Cold Emergencies and Ice Rescue
Instructor Guide

Level of Instruction: 3.0

Time Required: Three Hours

Materials:
- Overheads (To be created by user)
- Overhead Projector
- Videos (if available)
- Rope
- Cold water survival suits
- Safe area with water or ice access
- Lesson Guide
- Video-January 1996 American Heat Tape

References:
- Brady Emergency Care Manual 6th Ed.
- MFRI Rescue Specialist
- Anne Arundel Water rescue guide
- Company Standard Operating Guideline

PREPARATION:

Motivation:

As we all are aware waterways are used for both recreational and industrial use. In times of cold weather, civilians and employees alike are at risk of being exposed to the hazards and effects of cold weather and cold water. Hunters, fishermen, and other personnel can be found daily in many areas of the waterways. It is critical we understand certain techniques and problems that surround operations in cold weather and cold water.

Objective (SPO): 1-1

The student will be able to describe from memory without assistance, to the satisfaction of the instructor, the hazards and concerns associated with operations in cold weather, cold water, and ice conditions. Personnel will be familiar with equipment and techniques used to limit exposure to these elements. Personnel will recall the signs and symptoms which may be present when someone suffers the effects of exposure to the cold.

Overview:

Cold Emergencies and Ice Rescue
- Definitions
- Hypothermia (signs and symptoms)
- Wind chill
• Time of year concerns
• Cold Weather Operations
• Cold Water Rescue
• Ice Rescue
• Protective Equipment
• Practical Evolutions
Cold Emergencies and Ice Rescue

SPO 1-1 Cold Emergencies and Ice Rescue

EO 1-1 The student will be able to recall from memory without assistance to the satisfaction of the instructor key definitions related to cold emergency and rescue situations.

EO 1-2 Identify signs and symptoms which may be present at different levels of personnel exposure to the cold. Discuss mammalian diving reflex and treatment of hypothermia.

EO 1-3 Review the cause and affect of wind chill on the human body.

EO 1-4 Discuss the seasonal changes and time of year concerns related to air and water temperatures and related chance of exposures problems also.

EO 1-5 Present information relative to exposure during operations during cold weather. List and discuss operations in the fire service that are sure to expose personnel to the elements.

EO 1-6 Identify hazards encountered when working around or in cold water situations. Present techniques which may limit personnel exposure to these hazards. Discuss concerns of cold water exposure to the human body. Cover the facts of ice.

EO 1-7 Review specialized rescue techniques which may be needed to perform ice rescues.

EO 1-8 Cover specialized equipment needed and available to perform and operate under these special circumstances, discuss care, maintenance, and inspection practices needed to ensure serviceability of equipment.

EO 1-9 Conduct safe and realistic practical evolutions incorporating cold water and ice rescue techniques.
I. Definitions (1-1)

A. Cold emergencies, cold water and ice rescue definitions.
   1. Asphyxia – suffocation from lack of air
   2. Chilblains – lesions that occur from repeated prolonged exposure of bare skin to temperatures between 32º and 60º F.
   3. Drowning – death caused by changes in the lungs resulting from immersion in water.
   4. Freezing (deep frostbite) – the third stage, or the deepest of the three degrees of frostbite. The subcutaneous layers and deeper structures of the body are affected. Muscles, bones, deep blood vessels, and organs can become frozen.
   5. Frostnip (incipient frostbite) – the first stage of frostbite. The skin reddens or whitens and becomes numb, but there is little or no tissue damage.
   6. Hypothermia – a generalized cooling that may reduce body temperature below normal. Lethal in extreme situations.
   7. Mammalian Diving Reflex – a reaction that occurs when the face is submerged in water. Breathing is inhibited, the heart rate slows, and major blood is sent to the brain, heart and lungs.
   8. Water Chill – chilling caused by conduction of heat from the body when the body or clothing is wet.
   9. Wind Chill – chilling caused by convection of heat from the body in the presence of currents of cool air.

II. Signs and Symptoms (1-2)

A. Hypothermia
   1. Human body is very reactive to temperature changes.
      a. core temperatures of 96º-99º can cause shivering
      b. 90º to 95ºF can cause intense shivering and difficulty speaking
      c. 86º to 90ºF causes strong muscular rigidity, jerky movements, comprehension is dulled, thinking is less clear, still
psychologically in touch with surroundings.
d. 81º to 85ºF causes patient to become irrational loses contact with his environment, drifts into a stupor state, muscle rigidity continues, pulse and respirations slow, may develop cardiac arrhythmia.
e. 78º to 80ºF patient becomes unconscious, does not respond to spoken words, most reflexes cease to function, heartbeat becomes erratic.

2. Other factors which influence exposures
   a. size and weight of victim
   b. clothing worn by victim
   c. parts of individual which are exposed
      i. high heat loss areas are head, groin, and arm pits.
   d. victims ability to attempt to preserve heat (learned techniques)
      i. HELP Technique (heat escape lessening position)
      ii. Three areas where major heat loss occur: head, groin, and sides on chest under arms
      iii. Control heat loss from the head by wrapping a piece of cloth around the area of the head. Leave eyes, nose, and mouth exposes.
      iv. Control heat loss from the chest by holding the inner side of the arms against the side of the chest.
      v. Press thighs closely together and raise the legs into a fetal position. This will close the groin area.
   e. Mammalian Diving Reflex
      i. a reflex most evident in marine mammals. Studies in 1981 revealed that this reflex in humans is slightly different.
      ii. The colder the water, the more profound the response.
      iii. The younger the person, the more active the reflex.
      iv. It appears the face must be stimulated to activate the response.
3. If several persons are exposed and hypothermia is a concern, they should huddle together. This action has proven to increase survival time by 50%. It also helps to calm fears.

4. Basic Treatment for Hypothermia
   a. calm and reassure the patient
   b. recognize that hypothermia has occurred, cover the patient with warm, dry blankets
   c. move patient to warm environment as soon as possible
   d. keep patient dry and remove wet clothing
   e. support basic life support functions
   f. treat for shock and administer heated oxygen if possible
   g. contact referral center
   h. transport as soon as possible
   i. continue to monitor and reassure the patient

III. Wind chill (1-3)
   A. Wind chill is defined as the convection of heat from the body caused by the movement of cool or cold air.
   B. Effects only living things.
   C. Calculations based on air temperature and wind speed.
   D. May cause problems after very limited exposure.
   E. May affect persons differently.
      i. size and weight
      ii. age (younger and older affected worse)

IV. Seasonal Changes (1-4)
   A. Water Temperatures
      1. water temperatures, throughout the year, may cause hypothermia
      2. as long as water temperature is below body temperature, heat transfer will occur
      3. personnel should be protected at all times
   B. Expected Survival Times

<table>
<thead>
<tr>
<th>Water Temp.</th>
<th>Exhaustion/ Unconscious Time</th>
<th>Survival Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.5</td>
<td>under 15 mins</td>
<td>15 to 45 mins</td>
</tr>
<tr>
<td>32.5 to 40</td>
<td>15 to 30 mins</td>
<td>30 to 90 mins</td>
</tr>
</tbody>
</table>
C. Air temperatures
   1. cool temps, may have adverse affect on injured people
   2. people tolerate cold at different levels
   3. always protect victims and personnel from adverse conditions

V. Cold Water Operations - land and water (1-5)

A. Be prepared
   1. concern yourself with type and amount of clothing
   2. take the extra time to prepare yourself
   3. limit exposures
   4. weather exposures can occur any time during any operation

B. Land or fire operations
   1. wear adequate clothing under bunker gear
   2. have spare dry clothes available (socks and gloves)
   3. wear hats or hoods if possible
   4. monitor yourself and others for possible exposure problems
   5. report and seek medical care for extreme cases

C. Near or in water operations
   1. wear adequate clothing under suits or gear
      i. heavy wool or layered clothing
   2. have spare clothing available after exiting water
   3. OIC’s should provide heated area for dressing and undressing
      i. heated roomy vehicles
      ii. near by house or building
      iii. prepare at the station if you have to
   4. monitor yourself and others for evidence of exposures
   5. report and seek medical care for exposure related problems of injuries
VI. Ice Rescue Operational Hazards (1-6)

A. Hazards to ones self
   1. slip and fall hazards
      i. rough terrain
      ii. rocky shores
      iii. limited access area
      iv. steep embankments
   2. cold exposure hazards
      i. hypothermia
      ii. frostbite
      iii. wind chill
   3. lack of proper equipment
      i. PFD limits
      ii. boats non-available

B. Hazards to victims
   1. trauma related injuries
   2. HYPOTHERMIA
   3. post incident mental health problems

C. The fact of ice
   1. clouded or discolored ice is very weak
   2. ice less than 4” thick should not be expected to support several rescuers
   3. shore line ice can be cracked and dangerous due to tidal changes, and expansion and contraction of ice formations
   4. centers of deep lakes and ponds create poor ice due to currents and wind effect
   5. new ice is much stronger than old ice
   6. clear ice is much stronger than cloudy or bubbled ice
   7. ice around pilings, rocks or other obstructions can be very weak
   8. ice strength is dependent upon daily temperatures, thickness, snow cover, and the depth of the water under the ice. Water level changes and local currents greatly affect the format and strength of ice.

VII. Specialized Rescue Techniques (1-7)

A. Shore Based Techniques
   1. Flotation devices/rescue devices
i. throw rings
ii. reach poles
iii. throw bags or weighted ropes
iv. inflated fire hoses
v. ladders
vi. rigged rope systems
vii. line guns

2. Reach devices
   i. long poles
   ii. ladders (roof through extension)
   iii. ladder trucks or platform devices

3. Go devices
   i. flotation sleds
   ii. inflatable boats or rafts
   iii. boats
   iv. helicopters

B. Reach/Throw/Go
   1. Reach
      i. safest method
      ii. limited equipment necessary
      iii. close to shore rescues
   2. Throw
      i. also limits rescuers exposure
      ii. limited inexpensive equipment necessary
      iii. limited amount of training necessary
      iv. close to shore rescues also
   3. Go
      i. great hazard to rescuer
      ii. special training required
      iii. last resort
      iv. much more technical
      v. more equipment needed

C. Safety concerns
   1. on shore problems
      i. rough terrain
      ii. limited access
      iii. ice conditions
      iv. cold weather
   2. in water problems
      i. currents
ii. mud and muck bottoms  
iii. UXO  
iv. unknown ice conditions  

3. personnel problems  
   i. swimming abilities  
   ii. critical incident stress  
   iii. exposure problems  

VIII. Specialized Equipment (1-8)  
   A. Department Equipment  
      1. cold water exposure suits  
         i. neoprene rubber  
         ii. limited use short exposure duration  
         iii. provide flotation  
         iv. easy to use  
         v. easy to maintain  
      2. flotation devices  
         i. PFDs  
         ii. on site throw rings and other devices  
         iii. clothing and turn out gear  
      3. ropes and rope systems  
         i. extended set up time  
         ii. technical in nature  
         iii. extensive amount of equipment required  
      4. off shore equipment  
         i. department boat  
         ii. other organizations boats  
         iii. mutual aid sleds, boats, line gun, etc.  
      5. Maintenance of equipment  
         i. kept clean and free of damage  
         ii. inspected monthly to insure proper operations and care  
         iii. record and report any damage or problems  

IX. Practical Evolutions (1-9)  
   A. Practical  
      1. Warm weather operations  
         i. conduct shoreline and waterway familiarization  
         ii. utilize equipment in non hazardous conditions  
         iii. perform routine maintenance  
      2. Cold weather operations  
         i. conduct location and access familiarization  
         ii. conduct live cold water evolutions  

   B. Theory and Philosophy  
      1. cold water exposure suits  
      2. general cold water exposure suits
iii. utilize Ice Rescue techniques in live (controlled situations)

3. Boat operations
   i. completed throughout the year in different conditions
   ii. review launch operations
   iii. overview of safe boating operations
   iv. service PFDs
SUMMARY:

Review:

Hypothermia and Cold Water Rescue
• Definitions
• Signs and symptoms of exposure to cold
• Wind chill
• Seasonal changes
• Fire/rescue operations in cold weather
• Ice rescue operational hazards
• Rescue techniques
• Special rescue equipment
• Practical evolution

Remotivation:

Personnel can be called on at any time to perform a rescue from in the water or around the water. We must be prepared at all times no matter what the conditions are. We must also be aware that these situations are very dangerous not only to the victim but to the rescuer as well. Be familiar with the equipment available and know how and when to use it. Remember, reach, throw, and go. These could keep you out of a lot of trouble. Remember most of all to use a common sense approach to protect all those involved.

EVALUATION:

All personnel will be evaluated throughout the classroom and practical sessions and will perform to the satisfaction of the instructor.