Confined Space
Lesson One
Victim Management

DOMAIN: COGNITIVE / PSYCHOMOTOR

LEVEL OF LEARNING: APPLICATION

MATERIALS

FIRE ENGINEERING Confined Space Rescue; WILEY Confined Space Entry and Emergency Response; NFPA 1006, Standard for Technical Rescuer Professional Qualifications; NFPA 1670, Standard on Operations and Training for Technical Rescue Incidents; NFPA 1983 Standard on Life Safety Rope and Equipment for Emergency Services; OSHA 29 CFR 1910.146; multimedia projector and laptop computer; access to white board or flipchart; intrinsically flashlights with extra batteries, class 3 harness, prussik cords, rescue eight descender, self contained breathing apparatus with spare cylinders, intrinsically safe radios (throat / ear microphones), intrinsically safe air monitoring equipment, intrinsically safe exhaust fans with trunk hose, supplied air respirator (minimum of 300 feet of airline), compressor/manifold for same as above, AC hot-stick, 100 feet 7mm prussik cord, Class II and Class III harnesses, 100 feet 2 in. tubular, webbing, 100 feet 1 in. tubular webbing, Miller board / SKED stretcher, wristlets, tripod (minimum of 8 feet tall), fall arrest device, 6-1 in. x 4 ft. steel pickets, 8 lb. sledgehammer, lock out tags, locks for lock out tags, whistles / fluorocarbon horns, PPV blower, PAL/PASS devices, 2-6 in. double pulleys, 2-6 in. single pulleys, 2-1/2 in. gibbs ascenders, 1-Kootenay carriage, 12-steel carabineers, 600 ft. x 1/2 in. static kernmantle rope, 2-rescue eight descenders, 1-14 in. brake bar rack, belay plate, 2-14' straight ladders, rescue randy or hose dummy, fire extinguisher, and 1 roll "caution" tape.

NFPA 1006, 2008edition JPRs

7.1.2 Prepare for entry into a confined space
7.1.3 Enter a confined space
7.1.4 Package the victim for removal from a confined space
7.1.5 Remove all entrants from a confined space

Junior Member Statement:

Junior Member training activities should be supervised by qualified instructors to assure that the cognitive and psychomotor skills are completed in a safe and non-evasive manner. While it is critical that instructors be constantly aware of the capabilities of all students both mentally and physically to complete certain tasks safely and successfully, the instructor should take every opportunity to discuss with departmental leaders and students the maturity and job awareness each participant has for the hazards associated with fire and rescue training.

TERMINAL OBJECTIVE

The Technical Rescuer shall correctly demonstrate the various procedures for accessing, stabilizing, packaging, and removing a patient to a safe area from a confined space environment.

ENABLING OBJECTIVES

1. The Technical Rescuer shall correctly identify in writing, rescue considerations for each phase of the confined space rescue incident.

2. The Technical Rescuer when given the appropriate equipment, working as a member of a team, and following local medical protocols, shall correctly demonstrate the considerations and goals regarding assessing, stabilizing, and packaging a patient for safe removal from a confined space rescue incident.

3. The Technical Rescuer when given the appropriate equipment and working as a member of a team shall correctly demonstrate the procedures for stabilizing a confined space accident scene.

4. The Technical Rescuer when given the appropriate equipment and working as a member of a team shall correctly demonstrate safe and efficient rescue methods for preparing a PRCS for entry, making the entry, locating a patient, packaging a patient, and removing the patient from various confined space incidents.

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MOTIVATION

With the implementation of 29 CFR 1910.146, emergency service personnel should begin to assess their needs, pre-plan for incidents, train for proper confined space entry and rescue, and procure the specialized equipment needed to safely perform the confined space rescues within their jurisdictions. Communication between the local industries and the emergency services will be vital for compliance to the standard

Once rescuers have gained access to the victim and all medical assessments have been made, a plan must be devised for packaging and safely removing the victim from the environment that will minimize any aggravation of the victim's medical condition. Considerations should include: is the operation a rescue or a recovery? Will advanced life support be necessary before the victim can be moved or can it be delayed until the victim reaches the surface? Will the patient packaging device available to the AHJ fit in the confined space openings? Will a simple method, such as a passing the victim through the opening, work to evacuate the victim, or will a more complex lifting system be required? Regardless of the situation these questions cannot be answered without a definite plan. The plan should include input from the medical sector, interior operation crew and the Operations Officer. This plan should begin as soon as the interior operations begin, don't wait until you have the victim totally uncovered, the victim's injuries may require rapid evacuation. Develop at least two plans for evacuation, and begin implementing some of the elements as soon as possible. Remember plans can always be altered.

PRESENTATION

ENABLING OBJECTIVE #1

The Technical Rescuer shall correctly identify in writing, rescue considerations for each phase of the confined space rescue incident.

1. List and discuss the rescue considerations for Phase 1 of a confined space emergency. Phase 1 is Assessment.
   a) Primary Assessment includes information gathering, decision-making, and scene control.
   b) Secondary Assessment includes hazard assessment, identifying current and future resources, assessment of elevation changes, and determining the mode of operation.
   c) Command should consider of the proper equipment is on the scene to complete the operation.

2. List and discuss the rescue considerations for Phase 2 of a confined space emergency. Phase 2 is Pre-entry Operations.
   a) Develop the incident action plan (IAP).
   b) Gather resources such as personnel and equipment.
   c) Atmospheric monitoring
   d) Ventilation
   e) Preparing the scene
   f) Establish a communication network.
   g) Create the components of the rescue team.

4. List and discuss the rescue considerations for Phase3 of a confined space emergency. Phase 3 is Entry and Rescue Operations.
   a) Personnel Accountability
   b) Entry
   c) Search
   d) Victim Treatment/Stabilization
   e) Victim Removal

4. List and discuss the rescue considerations for Phase 4 of a confined space emergency. Phase 4is Termination.
    a) Personnel accountability.
    b) Identify and collect equipment.
    c) Decon of personnel, tools, and equipment; if needed.
    d) Is there a decision to abandon equipment due to present risk factors?
    e) Is an accident investigation necessary?
    f) Secure the scene and/or release control of the operation.
    g) Provide critical incident stress debriefing (CISD).

Reference: IFSTA Fire Service Search and Rescue Manual 7th edition, pages 173 through 183

Reference: FIRE ENGINEERING Confined Space Rescue, pages 201-209.

PRESENTATION

ENABLING OBJECTIVE #2

The Technical Rescuer when given the appropriate equipment, working as a member of a team, and following local medical protocols, shall correctly discuss the considerations and goals regarding assessing, stabilizing, and packaging a patient for safe removal from a confined space rescue incident.

1. Discuss considerations for spinal immobilization.
    a) Spinal injuries can occur when a patient sustains any sort of impact to the body. Even short falls can cause severe spinal injuries.
    b) Paralyzing or fatal damage to the spinal cord could result if a patient(s) with a spinal injury is moved without the proper precautions.
    c) Spinal immobilization must be established and maintained throughout all patient handling.
    d) Spinal immobilization requires specialized equipment and techniques; this equipment is commonly used by EMS personnel.
    e) Protection of Patients Spine is necessary from the time the rescuer comes in contact with the patient until the patient is turned over to EMS.

2. Discuss different methods for providing patient care in a confined space atmosphere.
   a. Discuss when to treat and when not to treat.
   b. Discuss hazards to consider.
   c. Discuss EMS Protocols of AHJ.
   d. Discuss level of care to provide (BLS vs. ALS).

3. Discuss and demonstrate using harnesses in victim removal.
   a) Considerations and limitations of a Class I harness.
   b) Considerations and limitations of a Class II harness.
   c) Considerations and limitations of a Class III harness.

4. Discuss and demonstrate using improvised harnesses in rescue operations.
   a) Swiss seat or hasty harness.
   b) Improvised seat harness.
   c) Improvised chest harness.
   d) Improvised full body harness.
   e) The rescue knot.

5. Discuss and demonstrate using the long backboard for removing victims in confined space emergencies.
   a) Considerations for backboard designs.
   b) Maintaining cervical spinal stabilization.
   c) Using diamond lashed webbing to secure the patient to the backboard.
   d) Using straps to secure the patient to the backboard.
   e) Considerations for packaging with the backboard.

6. Discuss and demonstrate using short immobilization devices for removing victims in confined space emergencies.
   a) Kendrick Extrication Device (KED).
   b) Oregon Spine Splint II (OSS).
   c) LSP Halfback.

7. Discuss and demonstrate using the SKED litter when removing victims in confined space emergencies.
   a) Spinal immobilization concerns with the SKED.
   b) Patient packaging with the SKED.

c) Rigging the SKED stretcher for transfer in the horizontal orientation.
d) Standard SKED rigging for transfer in the vertical orientation.
e) Alternative SKED rigging for transfer in the vertical orientation.
f) Other considerations for vertical SKED rigging.

8. Discuss and demonstrate using the OSS when removing victims in confined space emergencies.
   a) Developed to be used with the SKED stretcher.
   b) Similar to the KED and LSP Halfback.
   c) Used for spinal immobilization.
   d) Can also be used when a full-body harness is placed around both the OSS and the patient.

9. Discuss and demonstrate using the LSP Halfback when removing victims in confined space emergencies.
   a) Similar to both OSS and KED.
   b) Has six lifting handles for patient transfer when used as a short immobilizer.
   c) A lifting bridle is provided by the manufacturer and can be attached to D rings built into the Halfback device.
   d) Training should be conducted before attempting to use this device in a rescue operation.

10. Discuss and demonstrate using the basket litter when removing victims in confined space emergencies.
   a) Consideration for basket litter design and considerations.
   b) Securing the patient to the basket litter.
   c) Rigging the basket litter for patient transfer in the horizontal orientation.
   d) Rigging the basket litter for patient transfer in the vertical orientation.

Reference: WILEY Confined Space Entry and Emergency Response, pages 413-458.

11. Discuss the similarities and differences between packaging a victim for a confined space rescue and other types of rescue.

PRESENTATION

ENABLING OBJECTIVE #3

The Technical Rescuer when given the appropriate equipment and working as a member of a team shall correctly demonstrate the procedures for stabilizing a confined space accident scene.

1. Discuss with the candidates the principles of confined space rescue.

2. Using equipment and data available, discuss how rescuers should make an informed decision as to whether they are involved in a rescue or a recovery operation.
   a) Do not trade lives.
   b) Always test the atmosphere prior to entering a confined space.
   c) Never remove your face piece and try to resuscitate the victim while in the confined space.
   d) Never remove your retrieval line and attach it to the victim.
   e) Always back up your main lifelines with a back-up line (strict adherence to safety rules requires discipline).
   f) Safety all lifelines (tape or seize all knots).
   g) All those entering the space must wear equipment that will protect them from the worst possible anticipated hazard (suitable protective equipment varies with the work to be performed and the type of atmosphere present).
   h) An untested atmosphere must be assumed to contain all hazards.
   i) You must be sure with absolute certain that all electrical and mechanical components are locked out (when in doubt, lock it out).
   j) All ropes should be of lifeline quality as set forth in NFPA 1983 "Standard on Life Safety Rope, Harnesses and Hardware" (2006 edition).
   k) Train in context - treat each training site as if a hazard truly does exist, (test the atmosphere, wear full protective equipment and positive-pressure SCBA).
   l) Training in confined spaces provides emergency service personnel an opportunity to realize their personal limitations (e.g., phobias).

m) Emergency service personnel should recognize the need for the implementation of an Incident Command System.

3. Point out with the candidates that three ropes of lifeline quality should be used whenever possible.
   a) One rope to lower the rescuer (using a descent device).
   b) One rope to raise the victim (using a mechanical advantage system).
   c) One rope to raise the rescuer (the same mechanical advantage system could be used).
   d) If only one person is entering the space to effect the rescue, then a second rescuer should be rigged and ready (with SCBA on and low pressure hose disconnected) to enter the space to assist as necessary.

4. Describe how the rescuer has a number of choices available for rescuing the victim, given particular situations.

   a) The life-basket (bowline-on-a-bight with a chest-hitch, safe-body tie, the rescue knot).
   b) Full body harness or other commercially available device.
   c) When confronted with a confined space rescue with a narrow opening and shaft, it may be desirable to enter the space inverted (head down position with the SCBA attached to a line suspended below the rescuer) - the rescuer would only have enough room to place small slings around the victim's wrists that could be used to raise the victim.
   d) Another option given a narrow space and a small victim is to apply a sling under the buttocks and groin and around the waist (referred to as a "diaper").

5. List the different devices that might be used to affect a confined space rescue.
   a) Stokes basket.
   b) Miller board - 2" thick piece of high impact plastic that you can lash the victim to for narrow openings.

c) Sked stretcher - thin piece of plastic that "rolls" around the patient.
d) Reeves Sleeve - canvas type stretcher with wooden slats.
e) XP-One, Halfback, KED - vests that act as a harness that can be used to raise or lower a victim.

PRESENTATION

ENABLING OBJECTIVE #4

The Technical Rescuer when given the appropriate equipment and working as a member of a team shall correctly demonstrate safe and efficient rescue methods for preparing a PRCS for entry, making the entry, locating a patient, packaging a patient, and removing the patient from various confined space incidents.

1. Have the candidates, working as a member of a team; demonstrate rigging and entry procedures for performing a congested vertical entry.
   a) Work as a member of a team to perform a confined space entry operation safely and efficiently.
   b) Function in any role required to conduct entry operations for a vertical-type confined space, including a Hazard Control Unit, Air Supply Unit, Rigging Unit, Entry Unit, Extrication Unit, and Support Personnel Unit.
   c) Identify hazards that may be encountered in confined space entry operations, how they can be assessed or monitored, and how they can be abated or controlled.
   d) Select and rig retrieval equipment and other equipment that may be required for a rescue from a vertical-type space.
   e) Perform an appropriate safety check on all equipment used for vertical entry or extrication and identify unsafe conditions before the equipment is placed into operation.

2. Have the candidates, working as a member of a team; demonstrate rigging and entry procedures for performing a non-congested vertical entry.

a) Work as a member of a team to perform a confined space entry operation safely and efficiently.
b) Function in any role required to conduct entry operations for a vertical-type confined space, including a Hazard Control Unit, Air Supply Unit, Rigging Unit, Entry Unit, Extrication Unit, and Support Personnel Unit.
c) Identify hazards that may be encountered in confined space entry operations, how they can be assessed or monitored, and how they can be abated or controlled.
d) Select and rig retrieval equipment and other equipment that may be required for a rescue from a vertical-type space.
e) Perform an appropriate safety check on all equipment used for vertical entry or extrication and identify unsafe conditions before the equipment is placed into operation.

3. Have the candidates, working as a member of a team; demonstrate rigging and entry procedures for performing a congested horizontal entry.
   a) Work as a member of a team to perform a confined space entry operation safely and efficiently.
   b) Function in any role required to conduct entry operations for a vertical-type confined space, including a Hazard Control Unit, Air Supply Unit, Rigging Unit, Entry Unit, Extrication Unit, and Support Personnel Unit.
   c) Identify hazards that may be encountered in confined space entry operations, how they can be assessed or monitored, and how they can be abated or controlled.
   d) Select and rig retrieval equipment and other equipment that may be required for a rescue from a horizontal-type space.
   e) Perform an appropriate safety check on all equipment used for horizontal entry or extrication and identify unsafe conditions before the equipment is placed into operation.

4. Have the candidates, working as a member of a team; demonstrate rigging and entry procedures for performing a non-congested horizontal entry.

a) Work as a member of a team to perform a confined space entry operation safely and efficiently.
b) Function in any role required to conduct entry operations for a vertical-type confined space, including a Hazard Control Unit, Air Supply Unit, Rigging Unit, Entry Unit, Extrication Unit, and Support Personnel Unit.
c) Identify hazards that may be encountered in confined space entry operations, how they can be assessed or monitored, and how they can be abated or controlled.
d) Select and rig retrieval equipment and other equipment that may be required for a rescue from a horizontal-type space.
e) Perform an appropriate safety check on all equipment used for horizontal entry or extrication and identify unsafe conditions before the equipment is placed into operation.

5. Have the candidates, working as a member of a team; demonstrate rigging and entry procedures for performing an entry into a congested confined space that involves both vertical and horizontal entries.
   a) Work as a member of a team to perform a confined space entry operation safely and efficiently.
   b) Function in any role required to conduct entry operations for a vertical-type confined space, including a Hazard Control Unit, Air Supply Unit, Rigging Unit, Entry Unit, Extrication Unit, and Support Personnel Unit.
   c) Identify hazards that may be encountered in confined space entry operations, how they can be assessed or monitored, and how they can be abated or controlled.
   d) Select and rig retrieval equipment and other equipment that may be required for a rescue from a space requiring a change of direction.
   e) Perform an appropriate safety check on all equipment used for horizontal entry or extrication and identify unsafe conditions before the equipment is placed into operation.

6. Have the candidates, working as a member of a team; demonstrate rigging and entry procedures for

performing an entry into a non-congested confined space that involves both vertical and horizontal entries.

a) Work as a member of a team to perform a confined space entry operation safely and efficiently.
b) Function in any role required to conduct entry operations for a vertical-type confined space, including a Hazard Control Unit, Air Supply Unit, Rigging Unit, Entry Unit, Extrication Unit, and Support Personnel Unit.
c) Identify hazards that may be encountered in confined space entry operations, how they can be assessed or monitored, and how they can be abated or controlled.
d) Select and rig retrieval equipment and other equipment that may be required for a rescue from a space requiring a change of direction.
e) Perform an appropriate safety check on all equipment used for horizontal entry or extrication and identify unsafe conditions before the equipment is placed into operation.

APPLICATION

Divide the class into working groups and have them perform the following:

Given the appropriate equipment and working as a member of a team the Technical Rescuer shall demonstrate establishing an appropriate IMS system, perform a size up, develop an action plan and initiate appropriate steps to neutralize all existing and potential hazards, gain access to, stabilize and extricate a victim from the following confined space rescue accident scenarios.

Objective - The Technical Rescuer when given the appropriate equipment, working as a member of a team, and following local medical protocols shall correctly demonstrate making entry to a confined space and removing the a simulated victim to a safe area.

Scenario 1: Remove a victim from a congested horizontal confined space.

Scenario 2: Remove a victim from a non-congested horizontal confined space.

Scenario 3: Remove a victim from a congested vertical confined space.

Scenario 4: Remove a victim from a non-congested vertical confined space.

Scenario 5: Remove a victim from a congested confined space that involves both vertical and horizontal entries.

Scenario 6: Remove a victim from a non-congested confined space that involves both vertical and horizontal entries.

Advise the candidates they must address the following points while performing the above scenarios.

1. Scene size-up.
2. Establish command.
3. Assess the scene and the confined space.
4. Establish hazard zones.
5. Appoint ICS positions.
6. Establish and identify access point.
7. Provide appropriate ventilation procedures.
8. Provide continuous air monitoring.
9. Provide feasible retrieval systems and the necessary rigging.
10. Appoint Safety Officer and he/she should monitor all tactical operations to ensure all implemented procedures are safe.
11. The Safety Officer and Rigging Unit Leader should inspect all rigging before placing a life load on the system.
12. Provide protection for the victim and all interior rescuers.

Rotate the teams through all of the scenarios.

Suggest a maximum of a 1 to 10 instructor to student ration when in the field environment. Instructors should make sure all stations are safe, sufficient equipment is available to perform all task, all equipment is in safe working order and all rescuers are wearing appropriate PPE, including respiratory protection, for the task. Instructor should use a rescue dummy for the victim.

SUMMARY

In areas where emergency service personnel are subject to state occupational safety and health regulations, an Incident Commander at the scene of an emergency may be viewed the same as any other employer. If the Incident Commander fails to make the work place safe for the emergency service personnel, they may be subject to the same penalties of any other employer who allows their employees to work in an unsafe environment.

This lesson plans gives the candidates the opportunity to put into practice the elements and techniques for gaining access, ventilating, monitoring and removing patient(s) from various confined spaces. The Technical Rescuers are required to establish a command system, set up control zones, appropriate ICS positions, and implement tactics for various confined space incidents.