Massachusetts Firefighting Academy

Department of Fire Services

Surface Ice Rescue Technician

Student Guide



01/01/2024

Objectives

Students will be able to:

- Identify different ice conditions
- Discuss ice condition impact rescue techniques
- Recognize medical implications
- Discuss best practices for size-up
- Illustrate best practices for an ice rescue Incident Action Plan
- Familiarize with ice rescue equipment/PPE
- Apply Rescue Sequence for simulated scenarios
- Perform Self-Rescue skills



Regulations

NFPA 1006

NFPA 1006 outlines the minimum Job Performance Requirements (JPR's) of the individual.

20.1 Awareness Level.

Prior to qualification at the awareness level in ice rescue, the individual shall meet the requirements defined in Section 20.1.

20.1.1

Size up an ice rescue incident, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.

20.2 Operations Level.

The job performance requirements defined in Section 20.1 and 20.2.1 through 20.2.6 shall be met prior to or during operations-level qualification in ice rescue.

20.2.1

Support ice rescue technician-level operations, given a designated mission, safety equipment, props, and a water body, so that skills are demonstrated in a controlled environment, performance parameters are achieved, hazards are assessed continually, and emergency procedures are demonstrated.

20.3 Technician Level.

The job performance requirements defined in Section 20.2 and 20.3.1 through 20.3.2 shall be met prior to or during technician-level qualification in ice rescue.

20.3.1

Demonstrate techniques for movement on ice, given an ice formation that is representative of the bodies of water and ice existing or anticipated within the geographic confines of the AHJ, ice rescue PPE, and swim aids as required, so that the specified objective is reached, all performance parameters are achieved, movement is controlled, hazards are continually assessed, distress signals are communicated, and rapid intervention for the rescuer has been staged for deployment.

Size Up

Ice Development



How does ice over happen in a lake or a pond? Each winter, as water cools, its molecules crowd closer together, until it cools to a “magic” temperature (39.2 °F, or 4° C), where it reaches its heaviest density and sinks to the bottom. Normally the surface water of a lake is easily mixed as wind blows over the surface. For instance, in the summer only the top layer of warm water 75 °F to 80 °F is mixed. Before a lake can freeze over, its entire water column from top to bottom, must reach that magic temperature (39.2° F or 4° C). This natural cooling process is called fall overturn.

Types of Ice

Clear ice
- Indicates clean water
- Typically, solid strong ice
- Black, blue, or green color



Puddle ice
- Freeze thaw cycle
- Rain
- Melting snow
- Indicates weak ice

Snow ice
- Cloudy / milky looking
- Snow mixed with ice
- Snow insulator / can weaken ice



Shore ice
- Begins at shore
- Thaws at shore
- Melt due to radiating heat
  - Rock
  - Stump
  - Tree

Open water
- Caused by underwater springs
- Always moving even if it doesn't appear so



Moving water
- Caused by water from pond inlet / outlet
- Streams, rivers, and canals
- Water is 15% weaker

Thaw Holes / cracks
- Warm spring underneath
- Factory outlet nearby
- Dry cracks not all the way down to water
- Wet cracks all the way down to water level

Ice Strength



- Formula to determine ice thickness: $P = 50T^2$
- T = Ice thickness
- P = Bearing capacity of ice

EMS

Hypothermia
- Core body below 95 °F
- Mammalian Diving Reflex involves
  - Cold water hitting your face
  - Instinctive breath holding
  - Vital function slowdown
  - Blood shunting to body's core

Patient Care
- Handle gently
- Remove wet clothing / move patient to warm shelter
- Prevent further heat loss
- Initiate CPR if necessary
- Follow local EMS protocols
- Have victim evaluated at medical facility
- Continue CPR until victim is re-warmed at medical facility



Equipment and PPE

Ice Commander Suits
Survival Suits
Dry Suits
Floatation devices
Ropes, slings
Boats / sleds

Mustang Ice Commander

- Yellow in color
- 30 lb. buoyancy
- Built-in ice picks
- Chest harness with shoulder straps
- Flotation and thermal protection in-liner
- Not for moving water

Floatation Devices



Communications

- Whistle or Air Horn
- 1 Long Blast = All stop
- 2 Short Blasts = Resume or go
- Hand signals



Rescue Sequence

Teach
- Attempt to calm victim
- Coach victim in self-rescue techniques
- Slowly verbalize each step you done

Reach
- Ladder, pike pole, branch
- Inflatable hose device
- Double line floating tether

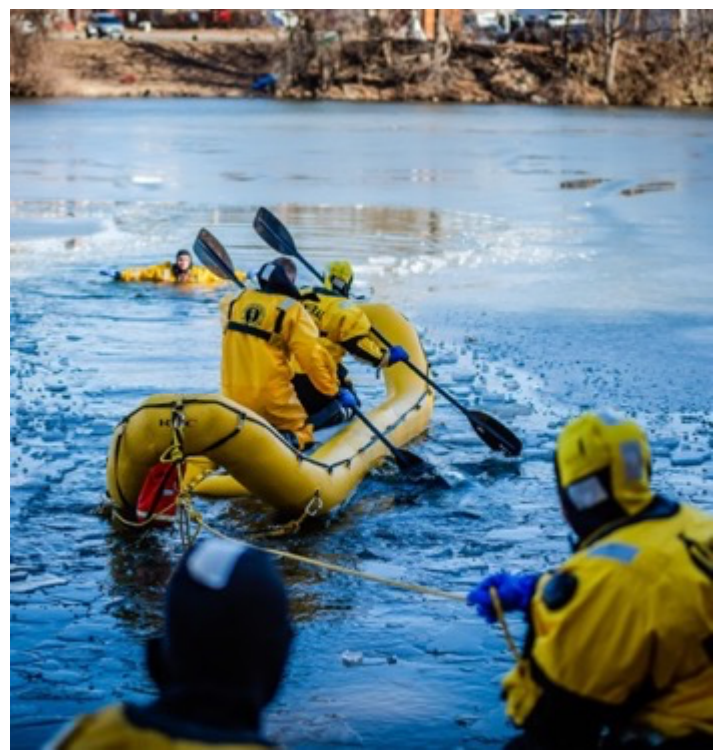


- Shore based rescue
- Commercially bought or made in-house
- (3) lengths of 2.5” hose max
- Need guiding lines to steer
- Attach ring buoy to maneuver

Throw
- Three methods of throwing
  - Underhand
  - Side Arm
  - Overhead (football)
- Yell “rope” prior to throwing
- Aim beyond victim

Row

- Depends on device
- Tie bow off back to shore team
- Two rescuers tied off to boat
- Victim too hypothermic, get into boat / pull them in



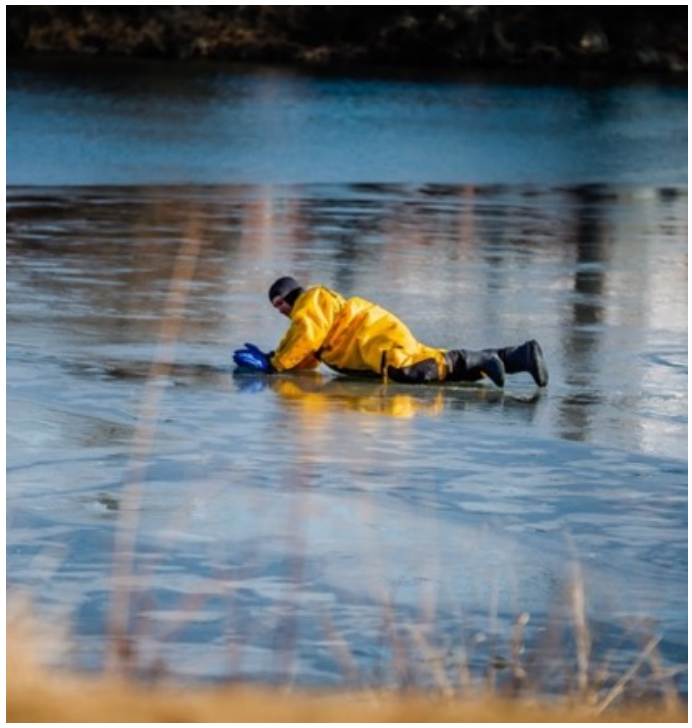


Go Rescue

- Tie rope end with figure “8” on a bight
- Connect to you with aluminum carabiner
- Five feet from knot, tie another figure “8” on a bight
- Use large aluminum carabiner
- Talk to victim the entire time
- Ensure them you are going to help
- Grab victim's wrist
- Slide into hole on your hip
- Burp suit to remain vertical in water
- Clip large carabiner to main line in front of patient
- Give signal for shore team pull in
- Get your arm between patient’s legs / prepare to lift
- When shore team starts pulling, lift patient up on to ice shelf

Moving Across the Ice

- Performed by shuffling feet
- 20’ from victim get on all fours
- 10’ from victim lie down on ice – fully disperse your weight
- If ice starts to break roll into victim's hole



Self-Rescue

- Use suit to bounce self out
- Bob at least four times, jettison yourself out
- Roll away from hole with tether line held above your head to avoid entanglement



Terminate an Incident



- Decontaminate
- Document
- Debrief/CISM
- Return to state of readiness