U.S. Department of Homeland Security

United States Coast Guard

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

Force Readiness Command (FORCECOM)

CGTTP 3-50.1
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United States Coast Guard

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COAST GUARD TACTICS, TECHNIQUES, AND PROCEDURES 3-50.1

Subj: ICE RESCUE OPERATIONS

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) U.S. Coast Guard National Ice Rescue School: Ice Rescue Trainer Course (IRTC), 502891
(c) U.S. Coast Guard Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series)
(d) Operational Risk Management, COMDTINST 3500.3 (series)
(e) Rescue and Survival Systems (RSS) Manual, COMDTINST M10470.10 (series)
(f) Motor Vehicle Manual, COMDTINST M11240.9 (series)
(g) Discharge of Oil, 40 CFR §110
(h) Land Search and Rescue Addendum to the National Search and Rescue Supplement to the International Aeronautical and Maritime Search and Rescue Manual, Vol 1; National Search and Rescue Committee, November 2011.
(i) U.S. Coast Guard Operations and Training (BOAT) Manual, Vol II, COMDTINST M16114.33 (series)
(j) U.S. Coast Guard Operations and Training (BOAT) Manual, Vol III, COMDTINST 16114.42 (series)
(k) Boat Crew Seamanship Manual, COMDTINST M16114.5 (series)
(l) Cleveland SAR Plan, D9INST M16100.1E

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 ice rescue operations. Internet release authorized.

3. DIRECTIVES/TTP AFFECTED. None.

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. DISCLAIMER. This guidance is not a substitute for applicable legal requirements, nor is itself a rule. It is intended to provide guidance for Coast Guard personnel and is not intended to nor does it impose legally-binding requirements on any party outside the Coast Guard.

6. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS. While developing this publication, Integrated Process Team (IPT) members examined environmental considerations under the National Environmental Policy Act (NEPA) and determined they are not applicable.

7. 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 (TTP), and then TTP Library. FORCECOM TTP Division does not provide paper distribution of this publication.

8. RECORDS MANAGEMENT CONSIDERATIONS. Integrated Process Team (IPT) members thoroughly reviewed this publication during the TTP coordinated approval process and determined there are no further records scheduling requirements per Federal Records Act, 44 U.S.C. Chapter 31 § 3101 et seq., NARA requirements, and Information and Life Cycle Management Manual, COMDTINST M5212.12 (series). This publication does not have any significant or substantial change to existing records management requirements.

9. FORMS/REPORTS. None.

10. REQUEST FOR CHANGES. Submit recommendations for TTP improvements or corrections via email to FORCECOM-PI@uscg.mil or through the TTP Request form on CGPortal. In CGPortal, navigate to the TTP Request form by selecting References, Tactics, Techniques, and Procedures (TTP), and then TTP Request.

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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

The TTP in this publication pertains to all U.S. Coast Guard (USCG) Ice Rescue Units, which have the equipment and trained personnel to conduct ice rescues. The TTP in this publication 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, 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 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 response. Reference (a) also provides policy for search and rescue (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

Refer to the D9 External Affairs Web site for questions regarding public affairs.

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.***

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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.

A.2. "Live Victims" in Training Environment

As a best practice, and to provide realistic training, unit COs/OIC's can use "live victims" in a controlled area when risk is minimal. It is essential that he or she use sound judgment in selecting persons to serve as "live victims" in training evolutions. Brief personnel serving as "live victims" in self rescue techniques, ensure he or she understands the risks, and ensure they are properly outfitted before entering the water.

WARNING:

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

Per lesson four of reference (b) U.S. Coast Guard National Ice Rescue School: Ice Rescue Trainer Course (IRTC), 502891, determine training objectives:

- Small scale: tailored to individual performance qualification standards (PQS) process.
- Medium scale: IRC class (multiple students) practical exercises per the IRC.
- Large scale: training exercise with scenario and usually involves other response agencies.

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

A.3. Trainee

Per reference (c), 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

Per reference (c), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), 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

Safety observers maintain an overall awareness of the training environment and have no other assigned duties. He or she ensures the safety of participants by monitoring conditions including but not limited to the following:

- Weather.
- Hazards.
- Student fatigue.
- Properly worn personal protection equipment (PPE).

Section B: Operational Environment Roles

B.1. Response Policy

Per information in reference (c), 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 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 (d) Operational Risk Management, COMDTINST 3500.3 (series) before and during mission.
- Implement additional conservation limitations, as conditions warrant, to effectively manage crew risk, endurance, and safety.

B.2. Minimum Crew Requirements

Per reference (c), 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 a best practice, ensure the fourth person (communications) is available/ready to assist the team in emergency situations.**

B.3. Roles and Responsibilities

B.3.a. Team Leader	Generally the most experienced ice rescuer, 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".
B.3.b. Primary Rescuer/Line Tender	The primary rescuer/line tender: • Performs the rescue as dictated by the team leader. • Tends the line.
B.3.c. Secondary Rescuer/Line Tender	The secondary rescuer/line tender: • Performs the rescue as dictated by the team leader. • Tends the line.
B.3.d. Fourth Team Member	The fourth team member: • Remains on-scene conducting shore communications. • Remains with the government vehicle to maintain communications.

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Chapter 3:
Mission Planning

Introduction

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.
- 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' (GV's) Global Positioning System (GPS), reduces response time.

A.2. General Equipment

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

- SKF-ICE.
- Shuttle board (2) – one ready for operations (RFI) and one for training.
- Cold Water Sling (2).
- 550 foot line reel with ice anchor and endless sling (reel only has stowage for ice anchor).
- Wool blanket (4).
- Flashlight (2).
- AOR maps/charts.
- M127A1 ground illumination signal (6).
- Handheld GPS (2).
- 150/200 foot tend line (2) with ice anchor and endless sling.
- VHF-FM radio – (3).
- Cellular phone - to remain in GV (1).
- Extra batteries - to remain in GV.
- Victim personal flotation device (PFD) (4).

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

- Night vision device (NVD) (2).
- Automatic external defibrillator (AED) (1).
- Head lamp (stations, 6; cutters, 3).
- Binoculars.
- Compass.
- First aid kit (with pocket CPR mask).
- Hypothermia recovery capsule.

- Ice awls (Minimum: stations, 6; cutters, 3).
- Life Guard Safety Harness (wear underneath the SAR vest).

A.3. Personal Protective Equipment (PPE)

Per reference (e), 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.***

- Maritime cold weather suit system (MCWSS).
- 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).

NOTE: **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.

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

- Type III PFD.
- 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.4. Mission Planning

Per reference (c), 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.

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

- Winds exceed 30 knots or,
- Temperature below 10 degrees 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 and,
- When transiting solid ice (not breaking through the ice during transit).

WARNING: ***Per reference (c), 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 (d), 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.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 (f), Motor Vehicle Manual, COMDTINST M11240.9, government-owned vehicles used to transport ice rescue personnel and equipment to scene in emergencies are "Operational Vehicles."
A.7.a. Pre-Response	Ensure/verify the following: • Conduct ORM per reference (d) Operational Risk Management, COMDTINST 3500.3 (series). • Tow vehicle/trailer weight rating not exceeded (all gear loaded). • Vehicle is suitable for winter driving conditions, i.e., 4X4 or AWD. • Vehicle is of sufficient size to accommodate all equipment/personnel. • Vehicle equipped with snow or all-season tires. • Daily vehicle/trailer safety inspection/checklist complete. • Vehicle/trailer maintenance is current. • Daily ice rescue equipment inspection completed. • Vehicle operator has the training and qualifications, and follows guidelines in reference (f). • Vehicle operator possesses a valid state drivers 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 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.
  - 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/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:
  - Guide victim with self-rescue.
  - Use "Reach" technique.
  - Use "Go" technique.

WARNING: ***Always be prepared to self-rescue.***

Section B: Operational Risk Management

B.1. Risk Management

Per reference (c), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), the ice rescue team leader, rescuers, and command must exercise sound judgment on a case-by-case basis and make appropriate recommendations to operational command (OPCON).

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.)

Refer to reference (d), Operational Risk Management, COMDTINST 3500.3 (series) and reference (c) for more details.

NOTE: **Animal rescue is risky and is an on-scene decision made by the team. For further guidance, consult reference (a), U.S. Coast Guard Addendum to the United States National Search and Rescue Supplement (SAR) to the International Aeronautical Maritime SAR Manual (IAMSAR), COMDTINST M16130.2 (series).**

WARNING: ***Per reference (c), there shall be no 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.***

WARNING: ***Per reference (c), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), never drive GVs on the ice.***

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, refer reference (c), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series).**

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/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/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

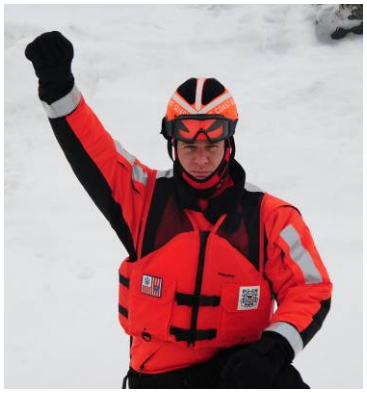

Figure 4-1 Avast arm signal

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

A.3. Transiting on Ice

Transiting on ice is a critical step when conducting ice rescue operations and training exercises. Always make verbal contact with victim and continue to give direction to victim throughout the rescue.

NOTE: **Always tether the rescuer during a rescue.**

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	Walk slowly, distributing your weight as much as possible.

Figure 4-5 Transiting ice

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

Step	Action
4	Move slowly forward over the ice, tapping in a semicircular pattern in front to test the ice. Strong ice has a hard, resonant sound while weak ice has the sound of a dead thud or cracking.
5	If approaching an area of thin ice drop down to a crawl. As the ice thins more, lay flat distributing your weight evenly on the ice and roll, crawl, shimmy, or ride the shuttle board or SKF-ICE to the victim.

Figure 4-6 Rescuer crawling over thin ice

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

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.

CAUTION:

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 4-8 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 4-9 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 4-10 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 or 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/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. 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 4-11 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 4-12 Use forearms and kicking action to propel onto the ice**

3	Place one knee on ice shelf to assist with self extraction.  **Figure 4-13 Place one knee onto ice shelf**
4	Once onto the ice roll to stronger ice.  **Figure 4-14 Roll to stronger ice**

A.6.b. 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 4-15 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 4-16 Use awls to pull self onto ice shelf with kicking action**

3	Place one knee on ice shelf to assist with self extraction.  **Figure 4-17 Place one knee onto ice shelf**
4	Once onto the ice roll to stronger ice.  **Figure 4-18 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/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 4-19 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 4-20 Connect tending line to MARSARS shuttle board**

2a	Ensure proper configuration of forearm sling release mechanism per manufacturers guideline (mechanical and Velcro devices).  **Figure 4-21 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 4-22 Tender connects strap to rescuer harness**
4	Using transiting on ice procedures maneuver to within a board's length of victim.  **Figure 4-23 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 4-24 Rescuer rolls onto ice on side opposite MARSARS cold water rescue sling**
6	Crawl towards victim, pull board to within the victim's reach, and push board toward victim taking care to not push victim off of the ice shelf.  **Figure 4-25 Rescuer eases board towards victim**

7	Direct victim to assist by placing both forearms through sling and firmly grasping the elbows.  **Figure 4-26 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 them get on the board.  **Figure 4-27 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 4-28 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 4-29 Victim is repositioned on board for transport**
11	Rescuer positions themselves by placing one knee on board between victims calves and grasping rear handles.  **Figure 4-30 Rescuer positioned on board with victim**
12	Rescuer signals HEAVE AROUND. Both rescuer and victim are pulled to safety.  **Figure 4-31 Rescuer and victim ride board to safety**

A.8. Go Techniques

The “Go” techniques 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

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

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 (i.e., 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 victims 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 4-32 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, unlike the MARSARS cold water rescue sling which 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 4-33 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 4-34 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 (i.e., rescuer's right hand grabs victim's right hand).  **Figure 4-35 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 and place sling over victim's arms and head and secure under armpit. Using forearm or chest, pin victims hand/arm maintaining positive control of victim.  **Figure 4-36 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 towards rescuer.

Figure 4-37 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 4-38 Adjust sizing strap

8	Connect rescue sling to thimble on tending line.  **Figure 4-39 Connect tending line**

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

9	Rescuer signals HEAVE AROUND.  **Figure 4-40 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.

NOTE: **Encourage/reassure the victim by talking to him or her. Continual verbal contact also allows you to assess physical state of the 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, 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 4-41 Connect tending line to MARSARS shuttle board**
3	Properly configure forearm sling release mechanism per manufacturer's guidelines (mechanical and Velcro devices).  **Figure 4-42 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 4-43 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 (i.e., rescuer's right hand grabs victim's right hand).  **Figure 4-44 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 victims hand/arm maintaining positive control of victim.  **Figure 4-45 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 towards rescuer.

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

9	Maintain positive control with dominant hand, 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 4-46 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 4-47 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, the shuttle is pulled out of the water and on to the ice, toward line tenders.  **Figure 4-48 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 4-49 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 4-50 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 hand-hold 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 4-51 Rescuer enters the water feet first**

8	Swim to victim.  **Figure 4-52 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 (i.e., 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 4-53 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 4-54 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 4-55 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 4-56 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 4-57 While heaving around, rescuer pushes MARSARS shuttle board down into water**

15	With victim aboard, shuttle moves toward line tenders.  **Figure 4-58 Rescuer rides MARSARS shuttle board with victim**
16	After pulling shuttle from the water, rescuer grabs end handles, rides shuttle, with the victim, to stronger ice/shore.
17	Once onto stronger ice, rescuer signals AVAST.  **Figure 4-59 Rescuer signals AVAST when on stronger ice**
18	Rescuer repositions victim for proper transport.  **Figure 4-60 Rescuer repositions victim on MARSARS shuttle board**

A.9. Victim Transit/First Aid

After recovering a victim from the ice, the team leader determines the most efficient means of transport to Emergency Medical Services or shore side. Use the following factors to assess the type of transport:

- Time immersed in ice/water.
- Is the victim ambulatory? (can walk without assistance).
- Presence of obvious life signs (i.e., pulse/breathing).
- Distance to travel to shore side.
- Transit conditions on ice (i.e., ice ridges, deep snow, clear ice).
- Availability of medical equipment/capabilities.

Methods:

- For a victim who is unconscious/unable to assist, the preferred method is via MARSARS shuttle board placed on top of the SKF-ICE. This facilitates easier transport across varied terrain as well as allowing administration of ongoing first aid. Use this method at any time for any type of victim.

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

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

- For all victims it is recommended that, immediately after extraction from the cold water, place the person in the hypothermia recovery capsule and, before placing the victim on the board/SKF-ICE, place a thermal survivors cap on the victim's head.

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

NOTE: **Avoid unnecessary delay in transporting victim to shoreside Emergency Medical Services.**

- If victim transport involves extended time and/or rough terrain/arduous conditions, ice rescue teams should attempt to provide first aid/basic life support interventions while transiting to shore side on the SKF-ICE.

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

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 such as 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 should refer to reference (d), 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 4-61 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 (g) 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; wear proper PPE and complete PQS.***

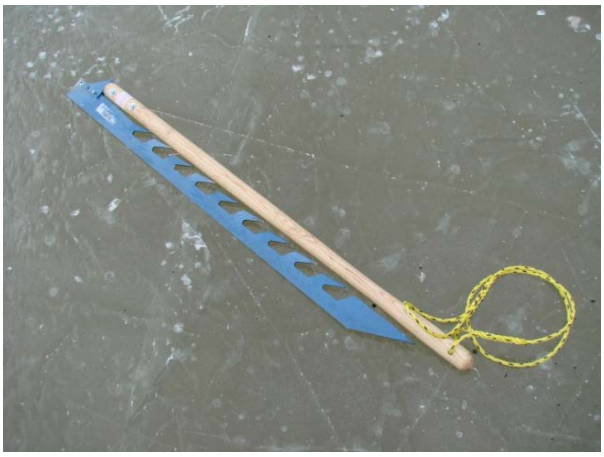

Figure 4-62 Ice hand saw

Figure 4-63 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 4-70). Ensure the hole remains properly marked until the hole in the ice has closed (figure 4-69).

Figure 4-64 Properly marked ice hole (1)

Figure 4-65 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 (b), U.S. Coast Guard National Ice Rescue School: Ice Rescue Trainer Course (IRTC), 502891), mark unattended holes cut in public access areas.**

Section B: Search on Ice

B.1. Overview	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.
B.2. Search Planning and Coordination	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 search and rescue units (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.
B.3. Initial Search Arriving On Scene	SRUs arriving at the reported position of a distress incident on ice and not immediately finding the distressed subject inform the SMC. If there was no SAP issued before arriving on scene, the SRU initiates a search per reference (a), sections 3.4.2.1, 3.4.2.2, and 3.4.1.3.The type of search depends on the SRU (see section B.4.a. Ice Rescue Team Searches).
B.3.a. Ice Rescue Team	After arriving on-scene, a well-coordinated reflex or “hasty” search as defined by reference (h) Land Search and Rescue Addendum to the National Search and Rescue Supplement to the International Aeronautical and Maritime Search and Rescue Manual, Vol 1; National Search and Rescue Committee, November 2011, might be the best course of initial action chosen by the ice rescue team leader or on-scene coordinator.
B.3.b. SPC-AIR	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.
B.3.c. Helicopter	After arriving on-scene, initiate a sector search (VS).
B.4. Extended Search Efforts	Incidents when the subject of a distress is not found at the reported position, is not located with initial search efforts, or the distress location was in doubt at the time of the initial notification (e.g. overdue) require more extensive searching. In these circumstances, the SMC issues a SAP that guides the search efforts of responding SRUs. The type and duration of search depends on the specific SRUs capabilities.

B.4.a. Ice Rescue Team Searches

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.

Ice rescue teams generally use five different search patterns:

- Trackline multi-unit return (TMR).
- Shoreline/contour.
- Parallel multi-unit (PM).
- Creeping multi-unit (CM).
- Expanding square multi-unit (SM).

B.4.b. SPC-AIR Searches

While underway, the SPC-AIR provides limited search capability due to vehicle motion and poor sight lines. The primary search tactic for the SPC-AIR is the "sprint and stop" search method.

- SMC provides an ordered list of 'stop' positions. On scene endurance determines the number of stops and spacing between the stops.
- SPC-AIR crew disembarks at each position and performs a 360 degrees visual scan (with the aid of binoculars if available) from the ice surface or the SPC-AIR 22 foot cabin top.
- SPC-AIR crew re-embarks, 'sprints' to the next position on the list, and repeats the 'stop' search.

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.**

B.4.c. Aviation Searches

Searches by helicopter SRUs are conducted over ice in the same manner as over open water.

B.5. Authority to Execute or Suspend Mission	
B.5.a. Notifying the SMC of Received Distress Alerts	The Preface and Program Overview of 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), section 6.e.(5), requires Coast Guard units other than the SMC's units to immediately relay received distress information to the SMC.
B.5.b. Immediate Response to Distress Situations	Units can initiate action for known distress incidents under Section 4.1 Maritime SAR Assistance Policy (MSAP) of reference (a) which governs the Coast Guard's response to reports of SAR incidents. Sections 4.1.5.1 and 4.1.6.2 provide for immediate response if feasible for any situation classified as distress.
B.5.c. Halting SAR Response	An 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. This does not change the status of the overall SAR response. The SRU waits until conditions improve or for arrival of another responding SRU(s).
B.5.d. Active Search Suspended Pending Further Developments	Per reference (a), sections 3.1.2.5(c) and 3.8.3, 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.

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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 Web site.

In This Chapter

This chapter contains the following sections:

Section A: Crew Requirements

A.1. Overview

Reference (i), 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/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 (e), 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 (c), 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 correctly worn.

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 (j), 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.

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).***

  - ➢ Shallow water.
- 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.

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 creates 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: **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 (i), U.S. Coast Guard Boat Operations and Training Manual - Volume II, COMDTINST M16114.33 (series) for current qualification requirements.**

NOTE: **Air operation procedures are described in reference (k), 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:

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. (reference (c), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series)

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.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.

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 RPM's while climbing the ice ridge can cause the boat to slip backwards, allowing the stern to jam into the ice and becoming 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 two 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.

- 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 much engine RPMs 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 and able to assist, it is possible for the victim to assist themselves 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.

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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 Web site.

In This Chapter

This chapter contains the following sections:

Section A: Crew Requirements

A.1. Overview

Reference (i), 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/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 play a significant role in the boat's operation.

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

- Operate 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.

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).***

  - ➢ Shallow water.
- 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 creates 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 (i), U.S. Coast Guard Boat Operations and Training Manual - Volume II, COMDTINST M16114.33 (series) for current qualification requirements.**

NOTE: **Air operation procedures are described in reference (k), 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

Due to 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:

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. (reference (c), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series)

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 (k), 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, reduces the RPM's so as not to launch the airboat off the ridge

NOTE: **The SPC-AIR only transits ice ridges that are two 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.
- 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 much engine RPMs 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 and able to assist, it is possible for the victim to assist themselves 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 Web site.

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, trouble shooting, 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

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 operation, maintenance, and warranty 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 trouble shooting 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 (c), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series) and reference (i), U.S. Coast Guard Boat Operations and Training Manual - Volume 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, in enclosed ports waterways and bays, or from a USCG Cutter. 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 (l), Cleveland SAR Plan, D9INST M16100.1E, 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 nautical miles offshore
Visibility	Greater than ¼ nautical miles
Maximum sea conditions	Less than one 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/in use.**

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

Attach tether lines (polypropylene lines) with snap hooks to SKF-ICE at key areas to assist in hauling craft.

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, 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.**

C.6. Affecting 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 MARSARS tending 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 on to 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 towards 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/her feet on the edge of the deck opening. Instruct the victim to kick his/her feet. Pull victim out of the water into the rescuer's lap, while rescuer simultaneously falls back onto the deck (see also fig 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**

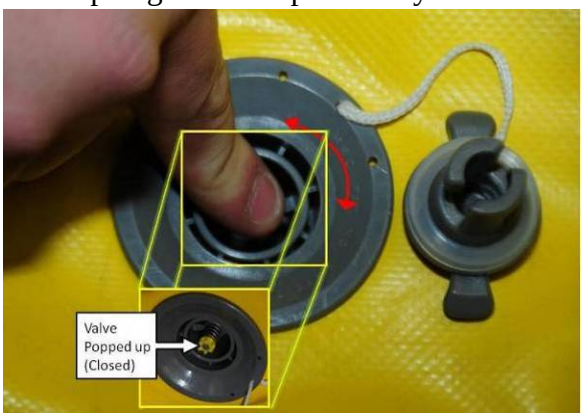
Once rescued, crews can place the victim on the SKF-ICE or on top of the MARSARS shuttle board on the SKF-ICE.

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.**

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 one minute for full inflation. Hold the inflation bottle securely while inflating.  **Figure 7-18 Hold inflation bottle during inflation**
7	The SKF-ICE is filled to operational pressure when one 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

CAUTION:

Failure to secure the air source prior to 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 towards the center using the large side tube tow D-rings as folding guide lines 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 – 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 use armor-all.
- 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

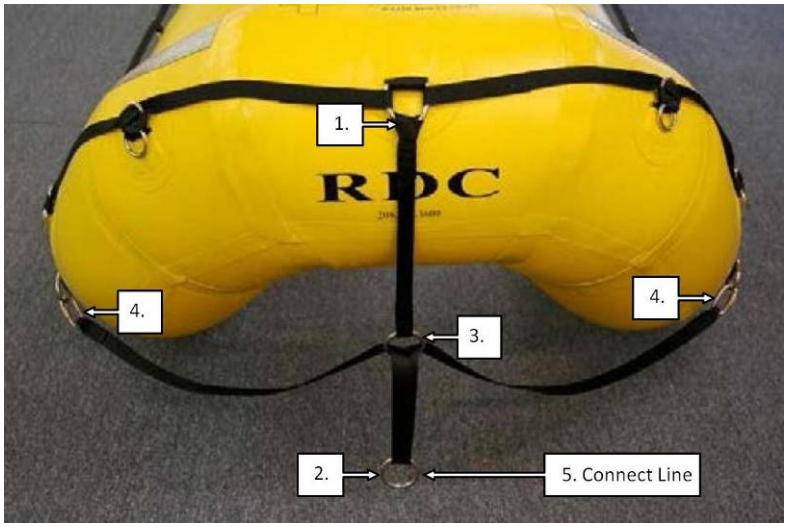


Figure 7-24 Properly configured tow strap

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 thru 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 Placement

Use the three nylon straps to secure the motor mount to the SKF-ICE. The straps consist of one 4 foot nylon strap and two 6 foot nylon straps.

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.

Run the two 6 foot straps from beside the transom plate, under the inflatable tubes, forward thru the lower 1 inch D-rings on the hand line, back under the inflatable tube, and into the cam buckle.

After installing all straps, install the outboard if needed (figure 7-26).

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 (figure 7-26).

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

Figure 7-26 Motor mount after strap secured

Figure 7-27 Top view of motor mount attached to SKF-ICE

C.8. Repair Procedures	Refer to manufacturer guidelines and Boat Forces Web site.
C.9. Disabling Casualties and Restrictive Discrepancies	Continuously monitor the SKF-ICE's readiness by 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 missions, but not all missions. Report restrictive discrepancies to the operational commander if you cannot repair the discrepancy within one 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 (c), 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.

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 3.5HP 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. This enhanced stability allows SKF-ICE use as a rescue device that can 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 SFK-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 prior to storing.
11. Ensure storage bag is free of damage.
12. Paddles (2) work properly.

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 operation, maintenance, and warranty 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.

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 but not limited to: the condition of the person in the ice/water, the proximity to shoal water, ice conditions, and weather (visibility, temperature, wind).

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 floatation 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 emphasizes what the ice rescue team needs to be aware of if/when required to conduct joint ice rescue operations with a helicopter.

In This Chapter

This chapter contains the following sections:

Section A: Helicopter Operations Over the Ice

A.1. Operations Over Ice

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).

A.2. Landings

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 an 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.

A.3. Joint Operations

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 surfaces assets are typically launched in ice rescue cases. If you need to work 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.

WARNING:

If conducting a hoist, be aware of potential static discharge from the helicopter.

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.

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Appendix A:
Glossary and Acronyms

AED	Automatic external defibrillator.
AFM	Air fill manifold.
AOR	Area of responsibility.
Channeling	When the boat breaks through the ice and leaves an open track.
CM	Creeping multi-unit.
CO	Commanding officers.
GPS	Global Positioning System.
GV	Government vehicle.
IRC	Ice Rescue Course.
IRTC	Ice Rescue Trainer Course.
Long-Haul Case	Greater than one-half nautical mile and less than ten 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.
MCWSS	Maritime cold weather suit system.
MOB	Man overboard.
MSAP	Maritime SAR Assistance Policy.
NIRS	National Ice Rescue School.

NVD	Night vision device.
OC	Operational commander.
OIC	Officers-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.
PPE	Personal protection equipment.
PQS	Performance qualification standards.
RFI	Ready for operations.
SAP	Search action plan.
SAR	Search and rescue.
SCC	Sector command center.
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.
SM	Expanding square multi-unit.

SMCs	Search and rescue mission coordinators.
SPC-AIR	Special purpose craft – airboat.
SRUs	Search and rescue units.
TMR	Trackline multi-unit return.
TTP	Tactics, techniques, and procedures.
VS	Sector search.
WMO	World Meteorological Organization.
WQSB	Watch Quarter Station Bill.

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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). 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 varies 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 creates 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 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.

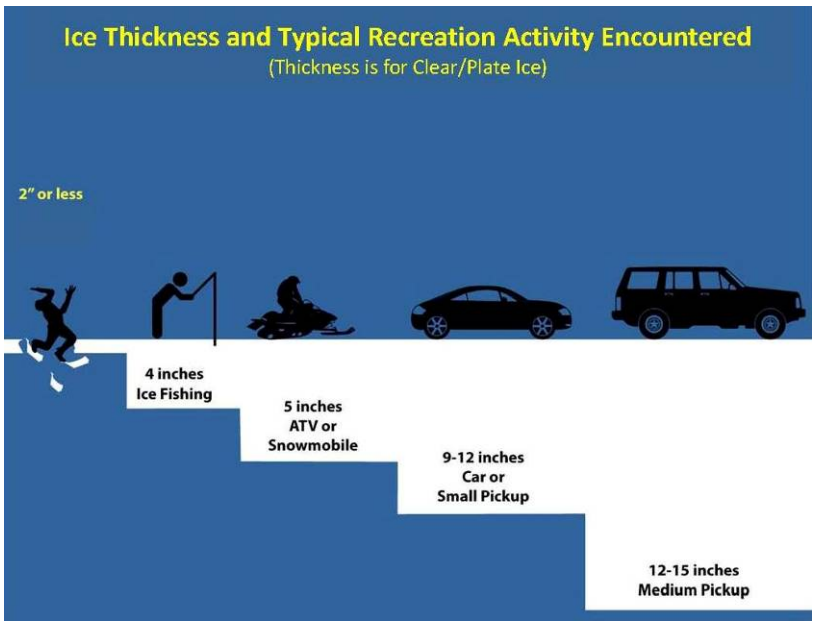

Figure B-1 Typical Ice Activities on various ice thicknesses

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 Web site.

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 (table B-2). A vehicle following closely behind another vehicle interrupts the wave actions created by the first vehicle causing cracks in the ice.

Water Depth (FT)	4	6	8	10	15	20	30
Critical Velocity (mph)	9	11	12	14	17	19	22

Table B-1 Critical velocity

WARNING: ***Per reference (c), U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Vol I, COMDTINST M16114.32 (series), never drive a GV on the ice.***

B.8. Ice Characteristics

For more details, refer to the World Meteorological Organization (WMO) Sea Ice Nomenclature Web site.

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)

B.8.d. 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

B.8.e. 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.f. Hummocking

When a broken plate or plates are forced perpendicular or near perpendicular. See RUBBLE.

B.8.g. 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 re-freeze, 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.h. 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.i. 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 ice an anchor.

Figure B-9 Layered ice

B.8.j. 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.k. 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.l. 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 re-freeze and retain appearance.

Figure B-12 Pancake ice

B.8.m. 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.n. 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.o. Rafting

When an ice plate rides over the top of another plate. See RUBBLE (next page)

B.8.p. 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.q. Snow Ice

Formed from the freeing of water soaked snow. It is porous and low density. Snow ice is weak and unpredictable.

Figure B-16 Snow ice

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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:
Oars:
Inflation assembly:
Air tank:
Tow shield:

SKF-ICE Outboard Engine
General condition:
Fuel level:
Oil level:
Propeller condition:

MARSARS Shuttle Board
General condition:

Cold Water Sling
General condition:
Quantity (2):

550 Foot Line Reel
General condition:

Wool Blanket
General condition:
Quantity (4):

Flashlight
General condition:
Quantity (2):

AOR maps/charts
General condition:

M127A1 Ground Illumination Signal
General condition:
Quantity (6):

Handheld GPS
General condition:
Quantity (2):
Battery condition/charge:

150 Foot Tending Line
General condition:
Quantity (2):

Victim PFD's
General condition:
Quantity (4):

Night Vision Device
General condition:
Quantity (2):

First Aid Kit
General condition:
Quantity (4):

Automated External Defibrillator
General condition:
Battery condition:

Hypothermia Cap
General condition:
Quantity: (2)

VHF-FM Handheld Radios
General condition:
Battery condition:
Quantity:

Binoculars
General condition:

Compass
General condition:

Hypothermia Recovery Capsule
General condition:

Head Lamps
General condition:
Battery condition:
Quantity (6):

Government Vehicle (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:
Verify extra batteries for electronic devices are present:

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Appendix D:
Ice Rescue Training Checklist

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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 CG 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		

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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

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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	

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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"

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