DEPARTMENT OF FIRE SERVICES
Massachusetts Firefighting Academy

SURFACE ICE RESCUE

STUDENT GUIDE

Ver. 51502

GENERAL DESCRIPTION

Ice rescue presents unique problems for the firefighter that require specialized technical skills to solve them. Too many times in the past, firefighters themselves have fallen victim to the hazards of ice rescue. In most cases, this can be attributed to deficiencies in three areas: proper training, equipment, and knowledge. This course is designed to train the firefighter in the most current techniques in Ice Rescue. The primary objectives of this program are to execute the following:

- Train the firefighter how to recognize ice characteristics, its strengths, and weaknesses
- To provide the firefighter with the knowledge to understand how hypothermia can affect both the victim as well as the rescuer
- Train the firefighter in proper techniques in planning and executing the appropriate rescue procedures and equipment using REACH, THROW, AND GO methods
- To provide the firefighter with a greater sense of competency in dealing with Ice rescues

REFERENCES

Ice Rescue Manual, Pennsylvania Fish Commission
Ice Rescue Manual, Ohio Department of Natural Resources, Division of Watercraft
Fire Service Rescue Practices, IFSTA, Fifth Edition
Cold Water Rescue, Connecticut Firefighting Academy

METHOD OF INSTRUCTION

Lecture, Audio/Video, and Practical Exercises

SEGMENTS OF INSTRUCTION

INTRODUCTION

Why Ice Rescue?

SECTION I — Recognizing Ice Characteristics

- Ice development
- Ice classification

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- Factors that determine ice strength

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INTRODUCTION

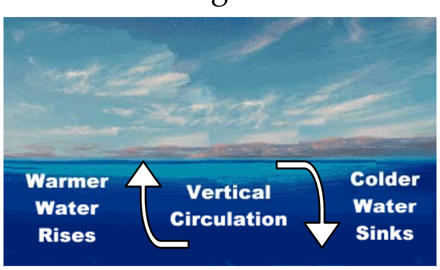
Why Ice Rescue?
Today, more than ever before, people are venturing out onto the ice. Increasingly popular activities on ice such as skating, fishing, snowmobiling, and skiing, call for firefighters to respond more frequently to ice-related emergencies.

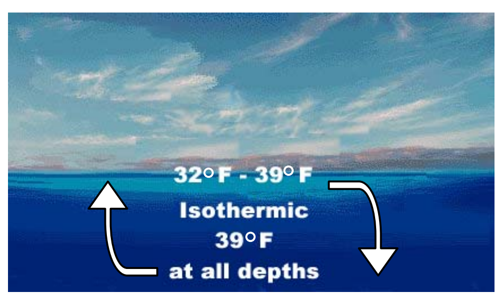
Unfortunately, many of these emergency calls are ending in tragedy for firefighters as well as the people they are trying to save. The real tragedy is that with proper planning, training, and equipment, most of these mishaps may have been avoided. Without them, what should be a simple ice rescue could easily turn into disaster.

The firefighter must have an understanding if ice characteristics, its strengths and weaknesses, and how hypothermia can affect both the rescuer and the victim. The firefighter must also have the capacity to save himself as well as others to insure his confidence in this abilities to successfully complete ice rescue. This course has been created to give the firefighter the judgment needed to take the proper steps to ensure safe, successful rescues.

SECTION I: RECOGNIZING ICE CHARACTERISTICS

A. Ice Development
   1. The blowing cold air currents of winter cools the surface water of a lake or pond. The cool water, which is heavier, sinks towards the bottom while the warmer water from the depths rises to replace it. The terminology of this water movement is *called vertical circulation*. This circulation process stops when the water temperature from the surface to the bottom becomes consistent at all depths. At this point, the water is known to be *isothermic*. While the water is in an isothermic state, its temperature is 39.2°F. Water that drops below 39.2°F becomes less dense and remains at the water's surface and freezes. This is how ice begins to form.





B. Ice Classification
   1. *Clear Ice* - Is new ice formed by a long, hard freeze. It can be blue, green, or black. It is usually the strongest ice.
   2. *Puddle Ice* - A collection of melted water on ice. The earliest stage is puddles of melted snow.
   3. *Snow Ice* - Fragile ice that is cloudy or milky looking. It is formed from refreezing melted snow.
   4. *Shore Ice* - An unbroken sheet that is attached to the shore of a lake, pond or river.

5. *Thaw Hole* - A vertical hole formed when surface holes melt through to the water below.
6. *Ice Crack* - Any fissure or break in the ice that has not caused the ice to be separated.
7. *Refrozen Ice* - Ice that has frozen after melting has taken place.
8. *Layered Ice* - Striped in appearance, it is constructed from many layers of frozen and refrozen snow.
9. *Frazil Slush* - Soft ice. Forms in moving water where currents prevent a solid freeze.
10. *Anchor Ice* - Created when river bottoms cool to 32°F and ice forms on solid objects. The sun then warms these objects, releasing them to the surface where they may cause ice jams.
11. *Pack Ice* - Ice is driven against ice by wind, current or waves. Pack ice can pile up and freeze together leaving weak holes.
12. *Drift Ice* - Ice that is floating free in a lake or pond. Any lake or pond ice that is not attached to shore.
13. *Pancake Ice* - Is a round section of recently formed free-floating ice. It spans approximately ten feet across and can be up to four inches thick. It is mostly level with elevated edges due to pieces colliding against one another.
14. *Floe Ice* - A fairly flat piece of ice ten feet across or more. A floe may be made up of one unbroken section or many joined sections.
15. *Ridged Ice* - Ice that is piled up by pressure. It is irregularly piled in the form of ridges or walls.
16. *Lead Ice* - A fissure or crack in ice that is large enough to make it negotiable by surface craft.
17. *Polyna Ice* - A sizeable, non-linear-shaped ice opening found in the same area or year.
18. *Pool Ice* - Is any small ice enclosed in a water area.
19. *Rotten Ice* - Decayed honeycombed ice in an advanced stage of deterioration.
20. *Ice Rind* - A fragile, glossy coat of ice formed on a calm surface. It can easily be damaged by wind and waves.
21. *Frazil Ice* - The first type of ice to form. It is composed of disk-shaped crystals suspended in the water. These crystals form an oily film which floats to the surface. As the temperature drops, the films group together to form a solid sheet.
22. *Candle Ice* - Fingers of ice in an ice surface that is rotting or dissipating clear ice. This ice can be fairly thick but still unable to bear any significant weight.

SECTION II: ICE RESCUE

A. Factors that Determine Ice Strength
   1. Ice strength and thickness may differ quite a bit from one location to another, even on the same body of water. It will rarely freeze and melt at a consistent rate. A variety of factors affect ice strength. Identifying these factors may be difficult, but emergency situations require immediate decisions. Obviously, you cannot take the time to cut a hole in the ice to measure its thickness whenever an ice rescue is needed, but a few general guidelines can assist you in performing a safe rescue.

2. Although ice thickness is only one factor to determine ice strength, charts are available to give a general idea of the ice's safe load (according to its thickness). It can be one foot thick in one location and only one inch thick ten feet away.
3. New ice is usually stronger than old ice. Ice normally grows stronger and thicker during formation. As ice decays, it can maintain its thickness, but still be unsafe. 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 the ice takes on a black appearance.
4. Many factors that contribute to ice strength also cause deterioration. Weather is a key factor. A light wind speeds up ice formation, while a heavy wind slows it down. Heavy winds keep open holes on frozen lakes. Wind also forces water beneath the edge of the ice and causes it to decay from below.
5. Snow acts in different ways. First, it insulates strong ice and prevents it from melting, but snow can also insulate the surface from freezing. It can cause ice to form slowly or deteriorate. Because of its weight, snow can depress the ice sheet and reduce its bearing capacity. Snow also conceals weak ice indicators.
6. Slush is caused by rain, warm temperatures or by water rising up through cracks in the ice. Beware of slush! It is a sign that water is no longer freezing from below. Slush normally freezes from the top down.
7. Water sitting on ice erodes it. Dangerous vertical fractures are caused in ice and the water percolates through it.
8. Daily temperatures affect ice strength. When air temperatures stay below 32°F ice is much stronger. Warm temperatures weaken ice because melting, shifting and contraction occurs. Even sunlight can deteriorate ice from below when it reflects off rocks or sand.
9. Changing air temperature can cause thermal expansion and create cracks in the ice sheet. Wet cracks reach clear through to water level and can be extremely dangerous if they meet at 90-degree angles. Thermal expansion can also cause pressure ridges where soft ice or open water areas can appear. The booming sound you hear on cold days occurs when the ice sheet is expanding and changing shape with the change in temperature.
10. The depth and size of a body of water affect ice strength. Large, deep lakes take longer to freeze, but are slow to decay. Very large lakes, such as the Great Lakes, may remain open in the winter because of wind, waves or current.
11. Ice closer to shore is weaker because of shifting, expansion, and sunlight reflecting off the bottom. This buckling shore ice continually thaws and refreezes.
12. Current and water velocity affect the strength of ice over moving streams. River ice is usually 15% 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 the underlying currents which often cause air pockets in the ice.
13. The chemical make up of water is an important factor in determining ice strength. Clean water freezes faster and deeper than water containing chemicals or pollutants. Pollutants concentrate along the crystal boundaries causing porous, vertical streaks called "candling".

14. Fluctuating water levels caused from rain, seepage from wet cracks or damage or dam releases can weaken ice. Lower water levels weaken ice because it lacks the support of water underneath. This ice will stress and crack.
15. Obstructions such as rocks, logs, vegetation, and pilings affect the strength of ice. Heat transfer from these obstructions slow ice formation. Ice shifting and expansion will create pressure cracks and ridges around these obstructions. Decomposing vegetation can generate heat which hinders ice formation. Underground springs weaken ice. The rising water warms the surface and prevents ice formation. Ice weakened by springs can be camouflaged by snow. Be aware of spring in your area.
16. Lastly, water fowl and schools of fish can prevent ice formation. This causes vertical circulation where they gather causing thin ice spots or even open water. Once left alone, this open area will freeze and will be weaker than the surrounding ice.

B. Ice Safety

1. Remember that the only absolute in ice safety is to stay off of it. Only when a complete knowledge of how ice is formed, the type of ice you have, and the factors affecting ice strength is developed, will you as a rescuer be equipped to judge the most effective way to complete an ice rescue.
2. Thickness is only one of many determining factors in ice safety. The following are only guidelines to indicate what kind of activities that good, clear, and solid ice can support.

The formula $\mathbf{P = 50T^2}$ can be used to estimate the strength of clear ice.

$\mathbf{P = 50T^2}$

T = Ice Thickness
P = Bearing Capacity of Ice

Example: 2" of clear ice
P = 50 x (2x2)
P = 50 x 4
P = 200 Lbs.

MAXIMUM SAFE LOAD for ideal ice .
(clear and solid)

3″............................... Walking
4″............................... Fishing
5″............................... Snowmobile
8-12″ .... Vehicles

SECTION III: HYPOTHERMIA

A. Heat Loss

1. Heat loss is due to the transfer of heat (calories) from one body to another, or from one body into the atmosphere. Heat loss occurs several ways.
   a. *Conduction* - Direct heat exchange from one body or surface to another by direct contact. Ex., a body immersed in cold water, or wearing wet clothes.
   b. *Convection* - Air currents blowing across the body remove heat and lower the body's temperature.
   c. *Radiation* - Body heat radiates away from the body and warming objects around it. (40% of heat loss from the body radiates away from the head and neck.)
   d. *Evaporation* - Evaporation of perspiration on the surface of the skin is the body's own way of cooling down. Also known as "sweating."
   e. *Respiration* - A person breathes in cool air and exhales warm air. When heat loss is greater than heat production, the body cools down.

B. Hypothermia

1. Begins when the core body temperature drops below 95°F. Submersion hypothermia is a combination of both hypothermia and hypoxia (deficiency of oxygen). Many studies have show remarkable results in resuscitating cold water drowning patients. Successful resuscitation without neurological impairment has been documented in cases of cold water submersion up to sixty-six minutes. The "Mammalian Diving Reflex", which involves instinctive breath holding, vital function slow down, and blood shunting to the body's core is credited with enabling these patients to survive. Cold water is also thought to protect the central nervous system from the otherwise damaging effects of cerebral hypoxia.

   In 1986 in Salt Lake City, Utah, a 2-½ year old girl fell into a creek that had a water temperature of 41°F. The little girl was submerged between 62 and 70 minutes before she was found. By the time she was pulled from the creek, her core body temperature had fallen to 62.3°F. The child made a full neurological recovery with only a slight learning deficit that cannot be contributed to the accident. ***(JAMA, July 15, 1988 Vol. 260 No.3)***

2. Research indicates that several factors may influence the outcome of a cold water submersion patient, including the following :
   a. Age
   - The younger, the better. It is believed that the smaller mass of a child's body cools faster than an adult's.

   b. Submersion Time
   - The shorter, the better. There is less chance for cellular damage due to hypoxia.

   c. Water Temperature
   - The colder, the better. The quicker the body is chilled, the less chance there is for cellular hypoxia.

d. *Struggle*
   - The less, the better. Less struggle means less muscular activity, which translates to less heat production, which speeds cooling. (Individuals intoxicated by either drugs or alcohol usually struggle less and have a better chance at recovery once revived.)

e. *Cleanliness of Water*
   - The cleaner, the better. Patients usually do better after resuscitation if they were submerged in clean water, rather than muddy or contaminated water.

f. *Quality of CPR*
   - The more aggressive, the better. Immediate, aggressive CPR is the key for submersion hypothermia patients.

g. *Associated Trauma*
   - The less, the better. Obviously, patients with existing trauma will not fare as well as otherwise healthy patients.

3. Some other things to consider in regard to hypothermia.
   a. The average person has a 50/50 chance of surviving a 50-yard swim in 50°F water.
   b. A person that is in 32-40° water while wearing a PFD can expect to be either completely exhausted or unconscious in 15 minutes. Survival time is 30-90 minutes.
   c. Struggling in water can cut a person's survival time by 50% due to increased heat loss.

Water Temperature and Estimated Survival Time	
Water 38 Degrees Fahrenheit	
Loss of use of hands and forearms	**15 minutes**
Loss of mental activity	**45 minutes**
Hypothermia & death	**65 minutes**
Water 48 Degrees Fahrenheit	
Loss of use of hands and forearms	**20 minutes**
Loss of mental activity	**60 minutes**
Hypothermia & death	**90 minutes**
Water 70 Degrees Fahrenheit	
Loss of use of hands and forearms	**3 hours**
Loss of mental activity	**4-5 hours**
Hypothermia & death	**6 hours**

C. Patient Assessment
   1. Body Temperature:
      a. 99° - 96°F
         - Intense and uncontrolled shivering
      b. 90° - 95-91°F: Mild Hypothermia
         - Altered level of consciousness
         - Confusion

- Slurred speech
- Altered gait
- Clumsiness

c. 90° - 86°F: Profound Hypothermia
- Muscular rigidity
- Lack of muscular coordination
- Erratic and jerky movements
- Amnesia

d. 85° - 81°F
- Irrational behavior
- Stuporous state
- Increased muscular rigidity
- Pulse and respirations slowed

e. 80° - 78°F
- Unconscious
- Non-responsive
- Loss of reflexes
- Erratic heart rate

f. Below 78°F
- Cardiac and respiratory centers of the brain fail
- Edema
- Hemorrhage of the lungs
- Death

D. Patient Care
1. Remove wet clothing
2. Move patient to warm shelter
3. Prevent further heat loss
4. Handle gently
5. Provide oxygen
6. Monitor respirators and initiate CPR if situation warrants it
7. DOs and DON'Ts of Immediate Care

a. DO's
- Handle victim gently
- Remove wet clothing immediately
- Protect the victim from the wind
- Rewarm the victim by applying external heat slowly
- Always have the hypothermia victim evaluated at a medical facility

b. DON'Ts
- Do not give hot liquids by mouth
- Do not give alcohol

- Do not allow the victim to move about, walk or struggle
- Do not stop resuscitative attempts until the victim has been rewarmed and preferably evaluated at a medical facility

*Refer to your local Emergency Medical Services protocols and remember - NO ONE IS CONSIDERED DEAD UNTIL THEY ARE WARM AND DEAD.

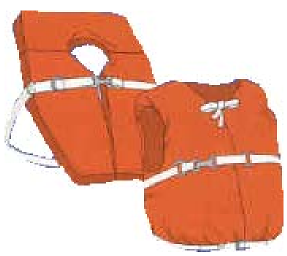
E. Types of Drowning
  1. Wet Drowning
     a. The definition of drowning is suffixation in a liquid. 85-90% of all drowning are wet drowning. In these cases, the victim inhales and swallows large amounts of water
  2. Dry Drowning
     a. 10-15% of all drownings are dry drowning. In dry drowning, water comes in contact with the larynx and triggers a reflex spasm. This laryngeospasm seals off the airway so effectively that no more than a small amount of water reaches the lungs.
  3. Secondary Drowning
     a. Occurs when a victim of a near drowning is successfully resuscitated but dies hours or days later due to complications such as pulmonary edema. All near-drowning patients must be transported to a medical facility immediately.

SECTION IV: PERSONAL PROTECTION

A. Protection from Exposure
  1. Obviously, while performing an ice rescue, the weather conditions will be difficult to work in at best. For firefighters to perform a safest rescue operation, they must first prepare themselves for the elements.
     a. Inner Layer
        - Proper dress for exposure protection begins with layering. Clothing should consist of three layers. The first layer, or inner layer, is one that covers the skin. It should be made from a material that is vapor transmissive to allow moisture to pass through it and away from the skin.
     b. Middle Layer
        - The second layer, or middle layer must provide insulation, such as a wool sweater.
     c. Outer Layer
        - The third layer, or outer layer should protect from the elements of wind or rain.

All of these materials that make up these layers (especially the inner and middle layers) should be able to retain most of their insulating qualities even when wet. Materials that absorb water, such as cotton, should be avoided. Once cotton becomes wet, it will lose its ability to provide insulation and instead holds a cold, clammy layer of moisture next to the skin. A warm hat and a pair of gloves are a must. The gloves you wear should allow you the dexterity you will need to work with ropes. Helmets should also be considered on slippery surfaces.

B. Personal Floatation Devices (PFD's)
1. Any firefighter on or near the water must be wearing a PFD. If you witness one of your fellow firefighters get into trouble in the water, chances are you will instinctively go to the firefighter's aid. If you are not wearing a PFD at this time, it is very likely that you will become part of the problem instead of the solution. *A good rule of thumb is to wear a PFD you go within 50' of the water's edge.*
2. A PFD should be the correct size, provide adequate floatation, and be bright in color with reflective tape sewn on it. It is also recommended that the PFD be of a type that wraps completely around the body's torso to provide some insulation against the cold. The PFD should also have a whistle attached as well as a torso and/or crotch strap.
3. Five Types of PFD's
   a. There are five types of PFD's:



- **Type I:** Over 20 lbs. of buoyancy. Designed to turn unconscious person from downward position to vertical or slightly backward position.

- **Type II:** At least 15.5 lbs. of buoyancy. Designed to turn an unconscious person from downward position to vertical or slightly backward position.

- **Type III:** At least 15.5 lbs. of buoyancy. Not designed to turn an unconscious person face up. More comfortable for water sports.

- **Type III PFD:** One of the best suited types to wear during a rescue or recovery operation. It has a minimum of 15.5 lbs. of buoyancy and provides comfort and mobility without much restriction.

- **Type IV:** At least 16.5 lbs. of buoyancy. Designed to be grasped, not worn. The floatation aid is thrown to the victim.

- **Type V:** Wearable device approved only for certain activities and conditions. The label on the device will show its approved uses and limitations. Varieties include boardsailing vests, work vests, whitewater vests, hybrid PFD's and others.

- **Type V PFD:** Special-use vest. Many of these types of PVD's are also excellent for cold water rescue. Some styles are available as floatation jackets or work suits and provide a great deal of insulation and buoyancy.

C. Exposure Suits
   1. The use of exposure suits may be a better alternative to layering clothing in many instances. There are many types of exposure suits which may be worn.
      a. Wet Suit
         - As its name implies, you will get wet in a wetsuit. A layer of water enters the suit and is trapped between the suit and the surface of the skin. Body heat then warms the trapped water and it acts as an insulating layer. Once wet, the suit will not provide protection against the elements of a long period of time in cold water. It may take longer to don a wetsuit and is not designed to be worn over clothing. Although a wetsuit will provide buoyancy, a PFD should still be worn with it.
      b. Dry Suit
         - As its name implies, a drysuit will keep you dry even when submerged in water. Water-tight wrist and neck seals prevent the water from entering the suit. Some dry suits are made of a light weight design for canoeing and windsurfing. These suits can be ideal for cold water rescues. Most dry suits can be quickly donned over clothing. The amount of buoyancy a dry suit provides depends on the amount of air trapped in the suit and the type of material of which the suit is made. Again, it is best to wear a PFD along with a dry suit.

c. Survival Suit or *Gumby Suit*

- This is the type of suit that many fire departments are using for cold water rescue work. This suit provides excellent buoyancy and exposure protection. However, it is cumbersome to work in. This type of exposure suit was designed as a survival suit for those who work at sea.

d. Cold Water Rescue Suit

- Although similar in many ways to the gumby suit, the cold water rescue suit has many features that make it the ideal rescue suit for "GO" rescues. It should have five finger mitts and hard sole boots, as well as a sewn-in chest harness to tether the rescuer. The suit should also have a pair of ice picks attached to the suit.

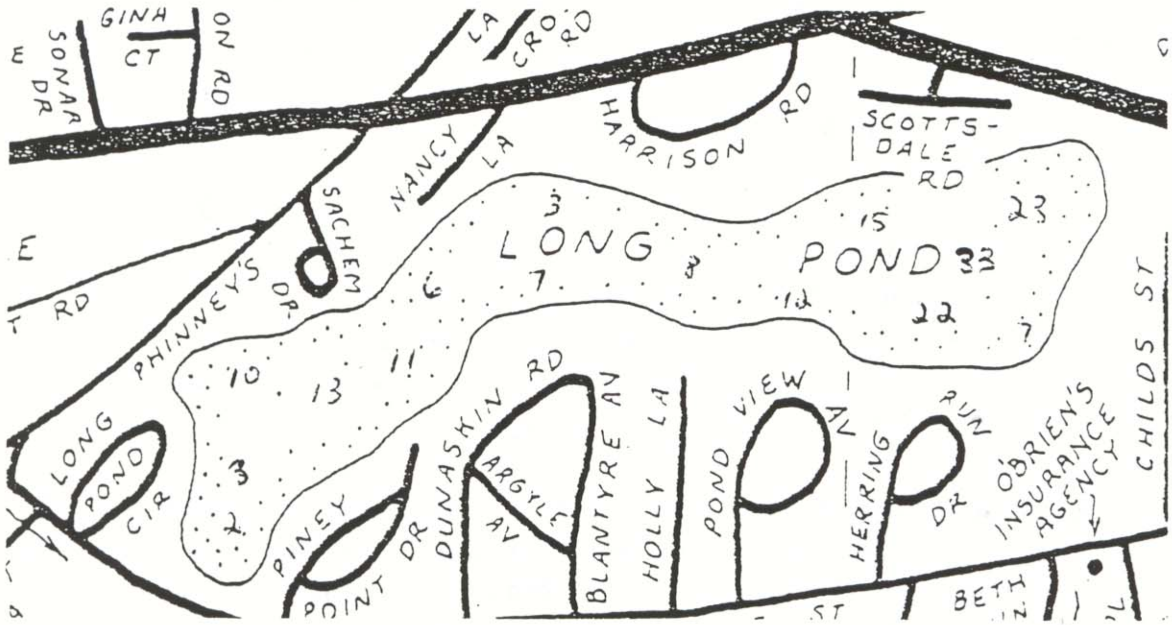
SECTION V: PRE-PLANNING

A. Target Areas

1. Pre-planning for an ice or cold water rescue is very similar to pre-planning a fire hazard in your jurisdiction. You can start to identify your target hazards by determining the areas where you have had previous incidents. It may not be possible to pre-plan every water or ice hazard, but you should pre-plan the target areas that have a history or are more likely to have a history or are more likely to have an accident. Some important factors to consider while developing a pre-plan are as follows:
   a. Manpower available
   b. Equipment available
   c. Training needs
   d. Survey of the water hazard
   e. Access to the area
   f. Identify other agencies that may become involved
2. Target areas should have a pre-plan that includes a map of the site. On these maps, significant factors appropriate to the site should be clearly marked. Some of these factors include the following:
   a. Description of hazards -manmade and natural
   b. Location
   c. Contact person
   d. Access
   e. Boat ramps
   f. Size of body
   g. Command location
   h. Depth
   i. Apparatus positioning

3. Proper pre-planning will lead to the following:
    a. Safety of rescuers
    b. Safety of victims
    c. Quick response
    d. Correct equipment for the job
    e. Interagency cooperation
4. Proper pre-planning will also save time, money, and lives.

Water Hazard Pre-Plan



Site Name: ______________________________

Body of water: Fresh ☐ Salt ☐ River ☐ ______________________________

Location: ______________________________

First alarm assignment: ______________________________

Access route: ____________________ Apparatus positioning: ____________________

Command positioning: ______________________________

Location: ______________________________

Boat launch location(s): ______________________________

Accident site history: ______________________________

Description of hazard(s): ______________________________

Location(s) - local landmarks: ______________________________

Addition Hazards: Dam ☐ Electrical lines ☐ HazMat ☐

Other ☐ ______________________________

Type of markings: ______________________________

Size of body: ____________________ Width ☐ Length ☐ Depth ☐

Contact person (keys, gates, discharges, lock and dams, etc.) ____________________

Address and phone number: ______________________________

B. The Rescue Team
1. In order to have a safe, efficient rescue, it is necessary to develop a well-trained rescue team. The rescue team members must have the capacity to do the following:
   a. Assuming all roles on the team
   b. Know their own limitations
   c. Know the limitations of their fellow team members
   d. Understand how to conduct a proper size up
   e. Selecting and using the proper equipment
   f. Becoming proficient in rescue skills and techniques
   g. Providing the proper back up
2. The roles assumed at an ice rescue may change as the situation unfolds. Team members must have a dynamic approach to a rescue and have the ability to perform all roles on the team. The incident command system should be followed including the following positions:
   a. Incident Commander:
      - Responsible for the overall management of the incident, but does not become involved in the actual rescue.
   b. Rescue Team Leader (RTL):
      - Directs the actual rescue. Responsible for the tactics and strategies needed to implement a safe, successful rescue.
   c. Rescuers:
      - Follows the orders and directions of the RTL. Sets up, performs the rescue, and communicates with the victim.
   d. Back Up Rescuers:
      - Rescue team members whose sole purpose is to stay back and be prepared to act if something does not go according to plan.

C. Communications
1. There will be times when rescuers will not be able to communicate with each other due to excessive noise at a rescue site. Noise from helicopters, engines, sirens, and moving water among other things can prevent proper communications between team members. This can still be the case even with radios. It may also be impractical for all team members to have their own portable radios.


I'm Okay !


Pull Me In !


Hold !
Stop Pulling Line !


Help !
Send Out Backup !

All hand signals should be performed with distinction!
Hand signals should be clear and leave no questions as to their intentions. Misinterpreted hand signals could lead to disaster at a rescue scene.

SECTION VI: RESCUE METHODS AND EQUIPMENT

A. Scene Evaluation

1. Risk/Benefit Analysis
    a. Before any rescues are conducted, a Risk/Benefit Analysis must first be completed. Risk/Benefit simply asks the question, "Does the potential benefit of a rescue justify the risk taken to successfully complete it?" If the potential to save a life is there, then more risk to the rescuer may justify a more dangerous rescue technique.
    b. If there is no benefit to be gained, such as a body or object recovery, then the least dangerous option that will provide the least amount of risk should be used. Even when there is a chance to save a life, that alone does not justify a high risk rescue technique. There may be other options that will be safe to the rescuers that can be utilized. If this is found to be the case, then the safest options should be chosen.
    c. The RTL must also understand that there may be times when no attempts at a rescue or recovery should be made. An RTL should never allow himself to be pressured into performing a rescue that is obviously beyond the capabilities of the rescue team.
    d. Sometimes rescuers may want to attempt a rescue because they feel that they "just have to do something." It is a difficult moment for the RTL to say no to performing an operation when feeling this type of pressure from the public or even from their own colleagues. It is the RTL's responsibility to take all available caution to ensure that the rescuers do not become the victims.
2. Size Up
    a. Upon arrival, the RTL must size up the situation correctly to employ the proper rescue technique.
        - Victims
            - How many victims? Where are they? Are they trapped? Are they submerged? Can the victims breathe? Can the victims help themselves? How much longer can they last? Have they made it to shore prior to your arrival and lying somewhere in need of medical help?
    b. Ice conditions
       How can things get worse? Will the ice support a rescue attempt? Is it salt ice? Is it over moving water?
    c. Equipment available
       Do you have the correct equipment to perform the rescue? If not, where can you get it? Are there other agencies that can help? Coast Guard, Local Police, State Police, Department of Natural Resources, Dive Team?
    d. Manpower available
       Do you have enough to perform a safe rescue? Do you have adequate back up? Where can you get more help? Have you requested Emergency Medical Services?
    e. Follow the rescue sequence
        - Victim self rescue
        - Shore-assisted rescue
        - Boat-assisted rescue
        - Go rescue

3. Moving Across Ice - *Self Rescue*
   a. While moving across ice, move slowly and carefully, distributing your weight as much as possible. Do not pick your feet up off the ice. Instead, shuffle along to lesson any impact loads caused by stepping. Never attempt to run across the ice. A pike pole or ice staff may be used to sound the ice in front of you. You will be able to hear the difference between the hard reverberating sound of firm ice as opposed to the flat "thud" of poor, weak ice. If you do come across ice that sounds weak, turn the staff around and jab it with the spike. If the ice is slushy and breaks away, retreat and try another route.
   b. If the ice starts to crack around you, lay across the staff at chest level to distribute your weight. If you break through the ice you can use the ice staff to help yourself out. Lay the staff horizontally across the opening to pull yourself out or use the spike end to jab the ice and drag yourself out. Once out of the opening and on the ice, roll toward safer ice.
   c. If you fall through the ice without an ice staff you can get out by using the "4 bounces" technique. Bob you body up and down a couple of times in the water and then lunge up onto the ice surface while kicking vigorously.
   d. Once you are out of the water, don't stand up. Roll away to safety.
   e. All rescuers venturing out onto the ice should have a pair of ice awls attached to their rescue suit. These awls will allow you to pull yourself right up onto the ice. Ice awls are simple and inexpensive to make. One of the simplest ways to make them is to mount a pair of bicycle hand grips over a pair of screw drivers or ice picks and tether them together with a three-foot section of bungie cord. The awl tips should be ground to a semi-sharp point. The awls should be stored in some kind of case or have corks put over the tips for safety.

The rescuer must always be prepared for self-rescue!

4. The Rescue Sequence
   a. Victim Self Rescue
      - Be sure to talk to the victim: let the victim know you are here to help. Let the victim know what you are trying to do. Encourage the victim to self rescue if it is possible.
   b. Shore-assisted Rescues
      - Try to help the victim without putting the rescuer in harm's way. The best way to do this is by reaching or throwing something to the victim. When it comes to reaching techniques, there are as many devices and uses as your imagination allows. For firefighters, some of the more obvious come to mind. Pike poles, ropes, fire hoses, and extension ladders to name a few. Depending on the size, an extension ladder can reach anywhere from 24' to 50' staypole ladders. A floatation device should be ties to the end, such as an inner tube, or a spare tire. You should remember that many extension ladders are heavy and that their weight on the ice can cause problems as well. Never tie yourself to a ladder on the ice. If the ladder breaks through, it will take you under with it and act like an anchor.
      - A better option may be an inflated fire hose. A 150' of 2-½" or 3" fire hose inflated to about 100 PSI is a light weight, quickly deployed rescue tool. Two tag lines should be used to help guide the hose to the victim(s). The inflated fire hose also has a great deal of buoyancy; one 50′ section can support 10 or more people.

c. Throwing Rescues

- Using a throw bag is one of the quickest, simplest, and safest ways to perform a rescue. A throw bag usually consists of a draw string bag into which 50′ to 70′ of water rescue line has been stuffed. This rope should be 3/8" in diameter, and have a tensile strength of at least 2,000 lbs. It must also be of a highly visible color, and should float. This small, inexpensive device allows for one rescuer to attempt rescue while staying safely on shore. It can be thrown overhand, underhand, or side arm. The rescuer should become competent in all three throwing techniques. Lines guns can also be very effective up to 600′.

d. Double Line Floating Tether

- Can be set up across a small pond, river, or quarry. Using two throw bags, the lines can be attached to a ring buoy, or other type of floatation device. The line is then moved into position so the victim can grab hold of it and is pulled to shore. For longer distances, a line gun can be used.

B. Boat-Assisted Rescues

1. Inflatable boats, rescue sleds, and small flat-bottom boats can be a great asset in performing a direct contact rescue with the victim. One, two, or three rescuers can easily slide the different rescue devices over the ice to the victim. If the ice begins to break, the rescuers simply jump into the boat and row, paddle, or push the boat to the victim. A safety line is always connected between the boat and shore.
2. When approaching the victim with the boat, slide the transom to the edge of the hole. At this point, the rescuers can enter the boat and pull the victim aboard. Always utilize the transom as the point of entry for the victim, as this provides for the maximum stability.
3. Once the victim is on board, the rescuers can either get out and slide the boat back to shore or signal and have safety back-ups pull you back to shore using the safety line.
4. Airboats and Hovercrafts are being developed and utilized to perform water, river, and ice rescues. Do not forget to use proper safety precautions and follow the rescue sequence when incorporating these devices. Know the equipment and what the limitations are for each. This will not replace proven principals in conducting a safe ice rescue.

C. GO rescue
   1. Conditions may make it necessary to send a rescuer out to the victim. This will only be considered when proper equipment is available to protect the rescuer from the ice cold water, when ice awls or ice staff are available, when a PFD is worn, and a safety line is attached. This does not mean that the rescuer should walk with reckless abandon towards the victim. Use the proper procedures for traveling on the ice as found in the self-rescue section. A dry suit, personal flotation device, and a safety line are definite requirements for this technique.
   2. There is a very simple rope system that can be used to quickly tether the victim to a rescue rope and bring both the rescuer and victim back to shore. The rescuer is secured to the rope with an aluminum locking carabiner, and *a figure 8 on a bight* knot hooked into the rescuer's chest harness. Approximately 3-4' from the first knot between the rescuer and the shore, secure a large carabiner with a *figure 8 follow through* knot. This carabiner should be a non-locking aluminum-type that is large enough to be manipulated with the gloved hand of a rescue suit.
   3. Attempt to reach the victim by walking out on the ice as described in Section VI-3, *Moving Across Ice -Self Rescue*. If the ice begins to weaken or crack around you, lie down and roll toward the victim holding the rope over your head. By holding the carabiner and rope over your head, you will avoid becoming entangled in the rope as you roll across the ice.
   4. When approaching the victim, you must approach from the side. This is important for two reasons. First, by approaching from the side, it will be more difficult for a panicky victim to grab you and possibly pull you under water. Second, if you approach the victim from the front, your own additional weight may cause the ice sheet onto which the victim is holding to break away and you may lose the victim under water. Because of both of these reasons, you may want to consider bringing some sort of floatation device such as a ring buoy with you. This can give the victim something to hold onto until you can secure him or her to the tethered line.
   5. Once you have reached the side of the victim and, only if it is necessary, carefully enter the water feet first, taking care not to collide into the victim. If you have approached the victim from the right side, you should have the carabiner in your right hand. Position yourself behind the victim and pass the carabiner under the victim’s right arm and secure the carabiner to the rope in front. Just the opposite should be done if approaching from the left side.
   6. Both the victim and rescuer will now be tethered together on the same line. Once the victim is secured, signal the rescue team to start pulling you in. The victim will be pulled out first, assisted by the rescuer. The victim should be handled as gently as possible and placed on an ice board or sled as soon as it is practical. Do not allow the victim to walk to shore.

CAUTION: The long-taught method of utilizing the "human chain" or "leap frog" technique is not a realistic method of getting to the victim. Too many times this technique has resulted in multiple drownings to the rescuers. It is much safer to send a lone rescuer out on the ice in a dry suit, personal floatation device, and a safety line attached, than to send a group of people ill-prepared for the cold water and relying on each other as a safety line.

7. Surfboards, paddleboards, boogieboards
   a. These are being recognized as quick, efficient rescue devices in river, water, and ice rescue operations. There are also many commercially made "Ice Rescue Boards" available. Use proper safety precautions and follow the rescue sequence when incorporating these devices.
   b. Know each piece of equipment, how it is used, and its limitations. Marker buoys and anchors can also be used in search and recovery operations to mark where the victim was last seen and to mark search patterns.

D. Rescue Review
   1. When attempting an ice rescue, the rescuer must follow the guidelines established by his or her department as well as common sense. Use the information you have received to effect a safe and successful rescue.
      a. Evaluate victim's condition.
      b. Evaluate ice conditions.
      c. Follow rescue sequence in choosing proper technique and pre-plan.
      d. Always wear a personal floatation device (life jacket).
      e. Always be connected to shore with a safety line when travelling on the ice.