U.S. Department of Homeland Security

United States Coast Guard

Ice Rescue Operations (IROPS) Tactics, Techniques, and Procedures (TTP)

Force Readiness Command (FORCECOM)

CGTTP 3-50.1C
August 2016

This page intentionally left blank.

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

Commander
United States Coast Guard
Force Readiness Command

300 E. Main Street, Suite 1100
Norfolk, VA 23510
Staff Symbol: FC-P
Phone: (757) 628-4463

CGTTP 3-50.1C
17 August 2016

COAST GUARD TACTICS, TECHNIQUES, AND PROCEDURES 3-50.1C

Subj: ICE RESCUE OPERATIONS, REVISION C

Ref:
(a) U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical Maritime Search and Rescue Manual (IAMSAR), COMDTINST M16130.2 (series)
(b) Operational Risk Management, COMDTINST 3500.3 (series)
(c) U.S. Coast Guard National Ice Rescue School: Ice Rescue Trainer Course (IRTC), 502891
(d) U.S. Coast Guard National Ice Rescue School: Ice Rescuer Course (IRC), 2013
(e) U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series)
(f) U.S. Coast Guard Air Operations Manual, COMDTINST M3710.1 (series)
(g) Rescue and Survival Systems (RSS) Manual, COMDTINST M10470.10 (series)
(h) CG-731 Authorization for Ice Rescue Staff memo 10470 of 25 Nov 14
(i) CG-731 Authorization for Ice Rescue Equipment memo 16101 of 04 Sept 15
(j) CG-731 Authorization for Ice Rescue Gear memo 10470 of 20 Jul 16
(k) U.S. Coast Guard Flight Manual Series HH-65C Helicopter, CGTO 1H-65C-1
(l) U.S. Coast Guard Flight Manual Series MH-60T Helicopter, CGTO 1H-60T-1
(m) Aviation Life Support Equipment Systems Process Guide, CGTO PG-85-00-310-A
(n) Motor Vehicle Manual, COMDTINST M11240.9 (series)
(o) U.S. Coast Guard Helicopter Rescue Swimmer Manual, COMDTINST M3710.4 (series)
(p) Boat Crew Seamanship Manual, COMDTINST M16114.5 (series)
(q) Command Center QRC Tactics, Techniques, and Procedures (TTP), CGTTP 3-56.1 (series)
(r) Cleveland SAR Plan, D9INST M16100.1 (series)
(s) Land Search and Rescue Addendum to the National Search and Rescue Supplement to the International Aeronautical and Maritime Search and Rescue Manual, Version 1.0; National Search and Rescue Committee, November 2011
(t) Discharge of Oil, 40 CFR Part110
(u) U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol II, COMDTINST M16114.33 (series)

(v) U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol III, COMDTINST 16114.42 (series)
(w) Instrument Flying Handbook, FAA-H-8083-15A

1. PURPOSE. To provide ice rescuers with Coast Guard tactics, techniques, and procedures (CGTTP) on ice rescue operations (IROPS).

2. ACTION. This CGTTP publication applies to all personnel conducting IROPS. Internet release authorized.

3. DIRECTIVES/TTP AFFECTED. This publication supersedes the Ice Rescue Operations (IROPS) TTP, CGTTP 3-50.1B.

4. DISCUSSION. This publication synthesizes information from several existing sources and Coast Guard subject matter experts (SMEs) to establish a single source for IROPS TTP.

5. MINOR CHANGES. This TTP publication uses Adobe Acrobat stamps to indicate revisions. For each revision listed below, there is a stamp in the left margin next to the section with a revision. To display the location of all stamps in the PDF file, select Comments/Comments List. Click anywhere in a comment row to move between revisions, or use the scroll bar to scroll through the revisions.

   This revision incorporates changes from the recently signed reference (j), CG-731 Authorization for Ice Rescue Gear memo 10470 of 20 Jul 16. This revision includes the following changes pertaining to multi-victim rescue with SKF-ICE, moving water and ice, and other minor updates throughout.

   a. LOP
      Reference (j), new for multi-victim rescue.

   b. Chapter 1: Introduction, Section A: Introduction
      (1) A.3. Registered Trademark Disclaimer, added.

   c. Chapter 2: Roles, Section A: Training Environment Roles
      (1) A.2. “Live Victims” in Training Environment, added reference (d), U.S. Coast Guard National Ice Rescue School: Ice Rescuer Course (IRC), 2013.

   d. Chapter 3: Mission Planning, Section A: Overview
      (1) A.2.a. Surface, revised text (review all).
      (2) A.3.a. Surface, added a WARNING and updated a NOTE.
      (3) C.4. Initial Report and Gathering Information, revised text (first bullet, know to known).
      (4) C.5. Additional Considerations, changed text to a NOTE and revised text.
      (5) C.11. Suspension of Search, added a NOTE and figure 3-17.

e. Chapter 4: Mission Execution, Section A: Ice Rescue Procedures
   (1) A.3. Transiting on Ice, added/updated two NOTES.
   (2) A.9.a.(1). Hypothermia Classification, updated table 4-1.
   (3) A.11. Multi-victim Rescue with SKF-ICE, new section with text and photos.
   (4) A.12. Moving Water and Ice, new section with text and photos.
   (5) A.13. Case Study, new section with text and photos.

f. Chapter 7: SKF-ICE, Section A: SKF-ICE Systems
   (1) A.2. Propulsion Systems, updated text (engine manual).
   (2) C.6. Effecting Rescue, updated text (step 2, 150/200-foot MARSARS tending line to 150/200-foot tend line).
   (3) D.2. Open Water Handing, updated text (second paragraph, last sentence).
   (4) E.3. Preventive Maintenance, updated text (engine manual).

g. Appendix A: Glossary and Acronyms
   (1) Added the following: BOAT, CGTTP, FC-P, FORCECOM, GAR, IROPS, MK-127 and NFPA. Deleted RFI.

h. Appendix B: Ice Development
   (1) B.8.d. Dynamic Ice, new section.

i. Appendix C: USCG Ice Rescue Daily Pre/Post Mission Checks
   (1) Updated/standardized format of quantity for the following: SKF-ICE, Shuttle Board, 550-Foot Line Reel, VHF-FM Handheld Radios, Automated External Defibrillator, Head Lamps, Binoculars, Compass and GV.
   (2) Added the following: Ice Awls, Life Guard Safety Harness, Blizzard SPR Blanket, Prusik Pulley and Quickdraw.

6. DISTRIBUTION. FORCECOM TTP Division posts an electronic version of this TTP publication to the CGTTP Library on CGPortal. In CGPortal, navigate to the CGTTP Library by selecting **References > TACTICS, TECHNIQUES, AND PROCEDURES LIBRARY**. FORCECOM TTP Division does not provide paper distribution of this publication.

7. REQUEST FOR CHANGES. Submit recommendations for TTP improvements or corrections through the TTP Request form on CGPortal. In CGPortal, navigate to the TTP Request form by selecting **References** > **FORCECOM - TTP Requests**.

BELBEN.LANCE.C.1186791750

Digitally signed by BELBEN.LANCE.C.1186791750
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USCG, cn=BELBEN.LANCE.C.1186791750
Date: 2016.08.18 11:43:37 -04'00'

L. C. BELBEN
Captain, U. S. Coast Guard
Chief, FORCECOM TTP Division (FC-P)
By Direction of Commander,
Force Readiness Command

Table of Contents

Table of Figures

Table of Tables

This page intentionally left blank.

Chapter 1: Introduction

Introduction

This chapter overviews the contents of this tactics, techniques, and procedures (TTP) publication. It also defines the use of notes, cautions, and warnings in TTP publications.

In This Chapter

This chapter contains the following sections:

Section A: Introduction

A.1. Introduction

This publication pertains to all U.S. Coast Guard (USCG) Ice Rescue Units, which have the equipment and trained personnel to conduct ice rescues. It also pertains to operational commanders (OCs), Coast Guard cutters that operate in ice, ice rescue commanding officers (COs)/officers-in charge (OIC), ice rescue unit personnel, aircrews conducting ice rescue, as well as ice rescue customers.

All USCG personnel who obtain guidance from this publication should become thoroughly familiar with its contents.

This publication cannot cover all contingencies. Successful operations require good safety practices, sound judgment, and common sense at all levels of command.

Occasionally, the operational environment or mission demands require on-scene deviation from prescribed instructions or procedures when the CO/OIC, aircraft commander, or team leader determines such deviation is necessary for safety, or to save a life. Do not take this lightly. Temper these decisions with maturity, sound judgment, and a complete understanding of the capabilities of the unit, its assets, mission, and crew.

Reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical Maritime Search and Rescue Manual (IAMSAR), COMDTINST M16130.2 (series), provides the policy foundation for conducting ice search and rescue (SAR) response. Reference (a) also provides policy for SAR on ice in addition to policy provisions for all SAR environmental conditions; ice-specific policies only relieve USCG units from adhering to general SAR policies where specifically stated in reference (a).

A.2. Public Affairs

Additional guidance regarding public affairs is available on the D9 External Affairs website.

Revision

A.3. Registered Trademark Disclaimer

The use of registered trademarks in this publication is not an endorsement of these products or companies by the United States Coast Guard, the Department of Homeland Security (DHS), or the Federal government.

Section B: Notes, Cautions, and Warnings

B.1. Overview The following definitions apply to notes, cautions, and warnings found in this TTP publication.

NOTE: **An emphasized statement, procedure, or technique.**

CAUTION: **A procedure, technique, or action that, if not followed, carries the risk of equipment damage.**

WARNING: ***A procedure, technique, or action that, if not followed, carries the risk of personnel injury or death.***

This page intentionally left blank.

Chapter 2:
Roles

Introduction

This chapter discusses training and operational environmental roles related to ice rescue.

In This Chapter

This chapter contains the following sections:

Section A: Training Environment Roles

A.1. Coast Guard Ice Rescue Training Courses

The Coast Guard offers two ice rescue courses. The National Ice Rescue School (NIRS) at Station Saginaw River provides the Ice Rescue Trainer Course (IRTC) to prepare trainers to conduct training at the unit level. Unit trainers, IRTC graduates, in turn provide the Ice Rescuer Course (IRC) training at the unit. This training is primarily designated for surface ice rescue boat units and cutters (refer to the USCG Training Quota Management website (Ice Rescue Training Course number 502891) for further guidance).

Revision

A.2. "Live Victims" in Training Environment

As a best practice, and to provide realistic training, unit COs/OICs can use "live victims" in a controlled area when risk is minimal. Each unit shall employ a proper risk assessment per reference (b), Operational Risk Management, COMDTINST 3500.3 (series). It is essential that team leaders use sound judgment in selecting persons to serve as "live victims" in training evolutions. "Live victims" must be trained in self rescue and wear proper agency specific personal protection equipment (PPE) before entering the water.

WARNING:

Ensure a qualified, fully-equipped ice rescuer accompanies "live victims" at all times.

Lesson four of reference (c), U.S. Coast Guard National Ice Rescue School: Ice Rescue Trainer Course (IRTC), 502891, and reference (d), U.S. Coast Guard National Ice Rescue School: Ice Rescuer Course (IRC), 2013, determines training objectives. The type of training, number of participants and objectives determine scale of exercise. Units normally deliver small and medium scale exercises. District planners usually coordinate large scale exercises.

- Small scale: tailored to individual performance qualification standards (PQS) process. Individual PQS training (1-3 members).
- Medium scale: IRC class (multiple students) practical exercises per the IRC. Group practical exercise/drill (4-16 members).
- Large scale: training exercise with scenario and usually involves other response agencies. Multi-agency, mass rescue operation (MRO), etc. (more than 16 members).

All involved personnel must participate in appropriate risk assessment before engaging in USCG ice rescue training evolutions.

A.3. Trainee (Surface Training)

Per reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), the trainee shall be willing, and have the maturity to take on the duties and responsibilities related to the ice rescue position. Refer to Appendix D: Ice Rescue Training Checklist.

A.4. Trainer (Surface Training)

Per reference (e), the trainer is involved primarily with the qualification phase of the training system. As such, the trainer is responsible for the initial training of the ice rescuer trainee and is an IRTC graduate certified by the command to deliver the IRC. Refer to Appendix D: Ice Rescue Training Checklist.

A.5. Safety Observer (Surface Training)

A safety observer maintains an overall awareness of the training environment. For small scale training, the team leader may fulfill the duties of the safety observer. For medium to large scale training exercises, the safety observer (qualified ice rescuer properly equipped with agency specific PPE) should have no other assigned duties.

Per reference (b), Operational Risk Management, COMDTINST 3500.3 (series), the safety observer ensures the safety of participants by monitoring conditions, including the following:

- Weather.
- Hazards.
- Student fatigue.
- Properly worn PPE.

A.6. Team Monitoring (Surface Training)

Monitor team members for the following signs of hypothermia:

- Shivering.
- Signs of fatigue.
- Heat exhaustion (overexertion).
- Sluggishness/slurred speech.

See Chapter 4: Mission Planning, Section A.9. Victim First Aid and Transit for more details.

Section B: Operational Environment Roles

B.1. Response Guidance

Per information in reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), freezing air and water temperatures significantly decrease survivability time for subjects trapped in the water or on the ice. Search and rescue mission coordinators (SMCs) must use the quickest on-scene resources without unduly risking the safety of responding personnel. Consider SAR resources for ice rescue as follows:

- Helicopters working with appropriate/available surface resources: prosecute cases in a timely, safe, and effective manner.
- Station-based surface resources: cases occurring on confined, small waterways, or where prevailing weather conditions prevent the safe launch of rotary wing search and rescue units (SRUs).
- Cutters: when available and where capabilities are suitable.

To ensure the effectiveness and safety of responding units, COs/OICs and the SAR chain of command also:

- Coordinate response with appropriate state and local ice rescue agencies.
- Conduct a risk assessment using operational risk management (ORM) per reference (b), Operational Risk Management, COMDTINST 3500.3 (series), before and during mission.
- Conduct a post-mission debrief/hotwash to capture knowledge and "lessons learned" for future missions.
- Implement additional conservation limitations, as conditions warrant, to effectively manage crew risk, endurance, and safety.

B.2. Minimum Crew Requirements

B.2.a. Surface

Per reference (e), an ice rescue team consists of a minimum of four persons:

- One team leader, coxswain-qualified if using a powered conveyance (except the SKF-ICE).
- Two rescuers.
- One communications person (on cutter bridge or on shore at the launch point to monitor operations, and maintain communications with the team and parent command).

NOTE:	**As an option, the fourth person (communications) can be available to assist the rescue effort as directed by the team leader.**
B.2.b. Aviation	Per reference (f), U.S. Coast Guard Air Operations Manual, COMDTINST M3710.1 (series), a SAR aircrew normally consists of four persons: • Two pilots. • One flight mechanic (FM). • One rescue swimmer (RS).
B.3. Roles and Responsibilities	
B.3.a. Surface	Per reference (d), U.S. Coast Guard National Ice Rescue School: Ice Rescuer Course (IRC), 2013, the roles and responsibilities of surface ice rescue team members are defined as follows.
B.3.a.(1). Team Leader	Designated by the officer in charge, the team leader: • Is in charge of the ice rescue team on the ice. • Acts in an oversight capacity. • Is not involved in the actual rescue unless all other options have been exhausted. • Assesses on-scene safety, ice conditions, weather, and risk. • Serves as liaison with other responding agencies on scene. • Coordinates search efforts and directs initial "hasty search." • Runs communications during joint USCG operations (see Chapter 10: Joint USCG Operations).
B.3.a.(2). Primary Rescuer/Line Tender	The primary rescuer/line tender: • Performs the rescue as dictated by the team leader. • Tends the line.
B.3.a.(3). Secondary Rescuer/Line Tender	The secondary rescuer/line tender: • Performs the rescue as dictated by the team leader. • Tends the line.

B.3.a.(4). Fourth Team Member	The fourth team member: • Remains on scene conducting shore communications. • Remains with the government vehicle to maintain communications. • As an option, the fourth person (communications) can be available to assist the rescue effort as directed by the team leader.
B.3.a.(5). Team Monitoring	See Chapter 2: Roles, Section A.6. Teaming Monitoring (Surface Training) for team monitoring details.
B.3.b. Aviation	
B.3.b.(1). Pilot in Command	Generally the most experienced pilot, the pilot in command: • Is in charge of aircraft operations. • Evaluates on-scene conditions. • Coordinates aircrew risk assessment and hoisting method.
B.3.b.(2). Co-Pilot	The secondary pilot: • Assists pilot in command in executing his or her duties. • Conducts other duties as directed by the pilot in command.
B.3.b.(3). Flight Mechanic	The flight mechanic: • Provides input for hoist technique. • Operates hoist. • Responsible for aircraft cabin management.
B.3.b.(4). Rescue Swimmer	The rescue swimmer: • Provides input for hoist technique. • Lowered via hoist to surface or water. • Responsible for survivor care.

Chapter 3:
Mission Planning

Introduction

Per reference (d), U.S. Coast Guard National Ice Rescue School: Ice Rescuer Course (IRC), 2013, this chapter provides guidance for conducting mission planning at ice rescue units.

In This Chapter

This chapter contains the following sections:

Section A: Overview

A.1. Overview

Planning is a critical part of safe, effective ice rescues. Per reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical Maritime Search and Rescue Manual (IAMSAR), COMDTINST M16130.2 (series), designated ice rescue units do the following:

- Identify high use areas and potential accident sites within area of responsibility (AOR).
- Select the safest and most effective rescue approaches.
- Practice possible techniques using appropriate equipment at the site.

A.1.a. Quick-Action Cards or Files

Per reference (a), ice rescue stations shall maintain quick-action cards or files that list locations in their AOR where ice related accidents are most likely to occur and locations, including inland waterways, where ice rescue resources can be deployed. Suggestions for a successful ice rescue:

- Survey potential accident sites within the unit's AOR before winter freezes; record size of area, water depth, and any structures in the water at the site.
- Examine sites to locate hazards, especially those with a history of accidents.
- Include location of access sites and direct routes to them. Pay particular attention to relatively inaccessible or dangerous areas such as canyons, cliffs, and marshlands. Record latitude and longitude coordinates of potential launch/rescue sites. Include local maps/charts for initial responders to reference en route to scene.
- Survey potential accident sites during periods of initial freeze, again recording characteristics of the location.

A.1.b. Other Factors to Consider

- Hold training exercises at potential accident sites when suitable ice forms. Staying within the limitations of the rescue team helps avoid unnecessary dangers.
- Organize and participate in multi-agency ice rescue drills to develop a greater understanding of capabilities, resources, and policies of various contributing agencies

As a best practice, regularly evaluate airboat/SKF-ICE launch sites to assess suitability for airboat/SKF-ICE operations. Easily accessible launch site information, including location data in government vehicles' (GVs) Global Positioning System (GPS), reduces response time.

A.2. General Equipment

Revision

A.2.a. Surface

Per reference (g), Rescue and Survival Systems (RSS) Manual, COMDTINST M10470.10 (series), each ice rescue station and cutter shall have the following minimum equipment:

- SKF-ICE (01).
- MARSARS shuttle board (02) – one ready for operation and one for training.
- MARSARS cold water sling (02).
- White Bear rescue sling (optional).
- 550-foot line reel with ice anchor (reel only has stowage for ice anchor). (01)
- Wool blanket (04).
- Flashlight (02).
- AOR maps/charts (AOR specific).
- M127A1 ground illumination signal (06).
- Handheld GPS (02).
- 150/200-foot tend line (02) with ice anchor and endless sling.
- VHF-FM radio (03).
- Cellular phone - to remain in GV (01).
- Extra batteries - to remain in GV (specific to equipment that requires replaceable batteries).
- Victim personal flotation device (PFD) (04).

NOTE: **As a best practice, ice rescue teams should have three adult PFDs and one child PFD available.**

- Night vision device (NVD) (02).
- Automatic external defibrillator (AED) (01).
- Head lamp (stations, 06; cutters, 03).
- Binoculars (01).
- Compass (01).
- First aid kit (with pocket cardiopulmonary resuscitation (CPR) mask) (01 10-person kit).
- Hypothermia recovery capsule (01).
- Ice awls (minimum: stations, 06; cutters, 03).

- Life guard safety harness (wear underneath the SAR vest) (stations, 06; cutters, 03).
- 75-foot rescue line (throw) bag (cutters only; 02).

Per reference (h), CG-731 Authorization for Ice Rescue Staff memo 10470 of 25 Nov 14, each ice rescue station and cutter shall have the following minimum equipment:

- Ice rescue staff (stations, 04; cutters, 02).

Per reference (i), CG-731 Authorization for Ice Rescue Equipment memo 16101 of 04 Sept 15, each ice rescue station and cutter shall have the following minimum equipment:

- Blizzard SPR blanket (03; replaces hypothermia recovery capsule with the exception of SPC-AIR units when hypothermia recovery capsule becomes unserviceable.
- Hypothermia cap (05).

Per reference (j), CG-731 Authorization for Ice Rescue Gear memo 10470 of 20 Jul 16, each ice rescue station and cutter shall have the following minimum equipment:

- Prusik pulley (02).
- Quickdraw (06).

A.2.b. Aviation

In addition to items required in reference (k), U.S. Coast Guard Flight Manual Series HH-65C Helicopter, CGTO 1H-65C-1, and reference (l), U.S. Coast Guard Flight Manual Series MH-60T Helicopter, CGTO 1H-60T-1, each airframe considers the following equipment:

- Ice chocks.
- Ice auger.
- Snow markers.
- Cold weather survival kit.

NOTE: **The rescue litter and mass casualty raft are not normally carried on H65 aircraft unless requested before aircraft launch.**

A.3. Personal Protective Equipment (PPE)

Revision

A.3.a. Surface

Per reference (g), Rescue and Survival Systems (RSS) Manual, COMDTINST M10470.10 (series), each member of the ice rescue team shall wear one each of the following personal protective clothing and equipment when conducting ice rescue:

WARNING: ***Cotton undergarments are not authorized.***

- Approved ice rescue dry suit.
- Layer I and Layer II thermal undergarments.
- Layer I socks.
- Wool socks/bootie – Layer II.
- Neoprene hood.
- Balaclava.

NOTE: **Balaclava is authorized for wear when risk of entry into water is minimal.**

- Goggles (clear/neutral lenses).

WARNING: ***Wear protective eyewear in bright sunny conditions to avoid ice blindness.***

NOTE: **The use of clear or tinted lenses with goggles depends upon environmental conditions.**

- Boat crew helmet.
- Boat crew survival vest with contents.

WARNING: ***Units must consider SAR vest contents reliability when operating in extreme cold as part of ORM. The operating lower limit of the personal locator beacon (PLB), strobe, and handheld radio is -4 degrees Fahrenheit. This is not the point where batteries fail, but at -4 degrees Fahrenheit battery efficiency (voltage droop) becomes more pronounced. Risk mitigating factors include operating in close proximity (in sight of) shore party, use of chemical heating pads, testing of equipment, and use of other means of reliable communications.***

- Type III PFD.

NOTE: **Inflatable PFDs set in manual inflate mode can be worn with MSD 900/901.**

- Cold weather glove system.

NOTE: **Cold weather glove system is authorized for wear when risk of entry into water is minimal.**

- Ice footwear.
- Neoprene gloves.

A.3.b. Aviation — For aviation ice rescue specific gear, refer to reference (m), Aviation Life Support Equipment Systems Process Guide, CGTO PG-85-00-310-A.

A.4. Mission Planning

A.4.a. Surface — Per reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), the team leader, rescuers, and command must exercise sound judgment and determine team endurance on a case-by-case basis due to extreme conditions and the variety of conveyances used during ice rescues. Refer to Chapter 5: Operating 20 Foot Special Purpose Craft – Airboat (SPC-AIR) and Chapter 6: Operating 22 Foot Special Purpose Craft – Airboat (SPC-AIR) for further details.

Limit maximum on-ice hours to 4 hours under the following conditions:

- Winds exceed 30 knots or,
- Temperature below 10 degrees Fahrenheit or,
- When transiting thin ice (continually breaking through the ice).

Limit maximum on-ice hours to 6 hours under the following conditions:

- Winds less than 30 knots and,
- Temperature above 10 degrees Fahrenheit and,
- When transiting solid ice (not breaking through the ice during transit).

WARNING:

Per reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), there shall be no ice rescue operations when the combined air temperature and wind velocity exceeds a wind chill factor of -54 degrees Fahrenheit without first obtaining approval from operational command (OPCON).

WARNING:

Swift water moves with sufficient force to present a significant risk of injury or death. Coast Guard ice rescue teams are not trained or equipped to operate in swift water.

Since it is difficult to assess the presence of swift water beneath the ice, local area knowledge is essential. Ice rescuers are guided by reference (b), Operational Risk Management, COMDTINST 3500.3 (series).

Some measures to reduce risk when operating in areas where current is present include: additional personnel and supervision, additional equipment (SKF-ICE, ice staff, tending lines), and assistance from local SAR partners.

A.4.a.(1). Surface Team Monitoring	See Chapter 2: Roles, Section A.6. Teaming Monitoring (Surface Training) for team monitoring details.
A.4.b. Aviation	Risk management per reference (f), U.S. Coast Guard Air Operations Manual, COMDTINST M3710.1 (series), and reference (b).
A.4.b.(1). Weather	Parameters for flying in cold weather/ice per reference (k), U.S. Coast Guard Flight Manual Series HH-65C Helicopter, CGTO 1H-65C-1, and reference (l), U.S. Coast Guard Flight Manual Series MH-60T Helicopter, CGTO 1H-60T-1, include the following: • En route. • On-scene weather. • Before and after the recovery.
A.4.b.(2). Flight Characteristics	Flight characteristics per reference (f) , include the following: • Endurance: ➢ In optimal conditions, H65 aircraft have a 100 nautical mile action radius and a capacity for evacuating 1 to 5 persons. ➢ In optimal conditions, H60 aircraft have a 100/200 nautical mile action radius and a capacity for evacuating 6 to 15 persons.

- Weather and nearest refuel location determine on-scene endurance.

- Established time to arrive on scene (max speeds).
- MH-65 aircraft are in an emergency situation and not capable of continuing flight with indications of airframe icing.

A.5. Pre and Post Mission Checks

See Appendix C: USCG Ice Rescue Daily Pre/Post Mission Checks for daily/weekly routine checks.

A.6. Cutters

A cutter response is potentially optimal for mass rescue operations and other cases when anticipating greater lengths of time on scene.

Planners consider the following:

- Location of the rescue.
- Condition of the ice.
- Water depth restrictions imposed by the cutter's navigational draft.
- Potential for the cutter to worsen the ice conditions by wake breaking and pressure cracks.

Cutters maintain an Ice Rescue Bill with positions assigned in the Watch Quarter Station Bill (WQSB).

A.7. Motor Vehicle Response

Per reference (n), Motor Vehicle Manual, COMDTINST M11240.9, government-owned vehicles used to transport ice rescue personnel and equipment to scene in emergencies are "operational vehicles."

WARNING:

Per reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), never drive GVs on the ice-covered waterways.

A.7.a. Pre-Response

Ensure/verify the following:

- Conduct ORM per reference (b), Operational Risk Management, COMDTINST 3500.3 (series).
- Tow vehicle/trailer weight rating not exceeded (all gear loaded) (Per reference (n), for trailer operator training and PQS materials, visit the D9 Ice Rescue CGPortal website).
- Vehicle is suitable for winter driving conditions, i.e., 4X4 or AWD.
- Vehicle is of sufficient size to accommodate all equipment/personnel.
- Vehicle is equipped with snow or all-season tires.
- Daily vehicle/trailer safety inspection/checklist complete.
- Vehicle/trailer maintenance is current.

- Daily ice rescue equipment inspection complete.
- Vehicle operator has the training and qualifications, and follows guidelines in reference (n), Motor Vehicle Manual, COMDTINST M11240.9.
- Vehicle operator possesses a valid state driver's license.
- Ice rescue response vehicle is ready to deploy.

A.7.b. Response

- Maintain ORM throughout the response.
- Follow safest route to scene.
- Obey speed limit.
- Reduce speed as road conditions worsen.
- Reduce speed as visibility decreases.
- Be prepared to brake for wildlife.
- Drive defensively.

A.7.c. Stowage

Figures 3-1 through 3-7 illustrate current best practices for stowing ice rescue equipment in GVs.

Figure 3-1 Bed extended

Figure 3-2 Front radio set-up

Figure 3-3 Bed left

Figure 3-4 Bed right

Figure 3-5 Cab left

Figure 3-6 Cab left (close-up)

Figure 3-7 Cab right

A.8. Ice Rescue Scene Preparation

Ice rescuers must exercise sound decision making based on prevailing conditions and follow the guidelines established by the CO/OIC, reference (d), U.S. Coast Guard National Ice Rescue School: Ice Rescuer Course (IRC), 2013, and this publication.

A.8.a. On-Scene Assessment

Gather the following information before conducting an ice rescue:

- Can you see victim or victims?
- Evaluate victim's condition. Ask the victim:
  - Are you alone?
  - How long have you been in the water or on ice?
  - Can you feel/move your hands and feet?

NOTE: **If the victim is conscious and able to assist, direct him or her to self rescue before losing mobility.**

- Evaluate ice conditions.
- Evaluate weather.
- Assess equipment available.
- Assess manpower available.
- Establish communication with station.
- Assess risk using ORM.
- Choose proper technique:
  - Surface:
    - Guide victim with self rescue.
    - Use "Reach" technique.
    - Use "Go" technique.
  - Aviation (refer to reference (o), U.S. Coast Guard Helicopter Rescue Swimmer Manual, COMDTINST M3710.4 (series), and Chapter 9: Aviation).
    - Helicopter ice disembark procedure.
    - Direct deployment ice recovery procedure.
    - Hover over solid ice deployment procedure.

WARNING: ***Surface ice rescuers and aircrew should always be prepared to self rescue. Refer to Chapter 4, Section A.6.: Self Rescue Technique for guidance on self rescue.***

Section B: Operational Risk Management

B.1. Risk Management

The ice rescue team leader, rescuers, and command must exercise sound judgment on a case-by-case basis and make appropriate recommendations to OPCON per the following:

- Reference (b), Operational Risk Management, COMDTINST 3500.3 (series).
- Reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series).
- Reference (f), U.S. Coast Guard Air Operations Manual, COMDTINST M3710.1 (series).
- Reference (p), Boat Crew Seamanship Manual, COMDTINST M16114.5 (series).

Factors that reduce a responder's functional readiness and capability to safely respond include:

- Wind burn.
- Frost nip/frost bite.
- Exposure.
- Fatigue.
- Dehydration.

Account for these additional factors within the ORM assessment:

- Poor ice conditions.
- Extreme negative temperatures.
- Reduced visibility (night, snow, fog, rain, etc.).

NOTE: **For guidance on surface animal rescue, consult reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical Maritime Search and Rescue Manual (IAMSAR), COMDTINST M16130.2 (series). For guidance on aviation animal rescue, consult reference (a) and reference (f).**

WARNING:

Per reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), there shall be no surface ice rescue operations conducted when the combined air temperature and wind velocity exceed a wind chill factor of -54 degrees Fahrenheit without first obtaining approval from OPCON.

Section C: Search on Ice

C.1. Overview

Per reference (d), U.S. Coast Guard National Ice Rescue School: Ice Rescuer Course (IRC), 2013, searches conducted on or over ice can combine normal concepts of maritime SAR with elements of land SAR. Ice rescue teams conduct a search when the subject of a distress incident is not at the reported position and/or cannot be immediately located, or when the distress report does not include specific or accurate location information.

Ice rescue teams are short-haul resources intended primarily to conduct rescues and searches where the entire search area is small (less than 1 square nautical mile)/confined within a harbor, small bay, or marina.

C.2. Search Planning and Coordination Guidance

Per reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (SAR) to the International Aeronautical and Maritime SAR Manual (IAMSAR), COMDTINST M16130.2 (series), the SMC for a SAR incident must develop and issue a search action plan (SAP) that directs the search efforts of responding SRUs. The SMC is also responsible for coordinating the overall SAR effort.

The SMC assigns an on-scene coordinator (OSC) to help coordinate efforts at the scene/in the search area when it increases effectiveness of the SAR efforts. The OSC is the central point of communication with SRUs and advises the SMC of conditions on scene requiring the adjustment of the SAP.

C.3. Immediate Response to Distress Situations

Units can initiate action for known distress incidents under Maritime SAR Assistance Policy (MSAP) of reference (a) which governs the Coast Guard's response to reports of SAR incidents. Reference (a) also provides for immediate response for any situation classified as distress.

Revision

C.4. Initial Report and Gathering Information

Upon receiving a report of a missing person(s) on the ice, gather the following pertinent information:

- Last known position (LKP).
- Number of missing persons.
- Intended route/destination/activity.
- Physical description (of each).
  - Name.
  - Age.

- Gender.
- Physical state.
- Mental state.
- Wearing PPE?
- In possession of safety equipment?

- Type of conveyance.

NOTE: **Pertinent information gathered for a missing person(s) is listed in the Ice Rescue SAR check sheet [reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical Maritime Search and Rescue Manual (IAMSAR), COMDTINST M16130.2 (series), or quick response card (QRC) found in reference (q), Command Center QRC, Tactics, Techniques, and Procedures (TTP), CGTTP 3-56.1 (series)].**

C.4.a. Pass Information to OPCON/SMC

Reference (a) requires Coast Guard units other than the SMC's units to immediately relay received distress information to the SMC.

C.4.b. Pre-Response Actions by the Ice Rescue Team Leader

The ice rescue team leader:

- Determines the safest, most expeditious route to scene or launch site.
- Determines means of travel to scene (GV, special purpose craft-airboat (SPC-AIR), foot, SKF-ICE).

NOTE: **SKF-ICE is a short-haul conveyance designed primarily to transport ice rescue teams to the last known position of the subject in distress. SKF-ICE is used for limited searching only when no other suitable conveyances are available or capable.**

- Brief team on situation consisting of:
  - Location of search area.
  - LKP.
  - Missing person (s) pertinent information (see Chapter 3: Mission Planning, Section C.4. Initial Report and Gathering Information).
  - Area information and potential hazards.

- Last activity of missing person(s).

- Means of communications and designated frequencies.
- Conduct ORM per reference (b), Operational Risk Management, COMDTINST 3500.3 (series).

C.4.c. Deployment of Ice Rescue Team

The team travels to:

- Last known position of missing person(s) or launch site.
- Search staging area (if determined).

NOTE: **While the team is in transit, the team leader maintains communication schedule with OPCON. New/developing information regarding the situation may be passed while in transit.**

C.4.d. Arriving On Scene

After arriving on scene, the team leader:

1. Assesses situation.
2. Identifies hazards.
3. Reassesses risk.
4. Requests air or additional ground support as necessary.

WARNING: ***The ice rescue team leader determines if conditions for on-foot searches are safe enough only after analyzing the actual on-scene conditions and risk assessment.***

C.4.e. Halting SAR Response Guidance

Per reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (SAR) to the International Aeronautical and Maritime SAR Manual (IAMSAR), COMDTINST M16130.2 (series), the SMC, SRU, or other person in the SAR chain of command can halt an SRU response if/when changing on-scene conditions exceed SRU operational limits, or those changed conditions present an unacceptable risk assessment.

Stopping an SRU response does not change the status of the overall SAR response. The SRU waits until conditions improve or for arrival of another responding SRU(s).

C.4.f. Determine Missing Person Clues

Look for clues that are specific to the missing person(s), including:

- Footprints.
- Sled tracks.
- Personal effects.
- Ski/skate tracks.
- Snow or ice disturbances.
- Debris.

NOTE: **Best practice is to help preserve clues and signs by marking with noticeable objects, i.e., chemlights, flag markers, and/or any available means of making a visual aid.**

C.4.g. Determine Probable Direction of Travel

To determine the probable direction of missing person(s) travel, consider the following:

- LKP.

NOTE: **"Point last seen" may be a sighting of the missing person(s) and may or may not establish LKP of the missing person(s).**

- Intended route of missing person(s) (subjective and deductive).
- Activity of missing person(s), i.e., hiking, fishing, skiing, etc.
- Sign and clues left behind by missing person(s).

NOTE: **Be aware of misleading or false clues.**

- Specific input about physical and psychological condition of missing person(s), i.e., dementia, wandering, medical issues, suicidal, etc.

NOTE: **Additional information about the missing person(s) might change search tactics.**

Revision

C.5. Additional Considerations

- An ice rescue foot search team should include a member (usually team leader or coxswain) who has completed SAR system training which is met by either attending the Search Coordination & Execution (SC&E) exportable course or completing the E-SAR course.
- Two hours is considered a reasonable search endurance for a single ice rescue team on foot.
- Never assign a single ice rescue team on foot more than a 4-hour search without concurrence from ice rescue team leader, SMC, and SAR coordinator.

NOTE:

This information is currently in reference (r), Cleveland SAR Plan, D9INST M16100.1 (series), but can eventually be found in reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (SAR) to the International Aeronautical and Maritime SAR Manual (IAMSAR), COMDTINST M16130.2 (series).

C.5.a.(1). Surface Team Monitoring

See Chapter 2: Roles, Section A.6. Teaming Monitoring (Surface Training) for team monitoring details.

C.6. Search Datum

- Datum is the singular form of data.
- For searches, it is a singular reference point, usually associated with a last known position or starting point of a search effort.
- If a datum is well-defined, such as a latitude/longitude or area of freshly broken ice, rescuers can use a more "focused" grid search, such as circular search (CC).

C.7. Engage Other Responders

If other agencies are on scene, the team leader considers the following before participating in a coordinated search effort:

- Other agencies and volunteers often bring specialized skills.
- Volunteers are not tasked with but may be advised of areas not covered.

WARNING:

Discourage inexperienced/improperly outfitted volunteers from venturing out onto the ice due to increased risk of injury.

- Engage other rescue leaders for unity of effort.
- State/local authorities usually have shared jurisdiction.
- State/local authorities are not obligated to follow USCG SAR guidance.

- USCG responders receive tasking directly from USCG team leader.

NOTE: **Joint ice rescue training and exercises build effective partnerships and improve familiarity with inter-agency equipment/capabilities for enhanced unity of effort.**

Figure 3-8 Multiple agency responders

C.8. Resource Selection Process

Once the team leader has ascertained the scenario, use the following process to make resource selections:

- Scenario development leads which to,
- Search area characteristics which leads to,
- Clue expectations which leads to,
- Resource selection.

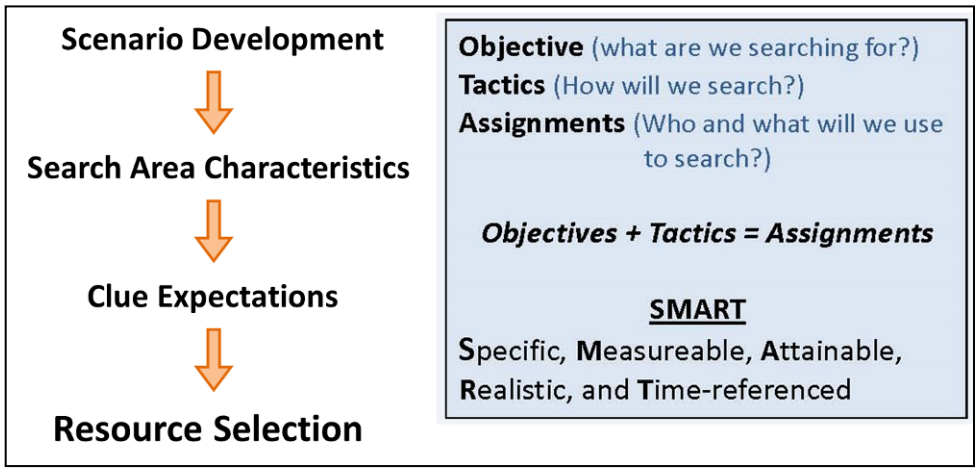


Figure 3-9 Resource selection flow chart

Objectives	Tactics	Assignments
Quick find	Hasty, route, spot search	Search teams, SPC-AIR, aircraft
Containments	Trail blocks, track traps, waterway perimeter	Containment teams (clue aware searchers)
Induce self recovery	Sounds, smells	Noticeable and enticing (music/horn/smoke)
Clue detection methods/equipment	Hasty, contour, track line, grid	Forward looking infrared (FLIR), radar, night vision goggles (NVG), binoculars

Table 3-1 Resource selection process

C.9. Means of Detection

Your natural means of detection are your eyes and ears. Use available equipment that enhances your natural means of detection, including:

- Binoculars.
  - ➢ Increased visual acuity/distance.
- Spotlight.
  - ➢ Focused illumination.
- Illumination flares (MK-127).
  - ➢ Wide area illumination.
- Monocular night vision device (MNVD).
- FLIR device.

CAUTION:

Illumination devices (spotlights/flares) produce bright lights that can damage night detection devices (NVG)/FLIR) and impact one's natural night vision. Coordinate illumination activities with rescue team leader(s).

C.10. Types of Searches

C.10.a. Hasty or Reflex Search

A hasty or reflex search is to send a fast moving, well trained crew of searchers to quickly check selected high probability areas. High probability areas include:

- Nearby structures.
- Freshly broken ice.
- Well traveled routes/trails.
- Nearby attractions.

Members of the hasty or reflex search team identify and preserve signs and clues as follows:

- Spread out in pairs while looking for clues in high probability places.
- Remain in communication with team leader.
- Remain within sight of one another.
- Be “clue conscious” or in tune with what clues to look for.
- Use “call-out” (attraction) and “listen” (detection) techniques. For further details, see reference (s), Land Search and Rescue Addendum to the National Search and Rescue Supplement to the International Aeronautical and Maritime Search and Rescue Manual, Version 1.0, November 2011.

C.10.b. Grid Search

Generally, search team endurance limits ice rescue teams searches to small areas, when, for example:

- Confined within harbor/bay.
- The entire search area is less than 1 square nautical mile.
- Targeting high probability areas supplemental to search efforts by other conveyances.

Per reference (r), Cleveland SAR Plan, D9INST M16100.1 (series), ice rescue teams generally use the following search patterns:

1. Shoreline/contour.
2. Circular search (CC).
3. Trackline multi-unit return (TMR).
4. Parallel multi-unit (PM).

C.10.b.(1). Grid Foot Searches

Per reference (d), U.S. Coast Guard National Ice Rescue School: Ice Rescuer Course (IRC), 2013, conduct grid foot search (usually follows a hasty search) as follows:

- Move slowly and deliberately.
- Average foot speed is 1.5 to 2.0 knots on snow-covered ice.
- Follow team grid search formations (see figure 3-11).

C.10.b.(2). Team Grid Search Formations

Team grid search formations:

- Are evenly spaced and within sight of one another.
  - Foot searcher track spacing. Track spacing for foot searchers should be no greater than 100 yards under ideal environmental conditions, in order to achieve acceptable probability of detection (POD) levels for a low profile object. Night search activities on foot should employ track spacing no greater than 50 yards. Reduced visibility lessens track spacing accordingly. Using infrared (IR) and NVG devices can increase track spacing at night up to 100 yards.
- Are in abreast, slant, or "V" formations.
- Follow along a specified direction, route, or contour.
- Have a "guide" or team leader (not always the same person).

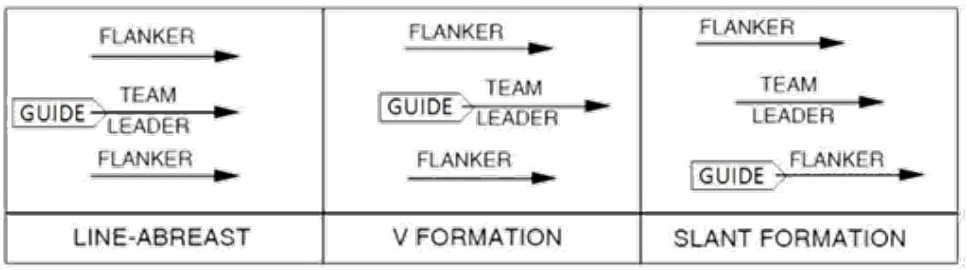


Figure 3-10 Team formation diagram

C.10.b.(3). Time Distance Table

ICE RESCUE RESPONDER FOOT SPEED, DISTANCE, & TIME TABLES

TI

TIME/DISTANCE TABLE AT 1.5KTS

TIME	DISTANCE YARDS	DISTANCE NM
10s	8.2	.0041
15s	12.4	.0062
20s	16.6	.0083
30s	25	.0125
40s	33.2	.0166
45s	37.4	.0187
50s	41.6	.0208
1 m	50	.0250

TIME/DISTANCE TABLE AT 2KTS

TIME	DISTANCE YARDS	DISTANCE NM
10s	11	.0055
15s	16.6	.0083
20s	22.2	.0111
30s	33.2	.0166
40 s	44.4	.0222
45 s	50	.0250
50 s	55.4	.0277
1 m	66.6	.0333

Figure 3-11 Time/distance for ice rescuer

Use GPS or stopwatch and compass to execute traditional maritime search patterns, e.g., parallel search (PS), trackline search (TS) as directed by the SMC per reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical Maritime Search and Rescue Manual (IAMSAR), COMDTINST M16130.2 (series).

Prepare to conduct a contour search that might change to a “TS or route search” pattern.

NOTE: **Contour searches follow a shoreline, ice edges, windrows, and/or are dictated by terrain and barriers.**

C.10.c. Contour or Shoreline Search

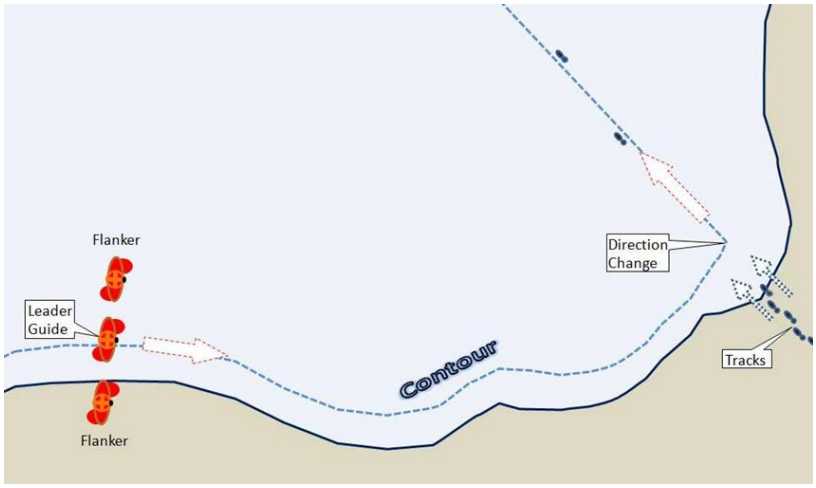


Figure 3-12 Abreast team formation conducting contour search

NOTE:

Contour/shoreline searches follow along a shoreline and are dictated by terrain and barriers. They are used to detect clues and may help determine whether or not the subject is within the ice covered waterway. A contour search can change to a route search if clues are found that lead the team along tracks.

C.10.d. TS or Route Search

A TS follows a heading based on probable direction of travel of the missing person. Route searches follow along a probable path of the subject based on established trails, signs, and clues.

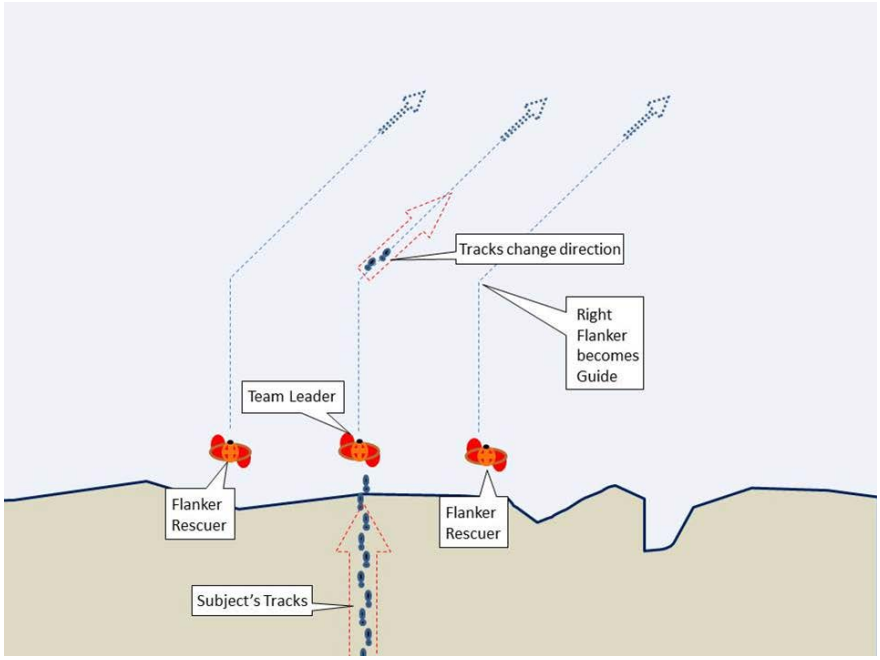


Figure 3-13 TS to route search

C.10.e. CC Search

To conduct a CC search:

- Use 550-foot line reel or 150/200-foot tend line.
- Anchor close to datum (see Chapter 3: Mission Planning, Section C.6. Search Datum).
- Space rescuers along line based on effective range of detection.
- Team members use line to maintain spacing.
- Outermost team member leads pace and ensures line tension and alignment of search team.

NOTE:

Search area can be expanded with additional tending line.

Figure 3-14 CC search

NOTE:

Per reference (r), Cleveland SAR Plan, D9INST M16100.1 (series), in no case shall a single ice rescue team on foot conduct more than a 4-hour search without concurrence from ice rescue team leader, SMC, and SAR coordinator.

C.10.f. SPC-AIR Searches

- After arriving on scene, perform a 360-degree visual scan (using binoculars if available) from the ice surface or the SPC-AIR 22-foot cabin top.
- As a surface "long-haul" asset, the SPC-AIR conducts surface grid searches as directed by SMC.
- Low height of eye, poor line of sight from inside the cabin, and vibration can severely impact detection capability.
- Search patterns for the SPC-AIR should not depend on precise turning/maneuvering techniques.
- The preferred method for the SPC-AIR is the "stop and sprint" search technique.

C.10.g. "Stop and Sprint" SPC-AIR Search

SMC provides an ordered list of "stop" positions. On-scene endurance determines the number of stops and spacing between the stops.

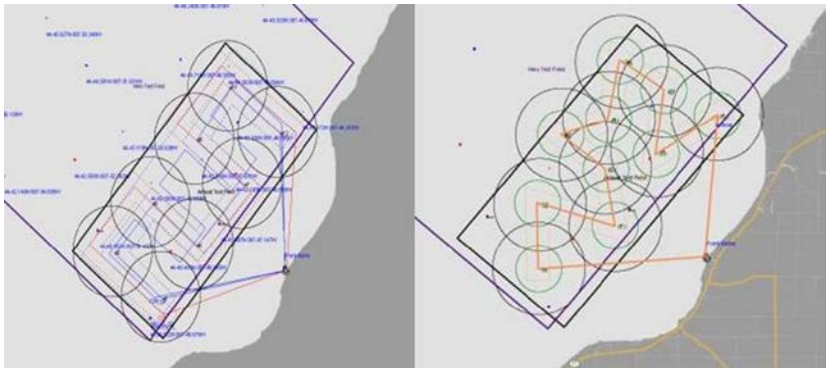


Figure 3-15 "Stop and Sprint" search pattern

CAUTION: **Stopping on the ice poses a risk of the SPC-AIR freezing in place. Ratchet straps attached to ice anchors and under tension coupled with fan power have proven effective at freeing the hull.**

C.10.g.(1). Conduct a "Stop and Sprint"

To conduct a "stop and sprint" search pattern, the SPC-AIR coxswain:

1. Stops at each waypoint.
2. Secures engine.

NOTE: **SPC-AIR crew disembarks at each waypoint, listens, and performs a 360-degree visual scan (with the aid of binoculars if available) from the ice surface or the SPC-AIR 22-foot cabin top.**

NOTE: **Although SPC-AIR has limited search capability while in motion, the crew continues to search during each "sprint" during the "sprint and stop" search.**

3. Proceeds to next waypoint.
4. Repeats steps 1 through 3 until finding the missing person(s) or ending the search.

Figure 3-16 Crew scanning from the SPC-AIR

C.10.h. Aviation Searches

Helicopter SRUs conduct searches over ice in the same manner as over open water.

Revision

C.11. Suspension of Search

Per reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical Maritime Search and Rescue Manual (IAMSAR), COMDTINST M16130.2 (series), full suspension of a SAR response can only be made by the SAR coordinator or persons in the SAR chain of command who have delegated authority, and based on SMC advice.

NOTE: **Search teams that come across abandoned equipment should report description of equipment. If possible, mark equipment with visual aid to prevent future search calls to the same area (see figure 3-18).**

Figure 3-17 Example of visual aid

Chapter 4:
Mission Execution

Introduction This chapter discusses the physical techniques used to rescue victim(s).

In This Chapter This chapter contains the following sections:

Section A: Ice Rescue Procedures

NOTE: **For this entire chapter, see reference (d), U.S. Coast Guard National Ice Rescue School: Ice Rescuer Course (IRC), 2013.**

A.1. On-scene Decisions

Once on scene, use sound judgment to make the final decision on the specific gear and techniques used to effect the rescue. Consider the following factors in selection decisions:

Victim status:

- Conscious and able to assist.
- Conscious and unable to assist.
- Unconscious.

Establishing contact with the victim is critical in determining the method of rescue. After arriving on scene, establish contact with the victim, and ascertain his or her status by asking the following three questions:

- Are you alone?
- How long have you been in water?
- Can you feel your hands and feet?

NOTE: **If the victim is conscious and able to assist, direct him or her to self rescue before losing mobility.**

A.2. Standard Commands

Use the four standard commands below when conducting ice rescue operations and training:

- Avast – Do not give or take any line.
- Ease – Slacken the line.
- Heave Around – Tension the line and slowly pull.
- Help – Distress.

A.2.a. Communications/ Signals

The following are communications/signals for each standard command:

A.2.a.(1). Avast

Verbal	AVAST
Arm signal	Arm straight up with a fist (figure 4-1)
Light signal	Wave horizontally from left to right
Whistle	One blast
Line-pull	One pull

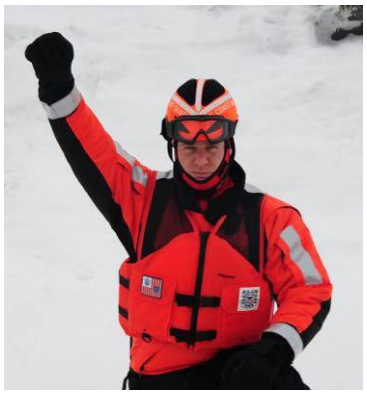


Figure 4-1 Avast arm signal

A.2.a.(2). Ease

Verbal	EASE
Arm signal	Wave arm up and down vertically (figure 4-2)
Light signal	Light up and down vertically
Whistle	Two blasts
Line-pull	Two pulls

Figure 4-2 Ease arm signal

A.2.a.(3). Heave Around

Verbal	HEAVE AROUND
Arm signal	Arm up, making circular motion (figure 4-3)
Light signal	Light up, making large circular motion
Whistle	Three blasts
Line-pull	Three pulls

Figure 4-3 Heave around arm signal

A.2.a.(4). Help

Verbal	HELP
Arm signal	Wave both arms vigorously (figure 4-4)
Light signal	Vigorous waving light
Whistle	Four or more blasts
Line-pull	Four or more pulls of line

Figure 4-4 Help arm signal

Revision

A.3. Transiting on Ice

Transiting on ice is a critical step when conducting ice rescue operations and training exercises. Per reference (h), CG-731 Authorization for Ice Rescue Staff memo 10470 of 25 Nov 14, the ice staff is a tool to assist the ice rescue team in determining ice quality. It also adds stability when transiting rough terrain and in adverse conditions. Always make verbal contact with victim and continue to give direction to victim throughout the rescue.

NOTE: **Use the ice staff to probe ice to assess ice quality.**

NOTE: **Always tether the rescuer during a rescue unless operating the SKF-ICE.**

WARNING: ***Handle the spike end of the ice staff with care; improper use can lead to rescuer injury or damage to PPE.***

Step	Action
1	Reassess ORM, scene, and situation.
2	Team members spread out 10 to 15 feet from each other to distribute weight over a larger area.
3	With ice staff in hand, move slowly forward over the ice, distribute your weight as much as possible, and tap spike in a semicircular pattern to test ice quality.

Figure 4-5 Transiting ice

WARNING:	***Use sound judgment when reaching questionable ice (refer to Appendix B: Ice Development and Characteristics).***

NOTE:	**Strong ice has a hard, resonant sound while weak ice has the sound of a dead thud or cracking.**

4	If approaching an area of weak ice, drop down to a crawl. As the ice weakens further, consider one of the following transiting options: • Use the ice staff. ➢ Lay flat distributing your weight evenly on the ice. ➢ Place the ice staff perpendicular to your chest with your hands on top.

NOTE:	**Placing ice staff perpendicular to your chest helps distribute your weight and makes it easier to shimmy or crawl forward with ice staff in your hands.**

4 (cont'd)	➢ Crawl to the victim. • Roll, crawl, shimmy. • Use MARSARS shuttle board or SKF-ICE.

Figure 4-6 Rescuer crawling over thin ice

Figure 4-7 Rescuer transiting weak ice using MARSARS shuttle board and ice awls

Figure 4-8 Transiting with ice staff

A.4. Establishing an Anchor Point

Step	Action
1	Assess quality of ice.
2	Determine anchor technique using sound judgment: endless sling or ice anchor.

A.4.a. Setting The Ice Anchor

Step	Action
1	Select an ice anchor area with ice that is solid and strong.
2	Remove protective cover from ice anchor.
3	Place ice anchor vertically with sharp section down onto the ice.
4	While applying slight pressure downward, begin rotating ice anchor handle clockwise until threads begin to penetrate ice.

WARNING: ***Keep hands away from sharp end/threaded areas to avoid injury to hands or damage to gloves.***

5	Continue to screw the ice anchor into the ice all the way down.  **Figure 4-9 Screw anchor all the way down, noting ice "core sample"**
6	Attach the tending line carabiner hook to the eye on the ice anchor handle.  **Figure 4-10 Properly installed ice anchor with tending line attached**

NOTE: **The extruded ice also provides a core sample of the ice to help assess ice strength.**

A.4.b. Affixing the Endless Sling Anchor Point

Step	Action
1	Select a nearby stationary object suitable as an anchor point.
2	Wrap the sling around the object and insert one end through the eye on the opposite end forming a choking strap.
3	Connect the tending line to the free eye.

WARNING: ***Use care when attaching endless sling to a moveable object such as a vehicle bumper hitch or snowmobile.***

A.5. Tending Line Procedures

Tend lines hand over hand as directed by the rescuer's signal.

Figure 4-11 Rescue team tending line

NOTE: **This technique reduces hand fatigue and line slippage in neoprene gloves.**

A.6. Self Rescue Technique

The rescuer or victim can use this technique with the ice staff or with/without ice awls to climb out of the ice. The rescuer talks the victim through the procedures.

NOTE: **Self rescue techniques are for victims that are conscious and able to assist.**

NOTE: **Encourage/reassure the victim by talking to him or her. Continual verbal contact also allows you to assess the physical state of the victim.**

WARNING: ***Exposure to cold water limits the victim's ability to assist in the rescue.***

A.6.a. Ice Staff

The following are standard procedures for self rescue with the ice staff:

Step	Action
1	Establish ice shelf with ice staff across chest and hands on top (shoulder width apart).  **Figure 4-12 Establishing ice shelf**
2	While pushing down as evenly as possible on the ice shelf with the ice staff, use the staff and kicking action to propel yourself onto ice shelf.  **Figure 4-13 Pushing down on ice staff and kicking action**

3	Slowly move forward while holding the ice staff against ice.
4	Place one knee on ice shelf to assist with self extraction.
5	Once onto the ice, crawl, shimmy, or roll to stronger ice.

NOTE: **To assist rolling motion, place ice staff parallel to body.**

WARNING: ***The ice staff does not replace the use of ice awls because doing so increases the risk of injury or damage to PPE.***

WARNING: ***Handle the spike end of the ice staff with care; improper use can lead to rescuer injury or damage to PPE.***

A.6.b. Without Ice Awls

The following are standard procedures for ice rescue without ice awls:

Step	Action
1	Establish ice shelf. Slowly spread arms onto ice edge keeping hands near your chest and forearms on the ice.  **Figure 4-14 Self rescue with forearm distributing weight**
2	While pushing down as evenly as possible on the ice shelf with both forearms, use forearms and kicking action to propel yourself onto ice shelf.  **Figure 4-15 Use forearms and kicking action to propel onto the ice**

3	Place one knee on ice shelf to assist with self extraction.  **Figure 4-16 Place one knee onto ice shelf**
4	Once onto the ice, roll to stronger ice.  **Figure 4-17 Roll to stronger ice**

A.6.c. With Ice Awls

The following are standard procedures for self rescue with ice awls:

Step	Action
1	Establish ice shelf. Slowly push ice awls at slight angle toward your body for best traction and avoid long reaches.  **Figure 4-18 Self rescue with awls at slight angle**
2	While pulling yourself onto ice edge, use a kicking action to propel yourself onto ice shelf.  **Figure 4-19 Use awls to pull self onto ice shelf with kicking action**

3	Place one knee on ice shelf to assist with self extraction.  **Figure 4-20 Place one knee onto ice shelf**
4	Once onto the ice, roll to stronger ice.  **Figure 4-21 Roll to stronger ice**

A.7. Reach Technique

Use this technique when victim is close to the rescuer. It is the safest technique for the rescuer and requires victim to assist rescuer by holding onto a reach object. Rescuer wears cold water rescue sling in prescribed manner. Rescuer is connected to tending line bag or 550-foot line reel with double float end connected to rescue harness D-ring.

If "Reach" technique does not work due to victim's condition, the rescuer can easily switch to a "Go" technique.

NOTE: **Self rescue techniques are for victims who are conscious and able to assist.**

NOTE: **Encourage/reassure the victim by talking to him or her. Continual verbal contact also allows you to assess the physical state of the victim.**

WARNING: ***Exposure to cold water limits the victim's ability to assist in the rescue.***

A.7.a. MARSARS Shuttle Board Forearm Sling

The following are standard procedures for performing ice rescue using MARSARS shuttle board forearm sling when the victim is conscious and able to assist:

Step	Action
1	Ice rescue teams are outfitted with prescribed PPE, and two rescuers wear MARSARS cold water rescue sling in the prescribed manner.  **Figure 4-22 Rescuer with MARSARS cold water rescue sling**
2	Connect MARSARS shuttle board to end of either 150/200-foot MARSARS tending line or 550-foot line reel.  **Figure 4-23 Connect tending line to MARSARS shuttle board**

2a	Ensure proper configuration of forearm sling release mechanism per manufacturer's guideline (mechanical and Velcro devices).  **Figure 4-24 Properly configured forearm sling mechanical release device**
3	Have team member connect black MARSARS shuttle board tending strap to the rescuer's D-ring on the rescue harness.  **Figure 4-25 Tender connects strap to rescuer harness**
4	Using transiting on ice procedures, maneuver to within a board's length of victim.  **Figure 4-26 Rescuer transiting ice with MARSARS shuttle board and ice awls**

NOTE: **Rescuers can use the MARSARS shuttle board as a sled for additional support, and propel using the attached ice awls.**

5	Once rescuer is a board's length from victim, carefully dismount shuttle on side opposite the sling.  **Figure 4-27 Rescuer rolls onto ice on side opposite MARSARS cold water rescue sling**
6	Crawl toward victim, pull board to within the victim's reach, and push board toward victim taking care not to push victim off of the ice shelf.  **Figure 4-28 Rescuer eases board toward victim**

7	Direct victim to assist by placing both forearms through sling and firmly grasping the elbows.  **Figure 4-29 Victim grasps elbows through forearm sling**
8	Rescuer tilts board up into the air, signals HEAVE AROUND, and pushes shuttle into the water under victim to help victim get on the board.  **Figure 4-30 Rescuer tilts board while team heaves around**
9	With victim aboard, pull the shuttle out of the water and onto the ice, toward line tenders.  **Figure 4-31 Victim hauled out onto the ice**

10	Once onto stronger ice, rescuer signals AVAST, stabilizes the board with feet, and repositions the victim fully on the board for proper transport.  **Figure 4-32 Victim is repositioned on board for transport**
11	Rescuer positions self by placing one knee on board between victim's calves and grasping rear handles.  **Figure 4-33 Rescuer positioned on board with victim**
12	Rescuer signals HEAVE AROUND. Both rescuer and victim are pulled to safety.  **Figure 4-34 Rescuer and victim ride board to safety**

A.7.b. Ice Staff Animal Rescue

The following is an optional procedure for performing domestic animal rescue with the ice staff.

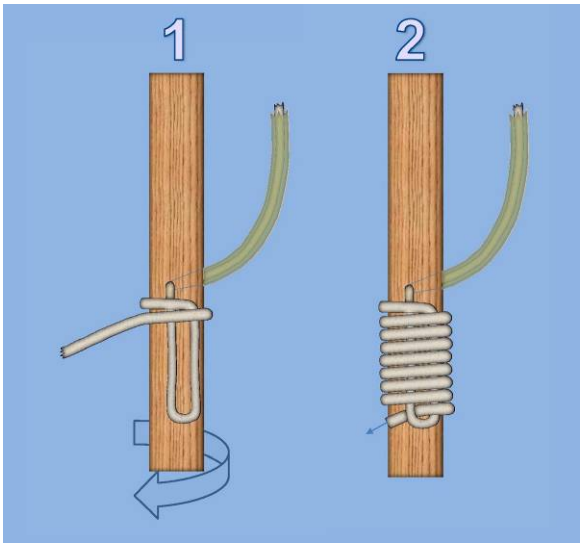
Step	Action
1	Untie the knot and remove turns from the excess line near the rescue loop.  **Figure 4-35 Untying knot and removing turns**
2	Clip carabiner tending line to the eye at the end of the rescue loop.  **Figure 4-36 Clipping carabiner tending line**

3	Pull on the rescue loop for desired rescue loop size.  **Figure 4-37 Rescue loop size**

NOTE: **Using Transiting on Ice Procedures, maneuver to within staff length of animal. To reduce risk of breaking the ice shelf, approach the animal at a minimum 45-degree angle.**

4	Place rescue loop around animal.  **Figure 4-38 Rescue loop around animal**

5	Pull tending line to size rescue loop around animal.  **Figure 4-39 Sizing rescue loop**
6	Rotate ice staff to tighten rescue loop if needed for smaller animals.  **Figure 4-40 Rotating ice staff**

7	Guide animal to safety.
8	Once in a safe location, slacken the rescue loop until wide enough for animal to exit.
9	To reconfigure the rescue loop, tie a temporary whipping.  **Figure 4-41 Temporary whipping**

NOTE: **Be sure to leave enough room at the bitter end for a small bowline.**

A.8. Go Techniques

The "Go" technique is any procedure used when the rescuer has to physically "go" to the victim and manually effect the rescue. Use for victims who are conscious/able to assist, conscious/unable to assist, or unconscious.

A.8.a. Victims: Conscious/Able to Assist

WARNING: ***Instruct victim not to do anything until guided by you. Encourage/reassure the victim by talking to him or her. Continual verbal contact also allows you to assess physical state of victim.***

WARNING: ***Exposure to cold water limits the victim's ability to assist in the rescue.***

WARNING: ***Approach victims at a 45-degree angle to reduce risk of compromising the ice shelf.***

CAUTION: **Do not attach the rescue sling to the tending line until sling is on the victim.**

A.8.b. White Bear Rescue Sling and MARSARS Cold Water Rescue Sling

Rescuers can use this technique without the MARSARS shuttle board with any victim. Ice rescuer maintains verbal contact with victim at all times providing reassurance and instructions. Rescuer wears cold water rescue sling in prescribed manner. Do not connect the rescue sling to tending line until sling is secure on the victim, and the victim is ready for extraction.

A.8.b.(1). White Bear Rescue Sling

The following are standard procedures for performing ice rescue using White Bear rescue sling:

Step	Action
1	Ice rescue team is outfitted with prescribed PPE with one rescuer wearing the White Bear rescue sling, and the other rescuer wearing the MARSARS cold water rescue sling in the prescribed manner.

NOTE: **Wear the White Bear rescue sling in the same manner as the MARSARS cold water rescue sling. To achieve the closed position with the White Bear rescue sling, put the stainless steel carabiner through the choking loop and clip carabiner to the stainless steel ring.**

2	After inserting carabiner through “choking loop,” connect stainless steel carabiner to stainless steel O-ring. This puts sling into the closed position.
3	Using transiting on ice procedures, maneuver to within crawling distance of victim. Make final approach to victim using crawling motion to distribute weight. To reduce risk of breaking ice shelf in front of victim, approach victim at a 45-degree angle. If rescuer needs to enter water to perform sling application, enter far enough away to prevent breaking the ice shelf.

NOTE: **If using the "rescuer in water" rescue sling technique, the rescuer can separate the White Bear rescue sling and re-assemble around the victim without disturbing the victim's hold on the ice shelf.**

4	Using the rescuer's hand opposite the shoulder the sling is resting on, reach and grab victim's opposite hand (e.g., rescuer's right hand grabs victim's right hand). Simultaneously pull victim's arm through opening in sling and place sling over victim's arms and head and secure under armpit. Using forearm or chest, pin victim's hand/arm maintaining positive control of victim.
5	Rotate sling sufficiently to pull the victim's other arm through the sling, securing under the armpit.

NOTE: **If the choking loop slips off the sling, correct in the next step.**

6	While maintaining positive control of the victim, tighten the sling to the victim by sliding the choking loop over the carabiner and back along the sling.

WARNING: ***The White Bear water rescue sling might not have sufficient inherent buoyancy for a heavily clothed victim. Provide buoyancy by supporting the victim's head out of the water.***

7	After sizing the sling around victim, connect stainless steel carabiner to tending line thimble.

NOTE: **The White Bear rescue sling is best suited for rescues involving very large or very small-framed victims due to the inherent "cinching" characteristics of the sling.**

8	Rescuer signals HEAVE AROUND, and as line tenders begin to pull, rescuer sweeps victim's legs up and away from ice shelf and assists victim up and onto the ice.  **Figure 4-42 Verbally instruct line tenders to HEAVE AROUND**
9	If needed, rescuer performs self rescue to exit the water.
10	Perform victim transport procedures.

WARNING: ***White Bear rescue sling cannot be used with the MARSARS shuttle board, so one member always carries the MARSARS cold water rescue sling.***

NOTE: **White Bear rescue sling is an excellent tool for very small (e.g., children) or very large victims, as it can be sized to fit a variety of body sizes. Conversely, the MARSARS cold water rescue sling has limited sizing ability.**

A.8.b.(2). Donning Procedures for MARSARS Cold Water Rescue Sling

Step	Action
1	Hold sling with non-dominant hand with sizing balls facing dominant hand.
2	Reach dominant hand through sling, placing the sling on your non dominant shoulder.
3	Ensure sizing balls and sizing strap are on your back.

A.8.b.(3). Rescue Using MARSARS Cold Water Rescue Sling

The following are standard procedures for performing ice rescue using MARSARS cold water rescue sling:

Step	Action
1	Ice rescue team is outfitted with prescribed PPE, and two rescuers wear MARSARS cold water rescue slings in prescribed manner.
2	Teammate connects tending line to D-ring on rescuer harness.  **Figure 4-43 Teammate connects tending line to rescuer harness**
3	Using transiting on ice procedures, maneuver to within crawling distance of victim. Make final approach to victim using a crawling motion in order to distribute weight. To reduce risk of breaking ice shelf in front of victim, rescuer approaches victim at a 45-degree angle. If rescuer needs to enter water to perform sling application, enter far enough away to prevent breaking the ice shelf.  **Figure 4-44 Approach victim at a 45-degree angle**

4	Using rescuer's hand opposite the shoulder the sling is resting on, reach and grab victim's opposite hand (e.g., rescuer's right hand grabs victim's right hand).  **Figure 4-45 Firmly grasp victim's hand or wrist**
5	Grab as low on the sling as possible and simultaneously pull victim's arm through opening in sling. Place sling over victim's arms and head; secure under armpit. Using forearm or chest, pin victim's hand/arm maintaining positive control of victim.  **Figure 4-46 Pull victim's arm through sling and place over victim's head**

6	Rotate sling 90 degrees, grab victim's other arm and pull through the sling securing under other armpit. Secure sling under both armpits by grabbing nylon strap and rotating toward rescuer.  **Figure 4-47 While sling is rotated 90 degrees, pull victim's other arm through**

NOTE: **Position victim's arms to the side or downward to prevent slippage through the sling.**

7	While maintaining positive control with dominant hand, perform an arm curl, exposing the Velcro sizing strap. While reaching under the sling with non-dominant hand, grab yellow tab on Velcro sizing strap and size sling appropriately.  **Figure 4-48 Adjust sizing strap**

8	Connect rescue sling to thimble on tending line.  **Figure 4-49 Connect tending line**

NOTE: **If using the line reel, place a temporary eye approximately 7 to 8 feet from the end using an overhand knot in order to attach the rescue sling carabiner hook.**

9	Rescuer signals HEAVE AROUND.  **Figure 4-50 Give signal to HEAVE AROUND**
10	As line tenders begin to pull, rescuer sweeps victim's legs up and away from ice shelf and assists victim up and onto the ice.
11	If needed, rescuer performs self rescue to exit the water.
12	Perform victim transport procedures.

A.8.c. MARSARS Ice Rescue Shuttle and Sling/ Rescuer on Ice

Use this technique when victim is conscious and unable assist.

WARNING:

Instruct victim not to do anything until guided by you. Encourage/reassure the victim by talking to him or her. Continual verbal contact also allows you to assess physical state of victim.

A.8.c.(1). MARSARS Shuttle Board/ Cold Water Rescue Sling

Use the following standard procedures for ice rescues with MARSARS shuttle board and cold water rescue sling:

Step	Action
1	Ice rescue team has prescribed PPE, and two rescuers wear MARSARS cold water rescue slings.
2	Connect MARSARS shuttle board to end of either 150/200-foot MARSARS tending line or 550-foot line reel.  **Figure 4-51 Connect tending line to MARSARS shuttle board**
3	Properly configure forearm sling release mechanism per manufacturer's guidelines (mechanical and Velcro devices).  **Figure 4-52 Properly configured forearm sling mechanical release device**

4	Have team member connect black MARSARS shuttle board tending strap to the rescuer's D-ring on the rescue harness.
5	Using transiting on ice procedures, maneuver to within crawling distance of victim. Make final approach to victim using a crawling motion in order to distribute weight. To reduce risk of breaking ice shelf in front of victim, rescuer approaches victim at a 45 degree angle. If rescuer needs to enter water to perform sling application, enter far enough away to prevent breaking the ice shelf.  **Figure 4-53 Approach victim at a 45-degree angle**
6	Using rescuer's hand opposite the shoulder the sling is resting on, reach and grab victim's opposite hand (e.g., rescuer's right hand grabs victim's right hand).  **Figure 4-54 Firmly grasp victims' hand or wrist**

7	Grab as low on the sling as possible, simultaneously pulling victim's arm through sling opening. Place sling over victim's arms and head; secure under armpit. Using forearm or chest, pin victim's hand/arm maintaining positive control of victim.  **Figure 4-55 Pull victim's arm through sling and place over victim's head**
8	Rotate sling 90 degrees, grab victim's other arm and pull through the sling securing under other armpit. Secure sling under both armpits by grabbing nylon strap and rotating toward rescuer.

NOTE: **Position victim's arms to the side or down to prevent slipping through the sling.**

9	Maintain positive control with dominant hand and perform an arm curl to expose the Velcro sizing strap. While reaching under the sling with non-dominant hand, grab yellow tab on Velcro sizing strap and size sling appropriately.
11	Attach the snap hook on the rescue sling to the large stainless steel O-ring on the shuttle forearm sling.  **Figure 4-56 Rescuer connects rescue sling carabiner to large ring on MARSARS shuttle board**

12	Rescuer tilts board up into the air, then signals HEAVE AROUND and pushes shuttle into the water under victim to assist the victim onto the board.

Figure 4-57 When heaving around, rescuer tilts board

WARNING: ***The White Bear water rescue sling might not have sufficient inherent buoyancy for a heavily clothed victim. Provide buoyancy by supporting the victim's head out of the water.***

13	With victim aboard, rescuer pulls shuttle out of the water and onto the ice, toward line tenders.

Figure 4-58 Rescuer signals AVAST when on firm ice shelf

14	Keep out of the shuttle's way as it passes; rescuer grabs the end handles until reaching stronger ice/shore.

15	Once onto stronger ice, rescuer signals AVAST and repositions victim for proper transport.  **Figure 4-59 Rescuer repositions victim on MARSARS shuttle board**

A.8.d. MARSARS Shuttle Board/Cold Water Rescue Sling/ Rescuer in Water

This technique, which requires the rescuer to enter the water, is the most aggressive ice rescue technique. This technique also carries the greatest degree of risk because it places the rescuer in the same environment as the victim.

Use this technique when the victim is separated from the rescuer by open water or broken/weak ice that requires the rescuer to enter the water.

NOTE: **Rescuers can use this technique with all victims.**

A.8.d.(1). MARSARS Shuttle Board/ Cold Water Rescue Sling in Water

Use the following standard procedures for ice rescues using MARSARS shuttle board and cold water rescue sling:

Step	Action
1	Ice rescue team has prescribed PPE, and two rescuers wear MARSARS cold water sling in prescribed manner.
2	Connect MARSARS shuttle board to end of either the 150/200-foot MARSARS tending line or 550-foot line reel.
3	Have a team member connect black tending strap attached to the board to D-ring on rescue harness.

4	Using transiting on ice procedures, maneuver to within crawling distance of victim.  **Figure 4-60 Rescuer crawls to proximity of victim where victim's ice shelf is not disturbed**
5	Pull yourself to within safe proximity of the victim, being careful not to break the victim's ice shelf.

WARNING:

Depending on ice conditions, the rescuer might unintentionally enter the water, causing weak ice near the victim to break free and the victim to lose handhold on the ice shelf. The rescuer must use sound judgment by entering the water a safe distance from the victim.

6	Stopping at a safe distance from victim, dismount shuttle on side opposite of the sling.
7	Roll or slide into water feet first as far from victim as possible to preserve ice shelf holding victim out of the water.  **Figure 4-61 Rescuer enters the water feet first**

8	Swim to victim.  **Figure 4-62 Rescuer swims to victim**

WARNING: ***With the rescuer in the water, exercise extreme care when alongside the victim. The victim might panic and reach for the rescuer placing both in danger.***

9	Rescuer uses hand opposite the shoulder the sling is resting on, reaches and grabs victim's opposite hand (e.g., rescuer's right hand grabs victim's right hand). Simultaneously pull victim's arm through opening in sling and place sling over victim's arms and head and secure under armpit.  **Figure 4-63 Rescuer gets victim's arm through rescue sling**

10	Grab victim's other arm and pull through the sling securing under other armpit. Secure sling under both armpits.

Figure 4-64 Rescuer gets victim's other arm through rescue sling

NOTE: **With rescuer in the water, approach victim from behind or from one side. If necessary, fit the MARSARS cold water rescue sling backwards with the carabiner and sizing strap to the victim's back.**

11	Using strap, size sling to victim's body, secure strap. Rotate snap hook toward shuttle.

12	Pull MARSARS shuttle board toward you and grasp rescue end.

Figure 4-65 Rescuer supports victim and retrieves MARSARS shuttle board

WARNING: ***The MARSARS cold water rescue sling might not have sufficient inherent buoyancy for a heavily clothed victim. Provide buoyancy by supporting the victim's head out of the water.***

13	Attach snap hook on sling to large stainless steel ring on rescue end of victim forearm sling.  **Figure 4-66 Rescuer connects sling to MARSARS shuttle board**
14	Rescuer signals HEAVE AROUND. As tenders begin to pull, rescuer pulls shuttle into the water pushing down while assisting victim onto shuttle.  **Figure 4-67 While heaving around, rescuer pushes MARSARS shuttle board down into water**

15	With victim aboard, shuttle moves toward line tenders.  **Figure 4-68 Rescuer rides MARSARS shuttle board with victim**
16	After pulling shuttle from the water, rescuer grabs end handles and rides shuttle with the victim to stronger ice/shore.
17	Once onto stronger ice, rescuer signals AVAST.  **Figure 4-69 Rescuer signals AVAST when on stronger ice**
18	Rescuer repositions victim for proper transport.  **Figure 4-70 Rescuer repositions victim on MARSARS shuttle board**

A.9. Victim First Aid and Transit

A.9.a. Establish Victim's Condition

Cold water immersion greatly increases the risk of cold water injury, including hypothermia. The following signs may be present:

- Shivering.
- Pale skin.
- Slow and labored breathing.
- Clouded mental capacity (may seem disoriented).
- Slurred speech (may seem intoxicated).
- May simulate or accompany shock.
- Dilated pupils.
- Weak and slow pulse (may be irregular or absent).
- Unconsciousness.

Revision

A.9.a.(1). Hypothermia Classification

Symptoms can provide degree or stage of hypothermia:

Stage	Symptoms	Degree	Core Temperature
1	Awake and shivering	Mild	90-95 degrees Fahrenheit
2	Drowsy and not shivering	Moderate	82-90 degrees Fahrenheit
3	Unconscious, not shivering	Severe	68-82 degrees Fahrenheit
4	No vital signs	Profound	Less than 68 degrees Fahrenheit

Table 4-1 Hypothermia classification by symptom

A.9.a.(2). Onset of Hypothermia Factors

The factors that accelerate the onset of hypothermia are:

- Prolonged exposure to cold water temperatures.
- Sea spray.
- Air temperature.
- Wind chill.
- Movement in cold water.
- Unprotected major heat loss areas (head, neck, thorax, and groin).

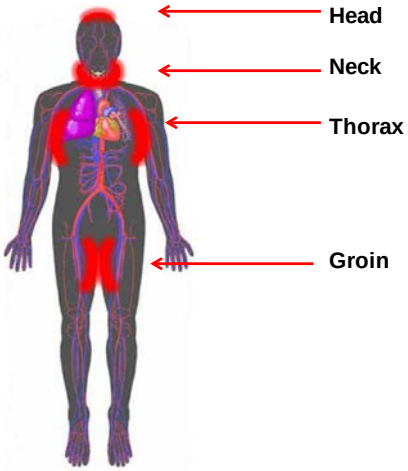


Figure 4-71 Major heat loss areas

- Dehydration.
- Thin physique.

A.9.a.(3). 1-10-1 Principle

1 minute to get breathing under control:

- Initial cold shock response - uncontrolled gasping and hyperventilation, pain, muscle cramps, disorientation.

10 minutes of “meaningful movement”:

- Cold incapacitation – Cold muscle tissue affects movement of hands, arms, and legs.

1 hour of consciousness if wearing PFD:

- Hypothermia – Approximately 1 hour before loss of consciousness. Keep mouth and nose out of the water.

A.9.b. Survival

A.9.b.(1). Factors Affecting Survival Time

- Water temperature.
- Exposure time.
- Protective wear.
- General circulatory health.
- Age.
- Body fat can insulate from the cold.
- Control breathing.
- Don’t panic.
- Will to live.

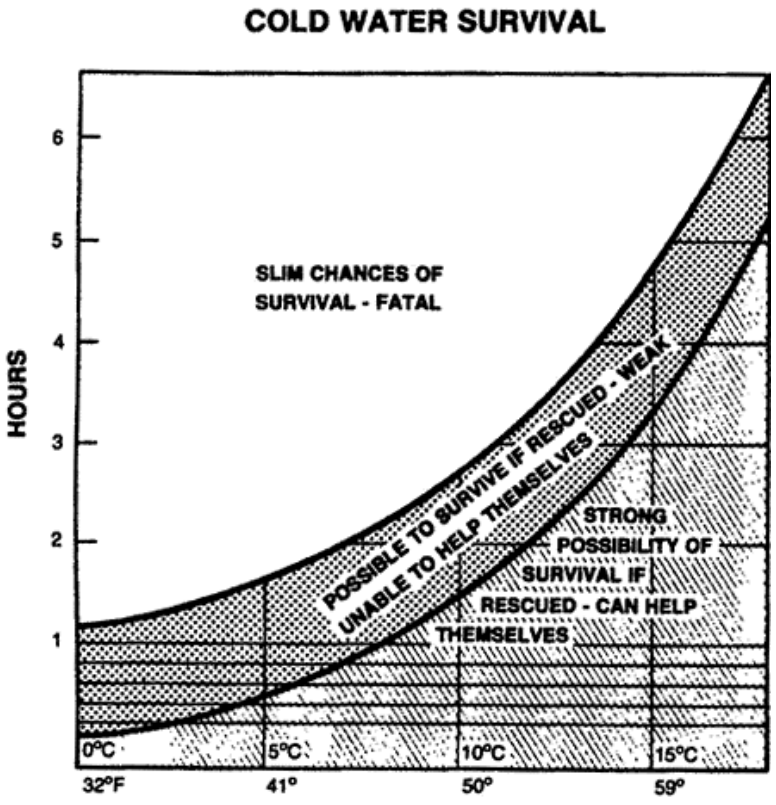


Figure 4-72 Cold water survival graph

A.9.c. Team Precautions and Monitoring

A.9.c.(1). Wind Chill

- The perceived decrease in air temperature felt by the body on exposed skin due to the flow of air. Wind does not reduce the actual temperature of objects below that ambient temperature no matter how great the wind velocity.
- Increases the rate of heat loss as the body tries to maintain normal temperature.
- Increases risk of adverse effects such as frost bite and frost nip.

A.9.c.(2). Frost Nip and Frost Bite

NOTE: **Vasoconstriction is caused by contraction of the muscular walls. It increases blood pressure and makes extremities pale/more prone to cold injuries.**

Insufficiently protected and exposed extremities are prone to cold injuries. Water accelerates cooling process.

Both frost nip and frost bite include symptoms of cold sensation, i.e., white/yellow skin, numbness, clumsiness, etc. The extent of permanent injury is determined by how long the tissue remains frozen. Many victims experience severe pain in the affected part during re-warming.

Both injuries commonly affect earlobes, cheeks, nose, fingers, and toes.

Risk factors include: Alcohol, smoking, previous cold injuries, fatigue, and diseases (e.g., diabetes).

Frost bite is damage to skin tissue caused by freezing. Very cold skin can freeze in minutes or seconds. Frost bite must be medically treated. Stages of frost bite injuries are classified as first through fourth degrees. First and second degree frost bite is superficial injury. Third and fourth degree frost bite is deep tissue injury.

Frost nip is a mild form of cold injury. Frost nip is treated by re-warming (passive heat source, i.e. blowing warm air, placing under arm pits, etc.).

Figure 4-73 Third degree frost bite

A.9.c.(3). Precautions

- Vasodilation – Keep response vehicle cool.

NOTE:

If you turn up the heat in the response vehicle en route to the scene and become warm, your surface blood vessels will dilate as the body tries to cool. This condition causes the body to cool much faster when exposed to a cold environment.

- Stay hydrated!
- Extra head and hand protection (frost nip/frost bite).

WARNING:

Wear warm gloves and headwear when conditions are harsh or when on the ice for extended periods, such as during a search effort. Always carry the neoprene hood and gloves to don before entering water (rescue) or when the conditions are such that the likelihood of falling though the ice is elevated.

A.9.d. Considerations after Determining Victim's Condition

The primary goal is to prevent further cold water injury and transport the victim to medical professionals as quickly and safely as possible.

- Survivors removed from the water and left untreated might suffer further critical loss in body temperature, causing death after being rescued (known as "after drop", see Chapter 4: Mission Planning, Section A.9.g: "After Drop").

- Do not allow a person to perform any physical activity other than what is absolutely necessary.

- When it is suspected that a survivor has moderate to severe hypothermia, avoid rough handling and minimize the amount of exertion by a victim.

A.9.e. Stabilize and Treat Victim

Scan for other possible life threatening injuries and provide basic first aid treatment as necessary.

WARNING: ***To reduce the risk of more serious injury, do not allow victims suffering from cold water injury/hypothermia to stand/walk.***

- Do not treat hypothermic patient for shock!
- Insulate victim by wrapping in blankets or placing in hypothermia recovery capsule or blizzard bag.
- Place hypothermia cap on victim's head.
- Do not remove wet clothes and expose skin to cold.
- May give warm, sweet fluids and sweet food items ONLY to MILD hypothermic victims and ONLY if able to ingest them.
- Do not give cold food items, caffeine, or alcohol to any victim.
- Reassure victim. Your demeanor can relieve the fear and panic of the victim, helping to prevent the victim from going into shock.
- Place victim flat on back on MARSARS shuttle board.

NOTE: **Rescuers can use the MARSARS board as a backboard and can hand carry or drag it.**

- The shuttle board can also be placed on the SKF-ICE.

NOTE: **For extended transits, secure victims on shuttle board using black tether. Weave tether through the handles to provide added security.**

- Treat other life-threatening injuries.

NOTE: **First aid provided is subject to the capabilities of the rescuers, availability of equipment/supplies, environmental conditions, and transit time to shore.**

A.9.f. CPR

As a hypothermic person's heart rate may be very slow, prolonged feeling for a pulse might be required before detecting.

Check for at least 30 to 45 seconds to verify the absence of a pulse before initiating CPR.

For ventricular fibrillation, a single defibrillation should be attempted.

NOTE: **For extended transits of hypothermia victim, seek further treatment guidance from OPCON.**

NOTE: **Core re-warming techniques require specialized care.**

A.9.g. "After Drop"

"After drop" is a further cooling of core temperature after the victim is removed from the cold environment and during transportation to a medical facility.

It is often responsible for "post-rescue collapse" and often causes ventricular fibrillation of the heart.

Active external re-warming is generally safe only for mild hypothermia because externally applied heat stimulates the peripheral circulation and increases the risk of "After drop."

Externally applied heating sources should accompany internal heating efforts, such as inhalation re-warming.

A.9.h. Advanced Re-warming Techniques

NOTE: **Only trained personnel perform advanced re-warming techniques. "Trained personnel" for treating hypothermia with warming devices (hot water bottle and warmed inhalation devices) are either advanced first aid, emergency medical technician (EMT), or as directed by flight surgeon.**

- Can be used when extended delay to medical professionals is anticipated due to distance and/or terrain.
- Inhalation re-warming eliminates respiratory heat loss, which accounts for 10 to 30 percent of the body's heat loss.
- Donates heat directly to the head, neck, and thoracic core.
- Used in conjunction with thermal stabilization and external heating sources, inhalation re-warming can increase survival rate of a moderate to severe hypothermic victim.
- Administer inhalation re-warming device (if available and personnel are trained to use it).
- Administer active external re-warming techniques.
  - Apply external heat (thermo-pads, hot packs, heating pads, etc.) to the head, neck, trunk, and groin.
  - Sources of heat MUST be insulated from direct contact with patient's skin to prevent thermal burns.

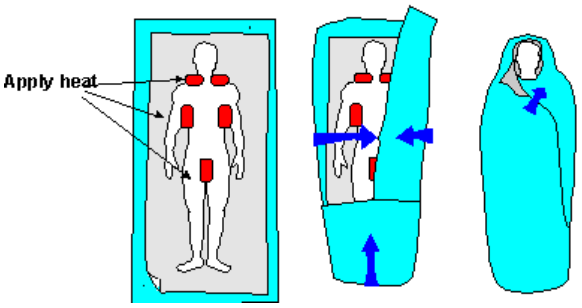


Figure 4-74 Where to apply heat

A.9.i. Victim Transport

After recovering a victim from the ice, the team leader determines the most efficient means of transport to emergency medical services or shoreside. Use the following factors to assess the type of transport:

- Available conveyances.
- Condition of victim (urgency).
- Availability of medical equipment/capabilities.
- Distance to travel to shoreside.
- Transit conditions on ice (i.e., ice ridges, deep snow, etc.)
- Air support.

NOTE:

Avoid unnecessary delay in transporting victim to shoreside emergency medical services.

A.9.j. Actions during Victim Transport

- Continue treatment.
- Maintain communication throughout transit.
- Instruct the victim to remain lying down to maintain a safe position.
- Monitor victim during transit.

A.10. Training Site Preparation and Procedures

A.10.a. Site Selection

Choose a well-protected site (e.g., boat basin or boat slip) since these areas generally are not associated with undercurrents and submerged hazards. Conduct a pre-evaluation of a potential site using the following criteria:

- The site is easily accessible by emergency medical personnel. Sites adjacent to USCG facilities are preferred.
- Ensure the area is free from hazards such as submerged objects and currents.
- Ensure ice thickness can safely support the weight of several students.
- Choose an area that is less frequented by the public, e.g., avoid ice fishermen, snowmobile routes, marine traffic, etc.

WARNING:

Swift water has sufficient force to present a significant risk of injury or death. Coast Guard ice rescue teams are not trained or equipped to operate in swift water.

Since it is difficult to assess the presence of swift water beneath the ice, local area knowledge is essential. Ice rescuers refer to reference (b), Operational Risk Management, COMDTINST 3500.3 (series).

Some measures to reduce risk when operating in areas where current is present include: additional personnel and supervision, additional equipment (SKF-ICE, ice staff, tending lines), and assistance from local SAR partners.

Figure 4-75 Ideal training site within USCG small boat basin

A.10.b. Exercise Planning	See Appendix D: Ice Rescue Training Checklist.
A.10.c. Prepare Training Site	
A.10.c.(1). Opening in the Ice	Some areas such as a small boat basin might have weak areas of ice that can easily be penetrated by the weight of an individual to produce an opening for ice rescue training. Other areas might have natural openings or openings caused by bubbler systems or ice capable vessels. If no such opening exists, cut a suitable size hole in the ice. A 5-foot diameter hole can generally accommodate both a "victim" and a rescuer.

CAUTION: **Reference (t), Discharge of Oil, 40 CFR § 110, prohibits introducing petroleum products into the environment.**

The recommended tool for cutting a suitable size hole through the ice is an ice hand saw. However, if conditions require the use of a chainsaw, ensure bar lubrication fill tank is empty to prevent the release of oil into the environment.

WARNING: ***Chainsaw use on the ice is risky; ensure the operator wears proper PPE and has completed the applicable PQS (located on the D9 Ice Rescue CGPortal website).***

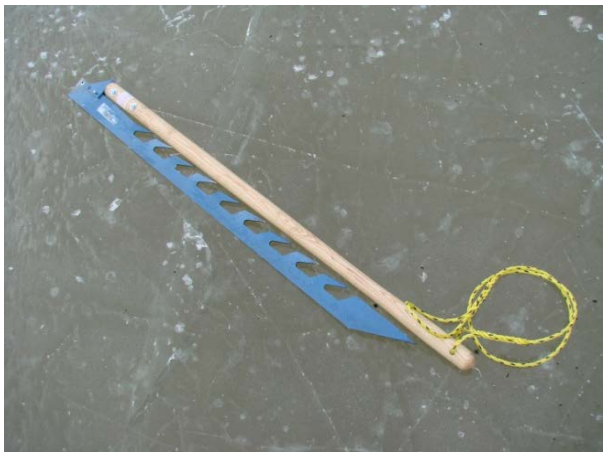


Figure 4-76 Ice hand saw

Figure 4-77 Using an ice hand saw

A.10.c.(2). Pre-Stage Training Props

Training props include placing inorganic objects (e.g., "Oscar") and search exercise clues (e.g., personal article). Live "victims," pre-staged at the training site, are always accompanied by a fully equipped ice rescuer.

A.10.d. Secure Training Site

A.10.d.(1). Mark Hole

Once the training evolution is over, mark the hole with a minimum of four large orange cones or four 2-inch by 4-inch by 4-foot long barricades with retro-reflection tape or lights (figure 4-79). Ensure the hole remains properly marked until the hole in the ice has closed (figure 4-80).

Figure 4-78 Properly marked ice hole (1)

Figure 4-79 Properly marked ice hole (2)

NOTE: **Marking holes is important to guard against liability. Some states have requirements for this. Contact the servicing legal office with questions regarding marking requirements.**

NOTE: **Per reference (c), U.S. Coast Guard National Ice Rescue School: Ice Rescue Trainer Course (IRTC), 502891, mark unattended holes cut in public access areas.**

Revision

A.11. Multi-victim Rescue with SKF-ICE

A.11.a. Triage Definitions

Triage is derived from the Old French word “trier”, which means “to sort.” It is a process for sorting injured people into groups based on their need for or likely benefit from immediate medical treatment. Be familiar with its use.

A.11.a.(1). ID-ME

ID-ME is a mnemonic for sorting patients during mass casualty incident triage. It is the most widely accepted international code for triage and uses colors:

I – Immediate (Red)

D – Delayed (Yellow)

M – Minimal (Green)

E – Expectant (Black)

A.11.a.(2). Green (Minimal)	• Ambulatory patients (no impaired function, can self-treat or be cared for by non-medical professionals). • "Walking Wounded." • Abrasions, contusions, minor lacerations, etc.
A.11.a.(3). Yellow (Delayed)	• Can wait for care after simple first aid (i.e., wounds dressed, splints applied). • Clearly need medical attention, but should not deteriorate rapidly if care is delayed.
A.11.a.(4). Red (Immediate)	• Critical (seriously injured but have a reasonable chance of survival). • Obvious threat to life or limb. • Complications in reciting the alphabet.
A.11.a.(5). Black (Deceased or Expectant)	• Expectant, shows obvious signs of death. • Included are unresponsive patients with no pulse or with catastrophic head injuries and/or chest injuries.
A.11.b. Overview	Use the following procedures in situations involving multi-victim rescue. These procedures work best in any hard or soft water scenario. Set-up time on scene is 5 minutes or less and has the potential to remove more victims from cold water, increasing the chance for survival. This procedure works with single, multiple, and mass rescue situations. Multi-victim rescue includes between 2 to 4 people. Mass rescue is 5 people or more. Refer to Chapter 4: Mission Execution, Section A.11.h.: Mass Rescue, for more details.
A.11.c. Additional Equipment	Additional equipment per reference (j), CG-731 Authorization for Ice Rescue Gear memo 10470 of 20 Jul 16, includes the following: • 06 Quickdraws. • 02 Prusik pulleys for maximum 15 millimeter line.

A.11.d. Equipment Set-Up

Step	Action
1	Rescuers connect quickdraw to forward D-ring on rescue harness.  **Figure 4-80 Quickdraw to forward D-ring connection**
1a	Inflate SKF-ICE per Chapter 7: Operating the SKF-ICE.
1b	Attach extra rescue slings if available to SKF-ICE grab handles.
2	Establish anchor point using ice anchor or endless sling. (see Chapter 4: Mission Planning, Section A.4.: Establish an Anchor Point, and Section A.4.a.: Setting the Anchor Point steps 1-5).

NOTE: **If left unattended, the 550-foot line reel can be secured in place using an ice anchor or endless sling.**

NOTE: **Multi-victim anchor point set-up differs from standard anchor point set-up.**

3	Connect 550 foot line reel snap hook with floats to anchor point. Set 550 foot line reel up so line pays out to rescue scene.  **Figure 4-81 550 foot line reel to anchor point connection**
4	Create bight in line and attach Prusik pulley.  **Figure 4-82 550 foot line reel placement**
5	Attach the Prusik pulley to SKF-ICE tow strap using the quickdraw.  **Figure 4-83 Prusik pulley attached to quickdraw and tow strap**

6	Maintain as much pulley alignment as possible with no greater than 15 feet line separation at the tender's location.

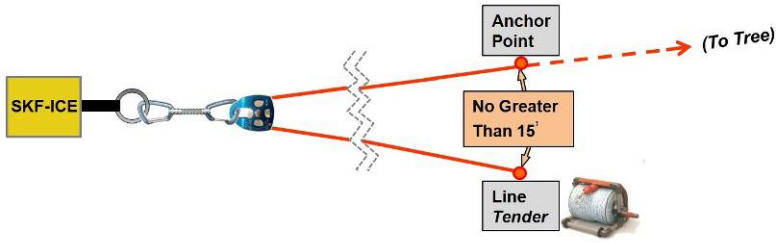


Figure 4-84 2:1 mechanical advantage

NOTE: **The 2:1 mechanical advantage of this system is increasingly reduced with greater line separation.**

NOTE: **For smoother operation, maintain positive control of reel, i.e., a line tender or an ice anchor, securing the reel to the ice.**

NOTE: **Line tenders must be aware of conditions that could foul or catch the line on rough ice.**

A.11.e. Deployment

Primary and secondary rescuers maneuver SKF-ICE near the rescue scene.

Figure 4-85 Maneuvering the SKF-ICE near rescue scene

NOTE: **For smoother operation, line tender maintains positive control of the 550 foot line reel while SKF-ICE is deploying.**

A.11.f. Rescue Procedures

Step	Action
1	Using procedures found in Chapter 7: Operating the SKF-ICE, conduct rescues.

NOTE: **Use of a tow shield might ease the retrieval of a fully loaded SKF-ICE.**

NOTE: **Connect rescue sling to quickdraw when affecting rescue with sling.**

2	Starting with first victim, shift him/her as far away from the rescue end as possible in recovery position on the SKF-ICE to allow maximum room for additional victims. Use best judgment when positioning victims.

NOTE: **Rescuers have the option of leaving slings on rescued victims and using backup slings for future rescues. If slings are left on the victim, they can be attached to the SKF-ICE black grab handles for positive control of the victims.**

CAUTION: **Do not overload the SKF-ICE. Ensure even weight distribution and total weight does not exceed 2,000 pounds. Refer to Chapter 7: Operating the SKF-ICE for SKF-ICE operating limitations.**

Figure 4-86 Positioning victims athwartships on SKF-ICE

WARNING: ***Handle hypothermic victims with care to avoid secondary injuries.***

3	If necessary to conduct additional rescues, detach additional sling from grab line.
4	Don rescue sling (see Chapter 4: Mission Execution, Section A.8.b.(2).: Donning Procedures for MARSARS Cold Water Rescue Sling for donning procedures).
5	Using procedures found in Chapter 7: Operating the SKF-ICE, conduct rescue for second victim.
6	After second rescue is complete, follow steps 1-4 until all victims are rescued, deck space is full, or weight limit is reached on the SKF-ICE.
7	To prepare for retrieval, shift weight opposite of the tending line to reduce drag and ease retrieval by line tender(s).

A.11.g. Retrieval

When rescues are complete and victims are relocated opposite of the tending line, line tenders heave around on working part of line (reel side) to retrieve SKF-ICE and victims to shoreside assistance.

Figure 4-87 Additional line tender(s) assisting SKF-ICE retrieval

Additional leverage for heaving around can be obtained by tying a bowline in a bight in the tending line and connecting it to the quickdraw on the D-ring. This allows use of body weight and legs to gain additional leverage.

Figure 4-88 Tending line bowline-in-a-bight connected to line tender's quickdraw

NOTE: **Rescuers can assist in victim retrieval by pushing behind or alongside SKF-ICE.**

NOTE: **This pulley configuration gives rescuers a 2:1 mechanical advantage to assist in heaving around the SKF-ICE.**

A.11.h. Mass Rescue

Per reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical Maritime Search and Rescue Manual (IAMSAR), COMDTINST M16130.2 (series), MROs are civil SAR services characterized by the need to provide immediate assistance to large numbers of persons in distress, and doing so would exceed the capabilities normally available to SAR authorities.

NOTE: **After proper ORM/Green, Amber, and Red (GAR) assessment, team leader has the option of using other capable on-scene resources to aid in the towing of the SKF-ICE such as snowmobile, ATV, etc.**

Figure 4-89 Use of other capable scene resources to tow SKF-ICE

NOTE: **When mass rescue situations arise, be prepared to re-deploy system until all victims are safely off the ice. Minimize crew fatigue and improve endurance by swapping rescuers with line handlers.**

Revision

A.12. Moving Water and Ice

Always consider the possibility of moving water and ice during any ice rescue. An ice-covered waterway can give a false sense of security about the conditions beneath the ice.

Coast Guard ice rescue teams are not trained or equipped to train or operate in moving water of sufficient force to present a significant risk to cause injury or death (commonly referred to as "swift water").

Ice rescuers are trained and equipped to respond in conditions other than swift water. Standard training and equipment are sufficient in lower risk conditions. When operating in moving water conditions, exercise greater caution and apply additional mitigation measures.

The unit commander designates high-risk areas based on seasonal characteristics. Units identify areas of higher risk based on area knowledge, and the team leader evaluates on-scene conditions.

This section is designed to assist the rescuer in recognizing the presence of and the risks associated with moving water and ice. It also provides some risk-mitigating techniques when operating in or near moving water and ice.

A.12.a. Moving Water Overview

The National Fire Protection Association (NFPA) defines "swift water" as water moving at a rate greater than 1 knot.

Lesson 1-2 of reference (f), U.S. Coast Guard National Ice Rescue School: Ice Rescuer Course (IRC), states: *"Swift water has sufficient force to present a significant risk of injury or death. Coast Guard ice rescue teams are not trained or equipped to operate in swift water. Since it is difficult to assess the presence of swift water beneath the ice, local area knowledge is essential."*

Water moving 2 feet in one second is moving at a rate of 1.2 knots.

A.12.a.(1). Forces of Moving Water

Be aware of the destructive forces of moving water. The following are examples:

- Water weighs 62 pounds per cubic foot.
- Water flowing at 6 knots can wash people off their feet in a depth of 9-10 inches.
- Water flowing at 3.5 knots can wash people off their feet in a depth of 3 feet.
- Water flowing at 2 knots can cause difficulty for people trying to retain balance in depth of 3 feet.
- Water flowing at 2-3 knots or more can cause the loss of hand hold and wash people under the ice without proper PPE.

A.12.a.(2). Forces of Moving Water on an Immersed Body

The force exerted on an object in water is proportional to the surface area that is exposed to the force. A stationary, immersed body creates drag in moving water. One knot of current can exert approximately12 pounds of force on a totally submerged body. This is a significant force on a near-weightless body underwater.

Current Velocity	Force on Legs	Force on Body
1 knot	05 pounds	12 pounds
2 knots	20 pounds	48 pounds
3 knots	45 pounds	115 pounds *
4 knots	80 pounds	176 pounds
**Would likely cause difficulty for a fully equipped rescuer to keep from getting swept under the ice.*		

Table 4-2 Forces of moving water on an immersed body

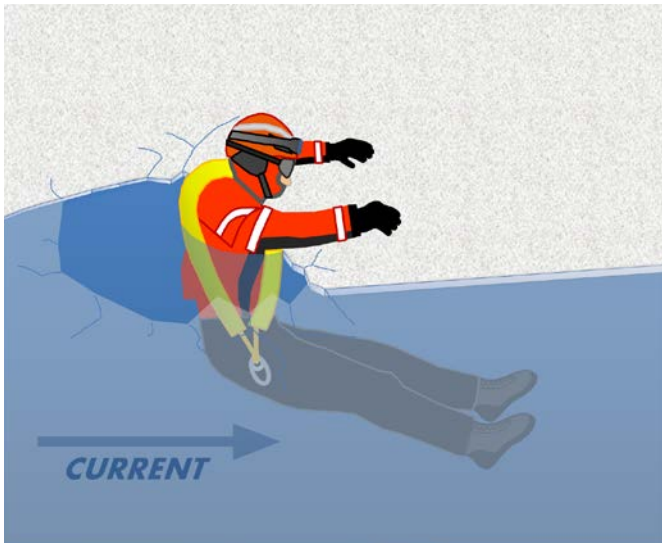


Figure 4-90 Double velocity, quadruple the force

Positive buoyancy (dry suit, PFD) plays a significant role in keeping the stationary object against the static ice shelf. In a 3 knot current there would likely be no victim present without a life jacket on since the 115 pounds force on the body is about the same as the buoyancy of a life jacket.

A.12.a.(3). How Moving Water Affects Ice

Factors to consider:

- Can ice form on moving water?
  - In extreme cold, moving water can produce frazil ice that can accumulate and freeze in slower moving areas to form a solid ice shelf.
  - Current flow can increase under ice that is already formed on a waterway.
- Current erodes ice from underneath.
- Understanding water flow can help predict potential weak ice based on waterway features.

Figure 4-91 Water flow

A.12.a.(4). River Flow

There are two types of river flow:

Laminar Flow: A layered flow of water that the slower layers push against the banks and bottom. The fastest layers are the top and midstream.

Helical Flow: A corkscrew motion downstream where the faster water is pulling the slower water to the middle.

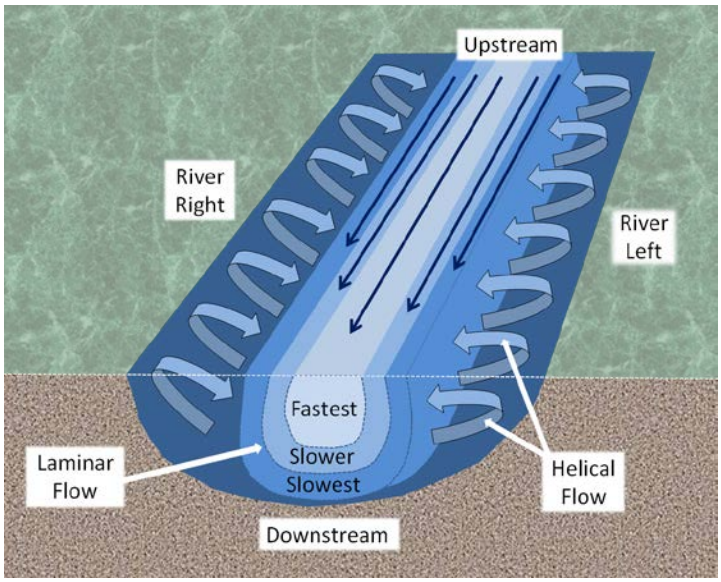


Figure 4-92 River flow

A.12.a.(5). Ice Covered River Flow

Factors to consider:

- Ice cover slows surface water.
- Fastest moving water is just below the surface, approximately 1 to 2 feet depending on the river depth.
- The underside of ice usually creates less friction than that of the river bed.

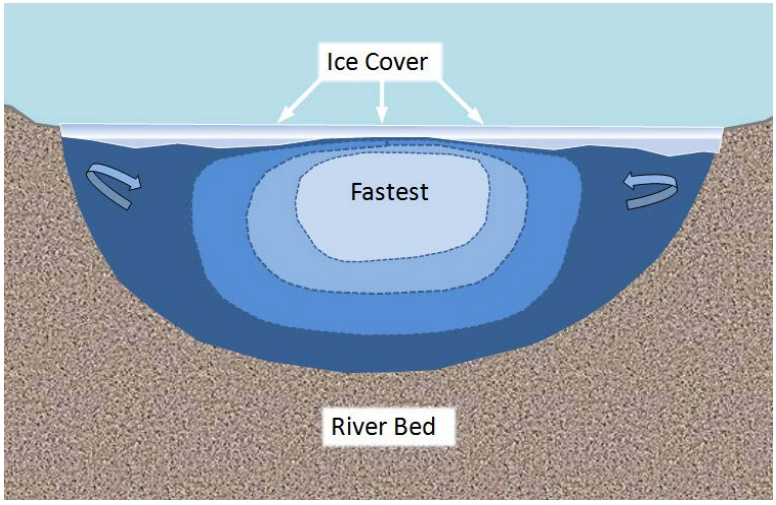


Figure 4-93 Ice-covered river flow

A.12.a.(6). Current and Geographic Features

Factors to consider:

- Generally, water follows the path of least resistance and inherently flows in a straight, gravitationally driven line.
- In river bends, the moving water scours areas along the outside, creating eddies and slower moving current on the inside of the channel.
- River mariners refer to this natural channel from bank to bank as a "Crossing."

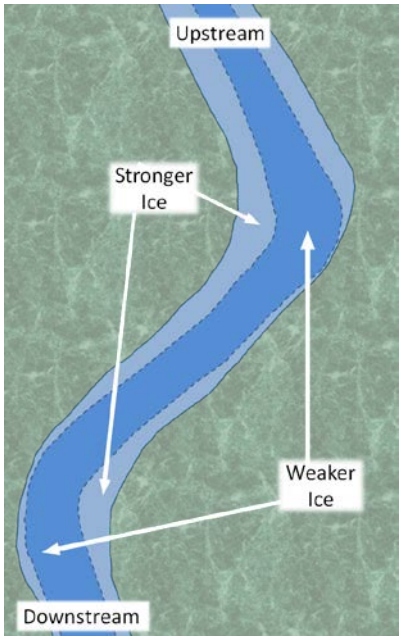


Figure 4-94 Current and geographic features

A.12.a.(7). Debris (Loads)

Factors to consider:

- All waterways contain debris.
- Debris are referred to as loads and separated into three categories:
  - Top: Easily recognized (because it is visible and the rescuers can see it).
  - Bottom: Present unseen danger (likely cannot be seen by the rescuer and could entrap lower extremities).
  - Suspended: Present unseen danger (most dangerous load as it is moving with the water flow, is likely not visible to the rescuer, and could collide with the rescuer injuring or sweeping them).

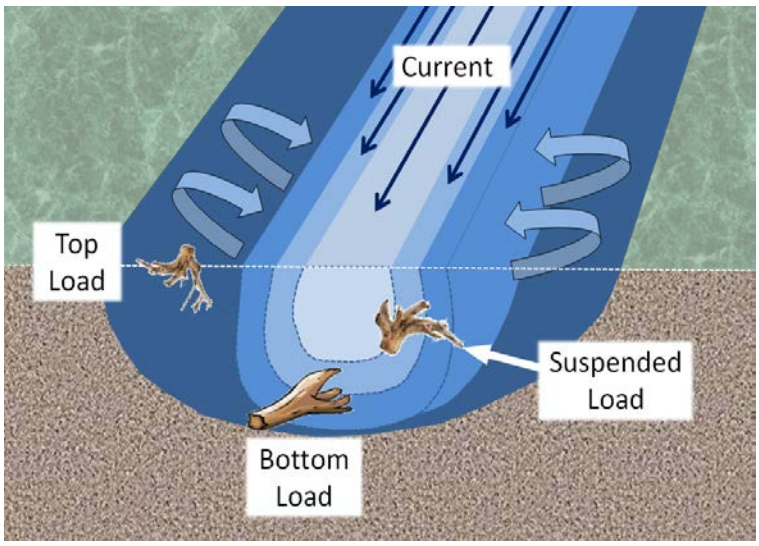


Figure 4-95 Debris (loads)

WARNING: ***Slippery rocks, muddy/soft bottoms beneath the ice can cause injury or entrap the rescuer.***

A.12.a.(8). Estimating Risk

Apply the following definitions with ORM when estimating risk as it pertains to moving water and ice:

- Green (low): Lowest probability of risk (e.g., solid ice mantle, little to no moving water).
- Amber (medium): Increased probability of risk (e.g., presence of moving water that poses additional risk to rescuer and victim. Take additional precautionary measures).
- Red (high): Highest probability of risk (e.g., swift water, rapids, extremely dangerous, specialized training required).

WARNING: ***Understand the risks. Ice-covered waterways can give a false sense of security by hiding dangerous moving water beneath the ice.***

NOTE: **Know your AOR, including areas of historical hazards, seasonal and controlled water flow rates, and areas to avoid.**

A.12.a.(9). Risk Mitigation

- Avoid immersion in moving water.
- Team tether when transiting on ice over moving water.
- Tether or hold on to the SKF-ICE (at least one member of the team is attached to the SKF-ICE).
- Walk in SKF-ICE ports.
- Use AOR charts annotated with areas of potential hazards or elevated risk.
- Use ice staff to prevent full immersion if ice gives way under foot.
- Third member wears ice rescue sling if sling is available.
- Transit downstream if possible.
- Know team limitations. Do not hesitate to call for additional resources if there is any doubt.

A.12.b. Rescue Considerations/ Procedures

Consider the following before rescue begins:

- Recognize own limitations and the need for specialized swift water equipment and training before making decision to "Go".

WARNING: ***Ice rescue teams do not have specialized swift water skills (use of high lines, specialized equipment, and rope configurations, etc.). Always consider use of helicopter and appropriately trained and equipped responders.***

- If the decision is made to "Go," exercise extra care to avoid disruption of the ice shelf directly in front of or behind the victim.

WARNING: ***Do not disturb the ice shelf either upstream or downstream. If the ice is disturbed there is an increased risk to the victim who could lose his/her hold on the ice shelf.***

- The preferred approach is from a 45 degree angle - Upstream.

WARNING: ***Do not disturb the ice shelf immediately in front of the victim. Upstream retrieval is preferred to mitigate sharp angles in the line on the ice edge if the victim goes under, making the retrieval more difficult.***

WARNING: ***Sharp angles of the tether against the ice shelf could severely hinder tether recovery of the rescuer and victim.***

WARNING: ***Avoid immersion in moving water.***

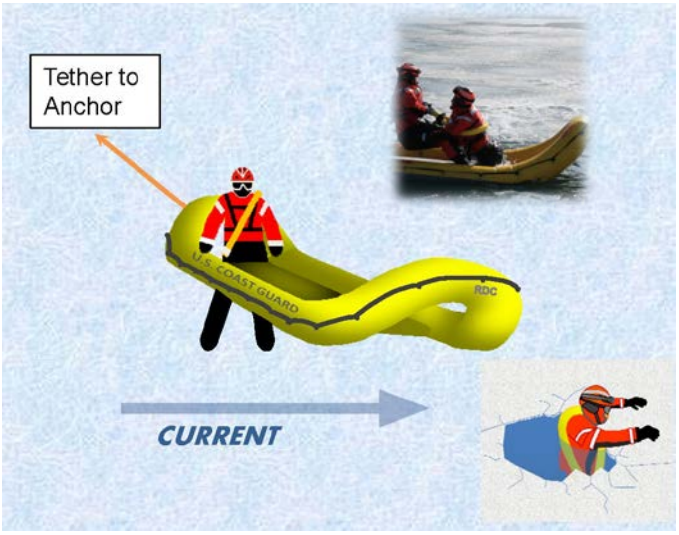


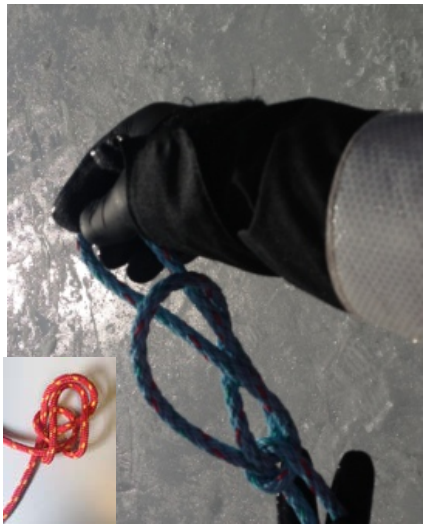
Figure 4-96 Rescue

A.12.b.(1). Team Tether

Step	Action
1	If using 150-foot tend line, make series of eyes using knot that will not bind and can be easily untied, such as a single bowline in a bight.
2	Tie bowlines 12 to 15 feet apart.
3	If transiting with the SKF-ICE, connect last eye to the SKF-ICE using carabiner hook.  **Figure 4-97 Connecting eye to SKF-ICE**
	 **Figure 4-98 Team tether**

A.12.b.(2). How to Tie a Single Bowline in a Bight

Step	Action
1	Using the left index finger and thumb, hold the center of 2 bights (loops), one up and one down.  **Figure 4-99 Step 1: Tie a single bowline in a bight**
2	Using right hand, grasp the line to the right and wrap it clockwise around the base of the upper bight all the way to the left. Hold it in place with the thumb.  **Figure 4-100 Step 2:Tie a single bowline in a bight**

3	Insert the lower bight up through the upper bight.  **Figure 4-101 Step 3:Tie a single bowline in a bight**
4	Pull tight, individually if necessary.  **Figure 4-102 Step 4:Tie a single bowline in a bight**

A.12.b.(3). Team Tether with SKF-ICE

Step	Action
1	Primary rescuer walks in rear of SKF-ICE ports.
2	Secondary rescuer and team leader are “team tethered” to SKF-ICE.
3	150/200-foot tend line is secured with last bowline to SKF-ICE attachment point.  **Figure 4-103 Team tether**
4	If anchor point is used, fourth rescuer tends line.

A.12.b.(4).
2:1 Mechanical Advantage Using Prusik Pulley

Step	Action
1	Open Prusik pulley and place bight of tending line into pulley.  **Figure 4-104 Open Prusik pulley**
2	Close Prusik pulley.  **Figure 4-105 Close Prusik pulley**

3	Connect one end of quickdraw to Prusik pulley and the other end to SKF-ICE tow ring.

Figure 4-106 Quickdraw

Figure 4-107 Quickdraw and Prusik pulley connected

Figure 4-108 Quickdraw and Prusik pulley connection

A.12.b.(5). Single Rescuer with SKF-ICE

Under special circumstances, it might be necessary to use a single rescuer with the SKF-ICE. If after careful consideration, it is determined that the reduced weight in the vicinity of the victim outweighs the added risk of a single rescuer, use this technique.

Step	Action
1	Rescuer walks in rear port of SKF-ICE while grasping grab lines.  **Figure 4-109 Rescuer standing in rear port**
2	Rescuer maneuvers SKF-ICE toward the victim from an area least likely to disturb the ice shelf in front of the victim.  **Figure 4-110 Rescuer maneuvering SKF-ICE toward victim**

3	Rescuer carefully maneuvers SKF-ICE rescue port over the victim and places the SKF-ICE down onto the ice.  **Figure 4-111 Rescuer maneuvers SKF-ICE rescue port over victim**

WARNING: ***Use extreme caution to prevent pushing the victim off the ice shelf.***

4	Once SKF-ICE rescuer port is positioned over the victim, rescuer crawls on SKF-ICE deck towards victim.  **Figure 4-112 Rescuer crawls toward victim**

5	Rescuer gains positive control of victim using standard SKF-ICE rescue procedures. Refer to Chapter 7: Operating the SKF-ICE.

Figure 4-113 Rescuer gains positive control of victim

Figure 4-114 Rescuer using standard SKF-ICE rescue procedures

A.12.c. Moving Ice

Limitations, risk assessment, and decision to "Go" or "No-Go" are based upon the conditions observed by the rescue team. Some conditions of moving ice are less risky, such as small, loose pieces of drift/brash ice that are moving extremely slow. A case study in Chapter 4: Mission Execution, Section A.13: Case Study discusses similar conditions.

Moving ice has the following characteristics:

- Caused by wind, current, or both.
- Any ice that is not fast ice is potentially dynamic.
- Is constantly changing. The dynamic nature of moving ice creates greater unseen risks that are difficult to predict.
- Can produce massive crushing force.

NOTE: **The crushing force of colliding ice can be enormous depending on the mass of the ice floe and the velocity that it is traveling. The greater the mass, the greater an external force is needed to change the velocity (inertia). Example: 6 feet x 6 feet x 1 foot ice block weighs more than 2,200 pounds.**

WARNING: ***Avoid immersion in a moving ice environment.***

Figure 4-116 shows a large ice floe that is separating from another ice floe along the pressure ridge (windrow), due to wind direction change.

Figure 4-115 Large ice floe

A.12.c.(1). Ice Under Pressure

Factors to consider:

- The accumulation of brash ice under pressure can give a false sense of firmness.
- Plate ice under pressure can rupture underfoot.
- Ice terrain can quickly change, impacting safe transit.
- Avoid immersion due to crushing forces of ice under pressure.

Figure 4-116 Ice under pressure

A.12.c.(2). Stranded on Ice Floes

Dangers/urgency:

- Exposure to elements.
- Floe breaking up (dynamics).
- Immersion.

Challenges/risks:

- Changing conditions/position.
- Distance to scene (increasing?).
- Appropriate/effective conveyance(s).
- Multiple victims/sorties.
- Other government agency (OGA) interoperability.

Figure 4-117 Stranded on an ice floe

Revision

A.13. Case Study

This actual rescue of a dog occurred in 2015 near USCG Station Frankfort, Michigan.

The dog was seen by station personnel struggling in the brash ice, and the ice rescue team responded.

Conditions were as follows:

- Wave surge seen, but ice did not appear to be moving along a current.
- 2 feet deep brash.
- Ice moving about 12 feet over half an hour at .0003 knots.
- No access to other side of channel.

Lessons learned:

- Difficulty transiting this kind of brash ice.
- Took 20 minutes to swim less than 100 yards.
- Rescuer exhausted and had to be retrieved.
- Rescuer stated if ice chunks were greater than 6 feet in diameter and current was moving at 1 knot or more, would have been “No-Go.”
- Swim fins might have helped.
- Fire department ladder truck would have been ideal.

Figure 4-118 Case study rescue

Figure 4-119 Animal retrieval

This page intentionally left blank.

Chapter 5:
Operating 20-Foot Special Purpose Craft – Airboat (SPC-AIR)

Introduction

This chapter discusses operations for the 20-foot special purpose craft – airboat (SPC-AIR).

For more specific information relating to the 20-foot SPC-AIR, refer to the Boat Forces website.

In This Chapter

This chapter contains the following sections:

Section A: Crew Requirements

A.1. Overview

Reference (u), U.S. Coast Guard Operations and Training (BOAT) Manual, Vol II, COMDTINST M16114.33 (series), provides the minimum standards and guidelines for SPC-AIR competence, which includes expectations that all crewmembers must:

- Be familiar with duties of other crewmembers as well as his or her own.
- Commit to memory important boat characteristics, equipment, and casualty procedures.
- Mentally rehearse operational casualty procedures (including actions expected of others).
- At every opportunity, get the boat underway to practice operational and emergency procedures.

Teamwork is the common thread that allows the crew to safely succeed.

A.2. Safety Equipment

Per reference (g), Rescue and Survival Systems (RSS) Manual, COMDTINST M10470.10 (series), crewmembers wear PPE:

- During all boat operations.
- If disembarking the boat onto the ice.

NOTE:

Per reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), the coxswain is responsible for ensuring that all personal safety equipment is worn correctly. Additionally, passengers and guests wear the same PPE or equivalent as the boat crew. Only personnel with pyrotechnics training can wear pyrotechnics.

A.2.a. Helmets, Seatbelts, and Eye Protection

Per reference (v), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol III, COMDTINST M16114.42 (series), the OIC establishes policy on using helmets, seatbelts, and eye protection for boat operations.

Section B: Guidelines for Ice Operations

B.1. Performance Data

It is important to understand how the boat performs in each environment. Friction from the boat's weight, flat bottom hull, and environmental surface play a significant role in the boat's operation.

The SPC-AIR was designed and built for the following conditions:

- Operating in protected bays and sheltered waters.
- Long-haul cases, operating up to 10 nautical miles from shore (and preferably in sight of land).
- Operating on all types of hard surfaces.
- Operating in water.
  - ➢ Shallow water.

WARNING: ***During freezing spray conditions, ice can accumulate on the boat and decrease its stability. Remove ice by striking it with a malleable object (e.g., wooden hammer).***

- Operating on ice.
  - ➢ Channeling.

WARNING: ***Use only wide sweeping turns and slower speeds to minimize the probability of damaging the hull when channeling.***

- Operating on land.

  The SPC-AIR is capable of operating on most surfaces; however, use caution when operating on unfamiliar surfaces.

- Speed.
  - Coxswains use safe speed at all times while underway.
  - Maximum travel speed on any surface (except open water) is 15 knots.
  - On rough plate ice the maximum safe speed is only 3-5 knots.
  - When channeling, safe speed is only 5 to 8 knots.

NOTE: **Wind conditions can cause unintended acceleration and affect maneuverability.**

NOTE: **The SPC-AIR's large power plant is not for obtaining great speeds, but for steering and maneuverability. It is important to know the difference between speed and thrust. Speed is how fast the vessel travels; thrust is the amount of force the propellers can put out.**

CAUTION: **Excessive speed is a contributing factor to a high number of small boat mishaps.**

- Stability.

The coxswain is responsible for increasing the boat's stability by ensuring the equal distribution of personnel and additional equipment throughout the boat.

B.2. Performance Monitoring

To ensure safe and efficient operation of the propulsion and ancillary systems, the coxswain and crewmembers must be aware of installed monitoring equipment and gauges. Additionally, crewmembers must know the "normal range" or indication of all gauges/indicators and report/react accordingly when changes occur.

Section C: Mission Performance

C.1. Overview

Field experience forms the basis of this section, but this section does not provide the "only way" to perform an action or complete a mission. Boat crews must use effective communications and teamwork skills along with this general information to adapt their actions to each unique mission scenario. Observe these procedures and apply skills developed through practice to effectively use SPC-AIR.

Information in this section alone does not qualify a crewmember.

C.2. Boat Handling

Operating the SPC-AIR requires a special skill set compared to conventional outboard and inboard boats.

- Maneuvering (requires propeller thrust).
  - When making headway, use of the rudders (without thrust) does not provide maneuverability like traditional boats use.
  - Constantly feather the throttle along with rudder adjustments to maintain a straight course.

CAUTION: **The radiator's location makes it highly susceptible to damage from ice and other debris kicked up during normal operations. Make large sweeping course changes on or around ice to reduce the likelihood of puncturing the radiator.**

WARNING: ***Propeller thrust can blow debris and other objects around behind the boat. The coxswain must be constantly aware of what is behind the boat to avoid unintentional damage or personal injury.***

C.3. Going alongside Boats and Persons

- Approaches on ice.
  - The boat's weight and momentum create a wake under the ice, which reverberates in all directions and weakens the surrounding ice.
  - When approaching persons or objects on the ice, slow the boat's speed well in advance to reduce the under ice wake.
- Approaches in water.
  - Approach persons or objects indirectly when operating in water.
  - Secure the engine well in advance to slow the boat for final approach.

WARNING: ***The boat's limited maneuverability and lack of reverse propulsion make direct approaches dangerous.***

C.4. Operations with Helicopters

The boat's design is not conducive to helicopter hoisting operations and presents many safety obstacles.

NOTE: **If a hoist is necessary, anchor the boat a safe distance away from the landing/hoist zone and secure all loose gear.**

NOTE: **Crewmembers on boats less than 30 feet in length are only required to possess knowledge of helicopter operations for qualification purposes. Always refer to reference (u), U.S. Coast Guard Boat Operations and Training Manual, Vol II, COMDTINST M16114.33 (series), for current qualification requirements.**

NOTE: **Air operation procedures are described in reference (p), Boat Crew Seamanship Manual, COMDTINST M16114.5 (series).**

C.5. Towing

SPC-AIR is not designed to conduct towing evolutions. Consult with your operational commander and exercise sound judgment if the circumstances dictate consideration of towing.

CAUTION: **The propeller is highly susceptible to damage from unsecured objects (i.e., towing lines).**

C.6. Anchoring

To anchor the SPC-AIR:

- The coxswain secures the engine to anchor the SPC-AIR on ice and to prevent forward motion (SPC-AIR travels forward even at idle).
- A crewmember connects anchor line to trailer eye bolt using carabiner hook, and extends line out to almost its full length.
- A crewmember places ice anchor in the ice and connects carabiner hook to ice anchor.

C.7. Operating on Water

The SPC-AIR's design and propulsion system present unique challenges when operating on water. The following techniques are not all inclusive and are only a guide for conducting operations in open water.

WARNING: ***Per reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), operating the SPC-AIR in heavy weather is not authorized. Heavy weather for the SPC-AIR is defined as sustained winds of 30 knots and waves greater than 1 foot.***

C.7.a. Optimal Performance

Open water: depths of water less than 3 feet (where lift is experienced).

WARNING: ***Shallow water raises the likelihood of striking submerged objects.***

C.7.b. Conducting a Turn

Take the following into account before making a turn:

- The boat's loading.
- Operational depth.
- Operational speed.
- The effect of these factors on maneuverability.
- Ice terrain.
- Other objects/obstructions.

When turning in open water, increase engine RPMs to complete the turn.

WARNING: ***The SPC-AIR has a low freeboard. To avoid having the boat's wake swamp the vessel, use caution when conducting turns in open water.***

Once the turn is complete, gradually decrease the RPMs.

C.7.c. Stability

With a lack of flotation, the SPC-Air is susceptible to sinking. Monitor the following:

1. Bilges; dewater immediately upon detection of measurable water.

NOTE: **The installed bilge pump is not automatic and has no audible or visual alarm to notify crew of flooding.**

2. Freeboard on all sides and at the stern.

NOTE: **Redistribute weight as needed.**

C.8. Capsizing

Crewmembers must prepare, both physically and mentally, to increase chances of survival.

- Step one: Have an action plan that includes extensive discussion on the boat and in the classroom.
- Step two: Be thoroughly familiar with the equipment and physical layout of the boat.

C.8.a. Egress Procedure

Unsnap any of the side panels in the canvas cabin.

WARNING:

Automatically inflatable PFDs activate inside the cabin if the boat capsizes. An inflated PFD increases the difficulty of egress.

C.8.b. Post Egress Procedures

Post egress procedures are as follows:

1. Muster the crew and passengers and account for any missing occupants.
2. Remain upwind/up current to prevent ingestion of gasoline that might be present.
3. Attempt to climb aboard the inverted hull.
4. Check for injuries and administer first aid to the best of your abilities.
5. Conduct an inventory of signaling equipment. Activate personal locator beacon (PLB).
6. Check for the presence of gasoline in the water before activating pyrotechnic signaling devices.
7. Stay with the boat and do not swim for shore. Distance to the beach can be deceiving, and strenuous activities such as swimming in cold water can hasten the onset of hypothermia.

C.9. Operating on Ice

This section discusses techniques for operating the SPC-AIR in conditions encountered on and in ice.

C.9.a. Transiting on Clear Ice

WARNING:

Wet solid ice is extremely hazardous due to the slickness of the surface.

To alleviate crew discomfort during transit, the coxswain:

- Operates at a safe speed.

NOTE: **The SPC-AIR's operational limit for transiting on ice is 15 knots.**

- Avoids ice chunks, debris, and ice ridges.

C.9.b. Transiting Snow Covered Ice

Transiting snow covered ice entails longer SPC-AIR maneuvering response time.

WARNING: ***Snow covered ice is hazardous. Snow and snow drifts can cover large ice chunks, ice ridges, and debris. Blown snow from the propellers during maneuvering reduces visibility.***

The coxswain and crew follow the same precautions as operating on clear solid ice.

CAUTION: **Stopping on the ice poses a risk of the SPC-AIR freezing in place. Ratchet straps attached to ice anchors and under tension coupled with fan power have proven effective at freeing the hull.**

C.9.c. Transiting from Open Water to Ice

To transit from open water to ice, do the following:

1. Upon approaching an ice shelf, reduce RPMs to bare steerage, make a slow approach, and maneuver so the bow is square to the ice shelf.
2. After making contact with the ice shelf, increase RPMs enough so the bow begins to ride onto the shelf.
3. Maintain RPMs and keep a slow steady movement onto the ice shelf until the SPC-AIR is fully on top of the shelf.
4. Decrease RPMs until achieving a safe speed.

WARNING: ***Use "bow to" approach to avoid capsizing when transiting an ice shelf from open water.***

C.9.d. Transiting from Ice to Open Water

To transit from ice to open water, do the following:

1. Upon approach to open water, reduce RPMs to bare steerage speed to avoid plunging the bow into the open water.
2. Maintain a slow speed until the SPC-AIR fully enters the water.
3. Once fully into the water, gradually increase RPMs until achieving a safe speed.

C.9.e. Transiting Ice Ridges

If unable to maneuver around an ice ridge and you must go over it:

- Make a square approach to the ice ridge before very carefully executing the maneuver.
- When approaching the ice ridge, reduce RPMs to bare steerage until the bow contacts the ice ridge.
- After making contact, increase RPMs so the boat climbs up the ridge at a slow and steady speed.

NOTE: **Decreasing RPMs while climbing the ice ridge can cause the boat to slip backwards, allowing the stern to jam into the ice and become stuck.**

- Once the boat reaches the cusp of the ice ridge, and the momentum starts to go downward, reduce the RPMs to avoid launching the airboat off the ridge.

NOTE: **The SPC-AIR only transits ice ridges that are 2 feet or less.**

C.9.f. Channeling

Channeling is when the SPC-AIR breaks through the ice layer. This can occur anywhere ice integrity is lost due to warm weather, or in areas of weak ice (rivers, warm water discharges, etc). Channeling limits the SPC-AIR's turning ability and places significant stress on the hull.

- If turning is necessary to maneuver to thicker ice, fluctuate engine RPMs while making as wide a turn as possible.
- If transiting through an area while channeling, increase engine RPMs to create lift so the ice plates don't increase undue pressure on the hull.

C.9.g. Stopping on Ice

To fully stop on ice, do one of the following:

- Conduct a 180-degree turn.
- Secure the engine (because the SPC-AIR continues to move forward even at idle).

C.9.h. Conducting a 180-Degree Turn

To conduct a 180-degree turn, do the following:

1. Reduce the RPMs, turn the rudder hard over in the direction of the turn, and quickly increase engine RPMs until the bow starts to turn.
2. As the bow moves in the direction of the turn, use as many engine RPMs as necessary to complete the maneuver.
3. When the bow comes within 45 degrees of the direction of the new course, shift the rudder and steady up the bow on the new course direction.
4. Once the momentum of the SPC-AIR starts to move in the direction of the new course, start to gradually decrease engine RPMs and proceed on the new course at a safe speed.

C.9.i. Person Recovery

CAUTION: **Due to SPC-AIR maneuverability limitations (no brakes, no reverse) and susceptibility to wind, a direct approach makes the evolution hazardous to the victim.**

If the victim is conscious, he or she might be able to assist in the rescue with help from a crewmember. With the engine secured, use an indirect approach with the boat hook.

C.10. Operating on Snow Covered Land

Snow covered land has its own hazards because snow and snow drifts often cover large objects, creating unknown impact hazards.

CAUTION: **Use caution when transiting uneven surface terrain, such as hills and ridges; these uneven surfaces hamper stopping ability and increase difficulty in maintaining a desired track.**

The coxswain and crew follow the same precautions as operating on snow covered ice.

C.11. Operating on Hard Surfaces	Only conduct operations on hard surfaces under operational necessity due to the excessive wear and tear to the polymer and boat.

This page intentionally left blank.

Chapter 6:
Operating 22-Foot Special Purpose Craft – Airboat (SPC-AIR)

Introduction

This chapter discusses operating the 22-foot special purpose craft - airboat (SPC-AIR).

For more specific information relating to the 22-foot SPC-AIR, refer to the Boat Forces website.

In This Chapter

This chapter contains the following sections:

Section A: Crew Requirements

A.1. Overview

Reference (u), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol II, COMDTINST M16114.33 (series), provides the minimum standards and guidelines for SPC-AIR competence, which includes expectations that all crewmembers must:

- Be familiar with duties of other crewmembers as well as his or her own.
- Commit to memory important boat characteristics, equipment, and casualty procedures.
- Mentally rehearse operational casualty procedures (including actions expected of others).
- At every opportunity, get the boat underway to practice operational and emergency procedures.

Teamwork is the common thread that allows the crew to safely succeed.

Section B: Guidelines for Ice Operations

B.1. Performance Data

It is important to understand how the boat performs in each environment. Friction from the boat's weight, flat bottom hull, and environmental surface plays a significant role in the boat's operation.

The SPC-AIR was designed and built for the following conditions:

- Operating in protected bays and sheltered waters.
- Long-haul cases, operating up to 10 nautical miles from shore (and preferably in sight of land).
- Operating on all types of hard surfaces.
- Operating in water.
  - Shallow water.

WARNING: ***During freezing spray conditions, ice can accumulate on the boat and decrease its stability. Remove ice by striking it with a malleable object (e.g., wooden hammer).***

- Operating on ice.
  - Channeling.

WARNING: ***Use only wide sweeping turns and slower speeds to minimize the probability of damaging the hull when channeling.***

- Operating on land.

  The SPC-AIR is capable of operating on most surfaces; however, use caution when operating on unfamiliar surfaces.

- Speed.
  - Coxswains use safe speed at all times while underway.
  - Maximum travel speed on any surface (except open water) is 15 knots.
  - On rough plate ice, the maximum safe speed is only 3-5 knots.
  - When channeling, safe speed is only 5-8 knots.

NOTE: **The SPC-AIR's large power plant is not for obtaining great speeds, but for steering and maneuverability. It is important to know the difference between speed and thrust. Speed is how fast the vessel travels; thrust is the amount of force the propellers can put out.**

CAUTION: **Excessive speed is a contributing factor to a high number of small boat mishaps.**

- Stability.

The coxswain is responsible for increasing the boat's stability by ensuring the equal distribution of personnel and additional equipment throughout the boat.

B.2. Performance Monitoring

To ensure safe and efficient operation of the propulsion and ancillary systems, the coxswain and crewmembers must be aware of installed monitoring equipment and gauges. Additionally, crewmembers must know the "normal range" or indication of all gauges/indicators and report/react accordingly when changes occur.

Section C: Mission Performance

C.1. Overview

Field experience forms the basis of this section, but this section does not provide the "only way" to perform an action or complete a mission. Boat crews must use effective communications and teamwork skills along with this general information to adapt their actions to each unique mission scenario. Observe these procedures and apply skills developed through practice to effectively use SPC-AIR to perform missions.

Information in this section alone does not qualify a crewmember.

C.2. Boat Handling

Operating the SPC-AIR requires a special skill set compared to conventional outboard and inboard boats.

- Maneuvering (requires propeller thrust).
  - When making headway, use of the rudders (without thrust) does not provide maneuverability like traditional boats use.
  - Constantly feather the throttle along with rudder adjustments to maintain a straight course.

CAUTION: **The radiator's location makes it highly susceptible to damage from ice and other debris kicked up during normal operations. Make large sweeping course changes on or around ice to reduce the likelihood of puncturing the radiator.**

WARNING: ***Propeller thrust can blow debris and other objects around behind the boat. The coxswain must be constantly aware of what is behind the boat to avoid unintentional damage or personal injury.***

C.3. Going Alongside Boats and Persons

- Approaches on ice.
  - The boat's weight and momentum create a wake under the ice, which reverberates in all directions and weakens the surrounding ice.
  - When approaching persons or objects on the ice, slow the boat's speed well in advance to reduce the under ice wake.
- Approaches in water.
  - Approach persons or objects indirectly when operating in water.

WARNING: ***The boat's limited maneuverability and lack of reverse propulsion make direct approaches dangerous.***

C.4. Operations with Helicopters

The boat's design is not conducive to helicopter hoisting operations and presents many safety obstacles.

NOTE: **Crewmembers on boats less than 30 feet in length are only required to possess knowledge of helicopter operations for qualification purposes. Always refer to reference (u), U.S. Coast Guard Boat Operations and Training Manual, Vol II, COMDTINST M16114.33 (series), for current qualification requirements.**

NOTE: **Air operation procedures are described in reference (p), Boat Crew Seamanship Manual, COMDTINST M16114.5 (series).**

C.5. Towing

SPC-AIR is not designed to conduct towing evolutions. Consult with your operational commander and exercise sound judgment if the circumstances dictate consideration of towing.

CAUTION: **The propeller is highly susceptible to damage from unsecured objects (i.e., towing lines).**

C.6. Operating on Water

The SPC-AIR's design and propulsion system present unique challenges when operating on water. The following techniques are not all inclusive and are only a guide for conducting operations in open water.

WARNING:

Per reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), operating the SPC-AIR in heavy weather is not authorized. Heavy weather for the SPC-AIR is defined as sustained winds of 30 knots and waves greater than 1 foot.

C.6.a. Optimal Performance

Open water: Depths of water less than 3 feet (where lift is experienced).

C.6.b. Shallow Water

The boat operates best in water depths less than 3 feet. The boat's displacement bouncing off the bottom creates lift on the boat and assists getting on a plane.

WARNING:

Shallow water operations raise the likelihood of striking submerged objects.

C.6.c. Conducting a Turn

Take the following into account before making a turn:

- The boat's loading.
- Operational depth.
- Operational speed.
- The effect of these factors on maneuverability.
- Ice terrain.
- Other objects/obstructions.

When turning in open water, increase engine RPMs to complete the turn.

WARNING:

The SPC-AIR has a low freeboard. To avoid having the boat's wake swamp the vessel, use caution when conducting turns in open water.

Once the turn is complete, gradually decrease the RPMs.

C.6.d. Anchoring — Use standard procedures found in reference (p), Boat Crew Seamanship Manual, COMDTINST M16114.5 (series), to anchor in open water.

WARNING: ***If the anchor line fairlead is from any point other than the bow, there is the potential for a tripping hazard and possible capsize. Never anchor from the stern.***

C.7. Capsizing — Crewmembers must prepare, both physically and mentally, to increase chances of survival.

- Step one: Have an action plan that includes extensive discussion on the boat and in the classroom.
- Step two: Be thoroughly familiar with the equipment and physical layout of the boat.

C.7.a. Egress Procedure — Port and starboard sliding doors.

WARNING: ***Automatic inflatable PFDs activate inside the cabin if the boat is capsized. An inflated PFD increases the difficulty of egress.***

WARNING: ***Keep the cabin doors slightly ajar at all times while underway for emergency egress purposes. During freezing spray conditions, cabin doors tend to freeze shut when fully closed.***

WARNING: ***The forward windows are not options for egress.***

C.7.b. Post Egress Procedures

Post egress procedures:

1. Muster the crew and passengers and account for any missing occupants.
2. Remain upwind/up current to prevent ingestion of gasoline that might be present.
3. Attempt to climb aboard the inverted hull.
4. Check for injuries and administer first aid to the best of your abilities.
5. Conduct an inventory of signaling equipment. Activate PLB.
6. Check for the presence of gasoline in the water before activating pyrotechnic signaling devices.
7. Stay with the boat and do not swim for shore. Distance to the beach can be deceiving, and strenuous activities such as swimming in cold water can hasten the onset of hypothermia.

C.8. Operating on Ice

This section discusses techniques for operating the SPC-AIR on conditions encountered on and in ice.

C.8.a. Transiting on Clear Ice

WARNING: ***Wet solid ice is extremely hazardous due to the slickness of the surface.***

To alleviate crew discomfort during transit, the coxswain:

- Operates at a safe speed.

NOTE: **The SPC-AIR's operational limit for transiting on ice is 15 knots.**

- Avoids ice chunks, debris, and ice ridges.

C.8.b. Anchoring

To anchor the SPC-AIR:

- The coxswain secures the engine to anchor the SPC-AIR on ice and to prevent forward motion (SPC-AIR travels forward even at idle).
- A crewmember connects anchor line to trailer eye bolt using carabiner hook and extends line out to almost its full length.
- A crewmember places ice anchor in the ice and connects carabiner hook to ice anchor.

C.8.c. Transiting Snow Covered Ice

Transiting snow covered ice entails longer SPC-AIR maneuvering response time.

WARNING:

Snow covered ice is hazardous. Snow and snow drifts can be covering large ice chunks, ice ridges, and debris. Blown snow from propellers during maneuvering reduces visibility.

The coxswain and crew follow the same precautions as operating on clear solid ice.

C.8.d. Transiting from Open Water to Ice

To transit from open water to ice, do the following:

1. Upon approaching an ice shelf, reduce RPMs to bare steerage, make a slow approach, and maneuver so that the bow is square to the ice shelf.
2. After making contact with the ice shelf, increase RPMs enough so the bow begins to ride onto the shelf.
3. Maintain RPMs and keep a slow steady movement onto the ice shelf until the SPC-AIR is fully on top of the shelf.
4. Decrease RPMs until achieving a safe speed.

WARNING:

Use "bow to" approach to avoid capsizing when transiting an ice shelf from open water.

C.8.e. Transiting from Ice to Open Water

To transit from ice to open water, do the following:

1. Upon approach to open water, reduce RPMs to bare steerage speed to avoid plunging bow into the open water.
2. Maintain a slow speed until the SPC-AIR fully enters the water.
3. Once fully into the water, gradually increase RPMs until achieving a safe speed.

C.8.f. Transiting Ice Ridges

If unable to maneuver around an ice ridge and you must go over it:

- Make a square approach to the ice ridge before very carefully executing the maneuver.
- When approaching the ice ridge, reduce RPMs to bare steerage until the bow contacts the ice ridge.
- After making contact, increase RPMs so the boat climbs up the ridge at a slow and steady speed.

NOTE: **Decreasing RPMs while climbing the ice ridge can cause the boat to slip backwards, allowing the stern to jam into the ice and become stuck.**

- Once the boat has reached the cusp of the ice ridge, and the momentum starts to go downward, reduce the RPMs so as not to launch the airboat off the ridge.

NOTE: **The SPC-AIR only transits ice ridges that are 2 feet or less.**

C.8.g. Channeling

Channeling is when the SPC-AIR breaks through the ice layer. This can occur anywhere ice integrity is lost due to warm weather, or in areas of weak ice (rivers, warm water discharges, etc). Channeling limits the SPC-AIR's turning ability.

- If turning is necessary to maneuver to thicker ice, fluctuate engine RPMs while making as wide a turn as possible.
- If transiting through an area while channeling, increase engine RPMs to create lift so the ice plates don't increase undue pressure on the hull.

C.8.h. Stopping on Ice

To fully stop on ice, do one of the following:

- Conduct a 180-degree turn.
- Lower the hydraulic plate.
- Secure the engine (because the SPC-AIR continues to move forward even at idle).

C.8.i. Conducting a 180-Degree Turn

To conduct a 180-degree turn, do the following:

1. Reduce the RPMs, turn the rudder hard over in the direction of the turn, and quickly increase engine RPMs until the bow starts to turn.
2. As the bow moves in the direction of the turn, use as many engine RPMs as necessary to complete the maneuver.
3. When the bow comes within 45 degrees of the direction of the new course, shift the rudder and steady up the bow on the new course direction.
4. Once the momentum of the SPC-AIR starts to move in the direction of the new course, start to gradually decrease engine RPMs and proceed on the new course at a safe speed.

C.8.j. Person Recovery

CAUTION: **Due to SPC-AIR maneuverability limitations (no brakes, no reverse) and susceptibility to wind, a direct approach makes the evolution hazardous to the victim.**

If the victim is conscious, he or she might be able to assist in the rescue with help from a crewmember. With the engine secured, use an indirect approach with the boat hook.

C.9. Operating on Snow Covered Land

Snow covered land has its own hazards because snow and snow drifts often cover large objects, creating unknown impact hazards.

CAUTION: **Use caution when transiting uneven surface terrain, such as hills and ridges; these uneven surfaces hamper stopping ability and increase difficulty in maintaining a desired track.**

The coxswain and crew follow the same precautions as operating on snow covered ice.

C.10. Operating on Hard Surfaces

Conduct operations on hard surfaces under operational necessity due to the excessive wear and tear to the polymer and boat.

Chapter 7:
Operating the SKF-ICE

Introduction

This chapter discusses operating the SKF-ICE.

For more specific information relating to the SKF-ICE, refer to the Boat Forces website.

In This Chapter

This chapter contains the following sections:

Section A: SKF-ICE Systems

A.1. Introduction

Since the SKF-ICE is a unique platform, it is important to be familiar with all systems and operating characteristics. This is critical to mission performance, safety, troubleshooting, and casualty control. Since rescuers can use SKF-ICE as a shuttle board, be aware of the risks associated with dragging over hard surfaces.

Figure 7-1 Rescuer using SKF-ICE to effect a rescue

Revision

A.2. Propulsion Systems

The SKF-ICE comes with an optional Mercury® 3.5 HP four-stroke engine. This engine features a self-contained fuel tank, manual starting, and an emergency kill switch. Refer to the Mercury® Outboard Owner's Manual for proper operating procedures.

A.3. Casualty Control Measures

This section describes the emergency procedures to take for casualties to the SKF-ICE, or a boat system. The best casualty control action is to prevent casualties through good maintenance and proper seamanship. If a casualty occurs, quickly execute a predetermined plan of action to correct the casualty and/or keep the situation from worsening. Frequent underway casualty control drills both prepare the crew and improve their response.

A.3.a. Casualty Control

Casualty control is positive action taken to correct, control, and/or combat operational discrepancies experienced during underway operations. Due to the nature of the Coast Guard's missions, corrective casualty control measures can affect a range of operational situations from the potential loss of life to minor hull or machinery damage.

A.3.b. Fire

This type of casualty presents the most common threat to operations. The most logical, best preventative action is to remain alert and take early corrective action for fire threatening conditions.

1. Notify the crew and the station.
2. Turn into the wind.
3. If possible, get to strong ice.
4. Secure the engine using the key or the kill switch.

A.3.c. Main Engine Runaway

Immediately take the following actions for a main engine runaway:

1. Notify the crew and station of the casualty.
2. Pull the kill switch lanyard.
3. Fully pull engine choke if kill switch lanyard was ineffective.

A.3.d. Engine Fails to Start

If the engine fails to start, do the following:

1. Ensure kill switch lanyard is in place.
2. Ensure fuel valve is in the ON position.
3. Check fuel level.
4. Check spark plug connection.
5. Consult manufacture troubleshooting guide.

NOTE: **Expect starting to be difficult in freezing conditions; repeated attempts on the pull start might be necessary. Take care throughout not to flood the engine.**

A.3.e. Deflation or Chamber Damage

If a chamber deflates or is damaged, do the following:

1. Identify affected chamber and reposition personnel for stability.
2. Transit to strong ice or shore.
3. If forced to abandon, pull kill switch to secure engine.
4. If even a single chamber remains inflated, the SKF-ICE is likely to float. Remain with the asset and signal for rescue.

Section B: Crew

B.1. Introduction

Reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), and reference (u), U.S. Coast Guard Boat Operations and Training Manual, Vol II, COMDTINST M16114.33 (series), provide minimum standards and guidelines for competence on board the SKF-ICE.

Each operator must:

- Commit to memory important SKF-ICE characteristics, equipment, and casualty procedures.
- Mentally rehearse operational casualty procedures (including actions expected of others).

Crew must:

- At every opportunity, get underway to practice operational and emergency procedures.

Teamwork is the common thread that allows the crew to safely succeed.

B.2. Passengers and Survivors

SKF-ICE capacity depends on the weather conditions and mission requirements. Operators must exercise prudent judgment to ensure the safety of the rescuers and survivors.

Ensure the total weight of the crew, passenger, outfit, and cargo does not exceed 2,000 pounds. It is important to determine whether the SKF-ICE is appropriate for the weather conditions and tasks before using it on a mission.

Section C: Operations

C.1. Introduction

The SKF-ICE's primary use is for ice rescue short haul cases from a USCG cutter, or in enclosed ports, waterways, and bays. Its construction and design make it an ideal platform for performing soft or hard water rescues, and pulling a victim out of the water. Other uses include:

- Transporting the ice rescue team to a location to effect a rescue.
- Transporting victims to shore.

NOTE: **Per reference (r), Cleveland SAR Plan, D9INST M16100.1 (series), use the SKF-ICE for limited searching only when no other SRUs are available or capable.**

C.2. Operating Parameters

The operational limitations of the SKF-ICE are as follows:

Operating in open water	Up to .5 (½) nautical miles offshore
Visibility	Greater than .25 (¼) nautical miles
Maximum sea conditions	Less than 1 foot
Maximum wind speeds	20 knots
Towing	No towing
Surf/bar conditions	No surf
Minimum crew size	Two – certified SKF-ICE operator and ice rescuer
Maximum weight	2000 pounds

Figure 7-2 Crew of two underway

NOTE: **Ensure one certified operator and one ice rescuer is on the SKF-ICE anytime it is underway and powered by the outboard.**

CAUTION: **The SKF-ICE is light and susceptible to winds or rotor wash, which can blow it away from rescuers. When operating near a helicopter and exposed to rotor wash, anchor the SKF-ICE at both ends.**

C.3. Transiting on Concrete or Rough Terrain

Use installed grab lines.

Figure 7-3 Rescuers carrying the SKF-ICE to avoid rough terrain

CAUTION: **Do not carry more than 400 pounds on the SKF-ICE when inflated.**

CAUTION: **Do not drag SKF-ICE on rough surfaces.**

Figure 7-4 Rescuers transporting SKF-ICE and equipment to the rescue scene

C.4. Transiting on Thin Ice or Ice with Open Pools

Ice crews can drag SKF-ICE or use it to balance the crew while crossing thin ice. A method for transiting on weak or thin ice is to use the craft's characteristics to disperse weight on the SKF-ICE. Do this by having one operator in the bow opening pushing down on the sponson, and the other two crewmembers behind the stern pressing down on the sponson.

C.5. Transiting Open Water

Ice crews transiting in open water can use paddles or the optional outboard motor. The certified operator on scene makes the decision to deploy the SKF-ICE based on judgment, environmental conditions, experience, and distance to rescue.

NOTE: **Use of tow shield is optional.**

Revision

C.6. Effecting Rescue

Using the SKF-ICE to effect a rescue is considered a "Go" technique.

Use the following standard procedures for ice rescues using the SKF-ICE:

Step	Action
1	The ice rescue team has the prescribed PPE and two rescuers wear the MARSARS cold water sling in the prescribed method.
2	Connect the SKF-ICE to the end of either the 150/200-foot tend line or the 550-foot line reel.  **Figure 7-5 Securing the SKF-ICE tow strap to the tending line**

3	Rescuer takes position lying down, crouched or on knees aft of the bow opening while holding onto the handles or sides of SKF-ICE.  **Figure 7-6 Rescuer riding the SKF-ICE to the victim**
4	Using the transiting on the ice procedures, a tender maneuvers the SKF-ICE's bow opening to victim.  **Figure 7-7 Team member propelling SKF-ICE with rescuer toward the victim**
5	Ensure rescuer and tender have good communications to position the SKF-ICE in front of victim without pushing victim off the ice shelf.  **Figure 7-8 Rescuer communicating with team member to maneuver to victim**

6	Rescuer places the rescue sling on the victim and sizes it.  **Figure 7-9 Rescuer placing rescue sling over victim from SKF-ICE**
7	Rescuer connects rescue sling to safety harness to assist with victim extraction.  **Figure 7-10 Rescuer connecting sling to harness**
8	While maintaining positive control of victim and grasping sling, rescuer places his or her feet on the edge of the deck opening. Instruct the victim to kick his or her feet. Pull victim out of the water into the rescuer's lap, while rescuer simultaneously falls back onto the deck (see also figure 7-12).  **Figure 7-11 Rescuer standing up and falling back with victim**

9	Rescuer gives the signal for tenders to HEAVE AROUND and pull the SKF-ICE with rescuer and victim to firm ice.  **Figure 7-12 Rescuer signals team to HEAVE AROUND**
10	Reposition victim on SKF-ICE. The team pulls victim to safety.  **Figure 7-13 Rescuer repositioning victim on SKF-ICE**

Once rescued, crews can place the victim on the SKF-ICE or on top of the MARSARS shuttle board on the SKF-ICE.

CAUTION: **Do not overload the SKF-ICE. Ensure even weight distribution of victims, rescuers, and gear, and total weight does not exceed 2,000 pounds.**

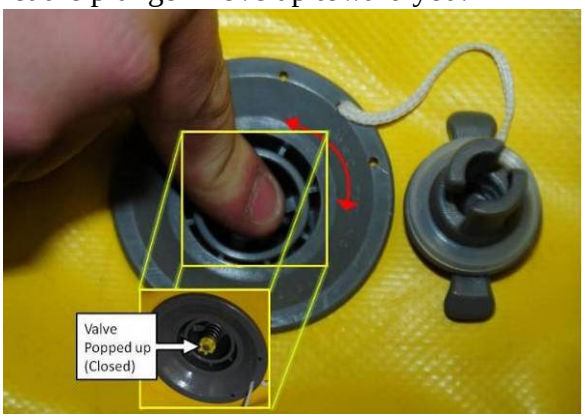
CAUTION: **During joint operations with helicopter, ice rescue teams might need to anchor the SKF-ICE to prevent it from being blown away from wind or rotor wash. Use best judgment when anchoring the SKF-ICE to prevent it from becoming a hazard.**

C.7. SKF-ICE Handling/Use

C.7.a. Inflation

Each SKF-ICE includes three air fill valves, three pressure relief valves, and an air fill manifold (AFM) hose for fast inflation using a scuba tank or other source of compressed air. To inflate the SKF-ICE:

Step	Action
1	Unfold on a flat area where nothing interferes with the inflation process.  **Figure 7-14 Deflated, unfolded SKF-ICE on flat surface**
2	Remove the air fill valve caps located on the perimeter tubes [2] and the floor [1] (refer to figure 7-17).

3	Set the air release poppet valves to the closed position. To do this, twist the small yellow knob ½-turn in either direction and let the plunger move up toward you.  **Figure 7-15 Closing air fill valves**
4	Attach the AFM to the three air fill valves. To do this, insert the valve adapters into the fill valves and twist them ¼-turn clockwise to lock them into position.  **Figure 7-16 Installing valve adapter**
5	Attach your air source to the AFM's input tube.  **Figure 7-17 Valve adapter and inflation hose affixed to fill valve**

6	Fill the SKF-ICE with air at a rate that does not make the air fill valves vibrate. This takes about 1 minute for full inflation. Hold the inflation bottle securely while inflating.  **Figure 7-18 Hold inflation bottle during inflation**

CAUTION: **Hoses are under pressure and can cause injury if they become loose at connection points.**

7	The SKF-ICE is filled to operational pressure when two or more of the pressure relief valves discharge excess air.  **Figure 7-19 Pressure relief valves**
8	When filling is complete, secure the compressed air supply source, remove the AFM and replace the 3 caps on the air fill valves.

WARNING: ***Failure to secure the air source before removal of the AFM could result in injury.***

NOTE: **When inflating, the (closed) air fill valve poppets open to let the air flow in. When you stop applying air, the poppets close by spring tension. This allows for exact inflation, prevents leakage, and allows you to take your time while reinstalling the caps. Open the poppets only when deflating for storage.**

C.7.b. Deflation and Folding

To deflate the SKF-ICE:

Step	Action
1	Allow to dry completely. Brush off sand, gravel, or other debris.
2	Lay the SKF-ICE flat on the ground. Deflate the floor by setting the floor air release plunger to open (see Step 4), and let it sag so a long fold line runs down the center of the floor.  **Figure 7-20 Deflate floor first**

3	Stand the SKF-ICE on its side, fill valve side up, and remove the air filler caps on the perimeter tube.  **Figure 7-21 SKF-ICE on side with inflation valves up**

4	Set the air release plungers to the open position by pushing in on the plunger and twisting the small knob a ½-turn in either direction to lock it open (plunger down, spring compressed).  **Figure 7-22 Fill valve open or locked inward**
5	As the tubes become soft, push the top of the floor so it begins to fold between the collapsing side tubes.
6	Keep the tubes straight and stacked on top of each other. This is easier if you do not vacuum the air out of the tubes or use excessive force to expel the air.
7	With the tubes flat and the floor folded between them, fold both ends toward the center using the large side tube tow D-rings as folding guidelines so that the final package is six layers deep.

NOTE: **The folded size is approximately 35 inches x 22 inches x 12 inches.**

C.7.c. Handling

The SKF-ICE has very little drag and can easily be handled by two people.

When deflated, it is more susceptible to abrasion damage. It has creases and points that are focal areas of excessive abrasion.

CAUTION: **Carry – do not drag – the SKF-ICE when deflated.**

The SKF-ICE is best protected in its custom-made storage bag.

C.7.d. Storage

Store the SKF-ICE deflated and bagged for fast access, less chance of damage, and longevity. Keep it in a dry area, out of direct sunlight.

CAUTION: **Do not store the SKF-ICE with the floor inflated! The floor is designed to be inflated hundreds of times for training and rescue deployment. It is NOT designed to be left fully inflated for thousands of hours. Storing the SKF-ICE with the floor inflated voids the warranty.**

C.7.e. Treatment and Maintenance

With proper care, the SKF-ICE should last approximately 10 years. Follow these tips:

- Store deflated and bagged, out of the sun.
- Do not clean with chemical solutions, such as Armor All® products.
- Remove oil, gas, or chemicals from the boat immediately, and only wash with a mild detergent and warm water.
- Do not carry more than 400 pounds in the SKF-ICE when using as a litter or gear transport.
- Do not move the SKF-ICE by winch or Z-drag set up. Towing by ATV or snowmobile (if available) is authorized.

C.7.f. SKF-ICE Tow Strap

Step	Action
1	Girth hitch the web loop end of the 12-inch strap through the bow end large D-ring so the support O-ring hangs about 10 inches below the girth hitch.
2	Thread the free attachment O-ring onto the middle of the 78-inch strap.
3	Pass both ends of the 78-inch strap through the support O-ring on the 12-inch strap.

4	Connect the ends of the 78-inch strap to the SKF-ICE large tow D-rings using the ¼-inch connector links.
5	Connect your line hardware to the attachment O-ring that is free floating on the 78-inch strap.

Figure 7-23 Tow strap assembly

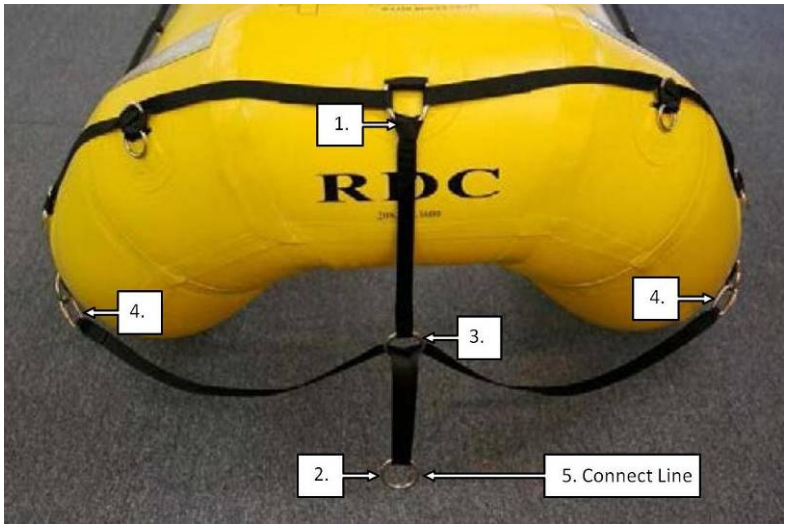


Figure 7-24 Properly configured tow strap

CAUTION:

Do not connect attachment hardware directly to the support O-ring or the top large D-ring. This system allows the lower tow D-rings to remain in shear tension, creates a change of direction at the support O-ring, and suspends the attachment at or above the water surface eliminating most potential snags.

C.7.g. SKF-ICE Floor Top Carpet Installation

Installing floor-top carpet is easier if the SKF-ICE is not fully inflated.

Step	Action
1	Starting from one end of the floor, remove two adjacent bolts from the floor handle loops.
2	Install the carpet between the handle loops and the floor edge using the same bolts, nuts, and washers. Do not tighten at this time.
3	Remove two adjacent bolts from the floor handle loops on the opposite side and install the carpet as before.
4	Continue alternating from side to side along the length of the floor.
5	Tighten all nuts and bolts after completing installation.
6	Finish inflating the SKF-ICE.

NOTE: **Consider the floor top carpet a permanent assembly that you do not need to remove between deployments. It easily rolls up with the SKF-ICE when deflating and fits inside the carrying bag.**

NOTE: **The floor top carpet provides enhanced boot traction when used in ice and snow conditions, and helps protect the inflatable floor from punctures and abrasions.**

Figure 7-25 3.5HP outboard mounted

C.7.h. SKF-ICE Tow Shield Installation

Tow shield use is optional. If used, installation is easier if the SKF-ICE is not fully inflated.

Step	Action
1	Turn the SKF-ICE either on its side or upside down.
2	Spread the tow shield on the bottom of the SKF-ICE and align the edge scallops with the large tow D-rings. Ensure the tow strap system is between the tow shield and the SKF-ICE.
3	Starting at the stern, connect the tow shield to the SKF-ICE's small D-rings using six of the quick links. Do not connect the quick links to any of the small D-rings that extend beyond the ends of the floor.
4	Repeat the quick link connections for the other side of the tow shield.
5	Thread the stern tension webbings through the large tow D-rings on the SKF-ICE and then back to the small double D-rings on the end of the tow shield. Secure with a friction hitch.
6	Roll the SKF-ICE right side up.
7	Grab the hook end of one of the bungee float assemblies and stretch it up over the top of the bow. Cross it over the bow access hole, and hook it into the 12-inch long web loop attached to the opposite side of the tow shield just behind the edge scallop. Repeat for the other bungee float assembly.
8	Finish inflating the SKF-ICE. You can leave tow shield permanently in place. It easily rolls up with the SKF-ICE when deflating and fits inside the carrying bag.

NOTE: **When approaching the victim(s), release the bungee float cords on the tow shield and push it under the floor of the SKF-ICE. Use the bow access hole to bring the victim(s) aboard. When crew and victim(s) are aboard, re-attach the bungee cords so the tow shield is in place to protect them from wind and spray.**

C.7.h.(1). SKF-ICE Motor Mount Attachment Strap Installation

Step	Action
1	Use the three nylon straps to secure the motor mount to the SKF-ICE.

NOTE: **The straps consist of one 4-foot nylon strap and two 6-foot nylon straps.**

2	Run the single 4-foot strap from the large 1 ½-inch D-ring at the top of the hand line under the inflated tube, around the top of the motor mount frame, back under the inflatable tube, and into the cam buckle.
3	Run the two 6-foot straps down from the D-ring beside the transom plate, under the inflatable tubes, over the top of the bar next to the transom plate, back under the inflatable tube, and then into the cam buckle.

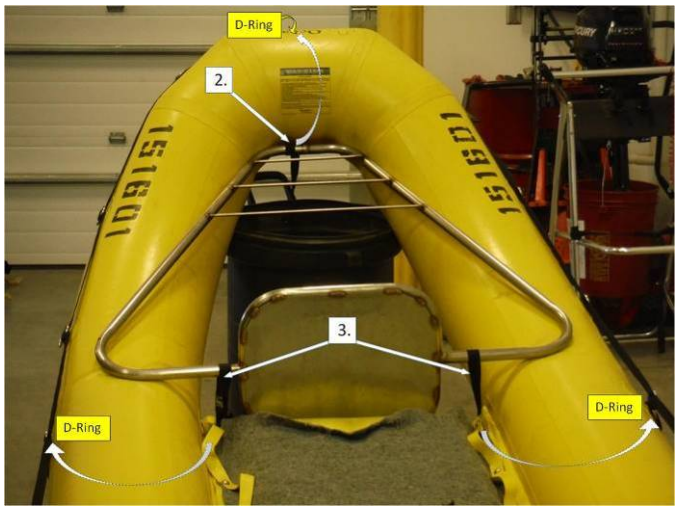


Figure 7-26 Motor mount

4	After installing all straps, install the outboard if needed.

Figure 7-27 Strap with cam buckle on the outside

C.7.h.(2). SKF-ICE Motor Mount Removal

When removing the motor mount, leave the tie down straps in place by securing the 6-foot straps to the grab handles on the side of the floor.

Secure the 4-foot strap around the top of the stern tube. With the straps in place, attaching the motor mount takes less than a minute.

NOTE: **As a best practice, keep the straps readily available for quick motor mount attachment if the situation dictates.**

C.8. Repair Procedures

Refer to manufacturer guidelines and Boat Forces website.

C.9. Disabling Casualties and Restrictive Discrepancies

Continuously monitor the SKF-ICE's readiness with weekly boat checks and the SKF-ICE's preventive maintenance system (PMS) schedule to ensure it is capable of unrestricted operations.

C.9.a. Disabling Casualties Description

Disabling casualties are those that make the SKF-ICE unserviceable. If you see a disabling casualty when moored, the SKF-ICE cannot get underway until the casualty is corrected.

C.9.a.(1). Disabling Casualties

The following is a list of disabling casualties:

- Puncture of the side collars.
- Any condition that prevents the collars of the SKF-ICE from holding air.

C.9.b. Restrictive Discrepancies

Restrictive discrepancies are those that restrict SKF-ICE operations to performing some, but not all, missions. Report restrictive discrepancies to the operational commander if you cannot repair the discrepancy within 1 hour. Place the SKF-ICE in "Charlie" status, and do not use until you correct the discrepancy or receive a waiver. Use CASREP traffic as appropriate to report key issues or seek required outside assistance.

Operate SKF-ICE with restrictive casualties per the waiver policy in reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series).

C.9.b.(1). Restrictive Discrepancies List

The following is a list of restrictive discrepancies:

- Floor not holding air.
- Inoperable outboard motor (optional; open water transit).
- Missing paddles (open water transit).

Section D: SKF-ICE Operations

D.1. Introduction

Each operator and ice rescuer should be familiar with the SKF-ICE's unique handling characteristics in soft water and hard water (ice). The SKF-ICE is easy to handle with the provided paddles as well as the 3.5HP outboard motor.

Revision

D.2. Open Water Handling

This section discusses the dynamics that affect SKF-ICE operations in open water. Like other small boats, static and dynamic forces affect the vessel's stability and handling. But a SKF-ICE's design allows rescues in a variety of circumstances.

The SKF-ICE can transit open water with either paddles or the 3.5 HP outboard motor. It has rockered (upturned) ends and the deck or floor is open at each end, allowing two entry points. The freeboard height is only inches, allowing a rescuer to easily pull a victim into the boat from either end. The decking is an I-beam design that, with minimal air pressure, becomes a stable working platform. The enhanced stability enables use of the SKF-ICE to carry an incapacitated victim to safety.

NOTE: **When using the SKF-ICE with the outboard, remain as close to the stern as possible to minimize deck flooding.**

NOTE: **The tow shield reduces drag from water over the floor.**

WARNING: ***Do not wax or shine the SKF-ICE. This creates an extremely slick working platform.***

D.3. Hard Water (Ice) Handling

On hard water (ice), the operator and ice rescuers carry or drag the SKF-ICE along the ice until needed to rescue or traverse open water.

D.4. Capsizing

Under calm conditions, the SKF-ICE is a stable platform; however, it is possible to capsize the SKF-ICE. During testing, deliberate excessive loading to one side made the SKF-ICE susceptible to capsizing. Once capsized, one person can easily right the SKF-ICE.

Section E: Preventive Maintenance

E.1. Introduction

It is important to keep equipment ready for ice operations so performance isn't degraded. Refer to Appendix C: USCG Ice Rescue Daily Pre/Post Mission Checks.

E.2. Weekly Check Off

Perform this checklist weekly; however, complete the daily ice rescue gear checks to ensure unit is fully mission capable.

1. Check engine fluid levels (fuel and oil).
2. Visually inspect the SKF-ICE seams and hardware for damage.
3. Ensure engine is in neutral.
4. Start engine while providing cooling water.
5. Run engine for approximately 15 minutes.
6. Ensure area around the engine is clear; ensure engine goes into gear smoothly.
7. Place engine in neutral.
8. Secure engine using the emergency kill cord.
9. Drain all cooling water from engine before storing.
10. Allow engine to cool before storing.
11. Ensure storage bag is free of damage.
12. Paddles (02) work properly.

Revision

E.3. Preventive Maintenance

A good preventive maintenance program prolongs the life of the SKF-ICE and its outboard, increases unit readiness, and reduces overall maintenance/repair costs.

Refer to the Mercury® Outboard Owner's Manual for proper maintenance procedures.

E.3.a. After Use Care

Step	Action
1	Ensure engine oil is full.
2	Visually inspect the fuel system for deterioration or leaks.
3	Check propeller blades for damage.
4	If operating in salt or polluted water, flush the outboard cooling system.
5	Lay the SKF-ICE flat and allow to dry completely before storing.
6	Inspect all seams and hardware for damage.

E.3.b. 100 Hour or Annually (whichever comes first)

Step	Action
1	Lubricate all lubrication points.
2	Change engine oil. Change the oil more often when operating the engine under adverse conditions (e.g., extended trolling).
3	Replace spark plug if needed.
4	Drain and replace gear case lubricant.
5	Check corrosion control anode.
6	Check and adjust valve clearance.
7	Lubricate driveshaft splines.
8	Replace water pump impeller.
9	Check tightness of bolts, nuts, and other fasteners.
10	Check cowling seals to make sure seals are intact and not damaged.
11	Check for loose hose clamps.

This page intentionally left blank.

Chapter 8: Cutters

Introduction

Cutters can get the ice rescue team to the scene of distress. For team and victim safety, it is important to know the procedures for transiting ice and deploying the team from cutters. Included in this chapter are best practices for cutters.

In This Chapter

This chapter contains the following sections:

Section A: Transiting Ice

A.1. Underway Maneuvering

It is important for the cutter to transit at slow speeds in the vicinity of the victim to avoid wake breaking the ice edge or creating pressure cracks in the ice.

WARNING: ***Avoid transiting or maneuvering near a victim in the water or on top of ice floes as doing so presents a crushing hazard to the victim.***

Section B: Deploying the Ice Rescue Team

NOTE:

The cutter CO determines the rescue recovery method for any person in the water or on the ice. During ice rescue recovery, the CO considers several factors and risks before deploying an ice rescue team, including: the condition of the person in the ice/water, the proximity to shoal water, ice conditions, weather (visibility, temperature, wind), etc.

B.1. Considerations

When deploying the ice rescue team, it is recommended to find an ice edge that can support the weight of the team (approximately 3 inches). It is not recommended to deploy the team in broken ice. Broken ice requires significant physical strength and endurance to traverse with the rescue gear and leads to premature team fatigue.

B.2. Deployment Tools

A Jacob's ladder, accommodation ladder, or brow are sufficient to deploy the ice team from the cutter onto the ice.

B.3. Deployment Procedures

Deploying an ice team:

1. Hove to or thrust into the ice edge until able to lower the brow or ladder onto the ice.
2. Send one tethered member onto the ice to assess the ice conditions.
3. If the ice is safe for transit, deploy the team.
4. Cutter teams are designated as short-haul capable, which means the team stays within a 1,000-yard radius of the cutter at all times.

Section C: Man Overboard

C.1. Overview

Cold temperatures, topside icing, and snow covered decks present a hazardous environment for cutter crews and could contribute to a man overboard (MOB) situation. An inexperienced crewmember and conning officer could potentially worsen the probability of survival and rescue.

C.1.a. Self Rescue

It is recommended that all cutter crewmembers are familiar with and practice self-rescue techniques to increase the probability of survival.

C.1.b. MOB Recovery in Ice

It is recommended for cutters that operate in ice conditions to practice recovery of a MOB using the ice rescue team.

To safely recover a MOB in ice, follow these steps:

1. Identify when a MOB occurs and announce over the 1MC.
2. If necessary, maneuver the ship to avoid the MOB.
3. Deploy flotation devices and/or position markers.
4. Record the position of the MOB and relay to nearest sector command center (SCC).
5. Determine the correct recovery method. Immediately stopping in the ice might be the safest method to avoid crushing the MOB between broken ice.
6. Notify other vessels in the area.
7. Deploy the ice rescue team using a Jacobs’s ladder, accommodation ladder, or brow to effect the rescue.

Chapter 9: Aviation

Introduction

This chapter discusses helicopter ice rescue operations. For more specific details, refer to reference (k), U.S. Coast Guard Flight Manual Series HH-65C Helicopter, CGTO 1H-65C-1, reference (l), U.S. Coast Guard Flight Manual Series MH-60T Helicopter, CGTO 1H-60T-1, and reference (o), U.S. Coast Guard Helicopter Rescue Swimmer Manual, COMDTINST M3710.4 (series).

In This Chapter

This chapter contains the following section:

Section A: Aviation Operations

A.1. Pre-Flight Mission Preparations

Pre-flight mission preparations ensure helicopter systems and all gear are in proper working order and the crew is properly prepared/outfitted for the upcoming mission. This section is for aircrew. For complete mission planning details, refer to Chapter 3: Mission Planning.

A.1.a. Support Gear

Some recommended gear includes:

- Ice auger: assists with determining ice depth (as needed).

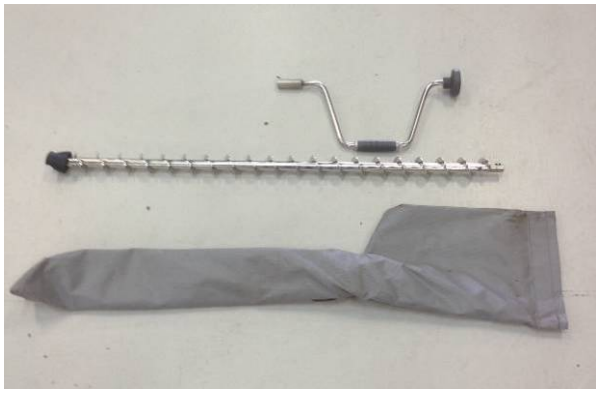


Figure 9-1 Ice auger

- Ice chocks (installed – seasonal winter gear): Prevents aircraft movement on icy surfaces.

Figure 9-2 Ice chock installed

- Litter.
- Isopropyl alcohol spray (typically used for brakes or frozen gear).

Figure 9-3 Isopropyl alcohol spray

- Balaclava.

Figure 9-4 Balaclava

- Cold weather gloves.

Figure 9-5 Cold weather gloves

- Cleats (remove before entering helicopter).

Figure 9-6 Cleats

- Snow pendant.

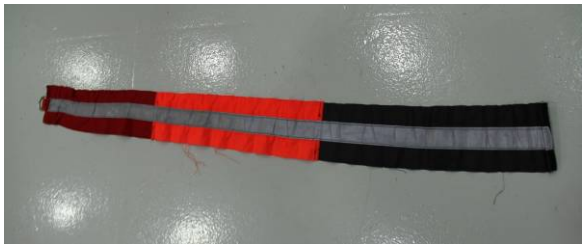


Figure 9-7 Snow pendant

WARNING: ***When the ramp area or helicopter parking surface is covered in ice and/or snow, aircrew should wear aircrew helmets for protection and proper footwear (cleats, if available) to prevent falling on slippery surfaces when transiting to/from the helicopter.***

A.1.b. Engine Start

Consider the following before/during helicopter engine start:

- Install ice chocks to reduce the likelihood of aircraft movement if parked in snow or ice covered area.
- Turning on the windscreen anti-ice may reduce the likelihood of in flight windscreen cracks in cold weather operations.

A.1.c. Taxi

- Remove ice chocks during taxi checks.
  - ➢ Keeping the ice chocks installed until ready for taxi (e.g., brake checks complete) reduces the likelihood of the aircraft moving during system equipment checks.
- Check brakes.
  - ➢ If aircraft brakes become frozen during taxi, spray isopropyl alcohol on them. This sometimes unfreezes brakes, allowing for a normal taxi.

CAUTION: **Taxiing through loose snow or in depths which reach the brake system increases the risk of frozen brakes after takeoff.**

CAUTION: **Taxi on ice and snow carries additional hazards (i.e., sliding, loss of visual reference). For detailed techniques, refer to reference (k), U.S. Coast Guard Flight Manual Series HH-65C Helicopter, CGTO 1H-65C-1, and reference (l), U.S. Coast Guard Flight Manual Series MH-60T Helicopter, CGTO 1H-60T-1.**

A.1.d. Takeoff

A slight increase in the collective without getting airborne causes the rotor wash to remove the loose snow around the helicopter. Removal of snow around the helicopter allows for better visual references during take-off.

A.2. Enroute Mission Preparations

During enroute mission preparations, the crew receives updates on mission status/weather, continues to monitor helicopter systems, and mentally prepares for the upcoming rescue.

A.2.a. Airframe Icing

Refer to reference (k), U.S. Coast Guard Flight Manual Series HH-65C Helicopter, CGTO 1H-65C-1, and reference (l), U.S. Coast Guard Flight Manual Series MH-60T Helicopter, CGTO 1H-60T-1, for early indications of airframe icing descriptions.

NOTE: **If the saltwater temperature is higher than 32 degrees Fahrenheit, lower flight over the water surface might provide an environment less conducive to icing.**

A.2.b. Radar Effectiveness

NOTE: **If the water surface is frozen solid the radar might not accurately differentiate between land mass and frozen water.**

Aircrews should consider the following when using aircraft radar:

- Typically a rough ice surface (pressure ridges, rafting, hummocks, etc.; see Appendix B: Ice Development and Characteristics) provides a radar return that is indistinguishable from a land mass.
- Smooth ice surface typically provides a return similar to open water.
- Radar navigation while navigating over rough ice is difficult and unreliable. Use other means of aircraft navigation.
- If the aircraft radome becomes coated in ice or snow, radar return effectiveness can be greatly diminished.

A.2.c. Electro-optical/infrared Sensor System (ESS) Use for Search

Electro-optical/infrared sensor system (ESS) provides gyro-stabilized images that can be magnified by up to 10 times. An infrared sensor allows displaying images based on an object's heat content. The larger the temperature difference between the target object and surrounding surfaces, the better the resolution on the ESS display.

A.3. Landing/ Hovering On Scene

Landing or hovering in ice or snow environments carries additional challenges and hazards. Aircrews should anticipate restricted visibility due to loose snow. On final approach to a landing or hover, aircrews can call out a developing snow cloud as it approaches the cabin to ensure the pilots are aware of the impending visibility restriction.

WARNING: ***If visual reference is lost, execute an instrument takeoff immediately.***

A.3.a.(1). Visual Illusions: Night

The use of landing lights at night during snowy conditions can increase pilots' susceptibility to visual illusions. Consider the following to avoid visual illusions:

- Higher hover to mitigate rotor wash conditions.
- Per reference (w), Instrument Flying Handbook, FAA-H-8083-15A, Featureless Terrain Illusion: *An absence of surrounding ground features, as in an overwater approach, over darkened areas, or terrain made featureless by snow, can create an illusion the aircraft is at a higher altitude than it actually is. This illusion, sometimes referred to as the "black hole approach," causes pilots to fly a lower approach than is desired.*
- Hover or slow flight through falling snow can create a false sense of forward motion.
- Turn off landing lights, position lights, and anti-collision lights.

A.3.a.(2). Visual Illusions: Day

During daytime conditions, the horizon can become obscured when flying over large unbroken expanses of snow, ice, haze, or blowing snow. In forward flight, maintain an instrument scan in these conditions. When established in a hover, the following techniques can assist with depth perception and position keeping:

- Snow markers/plastic streamers.
  - Different colors for depth.
  - Ideally placed at the 1 o'clock and 3 o'clock position, upwind of the hover location approximately 10 to 20 yards. For landings, place the markers at the intended landing location and conduct the landing with marker inside the rotor arc and visible during the entire final approach to landing. Typically, this is 3 to 10 feet from the flying pilot's window.
- If the ground crew is available, consider requesting established visual references that will not get blown away. Also see, Chapter 10: Joint Operations.

A.3.b. Hovering Operations

CAUTION: **Hovering over open water in freezing temperatures can cause rotor wash spray to freeze on the airframe. Typically, the first area to accumulate from this condition is the bottom of the aircraft. This increases the weight of the aircraft and decreases aircraft performance. Water can become frozen in the sliding door tracks and lock the door in either the open or closed position.**

To avoid these conditions, consider higher hovering altitudes to avoid the rotor wash spray.

NOTE: **In a no wind condition, maintaining an altitude of at least 1 rotor arc above the water will limit the airframe being exposed to rotor wash spray.**

NOTE: **If a wet survivor or rescue swimmer enters the cabin, the introduction of this water can cause the cabin deck to become covered in ice and slippery. Also, the water can become frozen in the sliding door tracks and lock the door in either the open or closed position.**

CAUTION: **Hovering around temporary buildings (i.e., shanties – only anchored with cords, or not at all), equipment, and/or large pieces of loose debris can cause damage and/or injury to survivors.**

A.4. Landing

NOTE: **Flying with gear down in a winter environment (even if snow/ice aren't present), makes brakes more susceptible to becoming frozen.**

A.4.a. Vertical Landing

Consider a vertical landing after flying through freezing temperatures with moisture present due to the possibility of frozen brakes.

CAUTION: **Running landings with frozen brakes increase the possibility of blowing a tire.**

A.5. Deployment /Delivery Procedures

Rescue swimmer (RS) is connected to the helicopter under most circumstances.

Procedures:

- Helicopter ice disembark deployment.
- Hover over solid ice deployment.
- Direct deployment ice recovery.
- Basket.
- Litter.

Per reference (k), U.S. Coast Guard Flight Manual Series HH-65C Helicopter, CGTO 1H-65C-1, and reference (l), U.S. Coast Guard Flight Manual Series MH-60T Helicopter, CGTO 1H-60T-1, the rescue hoist load is limited to a maximum weight of 600 pounds.

Refer to reference (o), U.S. Coast Guard Helicopter Rescue Swimmer Manual, COMDTINST M3710.4 (series), for further guidance.

A.6. On-Scene Rescue Procedures

Upon on-scene arrival, aircrew determines ice thickness, ice integrity, number of survivors, and operational hazards. Determine ice thickness using the following methods:

- Ice auger.
- Ground party.
- Visual.
- Known National Oceanic and Atmospheric Administration (NOAA) ice reports, etc.

Based on survivor's condition, aircrew decides which recovery procedure to use.

NOTE: **Consider using the double lift on hypothermic survivors.**

Various ice rescue gear aids the RS. For a list of optional gear, refer to reference (m), Aviation Life Support Equipment Systems Process Guide, CGTO PG-85-00-310-A.

A.6.a. Helicopter Ice Disembark Deployment

A.6.a.(1). Conditions

This procedure allows efficient transfer of multiple ambulatory survivors when the ice conditions allow the aircraft to touch down on the ice surface.

In this procedure, the helicopter pilot typically does not place the full weight of the helicopter on the ice, and the helicopter continues to produce significant rotor wash while the wheels are on the surface. Consider this rotor wash effect on any rescue.

NOTE: **Disembarking is used only when the helicopter has touched down on the ice surface. The helicopter maintains wheels lightly on ice during the evolution.**

- If the ice is free of cracks, voids, or melt ponds (refer to Appendix B: Ice Development and Characteristics) and is a minimum of 12 inches thick, the aircraft can be operated without restriction. (H65 only)

A.6.a.(2). Cable Management

Cable management is very important when performing the helicopter ice disembark procedure.

WARNING: ***The FM should not pull the rescue swimmer or survivor with the hoist cable.***

NOTE: **Limiting the hoist cable from maintaining contact with the snow/ice might prevent fouling the hoist drum.**

A.6.a.(3). RS Transit and Recovery

- Once the aircraft is in position, the RS exits while remaining attached to the hoist cable and carefully walks to the survivor.
- RS assesses survivor's ability to traverse the ice and provides verbal direction. (e.g., rotor wash considerations).
- The RS carefully escorts the survivor back to the helicopter as required.

NOTE: **Per the deployment procedures in reference (o), U.S. Coast Guard Helicopter Rescue Swimmer Manual, COMDTINST M3710.4 (series), the RS can disconnect from the locking hoist hook to move freely from survivor to survivor. Disconnect only after a thorough pre-brief and check of surrounding ice stability.**

CAUTION: **Limit walking in cabin with cleats on to prevent slip hazard and aircraft damage.**

A.6.b. Hover over Solid Ice Deployment

A.6.b.(1). Conditions

Use the hover over solid ice deployment when the following conditions exist. (Ultimately, each aircrew determines which procedure to use after analyzing the overall on-scene conditions.)

- Ice integrity is questionable (e.g., crew identifies cracks, voids, water, or other signs of rapid melting. Refer to Appendix B: Ice Development and Characteristics).
- Rotor wash may adversely affect rescue.
- Helicopter cannot land on ice for various reasons.
  - Sloped terrain.
  - Unprepared terrain/icy surfaces with questionable integrity.
  - Areas with potential obstructions (i.e., sharp objects, posts, etc.) extending above the rest of the terrain/surface.

NOTE: **Based on environmental atmospheric conditions, consider use of the hoist static discharge (HSD) cable before deployment.**

A.6.b.(2). Overview

Once the helicopter is in position and a steady hover, the RS is lowered to the ice surface. The RS carefully walks to the survivor while remaining connected to the hoist cable. RS can kneel or lay down to indicate difficulty walking; this signal indicates an adjustment to altitude or reposition of the aircraft is required.

In a single survivor case, the helicopter can move over the RS and survivor once RS gives the ready for pick up signal. In the event of multiple survivors, the RS can escort the survivor back to the original deployment point to ensure other survivors are free of helicopter rotor wash.

See reference (o), U.S. Coast Guard Helicopter Rescue Swimmer Manual, COMDTINST M3710.4 (series), for a full description of deployment procedures, but keep the following in mind:

- RS kneels down to let aircrew know he or she is having trouble walking.
- Aircraft adjusts altitude in order to aid RS.

NOTE: **Once RS and survivor are clear of water/ice, the pilot lowers hover altitude (conditions permitting) to maintain RS and survivor no more than 10 feet above the surface until they are inside the helicopter cabin. This minimizes the risk of the survivor falling out of the recovery device.**

WARNING: ***RS constantly evaluates ice while transitioning from aircraft to survivor/survivors (i.e., cracks, voids, open water, rotor wash) (refer to Appendix B: Ice Development and Characteristics).***

A.6.c. Direct Deployment Ice Recovery

A.6.c.(1). Conditions

Use direct deployment when any of the following conditions exist. (Ultimately, each aircrew determines which procedure to use after analyzing the overall on-scene conditions.)

- Persons trapped in ice hole.
- Swift water in icy conditions.
- Ice integrity is questionable.

A.6.c.(2). Considerations (Helicopter/RS)

The RS is lowered to an altitude of approximately 5 feet over water or ice during approach to survivor. This is particularly relevant over ice to prevent possible injury of the RS due to aircraft emergencies, shearing of the RS, etc. The RS maintains visual contact with the survivor when possible.

CAUTION: **Rotor wash may disrupt equipment, temporary buildings, or personnel in the area.**

A.6.c.(3). Recovery Considerations

- The greatest chance of pushing a survivor underwater is during a direct recovery. Reduce water wash by hoisting at a higher altitude or using catenary to allow RS to swim to survivor.
- If survivor is located in an ice hole, consider lowering the RS into the ice hole or water and approaching the survivor from the water.
- If RS physical grip recovery becomes necessary, aircrews can consider moving survivor to ice before hoisting.

NOTE: **Survivor weight might increase due to water soaked winter clothing.**

- Route the quick strop from below survivor or disconnect and route quick strop around survivor. Reference (o), U.S. Coast Guard Helicopter Rescue Swimmer Manual, COMDTINST M3710.4 (series), outlines these maneuvers in more detail.

WARNING: ***The survivor's clothes and arms can freeze to the ice shelf making removal of survivor's hand hold on ice shelf (before attaching the rescue device) potentially dangerous. Refer to reference (o), for a full description of deployment procedures.***

A.6.d. Basket

A.6.d.(1). Conditions

Use basket deployment when the following conditions exist. (Ultimately, each aircrew determines which procedure to use after analyzing the overall on-scene conditions.)

- Survivor is ambulatory.
- Qualified ground party is present.

NOTE: **At the discretion of the aircrew, you can conduct basket hoists without RS assistance. However, not including the RS increases injury risk to the survivor, so it is important in high risk situations to consider the RS.**

WARNING: ***To prevent shock, allow the basket to contact ice or water before being touched. Refer to reference (o), for a description of deployment procedure.***

A.6.e. Litter

Use the rescue litter to recover the survivor when the following conditions exist. (Ultimately, each aircrew determines which procedure to use after analyzing the overall on-scene conditions.)

- Neck or spinal injuries are suspected (i.e., snowmobile accidents, motor vehicle accidents, etc.).
- Survivor is not ambulatory.

NOTE: **Only trained personnel package survivor in a litter.**

WARNING: ***To prevent shock, allow the litter to contact ice or water before being handled.***

CAUTION: **Approved litters aboard cutters or at boat stations shall be marked as "Helicopter Hoistable" and maintained per reference (g), Rescue and Survival Systems Manual, COMDTINST M10470.10 (series).**

A.7. Rescue Swimmer Emergency Procedures

RS day emergency signal is vigorous waving of a single arm overhead; night emergency signal is to activate strobe light. Refer to reference (o), U.S. Coast Guard Helicopter Rescue Swimmer Manual, COMDTINST M3710.4 (series), for full RS emergency procedures.

If the RS remains on scene, consider leaving the following items/equipment:

- RS raft (for shelter).
- Crew raft (for shelter and/or for multiple survivors).
- Hypothermia recovery capsule.
- Cold weather aircrew survival kit (CWASK).
- Personal survival kits.
- Extra food and/or water.

Chapter 10:
Joint USCG Operations

Introduction

This chapter describes joint operations between all ice rescue surface teams, aircrews, and assets.

Per reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical Maritime Search and Rescue Manual (IAMSAR), COMDTINST M16130.2 (series), air and surface assets are typically launched in ice rescue cases. When working with a helicopter, follow these guidelines:

- Anchor boats and SKF-ICE.
- Secure gear, equipment, and boat before helicopter arrives on scene.
- Establish hoisting zone downwind of equipment and personnel.

Ice rescue team leader establishes communication with helicopter to coordinate on-scene response.

In This Chapter

This chapter contains the following sections:

Section A: En Route

A.1. Mission Planning

This chapter is for joint operations, for full details, see Chapter 3: Mission Planning.

- Surface equipment (see Chapter 4: Mission Execution).
- Aviation equipment (see Chapter 9: Aviation).
- Closest surface team/asset passes environmental conditions to helicopter.
  - Wind direction/speed.
  - Snow depth/ice thickness.
  - Visibility.
- Number of survivors/conditions.
- Amount of CG/OGA personnel on scene.
- Unusual hazards (pressure ridges, ice caves).

A.2. Surface to Air Position Locating

Aircrews typically fly with NVGs. NVGs amplify existing light (up to 5,000 times), improving the ability to see and operate in the night environment. Below is a list of options to assist aircrews in locating surface teams.

- Radios.
- Strobes at night (only with concurrence from aircrew).
- Flares at night (only with concurrence from aircrew).

NOTE: **A flashing light helps identify the rescue site.**

- Lights to mark position.
- Chemical lights.

WARNING: ***Use of flares or strobe lights at night with an aviation asset in the vicinity can cause immediate loss of visual reference by aircrew.***

A.3. Communications (Radio Frequencies)

Currently ice rescue teams have limited range and capabilities that aircrews need to be aware of:

- Team leader: Handheld radio VHF radio.
- GV ("shore party"/"mobile 1"): Mounted VHF radio and cell phone.
- Airboats: Mounted VHF.

Aircrew have the following:

- Aircraft multi bands and widths VHF/UHF.
- RS handheld VHF radio.
- Aircraft also carries an additional handheld VHF radio that can be delivered from the aircraft to the ground crew.

A.3.a. Initiating Joint Operation Communications

As helicopter is en route to the scene, communications expedite rescue coordination. Use the following call signs:

- Helicopter: "65xx", "66xx", or "60xx" (xx is equal to the final two tail numbers).
- Shore GV: "Shore party" or "Mobile 1".
- Surface: "Team lead" or "ice rescue team 1"/ice rescue team 2", etc.
- Airboat: "22xxx" or "20xxxx" (xxx and xxxx are equal to the final hull numbers).

A.3.b. Communication Sequence

The following is the typical communication progression helicopters use to execute joint ice rescue mission.

1. Contact sector or local station to gain working frequency of ice rescue team.
   a. Relay mission planning items per Chapter 10: Joint USCG Operations, Section A.1 Mission Planning.
   b. Ensure on-scene ice rescue team is aware of helicopter estimated time of arrival (ETA), available time on scene, and survivor capacity.
2. Once on scene:
   a. Primary contact is team leader or airboat.

NOTE: **If working with an airboat, communications might be limited due to loud noise when airboat is making way. Airboats should consider coming to a full stop to establish communications.**

   b. If unable to contact team leader, contact “shore party”/”Mobile 1.”

A.3.c. Working with OGA

Be aware of unit AOR partner agencies and contact information.

Section B: On Scene

B.1. Communications

Primary communication is via radio frequencies established in Chapter 10: Joint USCG Operations, Section A.3.: Communications (Radio Frequencies). However, noise generated by helicopter on scene can make verbal communications less effective.

B.1.a. Hand Signals

If verbal communication cannot be maintained by surface and aircrew, refer to Boat Crew hand signals [reference (u), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol II, COMDTINST M16114.33 (series)].

B.1.b. Emergency Signals

Day:

- Strobe light.
- Orange smoke.
- Flare.
- Surface team: Wave both arms vigorously (see figure 4-4: Help arm signal).
- Rescue swimmer: Vigorous waving of one arm.

Figure 10-1 RS day emergency hand signal

Night:

- Strobe light.
- Flare.

B.2. Hover/ Landing

Helicopter operations over icy water and solid ice are safe if crews pay careful attention to the thickness and quality of ice. If known, provide the following information to the aircrew to assist in their evaluation:

- Visible thickness of the ice.
- Presence of equipment or vehicles already on the ice.
- If people or equipment have broken through the ice.
- Ice condition (honeycombed, cracks, leads, refer to Appendix B: Ice Development and Characteristics and check terms).

Keep the following in mind regarding helicopter landings:

- Helicopter maintains some rotor pitch to allow minimal weight on the wheels supported by the ice once landed.
- Parameters for a H-65 unrestricted landing include ice thickness of more than 12 inches, and ice is free of cracks, voids, or melt ponds.
- Passing ice thickness information to the aircrew assists in their determination to land or not and conserves fuel while patient is transferred to helicopter.

CAUTION:

The SKF-ICE is light and susceptible to winds or rotor wash, which can blow it away from rescuers. When operating near a helicopter and exposed to rotor wash, anchor the SKF-ICE at both ends. (See Chapter 7: Operating the SKF-ICE.)

WARNING:

Minimize time ground personnel or survivors are exposed to rotor wash to reduce effects of cold air/wind chill. Also, rotor wash poses a hazard to personnel from blowing loose snow or ice chunks.

WARNING:

Aircraft visibility is reduced from the 5 to 7 o'clock position; ground crews approaching the helicopter from this direction are exposed to increased hazards from rotor wash, tail rotor, and unintended aircraft movement.

B.2.a. Rescue Site Staging

Set up rescue site:

- Ensure all rescue gear is upwind by at least 100 feet of the intended rescue site.
- Secure equipment that can't be moved outside this distance with ice anchors. (See Chapter 7: Operating the SKF-ICE.)

- To aid aircraft in established visual references for safe hover/landing in low light/low visibility/night conditions, surface teams can use anything that establishes color contrast with the snow and does not blow away. These items should be approximately 30 degrees clockwise of the wind line starting at 20 feet from the hover or landing area and extend at 10 foot intervals.

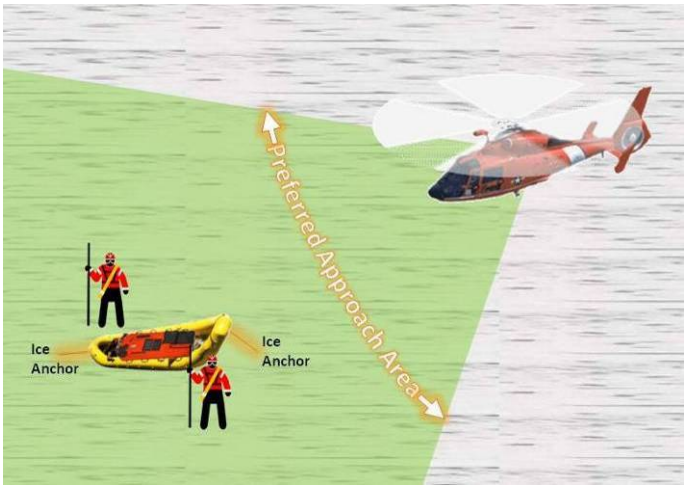


Figure 10-2 Helicopter approach

WARNING:

Smooth ice provides an almost frictionless surface. The rotor downwash from the helicopter can easily blow a 230 pound person and gear across the ice and into the water. USCG personnel operating near helicopters must wear appropriate ice footwear or remain clear of rotor wash. Be aware that other personnel operating near the helicopter might not have appropriate ice footwear.

B.3. Retrieving Survivors

Transfer survivors via helicopter hoist, rescue swimmer deployment, or physical walking of survivor to helicopter per Chapter 9: Aviation.

WARNING:

If conducting a hoist, be aware of potential static discharge from the helicopter.

B.3.a. From Airboat/SKF-ICE

NOTE:

Do not hoist survivor from airboat or SKF-ICE. See Chapter 5: Operating 20 Foot SPC-AIR and Chapter 6: Operating 22 Foot SPC-AIR for further details.

	Move survivor to prepared surface location for safe extraction. See consideration in Chapter 10: Joint USCG Operations, Section B.2. Hover/Landing (i.e., upwind anchor, etc.)
B.3.b. Surface/ Rescue Team	When working with the surface team, the helicopter uses the procedures listed below.
B.3.b.(1). Rescue Swimmer Deployments	Refer to Chapter 9: Aviation on rescue swimmer deployments for further information.

NOTE: **If the rotor wash is affecting the RS (e.g., making walking difficult), RS might kneel down or lay face down on the ice. This does not signal that the RS is in danger. Once the helicopter clears the RS, the RS stands up and walks toward the survivor.**

WARNING: ***Only approach helicopter under the direction of aircrew.***

- If RS or ice rescue team member falls through ice, do not assist unless directed by appropriate party.
- RS is at least EMT basic certified; he or she will ask amplifying medical information of survivor. Best practice is to list information on piece of paper and hand to RS or place on survivor's person.
- Multi victims: Pass triage info to RS or RS can conduct on scene to select which survivors to pick up first.

B.3.b.(2). Basket/ Litter Recovery

NOTE: **Rescue litter is not standard equipment on the H-65 aircraft. Request before the aircraft becomes airborne to the rescue.**

WARNING: ***Per reference (u), U.S. Coast Guard Operations and Training (BOAT) Manual, Vol II, COMDTINST M16114.33 (series), wait until grounded due to static discharge. Use care not to break charge.***

- Basket:
  - Consider using a trail line to deliver and recover the rescue basket.
- Litter:
  - Consider using a trail line to deliver and recover the rescue litter.
  - The trail line might be discarded by the aircrew but doesn't indicate an emergency situation.
  - Only use an approved rescue litter. (Refer to Chapter 9: Aviation, Section A.6.e: Litter).
  - RS ensures survivor is properly secured in the rescue litter.

B.4. Leaving Scene

After the rescue evolution is complete, the scene may still contain hazards to the public and other factors that need to be addressed before or immediately after departing the scene.

B.4.a. Considerations

Open holes in the ice and abandoned equipment could pose hazards to the public.

- Record GPS position and pass to corresponding sector.
  - If leaving equipment, attempt to record description and position to prevent being launched on unnecessary SAR call.

B.4.b. Multi-survivors

Depending on the capacity of the aircraft, the potential exists for some survivors to be left on scene. Helicopters pass the following information to the surface ice rescue team:

- Estimated time of return if/when (fuel, distance, location).
- Destination.
- Anticipated capacity for future evolutions.

This page intentionally left blank.

Revision

Appendix A:
Glossary and Acronyms

AED	Automatic external defibrillator.
AFM	Air fill manifold.
AOR	Area of responsibility.
BOAT	Boat Operations and Training.
CC	Circular search.
CGTTP	Coast Guard tactics, techniques, and procedures.
Channeling	When the boat breaks through the ice and leaves an open track.
CO	Commanding officer.
CPR	Cardiopulmonary resuscitation.
CWASK	Cold weather aircrew survival kit.
EMT	Emergency medical technician.
ESS	Electro-optical/infrared sensor system.
ETA	Estimated time of arrival.
FC-P	FORCECOM TTP Division.
FM	Flight mechanic.
FORCECOM	Force Readiness Command.

FLIR	Forward looking infrared.
GAR	Green, Amber, and Red.
GPS	Global Positioning System.
Ground Crew (party)	The aviation community typically refers to ground crews as anyone on scene that is not part of the aircrew, including ice rescue teams, fire department, etc. When the RS goes down, he or she is still referred to as RS to lessen confusion.
GV	Government vehicle.
HSD	Hoist static discharge.
IAMSAR	International Aeronautical Maritime Search and Rescue Manual.
IR	Infrared.
IRC	Ice Rescuer Course.
IROPS	Ice rescue operations.
IRTC	Ice Rescue Trainer Course.
LKP	Last known position.
Long-Haul Case	Greater than one-half nautical mile and less than 10 nautical miles from shore. These cases anticipate extended exposure times for the ice rescue team. To limit the effects of exposure and expedite the rescue, these cases might require a conveyance to transport gear and the ice rescue team.
MK-127	Illumination flares.
MNVD	Monocular night vision device.
MOB	Man overboard.
MRO	Mass rescue operation.

MSAP	Maritime SAR Assistance Policy.
NFPA	National Fire Protection Association.
NIRS	National Ice Rescue School.
NOAA	National Oceanic and Atmospheric Administration.
NSS	National Search and Rescue Supplement.
NVD	Night vision device.
NVG	Night vision goggles.
OC	Operational commander.
OGA	Other government agency.
OIC	Officer-in-charge.
OPCON	Operational command.
ORM	Operational risk management.
OSC	On-scene coordinator.
PFD	Personal flotation device.
PLB	Personal locator beacon.
PM	Parallel multi-unit.
PMS	Preventive maintenance system.
POD	Probability of detection.
PPE	Personal protection equipment.

PQS	Performance qualification standards.
PS	Parallel search.
QRC	Quick response card.
RS	Rescue swimmer.
RSS	Rescue and Survival Systems Manual.
SAP	Search action plan.
SAR	Search and rescue.
SCC	Sector command center.
SC&E	Search Coordination & Execution course.
Short-Haul Case	One-half nautical mile or less from shore. These cases are normally a rapid recovery by an ice rescue team consisting of three qualified team members on the ice and a fourth team member relaying communications from a government vehicle.
SMC	Search and rescue mission coordinator.
SME	Subject matter expert.
SPC-AIR	Special purpose craft – airboat.
SRU	Search and rescue unit.
TMR	Trackline multi-unit return.
TS	Trackline search.
TTP	Tactics, techniques, and procedures.
USCG	U.S. Coast Guard.

WQSB	Watch Quarter Station Bill.

This page intentionally left blank.

Appendix B:
Ice Development and Characteristics

B.1. Understanding Ice

Per reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (NSS) to the International Aeronautical Maritime Search and Rescue Manual (IAMSAR), COMDTINST M16130.2 (series), crews tasked with ice rescue responsibilities require a complete knowledge of ice characteristics, ice formation, and the hazards of hypothermia and frost bite. The more rescuers know about the risks involved with ice rescue, the better they are able to perform the mission and, more importantly, be a survivor on the ice. Whenever possible, make an effort to include identification of different ice conditions during training exercises. Ice conditions are affected by a number of factors.

B.2. Ice Chemistry Overview

Water chemistry is an important factor in determining ice strength. Pure water freezes faster and deeper than water containing chemicals or pollutants. When water cools at the surface, it begins to sink because it is heavier than the warm water that rises to replace it. This is called vertical circulation. This vertical circulation stops when the body of water becomes isothermic (e.g., all water at different depths is exactly 39.2 degrees Fahrenheit). At this point, water becoming colder stays at the surface and ice begins to form.

B.3. Ice Formation

Ice usually freezes from shore outward. Ice near shore on a frozen lake weakens due to pressures outward and upward which causes cracks to appear. Fluctuating water levels also weaken inshore ice. Dropping water levels leave ice “high and dry” with no liquid beneath it for support.

The depth and size of a body of water affects ice strength. Large deep lakes take longer to freeze but are slower to decay. Very large lakes, such as the Great Lakes, can remain open in the winter because of wind, waves, and currents.

B.4. Ice Strength

Ice strength and thickness vary considerably from one location to another. Seldom does ice freeze and thaw at a uniform rate. Ice strength depends on thickness, daily temperatures, snow cover, depth of the water under the ice, and local water fluctuations and currents.

Clear, new ice is stronger than old ice. Direct freezing of lake-water is stronger than ice formed from melting snow or refrozen ice. Discolored or cloudy ice tends to indicate weaker ice.

Ice normally grows stronger and thicker during formation. As ice decays, it can maintain its thickness but can still weaken. Decaying ice does not melt to a thin sheet. Instead, the bond between the ice crystals decays or "candles" the ice into a dangerous porous condition. Sometimes this ice takes on a black appearance.

Ice near the shore of a frozen lake weakens due to outward and upward pressures which cause cracks. Ice closer to shore is weaker because of shifting, expansion, and sunlight reflecting off the bottom. This buckling shore ice continually thaws and refreezes.

B.5. Factors Affecting Ice Strength

A variety of factors such as weather, water depth, size of the body of water, obstructions, etc., affect ice strength. Identifying these factors might be difficult, but emergency situations require immediate decisions.

In emergency situations, ice rescuers cannot always accurately assess ice thickness through visual observations. Factors affecting ice strength are:

Obstructions such as rocks, logs, vegetation, and pilings affect the strength of ice. Heat from these obstructions slows ice formation. Ice shifting and expanding create pressure cracks and ridges around the obstructions.

Decomposing vegetation generates heat which hinders ice formation and accelerates thawing.

Discolored or cloudy ice indicates weaker areas. Any ice over or near moving water is too weak to support a rescuer.

Water fowl and schools of fish can prevent ice formation. Both result in vertical circulation causing thin ice spots or even open water. Water fowl gather to try to keep an area of open water for feeding. If this open area freezes, it is thinner than the surrounding ice.

Pollutants concentrate along the boundaries of ice crystals as they form. This causes melting along the crystal boundaries and vertical streaks called "candling."

Fluctuating water levels from rain, seepage from wet cracks, dam releases, and wind seiches can also weaken ice. Lower water levels weaken ice because the ice sheet lacks the support of the water underneath it causing the ice to stress and crack.

Warm temperatures weaken ice and cause melting, shifting, and contraction to occur.

Sunlight deteriorates ice formation from below when it reflects off rocks and/or sandy bottoms.

Heavy winds keep holes open on frozen lakes. Winds can force water beneath the edge of the ice and rot it from below.

Snow acts in different ways. It insulates strong ice and prevents the ice from melting. Conversely, it can also insulate the surface against freezing. Snow can cause ice to form slowly or deteriorate the ice. Because of its weight, it can depress an ice sheet and reduce its bearing capacity. Snow also covers the danger signs of hazardous areas.

Currents and water velocity affect the strength of ice over moving streams. River ice is usually 15 percent weaker than lake ice due to the current. Smooth, straight stretches of ice are stronger than river bends because the current is slower. River mouths are dangerous because of underlying currents which often cause air pockets in the ice.

B.6. Ice Thickness and Recreational Activity

Ice thickness is only one factor in determining ice strength. The following indicates typical activities on clear/plate ice.

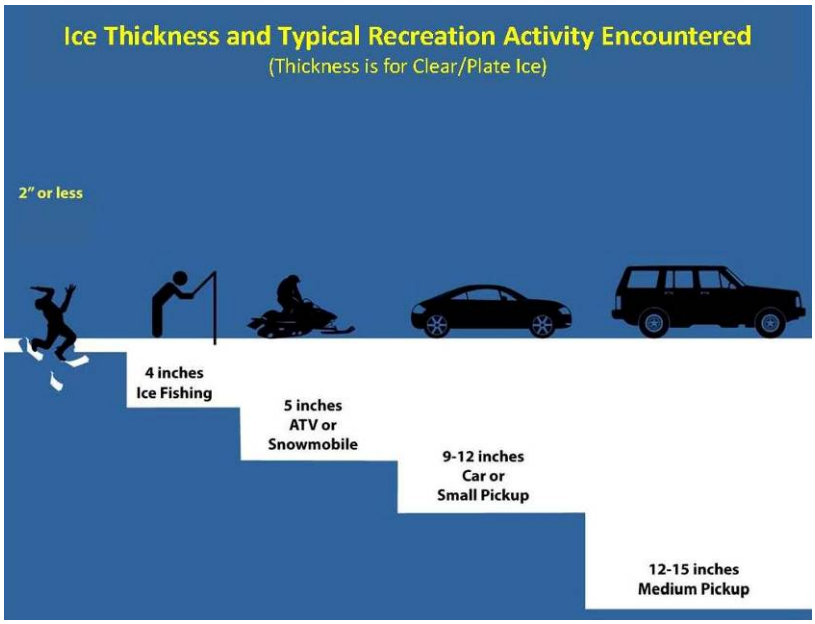


Figure B-1 Typical ice activities on various ice thicknesses

WARNING:

Never make recommendations to the general public as to when it might be safe to go onto the ice. Always seek guidance from Public Affairs before discussing recreational activities on the ice. Link to the D9 External Affairs website.

B.7. Vehicles on the Ice

Be aware of the inherent dangers of vehicles operating on the ice. A light truck parked on ice 12 inches thick depresses the ice 2.5 inches around it for approximately 200 feet. Vehicles moving across the ice force the ice to bend up and down. This movement forms long waves which roll out and away from the vehicle, similar to the wake a boat creates on water. The movement also creates another wave in front of the vehicle which might create a pressure ridge crack if the vehicle is moving at the applicable critical speed.

Water Depth (feet)	4	6	8	10	15	20	30
Critical Velocity (mph)	9	11	12	14	17	19	22

A vehicle following closely behind another vehicle interrupts the wave actions created by the first vehicle causing cracks in the ice.

WARNING:

Per reference (e), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), never drive GVs on the ice covered waterways.

B.8. Ice Characteristics

For more details, refer to the D9 Ice Rescue CGPortal website.

B.8.a. Brash Ice

Brash ice is the accumulation of small ice fragments broken off from other ice formations caused by weather or vessel passage.

Brash ice thickness can range from mere inches to 8 feet or more. It can be loose or refrozen. Very loose brash ice is called drift ice.

Figure B-2 Brash ice

B.8.b. Candle Ice

Candle ice is commonly found in late winter or early spring, and looks like many candles bundled together.

This type of formation is rotting, or in the final stages of deterioration. It is porous, weak, unpredictable, and difficult to transit.

Figure B-3 Candle ice

B.8.c. Clear (Plate) Ice

Clear ice forms by long hard freezes, is usually the strongest type of ice formation (depending on ice thickness), and can be blue, green, or black (depends on the color of the water visible though the ice).

Clean, smooth, plate ice is sometimes referred to as “glare ice.”

Figure B-4 Clear (plate ice)

Revision

B.8.d. Dynamic Ice

Dynamic is changing. Ice has to be moving in order to change (except freeze/thawing).

B.8.e. Fast Ice

Fast ice (also called land-fast ice, and shore-fast ice) is “fastened” to the coastline or fixed object. When fast ice detaches from shore, it becomes an ice floe.

Figure B-5 Fast ice (along shoreline)

B.8.f. Frazil Ice/Frazil Slush Ice

These first stage ice formations start with disk-shaped crystals that form and grow suspended in the water. These crystals eventually form a thin, oily, or opaque looking film that floats to the surface. Water movement interrupts the crystals’ growth. When this happens, the crystals cannot join together to form a solid sheet of ice.

Unpredictable while forming, it can be difficult to transit if collected in an area, and will not support a rescuer’s weight.

Figure B-6 Frazil ice/frazil slush ice

B.8.g. Hummocking

When a broken plate or plates are forced perpendicular or near perpendicular. See Rubble.

B.8.h. Ice Fracture (Crack)

Any fracture in the ice (open or closed). Depending on the wind direction, the fracture could be separating.

Open ice fracture can refreeze, and snow cover can deceive strength of newly refrozen open fracture. Ice can be weaker near the fracture.

Figure B-7 Ice fracture (crack)

B.8.i. Ice Floe

Flat pieces of ice, 10 feet in diameter or larger. Can consist of one or many combined fragments of ice.

Results from offshore winds and currents.

Time is a critical factor when dealing with this type of formation. The further the floe is pushed by winds, the greater the seas build, breaking the ice.

Figure B-8 Ice floe

B.8.j. Layered Ice

Layered ice is a combination of two or more types of ice structures.

Pockets of air and porous ice layers are questionable locations for an ice anchor.

Figure B-9 Layered ice

B.8.k. Lead

Large, open crack that is too wide to transit across on foot. Usually indicates large ice floes that are moving.

Rule of thumb: If you can jump over it, then it is a crack or fracture.

Figure B-10 Lead

B.8.l. Pack Ice

The accumulation of ice floes formed by wind, waves, or current. Ice fragments are larger than those used to describe brash ice.

Too unpredictable and unstable to effectively support a rescuer or conveyance.

Can be loosely or densely packed.

Figure B-11 Pack ice

B.8.m. Pancake Ice

Caused when small, loose fragments of ice (brash) repeatedly impact each other due to water movement, causing the sharp edges to round-over.

Sometimes frazil ice separates the pancakes.

Can refreeze and retain appearance.

Figure B-12 Pancake ice

B.8.n. Polynya

Irregular, isolated openings in the ice.

Caused by the re-joining of large floes.

Small openings are “ice holes.”

Figure B-13 Polynya

B.8.o. Pressure Ridge (Windrow)

Rows of ice piles formed by colliding wind-driven masses of plate ice. They continue to grow in height, depth, and breadth, as long as the wind persists. Approximately 70 percent of the height is below the water.

“Windrow” is a Great Lakes term for a pressure ridge. Large areas of windrows are sometimes called “rubble.” Can also be caused by expanding ice.

Figure B-14 Pressure ridge (windrow)

B.8.p. Rafting

When an ice plate rides over the top of another plate. See Rubble.

B.8.q. Rubble

Large areas where prolonged pressure creates very rough terrain.

Accumulation of windrows. Large areas are called “rubble fields.”

Like windrows, ice typically “rafts” (see Rafting) or “hummocks” (see Hummocking).

Figure B-15 Rubble

B.8.r. Snow Ice

Formed from the refreezing of water soaked snow. It is porous and low density. Snow ice is weak and unpredictable.

Figure B-16 Snow ice

This page intentionally left blank.

Revision

Appendix C:
USCG Ice Rescue Daily Pre/Post Mission Checks

Inspect (and comment on) the following for material condition and ready service.

SKF-ICE
General condition:
Quantity (01):
Oars:
Inflation assembly:
Air tank:
Tow shield:

SKF-ICE Outboard Engine
General condition:
Fuel level:
Oil level:
Propeller condition:

Shuttle Board
General condition:
Quantity (02):

Cold Water Sling
General condition:
Quantity (02):

550-Foot Line Reel
General condition:
Quantity (01):

Wool Blanket
General condition:
Quantity (04):

Flashlight
General condition:
Quantity (02):

AOR maps/charts
General condition:

M127A1 Ground Illumination Signal
General condition:
Quantity (06):

Handheld GPS
General condition:
Quantity (02):
Battery condition/charge:

150/200-Foot Tending Line
General condition:
Quantity (02):

VHF-FM Handheld Radios
General condition:
Quantity (03):
Battery condition:

Victim PFDs
General condition:
Quantity (04):

Night Vision Device
General condition:
Quantity (02):

Automated External Defibrillator
General condition:
Quantity (01):
Battery condition:

Head Lamps
General condition:
Battery condition:
Quantity (stations, 06; cutters, 03):

Binoculars
General condition:
Quantity (01):

Compass
General condition:
Quantity (01):

First Aid Kit with CPR Pocket Mask
General condition:
Quantity (01):

Hypothermia Recovery Capsule
General condition:
Quantity (01):

Ice Awls
General condition:
Quantity (stations, 06; cutters, 03):

Life Guard Safety Harness
General condition:
Quantity (stations, 06; cutters, 03):

75-Foot Rescue Line (throw) Bag (cutters only)
General condition:
Quantity (01):

Ice Staff
General condition:
Quantity (station 04; cutter, 02):

Blizzard SPR Blanket
General condition:
Quantity (03):

Hypothermia Cap
General condition:
Quantity: (5)

Prusik Pulley
General condition:
Quantity (02):

Quickdraw
General condition:
Quantity (06):

GV
Oil condition:
Coolant condition:
Tire(s) pressure condition:
Headlight(s) condition:
Turn signal(s) condition:
Horn condition:
Installed VHF-FM radio condition:
Cellular phone condition (01):
Extra batteries for electronic devices or portable charging device:

This page intentionally left blank.

Appendix D:
Ice Rescue Training Checklist

GUIDELINES FOR THE TRAINING CHECKLIST:

This checklist is provided to assist the Ice Rescue Trainer in developing medium and large scale* on-ice training events and to assist with planning joint exercises with other responding agencies.

Complete all sections of this checklist and route to the appropriate individuals for review and approval.

*As defined by USCG Ice Rescue Trainer Course (IRTC)

Description of Exercise/Training Event	***Date/Time***

Location of Exercise/Training Event

Trainer Name	***Safety Supervisor Name***	***Shore Party Name***

Trainer/Student Ratio		

Agencies Involved and Number of Participants	***POC***

Training Scenario/Narrative

Reviewers: (Print Name)	***Date:***	***Signature***
Ice Rescue Trainer		
Agency Representative (if applicable)		
Agency Representative (if applicable)		
Safety Supervisor		
OINC/Commanding Officer		

1.0 Training Objectives		
✓*Check All That Apply*		***Comments***
	Ice Type/Quality	
	Transiting Ice	
	Anchor Point	
	Tending Line Procedures	
	Self Rescue Techniques	
	Reach Techniques	
	Sling Rescue	
	Sling/MARSARS Rescue	
	SKF-ICE	
	Search Technique(s)	
	Victim Transit/First Aid	
	SPC-AIR Rescue	
	Pyrotechnics	
	Other	

2.0 PPE and Equipment		
✓*Check upon Completion*		*Comments*
	PPE Inspected/Tested	
	SAR Vest Inspected	
	Equipment Inventory Completed	
	Equipment Serviceable	
	Other	

Additional Comments

3.0 Personnel Considerations		
✓ *Check upon Completion*		*Comments*
	IRC Classroom Topic Completed	
	Students Physically Fit	
	Trainer/Student Ratio NGT 5:1	
	Safety Supervisor Assigned	
	Instructors IRTC Graduates	
	Roles/Responsibilities Assigned	
	Other	

4.0 Contingencies		
✓ *Check upon Completion*		*Comments*
	Injury/Evacuation Procedures	
	Weather	
	EMS Notification/Access	
	Alternative Training Site	
	Actual SAR Response	
	Other	

5.0 Training Site		
✓ *Check upon Completion*		*Comments*
	Absence of Hazards/Current	
	WX Conditions Suitable	
	Suitable Ice Strength	
	Ice Fast to Shore	
	Minimal Traffic	
	Local Notifications/BNM issued	
	Hole Prepared/Marked	
	Props Pre-Staged	
	Authorized Simulations	
	Other	

6.0 Communications Plan		
✓ *Check upon Completion*		
	Primary VHF Frequency	
	Secondary VHF Frequency	
	Cellular Telephone(s)	
	Inter-Agency Communications	
	Status Reports	

7.0 Brief Exercise Plan		
✓ *Check upon Completion*		*Comments*
	Plan Briefed to all Members	
	GAR Results	
	Issues & Concerns Addressed	

Debrief/"Hot-Wash"

This page intentionally left blank.