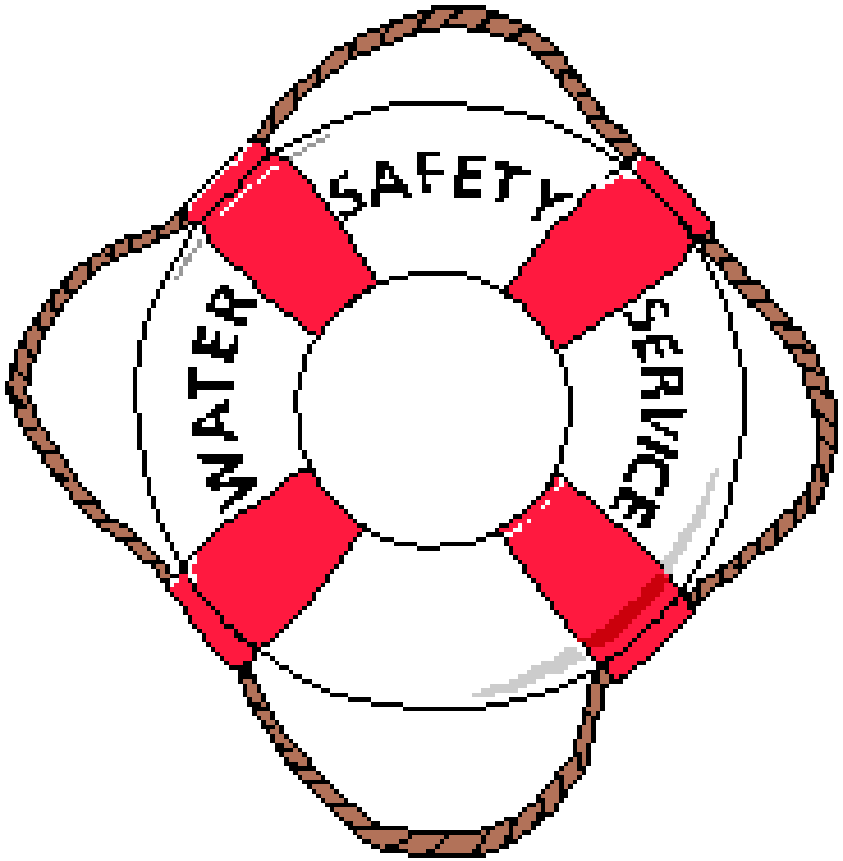
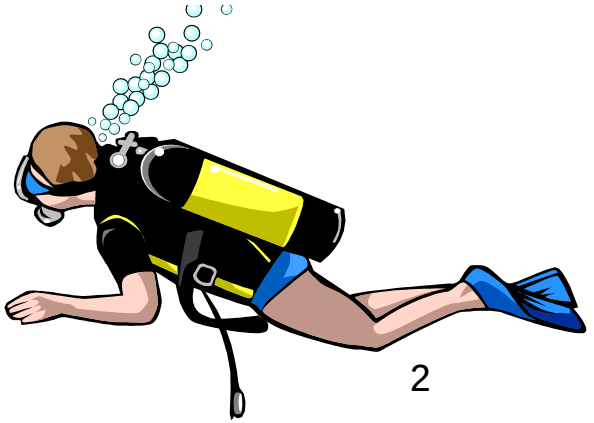
WATER RESCUE



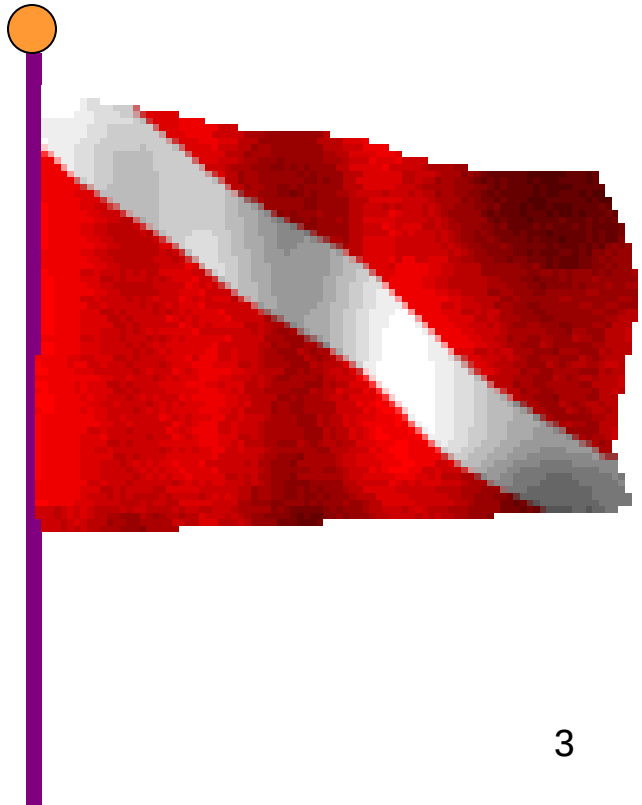
Water Rescue

- Need for water rescue awareness
  - Most FD's have some body of water
  - Potential for flooding
  - Many water incidents require resources beyond capability of FD
    - Operations and technician trained
    - Proper PPE
    - Technical rescue equipment



NFPA 1670

- Water related disciplines
  - Dive
  - Ice
  - Surf
  - Swift water



Hazards Associated with Water Rescue

- Firefighter (human) nature
  - Action oriented
    - Need to do something now
  - Make rescue attempts without proper training or equipment

Hazards Associated with Water Rescue (con't)

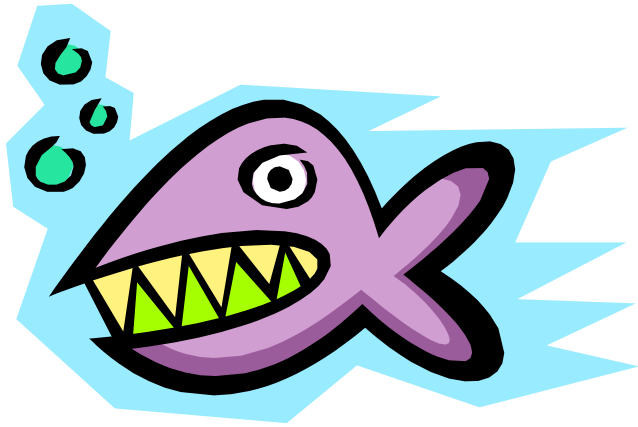
- An average of 7 public safety rescuers die each year in water related incidents.
  - **WHY?**
    - Sound judgment, good reasoning, and disciplined plan of action was not followed.
    - The temptation to enter an uncertain environment was too great.
    - Lack of training and expertise in water related emergencies.

Environmental Hazards

- Extreme temperatures
  - Cold
    - Hypothermia, frostbite, equipment malfunctions
      - » Effects ability to think clearly & fine motor skills
  - Heat
    - Hyperthermia, overheating in PPE
    - Underwater survival time lost in hot temperatures
      - » Exhaustion, dehydration

Environmental Hazards (con't)

- Weather
  - Rain, snow, high winds, fog
    - Accelerates hypothermia
    - In still water, body heat is lost 25 times greater than in air at the same temperature
- Aquatic environment
  - Animal life, fish, insects
  - Plant life, seaweed
  - Biohazards, bacterial, viral

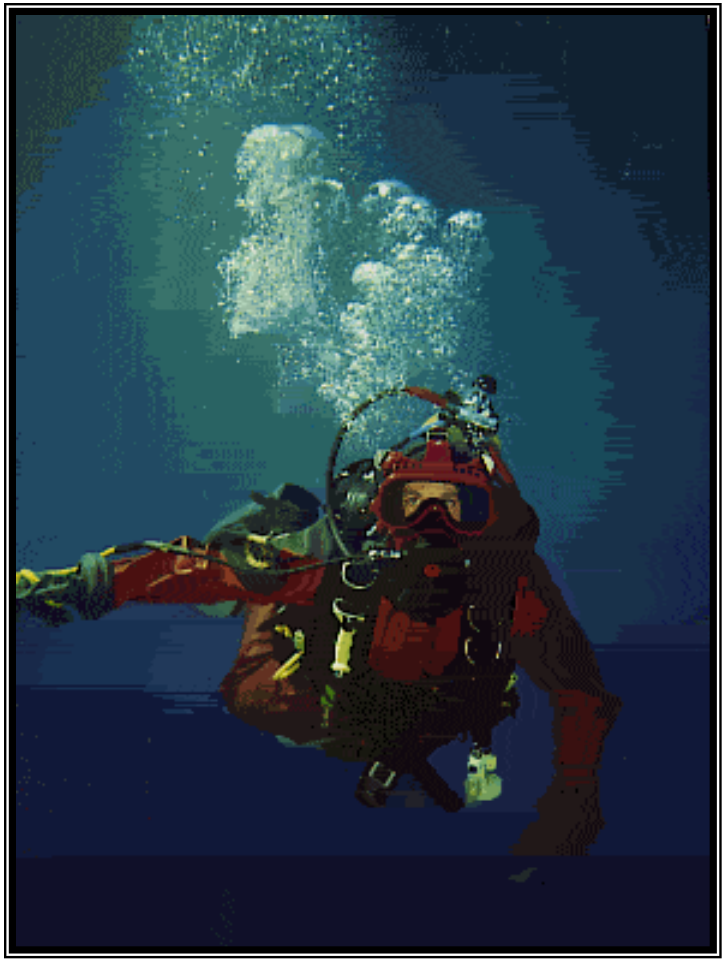


General hazards

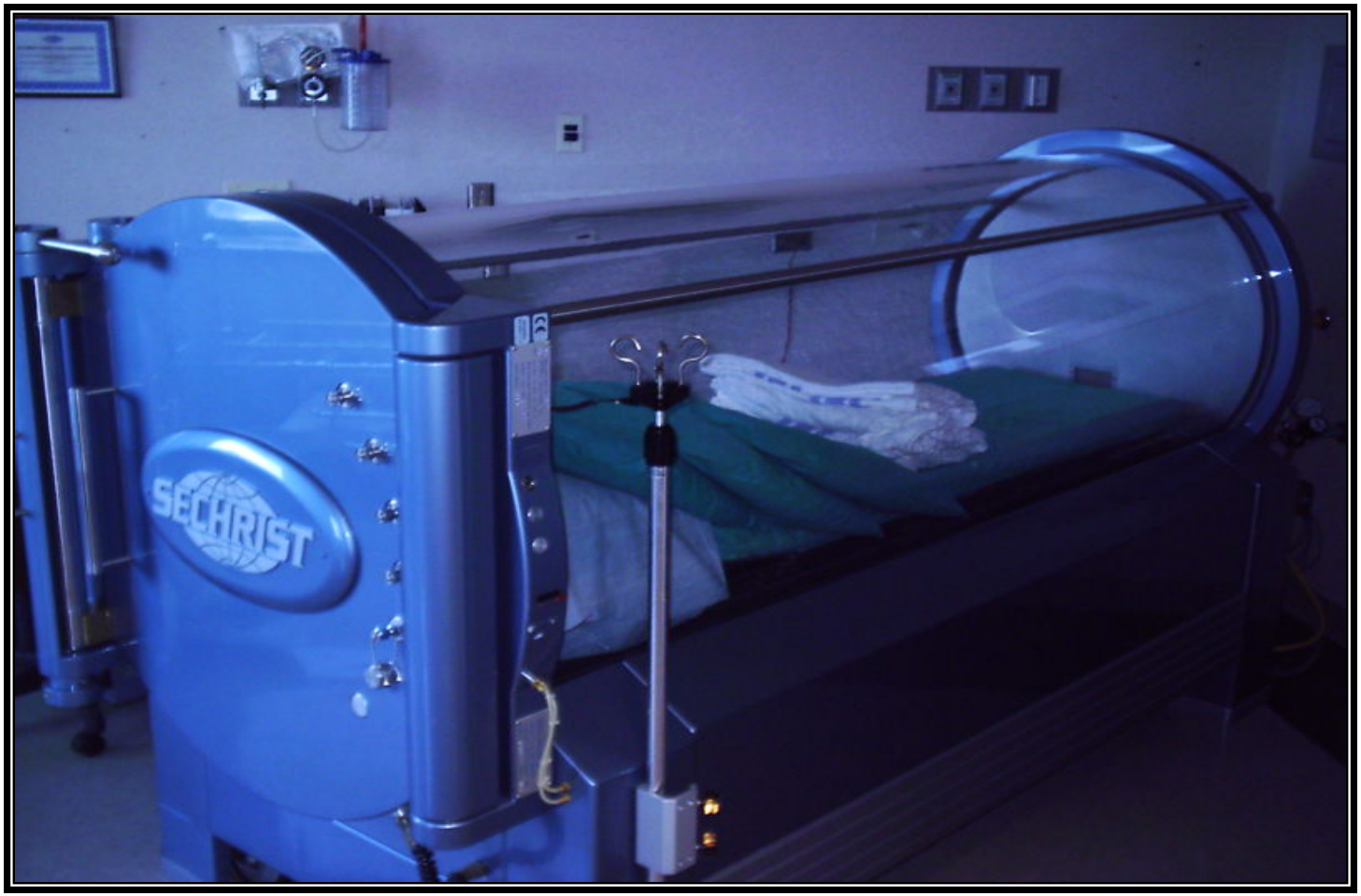
- Utilities
  - Electric, gas, sanitary, communications
  - Hazardous materials
  - Personal hazards – water's edge
    - Tripping, falling
    - Steep, slippery terrain
    - Drop-offs
    - Holes
    - Hidden obstructions
      - » Cause injury, entanglement

Dive Operation Hazards

- Barotraumas
  - Decompression sickness
  - Nitrogen narcosis
  - Oxygen toxicity
  - Embolism
- Drowning
  - Fatigue
  - Lost diver
  - Loss of air
  - Anxiety reactions



Dive Operation Hazards

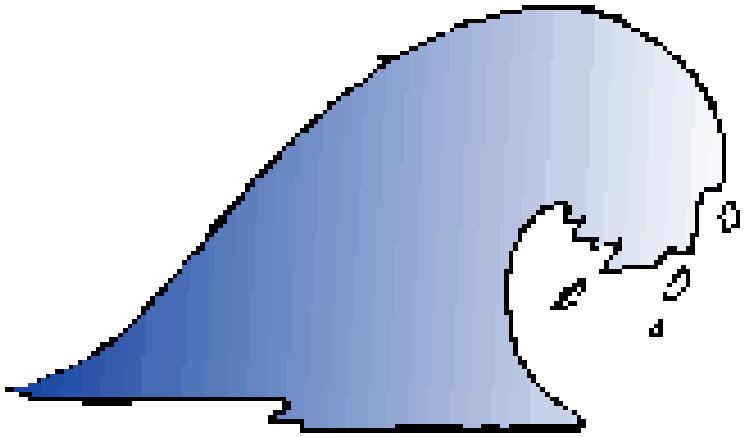


Ice Operation Hazards

- Cold injuries
  - Frostbite
  - Hypothermia
- Thin ice
  - Sudden immersion reflex
  - Entrapment under ice

Surf Operation Hazards

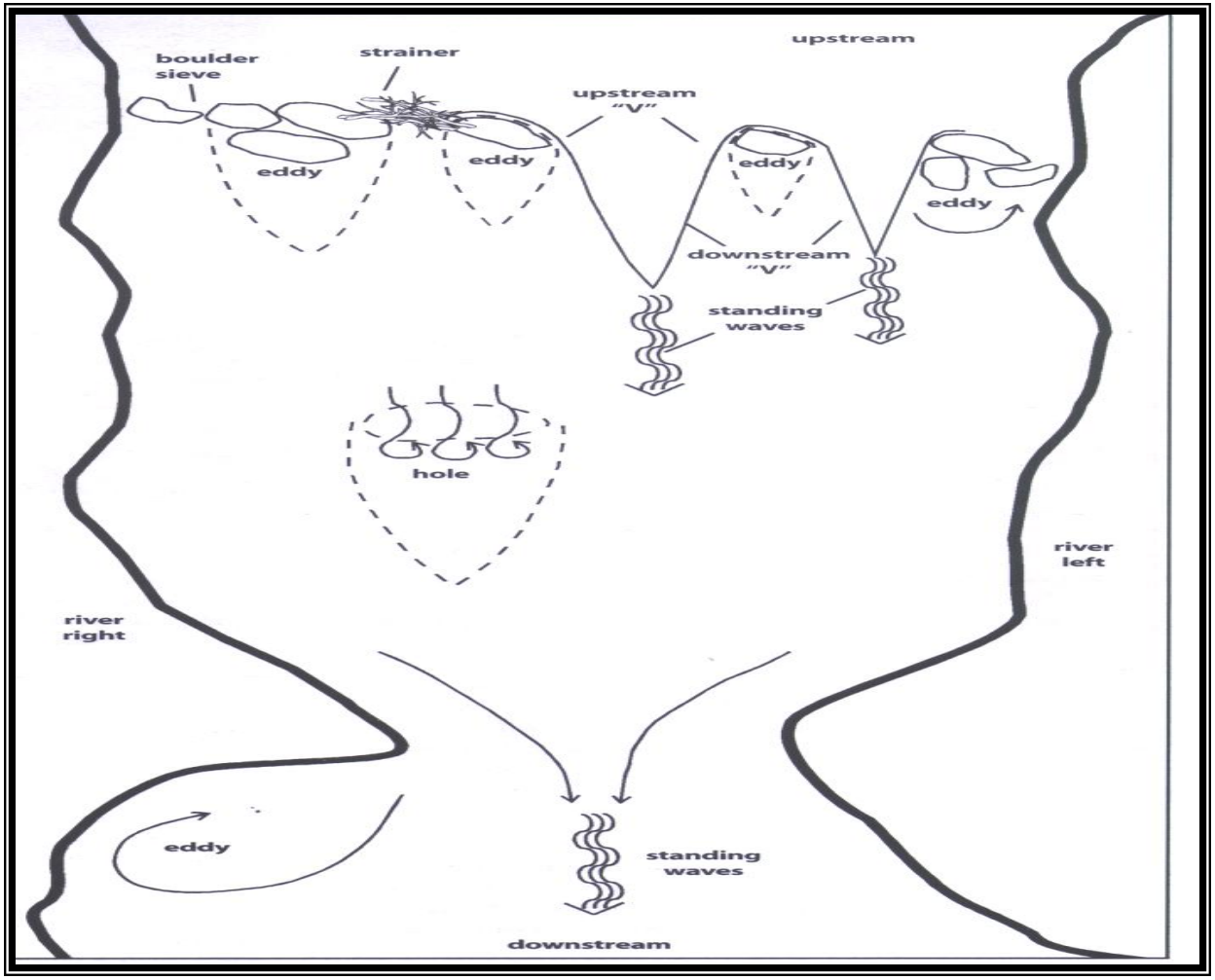
- Breaking waves
  - Generate extreme force
- Undertows, tides, current



Swift Water Operation Hazards

- Awesome, relentless power of moving water
- Strainers & debris
  - Stationary objects
- Holes
- Obstructions
  - Above the water surface
  - Below the water surface
    - Upstream “V”
    - Downstream “V”

Swift Water Operation Hazards



Swift Water Operation Hazards

Swift Water Operation Hazards (con't)

- Current patterns
  - Laminar flow
  - Helical flow
    - Upwelling
  - Eddies
    - Back current
- Heavy downpours
  - Make quiet streams swiftwater

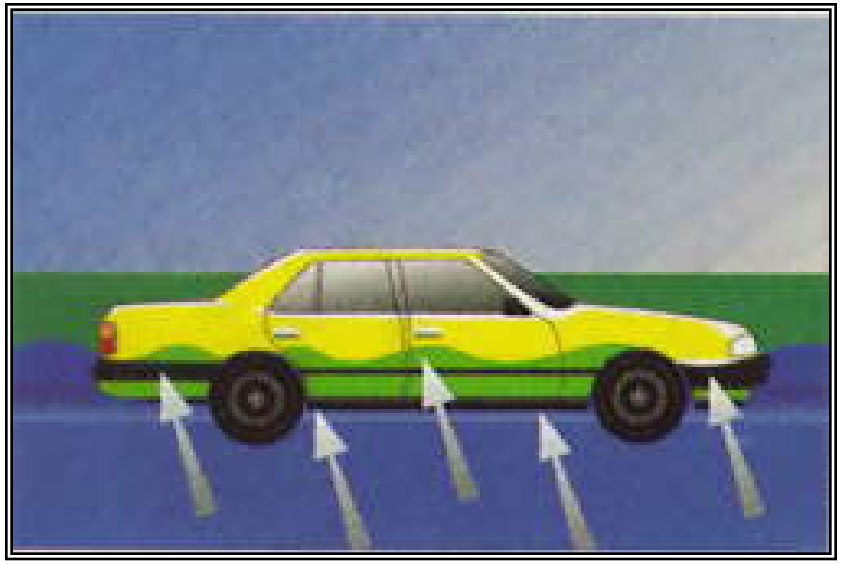
Swift Water Operation Hazards (con’t)

Water weight 62.4 lbs per cubic foot and typically flows downstream at 6 to 12 miles per hour.

Swift Water Operation Hazards (con't)

When a vehicle stalls in the water the water's momentum is transferred to the car. For each foot the water rises, 500 lbs. of lateral force is applied to the automobile.

Swift Water Operation Hazards (con’t)



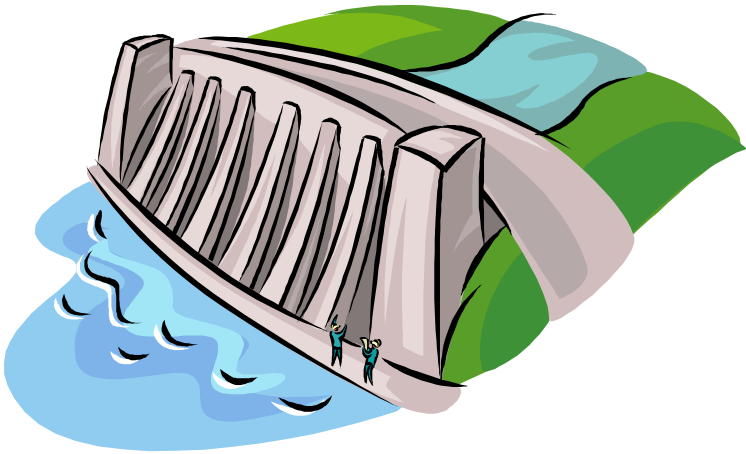
But the biggest factor is buoyancy. For each foot the water rises up the side of the car, the car displaces 1500 lbs. of water. In effect, the automobile weighs 1500 lbs. less for each foot the water rises.

Swift Water Operation Hazards (con’t)

Two Feet of Water Will Carry Away Most Automobiles!!!

Low Head Dam Hazards

- The killing / drowning machine
  - Boil line
    - Point where water breaks in two directions
  - Illusion
    - Cannot be perceived from upstream
    - Do not look dangerous
  - Hydraulic
    - Vertical whirlpool
  - Aeration in the hydraulic
    - Causes cavitation to boat props



Low Head Dam Hazards

Low Head Dam Hazards

Water Rescue PPE

- Firefighting helmets, boots, and turnout gear are ***NOT*** appropriate for water rescue
- Proper PPE includes the following
  - Wet suits / dry suits / exposure suits
  - Thermal protection
  - PFD's (whistle & knife & strobe light or light stick)
    - Worn by all personnel
      - » In or near water
      - » On a boat

glines / lifelines

elmet, gloves

Cold Water Near Drowning

- Age of victim
- Temperature of water
  - Below 70^{o}F
  - Patient could be below thermocline
- Length of submersion
  - Under 90 minutes
    - Still rescue mode
  - Quality BLS & ALS treatment

Size-up

- Scope, magnitude, type of water rescue incident
  - Environmental factors
    - Change in weather conditions
    - Loss of daylight
    - Water levels
    - Current changes

Size-up (con't)

- Assessment of hazards
- Location & number of victims
- Risk / benefit analysis
  - Rescue vs. recovery
- Access to scene

Water Rescue

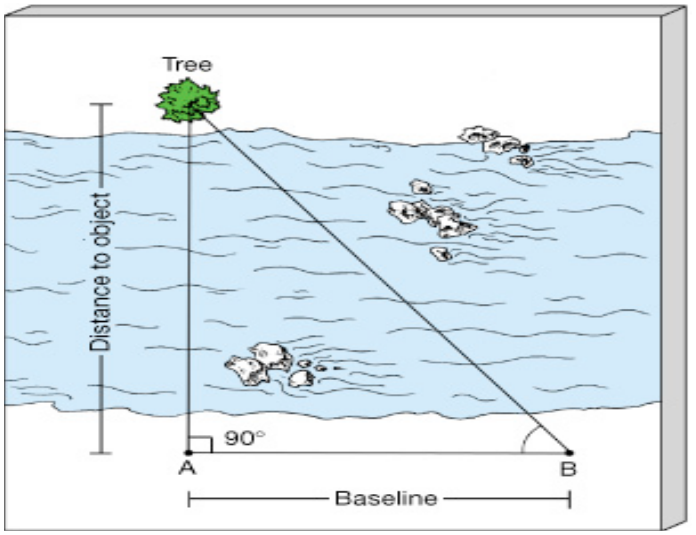
- Awareness Level Personnel May:
  - Establish scene control
  - Establish IC
  - Initiate accountability & safety
  - Evaluate patient condition
    - Can patient assist with rescue?
  - Activate Needed resources

Water Rescue

- Awareness Level Personnel May: (con't)
  - Secure & interview witnesses
    - Keep witnesses at scene
    - Interview witnesses separately
    - Collect witnesses' personal information

Water Rescue

- Awareness Level Personnel May: (con't)
  - Establish last seen point
    - Triangulate with multiple witnesses
    - Use a reference object
    - Hole in ice is great last seen point
      - Don't destroy it

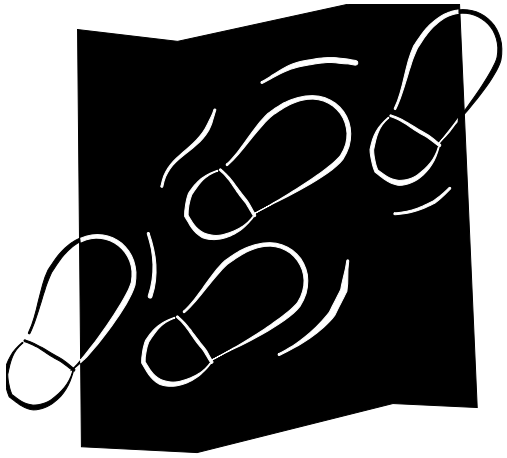


Water Rescue

- Awareness Level Personnel May: (con’t)
  - Identify number of victims
  - Identify age and sex of victim, if possible

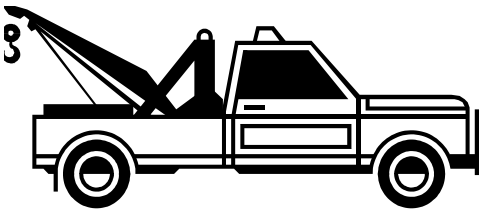
Water Rescue

- Awareness Level Personnel May: (con't)
  - Evaluate physical evidence
    - Notes
    - Clothes
    - Footprints
    - Tire tracks
    - Debris
    - Oil slick
    - Bubbles



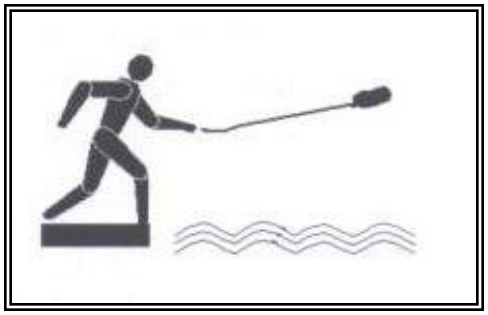
Water Rescue

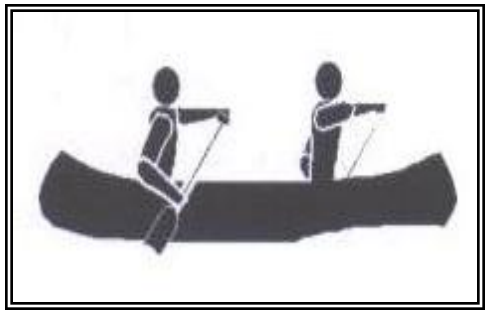
- Beyond the awareness level
  - AHJ must have emergency response plan
    - Operations & technician level personnel
    - Police & evidence technicians
    - Specialized equipment
      - Boats, tow trucks, etc.
    - EMS response
      - Ambulance for patient(s)
      - Ambulance for divers
      - Aeromedical transport



Scene Considerations

- Rehab personnel early
- Operational plan
  - Reach, throw, row, go





Scene Considerations

- Request divers early in an incident
  - Victims at the surface may submerge
  - Keep incident operating in rescue mode

Water Rescue Scenario

- It is a Saturday morning just after shift change, the truck's have been checked and everyone is enjoying a cup of coffee.

Water Rescue Scenario

- The alarm sounds for a person through the ice on a retention pond in your district.

Water Rescue Scenario

- How will you respond?

Water Rescue Summary

- Recognize the need for water search and rescue.
- Describe implementing the assessment phase.
- Identify the resources necessary to conduct safe and effective water rescue operations.
- Identify the emergency response system for water rescue emergencies.

Water Rescue Summary

- Identify the site control and scene management procedures at water rescue incidents.
- Identify the general hazards associated with a water rescue incident.
- Identify the rescue vs. recovery mode when concerned with a cold water near drowning patient.