TR: Confined Space Lesson One Rescue Operations for the Confined Space Rescuer

DOMAIN: COGNITIVE

LEVEL OF LEARNING: COMPREHENSION / APPLICATION

MATERIALS

IFSTA 7th Edition Fire Service Search and Rescue; IFSTA 6th Edition Essentials of Firefighting, WILEY Confined Space Entry and Emergency Response manual; Fire Engineering Confined Space Rescue; MOSBY Confined Space and Structural Rope Rescue manual; NC OSHA A Guide to Safety in Confined Spaces; NFPA 1006, Standard for Technical Rescuer Professional Qualifications; NFPA 1670, Standard on Operations and Training for Technical Rescue Incidents; NFPA 1561, Standard on Emergency Services Incident Management System; OSHA Title 29 CFR 1910.146-Confined Space, 29 CFR 1910.147- Lock out Tag Out, 29 CFR 1910.120- Hazardous Waste Operations and Emergency Response and 29 CFR 1910.134 - Respiratory Protection; multimedia projector and laptop computer; white board or flipchart; assorted marker pens.

NFPA 1006, 2013 Edition JPRs

7.1.1 Conduct monitoring of the incident
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
7.2.1 Preplan a confined space incident
7.2.2 Assess the incident

7.2.3 Control hazards

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 identify in writing the necessary elements of pre-incident planning, a scene size-up, incident action plan, hazard assessment procedures, and command responsibilities associated with confined space rescue incidents.

ENABLING OBJECTIVES

1. The Technical Rescuer shall correctly describe in writing the necessary elements of successful pre-planning as they relate to confined space incidents.

2. The Technical Rescuer shall correctly describe in writing the factors that rescuers must know to effectively perform a scene size-up involving confined space rescue incidents.

3. The Technical Rescuer shall correctly describe in writing the necessary elements for implementing an on-scene operational plan or incident action plan (IAP) associated with incidents involving confined space rescue operations.

4. The Technical Rescuer shall correctly describe in writing the types of confined spaces and associated hazards for rescuers that need to be included in a hazard assessment for incidents involving confined space rescue operations.

5. The Technical Rescuer shall correctly describe in writing the responsibilities of Command and the primary functions of Command associated with incidents involving confined space rescue operations.

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

7. The Technical Rescuer shall correctly identify in writing the components of an effective equipment assessment for confined space rescue incidents.

8. The Technical Rescuer shall correctly identify in writing the different types of loads and how they interact with the equipment used to lift rescuers, victims, and other equipment.

9. The Technical Rescuer shall correctly identify in writing describe the function and demonstrate the operation of various tools and equipment that may be necessary during confined space rescue incidents.

10. The Technical Rescuer shall correctly identify in writing personal protective garments and accessory gear recommended for wear at confined space rescue incidents.

11. The Technical Rescuer when given the appropriate equipment shall correctly demonstrate the use of breathing apparatus used at confined space rescue incidents.

12. The Technical Rescuer when given the appropriate equipment shall correctly demonstrate the proper donning techniques of SCBA and SAR.

Confined Space
Lesson One
Rescue Operations for the Confined Space Rescuer

MOTIVATION

Confined Spaces in N.C. are regulated by the N.C. Department of Labor, Division of Occupational Safety and Health (OSHA). Fire and rescue agencies responding to confined space rescues are required to comply with the safety procedures that are mandated by OSHA. Fire and rescue agencies could be held accountable for inappropriate actions taken at a confined space incidents. A copy of the standards listed in the materials list and a guidebook are available by contacting N.C. OSHA, The telephone number is (800)-625-2267. To access information regarding NC OSHA rules and regulation log on to www.nclabor.com and go to compliance standards.

PRESENTATION

ENABLING OBJECTIVE #1

The Technical Rescuer shall correctly describe in writing the necessary elements of successful pre-planning as they relate to confined space incidents.

1. Define and discuss the following terminologies that are helpful for emergency responders working at a confined space rescue incident.
   a) ATTENDANT - A person who is assigned to monitor a confined space process or operation, and provide support or react as required to provide for the safety of the entrants and entry team.

b) BIOLOGICAL HAZARDS - Microbial agents presenting a risk or potential risk to the well-being of humans through inhalation, ingestion, skin absorption, or injection.
c) BLINDING / BLANKING - Inserting a solid barrier across the open end of a pipe, or in between two flanges, leading into or out of the confined space, and securing the barrier in such a way to prevent leakage of material.
d) CONFINED SPACE - An enclosed area that is large enough and so configured that an employee can bodily enter. Its primary function is something other than human occupancy and has a restricted entry and exit. Restricted entry and exit is a physical configuration, which requires the use of the hands or contortion of the body to enter into or exit from a confined space.
e) DOUBLE BLOCK AND BLEED - A method used to isolate a confined space from a line, duct or pipe by physically closing two main valves on a piping system, and opening a “vented-to-atmosphere” valve between them.
f) EMERGENCY - Any occurrence inside or outside of the confined space that could endanger the entry team.
g) ENGULFMENT - The surrounding and effective capture of a person by a liquid or flowable solid substance.
h) ENTRANT - A person who enters a confined space to perform an assigned task.
i) ENTRY - Ingress by persons into a confined space, which occurs upon breaking the plane of the confined space portal with any part of the body. Entry includes all periods of time in which the confined space is occupied.
j) ENTRY SUPERVISOR/LEADER - An individual who has been assigned the responsibility for directing all aspects of the confined space entry.
k) EVACUATION - An unaided emergency exit out of a confined space. This action may result from the entrant’s own decision or by a command from outside the space.
l) HAZARD - A condition or changing set of circumstances that presents a potential for injury, illness, or property damage. The potential or inherent characteristics of an activity, condition, or

circumstance, which can produce adverse or harmful consequences.

m) HAZARDOUS ATMOSPHERE - An atmosphere that may be, or is injurious to occupants by reason of: oxygen deficiency or enrichment; flammability or explosive; or toxicity.

n) HORIZONTAL RESCUE - Methodology to move the entrant to safety while the entrant's weight is supported by the surface of the space's floor or other horizontal level within the space.

o) HOT WORK - Work within a confined space that produces arcs, sparks, flames, heat, or other sources of ignition.

p) ISOLATION - A process of physically interrupting or disconnecting, or both, pipes, lines and energy sources from the confined space.

q) LEL / LFL and UEL / UFL - Abbreviation for lower explosive limit / lower flammable limit and upper explosive limit / upper flammable limit.

r) LOCKOUT / TAGOUT - The placement of a lock/tag on the energy isolating device in accordance with an established procedure, indicating that energy isolating device shall not be operated until removal of the lock / tag in accordance with an established procedure. The term "lockout / tagout" allows the use of a lockout device, a tag, or a combination of both.

s) NON-PERMIT CONFINED SPACE (NPCS) - A space, which by configuration meets the definition of a permit required confined space but after evaluation is unlikely to have potential hazards or has the hazards eliminated by engineering controls. OSHA 1910.146 "Non-permit confined space" means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

t) OXYGEN DEFICIENT ATMOSPHERE - An atmosphere containing less than 19.5% oxygen by volume.

u) OXYGEN ENRICHED ATMOSPHERE - An atmosphere containing more than 23.5% oxygen by volume.

v) PEL - Abbreviation for Permissible Exposure Limit.

w) PERMISSIBLE EXPOSURE LIMITS (PEL) - are the allowable air contaminant level established by the U.S. Department of Labor, Occupational Safety and Health Administration.

x) PERMIT REQUIRED CONFINED SPACE (PRCS) - A confined space, which after evaluation, is found to contain actual or potential hazards. Because of the hazards, the confined space requires written authorization for entry.

y) PERMIT SYSTEM - A written procedure for preparing and issuing permits for entry and for returning the permit required confined space (PRCS) to service following termination of entry.

z) QUALIFIED PERSON - A person who by reason of training, education and experience is knowledgeable in the operation to be performed, and is competent to judge the hazards involved and can specify controls and protective measures.

aa) RESCUE - Aided assistance in exiting the confined space requiring entry by the rescuer.

bb) RETRIEVAL - Aided assistance in exiting the confined space not requiring entry.

cc) SHALL - Denotes a mandatory requirement.

dd) SHOULD - A recommendation that is a sound safety and health practice. It does not denote a mandatory requirement.

ee) THRESHOLD LIMIT VALUE (TLV) - are guidelines (not standards) prepared by the American Conference of Governmental Industrial Hygienists, Inc (ACGIH) to assist industrial hygienists in making decisions regarding safe levels of exposure to various hazards found in the workplace.

ff) TOXIC ATMOSPHERE - An atmosphere containing a concentration of a substance above the published or otherwise known safe levels.

gg) VERTICAL RESCUE - Methodology to move the entrant to safety while all or a portion of the entrant's weight is supported by life-safety rope or wire. This methodology would include Diagonal Rescue where a portion of the entrant's weight is supported by a surface within the space.

2. Identify and discuss the OSHA estimates for the number of confined spaces.

a) OSHA estimates 238,000 establishments have permit required confined spaces.
b) These 238,000 establishments employ approximately 1.6 million workers.
c) These workers enter 4.8 million permit-required confined spaces annually.
d) OSHA estimates 63 fatalities occur annually.
e) OSHA estimates 13,000 lost workday cases involving confined spaces occur annually.

3. Identify and discuss the leading causes of death associated with confined space entry.
   a) Oxygen deficiency, hydrogen sulfide, methane, and inert gases are the leading specific atmospheric hazardous conditions.
   b) Engulfment was the second leading cause of death.
   c) Mechanical asphyxiation from loose material such as grain, agricultural products, sand, cement, and gravel are also leading causes.

4. Discuss the critical role of design in influencing the safe entry of confined spaces. Design deficiencies often increase the risk for entrants.
   a) Means of entry such as portals or hatchways. These entry points are often too small, improperly located, complicated or inhibit escape.
   a) Spaces that are convoluted, unnecessarily obstructed, or hazardously configured.
   b) Internal clearances too tight for safe passage.
   c) Space penetration distance that is excessive without a secondary means of escape.
   d) Absence of needed devices to isolate all energy sources from the space.
   e) No vessel mechanisms or devices to prevent loose materials from bridging or compacting.
   f) No features that would enhance ventilation of the confined area.
   g) Structural weakness in the walls, floors, or ceilings of the confined spaces. They may also have pipes containing gases, liquids, or steam. All of these weaknesses increase the risk to entrants while working within confined spaces.

5. Point out that all NC Emergency Service responders likely to respond to a confined space emergency

should be familiar with OSHA standards that pertain to confined space search and rescue operations such as OSHA Title 29 CFR 1910.146-Confined Space, 29 CFR 1910.147- Lock out Tag Out, 29 CFR 1910.120-Hazardous Waste Operations and Emergency Response and 29 CFR 1910.134- Respiratory Protection.

6. Discuss the definition of a needs assessment and identify the criteria for conducting a needs assessment specifically for a confined space search and rescue operation.
   a) A needs assessment is typically part of the pre-planning process.
   b) The purpose of a needs assessment is to evaluate the responding department's capacity to function safely at any given emergency incident.

7. Discuss questions that should be addressed during the needs assessment process.
   a) Are confined space rescues performed regularly or infrequently?
   b) Do confined space rescue incidents occur more frequently during a particular time of day, or on a particular day of the week?
   c) How severe are the confined space rescue incidents, do they involve simple, quick actions or are they long, tedious operations?
   d) Do the confined space rescue problems involve natural hazards?
   e) Are parts of the response district more likely than others to generate a confined space rescue incident?
   f) What is the average response time to any location within the response district?

Reference: IFSTA 7th Edition Fire Service Search and Rescue manual, pages 7 through 9.

8. Discuss issues that should be addressed when developing a pre-plan.
   a) What are the technical capabilities of response agencies?
   b) Does the department have the necessary equipment to match the response level?

c) How many personnel are trained to the respond and work at a confined space search and rescue operation?
d) Established resource list of personnel and equipment.
e) Tour your district periodically to compile a list of active establishments where confined spaces are located.
f) Identify the various types of confined spaces located within your district.
g) For long-term operations, questions such as how will personnel's hygiene needs be met?
h) How will personnel's need for food and water be met?
i) What about a rehab station and medical monitoring of rescuers?
j) How will crowd control be handled?
k) How will rescuers and victim be protected from the environment, extreme heat, extreme cold, and rain or thunderstorms?
l) What are the legal issues that must be addressed when pre-planning?
m) Identify and address on pre-plans all hazards that could be associated with the confined space.

9. Discuss self-sufficient response as an option for the AHJ.
   a) A department may choose to be self sufficient. This would require a commitment of many hours of specialized training and practice, the need for specialized equipment and a transport vehicle.
   b) The above method of response is the most efficient method for ensuring rapid response and high-level skill capability, but it is also the most expensive method.

10. Discuss the community dependent response as an option for the AHJ.
   a) A department may choose to be community dependent which would require meeting with local government agency officials such as the sewer department, water department and highway department to determine their resource capabilities, both personnel and equipment.
   b) Meet with these agencies' representatives to determine their resource capabilities.

c) Establish a 24 hour resource list including contact numbers and names of contact persons.
d) Meet with the department heads of other emergency service agencies to discuss their resource capabilities.

11. Discuss regional response as an option for the AHJ.
    a) A great advantage of this type of response is that it spreads the cost of implementation and operation over several jurisdictions.
    b) It reduces the financial burden on an individual organization.
    c) It requires a commitment of each agency involved to maintain training proficiency and maintenance of assigned equipment.
    d) This type of response system can be very hard to organize and maintain because personnel and equipment may be spread over a large area.
    e) Establish written mutual aid agreements and response guidelines with all agencies that have agreed to respond in the event of a confined space rescue incident.

12. Discuss the elements of creating a confined space rescue response team.
    a) Confined space rescue activities are obviously very strenuous and require rescuers to work in very small and tight areas.
    b) Select personnel that are emotionally adapted to the various stresses that may be present at a confined space rescue incident.
    c) The work can be more mental than physical from time to time. Extreme fears are acrophobia, the fear of heights, and claustrophobia, the fear of confined spaces.
    d) It is critical that selected team members are physically fit to meet the demands of the rescue operation.
    e) Select personnel that are proficient in technical rope work.
    f) Be very selective as to what roles you expect your team members to function in.
    g) Recognize that everyone does some things better than others.
    h) Make sure that the medical personnel working with your team are well trained to deal with the

special trauma associated a confined space entrapments.

13. Discuss the T.E.A.M. acronym: Together Everyone Accomplishes More.
    a) The most important attribute for team members is to be a team player.
    b) Team oriented rescuers can take direction as well as give it.

14. Point out those personnel responsible for developing pre-plan guidelines may choose to adopt NFPA 1670 Chapter 4.1.1 for the purpose of determining what level of response proficiency the AHJ is going to provide to the community regarding a confined space rescue incident.

15. Discuss the purpose for NFPA 1670 Operations and Training for Technical Rescue Incidents and how it may impact pre-incident planning and potential scene size-ups. The document requires local jurisdictions to survey their response districts to assess the potential for rescue incidents.

16. Emphasize that the Authority Having Jurisdiction (AHJ) shall make decisions regarding how to effectively respond and mitigate the problems associated with each confined space rescue incident.
    a) Operational Protocols should be established by the (AHJ).
    b) The AHJ should use and maintain Pre-Plan forms so as to maintain uniformity throughout the jurisdiction.

Reference: Confined Space and Structural Rope Rescue, Rescue, Unit 11, pages 1-22.

17. Point out that NFPA 1670, Chapter 4.1.1 requires the AHJ to develop procedures for the procurement and utilization of resources needed to conduct a safe and effective confined space rescue operation.
    a) Requires the AHJ to establish levels of operational capability needed to conduct operations at technical search and rescue incidents safely and effectively, based on hazard identification, risk assessment, training level of

personnel, and availability of internal and external resources.

18. Identify and discuss the departmental functions for the Awareness Level response to confined space search and rescue incidents as established by NFPA 1670 Chapter 7.2.
    a) Recognizing the need for confined space search and rescue.
    b) Initiating contact and establishing communications with victims where possible.
    c) Recognizing and identifying hazards associated with non-entry confined space emergencies.
    d) Recognizing confined spaces.
    e) Performing non-entry retrieval.
    f) Implementing the emergency response system for confined space emergencies.
    g) Implementing site control and scene management.

19. Identify and discuss the departmental functions for the Operations Level response to confined space search and rescue incidents as established by NFPA 1670.
    a) Sizing up existing and potential conditions at confined space emergencies.
    b) Protecting personnel from hazards within the confined space.
    c) Ensuring that personnel are capable of managing the physical and psychological challenges that affect rescuers entering confined spaces
    d) Identifying the duties of the rescue entrant and backup rescue entrant, rescue attendant, and rescue team leader.
    e) Monitoring continuously, or at frequent intervals, the atmosphere in all parts of the space to be entered for oxygen content, flammability (LEL / LFL), and toxicity, in that order.
    f) Performing entry-type rescues into confined spaces meeting all of the following specific qualifying characteristics: 1) the internal configuration of the space is clear and unobstructed so retrieval systems can be utilized for rescuers without possibility of entanglement, 2) the victim can be easily seen from the outside of the space's primary access opening, rescuers can pass easily through the access/egress opening(s) with room to spare when PPE is worn

in the manner recommended by the manufacturer, 3) the space can accommodate two or more rescuers in addition to the victim, and 4) all hazards in and around the confined space have been identified, isolated, and controlled.

g) Using victim-packaging devices that could be employed in confined space rescue.

h) Selecting, constructing, and using a rope lowering and raising system in the high-angle environment

20. Identify and discuss the departmental functions for the Technician Level response to confined space rescue incidents as established by NFPA 1670.
    a) Developing hazard isolation and control requirements. Ensuring that rescue team members take part in a medical surveillance program.
    b) Planning response for entry-type confined space rescues in hazardous environments.
    c) Implementing the planned response.

Reference: NFPA 1670 Standard on Operations and Training for Technical Rescue Incidents, 2009 Edition.

21. Emphasize that personnel responding to a confined space rescue incident require specialized training.
    a) Training should be tailored to address rules and regulations established by OSHA 1910.146 Permit-required Confined Space Standard and response guidelines established by NFPA1670 and the professional qualification standard for confined space search and rescue, NFPA 1006 Chapter 7.
    b) After initial training, periodic continuing education should be required to ensure that personnel retain their skill proficiency.

22. Discuss how training integrates into the pre-planning process.
    a) Periodic intensive training should be made available to all personnel who may be involved in the incident.
    b) Training exercises give those who would be involved in an incident an opportunity to see the plan in action and test their understanding of the plan.

c) Any deficiencies can be identified and remedied.

Reference: IFSTA 7th Edition Fire Service Search and Rescue manual, page 128.

23. Command Officers and especially scene Safety Officers should be very familiar with all regulations that might impact actions taken during a confined space rescue operation.

24. Consider inviting an OSHA representative to your planning session to get input from them as to how the confined space standard will affect your operation.
    a) Another suggestion would be to put your OSHA representative on your call resource list.

25. From a rescue agency standpoint, when does OSHA require compliance with the standard?
    a) When an employer / employee relationship exist.
    b) When confined space entries are made as part of the job.
    c) Would your department normally be dispatched to a confined space rescue operation?
    d) Does your department train for, acquire equipment for, and prepare to participate in confined space rescue operations?

26. Discuss the issue regarding paid versus volunteer departments.
    a) Most paid departments especially those with a state run OSHA program must be compliant with OSHA regulations.
    b) Volunteers may be exempt from many OSHA regulations
    c) Consider the following: Do volunteers have to comply with NFPA? Highly recommended but not mandatory.
    d) Do volunteers have to comply with OSHA?

PRESENTATION

ENABLING OBJECTIVE #2

The Technical Rescuer shall correctly describe in writing the factors that rescuers must know to effectively perform a scene size-up involving confined space rescue incidents.

1. Initial size-up begins at the time of the alarm. Identify information that should be obtained while enroute to the scene.
   a) Initial information regarding the incident is typically sketchy.
   b) Prompt the dispatcher to try to maintain contact with the caller so that additional information may be gathered to assist with developing an initial plan of action while enroute to the scene.
   c) During the initial scene size-up, steps to take control of the scene are initiated.

2. Identify and discuss questions that should be addressed during the response phase.
   a) What has happened?
   b) How many victims are there? Number, condition, and location of victims.
   c) Are they injured or just trapped?
   d) How long have they been down?
   e) Are they conscious? Can they communicate?
   f) Are they all in the same confined space?
   g) Is there an entry permit available?
   h) Will access to the site be a problem for vehicles and personnel?
   i) What is short term and long-term status of the weather?
   j) Where is the closest Level I staging area for all resources responding to the scene?

3. Discuss points that should be addressed during the primary assessment of a scene size-up.
   a) What has happened and who is in charge?
   b) Contact the victim, if possible.
   c) Interview witnesses.
   d) Examine permits.
   e) Monitor atmosphere within the space.
   f) Identify hazards.
   g) Evaluate what has been and is being done.
   h) Weigh risks vs. benefits of available options.
   i) Is this a rescue or recovery?

4. Discuss the decision making process as it relates to the primary assessment.
    a) Are on-scene resources sufficient to handle the operation?
    b) Establish scene control.
    c) Control the bystanders.
    d) Set up the control zones.
    e) Contact expert assistance.

5. Identify the components of a secondary assessment.
    a) What is the type of confined space?
    b) What is the condition of the space?
        I. Permit
        II. Reclassified space.
    c) What are the contents of space?
    d) Determine the mode of operation - rescue or recovery?

6. Identify and discuss the types of confined spaces.
    a) Tanks / vessels.
    b) Silos / elevators.
    c) Storage Bins / hoppers.
    d) Utility Vaults / pits.
    e) Aqueducts / sewers.
    f) Cistern / wells.
    g) Coffer dams.

Reference: IFSTA 7th Edition, Fire Service Search and Rescue Manual, pages 162 through 164 and 168.

7. What significance does a risk / benefit analysis have on the success or failure of a confined space rescue incident?
    a) It is always easier to surmise what should have been done, especially after we have evaluated the outcome of our actions.

8. Point out that a risk / benefit analysis is the internal process used to decide how much risk is willing to be assumed in the performance of duty?
    a) The above analysis involves weighing all of the factors that deal with risk and compare them with the factors that determine benefits.
    b) The operation can have a favorable outcome if the benefits heavily outweigh the risk.

c) If the risks appear to outweigh the benefits, there may be no advantage to continue the operation.

9. Discuss the purpose of conducting a risk / benefit analysis as part of a size-up to prevent being put into a position that causes poor judgment calls that may have disastrous results.

10. Point out that the best two ways to reduce rescuer injuries and fatalities through proper pre-planning and comprehensive training.
    a) By identifying potential sites with confined spaces, being aware of rules and regulation pertaining to confined space rescue operations, and developing a comprehensive response plan, will greatly help reduce problems that may arise during a confined space rescue operations.
    b) Strategy and tactics training is important and should be addressed continuously.

11. One way to reduce the risk is to identify early on in the operation whether you have rescue mission or a recovery mission. Conduct a Risk vs.Benefit analysis.

12. What is the risk to the rescuer?
    a) After addressing all the safety issues and neutralizing hazards to the best of your ability, do the rescuers stand a fair chance of succeeding with the operation without getting injured or killed?
    b) Is the risk to the rescuer proportional to the potential benefit of the attempted action?
    c) If questions arise regarding your judgment at this point in the operation, chances are you are getting ready to make a big mistake.

13. What are the benefits to the situation?
    a) If the risk to the rescuer can be reduced and the benefit is a savable victim, you are close to giving the situation a green light.
    b) There is no benefit in saving a dead person or a dead person’s property if the action taken unnecessarily jeopardizes the rescuer.

14. Discuss the Head vs. Heart mentality.
    a) Compassion can get the rescuer killed.

b) Remember to act responsibly regarding rescuer and civilian safety.

15. Define the acronym F.A.I.L.U.R.E.
    a) Failure to understand or underestimating the environment.
    b) Additional medical considerations not considered.
    c) Inadequate rescue skills.
    d) Lack of teamwork and experience
    e) Underestimating the logistical needs of the operation.
    f) Rescue-recovery mode not considered.
    g) Equipment not mastered.

16. Remember the three major things that will greatly enhance the potential for a successful operation.
    a) Special people.
    b) Special equipment.
    c) Special training.

Reference: Confined Space Entry and Emergency Response, Unit 15, pages 345-346.
Reference: 7th Edition, Fire Service Search and Rescue page 168.

PRESENTATION

ENABLING OBJECTIVE #3

The Technical Rescuer shall correctly describe in writing the necessary elements for implementing an on-scene operational plan or incident action plan (IAP) associated with incidents involving confined space rescue operations.

1. Discuss points to consider when developing an incident action plan (IAP).
    a) Who is in charge?
    b) Is there a language barrier?
    c) Are the hazards within your scope of operations?
    d) What are the injury problems?
    e) What is the victim's survivability profile?
    f) What is the type of confined space and what obstructions are present?

2. Define and discuss definition of an incident action plan (IAP).

a) An IAP is a battle plan, designed to establish reasonable goals and objectives based on the situation and implemented to mitigate hazards, gain access to victims, stabilize them and remove them from peril while minimizing the risk to all rescuers.
b) An IAP is developed after a preliminary size-up has been competed.
c) Hazards are identified and the risk and benefits to the victim and rescuers are addressed heavily.
d) The IAP should be simple, concise and flexible.
e) All on-scene personnel should be made aware of the IAP and instructed as to what each rescue component's role is.
f) All personnel must be advised when changes are made to the IAP.
g) Be sure to develop a back up plan in the event something unforeseen occurs during the operations
h) Included in the IAP are plans for providing a rapid intervention team (RIT) or other means for instituting rescue and care of injured rescuers

Reference: IFSTA 7th Edition, Fire Service Search and Rescue manual, page 175.

PRESENTATION

ENABLING OBJECTIVE #4

The Technical Rescuer shall correctly describe in writing the types of confined spaces and associated hazards for rescuers that need to be included in a hazard assessment for incidents involving confined space rescue operations.

1. Define a confined space.
   a) Confined spaces have certain characteristics.
   b) Is the space large enough and so configured that an employee can bodily enter and perform assigned work?
   c) Does the space have limited or restricted means for entry or exit?
   d) The space is not designed for continuous employee occupancy.

3. Identify and discuss permit-required confined spaces.

a) Contains or has a potential to contain a hazardous atmosphere.
b) Contains a material that has the potential for engulfing the entrant.
c) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward to a smaller cross section.
d) Contains any other recognized serious safety hazard.

4. Define and discuss tanks and vessels.
   a) They come in various sizes and shapes.
   b) They are constructed of wood, fiberglass and masonry. Most are made of aluminum or steel.
   c) Most are elevated high off of the ground.
   d) Vessel can refer to any confined space, but it usually refers to tanks involved in transporting products on land or water.
   e) Vessels may be tank trucks, railroad cars, barges, or ships with confined cargo spaces.

5. Define and discuss silos tanks and elevators.
   a) They are designed to contain agricultural products.
   b) Silos are likely to involve workers who have been overcome by a hazardous atmosphere.
   c) Grain elevators are likely to involve workers who have been engulfed by flowing grain.

6. Define and discuss storage bins and hoppers.
   a) Bins and hoppers are similar to silos and elevators.
   b) They normally contain dry products.
   c) Bins and hoppers are usually smaller.
   d) They often contain the following: sand, grain, gravel, dry Portland cement, wood chips, or sawdust.

7. Define and discuss utility vaults and pits.
   a) Usually constructed of concrete or other masonry.
   b) Often below ground level.
   c) May contain high voltage electrical equipment.
   d) May contain pumps and values for controlling gases or liquids in pipelines.

8. Define and discuss aqueducts and sewers.
    a) These confined spaces include pipelines that carry water to cities or industrial complexes.
    b) They also carry effluent away from the same places.
    c) May be just big enough for one person to fit inside.
    d) Could be big enough to drive trucks through.
    e) Made of various products, but most likely concrete or steel.

9. Define and discuss cisterns and wells.
    a) Tanks usually used to collect rainwater.
    b) They are most likely underground.
    c) They may contain water, but could be found dry.
    d) Most likely to be old and abandoned.
    e) Could be made of both steel and concrete. Ungrouted masonry was also common method of construction.

10. Define and discuss cofferdams.
    a) They are watertight barriers installed or constructed to provide a dry environment in which work can occur.
    b) Cofferdams are often used when concrete must be poured in deep water.

Reference: IFSTA 7th Edition Fire Service Search and Rescue manual, pages 160 and 162 through 164.

PRESENTATION

ENABLING OBJECTIVE #5

The Technical Rescuer shall correctly describe in writing the responsibilities of Command and the primary functions of Command associated with incidents involving confined space rescue operations.

1. Discuss the role of Command.
    a) The Command position fixes responsibility of command on a specific individual through a standard identification system.
    b) It ensures that a strong direct and visible command will be established from the onset of the incident.

c) Command establishes an effective organization defining the activities and responsibilities assigned to the Incident Commander and to other individuals operating within the Incident Management System.
d) It provides a system to process information to support incident management planning and decision-making.
e) It provides a system for the orderly transfer of command to subsequent arriving officers.
f) According to NFPA 1561, *Standard on Fire Department Incident Management System*, an IMS defines the roles, responsibilities, and standard operating guidelines used to manage emergency operations.

2. Identify the procedures for establishing command.
   a) The first unit or member on the scene must initiate whatever parts of the Incident Management System are needed to effectively manage the incident.
   b) Command is activated by the first radio report announcing arrival of the first in unit, and a brief report of existing conditions.

3. Point out that a single-company incident may only require that the company or unit acknowledge their arrival on the scene.

4. Emphasize that for incidents requiring the commitment of multiple companies or other resources, the first arriving unit or member must establish and announce command and develop an incident command structure appropriate for the incident.
   a) Multiple rescue sites requiring unified command will be more complex in developing the incident organization.

5. Identify the responsibilities of Command.
   a) Follow all SOG’s and safety protocols established by the AHJ.
   b) Remove endangered occupants and treat the injured.
   c) Provide for life safety and stabilize the incident.
   d) Conserve property and evidence.

e) Provide for the safety, accountability, and welfare of personnel. Emphasize this priority is ongoing throughout the incident.
f) Establish safe control zones that rescuers will work in.
g) Discuss accountability procedures. PAR is an acronym for personnel accountability report.

6. Identify and define the three control zones that should be established.
   a) Hot Zone - area where the rescue takes place. Only rescuers directly responsible for freeing or treating the victim are allowed in this zone. This zone should have on way in and on way out and strict accountability should be maintained
   b) Warm Zone - located immediately outside the hot zone and designated for personnel assisting with support operations for rescuers in the Hot Zone.
   c) Cold Zone - Located outside the Warm Zone, this area is where the command staff, staging, media and family members will be staged.

Reference: IFSTA 7th Edition, Fire Service Rescue, page 45.

7. Identify the functions of command.
   a) Responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources.
   b) Assumes and announces command and establishes an effective operating position or Command Post.
   c) Rapid size-up to evaluate the situation.
   d) Initiate, maintain, and control the communication process.
   e) Identifies the overall strategy, develops an incident action plan, and assigns companies and personnel consistent with plans and standard operating guidelines.
   f) Develop an effective Incident Management Organization.
   g) Provide clear tactical objectives.
   h) Initiate and maintain a tactical worksheet for accountability and documentation.
   i) Review, evaluate, and revise the incident action plan.

j) Provide for the continuity, transfer, and termination of command.

Reference: Confined Space Entry and Emergency Response, Unit 16, pages 366-373.
Reference: NFPA 1561, Standard on Emergency Services Incident Management System, 2013 Edition.

8. Define and discuss unity of command and division of command.

9. Discuss the concept of Unified Command.
   a) An application of the incident command system (ICS) that allows all agencies with jurisdictional responsibility for an incident or planned event, either geographical or functional, to manage an incident or planned event by establishing a common set of incident objectives and strategies.
   b) UC is accomplished without losing or giving up agency authority, responsibility or accountability.

Reference NFPA 1561 Standard on Emergency Services Incident Management System, 2013 Edition.

10. Identify the role of the Safety Officer.
   a) Answers directly to the IC.
   b) Is responsible for monitoring and assessing safety hazards and unsafe situations, and for developing measures for ensuring personnel safety
   c) The Safety Officer must be familiar with the environment and any standards that may apply to the rescue incident.
   d) The Safety Officer is responsible for controlling the “big picture” regarding safety issues.
   The Safety officer is the only officer, other than the IC that has the authority to halt an operation.

Reference: NFPA 1561, Standard on Emergency Services Incident Management System, 2013 Edition.

11. Identify the role of the Liaison Officer.
   a) Responsible for gathering critical inter-agency information from all responding agencies.

b) Agencies that might interact with the Liaison Officer are the police department, utility contractor, electric company, water department, Red Cross, and OSHA.

Reference: NFPA 1561, Standard on Emergency Services Incident Management System, 2013 Edition.

12. Identify the role of the Public Information Officer.
    a) The PIO is responsible for; interfacing with the public and media or with other agencies with incident-related information requirements
    b) The PIO educates the media on rescue methods and the difficulties of the task.
    c) The PIO keeps the media informed, and gives command an important ally that may result in additional funding, or donations for desperately needed equipment.

Reference: NFPA 1561, Standard on Emergency Services Incident Management System, 2013 Edition.

13. Identify the role of the Operations Section Chief.
    a) The Operation Section Chief is responsible for overall coordination of the rescue effort.
    b) The Operation Section Chief is responsible for implementing tactical decisions that will make the IC's strategy successful.
    c) The tactical operations are carried out in order to meet the strategic goals established by command.

14. Identify the role of the Logistics Section Chief.
    a) The Logistics Section Chief, when appointed, is the person responsible for procuring the necessary equipment and personnel requested by the Operations Section Chief.
    b) Functions that fall under the Logistics Section Chief include staging and rehab.
    c) The Staging Manager is responsible for ordering and maintaining adequate resources at the scene to handle additional request for equipment and manpower.
    d) The Medical Unit of the Service Branch is responsible for medical monitoring of personnel and providing food and fluids.

e) Rescuers involved in tactics should be required to periodically rotate through this station during the operation.
f) The Logistics section is responsible for maintaining an inventory of all equipment that is on standby for use, and is responsible for keeping track of which section of the operation the equipment is assigned to, as well as accounting for it after the operation is complete.

15. Identify and discuss the role of a rescue branch.
    a) If used, the rescue branch could be divided into three groups.
    b) Fire suppression group – responsible for fire control and extinguishing any fires still burning in the area.
    c) Hazardous materials group – responsible for migrating hazardous materials spills and or leaks and dealing with any hazardous atmosphere in the area.
    d) Rescue group – is divided into several units including hazard control unit, air supply unit, rigging unit, entry unit, extrication unit, and support personnel unit.

15. Identify and discuss the role of the rescue group.
    a) Hazard control unit – performs ventilation, isolation, and other hazard control procedures as required to make the confined spaces and the area of operations safe to occupy.
    b) Air supply unit – ensures that adequate supplies of breathing air are available for rescue team entries.
    c) Rigging unit – rigs up any rescue system or other equipment required for transferring rescuers or patients.
    d) Entry unit – makes entries into the spaces to access, assess, treat, package, and remove patients from the space.
    e) Extrication unit – performs difficult extrication operations to free patients.
    f) Support personnel unit – performs various duties as required to support the operation of the rescue group.

16. Identify the role of the Medical Branch.

a) This section is charged with handling patients involved in the emergency.
b) May be divided into three groups: triage, treatment, and transport.
c) This branch coordinates the various support functions and ensures the proper steps in the recovery effort are followed.
d) Medical monitoring for entrants is provided by the Medical Unit of the Logistics Section.
e) Follow medical protocols established by the AHJ.

17. Display and discuss the modular development concept of an organizational chart for a multi-group / division response.

PRESENTATION

ENABLING OBJECTIVE #6

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

1. Define and discuss preparation

2. Discuss the steps needed to evaluate the rescue team.
   a) Is the team competently trained and equipped to perform a confined space rescue.
   b) Does the rescue team understand and conform to the OSHA standard?
   c) Does the rescue team have enough trained personnel to sustain a confined space operation?
   d) Does the rescue team have the proper equipment to perform this operation?

3. Discuss the steps needed to evaluate the equipment and list the minimum equipment needed. Confined rescue tool kit:
   a) Supplied air respirators (SAR).
   b) Cascade system.
   c) Patient packaging equipment.
   d) Patient removal equipment.
   e) Rope, harnesses, and hardware.
   f) Atmospheric monitoring equipment.
   g) Ventilation equipment.
   h) Lighting equipment (explosive proof).

i) Communications equipment.
j) Personal protective equipment.
k) Lock out, tag out, blank out kits.
l) Personal accountability.
m) ICS forms and tactical worksheet.

4. Explain that during the initial preparation phase, rescue teams need to consider pre-planning for specific hazards which may effect their operations and identify potential rescue sites.
   a) Are there any locations or industries that routinely perform confined space entries for cleaning or general maintenance?
   b) Are there any special projects being undertaken that are confined spaces?
   c) Does your response area include facilities with high hazard potentials such as water or sewage treatment facilities?
   d) Contact the representatives that work in these areas and request an on-site inspection.
   e) Request prior entry permits or other site-specific information such as energy control or emergency plans.
   f) Identify any special hazards or chemical processes.
   g) Identify site-specific problems such as location, access, air supply, ventilation requirements or extreme elevation differences.

5. Discuss evaluation of rescue personnel.
   a) Rescue personnel must have the same knowledge and training as work entry personnel.
   b) In addition, rescue personnel must have training in rescue operations and equipment.
   c) Do any of the rescue personnel suffer from claustrophobia?
   d) Training in hazardous materials and ICS/IMS are also important.
   e) Rescue personnel will need rope skills used in high angle rescues.
   f) All of the competencies listed before are mandatory before attempting a confined space rescue.

NOTE: OSHA 1910.146 Appendix F provides a sample of rescue service evaluation

6. Discuss the importance of using an Incident Management System at a confined space emergency.
    a) The use of an Incident Command System will aid the Incident Commander in managing any confined space rescue.
    b) ICS usage will span all phases of the rescue operation.
    c) The Incident Commander is responsible for overall management of the incident. The IC directly controls the command staff and the section chiefs.

7. Describe and discuss the command staff and their assigned duties.
    a) Safety Officer – is responsible for developing and recommending measures for assuring personnel safety and to assess or anticipate hazardous and unsafe situations.
    b) Public Information Officer – is responsible for developing and releasing information about the incident to the media.
    c) Liaison Officer – is responsible for working as the point of contact for all assisting or cooperating agencies not involved in the tactic assignments.

8. Describe and discuss the section chiefs and their assigned duties.
    a) Planning section – is responsible for collection, evaluation, dissemination and use of information about the development of the incident and the status of the resources.
    b) Finance section – is responsible for tracking expenses of the operation.
    c) Logistics section – is responsible for supplying all resources needed to complete the operation.
    d) Operations section – is responsible for the management of all operations involved in the incident.

9. The Logistics Section Chief is responsible for the accumulation, location, and distribution of all needed equipment and the following position may be needed as part of this section.
    a) Air Supply Unit – is responsible for all air supply, bottles, and supplied air breathing apparatus.

b) Medical Unit – is responsible for all medical care of the rescuers.

10. The Operations Section Chief is responsible for the coordination of the operational portion of the incident and the following positions may be needed as part of this section.
    a) Rescue Group Supervisor – is responsible for the entire rescue group.
    b) Entry Team – performs all duties inside the confined space. These duties include recon, patient extrication and packaging.
    c) Attendant – has many of the same duties as the entry team. The attendant must also communicate with the entry team, track the entrants, and provide air monitoring of the confined space.
    d) Back up Team – should be in the ready state and prepared to make entry if the entry team needs rescued.
    e) Ventilation Team – this unit is responsible for ventilation inside and outside areas of the confined space.
    f) Rigging Team – responsible for the coordination and evacuation of the patient(s) and the entry teams. They operate all of the retrieval systems and equipment.
    g) Decon Team – is responsible for any decontamination operations that may be needed during the confined space incident.
    h) Medical Group – is responsible for medical attention and care of the patient(s).

11. Define and discuss Phase 1: Assessment. Assessment should be divided into two areas when dealing with and arriving at confined space incidents.
    a) Approach assessment is the initial size-up of the emergency and used to identify any hazards.
    b) Resource assessment is the determination of whether or not adequately trained personnel and recourse to accomplish this assignment or either on-site or responding to the incident.

12. When arriving at the scene the following questions should be asked and the response evaluated. The

information gathered will be critical in the development of the incident action plan.

a) What is the problem?
b) How many personnel are trapped or injured?
c) How many personnel are unaccounted for and what is the location where they were last seen?
d) What type of space is this?
e) What is the space used for?
f) Is the space currently in use?
g) Is this a product storage area?
h) Are there product storage hazards?
i) Is there a viscous or heated material?
j) What residue is possible?
k) Is there an engulfment potential?
l) What other hazards are there in the space?
m) Electrical, mechanical, or stored energy?
n) What are the entry and exit points?
o) Are there multiple entry points?
p) Are the entry points above ground or below grade?
q) Are there other access problems?

13. Once these questions are answered and the incident action plan is developed the Incident Commander should look at the resources on-site and enroute to determine if additional resources may be needed. The IC must use the information from the assessment during the pre-entry and entry phases. The IC must complete the following tasks:
    a) Set up a logical and safe command post that is upwind and away from the incident.
    b) Assign key positions as needed. A Safety Officer should be considered early on during an expanding incident. Other positions can be assigned and should be considered when trained personnel arrive on scene of the incident.
    c) Locate and retain a responsible person from the site that is familiar with the operation and any isolation procedures for the confined space.
    d) Establish control of the rescue site and only allow trained personnel with PPE into areas that have not been cleared of all hazards.
    e) Establish a perimeter and keep unwanted people and vehicles clear of the hazard area.
    f) Provide atmospheric monitoring inside and outside the confined space.

g) Assessment of physical hazards.
h) Look for the entry permit or the energy control plan; they both are good sources of information regarding any physical hazards for the confined space.
i) Determine resources needs.
j) Evaluate survivability; is this a rescue or recovery.

14. Define and discuss Phase 2: Pre-Rescue Operations.
    a) This is where all preparations are made for the entry into a confined space.
    b) Evaluation of information gathered during the Assessment Phase will determine the specific task that will need to be accomplished.

15. Controlling the hazards fall into two categories.
    a) Making the general area safe.
    b) Making the rescue area safe.

16. Discuss the steps necessary to make the general area safe.
    a) Establish safety zones by creating a marked area with barrier tape or other means for establishing the control zones.
    b) Establish general area ventilation. This is only needed if high level of contaminant migration is taking place.
    c) Assign an entry / exit point and identify this point so it can be controlled. If multiple points are used, coordination must be assured.
    d) Eliminate all ignition sources, both actual and potential. This will include any hot work being performed in the area, vehicles, generators, or other electrical equipment.

17. Discuss the steps necessary to make the rescue area safe.
    a) The Rescue Group Supervisor should assign personnel to all positions needed to accomplish the tasks you have identified and perform lock out / tag out / blank out procedures.
    b) Entry teams should always work in pairs; there could be exceptions to this rule.
    c) Should be a back-up team for every entry team.
    d) Each team should be clearly identifiable with a unique designation.

e) The Entry Team should wear appropriate PPE for the hazards likely to be encountered and should take additional breathing apparatus for the victim.
f) The Attendant should establish a tracking system; establish communication with the entry teams; and continuously monitor the atmosphere around and inside the confined space.
g) The Back-up Team should perform the same duties as the entry team including wearing the appropriate PPE.
h) The Ventilation Team should establish ventilation inside and around the confined space.
i) The Rigging Team should identify some form of victim and rescuer retrieval system.
j) The Decon Team should set-up decontamination of Entry Teams, Back-up Teams, any patients, and equipment as they exit the confined space.
k) The Medical Group should provide care and transportation as the patient(s) are removed from the confined space.
l) The Logistics Section Chief should supervise the Air Supply and Medical Units.
m) The Air Supply Unit should set-up both primary and secondary air supply systems.
n) The Medical Unit should set-up rehab and care areas for the Entry Teams. In addition, they should perform pre-entry and post-entry medical monitoring of the Entry and Back-up Team members.

18. Define and discuss Phase 3: Rescue Operations.
    a) Phase 3 involves the placement of teams into the confined space, recon, location, and removal of the patients. This phase should not begin until all of the pre-entry requirements have been met.

19. Responsibilities during the Rescue Operations Phase include the following steps:
    a) The Rescue Group Supervisor should coordinate all aspects of the entry, extrication, and removal of the patient(s) and entry personnel.
    b) The Entry Team should work as a team and communicate planned actions to each other as well as assuring that adequate communication is maintained with the attendant.

c) The Entry Team should watch air lines and assist in the movement of them throughout the space, and use entry / exit tag line.
d) The Entry Team should beware of elevation differences, unstable footing, machinery, electrical, and engulfment hazards.
e) The Attendant should continue atmospheric monitoring and record all readings, log all entry times and names of entry personnel, and provide constant communications to the Entry Teams and relay information to the Rescue Group Supervisor.
f) The Back-up Team should remain outside the space prepared for immediate entry, if the Entry Team should need assistance.
g) The Ventilation Team should monitor the ventilation system to assure continuous air movement.
h) The Rigging Team should assist the Entry Team in and out of the space, remain ready for any needed emergency evacuation, provide equipment to the Entry Team, and operate retrieval systems when needed to evacuate the patient(s) and Entry Team from the confined space.
i) The Decon Team should decontaminate personnel and equipment as needed.
j) The Medical Group should have medical personnel staged and ready to receive the patient for pre-hospital care and treatment.
k) The Logistics Section Chief should coordinate with the IC and Operations Section Chief.
l) The Air Supply Unit should continually monitor the breathing air supply and equipment needs.
m) The Medical Unit should remain outside the space and available to provide medical support to any rescuer on-scene, perform pre-entry and post-entry medical monitoring, and provide fluid rehydration for all rescuers working on the incident.

13. Define and discuss Phase 4: Termination.
    a) Account for everyone who entered the space once all patient, equipment, and rescuers have exited the confined space.

14. Incident Commander should use universal documentation forms for all incidents, especially when changing command.
15. All Entry Team members should be debriefed for critical information regarding the confined space, victim, and rescue operations. This information gathering may include:
    a) Location and position of patient(s).
    b) Condition of the patient(s).
    c) Have the Entry Team provide a drawing of the area.
    d) Detail any specific problems encountered within the space.

16. All entry personnel should be sent to rehab and go through post-entry medical monitoring. All of this information should be recorded and become part of the incident report. Provide critical incident stress debriefing for personnel as needed.

17. After all of the rescue personnel have been cared for attention should be directed to the equipment. Equipment needs should include:
    a) Inventory all equipment to make sure everything is accounted for.
    b) In some cases, the environment within the confined space is too hazardous to justify sending rescue personnel back in to retrieve equipment.
    c) It is sometimes advisable to simply abandon the equipment in place.
    d) Account for all damaged equipment.
    e) Clean, maintain, log, repack equipment.
    f) Restock expendable supplies as needed.
    g) Mark and tag damaged or inoperable equipment.
    h) Incident Commander is responsible for having responsible party seal the space and all entry points until completion of the accident investigation by the authorities having jurisdiction.

Reference: IFSTA Fire Service Search and Rescue Manual, 7th Edition, pages 173 through 183.
Reference: Fire Engineering, Confined Space Rescue, pages 201-209.
Reference: Confined Space Entry and Emergency Response, Unit 16, pages 366-373.

18. Discuss methods for securing the confined space site and scene.
19. Discuss protocols for denying entry into the scene.
    a) Posting law enforcement or establishing a barrier.

APPLICATION

1. Divide the candidates into an equal number of groups. Have each group develop a pre-plan on a flip chart for a confined space rescue incident. Post each plan and have each group present their plan. Compare the plans. After the plans are compared, have the class as a whole select the best components of each plan to come up with a workable and effective pre-plan.

2. Following the same procedure as listed in #1 have the candidates develop an effective Incident Action Plan.

ENABLING OBJECTIVE #7

The Technical Rescuer shall correctly identify in writing the components of an effective equipment assessment for confined space rescue incidents.

1. Discuss the gear that is used for protection of the rescue team, as opposed to the PPE worn by each team member.
    a) Air-supply equipment.
    b) Ventilation equipment.
    c) Atmospheric-monitoring equipment.
    d) Lighting equipment.
    e) Retrieval systems.

2. Define and discuss the need for air-supply equipment.
    a) All the equipment needed to provide a safe and dependable source of breathing air to individual team members who must enter contaminated atmospheres to affect rescues.
    b) The equipment may consist of a cache of SCBA cylinders, an air supply unit with a cascade system for refilling cylinders, or an air supply unit with both large air tanks and an air compressor for supplying airline respirators.

3. Define and discuss the need for ventilation equipment.

a) The interior of the space must be adequately and continuously ventilated by mechanical means.
b) Ventilation is used to enhance the level of safety for rescues working in confined spaces in which the atmosphere is contaminated.
c) Ventilation will increase chances of survival for trapped victims.
d) It is loosely defined in 29 CFR 1910.146.
e) It is essentially a mechanical means of ventilation located outside of the contaminated area with some means of channeling fresh air into the space.
f) An intrinsically safe blower can be used to exhaust contaminated air from the space.

4. Define and discuss the need for atmospheric monitoring equipment.
   a) Monitoring equipment used to sample and analyze the atmosphere within a confined space must be accurately calibrated and capable of measuring the various contaminants that could be present in a confined space.
   b) Air monitors should read the oxygen content, flammable range, and toxicity levels of various hazardous gases.

5. Define and discuss the need for lighting equipment.
   a) Type and amount of lighting equipment can vary greatly.
   b) With the opening being small, some form of artificial lighting is almost always needed.
   c) Individual flashlight or hand lanterns may be sufficient.
   d) Most of the time some higher level of lighting will be needed.
   e) All forms of lighting equipment used must be intrinsically safe.
   f) Portable generators must be placed downwind from the confined space access way to ensure the exhaust from the gasoline engine does not get carried into the confined space.

6. Define and discuss the need for a retrieval system.
   a) OSHA regulations require that anyone who enters a permit-required confined space must be fitted with some form of retrieval system.

b) It also requires that there be an attendant outside the space monitoring those inside.
c) Retrieval systems consist of a retrieval line attached to either a chest or full-body harness or to wristlets.
d) These devices will allow the attendant to pull the entrant from the space without entering the space.
e) Retrieval lines can be removed if the line actually increases the overall risk by becoming entangled, or if the line would not contribute to the rescue of the entrant.

Reference: IFSTA Fire Service Search and Rescue, 7th Edition, pages 166 through 168.

PRESENTATION

ENABLING OBJECTIVE #8

The Technical Rescuer shall correctly identify in writing the different types of loads and how they interact with the equipment used to lift rescuers, victims, and other equipment.

1. Identify the different types of loads and how they interact with the equipment used to lift rescuers, victims, and other equipment.
   a) Static loads.
   b) Impact loads.
   c) Working loads.
   d) Axial loads.
   e) Eccentric loads.

2. Define and discuss static loads.
   a) A static load is a load applied when the load is at rest.
   b) They are applied and remain in the same position and location.
   c) Forces of a static load are applied in only one plane.
   d) Examples of static loads are forces applied to a harness or life safety rope during testing, a building sitting on its foundation, or a tank sitting on its support.

3. Define and discuss impact loads.
   a) An impact load is a load applied in a very short duration so as to include the effects of acceleration in the load.
   b) They are more critical to rescues because they can greatly exaggerate the force being applied.
   c) Impact loads may be applied in all directions; up, down, left, right, front, and back.
   d) An example of an impact load is a person walking on a board. If the board is supported on each end and the person slowly lowers his weight onto the board, it might flex and bend but still support the weight.

4. Define and discuss working loads.
   a) A working load is the maximum weight that a rope is expected to support.
   b) Working loads are expected to be applied to equipment during its use.
   c) The maximum working load is the maximum weight that is expected to be supported by the equipment.

5. Define and discuss axial loads.
   a) An axial load is a load transmitted through the axis of its supporting device.
   b) An axial load refers to the direction that a load is carried.
   c) Axial simply means moving about the axis. The axis in this application is the centerline of a load bearing point. Example: Imagine that you are looking straight down on a tripod from above. As the victim is being raised, the direction of pull on the line supporting the victim is straight up and down. If the load was not transferred along the axis, but rather at an angle to the axis or off center of the axis, then the load could cause the tripod to fail.

6. Define and discuss eccentric loads.
   a) An eccentric load is a load applied so that the force is off center of the supports carrying the load.
   b) A load that is applied off center of the axis is an eccentric load which can cause collapse or twisting of a support.

7. As equipment is set up for a rescue situation, the Technical Rescuer should consider the direction of pull that will be applied to any load and whether it will affect the stability of the point where it is being applied.

Reference: Delmar, Confined Space Rescue, pages 161-165.

PRESENTATION

ENABLING OBJECTIVE #9

The Technical Rescuer shall correctly describe in writing the function and demonstrate the operation of various tools and equipment that may be necessary during confined space rescue incidents.

1. Discuss the characteristics of the Class I rescue harness.
   a) It is designed for emergency escape use only.
   b) The harness is designed for one time use.
   c) It looks like a Class II rescue harness in design but rated only for a one-person load.
   d) It fastens around the waist and thighs or under the buttocks.

NOTE: NFPA 1983 no longer recognizes Class I rescue harnesses.

2. Discuss the characteristics of the Class II rescue harness.
   a) It is designed for rescue operations.
   b) It is not designed for fall protection.
   c) NFPA 1983 requires a design load of 600lbf.
   d) The harness fastens around the waist and thighs or under the buttocks.
   e) It shall be permitted to be one or more parts.

3. Discuss the characteristics of the Class III rescue harness.
   a) It is designed for fall protection and rescue operations where the potential for inversion may occur.
   b) NFPA 1983 requires a design load of 600lbf.
   c) It fastens around the waist and thighs or under the buttocks and over the shoulders.

d) It shall be permitted to be one or more parts

4. Identify the minimum guidelines for webbing to be used as improvised rescue harnesses for humans.
   a) The webbing should be a minimum of 1¾ inch wide.
   b) The breaking strength should be 6,000 lbf with a design load of 600 lbf.

5. Discuss the characteristics and design of modified harnesses.
   a) Rescue knot.
   b) Seat harness.
   c) Seat harness with chest harness.

6. Identify and discuss the safety checks that should be conducted for rescue harnesses.
   a) Check Class II and III rescue harness straps and buckles.
   b) Check for frayed stitching and damaged metal.
   c) Follow the manufacturer's guidelines for use, inspection, and maintenance.

7. Discuss the Harness Induced Pathology (H.I.P).
   a) Serious problems can occur when rescuers suspend motionless for a long period of time. The compression created by the straps can reduce the venous flow from the legs.
   b) Venous pooling typically occurs in the legs due to the force of gravity and a lack of movement. Some venous pooling occurs naturally when a person is standing. In the veins, blood normally is moved back to the heart through one-way valves using the normal muscular action associated with limb movement. If the legs are immobile, then these "muscle pumps" do not operate effectively, and blood can accumulate. Since veins can expand, a large volume of blood may accumulate in the veins.
   c) An accumulation of blood in the legs reduces the amount of blood in circulation. The body reacts to this reduction by speeding up the heart rate and in an attempt to maintain sufficient blood flow to the brain. If the blood supply is significantly reduced, this reaction will not be effective. The body will abruptly slow the heart rate and blood

pressure will diminish in the arteries. During severe venous pooling, the reduction in quantity and/or quality (oxygen content) of blood flowing to the brain causes fainting. This reduction can also have an effect on other vital organs such as the kidneys. The kidneys are very sensitive to blood oxygen, and renal failure can occur with excessive venous pooling. If these conditions continue, they potentially may be fatal.

d) This pathology can be minimized greatly by using wide material for harnesses such 2- inch webbing.

Reference: IFSTA, 7th Edition, Fire Service and Search and Rescue, pages 115 through 120.
Reference: High Angle Rescue Techniques, 3rd Edition, pages 13-16.

8. Discuss the characteristics of wristlets.
   a) Wristlet straps are designed to be placed around the wrist of a person to allow him to be raised or lowered through a vertical opening while hanging from the straps.
   b) May be used in specific circumstances when it is not possible to use a harness.
   c) Wristlets may also be used around the ankles for a horizontal entry when the victim or rescuer could not use a harness.
   d) Webbing of a harness is required to have a minimum breaking strength of 6,000 pound; wristlets are more difficult to categorize.
   e) Wristlets carry the load through the joints within the body and do not support it, so the safety factor is 3:1. Example: you intend to lift a 300-pound load: then the wristlets must have a breaking strength of 900-pounds.
   f) Breaking strength of wristlets will vary and the rescuer must be aware of the strength.
   g) Very few wristlets have a breaking strength of greater than 5,000 pounds.

Reference: Delmar, Confined Space Rescue, pages 173-174.

9. Discuss the design specifications and characteristics of a tripod.

a) When lifting with a tripod, the rescuer must watch how the equipment will be loaded and make sure that all loads are axial loads to keep from tipping over or collapsing the equipment.
b) It is the rescuers responsibility to know the limitations of the equipment. Not all hoists can carry the same loads.
c) Attaching hoisting equipment incorrectly or at the wrong point can lead to a connection failure.
d) Pay special attention to the usability of the tripod on some situations such as a sloped tank roof with a smooth surface.
e) Most tripods come equipped with swiveling feet to provide traction on smooth surfaces.
f) They will also have pointed feet on the reverse end to allow the foot to be pushed into soft ground for anchoring.
g) Tripods that are placed on sloped surfaces should have two of the legs placed on the same plane downhill of the opening in order to provide the greatest stability.
h) When lifting loads a change of direction pulley may be needed to keep the load axially to the tripod. If the change of direction pulley is placed outside the feet of the tripod, the load will not be axial, and the tripod could tip over.
i) The head of the tripod and the earth must remain parallel and the load must be hoisted perpendicular to both the head of the tripod and the earth.
j) The axis is imaginary line that runs perpendicular to the head of the tripod and the earth. It is also a path on which the load being hoisted out of a confined space must travel.
k) If this axis, perpendicular to both the earth and head of the tripod, is not maintained the tripod is likely to tip over.
l) Some tripods have adjustable legs and extending the legs changes its load carrying ability. The longer the tripod legs, the less weight they can carry.
m) Most tripods are also equipped with chains between the tripod feet to keep them from spreading as a load is applied.

10. Discuss the design specifications and characteristics of a quad pod.
    a) Quad pods are retrieval devices with four legs and a davit arm.
    b) The device must be loaded with the same care as a tripod.
    c) The davit arm, which extends between the feet of the device, relies on the device being loaded properly.
    d) If the device is tilted or not loaded axially, it may tip over or be pulled away from where it has been set-up.
    e) Knowledge of the equipment's limitation is essential.
    f) As with tripods, quad pods that are placed on sloped surfaces should have two of the legs placed on the same plane downhill of the opening in order to provide the greatest stability.

11. Discuss the design specifications and characteristics of a transformer retrieval support.
    a) One of the most difficult places to put a tripod is on the sloped roof of a tank or between several narrow and close confined spaces.
    b) These types of rescue situations need to be preplanned and may be better fitted with permanent equipment mounted in the area.
    c) A transformer retrieval support was designed for the situations described above.
    d) They are designed to be bolted directly to the flange of a man-way opening.
    e) It has a very specific use and is a very valuable device where the use of a tripod would be limited.

12. Discuss the design specifications and characteristics of retrieval winches.
    a) Retrieval winches are designed for hoisting people.
    b) They usually have stainless steel or galvanized steel cables and provide mechanical advantage for raising and lowering people.
    c) Some cannot be used for controlled lowers, but only as a raising mechanism.
    d) Built in advantages include fall protection, handle breaks to prevent movement of loads when the handle is released, ability to adjust the

mechanical advantage, and a clutch mechanism to prevent applying mechanical advantage to and entrapped person.
   e) Some winches can also provide a self-retracting safety line.
   f) A self-retracting safety line allows the line coming from the winch to be extended and retracted as fast as the wearer moves.
   g) If the wearer moves too quickly such as during a fall, the line locks and stops the fall.
   h) These systems limit a free fall to 18 inches and will not have to be tended by a person.

13. Discuss the design specifications and characteristics of fall protection.
   a) Fall protection is used to terminate falls if they occur.
   b) A personal fall-arrest system is a harness connected by a fall-arrest lanyard and shock absorber to a suitable anchorage in the work area.
   c) These systems allow rescuer mobility but still provide fall protection.
   d) Various equipment and options for establishing fall-arrest systems are available.
   e) Rigging techniques can be applied in establishing personal fall-arrest systems.

Reference: Delmar, Confined Space Rescue, pages 160-190.

14. Discuss and demonstrate atmospheric monitors and monitoring guidelines.
   a) Selection of an appropriate monitor.
   b) Calibration and bump test.
   c) Monitoring in order:
      I) Oxygen.
      II) Flammability / combustibility.
      III) Toxicity.

15. List and identify monitoring terms and relation to the use of atmospheric monitoring.
   a) Alarm Settings – the preset level within a monitor at which the monitor will display a visual and audible alert signal.

b) Detection – the act of discovering the presence of a contaminant.
c) Detection range – expresses the unit of measure a monitor uses to detect the vapor for which it is programmed. Combustible Gas Indicators (CGI) usually displays a percentage reading for the LEL and a PPM reading for toxicity.
d) Explosive Limits – a display indicating the percentage of air to gas mixture known as LEL and UEL.
e) Flammable range – the percent of vapor in the air that must be present to sustain combustion should an ignition source be present.
f) Flash point – the minimum temperature at which a combustible substance generates enough vapor to form an ignitable mixture with air in the vapor space above itself.
g) Ignition temperature – the minimum temperature to which a liquid must be raised in order for combustion to be initiated and sustained.
h) Immediately dangerous to life and health (IDLH) – the maximum concentration from which a person could escape without permanent or escape impairing effects within 30 minutes.
i) Permissible exposure limits (PEL) – the average concentration that must not be exceeded during an 8 hour work shift or 40 hour work week.

16. Discuss the guidelines for using ventilation at a confined space operation.
    a) Anytime the confined space is suspect of containing or has the potential for containing a hazardous atmosphere, ventilation should be implemented.
    b) If the hazardous atmosphere cannot be confirmed or denied rescue personnel near or in the confined space should consider wearing appropriate breathing apparatus until the atmosphere is deemed safe.
    c) All fans used for ventilation purposes must be able to produce a continuous minimum airflow of 4,000-5,000 cubic feet per minute (CFM).
    d) Flexible trunk tubes attached to a ventilation fan should stay relatively straight; a 90 degree bend in a trunk tube can reduce cfm air flow up to 50%.

e) Air monitoring should be periodically conducted even with constant ventilation.

17. Identify and discuss the features of a supplied air respirator (SAR), also called supplied air breathing apparatus (SABA).
    a) The SAR unit supplies air to the wearer for virtually unlimited amounts of time.
    b) It can be operated with an approved air compressor system, a cascade system, or SCBA bottles.
    c) It can be used in a toxic environment as well as an oxygen deficient atmosphere of less than 19.5 %.
    d) The air is supplied from the source through a supply line, passing through a regulator where the pressure is reduced, and on to the rescuer who wears an SCBA style facemask.
    e) OSHA 29 CFR 1910.146 mandates that the wearer also carry an escape bottle system providing at least 10 minutes of air.
    f) Depending on breathing patterns and the amount of physical exertion, the escape bottle may only deliver 2-3 minutes of emergency air. Rescuers should be monitored closely to ensure that the distance and time traveled in a confined space does not exceed the rescuer's ability to safely escape.
    g) The SAR is not as bulky as an SCBA and is easier to use in a confined space.
    h) Rescuers have the capability of traveling up to 300 feet using a SAR unit.

18. Discuss and demonstrate the proper operation and use of a SAR system.

19. Discuss and demonstrate the proper operation and use of an emergency escape bottle.

Reference: CMC, Confined Space Entry and Rescue, pages 9.1-9.40.

20. Discuss methods to reduce or avoid damage to all rescue equipment including Rescue Tool Kit.

21. Discuss Rescue Tool Kit – any tools that can be used for specific rescue situations such as confined space rescue.
    a. Tools for pre-plans.
    b. Tools for entry into the space.
    c. Tools for exiting the space.
    d. Tools for securing the space and making surrounding area safe.

ENABLING OBJECTIVE #10

The Technical Rescuer shall correctly identify in writing personal protective garments and accessory gear recommended for wear at confined space rescue incidents.

1. When establishing guidelines for personal protective equipment for specialty rescue responses, the AHJ may choose to review NFPA 1951 Standard on Apparel for Urban Technical Rescue Incidents that would be appropriate for a confined space rescue incident. The apparel list includes a helmet; wrap around eye protection, long pants and long sleeve shirt or jumpsuit, steel-toed boots, and leather work gloves.

2. Point out that additional PPE may include knee and elbow protection, SCBA, hearing protection, safety vest and dust masks.

Reference: IFSTA, 7th Edition, Fire Service Search and Rescue, pages 54 through 60.

3. Discuss with the students the criteria for selecting a helmet for rescue activity.
    a) Fire helmets, construction helmets, motorcycle helmets, and helmets used for sport activities are not suitable for most rescue activities.
    b) Rescue helmets should have a three-point suspension type chin strap. A single chinstrap is inadequate for rescue activities.
    c) The shell of the helmet should be constructed of material that will resist impacts and penetration of sharp objects. Examples of such materials include Kevlar or fiberglass composites.
    d) The design of the helmet should protect the head from falling objects and side impacts.

e) The helmet should have a narrow profile with a slight brim.
f) The inside suspension system of a helmet should hold the helmet away from the skull to reduce the shock of impact and provide comfort and adequate air circulation.
g) The helmet should comply with NFPA 1951.

Reference: IFSTA, 7th Edition, Fire Service Search and Rescue, pages 55 and 55.

4. Discuss with the students the criteria for selecting appropriate clothing protection for confined space rescue incidents.
   a) Clothing that has potential for coming into contact with fire should be constructed of fire resistant material such as Nomex.
   b) Turnout gear tends to be bulky and too hot for most rescue activities. Jumpsuits or BDUs (battle dress uniforms) tend to be more functional.
   c) Clothing should give full body protection and have the ability for self-ventilation. Gore-tex™, polypropylenes, and Thinsulate™ are materials that provide good ventilation and protection from the elements.
   d) Clothing used for rescue should be sized so as not to bind when arms are extended above the head or when legs are raised. Avoid binding at the wrists and ankles.

5. Emphasize that cotton is the least desirable material for wet and cold environments. Discuss the most desirable materials for wet and cold environments.

6. Point out that layering clothing prepares the rescuer for various environmental conditions.
   a) The first layer is underwear.
   b) The second layer is for insulation.
   c) The third layer is the outer shell.

7. Point out that footwear should provide adequate support to the ankle, and protect the feet from impact loads, bruises, scrapes, and cuts.
   a) Work boots usually fill this requirement well.
   b) The soles of the boot should have a good adhesion surface, not slick like street shoes.

c) Select socks that provide good wicking capability that pulls moisture away from the feet to keep the feet dry and warm, and decreases the formation of blisters.

8. Explain that gloves used in confined spaces should provide comfort, protection from abrasions, cuts, and ease of use for rope handling activities.
   a) Gloves should allow the hands to retain a sense of feeling so the fingers can manipulate equipment, leather work gloves provide good hand protection and are flexible enough to pick up objects easily, and are relatively inexpensive. Fire service gloves are often bulky and not the best choice.
   b) Leather gloves may become slick when wet. Synthetic gloves work well and maintain dexterity when wet.
   c) Many rescuers are purchasing military flight gloves that have the same features as a leather work glove with the added feature of being flame resistant.

9. Point out that protective eyewear should prevent dust and flying debris from entering the eyes.
   a) The eyewear should be OSHA approved close fitting goggles or safety glasses; face shields alone on fire and rescue helmets do not give adequate protection from dust and flying debris.

10. Point out when working inside the confined spaces, rescuers benefit from wearing elbow pads and kneepads to protect the rescuer's joints from abrasion and blunt trauma.

11. Point out that selection of respiratory protection devices will depend on the atmospheric conditions of the environment in which the rescuer is working.
   a) To filter dust and non-toxic particulates in an open clean atmosphere (19.5-23.5 % oxygen), a simple dust mask may be adequate, but will not filter out toxins.

Reference: IFSTA, 7th Edition, Fire Service Search and Rescue, page 58.

PRESENTATION

ENABLING OBJECTIVE #11

The Technical Rescuer when given the appropriate equipment shall correctly demonstrate the use of breathing apparatus used at confined space rescue incidents.

1. Point out that self-contained breathing apparatus (SCBA) or supplied air respirators (SAR) must be available for use during technical rescue operations.

2. Identify and discuss the features of an SCBA backpack assembly.
   a) The assembly is designed to securely hold the air cylinder on the rescuer's back.
   b) Adjustable shoulder straps provide for a secure fit.
   c) The waist strap helps distribute the weight of the cylinder to the hips. Removal or non-use of the waist strap voids the NIOSH (National Institute Occupational Safety and Health) and the MSHA (Mine Safety and Health Administration) certification.
   d) Swapping manufacturer parts voids the above certifications.

3. Identify and discuss the features of a SAR backpack assembly.
   a) The assemblies are streamlined with a lightweight design.
   b) Systems are designed for entry into or escape from confined spaces or hazardous atmospheres.
   c) Both 5 and 10 minute escape air bottle configurations are available as are various style choices for the harnesses.
   d) Most also have an interface option for communication systems.

4. Identify the features of the air cylinder assembly.
   a) This assembly constitutes the main weight of the SCBA.
   b) Weight varies depending on the manufacturer and the material used for construction.

5. Identify the most common sizes of air cylinders. Discuss what the “minutes” mean to the rescuer.
   a) 30 minute - 2216 psi.
   b) 30 minute - 4500 psi
   c) 45 minute - 3000 psi.
   d) 45 minute - 4500 psi.
   e) 60 minute - 4500 psi.

Reference: IFSTA, 6th Edition, Essentials, pages 289-293.

6. Point out the importance of practicing with an SCBA while doing work to identify how much time the rescuer has to actually enter, work, and exit a confined space.

7. An air consumption test is a good way to demonstrate time in a controlled environment.

8. Identify the features of the SCBA regulator assembly.
   a) Air from cylinder passes through the high-pressure hose to the regulator.
   b) The regulator reduces the pressure of cylinder air to slightly above atmospheric pressure and controls the airflow to meet the wearer’s requirements.
   c) Some regulators are mounted to the face piece. Others are attached to the chest strap or waist strap.
   d) There are two control valves: a mainline valve and a by-pass valve.
   e) During normal operations the mainline valve should be open and the by-pass valve shut.
   f) The by-pass valve should be opened when there is a malfunction of the mainline valve or the rescuer feels the need for a little extra flow.
   g) A remote pressure gauge is located on the harness in a position visible to the rescuer. The gauge reading should read within 100 psi of the cylinder gauge reading. When in doubt, use the lower reading to determine your actions.
   h) A low-pressure alarm will activate when the cylinder pressure reaches approximately one-fourth of the cylinder’s maximum rated pressure.

9. Identify the features of the SCBA face piece assembly.
   a) The face piece holds in cool breathing air.

b) It affords some protection against facial and respiratory burns.
c) Some helmets have a face piece bracket.
d) The exhalation valve is a one-way valve that allows air to be expelled from the mask without allowing outside contaminants inside the mask.

10. Point out that using a nose-cup and the application of an antifogging solution can reduce fogging of the mask.

11. Discuss the guidelines for SCBA weekly inspections, and before and after each use. Point out the importance of keeping records of such inspections.
    a) Make sure the cylinder is full.
    b) All gauges are in operating order.
    c) Low-pressure alarm is working.
    d) No leaks in the hoses and all connections are tight.
    e) The face piece is clean and functional. Do not use paper products to clean face piece as it may scratch the lens.
    f) The harness system is in good working order.
    g) All valves are operational.
    h) PASS device is working properly.

12. Discuss the guidelines for SCBA monthly inspections, and point out the importance of keeping records of such inspections.
    a) Check all components for deterioration.
    b) Check for leaks around valves and cylinder connection.
    c) Verify that all gauges, valves, regulator, exhalation valve, and low-pressure alarm are functional.

13. Discuss the guidelines for an annual inspection, and point out the importance of keeping records of such inspections.
    a) A factory certified technician should conduct the annual inspection.
    b) Steel and aluminum cylinders must be tested every five years.
    c) Composite cylinders must be tested every three years.

Reference: IFSTA, 6th Edition, Essentials of Firefighting, pages 291-294.

PRESENTATION

ENABLING OBJECTIVE #12

The Technical Rescuer when given the appropriate equipment shall correctly demonstrate the proper donning techniques of SCBA.

1. Demonstrate donning techniques for SCBAs.
   a) Over-the-head-method.
   b) Coat method.

2. Identify and discuss the donning procedures that should be conducted for supplied-air respirators (SAR).
   a) Follow the specific manufacturer's guidelines for conducting donning procedures, safety inspection and performing maintenance procedures.

Reference: IFSTA 6th edition Essentials of Firefighting, pages 297-302

APPLICATION

1. Divide the class into four equal groups. Set up:
   a) An inspection station. Have the students, using their own personal SCBA, or an SCBA supplied by the AHJ, perform a safety inspection.
   b) Over - the - head donning station. Have the students practice this technique in full PPE. Students shall practice performing this task within a maximum time of two (2) minutes.
   c) A coat - donning method station. Have the students practice this technique in full PPE. Students shall practice performing this task within a maximum time of two (2) minutes.
   d) Set up two skill stations. Have each student perform the skills while wearing PPE and SCBA.

2. Allow the students sufficient time to practice and advise the students regarding correct or incorrect procedures. Emphasize to the students that this is an area where the saying "practice makes perfect" is most appropriate.

3. Keep track of the time it takes to correctly don all of the different types of PPE. Then try to reduce the amount of time to two minutes, and then to one minute.

4. Have the students wear a full SCBA while performing a physical activity typical of a confined space rescue incidents. Time how long it takes for each student to run out of air. Discuss the importance of knowing this time limit when entering, working, and exiting a structural collapse incident.

SUMMARY

This lesson introduces the Technical Rescuer to the various components of preplanning, effective scene and confined space size-up procedures, developing effective operational plans, instituting an effective incident management system, identifying obstructions, and hazards, that need controlling before entry of a confined space. It is designed to prepare the Technical Rescuer to identify the many hazards that will be present at a confined space emergencies and organize an effective and functional incident management system to combat those hazards while ensuring the safety of all rescue personnel, victims, and bystanders.