likelihood of making way inadvertently.	0 SRPM			15 SRPM			30 SRPM				40 SRPM
Wind Chill	Wind chill directly affects the ability for personnel to conduct operations outside.				-0ºF			-20ºF			-60ºF	

[1] From Canadian Ice Service (http://ice-glaces.ec.gc.ca)

Additional factors to be assessed:

- ☐ On-ice operations should not be attempted if the ice is actively deforming (separating, ridging, buckling, etc.)
- ☐ On-ice operations should not be attempted on first year ice floes smaller than three baseball fields coverage as a rule thumb.
- ☐ On-ice operations should not be attempted on sea ice in any amount of sea or swell.

Enclosure 3. Tactics for Re-Assessment of Ice Conditions

The following tactics should be used during on-ice operations, many of which provide additional information to better assess actual ice conditions once on the ice. Figure 1. provides a visual sample of the tactics.

1. Evaluate loose snow and ice conditions near the deployment location with a shovel, ice pole, or ice chisel. Snow, loose ice, cracks, thin ice, etc. at the end of the brow or landing area could hide cracks in the ice or other hazards, or make retreating conditions hazardous. The rescue swimmer should remove loose snow using a shovel just after getting to the ice.

2. Probe ice with an ice pole or ice chisel during initial assessment. A pick attached to the end of an ice pole should be used to test ahead of the rescue swimmer when making an initial assessment of the ice in the area of operations. Testing is done by jabs through the snow – solid feedback through the shaft of the pole must be felt, otherwise a hazard could be present. When walking the ice pole should be held horizontally when not probing the ice to lessen the risk of falling completely through the ice (versus up to the chest level).

3. Gage thickness of questionable ice to a depth of 24 inches. Auger the ice in a grid pattern over the area of operations. The ice auger is used by the rescue swimmer or tender to measure ice thickness and quality. While it is impractical to measure the ice thickness and quality over the entire area of operations, it should be evenly tested and at locations which are questionable. HEALY should discuss with the scientists prior deploying to the ice issues relating to how close auguring can be done without interfering with science sampling or measuring. Finding an acceptable balance between safety and science objectives is the goal of that discussion

4. Deploy a visual reference from the bridge wing. By deploying a visual reference from the bridge wing, the OOD can use marks along the hull as a range for determining if the cutter is sliding over time in the ice. Visual references may include snow stakes, flages, disposable wood, coffee grounds, cardboard, or paper, or a heaving line. The reference must have a low probability of moving relative to the piece of ice it is marking.

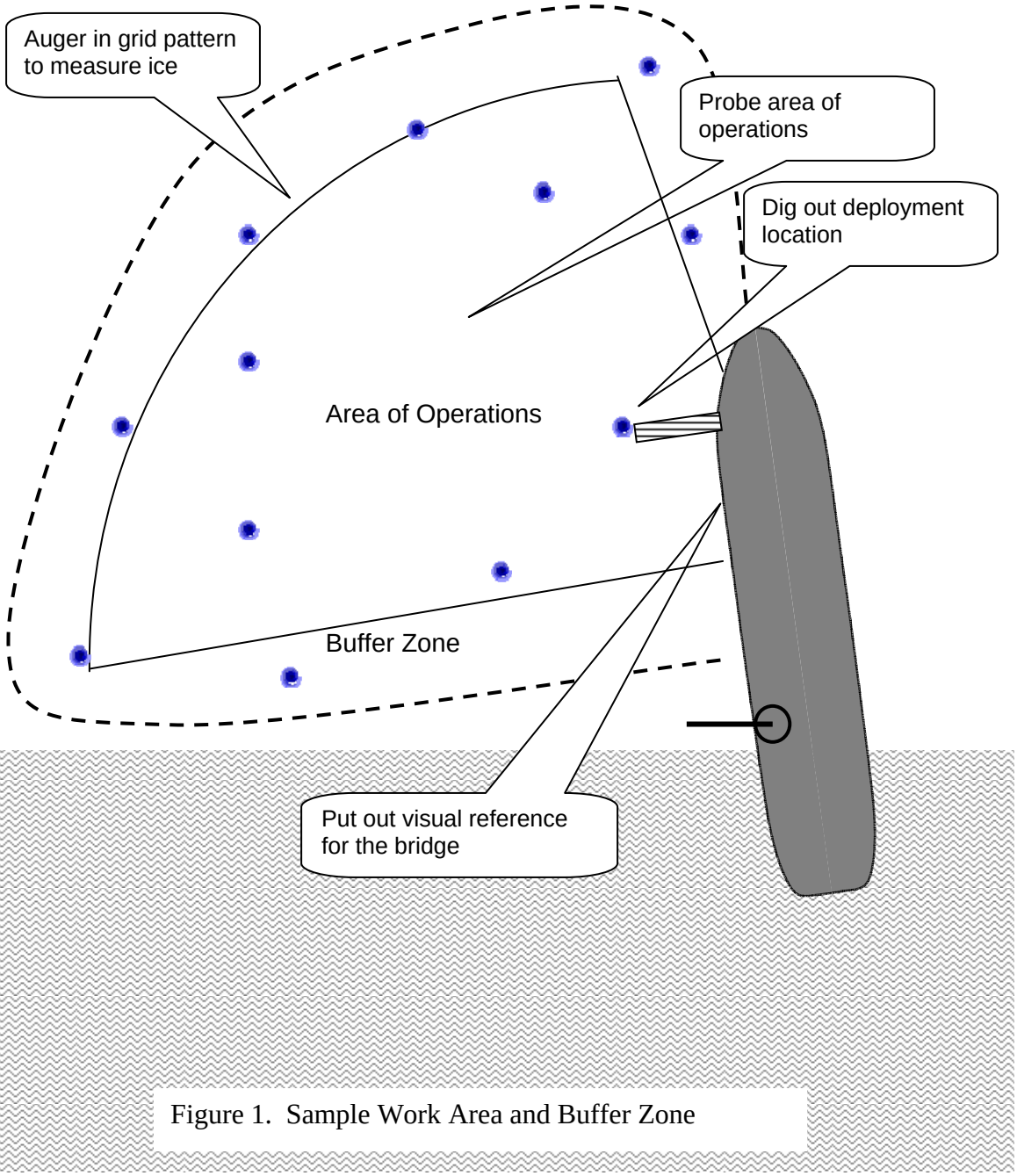

Figure 1. Sample Work Area and Buffer Zone