U.S. Department of Homeland Security
United States Coast Guard

Commanding Officer
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HEALYINST 3058.1A
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USCGC HEALY INSTRUCTION 3058.1A

Subj: ON-ICE OPERATIONS

Ref: (a) Rescue and Survival Systems Manual, CIM 10470.10 (series)
(b) Ice Rescue Operations Tactics, Techniques and Procedures, CGTTP 3-50.1 (series)

1. PURPOSE. This instruction provides guidance for HEALY's on-ice operations. It provides a systematic process for the evaluation and continuous re-assessment of risks for on-ice operations. It also specifies personnel protective equipment requirements as well as best operations practices.

2. ACTION. CGC HEALY's First Lieutenant shall oversee and ensure compliance with this instruction. Any HEALY crewmember, embarked scientist, or other embarked personnel intending on participating in an ice-station shall read and be familiar with this instruction.

3. BACKGROUND. On-ice deployments are a primary mission of CGC HEALY and all departments shall support as needed to ensure a safe and effective evolution. The decision to deploy to the ice shall be made by the Commanding Officer. A risk assessment and operational overview briefing will be held prior to on ice deployment and shall be attended by all personnel involved in any capacity of operations. A re-assessment of the risks will be conducted if the activities or conditions change. The primary activities while on the ice are science, logistics, and training. A secondary activity is morale and recreation for the crew and attached science party. Potential gains from being on the ice must be balanced with the risks involved.

a. On-ice operations expose personnel to many hazards:

i) Injury simply reaching the ice off a steep brow.

ii) Exposure to sea water by falling in a meltpond or breaking through thin ice.

iii) Ice blindness, frostbite, and hypothermia are all dangers even if ice conditions are stable and sufficiently thick.

iv) Tools used for assessing ice conditions or scientific work may damage PPE, cut skin, dislocate joints, or break bones (e.g. drills, augers, chisels, saws, knives, etc.).

v) The ship may be unable to maintain station along an ice floe leaving people stranded (ice anchors have been determined to be a viable option when HEALY has difficulty maintaining position next to a small floe).

vi) The ice floe may break apart and strand people from the ship, helicopter, or small boat.

vii) Ice movement may cause the floe to submerge or crumble causing an unsafe condition.

viii) Slips, trips, and falls due to the ice conditions or by snow covered air pockets.

ix) Polar bear encounters.

b. The bridge watch, deck personnel, and other personnel deployed on the ice are responsible for monitoring the situation during the entire operation and communicating changes that influence the risks of the activities. Tasking that leads to inactivity, lack of situational awareness, boredom, or fixation may lead to a dangerous situation.

c. Putting personnel onto sea ice may be accomplished using HEALY's small boats, a personnel basket via crane, by portable brow or gangway from the bow cutouts or quarterdeck, or by helicopter.

i) Under normal conditions, the bow crane is the preferred method to deploy equipment to the ice. The 50' brow rigged at the forward cutout on the bow is the preferred method to deploy personnel. For deployments using a brow or basket, the ship must be able to maintain position alongside or in an ice floe.

ii) The ASB or CBL should be considered for on ice-deployments to smaller, less stable ice floes. The ice concentration for boat operations must not put the boat at risk for being beset by ice or excessive movement of the ice itself. Depending on mission requirements, small boat delivery may be the least preferred method due to additional risk to personnel and equipment during the offload and onload process.

iii) The forecasted weather must allow for Visible Meteorological Conditions (VMC) throughout the operational period when using a helicopter.

d. 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. DIRECTIVES AFFECTED. None.

5. DISCUSSION. The following guidelines shall be used in planning and preparing for operations on the ice.

a. In general, some of the risks associated with conducting an ice station can and should be evaluated from the ship. Enclosure (1) is the basic framework for analyzing the risk associated with an initial ice deployment. Science party members should participate in the initial risk assessment and help provide a recommendation to the Commanding Officer. Additional risks become more apparent during an initial assessment once on the ice. Other risk factors require close observations of the environment over several few hours. The risk management

approach is to begin operations with a conservative posture using greater safety practices and equipment. Any subsequent relaxing of the safety requirements must be supported by evidence of lower risk with concurrence of the Commanding Officer. Many of the risks cannot be assessed prior to deployment on the ice and additional factors, such as the movement of ice and tendency of the weather, and instead 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.

b. Re-assessment of the ice begins when the first person is deployed on the ice and continues until the last person is off the ice. With more information about the ice and the environment available after a period of time, a revised risk assessment can be made to reduce or stop the activities, being new activities, or change the requirements for persons on the ice if necessary. 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.

c. If time permits, an ice rescue drill shall be performed at the first opportunity available to allow Ice Rescuers, Cutter Surface Swimmers, and other personnel to experience the capabilities and constraints of our ice rescue doctrine, and maintain currency based tasks for certification

d. This instruction does not address periods of darkness or ice affected by sea swells – deployment in these conditions should be avoided.

e. Recreational swimming (i.e. Polar Bear Plunges) is never permitted from the ice. Personnel may be allowed in surveyed melt ponds wearing approved Personnel Protective Equipment with a minimum ice thickness of 18 inches as long as a qualified Ice Rescuer is present and it is approved by the Commanding Officer.

6. PROCEDURE.

a. Assignments.

i) Commanding Officer. The Commanding Officer (CO) is inescapably responsible for the safety of personnel and equipment deployed on the ice. He/she is singularly authorized to permit or deny the execution of an ice station, or change the character of the ice-station at any time during its execution.

ii) 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. The Bridge Watch shall check in with the Brow Watch and Bear Watch every 15 minutes. Marking the ship's position in some way to detect creep in position is encouraged. The Bridge Watch must inform the Engineering Watch when there is an on-ice deployment and subsequent limitations in maintenance and training. The Bridge Watch should

periodically review actions needed for a person falling into the water, loss of propulsion, loss of visibility or communications, and breakup of the ice floe.

iii) Engineering Watch. While not specifically a restricted maneuvering situation, on-ice deployments from the ship typically require uninterrupted power to the propulsion motors, and the Restricted Maneuvering Doctrine may be set.

iv) Deck Department. Deck Department is 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 Department is also responsible for acting as Safety Observers on deck for ice/ship movement, personnel embarkation/disembarkation, and assisting in lowering and raising science/support equipment to the ice. If concurrent oceanographic operations are occurring at an on-ice deployment site, Deck Department and/or other appropriate departments will provide additional personnel to assist.

v) Operations Department. In coordination with the 1st LT, the Operations Officer will initiate and conduct the mission brief. Science Division personnel will act as on-ice liaisons to assist the science party in accomplishing objectives, assist Deck Department as Safety Observers on deck, and provide communication by handheld radio to the Bridge Watch, Bear Watch, Brow Watch, and Ice Rescuers. Science Division personnel will also assist in the equipment transfer between the cutter and the ice by acting as riggers or crane operators as necessary.

vi) Ice Rescuers.

(a) Ice Rescuers shall provide ice etiquette training to personnel who are deploying on the ice. Mission specific guidance must be negotiated with the science party to ensure their equipment is properly handled, experiments and observations occur as needed, and all personnel maintain an appropriate position relative to the cutter. Training on safe use of equipment (e.g. ice pole, chisel, auger, flag markers, etc.) must be provided to personnel who will support the on-ice activities.

(b) Two Ice Rescuers will be the first personnel on the ice. Once disembarked, the Ice Rescuers will make an initial assessment of ice conditions near the deployment point. From there, an expanding area search for hazards will be made. An "ice perimeter" shall be established using orange cones or spray paint to denote the limit of where personnel may travel once deployed to the ice. During the initial assessment and throughout the operational period, the Ice Rescuers will continually re-assess the ice.

(c) Once the ice is determined safe for mission related activities, the Ice Rescuers may assist in transferring personnel and equipment to the ice, and likewise from the ice at the conclusion of the operations.

(d) Once the operation is well established, the Ice Rescuers can be recovered back on board and be in a standby status in a sheltered location on the bow, immediately available in case an emergency occurs, or if a new area needs to be surveyed prior to use.

vii) Brow Watch. The Brow Watch shall consist of a Deck Supervisor and Crane Operator. They shall keep radios with them for communications with the Bridge Watch, Bear Watch, and Ice Rescuers. The Brow Watch shall report the arrival and departure of personnel on the ice. Accountability will be by name for small groups and all-hands events. A complete crew and science party accountability will follow all-hands events.

viii) Bear Watch. A Bear Watch will be stationed on the bow for increased visibility. The need for an additional/second Bear Watch on-ice will be evaluated during the operation. If visibility drops below 500 yards or an autonomous group needs to work greater than 250 yards from the cutter, a second on-ice Bear Watch should be considered. The specific duties of the Bear Watch are provided in the On-Ice Operations Bill in HEALY's Cutter Organization Manual.

ix) All crew members on the bridge watch, working on deck, and deployed on the ice are responsible for identifying and reporting unsafe conditions. Likewise, the embarked science party is responsible for following safety practices and looking out for risks during their work.

b. Personal Protective Equipment. Ice Rescuers shall comply with the personal protective equipment (PPE) requirements as per reference (a) and enclosure (2), which includes a dry suit donned with two additional layers specified in the enclosure, a neoprene hood, goggles, neoprene gloves, ice cleats, boat crew helmet, ice awls with safety tip, safety harness, PFD, and boat crew survival vests.

i) On-ice deployments supported by one of HEALY's cutter boats requires civilian scientist to wear the same level of PPE as onboard boat crew personnel outlined in enclosure (2) **The ship does not provide drysuits for civilian science personnel.** Every effort shall be made during the pre-cruise mission planning activities to identify scenarios that will require civilian scientists to don drysuits so that they come prepared with the proper PPE.

ii) On-ice deployments supported directly from HEALY (brow or basket) require anti-exposure coveralls or other appropriate cold weather clothing appropriate for the on-scene conditions, to be determined in the planning and risk assessment.

iii) Boat crew helmets or hard hats with chin straps are required for all persons deploying on the ice via the personnel basket or brow (if suspended by a crane).

iv) Relaxing of PPE for any on-ice operations may only be authorized by the Commanding Officer, and should coincide with a re-assessment of the operational risks.

c. Other. For mission related objectives that require ice melt pond entry, minimum PPE requirements will be adjusted based on weather conditions and mission objectives. For less than

favorable or extremely cold conditions, the PPE should be similar to the requirements for Ice Rescuers.

i) 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 the minimum PPE for recreation on the ice. If the ice floe is large, thick, and stable after monitoring for a prolonged period, the Commanding Officer may relax PPE for crew and science party recreation.

ii) Handheld radios must be carried by representatives from every group on the ice. This includes a handheld radio for each group near the ship but separated by distances greater than two ship lengths and groups deployed from a small boat to the ice. Signal flares, a personal locator beacon, and handheld satellite phone should be considered for autonomous groups. A communications plan must be prepared prior to an on-ice deployment and included as part of the mission brief.

d. Best Practices.

i) Arrive on station well before the planned deployment to allow time to assess the relative drift, weather, and other observable properties outlined in enclosure (1).

ii) Hold the risk assessment brief one hour prior to deployment; preferably before lunch.

iii) On-ice personnel should eat prior to deployment in order to maximize endurance.

iv) Deploy equipment utilizing the cranes whenever possible.

v) Personnel deployment is preferred utilizing a brow from the bow or quarterdeck.

7. ENVIRONMENTAL CONCERNS. These were analyzed and determined not applicable.

8. FORMS/REPORTS. The medical screening form is enclosure (1).

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Encl: (1) HEALY On-Ice Risk Assessment
(2) HEALY PPE Requirements

Item	Considerations	LOW		MODERATE	HIGH
Ice Thickness	Thinner ice, ice that is near its freezing point, ice that is heavily fractured, etc. Increases the risk to personnel.	17.5 IN		7.9 IN	5.0 - IN
Water Temp	Ordinary water freezes at 28.6*F; however, less salty water sinks faster causing the water churn to prevent freezing. Temperature must be evaluated over time (3-10 days for specified area).		28.6*F	29.5 *F	31*F
Air Temp	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.	0*F	28*F	31*F	33*F
Wind Speed	Greater wind speeds increase the pressure of the cutter on the ice floe and increase the chances for the ice flor deformation (from ridging, buckling, etc).	0 KTS	10 KTS	25 KTS	40 KTS
Wind Chill	Wind chill directly affects the ability for personnel to conduct operations outside.	10*F	0*F	-20*F	-60*F
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	2.5KTS
Snow Depth	Snow acts as an insulator to prevent freezing air to increase the ice thickness and prevents visible assessment of ice thickness, ridging, melt pools, etc.	CLEAR	BLANKET	DRIFTS	BOTH
Visibility	Horizontal and vertical visibility influence the ability to assess ice conditions and keep the on-ice party safe.	CLEAR	OVC	1.0 NM	.25 NM
Station Keeping	Larger forces required to keep the cutter stationary alongside an ice floe increase the likelihood of making way inadvertently.	0 SRPM	15 SRPM	30 SRPM	40 SRPM

PPE for Work Parties on the Ice: Work parties include all personnel going onto the ice for science operations. Whether supervising or operating the sampling equipment or simply assisting in the transport of gear to and from the ship, all work party members must be prepared to whether the extreme and ever changing conditions of the Arctic. To do so, all work party members must be wearing the following PPE at a minimum:

Anti-exposure coveralls: These are provided by the ship; however, scientists may also bring their own provided they match or exceed the salient characteristics of the ship provided coveralls.

- Anti-exposure coveralls are constructed of a urethane coated nylon fabric with a closed cell foam interlining.
- Sleeve and leg openings can be closed tightly around the wrist and ankles; however, they do not provide a watertight seal.
- Anti-exposure coveralls provide 22 to 45 pounds of buoyancy (depending on size) and feature, an attached orally inflated pillow to support the wearer's head in the water, an attached hood for extra thermal protection, and retro-reflective tape on the hood and shoulders is applied for increased visibility in low-light environments.
- A personal marker light or strobe light and the cork-less whistle are required.
- Warm undergarments and clothing under the coveralls appropriate to the prevailing conditions such as thermal underwear, warm pants, a shirt, and sweater. The anti-exposure coveralls will be relatively warm but their main design is to help with floatation and insulation in the event you fall into the water.
- Cold weather headgear such as a balaclava or beanie that can cover and provide warmth over the ears.
- Cold weather gloves appropriate for the work being done. For example, if you are taking water samples then waterproof or neoprene gloves will be more appropriate than wool gloves. It is recommended, however, that a second dry pair of gloves be brought along for use to and from the ship.
- Insulated cold weather boots with cold weather socks. These do not need to have a safety toe unless you also plan to use them on the ships working decks where a safety toed boot is required.
- NOTE: Cotton shall not be worn for thermal protection. Cotton absorbs and retains moisture, robbing body heat and can cause rapid onset of hypothermia.

- Other than the anti-exposure coveralls and hard hats when needed, the ship does not maintain a supply of on-ice safety gear for embarked personnel other than permanent party crew members. All other gear must be provided by and brought with the science party.

Small Boat Deployment to the Ice: If the small boat is the preferred method of deployment to the ice or the science party plans to use the small boat specifically for sample collection or other uses as part of the science mission then, in place of the anti-exposure coveralls outlined above, a drysuit with proper layer I and layer II protection will need to be worn by all personnel transiting in the small boat.

Three Layer Drysuit Requirement. The Coast Guard has developed a three-layer system for dry suits which incorporate three distinct layers to prevent moisture from building, providing warmth, and providing watertight integrity.

- Layer I: Light and medium weight moisture wicking thermal undergarments consist of separate shirt and long drawers.
- Layer II: Light and medium weight fleece worn over the first layer as the second layer of protection, providing insulation and warmth for the individual.
- Layer III: A constant-wear dry suit designed to preclude the entry of water upon immersion.