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FOR HAZARDOUS WASTE
WORKER TRAINING

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Confined Space Rescue

Participant Guide

Acknowledgments

The Midwest Consortium for Hazardous Waste Worker Training adapted this program from work created by ERS International for private industry under cooperative agreement number U45 ES 06184 from the National Institute of Environmental Health Sciences.

We encourage you to comment on these materials. Please give your suggestions to those leading the program in which you are now enrolled or click on 'contact us' at https://mwc.umn.edu.

Warning

The material was prepared for use by experienced instructors in the training of persons who are or who anticipate entering a confined space. Authors of this material have prepared it for the training of this category of workers as of the date specified on the title page. Users are cautioned that the subject is constantly evolving. Therefore, the material may require additions, deletions, or modifications to incorporate the effects of that evolution occurring after the date of this material preparation.

Preface

Employees who work in confined spaces, such as tanks, pits and vaults, face serious risks. They may be exposed to hazardous atmospheres, hazardous sources of energy, engulfment or entrapment hazards, and physical hazards, such as extreme temperatures or insecure footing. Emergency personnel who are responsible for providing rescue services for confined space workers are at higher risk because rescue services would not be necessary unless a serious problem occurred. According to the Occupational Safety and Health Administration, 60% of employees killed in confined space incidents are attempting rescue. Training is designed to change these statistics.

This course will provide participants with the knowledge and skills required to rescue employees from confined spaces at the Operations Level. According to the National Fire Protection Association, a rescue at the Operations Level includes the following conditions: (1) the victim is visible from outside the primary access opening of the

space; (2) the internal shape of the space is clear and unobstructed; (3) rescuers can easily pass through the opening of the space while wearing personal protective equipment; (4) the space can accommodate two or more rescuers in addition to the patient; and (5) all hazards in and around the space have been identified, isolated and controlled. For rescues that exceed these conditions, additional training is required.

For Operations Level confined space rescues, this course meets or exceeds training requirements established by OSHA in its standard on Permit Required Confined Spaces as described in 29 CFR 1910.146 and referenced in OSHA's standard on Hazardous Waste Operations and Emergency Response.

The course includes 24 hours of instruction, including classroom discussions and hands-on activities. The number of hours may vary slightly depending on the needs of the participants. Topics include legal requirements, rescue scene management, conducting an initial response, rigging, and entry team operations.

To ensure you understand the information presented, you are encouraged to ask questions. Your active participation throughout this program is critical to your success.

This content was updated on June 20, 2024 and all web links are active as of that date; if you find an error, please inform the facilitator so that it can be updated.

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Rights & Responsibilities

Upon completion of this Module, the participant will meet the cognitive and affective requirements associated with Confined Space Awareness as described in NFPA #1670 -- Standard on Operations and Training for Technical Rescue Incidents, Chapter 5 -- Confined Space.

When you have completed this section, you will be better able to:

- 1-1: Recognize what a confined space is and identify the types of confined spaces listed in this Module.
- 1-2: Recognize common hazards found in the confined space environment
- 1-3: Identify common causes of confined space accidents
- 1-4: Identify laws and standards associated with Confined Space Rescue
- 1-5: Identify the capabilities and limitations of an awareness and operations level response

Module Overview

From 1986 to 1990, the Occupational Safety and Health Administration (OSHA) estimates that 63 fatalities, 5,931 lost workday cases, and 6,951 non-lost-workday cases occurred annually in incidents involving confined spaces. Most of these accidents could be avoided by using the safety procedures found in Part 90 Confined Space (MIOSHA). The majority of confined space deaths are attributed to atmospheric conditions. Additionally, a large number of injuries and deaths are caused by hazardous energy sources. More important, data from the National Institute for Occupational Safety and Health (NIOSH) suggest that more than 60% of those killed are would be rescuers. These rescuers may very well be fire fighters.

In 1992 several fire departments responded to a confined space incident at a radiator plant outside of Detroit. While attempting to rescue the victim from a pit beneath a degreasing tank, fire fighters were exposed to hydrochloric acid. Although no fire fighters died as a result of this incident, seven of eight fire fighters who responded were taken to a local hospital where they were treated for chemical burns.

In another case in Norfolk, Virginia, a private contractor, working for the US Navy, was overcome by fumes while working in a fuel cofferdam. The Little Creek Fire Department responded and entered the fuel cofferdam hoping to rescue the contract worker. While moving through areas as small as sixteen inches in diameter, the fire fighters removed helmets, turnout coats, boots and SCBA harnesses from their backs. One fire fighter died during this rescue attempt and another was hospitalized following the inhalation of toxic fumes.

The Occupational Safety and Health Administration (OSHA) and the National Fire Protection Association (NFPA) have adopted rules to protect people working in confined spaces. Rescuers must understand the hazards associated with confined space operations and must understand the capabilities and limitations of their response. This Module will highlight these important issues.

1-1 CONFINED SPACE DENTIFICATION

Types of Spaces

There are probably many confined spaces in your facility. Common confined spaces include:

- Sewers
- Digesters
- Pump Stations
- Vaults
- Tanks
- Pits
- Hoppers
- Wells
- Septic Tanks
- Silos
- Culverts

Definitions

Confined Space - For a space to be considered confined, three conditions must be met:

1. The space is large enough and so configured that an employee can enter and perform work.
2. The space has limited means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults and pits).
3. The space is not designed for continuous employee occupancy.

All three of these conditions must exist before a space is considered confined. Some confined spaces require a permit, while others do not. The hazardous conditions present determine the need for a permit.

Permit Required Confined Space

A permit-required confined space means a confined space that has one or more of the following characteristics:

- Contains or has a potential to contain a hazardous atmosphere
- Contains a material that has the potential for engulfing an entrant
- Has an internal shape that could trap or suffocate an entrant, such as being trapped by inwardly converging walls
- Contains any other recognized serious safety or health hazard, such as electrical, mechanical, or physical hazards

Non-Permit Confined Space

This is a confined space that does not contain, or with respect to atmospheric hazards, have the potential to contain any hazards capable of causing death or serious injury.

Examples of non-permit confined spaces include vented vaults and dropped ceilings. Although they are confined spaces, these spaces have either natural or permanent mechanical ventilation to prevent the build-up of hazardous atmospheres, and they do not present other serious hazards.

Entry

Entry refers to the act by which a person passes through an opening into a confined space. Entry is considered to have occurred as soon as any part of the entrant's body breaks the plan of the opening of the space. This definition was chosen because workers have become injured when putting their head into the opening of a space and being overcome with toxic chemical vapors.

Permit Systems

Under these rules, employers are required to develop a written permit space program, to ensure that certain steps are taken before employees enter permit spaces, and complete an entry permit before the work is done. These are all explained in Sections (d), (e), and (f).

Normally, **rescue organizations** will not be responsible for completing permits. However, if training is being conducted in permit-required spaces, the organization must complete a permit in order to ensure the safety of rescue personnel. This will be discussed in greater detail when we look at requirements involving the rescue service.

More importantly, when the rescue organization is called upon to provide rescue services for a confined space, a copy of the permit, if one exists, should be obtained as soon as possible.

A properly completed permit contains information that is valuable to the rescue team. OSHA rules requires a permit to include the following:

- Space to be entered
- Purpose of the entry
- Date and authorized duration of the entry
- Names of authorized entrants
- Names of attendants
- Name of the entry supervisor
- Hazards of the permit space
- Measures used to isolate the permit space and to eliminate or control hazards
- Acceptable entry conditions
- Results of air monitoring
- Rescue service that can be called
- Communication methods between entrants and attendants
- Equipment that will be used
- Additional permits, such as for welding done in the confined space

The employer-prepared permit may not be complete, especially if the rescue service has been called. The rescue organization may want to develop its own form to protect the safety of the rescuers. The host employer must keep completed permits on file for one year.

Alternate Entry Spaces

The rescue team may receive information that the confined space has been classified as an ALTERNATE ENTRY. In theory, this means that the space has been determined to contain only an atmospheric hazard that can be controlled with ventilation procedures. In order to use alternate entry procedures, the following conditions must exist:

- The employer can demonstrate that continuous forced air ventilation will keep the space safe for entry
- The employer develops inspection and monitoring data
- In making entry to collect this data a permit is filled out
- The employer makes the data available to employees
- Entry into the space takes place according to specific requirements described in the OSHA rules

Rescuers should understand that when a confined space is classified as an alternate entry, it relieves the following Permit Space requirements. The space can be entered:

- Without a permit/permit issuer (supervisor)
- Without an attendant
- Without a rescue service
- Without a communication system

Rescue teams must consider all confined spaces to be permit type entries and must take appropriate precautions.

1-2 HAZARD RECOGNITION

There are a number of hazards associated with confined space incidents. Awareness Level personnel must be trained to recognize these hazards. They must also be trained in procedures to mitigate hazards within the general rescue area. This "General Area" is typically an area around the confined space within 300 feet or more, as determined by the Incident Commander. Common hazards in the "General Area" may include:

Atmospheric Hazards

A hazardous atmosphere is one that exposes employees to the risk of death, incapacitation, or impairment of ability to escape unaided from the space. A hazardous atmosphere includes one or more of the following:

Oxygen Deficient or Enriched

If there is not enough oxygen in the air in a confined space, employees can lose consciousness. The lowest acceptable level is 19.5%.

When oxygen in a confined space is between 15 and 19%, your coordination is impaired and your ability to work hard is decreased. Between 12 and 14%, your coordination is further impaired, as is your perception and judgment. Your rate of respiration will also increase upon exertion.

At oxygen levels below 12%, respiration further increases in rate and depth, and other signs, such as mental failure, fainting, nausea, vomiting, convulsions, unconsciousness and death may occur. At lower levels, you cannot breathe and cannot rescue yourself.

When there is too much oxygen in a confined space (more than 23.5%), there is a danger of fire and explosion. In an oxygen-enriched atmosphere, clothing, hair, and other combustible materials will burn violently when ignited. For this reason, never use pure oxygen to ventilate a confined space.

Flammable Atmospheres

When flammable gases, vapors, or dusts are present in the air of a confined space, there is a potential for fire or explosion. Explosive vapors may be produced by many different substances, including fuels, solvents, paint thinners, and cleaning compounds.

Some possible sources of flammable materials in confined spaces include: spilled gasoline that has found its way into the water table and then into various underground structures; methane gas that is produced by the natural decomposition of organic material in the soil, and sewer gas that contains methane and small amounts of hydrogen sulfide and is also produced by the decomposition of organic material. Hydrogen sulfide is a flammable gas.

A flammable or explosive atmosphere is one in which flammable gases, vapors, or mists are present at a concentration greater than 10% of their Lower Explosive Limit (LEL). For example, the LEL for methane is 5%. An atmosphere containing 0.5% methane would be considered a flammable atmosphere.

Dusts, such as coal, grain, plastic, and fine metals may form explosive mixtures with air. Combustible dusts are included in the definition of hazardous atmospheres if the concentration of the dust meets or exceeds its LEL. **Note that 10% of the LEL does not apply to dusts.**

As a rule of thumb, when dust concentrations obscure vision at distances of five feet or less, that atmosphere should be considered explosive. This should only be used as a guide because some dusts are explosive at concentrations that would obscure vision only at distances greater than 5 feet.

Toxic Atmospheres

Toxic atmospheres are those where the air contains gases, vapors, fumes, dusts, or mists that are poisonous to the human body. **Hydrogen sulfide and carbon monoxide are among the most common toxic gases found in confined spaces.**

A hazardous atmosphere that is toxic would potentially expose an employee in excess of the Permissible Exposure Limit set for that chemical or substance.

Toxic substances can come from several sources. Products stored in the space can be absorbed into the walls and emit toxic gases when removed. The work being done in a confined space can also produce toxic materials, such as those generated by welding, cutting, painting, sanding, cleaning, or degreasing. Toxic gases from work in the area close by may enter and build up in the confined space. For example, exhaust from vehicles or solvent vapors are heavier than air and will settle in confined spaces below grade.

Immediately Dangerous to Life or Health (IDLH)

The fourth type of hazardous atmosphere is one defined as IDLH. This includes any other condition not already listed that poses an immediate or delayed threat to life or that interferes with a person's ability to escape unaided from a confined space.

Some chemicals, such as hydrogen fluoride or cadmium vapor, may produce immediate effects that go unnoticed, but result in sudden and possible fatal collapse 12 to 72 hours after exposure. These delayed effects are considered IDLH levels.

Hazardous Energy

Accidents have occurred in confined spaces when equipment within the space was not isolated from sources of hazardous energy, or when equipment was not properly guarded. In most of these cases, death occurred when the employee was crushed by moving equipment.

An investigation revealed that the deaths could have been prevented if the equipment had been locked out so it could not be started when employees were in the confined space. For this reason, rescuers must pay special attention to lockout procedures.

Hazards are also created by tools that are not properly grounded or insulated. Equipment that is not explosion proof creates dangers in atmospheres that are flammable or explosive. Types of hazardous energy include:

- Electrical
- Pneumatic
- Hydraulic
- Gas/Chemical
- Water/Steam
- Gravity
- Mechanical
- Special
- Multiple

Physical Hazards

In addition to the hazards discussed previously, there are many other hazards created by physical conditions within the confined space. These include the following:

Temperature Extremes

Extremely hot or cold temperatures in a confined space present problems for rescue personnel. Excessive heat may cause varying degrees of heat stress, which is made worse by lack of natural ventilation or the protective clothing of the rescuer.

Extreme cold causes people to become clumsy, tire easily, make mistakes, and generally be at greater risk of injury. If not treated, this condition can cause body temperatures to become abnormally low. This is called hypothermia. Numbness in the arms and legs is a common symptom.

Frostbite causes injury to specific areas of the body and results from exposure to extremely low temperatures.
Also, protective clothing, such as self-contained breathing apparatus, may not work at extremely low temperatures.

Insecure Footing

Many confined spaces have oily or slippery floors that cause insecure footing. Rescue personnel may fall when climbing into confined spaces using ladders or narrow stairways. In addition, once inside the space, the rescuer may have to stand on a surface with insecure footing.

Noise

Noise levels in a confined space may cause physical damage to the ears, temporary and or permanent hearing loss, and inability to hear warnings.

Hearing protection must always be provided and worn when exposures exceed 85 decibels, averaged over an 8-hour day. Ear plugs and muffs are examples of hearing protection.

If there is a chance that a warning will go unheeded, other kinds of communication must be used. Hand signals, tugging on a rope or lifeline, or throat microphones are substitutes.

Presence of Animals

Some confined spaces may contain potentially dangerous animals, such as snakes, rats, raccoons or poisonous insects. This danger may be eliminated by the use of air horns to frighten the animals away. The rescuer must use caution in any dark area.

Overhead Hazards

Once rescuers enter a confined space, a variety of hazards that may fall or be dropped come into play. Overhead hazards include such things as ladders, rescue equipment, and pipes.

Biological Hazards

Workers injured or killed in confined spaces commonly emit bodily fluids. Blood, vomit, urine, and feces are often part of confined space rescue work. Rescuers must use Universal Precautions found in medical department requirements.

Hazard Control

A variety of hazards may exist at confined space rescue incidents. Rescuers must make decisions about what actions will be taken when dealing with these hazards. Hazard control choices include: (1) avoid the hazard; (2) remove the hazard; (3) control the effects of the hazard; and (4) use personal protective equipment (PPE).

The Incident Commander must conduct a risk/benefit analysis to determine how long these methods will take to implement and how much survival time the victim has. Factors involved in that analysis include an assessment of equipment and an assessment of the training, skills, knowledge, and number of rescue personnel that are required to protect rescuer safety.

A. Avoidance

Rescuers may be presented with options that allow for avoiding the hazard(s). Avoidance may be a good choice because it can often be done without the additional equipment needed for control, removal and protection procedures.

Example: A maintenance worker crawled into an opening in a heating, ventilation, and air conditioning system to perform scheduled work. In order to get to the work area, he crawled past an electric motor and through the blades of a large flywheel. A rescue team was called when the man became unconscious. The rescue team recognized the electrical, gravity and momentum hazards and avoided them by entering and removing the victim through another opening.

B. Removal

Another option in hazard control is removal. True hazard removal permanently terminates the risk to the rescue team. When removal can be accomplished in a timely manner, it becomes an excellent choice.

Example: An electric utility pole that carried a wire from pole to building tilted during a trenching operation accident. The partial collapse of the pole, due to trench wall failure, pulled the wire off the building. The live wire laid on top of the trench, which had two workers trapped in it. The rescue team recognized the hazard and determined that their training, 20,000 volt rated gloves, and hot stick/cutter would allow them to cut and remove the wire.

C. Control

This procedure is sometimes confused with removal. Control techniques do not actually remove the hazards, but instead temporarily control them. While the hazard mechanism remains in place, the potential to injure or kill anyone is held in check.

Example: A worker applying an interior coating to the inside of a tank became dizzy and weak due to vapors. A rescue team was called when the worker was unable to exit from the tank. Initial atmospheric monitoring indicated Lower Explosive Limits over 40%. The open cans of coating along with the coating applied to the interior of the tank would continue to give off the flammable vapors. Removal of the coating material was not possible without entering the tank to remove the open cans and to purge the tank.

Forced air ventilation was chosen as a technique to control the hazard. Through the use of this technique, the flammable atmosphere could be kept below 10% of the LEL, even though the hazard could not be avoided or removed.

D. Personal Protective Equipment (PPE)

Protective equipment can be used as an alternative for hazard control as long as engineering and work practices do not adequately protect employees. Rescue Teams should establish minimum levels of PPE. When possible, rescue personnel should use PPE as a supplement to and not a substitute for control methods.

Example: While climbing down a fixed ladder into a lift station, a rescuer's weight caused the rusted ladder rung to break. The startled rescuer began to fall towards the concrete floor 50 feet below. A fall arresting device connected to a full body harness stopped the fall. In this case, the PPE protected the rescuer from the hazard.

Note: You will learn more about specific hazard control techniques during the hands-on workshops provided in this course.

1-3 COMMON CAUSES OF CONFINED SPACE ACCIDENTS

People do not go to work hoping to have an accident. In fact, with proper training, information, and equipment, workers are able to avoid most accidents. Why then do people continue to be injured and killed while working in confined spaces? The **FAILURE** acronym highlights many of the common causes associated with confined space accidents.

Financial Motivation: Time is money and money is time. Supervisors and their employees will often cut corners on safety in order to save time.

Assessment Deficit: Not performing or inadequately performing a hazard assessment.

Inadequate PPE: Not using proper personal protective equipment.

Lack of Training: Uninformed and uneducated workers will make poor decisions that can cause accidents.

Underestimating the Environment: Many of the hazards associated with confined spaces cannot be seen. Workers will often underestimate the confine space environment and are injured by hidden hazards.

Routine Operation Syndrome: Thinking that the space is safe today because it has not resulted in injuries during previous entries.

Equipment Failure: Improper maintenance, abuse, lack of back-ups, and equipment use that has not been mastered can all lead to accidents.

1-4 CAPABILITIES AND LIMITATIONS

Laws

Depending on the host country, laws concerning minimum requirements for the practices and procedures to protect employees from the hazards associated with entry into permit required confined spaces are published by the federal government or the individual state or provincial government.

Ford Requirements

The minimum safety standards set forth in this document apply to all fire departments and rescue teams with confined spaces in their jurisdictions. They have been adopted by Ford Motor Company and so are enforceable in all places where Ford does business.

Other Company-specific Requirements

As appropriate, the facilitator will introduce specific requirements applicable to your employer. These may be designed by a parent company, a local employer based on experience or State requirements, for example.

1-5 DUTIES OF HOST EMPLOYERS

An employer who designates rescue and emergency services, has several responsibilities. These include:

- Evaluate a prospective rescuer's ability to respond to a rescue call in a timely manner
- Evaluate the rescue service's ability to perform the tasks associated with rescuing employees from permit spaces
- Select a rescue team that can reach the victim(s) in a time frame that is appropriate to the hazards present

If the employer decides to use an in-house rescue service, the following requirements have to be met.

- Provide employees with personal protective equipment and train them in how to use the equipment
- Train employees to perform assigned rescue duties
- Train employees in basic first aid and CPR
- Ensure that employees practice making permit space rescues at least once every 12 months from the types of spaces that are present at the facility

If the employer decides to use an off-site rescue service, arrangements must be made in advance. In other words, the host employer cannot assume that a fire department will automatically provide the service. The agreement does not have to be in writing. Unfortunately, many employers may assume that they can rely on the fire department for assistance without contacting them in advance. This assumption can lead to trouble if the fire department is not prepared to respond to confined space rescues.

Rescue Plans

A rescue plan must be completed for each permit space for which the rescue organization will provide the service. This will ensure that all rescue personnel are familiar with the hazards they may face. The rescue plan will be a resource the Incident Commander can use to develop a safe and effective action plan.

The rescue plan should include:

- Identification of the facility
- Location of the spaces to be entered
- Actual and potential hazards
- Equipment that will be needed

1-6 LAWS AND STANDARDS

In addition to employer requirements (such as Ford) on confined space rescue, laws and standards will have an impact on the manner in which the rescue organization provides its service. This includes local, state/provincial, and federal laws pertaining to:

- Fire Fighting
- Respiratory Protection
- Excavation, Trenching, Shoring
- Personal Protective Equipment
- Lockout/Tagout

Standards

NFPA Standard #1670

Employers may adopt a standard such as the National Fire Protection Association (NFPA) on Operations and Training for Technical Rescue Incidents. This standard covers the following types of rescue:

- Structural Collapse
- Rope Rescue
- Confined Space
- Vehicle and Machinery
- Water
- Wilderness Search and Rescue
- Trench and Excavation

Because the Company has adopted this regulation, it becomes enforceable wherever Ford does business.

Under the NFPA standard on Technical Rescue, rescue organizations must establish levels of operational capabilities needed to conduct operations at technical rescue incidents safely and effectively. These levels include:

Awareness: This level represents the minimum capability of a responder who, in the course of his or her regular job duties, could be called upon to respond to, or could be the first on the scene of a technical rescue incident. This level can involve search, rescue, and recovery operations. Members of a team at this level are generally not considered rescuers.

Operations: This level represents the capability of hazard recognition, equipment, and techniques necessary to safely and effectively support and participate in a technical rescue incident.

Technician: This level represents the capability of hazard recognition, equipment, and techniques necessary to safely and effectively coordinate, perform, and supervise a technical rescue incident.

ACTIVITY 1-1: Rights & Responsibilities

Purpose: To allow the participant the opportunity to apply the information from the module to an actual confined space rescue.

Directions: View the video written description of a rescue provided by the instructor and, in a group, answer the following questions concerning Legal Requirements. Be prepared to give a report to the class.

https://www.youtube.com/watch?v=VV6DbWWbKT0

https://www.cdc.gov/niosh/face/In-house/full8764.html

1. Why was this space a confined space?

2. If so, what type of confined space was it? Why?

3. What hazards were found outside and inside the space?

4. What were the causes of the worker accident?

5. What was the cause of the Rescue Team accident?

6. What Laws and Standards applied to this incident?

7. What level of response was indicated for the rescue team? Why?

Module Summary

In this module of the course, you learned what a confined space is and you learned about the laws and standards that regulate work in confined spaces, as well as rescue operations. This Module also addressed the different levels of confined space rescue, including Awareness, Operations, and Technician. Finally, you learned about the hazards that may be present in a confined space and the ways in which those hazards can be eliminated or controlled.

Rescue Scene Management

Given a confined space rescue scenario, the participant will apply the principles of Rescue Scene Management presented in this Module.

When you have completed this section, you will be better able to:

- 2-1: Identify the four phases of the Standard Operating Guideline presented in this Module.
- 2-2: Recognize the functional components commonly utilized at a confined space rescue (Operations Level) and the duties necessary to complete them.
- 2-3: Recognize the operations worksheets provided to enhance efficiency and safety at confined space incidents.

Module Overview

High levels of emotional reaction, anxiety, and feelings of helplessness often lead to illogical actions and chaos on the rescue scene. First arriving emergency responders must immediately assess, command, and control the situation. Proper Initial Actions are the foundation of a successful rescue operation. Plan Development and the implementation of Sustained Actions are essential parts of a well-run incident. Emergency service providers must maintain discipline and control beyond the patient removal and transport portion of the incident. Well-defined incident Termination procedures need to be developed and followed.

In this Module we will explore ways to enhance Scene Management at rescue incidents. A model Standard Operating Guideline (SOG) is presented to help organize, plan, direct and simplify tactical assignments. Operation worksheets are designed to serve as checklists for command and company operations.

2-1 STANDARD OPERATING GUIDELINE

Phase I: Initial Actions

The first arriving company will ensure that a safe approach to the confined space is provided, incident command is implemented, a site assessment is conducted, and scene control is established.

Awareness Level Procedures

Approach

- Come in from a safe direction
- Position apparatus no closer than 100 feet from space
- Approach with Personal Protective Equipment appropriate for the site
- Seek witnesses, workers, and attendants

Notification

- Establish command
- Provide a brief incident report
- Determine command location and initial staging area
- Make initial action assignments

Identification

- Information Sources (workers, supervisor, witnesses, attendant, permit, MSDS)
- Reconnaissance (hazard recognition and victim information, confined space detail, resources available)

Isolation

- Zoning
  - Rescue zone: use barrier tape to create a Rescue Zone of approximately 50-foot perimeter around the space
  - Work Zone: use barrier tape to create a larger Work Zone about 100 feet around the space
  - Limit Access: provide limited access points to these zones that will facilitate the movement of assigned personnel and equipment

- Evacuation
    - Surface victims: take control of care and treatment of injured surface victims
    - Trapped victims: provide fresh air and self-rescue assistance, when appropriate
    - Untrained rescuers: direct would-be rescuers out of unsafe areas
    - Bystanders: remove spectators and media from Rescue and Work Zones
    - Emergency Personnel: permit entry of assigned emergency personnel only

<u>Protection</u> (Exterior Hazard Mitigation)

- Traffic: block/barricade traffic and create a safe working zone
- Heavy Equipment: shut down heavy equipment
- Atmospheric: ventilate the area, if needed
- Downed Wires: barricade/tape off area and call electric company
- Hazardous Energy: lockout and tagout
- Disrupted Utilities: call for appropriate sewer, water, gas, and electric company emergency teams
- Trip Hazards: remove tools, small pipes, boards, and other trip hazards

Phase II: Plan Development

The Incident Commander will establish a plan of action (Incident Action Plan) that will match the resource capabilities to the situation at hand.

Size-Up

- Operational Mode
  - Rescue: There is a good possibility that the victim is viable. Rescue team actions may be urgent. Evaluated, reasonable risks may be taken.
  - Recovery: The victim is obviously dead or the probability of survival is extremely low. Actions will be carefully evaluated and all hazards to rescue workers will be controlled or removed.
- Strategic Mode
  - Offensive: The rescue, search or recovery must be done by entry into the space
  - Defensive: The rescue, search or recovery may be done without entering the space (non-entry)
  - Transitional: The rescue, search or recovery will begin with one mode (offensive or defensive) and will predictably change to the other

Incident Level

- Awareness: Non-entry operations
- Operations: Entry into the space
  - Victim is visible from outside the space's primary access opening
  - Internal shape is clear and unobstructed, so retrieval systems can be used for rescuers without the possibility of entanglement
  - Rescuers can pass easily through the opening, with room to spare while PPE is being worn, as recommended by the manufacturer
  - The space can accommodate two or more rescuers in addition to the victim
  - All hazards in and around the space have been identified, isolated, and controlled
- Technician: Entry into space beyond Operations Level restrictions
  - Continued size-up of existing and potential conditions
  - Procedures to ensure that rescue team members shall take part in a medical surveillance program

- Planning response for entry-type confined space rescues in hazardous environments
- Implementation of the planned Technician response

Resources

- On-Scene: The operation can be completed with the first due response
- On-Duty: The operation can be completed with the addition of rapidly deployable (on-duty) resources
- Mutual Aid: The operation can be completed with the addition of neighboring county or regional resources that have previously arranged response agreements
- State/Provincial/Federal: The operation requires the use of state, provincial, and/or federal resources

Phase III: Sustained Actions

Briefing

The Incident Commander will ensure that the following information is provided and document that it is understood.

Emergency Signals

- Evacuate – 3 blast series
- Stop – 1 long blast
- Resume – 1 long and 1 short blast

Scene Awareness

- Hazards
- PPE Requirements
- Site Details
- Incident Action Plan
- Decontamination

Entry Team Briefing

- Safe Entry Conditions
- Entry PPE Requirements

- Team Assignments
- Support Readiness
- RIT Readiness
- Additional Equipment

Initiate Assigned Tasks

Hazard Mitigation

Atmospheric
Hazardous Energy
Engulfment and Entrapment
Fall Protection
HazMat/Biological
Personal

Locate

Visual/audio contact
Eyewitness reports
Clues
Electronic
Entry search

Access

Ladder placement
Rescue rigging
Horizontal
Secondary points

Stabilize

Rescue ventilation
Victim air supply
Patient care
Transfer device
Physician rescue team

Transfer

Disentanglement/Extrication
Patient Removal (rope rescue, carry out)
Transport to medical facility

Phase IV: Termination

Incident termination includes on-scene termination operations and follow-up procedures that occur after the personnel and equipment are returned to quarters.

On-Scene Procedures

Safety

- Continue to enforce scene control during this phase
- Ensure that safe termination procedures are used

Accountability

- Concludes the ongoing personnel accountability
- Documented prior to leaving the scene

Rehabilitation

- Final step in personnel rehabilitation
- Personnel should be rested and hydrated prior to conducting equipment-gathering duties

Debriefing

- All personnel will be gathered together in a safe and quiet location prior to leaving the scene
- Incident goals, strategies, and tactics will be highlighted
- The termination procedure will be outlined and assignments made

Follow-Up Procedures

Post Incident Analysis

- Information discussion of the incident
- Should take place within 24 hours of the incident

Incident Critique

- Formal critique of the incident
- All participating agencies should be invited
- Should take place within 72 hours of the incident

Critical Incident Stress Debriefing

- Incident Commander and officers must be trained in recognition
- CISD is available through unions, local governments, and hospitals

Equipment

- Recovery
- Accounting
- Recondition
- Restock

Site Control Transfer

- Official transfer to authority having jurisdiction.
- Document representative's name and time of transfer.

Incident Documentation Complete

- Complete internal incident report and narrative.
- Complete Division/Corporate reports.

2-2 FUNCTIONAL COMPONENTS

The **Incident Commander** has the following responsibilities during a confined space rescue:

- Provide for the safety of all personnel
- Determine incident priorities
- Establish strategic goals
- Coordinate all activities
- Assign resources
- Determine the command structure
- Respond to the media

The **Operations** function implements the action plan as determined by the Incident Commander and has the following responsibilities:

- Control tactical operations
- Provide direct supervision in the Hot Zone

The **Planning** function supports the Incident Commander by:

- Collecting and evaluating all information
- Assisting in development of the action plan
- Providing situation status
- Providing resource status
- Determining outcomes and alternates
- Documenting the incident

The **Logistics** function provides all necessary resource support. This function also assists in action plan development.

The **Finance** function provides documentation of the costs of the incident, including payroll and purchase orders.

2-3 OPERATION WORKSHEETS

The following worksheets will be provided and discussed:

- Command Worksheet
- Approach Assessment Checklist
- Resource List
- Planning Worksheet
- Incident Action Plan
- Technical Rescue Incident Report

INCIDENT MANAGEMENT WORKSHEET

Phase I: Initial Actions

- ☐ Notification (Establish Command)
  - Brief initial report
  - Primary assignments
  - Incident notification (internal and external)
- ☐ Identification
  - Hazard Assessment (Checklist)
  - Reconnaissance
  - Resources
- ☐ Isolation (Scene Control)
  - Zoning
  - Staging
  - Evacuation
- ☐ Protection
  - Personal Protective Equipment
  - Hazard Control

Phase II: Plan Development

- ☐ Incident Control Plan
  - Size-up
  - Strategic goals
  - Tactical operations
  - Resources
  - Assignments (Expand IMS)

CONTROL PLAN

Strategic Goal(s):

_____

_____

_____

Tactical Operations: **Assigned**

_____

_____

_____

_____

_____

_____

_____

_____

_____

Phase III: Sustained Actions

- ☐ Control Plan Implementation
  - Briefing
  - Initiate Assigned Tactics
  - Evaluate Control Plan
    - ➔ Tactics achieved (Go to Termination)
    - ➔ Tactics not achieved (Re-evaluate Control Plan)

Phase IV: Termination

- ☐ Termination (Personnel)
  - Accountability
  - Rehabilitation
  - Post Incident Analysis
  - Critical Incident Stress Debriefing
  - Documentation
- ☐ Recovery (Equipment)
  - Site Transfer
  - Re-supply
  - Recondition
  - Inventory

Control of Site Transferred to:

_____

Time: _____

Date: _____

Signature: _____

APPROACH ASSESSMENT CHECKLIST

Approach

- Keep apparatus at least 100 ft. from space
- Check permit, attendant, or witnesses
- Stage rescue personnel
- Approach with appropriate PPE

Situation

☐ Atmospheric related incident
☐ Entrapment
☐ Medical/trauma (no entrapment)
☐ Other

Hazards

☐ Oxygen
☐ Carbon monoxide
☐ Hydrogen sulfide
☐ Lower Explosive Limit
☐ Electrical
☐ Mechanical
☐ Gas
☐ Heat
☐ Converging walls
☐ Physical (noise, falls, animals, etc.)
☐ Other

Confined Space Detail

Type of Space: _____
Size of Opening: _____
Depth: _____
Interior Obstructions: _____
Width: _____
Normal Use: _____
Length: _____
Work Being Done: _____

Patient Assessment

	Location	Condition
Patient #1		
Patient #2		
Patient #3		
Patient #4		

Resource Assessment

☐ Rescue cart
☐ Traffic control
☐ Ventilation
☐ Heaters
☐ Personnel
☐ Hand tools
☐ Generator
☐ Ladders
☐ Lifting device
☐ CSR Techs
☐ Qualified person
☐ Pat. packaging
☐ De-watering
☐ Scene lighting
☐ Tripod
☐ Medical

RESOURCE LIST

Utility Control	Name:	Phone:
	Name:	Phone:
Digging/Sloping	Name:	Phone:
	Name:	Phone:
Sheeting/Shoring	Name:	Phone:
	Name:	Phone:
Dewatering	Name:	Phone:
	Name:	Phone:
Air Bags	Name:	Phone:
	Name:	Phone:
Lights/Generators	Name:	Phone:
	Name:	Phone:
Traffic Control	Local Police	
	State/Provincial Police	
Rehabilitation	Salvation Army	
	Red Cross	
Confined Space Teams	Name:	Phone:
	Name:	Phone:
Technical Advisors	Name:	Phone:
	Name:	Phone:
Hazmat Teams	Name:	Phone:
	Name:	Phone:
Medical	Name:	Phone:
	Name:	Phone:
Search Teams	Name:	Phone:
	Name:	Phone:
Soil Engineers	Name:	Phone:
	Name:	Phone:
Rope Rescue Teams	Name:	Phone:
	Name:	Phone:

SUSTAINED ACTIONS: PLANNING WORKSHEET

Operational Mode

☐ Rescue ☐ Search ☐ Recovery

Resource Evaluation

Hazard Mitigation	☐ On Scene	☐ On route, ETA
Locate	☐ On Scene	☐ On route, ETA
Access	☐ On Scene	☐ On route, ETA
Stabilize	☐ On Scene	☐ On route, ETA
Transfer	☐ On Scene	☐ On route, ETA

Strategic Mode

☐ Offensive ☐ Defensive ☐ Transitional

Strategic Goals:

Tactical Objectives

☐ Hazard Mitigation	
☐ Locate:	
☐ Access:	
☐ Stabilize:	
☐ Transfer:	

RESCUE TEAM OFFICER CHECKLIST

PRE-ENTRY (BRIEFING)

☐ Entry Conditions	Hazard Control Method
1.	
2.	
3.	
4.	

☐ **Entry Team Equipment**: PPE, Patient (Stabilize/Transfer), Entry Line

☐ **RIT Equipment**

☐ **Entry Plan**	☐ **RIT Plan**
L:	
A:	
S:	
T:	

☐ **Communications**	☐ **Support Team Readiness**
Primary:	Rigging
Secondary:	Hazard Control
Emergency:	Reconnaissance
	Medical

ENTRY OPERATIONS

☐ Coordinate safe entry and removal operations
☐ Maintain communications with Entry Team
☐ Monitor and record air supply (SCBA- every 5 minutes)
☐ Ensure safe and healthy conditions in the space (monitoring)
☐ Rotate entry personnel as needed
☐ Implement evacuation procedures as needed

AIR SUPPLY RECORD

Team Member	Time On	Check #1	Check #2	Check #3	Time Off
1.					
2.					
3.					
4.					

TECHNICAL RESCUE INCIDENT REPORT

Incident #
Nature of Incident:
Location:
Contact Person: Phone:
Description of Rescue Site:
Time Out: Time Arrived:
All Set Time: Date:
Personnel Present:

Hazards Present:

Hazard Control Techniques:
Other Agencies:
Sketch or Diagram of Rescue Area

Action Taken: Rescue Recovery Search Standby
Other:
Patient Status:
Rescued: # Injured:
Deceased: # Transported:
Ambulance Service:
Medical Facility:
Rescue Techniques Used:
Non-Entry
Entry - Problems encountered:
Raising - Describe:
Lowering - Describe:
Anchors - Describe:
Extrication - Describe:
Equipment Used (Designate with an “x” if expended or not recovered.

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Rescue Officer in Charge:
Supplemental Sheets:
Report Completed By: Date:

ACTIVITY 2-1: RESCUE SCENE MANAGEMENT

Purpose: To allow participants the opportunity to practice the Rescue Scene Management skills presented in this Module.

Direction: You arrive on the scene of a confined space incident described by the facilitators. You have the plant Emergency Response cart and all of the members of the class. Complete the following activity checklist.

Phase I

1. You are in command of this incident. Provide a Brief Initial Report.

2. How would you begin the response system?

3. Assign ERT members to Initial Action duties:

	Names	Task	PPE
Reconnaissance			
Isolation			
Protection			

Phase II

Using the Approach Assessment Sheet provided, determine the following:

1. Operational Mode Rescue Recovery
2. Strategic Mode Offensive Defensive Transitional
3. Level Awareness Operations Technician
4. Resources On scene On duty Mutual aid State, Provincial, Federal

Phase III

Assign functional tasks by name.

Task	Name(s)	PPE	Set-Up Complete ✓
Entry			
Rapid Intervention Team (RIT)			
Rescue Team Officer (RTO)			
Rigging			
Medical			
Recon			
Control			

Emergency Signals	
Scene Awareness	☐ Hazards ☐ PPE ☐ Site details ☐ Action Plan ☐ Decontamination
Entry Team Briefing	☐ Conditions ☐ Assignments ☐ RIT Readiness ☐ Check PPE ☐ Support and Readiness ☐ Communications (Primary) ☐ Communications (secondary) ☐ Additional equipment

Phase IV

1. List a safety issue:	
2. List an accountability issue	☐ Entry ☐ Recon ☐ Hazard Control
3. Rehabilitation location:	

Debriefing: What Happened?

1. Level of Rescue:	
2. Strategic Mode Used:	
3. Resources Used:	
4. Time Frame:	____ minutes to remove patient ____ minutes to remove Entry Team
5. Safety Concerns:	
6. Procedural Issues:	
7. Thanks	
8. What needs to be done?	
9. Assignments:	

Equipment

☐ Recovery ☐ Clean/Repair ☐ Documentation
☐ Accounting ☐ Restock ☐ Site Transfer

Module Summary

In this Module, we looked at ways to help manage the rescue scene. Using the Incident Management System as a foundation, we discussed a four phase Standard Operating Guideline. We learned about the functional components and duties that are associated with an Operations Level confined space rescue incident. Finally, we identified worksheets designed to enhance Rescue Scene Management.

Initial Response

Given a confined space rescue scenario, the participant will demonstrate the knowledge and skills needed to complete the initial response, according to the Participant Guide.

As a member of a workshop group, the participant will demonstrate:

- 3-1: Incident Command (Notification) duties
- 3-2: Selection and donning of personal protective equipment (PPE) for the initial response
- 3-3: Scene control (Isolation) duties
- 3-4: Reconnaissance (Identification) duties
- 3-5: Hazard control (Protection) duties
- 3-6: Incident Command (Plan Development) duties
- 3-7: Non-entry rescue retrieval system duties

Module Overview

Actions taken during the Initial Response often dictate the success or failure of a rescue operation. First responders and Rescue Specialists share the responsibility of ensuring that both Initial Actions and Plan Development have been completed. In addition, non-entry rescue procedures, provided by Awareness and Operations Level personnel, can often increase victim viability, while enhancing rescuer safety.

3-1 COMMAND FOR INITIAL ACTIONS (NOTIFICATION)

Any member of the Emergency Response Team (ERT) may be the first to arrive at an emergency scene. It is important that every responder is able to command the Initial Action phase of the operation.

Initial Actions Command Duties

- Establish command
- Begin an approach assessment
- Provide a Brief Initial Report (BIR)
- Identify the Command and Staging locations
- Assign initial action duties and identify appropriate levels of PPE
- Initiate the response system and request appropriate internal and external resources

3-2 PERSONAL PROTECTIVE EQUIPMENT

Initial responders to a confined space incident need to be able to select and don PPE that will provide the protection needed to perform their assignments. ERT members assigned to operate near the confined space opening should consider firefighting turnout gear as minimum PPE, unless officially downgraded by the Incident Commander. Hazardous materials incidents, which are beyond structural firefighting PPE levels, are beyond the scope of the confined space rescue training provided in this program.

PPE Selection

The selection and use of PPE by the initial responders is determined by the work assignment, the area you will work in, and the potential and real hazards present. ERT members performing initial actions must wear the minimum PPE. The following pages discuss the minimum levels that should be provided for non-entry rescuers.

1. **Respiratory Protection**

Due to the high risk of atmospheric hazards at a confined space incident, respiratory protection (Self-Contained Breathing Apparatus) must be worn until an atmospheric monitoring test verifies safe conditions. Personnel working outside the space can be subjected to hazardous conditions coming from the opening. In addition, confined space ventilation can contaminate an area outside of the confined space, where initial actions are taking place.

2. Body Protection

Non-entry personnel must be protected from abrasion and fire hazards. Nomex-type coveralls are a good choice for this type of work due to their lightweight design and ease of movement styling. However, when poor weather conditions or chemicals are present, the Incident Commander should upgrade body protection.

3. Head Protection

Since non-entry rescue personnel often have to be in tight areas, surrounded by steel (beams, columns, pipes, etc.), head protection is required in the hot zone (rescue area).

These rescuers are also working under rigging, and therefore, may be hit by falling objects that can cause head injuries. While the use of strong, lightweight and non-conductive rescue style helmets is preferred, fire fighter helmets are a reasonable choice. Nomex hoods will provide flash protection to the head area.

4. Eye Protection

Protection from dust, vapors, mists, and flying objects that can injure the eyes is a requirement in every industrial setting. These hazards are also present at an industrial rescue scene. Plant approved safety glasses are a good choice for minimum eye protection.

5. Hand Protection

A good pair of leather work gloves will provide the non-entry rescuer with minimum cut and abrasion protection. These gloves offer a great improvement in dexterity over firefighting gloves.

6. Foot Protection

Shoes or boots must provide protection from slip hazards, abrasions, cuts, and falling objects around the rescue scene. As a minimum, non-entry rescue personnel should wear approved leather footwear with slip resistant soles.

7. Hearing Protection

ERT members must protect their hearing from loud noise levels. Factory approved hearing protection is usually appropriate for non-entry rescue personnel.

8. Fall Protection

Non-entry ERT members working at heights or working near an opening to a confined space that presents slip or fall hazards must be protected by harnesses and fall arresting systems.

9. Lighting

Area lighting must be provided for non-entry rescuers assigned to poorly lighted areas. Flashlights and floodlights are acceptable for most situations. Where the possibility of flammable atmospheres exists, non-explosive lights and calumine sticks are required.

10. Atmospheric Monitoring

The area outside the confined space must be continually monitored for oxygen, flammable gases, and toxic chemicals, such as carbon monoxide and hydrogen sulfide.

ACTIVITY 3-1: Notification and Command

Purpose: To provide participants with the opportunity to practice Initial Actions duties at the scene of a simulated confined space rescue.

Directions: As a member of a work group, you will perform the duties of the first arriving Incident Commander.

Notification and Command	Yes	No
As a member of a work group, did you:		
1. Establish command?		
2. Begin an approach assessment?		
3. Contact Security and provide a Brief Initial Report?		
4. Identify a command and staging location?		
5. Assign initial action duties and identify appropriate first responder levels of personal protective equipment?		
6. Request any internal and/or external resources?		

3-3 ISOLATION: SCENE CONTROL PROCEDURE

Gaining control of the scene is an initial action that can result in the prevention of additional injury or death. Scene control must begin with the arrival of the first responders and continue throughout the incident. Initial actions for scene control need to include establishing zones and controlling people on the site.

1. Isolation (Scene Control) Duties

- Select and don PPE required for isolation activities
- Establish a rescue area (Hot Zone)
- Remove bystanders and unassigned emergency responders from the rescue area
- Control the entry point to the rescue area
- Establish a staging area
- Establish a general area (Warm Zone)
- Control the entry point to the general area
- Establish and control “No Entry Zones” where appropriate

2. Zoning

Create clearly identifiable zones by using caution tape, rope, barricades, cones, apparatus, and existing features, such as fences, buildings, etc.

A. Rescue Area (Hot Zone): Establish this primary exclusionary zone upon arrival. The goal is to gain control of an area 50 feet (100 foot diameter) on every side of the space. Begin with a double row of barrier tape.
Personnel assigned to the following functions
are permitted in this zone.

- Recon
- Entry Team
- Hazard Control
- Incident Commander
- Rigging
- Safety Officer

B. No Entry Zone

This zone is set up to identify areas with uncontrolled hazards. ERT personnel are not permitted in this area unless they have been assigned to hazard mitigation and have donned proper PPE. Personnel to hazard mitigation duties are the only ones permitted in this area.

C. General Area (Warm Zone)

With the arrival of additional rescue personnel, the exclusionary zone will be expanded. An additional zone (Warm Zone) will surround the rescue area. This zone will add another 50 to 100 feet of control. The general area will be identified by a single strand of barrier tape. Personnel assigned to the following functions are permitted in this zone.

- Incident Commander
- Safety Officer
- Rehabilitation
- Police
- Public Information
- Plant Officials
- Staging
- Medical

D. Staging

Initial staging will be identified by the position of the rescue cart. It will be outside the rescue area (Hot Zone).

3. Control People

Gain control of the people at the scene by assisting the injured and be getting others to buy into and become part of your rescue action plan.

- Surface Victims: Take control of and provide care and treatment to those who are injured but outside of the space.

- Trapped Victims: Provide fresh air and self-rescue assistance, when appropriate, to those victims in the space.

- Untrained Rescuers: Direct these would-be rescuers, who may include bystanders, fellow workers, police and ambulance personnel out of and away from the Rescue Area.

- Bystanders: Remove spectators, media and others from the Rescue/General Area.

- Workers: Control the actions of workers. Halt any unsafe or unproductive actions. Begin to remove any unneeded workers from the Rescue Area.

- Emergency Personnel: Limit the Rescue Area to assigned personnel only. Limit the General Area to command and support personnel.

ACTIVITY 3-2: Isolation

Purpose: To provide participants with the opportunity to practice Initial Actions duties at the scene of a simulated confined space rescue.

Directions: As a member of a work group, you will perform the duties of personnel assigned to Isolation

Isolation	Yes	No
As a member of a work group, did you:		
1. Select and don PPE required for isolation duties?		
2. Establish a rescue area (Hot Zone)?		
3. Discuss methods to remove bystanders and unassigned personnel from the rescue area?		
4. Provide and control a point of entry to the rescue area?		
5. Identify a staging area?		
6. Establish and control a general area (Warm Zone)?		
7. Establish and control a “No Entry” Zone?		

3-4 IDENTIFICATION: RECONNAISSANCE PROCEDURES

The foundation for the decisions made during Initial Actions and Plan Development come from the identification process. The first arriving responder (Incident Commander) begins this process with an approach assessment. A Reconnaissance Team often collects additional identification data. Accurate information is critical to the safety and efficiency of every ERT member at the scene.

Identification (Recon) Team Duties

- Select and don appropriate PPE for Recon
- Collect information (approach assessment) about the incident situation, hazards, victims, and resources present
- Attempt visual, voice or audible contact with the victim(s)
- Conduct a Recon atmospheric monitoring of the space
- Report approach assessment findings to the Incident Commander

Approach Assessment

The approach assessment checklist covers six critical topics.

- Approach
- Situation
- Hazard Assessment
- Confined Space Detail
- Victim Assessment
- Resource Assessment

Atmospheric Monitoring

Safety at confined space incidents can be enhanced through the proper use of air monitors. The 4x4x4 monitoring technique is designed to obtain the atmospheric values necessary for most confined space rescue operations. Additional, site-specific monitoring may be required for incidents involving chemical, radiation, or other atmospheric hazards.

Four Function Monitoring

Monitor at least the following:

- Oxygen
- Flammables
- Specific Toxics
- Broad Range Toxics

Four Initial Locations

Report and record the initial readings from the following areas:

- Outside the Space
- Top Level – Inside the Space
- Middle Level – Inside the Space
- Bottom Level – Inside the Space

Four Foot Increments

Following the initial readings, more precise monitoring will take place. Record readings taken at 4-foot increments. Based on hazards found during primary atmospheric monitoring, frequent monitoring will take place during entry operations. In addition, entry teams should be provided with their own atmospheric monitoring equipment.

ACTIVITY 3-3: Reconnaissance (Approach and Identification)

Purpose: To provide participants with the opportunity to practice Initial Actions duties at the scene of a simulated confined space rescue.

Directions: As a member of a work group, you will perform the duties of personnel assigned to Reconnaissance (Approach and Identification).

Reconnaissance (Approach and Identification)	**Yes**	**No**
As a member of a work group, did you:		
1. Select and don PPE required for duties?		
2. Use an Approach Assessment Worksheet to record data on:		
A. Situation?		
B. Hazards?		
C. Confined Space Details?		
D. Victims?		
E. Resources?		
3. Attempt visual, voice, or audible communication with the victim(s)?		
4. Check the type of air monitoring you conducted. □ Field test □ 4 x 4 monitoring □ Approach monitoring		
5. Report Approach Assessment findings to the Incident Commander:		

3-5 PROTECTION: HAZARD CONTROL PROCEDURES

Hazards found inside and outside the confined space must be mitigated to acceptable entry levels to protect ERT members and to prevent additional exposure to the victim(s). Personnel assigned to Hazard Control will be expected to engage in activities that are within the PPE available to the first responder. Situations involving fire and hazardous materials that require structural turnout gear or Level B chemical protective clothing are beyond the scope of the Hazard Control team. These duties should be performed by trained and equipped personnel.

Hazard Control Team Duties

- Select and don appropriate PPE for Hazard Control duties
- Identify and mitigate external hazards (traffic, equipment, machines, atmospheric hazards, electric, utility, trip, fall, etc.)
- Identify and control internal hazards, including:
    - Atmospheric (Rescue Ventilation)
    - Hazardous Energy (Lockout for Rescue)

External Hazards: Various hazards may be present at a confined space work site. Initial actions should include the mitigation of hazards outside the actual space.

Traffic: Cars, trucks, carts, and forklifts that are on aisles or roads near the confined space can create havoc and can cause collisions with rescue workers and equipment. Begin by completing blocking off all roadways/aisles within 300 feet of the space. Pass this duty off to police as they arrive on the scene.

Heavy Equipment: Shut down heavy equipment, as well as blasting and other construction related sources of vibration operating within 300 feet of the space.

Atmospheric: Consider the air around the confined space opening to be hazardous. Respiratory protection shall be used until atmospheric testing confirms acceptable conditions. Blowers may be used to control the atmosphere outside the confined space.

Downed Wires: Initial actions for downed wires should include isolating the area with barricades or barrier tape and requesting the power company to respond to the emergency.

Disrupted Underground Utilities: Call immediately for the appropriate sewer, water, gas and electric company emergency teams. (See CSR Resource list.)

Trip Hazards: Remove extension cords, small pipes, boards, tools, and other trip hazards within the Rescue Zone. Mark the location of worker tools near the space if the victim cannot be seen.

Internal Hazards

Primary ventilation at confined space rescue incidents is directed to improving atmospheric conditions for the victim(s). This technique is referred to as Rescue Ventilation. Secondary ventilation is directed at controlling the overall atmospheric conditions within the space. This technique is referred to as Confined Space Ventilation.

When operating in a rescue mode, rescue ventilation may be supplemented by Confined Space Ventilation techniques. When operating in a recovery mode, confined space ventilation will be in place and atmospheric hazards shall be eliminated prior to rescue team entry.

Rescue Ventilation

1. Supply, rather than exhaust, air into the space
2. Use ductwork to position the flow of air as directly as possible to the victim's face
3. Ensure a continuous flow of uncontaminated air to the intake side of the blower

Ventilation General Techniques

Oxygen Deficiency – Supply ventilation techniques, using ventilation equipment capable of producing large volumes of air, can effectively improve oxygen deficient environments.

Toxics – Exhaust ventilation techniques work well when toxic gases are in the space. Effective exhaust ventilation occurs when the exhaust (duct or blower) is placed close to the source of the contaminant. During a rescue, a supply of fresh air must continually be provided to the victim(s).

Flammables – Exhaust ventilation techniques are generally preferred for flammable conditions. Blowing air in can agitate the sources, especially flammable liquids, and can carry flammable gases to nearby areas. Flammable levels must be reduced to acceptable entry levels because no PPE can protect rescuers from fire or explosion in a confined space. These considerations must be taken into account when Rescue Ventilation is provided in the presence of flammable atmospheric conditions. Ignition source elimination and constant atmospheric monitoring must be in place during these operations.

Blower Placement

Fresh Air Source – A continuous supply of fresh air must be available for the intake side of supply ventilation operations. Blower and/or supply side duct tubing can be used to accomplish the needed fresh air supply.

Noise – Blowers should be placed to minimize motor noise causing interference of communication between rescue team members.

Obstructions – Rescuers should avoid obstructions in and around the space that could interfere with blower, duct tubing, or electric cord placement. Sharp turns in duct tubing dramatically reduce airflow.

Distance – Blowers should be placed in positions that will not create trip hazards for rescuers working around the confined space opening. Also, long stretches of duct tubing reduce blower efficiency.

Exhaust – Air being exhausted from confined spaces must be monitored to ensure the safety of rescuers that may be exposed to the exhaust.

Ventilation Problems

Patient Care – Ventilation efforts in cool and damp environments can create hypothermia in patients. Patient considerations must be evaluated during ventilation operations.

Re-circulation – Proper placement of blowers and duct tubing is needed to elimination re-circulation problems.

Short Circuiting – Short Circuiting occurs when fresh air moves directly from inlet to outlet without circulating through other areas of the space. Duct tubing placement deeper into the space can solve short circuiting problems.

Atmospheric Monitoring

Monitoring should take place:

- Prior to ventilation
- During ventilation, in order to assess effects

ACTIVITY 3-4: Rescue Ventilation

Purpose: To provide participants with the opportunity to practice setting up and evaluating a confined space rescue ventilation system.

Directions: The instructor will give you a simulated confined space incident. As a member of a team, you will demonstrate the use of ventilation equipment, according to the manufacturer's guidelines.

Rescue Ventilation	Yes	No
1. Did you participate in a discussion on the differences between Primary (Rescue) Ventilation and Secondary (Confined Space) Ventilation?		
1. Did you assemble the ventilation and duct work?		
2. Did you position taking account of the following:		
A. Fresh air intake?		
B. Noise		
C. Distance?		
D. Obstruction		
E. Exhaust?		
4. Did you place the duct work as close to the victim's face as possible?		
5. Did you avoid problems caused by:		
A. Recirculation?		
B. Short-circuiting?		

Lockout for Rescue Procedure

Hazardous energy must be identified and controlled at rescue scenes.

Energy Source Identification

The following types of energy sources should be identified through the use of workers/supervisors and by tracing, as well as system component recognition.

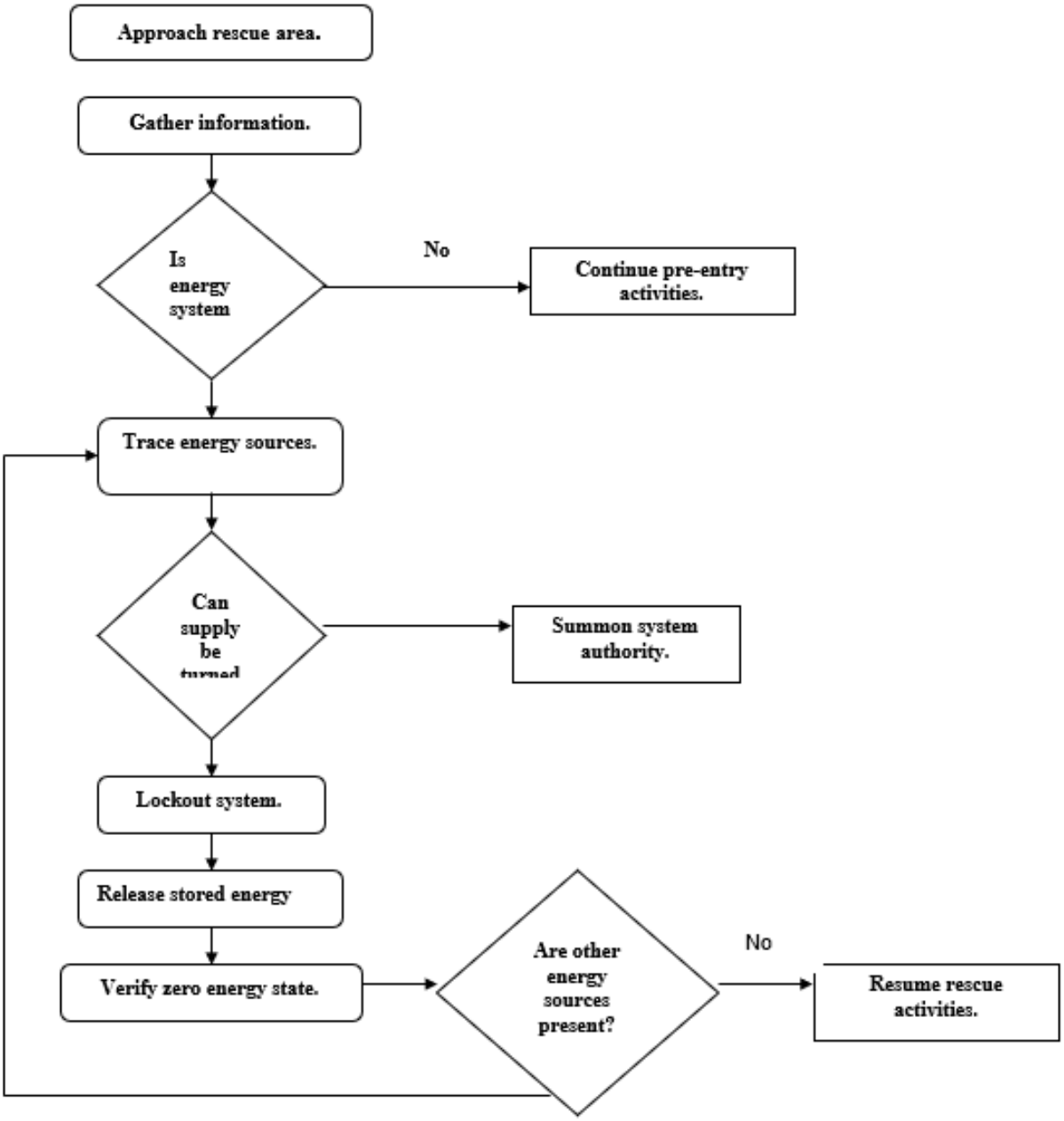
- Electric
- Gas
- Water/Steam
- Chemical
- Hydraulic
- Pneumatic
- Stored Energy
- Gravity/Momentum

Energy Isolation and Control

Once the source of energy has been determined, the system can be isolated (shut down) and controlled by:

- Locks and Tags
- Lockout Devices
- Chains
- Rescue Personnel Assigned to Control Stations

HAZARDOUS ENERGY CONTROL FLOW CHART



ACTIVITY 3-5: Energy Control and Power Lockout (ECPL) for Rescue

Purpose: To provide participants with the opportunity to practice ECPL and hazard control measures during a tour of the facility.

Directions: You will control various real or simulated sources of energy and power using devices provided by the employer.

ECPL for Rescue	Yes	No
1. Select and done PPE required for Recon duties?		
2. Did you participate in a review of the employer's lockout procedures?		
3. Did you participate in a discussion of the differences between normal ECPL procedures and those used during Lockout for Rescue?		
4. Indicate what methods you used to identify types of energy hazards present by tracing and component identification techniques		
A. Workers/Supervisors		
B. Placards/Signs		
C. Tracing		
D. System Component Identification		
4. Indicate the type of lockout equipment you applied:		
A. Ball valve		
B. Gate valve		
C. Electrical cord D. Electrical circuit breaker		
E. Electrical panel (disconnect)		
F. Electrical switch		
G. Outside screw and yoke (OS&Y) H. Pneumatic valve (Ross Valve)		
I. Other:		

ACTIVITY 3-6: Protection and Hazard Control

Purpose: To provide participants with the opportunity to practice the duties associated with the goal of Protection.

Directions: As a member of a work group, you will demonstrate methods to control external and internal confined space hazards.

Hazard Control	Yes	No
As a member of a work group, did you:		
1. Select and don PPE required for Protection (hazard control) duties?		
2. Indicate the types of external hazards you identified and controlled. □ Traffic □ Atmospheric □ Utility □ Equipment or machines □ Electric □ Trip hazards		
3. Indicate the types of internal hazards you identified and controlled. □ Atmospheric □ Hazardous energy		
4. Assemble the components of a confined space ventilation system and position the system for “rescue ventilation”?		
5. Recognize a hazardous energy source by tracing, component recognition, and control the system with “Lockout for Rescue” procedures?		
6. Identify differences between normal ECPL and Lockout for Rescue?		

3-6 PLAN DEVELOPMENT

The Incident Commander will establish a plan of action (Control Plan) that will match the resource capabilities to the rescue needs. Much of the plan will be based on information obtained from the approach assessment.

Incident Command: Plan Development Duties

- Determine if this is a rescue or recovery
- Decide if offensive or defensive actions are needed
- Identify the operational level of the rescue
- Identify the operational capability of the resources on hand and supplement resources as needed
- Develop strategic goals and tactical objectives

Control Plan

Utilize the Incident Management Worksheet to identify strategic goals and tactical objectives.

3-7 NON-ENTRY RESCUE

Non-entry (defensive) procedures should be considered whenever possible at confined space incidents. These procedures eliminate exposures to the hazards inside the space. Defensive rescue operations should consider victim life support, assisted self-rescue, and retrieval systems.

Non-Entry Rescue Team Duties

- Identify and select proper non-entry rescue methods
- Select and don PPE required for non-entry rescue duties
- Provide non-entry life support methods
- Provide non-entry assisted self-rescue methods
- Provide non-entry retrieval system methods

Non-Entry Rescue Methods

Life Support: Utilized when a patient cannot be quickly removed from a space. Supplying the patient with a breathing apparatus, if conscious, rescue ventilation, and other appropriate life support techniques delivered from outside the space.

Assisted Self-Rescue: Utilized when the patient is conscious and able to help. Providing victims with a ladder to climb out of the space or a tool to extricate themselves are examples.

Retrieval System: Utilized when a victim is inside the space with a transfer device, such as a harness or wristlets, and a retrieval line is connected and positioned outside the space.

Retrieval System

When a patient must be raised or pulled from a space, the following retrieval chain should be considered:

Anchor – Bombproof or substantial anchor points shall be developed with proper attachments. These may include overhead anchor development.

Retrieval Line – This will be a rope or cable that is either already attached to the patient or lowered down to a conscious person.

Transfer Device – A device that will attach to the patient and permit safe transfer to the exit point. These devices usually include items like a rated harness, wristlet or cinch ring type appliance.

Mechanical Lifting Device – Hand operated devices that are designed to raise or pull humans. Typically, this will include hand winches or rope based mechanical advantage systems. CAUTION: Powered devices, without proper load limiters, can injure or kill people.

Belay – When time and circumstances permit, a belay comprised of a separate anchor system, line and attachment point provides additional safety to non-entry rescue operations.

ACTIVITY 3-7: Non-Entry Rescue

Purpose: To provide participants with the opportunity to demonstrate the skills necessary to accomplish a non-entry rescue.

Directions: As a member of a work group, you will demonstrate the duties of a non-entry rescue team.

Non-Entry Rescue	Yes	No
As a member of a work group, did you:		
1. Discuss the advantages and disadvantages of Non-entry Rescue?		
2. Assemble or review the contents of the Non-entry Rescue kit?		
3. Select and don PPE required for Non-entry Rescue?		
4. Discuss non-entry rescue methods?		
A. Support		
B. Assisted Self-rescue		
C. rope Retrieval Systems		
5. Perform (simulate) a rope retrieval system rescue of a conscious victim wearing a harness?		
6. Perform (simulate) a rope retrieval system rescue of a conscious victim not wearing a harness?		
7. Perform a rope retrieval system rescue of an unconscious victim that was wearing a harness and was attached to a rope.?		
8. Perform a rope retrieval system rescue of an unconscious victim that was wearing a harness but was not attached to a rope?		
9. Perform at least one rope retrieval rescue		
A. with an overhead anchor?		
B. without an overhead anchor?		

ACTIVITY 3-8: Non-Entry Rescue (Initial Actions)

Purpose: To provide participants with the opportunity to practice Initial Actions skills during a simulated confined space rescue.

Directions: As a member of a work group, you will demonstrate scene management of a simulated confined space rescue.

Total Time to Complete Initial Actions: _____

Non-Entry Rescue (Initial Actions)	Yes	No
1. Did you implement the Incident Management System (establish Command)?		
2. Perform the following duties under Notification?		
A. Establish Command		
B. ID Command Post		
C. Internal Notifications		
D. Approach Assessment		
E. ID Staging Location		
F. External Notifications		
G. Brief Initial Report		
H. Assign Initial Actions		
I. Utilize IAP Worksheet		
3. Select and don the appropriate PPE for the duties you were assigned?		
4. Did you perform the following duties under Isolation?		
A. Hot Zone		
B. Warm Zone		
C. No Entry Zone		
D. Remove bystanders		
5. Did you perform the following duties under Identification?		
A. Information Sources		
B. Victim Contact		
C. Reconnaissance		
D. Report Findings		
E. Air Monitoring		
F. Approach Assessment Worksheet		
6. Did you perform the following duties under Protection?		
A. External Hazards		
B. Rescue Ventilation		
C. ECPL (Energy Control for Rescue)		

ACTIVITY 3-9: Non-Entry Rescue (Plan Development)

Purpose: To provide participants with the opportunity to perform Plan Development duties during a simulated confined space rescue.

Directions: As a member of a work group, you will demonstrate Plan Development duties at a simulated confined space rescue.

Non-Entry Rescue (Plan Development)	Yes	No
1. Did you use the Approach Assessment Worksheet information for Plan Development?		
2. Did you make a rescue/recovery determination?		
3. Did you identify offensive and/or defensive action needs?		
4. Did you determine the operational level of the incident?		
5. Did you determine the operational capability of the Emergency Response Team?		
6. Did you determine the need for additional resources and discuss resource request options?		
7. Did you identify strategic goals and tactical objectives?		
8. Did you use the Incident Command Worksheet (Plan Development and Control Plan sections)?		

Module Summary

During this Initial Response workshop, you learned the skills necessary to perform Initial Actions, Plan Development, and Non-Entry Rescue. Initial Actions included Command (Command Worksheet), Approach Assessment (approach, hazard assessment, victim assessment, confined space assessment, resource assessment, atmospheric monitoring) and Control (Site Control, Ventilation, and Hazardous Energy Control). Plan Development provides the planning and implementation of a confined space rescue operation appropriate to the Operations Level. Non-Entry Rescue procedures include assisted self-rescue and patient removal without rescue personnel entering the space.

Rigging

The student will demonstrate the safe use of confined space rescue rigging equipment provided by the authority having jurisdiction during an Operations Level confined space rescue scenario, according to NFPA 1670.

As a member of a workshop group, the participant will demonstrate:

- 4-1: Demonstrate the following knots: Figure 8, Figure 8 Loop (on a bight), Butterfly Knot, Munter Hitch, and Water Knot (Prusik Wrap and Double Fisherman, site specific)
- 4-2: Demonstrate the anchor selection and attachment techniques for confined space rigging presented in this Module
- 4-3: Don and doff the confined space rescue harness provided by the authority having jurisdiction
- 4-4: Demonstrate the set-up and use of a one-person fall arresting belay
- 4-5: Demonstrate the set-up and use of a rope and pulley system for raising
- and lowering operations
- 4-6: Identify tactical procedures associated with rigging equipment use, according to NFPA 1670

Module Overview

Objectives for Confined Space Rescue rigging include: (1) fall protection; (2) entry transportation; and (3) removal. Equipment designed for confined space entry and rescue, such as tripod systems, often meet all three of these objectives. While these pieces of equipment may be excellent for specific confined space work, they have limitations that often require the use of other techniques for rescue operations. Basic rope rescue systems, on the other hand, offer the versatility needed for rescue and recovery.

Training and working in vertical situations is inherently dangerous. Improper use of equipment and techniques can lead to serious injury or death. Frequent on-going training, under the supervision of a qualified instructor, is a necessary part of rigging and rope rescue both in and out of the confined space environment.

4-1 KNOTS

Of the hundreds of knots that are in existence, a dozen are typically used for rescue. While proficiency in knot craft is useful, a handful of knots have proven useful for confined space rescue (Operations Level). The NFPA requires a minimum breaking strength of 4,500 pounds for one-person loads and 9,000 for two-person loads. Knots reduce the strength of all ropes. The NFPA recognizes this; however, the standard does not address knot use or selection.

Knots used at the Operations Level include:

- Figure 8
- Munter Hitch
- Figure 8 Loop (on a bight)
- Water Knot (overhand bend)
- Butterfly
- Prusik Wrap and Double Fisherman (site specific)

These knots were selected using the following criteria:

Security- Knots tied with proper tail lengths and when pulled in the direction intended will not loosen, capsize, or otherwise come apart.

Ease of Tying – These knots will not require difficult or time-consuming movements to tie. These knots will also be easily untied after being subjected to intended loads.

Ease of Inspection – They will be easily recognizable and readily identified when tied correctly.

Strength – They will not reduce the overall rope system strength by more than one third.

Note: A minimum of 10 to 1 safety factor must be maintained in all rope rescue systems.

ACTIVITY 4-1: Ropes and Knots

Purpose: To practice using rope to tie knots that are safe for rescue work.

Directions: Your instructor will provide you with a piece of rope to practice. You will practice tying the knots listed in the skills checklist.

Ropes and Knots	Yes	No
1. Did you tie a Figure 8 on a bight?		
2. Did you tie Triple Wrapped Prusik?		
3. Did you tie a butterfly knot?		
4. Did you tie Munter Hitch (optional)?		
5. Were all of the knots tied with consideration given to:		
A. Proper application?		
B. Appropriate size loop?		
C. Dressed?		
D. Pre-tensioned?		
E. Sufficient length of tail?		

4-2 ANCHORS

An anchor site is a point of attachment for ropes and rope systems. Anchor sites must be strong enough to hold rescuers, the patient, and all ropes and equipment, under the seen and unseen forces that may be acting upon it. Anchors that are sufficient to withstand all intended loads and forces are called “bombproof” anchors.

Selecting an Anchor

When choosing anchors, consider the following selection criteria:

- Location
- Mass
- Construction
- Condition

The strength of an anchor depends on many factors, including how it is loaded, material composition, condition, and its intended use. While tensile and shear strengths of objects found in the urban and industrial areas would be all but impossible to memorize, some common sense can go a long way in anchor site selection.

A 6-inch steel I-beam in good condition will hold a larger load than a half-inch steel pipe. A reinforced concrete column in good condition will support more than wood posts and beams. In both previous examples, conditions play a key role. Any anchor that is rusted, rotted, or otherwise poorly maintained, should be viewed as unacceptable, regardless of the construction or mass of the object.

The position of the anchor as it relates to the edge and load is another important determining factor. Angles developed by the anchor-edge-patient relationship can employ forces that are more than twice the load.

Suitable permanent anchor sites include natural objects, such as trees and rocks. Permanent artificial anchors include:

- Utility poles
- Large heating, ventilation, and air conditioning units
- Concrete or welded steel stair assemblies
- Large steel pipes

A properly secured, guarded, and disabled fire truck is an example of a suitable anchor.

CAUTION: The majority of rope system failures have resulted from inadequate edge protection. Always protect ropes and equuipment from hard or sharp edges through the use of edge pads or rollers.

Overhead Anchors

Overhead anchor points can dramatically increase the safety and efficiency of rescue operations at confined space, trench, and building collapse, as well as other below grade and elevated environments.

Both permanent and temporary anchors can be used to elevate a leading anchor point. These anchors can be the point of attachment for lowering or raising systems or can be a change of direction for the main line. In any case, they often result in operations that are safe and efficient by decreasing rescuer effort, and easing complicated edge techniques and inconveniences.

Advantages

- Edge management
- Load control
- Obstruction management
- Operational convenience

Disadvantages

- Potential for increased drop distances
- Possible inadequate anchor development

Permanent Overhead Types

In the urban environment, these anchors include beams, trusses, railings, standpipes, and other structural components. The construction, size, condition, loading, and position of the overhead anchor must be evaluated and must be considered as bombproof for use with live loads.

Temporary Overhead Anchor Types

A common and versatile piece of equipment found in the fire service is the ladder. This piece of equipment is well suited for use as an elevated anchor. The rungs and beams are designed to withstand considerable forces and when vectored properly can create bombproof ppoints. Emergency responders can use ground ladders in a variety of ways to create elevated anchors.

Many rescue teams now carry tripods. You can set these devices up quickly, and they are strong and stable when the forces are kept within the legs of the tripod. These devices are much less stable on uneven surfaces and may not be useful in areas with overhead obstructions.

Some basic temporary overhead anchor points include the following:

Aerial Ladders

Aerial ladders may be used as elevated anchor points in places where they can be positioned. These devices may be limited at trench and building collapse incidents due to their potential to cause secondary collapse. You must never use aerial ladders to raise a victim mechanically. You can use them as an attachment point for lowering or raising systems. They must be locked out.

Ladder Gin

A straight ladder makes an excellent ladder gin. A rope, block and tackle, and four tie-down stakes are required along with the ladder.

The ladder is laid at the selected site with the butt next to the hoisting area. The rope is played out and doubled to form two equal lengths of line with a bend at the tip of the ladder. Approximately three feet from the bend, on each of the two lines, a standing bight is made that is large enough to slip over the tips of the beams. The loop between the bights is turned to form a Figure 8 and the slack is pulled to the outside loop, that is

dropped over the top of the ladder. The line on the opposite side of the ladder is grasped and pulled out, and the Figure 8 is turned.

A single or roof ladder is rigged, except that it is not lashed to any stakes. The ladder is placed on the padded area of the tailboard and then raised into position. The guy ropes are tied off to the large suction intake ports of the fire pump. Care must be taken to balance the tension on the two ropes. The pumper is then moved into position.

A-Frame

The A-Frame is especially suited for raising loads out of trenches or other similar excavations. The A-Frame is the easiest to make when two ladders of different widths are used. The steps for rigging the A-Frame are as follows:

Step 1: Both ladders are placed on the ground on beams. The tips are brought together and the top rungs are lashed together to form the top of the A.

Step 2: A rope is used to form guy lines needed to minimize side-to-side movement. A bowline-on-a-bight is tied in the center of the rope. The loops should be long enough to pass over the ladder beams at the top of the A.

Step 3: The block and tackle is attached to the bight of the bowline, and the A-Frame is raised over the objective.

Step 4: A ladder is placed flat on the ground at right angles to the A-Frame, and the sway lines are secured to either end. Instead, anchor stakes are used to tie off sway lines.

Step 5: A rope hose tool or other piece of line is used to form the cross leg of the A, or the lader butts are staked and lashed so the A-Frame will not spread apart when the load is picked up.

Definitions

Bombproof Anchor: An anchor that is determined to be of sufficient strength to hold all the loads and forces it may encounter during a rope rescue operation. When an anchor is determined to be bombproof, it is sufficient for use as an anchor point for the both the belay and the load system. Bombproof anchors can be artificial elements (guardrails, structural members) or natural elements (trees or large rocks).

Substantial Anchor: An anchor subjectively judged to have a strength safety factor of 10 to 1 for all the loads and forces it might encounter during a rope rescue operation. A substantial anchor shall be used as an attachment point for a single system. It is not to be used for more than one function (belay, lower, raise).

Marginal Anchor: An anchor that has been judged to have suspect capabilities for holding any single system (belay, lower, raise) loads and forces it might encounter during a rope rescue operation. Marginal anchors are not suitable for rescue operations unless they are collected in a systematic set-up that would then be considered Substantial.

Anchor Point: Identified locations or objects that are considered fixed points of attachment for rope rescue operations. They may be classified as Bombproof, Substantial, or Marginal. Several anchor points may be used in conjunction with each other to create a single “working” anchor point.

Attachments: Methods to attach a rescue rope system to an anchor.

Webbing: Create anchor point locations by attaching them using 1-inch or 2-inch webbing configurations.

Quick Sling: A pre-tied or per-sewn webbing placed around a selected point in basket type configuration on a small to medium size anchor. It is used when speed is essential. The inside loops should create an angle of 90 degrees or less.

Wrap and Pull (W3P2): A single piece of untied webbing wrapped three times around an anchor point and then tied together with an overhand bend (Water Knot). As two of the wraps are pulled toward the load, the bend is brought up against the anchor. Use the length of the webbing to adjust the inside angle to 90 degrees or less.

CAUTION: The majority of rope system failures have resulted from inadequate edge protection. Always protect ropes and equipment from hard or sharp edges through the use of pads or rollers.

ACTIVITY 4-2: Anchor Points

Purpose: To practice selecting and evaluating anchor points and making attachments for rescue systems.

Directions: Your instructor will take you to an area in your facility. You will look at various anchor points to determine safety. You will also set up the anchor point using slings.

Anchor Points	Yes	No
1. Did you participate in the discussion of criteria for selection of an anchor based on:		
▪ Use		
▪ Location		
▪ Mass		
▪ Construction		
▪ Condition		
2. Did you identify various potential anchor points as either:		
▪ Bombproof (overhead)		
▪ Bombproof (horizontal)		
▪ Substantial (overhead)		
▪ Substantial (horizontal)		
3. Did you attach to the anchor point using:		
▪ Manufactured sling		
▪ Quick sling		
▪ Wrap 3, Pull 2		
4. Did you identify the need to protect the attachment from possible injury?		

ACTIVITY 4-3: Overhead Anchor

Purpose: To allow the participant the opportunity to practice the skills necessary to create overhead anchors.

Directions: The participant, as a member of workshop group, will create an overhead anchor point for use in confined space rescue, according to the criteria presented.

Overhead Anchor	Yes	No
1. Did you participate in a discussion regarding the use and criteria for overhead anchor points?		
2. Did you make use of a structural component for an overhead anchor point?		
3. Did you make use of a tripod for an overhead anchor point?		
4. Did you participate in the construction and use of an improvised overhead anchor point?		
5. Circle the type of improvised anchor you used. Ladder Gin Ladder A-Frame Aerial Ladder Boom-Supported Lift (JLG)		

4-3 HARNESS

OSHA requires a full body harness for entry into confined spaces. These harnesses provide security for the wearer and allows for personnel to be removed in an upright position. Full body harnesses also allow rescuers to invert, when necessary, without coming out of the harness.

Full body rescue harnesses (NFPA – Class III) are recommended for rescue work. These harnesses differ from the "Entry" harness required by OSHA. While they meet the safety issues of the OSHA style entry harness, they also provide additional features needed for rescue work. Class III rescue harnesses are padded for comfort. They have several points of attachment (main line, belay line, tag line, etc.) and allow equipment to be connected to them. This type of harness typically is easier to and quicker to don and adjust than a confined space entry harness.

The harness must be inspected before each use. Check the hardware for nicks, bending, corrosion, discoloration and breaks. Check the software for cuts, burns, discoloration and abrasions.

Store and maintain the harness in accordance with manufacturers recommendations. Storage of any life safety equipment must be in compartments free of moisture, chemicals, sunlight, heat and petroleum fumes.

ACTIVITY 4-4: Harness

Purpose: To allow the participant the opportunity to practice donning, doffing, inspecting, stowing and storing harnesses.

Directions: Given a harness provided by the employer, the participant will demonstrate its use according to the manufacturer's recommendations.

Harness	Yes	No
1. What Class or Type of harness is required for confined space entry?		
2. Did you participate in a discussion of the differences between a rescue harness and a confined space entry harness?		
3. Did you don and doff the harness?		
4. Did you inspect the harness after doffing? Manufacturer's Name: Date of Manufacture:		
5. Did you participate in a discussion of the care, maintenance and storage of harnesses?		

4-4 BELAY/FALL ARREST

The rescue agency must provide a belay (see definition) whenever personnel are on rope in high or steep angle environments. Permissible deviations from this policy are restricted to high benefit situations where time becomes a critical element for a rescue or self-survival.

Definitions

Belay – To provide protection against a victim or rescuer fall while suspended by handling an additional unloaded rope (belay line) in such a manner that it may take in or let out as the victim or rescuer is raised or lowered. The fire department recognizes the following belay methods as satisfactorily meeting the fall protection requirements.

Munter Hitch Belay – A belay method that uses a Munter Hitch on a carabiner for the "catch". The Munter Hitch belay is limited to single person loads.

Tandem Prusik Belay – A belay method that uses tandem triple wrap prusik loops for the fall arrest. This method should incorporate the use of a load-releasing hitch (LRH) and a prusik minding pulley for optimum effectiveness. It is the only method that is currently acceptable for "catching" a two-person load.

Traverse 540 Rescue Belay - A belay method that uses a hardware device to create fruction for arresting the fall. It is a method suitable for catching one and two-person loads.

Munter Hitch Belay

1. **Rigging**

- Identify and attach to a substantial or better anchor.
- Attach a large locking steel carabiner to the anchor in a “Down and Down” position. Note: “Down and Down refers to the position of the gate side of the carabiner and its locking sleeve. The gate side of the carabiner and ratational direction of the locking sleeve should be toward the ground when in a position of function.
- Tie a Munter Hitch onto the carabiner.
- Provide adequate edge protection. Note: No rope rollers.

2. **Lowering Operation Guidelines**

- The belayer must pay attention to what the working or main line is doing. The belay line should mirror the main line’s progress throughout the operation.
- Position rope in anticipation of twisting or have an assistant available to aid in untwisting the supply of the belay line.
- Check the progress of the lower through the use of a “Z” turn when the entire belay line is not visible. The “Z” turn is the operational slack limiter in the belay line.
- The belayer’s brake hand must never leave the belay line.
- If the lowering operation is halted, all slack should be quickly taken up.

3. Raising Operation Guidelines

- The operation of a Munter Hitch belay during a raise is easier due to the fact that the “Z” turn is no longer necessary. It is simply a matter of taking up slack in the line.
- The belay line is kept snug by feeding the slack into the hitch with the guide hand and simultaneously pulling the slack out of the hitch with the brake hand. To accomplish this action safely, you must perform a “waltz of the hands” to maintain control at all times.

Tandem Prusik Belay

1. Rigging

- Identify and attach to a substantial or better anchor.
- Attach a Load Releasing Hitch (LRH) to the anchor using a large locking steel carabiner in a down and down attitude.
- The order of loading for the LRH's carabiner should be: Short Loop (triple wrapped); Long Loop (triple wrapped); and Prusik mining pulley (if there is a possibility of a raise).

2. Lowering Operation Guidelines

- Pay attention to what the main line station is doing. It will aid you knowing what must be mirrored at the belay station.
- The belayer may need help in managing the rope going into the TPB. Working out of a rope bag that has been flaked stuffed can simplify the job.
- Use proper "Z" turns if the load is not visible. A skilled belayer may not need the "Z" turn if the load is visible.
- The belayer must ensure that the prusiks being controlled by the brake hand are adjusted snuggly.
- If the lowering operation is stopped, all slack is to be taken out of the line. To resume, a "Z" turn is placed back into the belay line.
- On long lowers (greater than 100 feet), an assistant may supply back tension on the belay line to reduce the potential for slack in the belay.

3. Raising Operation Guideline Using a Prusik Minding Pulley (PMP)

- The belayer should stand between 0 to 5 degrees away from the belay rope going into the load.
- The belayer should be positioned no further than 3 feet from the TPB.
- During any reset of the pulley, the belayer should check the tightness of the prusik wraps.
- The belayer should take up all slack in the belay rope as the load rises.

4. Raising Operation Guideline Without a PMP

- The belayer reverses direction of rope pull described in Lowering Operation Guidelines. The use of a "Z" turn is not needed.
- Raising progress should not exceed the ability of the belayer to remove slack from the line.

Traverse 540 Rescue Belay

1. Rigging

- Push pin release and disassembly method
- Proper rope loading sequence
- Re-assembly method
- Inspection points
- Personal Protective Equipment

2. Lowering Operation Guidelines

- Evaluate edge protection, obstructions, and obstacles that could interfere with the operation of the device
- Hand position and technique to provide back tension on the load side
- Self-locking technique
- Manual locking technique
- Releasing a locked belay rope
- Rope management technique

3. Raising Operation Guidelines

- Hand position and technique to pull up on the load side, feeding it into the device and pull on the running end
- Methods to maintain suitable slack on the load side
- Self-locking technique
- Manual locking technique
- Releasing a locked belay rope
- Rope management techniques

ACTIVITY 4-5: Belay/Fall Arrest

Purpose: To allow the participant the opportunity to practice skills in rigging and operating fall arrest and protection (belay) systems.

Directions: The participant will provide fall protection for a one-person load.

Belay/Fall Arrest	Yes	No
1. Did you participate in the construction of a Munter Hitch?		
2. Did you participate in the assembly of a manufactured fall arrest system?		
3. Which fall arrest system did you operate? Munter Hitch Manufactured System		

4-5 RAISING/LOWERING SYSTEMS

Raising and lowering systems presented in this program (Operations Level) are designed with a practical distance limitation of about 30 feet of travel. These systems are typically constructed using NFPA rate rope, pulleys, and carabiners. Pre-packaged systems that utilize two double pulleys with beckets can be quickly hung with a 4 to 1 mechanical advantage with a change of direction (COD) configuration. You can use them to lower rescuers into a space, remove patients, and remove rescue team members.

NOTE: Vertical entry into confined spaces, for rescue operations beyond 30 feet of travel, usually require Confined Space Rescue Technicians and high angle techniques performed by Rope Rescue personnel at the Technician Level.

ACTIVITY 4-6: Raising and Lowering Systems

Purpose: To enable the participant to accomplish raising and lowering operations in a confined space, according to criteria presented.

Directions: Using ropes and pulleys, you will assemble the equipment provided into a mechanical advantage system according to the criteria presented in the workshop.

Raising and Lowering	Yes	No
1. Did you participate in a discussion and explanation of mechanical advantage basics?		
2. Did you construct and operate a 2 to 1 (COD) mechanical advantage system?		
3. Did you construct and operate a 3 to 1 (COD) mechanical advantage system?		
4. Did you construct and operate a 4 to 1 (COD) mechanical advantage system?		
5. Did you participate in a discussion of the operational needs and limitations for each of the mechanical advantage systems constructed?		
6. Did you participate in a simulated rescue raise and lower operation?		

ACTIVITY 4-7: Miller 70

Purpose: To provide the participant with the opportunity to practice the assembly, set-up, and operation of the Miller 70.

Directions: You will assemble and use the Miller 70 to accomplish a raise and lower of a real or simulated one-person load, according to the manufacturer of the system.

Miller 70	**Yes**	**No**
1. Did you participate in a discussion of the following elements of the Miller 70?		
A. Components		
B. Strengths		
C. Care		
D. Maintenance		
E. Limitations		
2. Did you operate the Miller 70 system to perform the following:		
A. Lower a one-person load?		
B. Raise a one-person load?		
3. Did you operate the Miller 70 when attached to the following:		
A. Evaluated vertical anchor point?		
B. Tripod?		
4. Did you use the Miller 70 as part of a non-entry retrieval system?		

4-6 TACTICAL PROCEDURES

Raise and Lower Chain

- Overhead anchor point – bombproof or substantial
- Mechanical Advantage System – typically a 4 to 1 (COD) system made up of ½ inch rescue rope
- Transfer Device – includes manufactured harness, wristlets, webbing harness, cinch ring, and other related devices
- Belay – one-person belays (Munter Hitch) are normally used in confined space rescues

Because of the short distance (30 feet) involved at the Operations Level and the normally small access openings found in confined space entry operations, the patient will be removed without being accompanied by an entry team member. This removes the need for a two-person belay (Tandem Prusik).

Safety Procedures – a rescue team officer an edge person are positioned, and a communication check is conducted prior to raising and lowering.

- Technique
- Rescue Team Officer directs action
- Action plan briefing
- Smooth raise/lower at approximately 1 foot per second
- Entry team and Rescue Team Officer coordinate the operation through established communications

Communications

Good communications need to include an understanding and designation (name) for each functional position needed for the operation. The positions defined in this document do not include the Incident Commander, Safety Officer, or other management functions typically found on an emergency scene. The scope of this document applies only to those functional positions needed for the use of ropes in a rescue.

Position Designations

Rescue Team Officer (RTO): This person should be the most knowledgeable rope person on the scene. The RTO determines the system set-up and tactics to be used. The RTO must assure that a final safety inspection of all systems and components has been conducted prior to use. The RTO commands and controls the overall rope rescue operation including belaying, raising and lowering.

Belay is the rescuer who is assigned the task of operating either tandem prusik belay (TPB) or Munter Hitch belay.

Rescuer is the person who will make initial contact with the patient. If at all possible this should be a team of two (2) rescuers. In high-angle situations, this is usually a single litter attendant. This individual(s) must have appropriate medical skills.

Brake: This position operates the decent control device (DCD) for a lower operation. This person is usually assigned the ratchet position if there is a lower to raise changeover.

Edge: This position is usually staffed by two (2) individuals in most operations. The edge position is responsible for rope management issues between the brake and the Rescuer. This position also assists in the transition of rescuer and patients over the edge.

Haul Team: These personnel are responsible for supplying the labor needed to operate the MSA system. The haul team does not require a high degree of rope rescue knowledge, but must understand rope operations directions and have awareness knowledge of rope rescue operations. One person is designated Haul Team leader. The Haul Team leader receives and responds to the commands from RTO.

Verbal Commands

Position Check, Operational Readiness

- "Belay ready?"
- "Brake ready?"
- "Edge ready?"
  "Rescuer ready?"
- "Spotter ready?"
- "Haul Team ready?"
- "Ratchet ready?"

Response: "Position Name ready."

Belay

- "Belay on." RTO orders belay into operation.
- "On belay." Belayer's response.
- "Off belay." RTO informs belayer that load is on the ground.

Lowering

- "Brake." RTO to break to stop rope movement.
- "Holding." Response by brake person to "Brake."
- "Down rope." RTO directs the brake to commence lowering.
- "Slow, down rope." Directs rope lowering speed.
- "Fast, down rope." Directs rope lowering speed.
- "Pre-tension mainline." Initial pre-loading of mainline in safe area.
- "Vector mainline." Angle deflection of mainline to reduce slack.

Raising

- "Up rope." Command to begin raise operation.
- "Faster, up rope." Directs rate of rise.
- "Slower, up rope." Directs rate of rise.
- "Brake." Halts raise operation.

Problems

- "STOP." Any team member who sees a system problem or a safety issue may call for the operation to stop. All personnel will immediately halt whatever action they are performing and await direction from the RTO.

Whistle/Horn Commands

- "Stop." One long blast.
- "Brake." One short blast.
- "Raise." Two short blasts.
- "Lower." Three short blasts.
- "Resume." One short blast.
- "Evacuate." Three long blasts repeated.

Safety Check

All rescue personnel on the scene are responsible for safety issues. The Rescue Team Officer must assure the completion of the following "System Safety Check" items prior to the placing personnel on the rope system.

- Physical/Visual Check – Each individual component of the raise, lower and belay systems must be physically inspected by touch and evaluated for its correctness.

- Load Test – A pre-loading of the system with a force closely approximating the true load shall take place away from the edge.

- Critical Point Test – Each component of the system must be inspected again. All points must be backed-up with another system component. The failure of any one point must not result in a loss of control of the load.

- Audible/Visual Confirmation – A confirmation of readiness must take place between the RTO and all personnel responsible for the rescue operation prior to commencing actions.

ACTIVITY 4-8: Raising/Lowering System Operations

Purpose: Provide the participant with the opportunity to practice the skills required to operate a raise/lower system for a one-person load safely and efficiently.

Directions: Your instructor will assign you to a group. Your group will operate a raise/lower system for a one-person load for use at confined space rescues.

Raising/Lowering System	Yes	No
1. Indicate which of the following elements of a rope-based raising/lowering system that you discussed.		
A. Components?		
B. Strengths?		
C. Care?		
D. Maintenance?		
2. Indicate which of the following types of raising/lowering operations you performed.		
A. Lowering of a one-person load?		
B. Raising of a one-person load?		
C. Raising to lower change over?		
3. Did you operate the raising/lowering system from an elevated (overhead) anchor point?		
4. Did you operate the belay system for a one-person load?		
5. Were you suspended from a temporary overhead anchor, while wearing a rescue harness?		
6. Indicate which of the following tactical procedures you implemented during the operation.		
A. Raise and lower chain?		
B. Position designation?		
C. Verbal commands?		
D. Safety checks?		

SUMMARY

In this Module, we learned the basic rope rescue skills that are fundamental to rigging for confined space rescues. We discussed the purpose, capabilities and limitations of rigging for confined space rescues. As a participant, you completed the following activities:

- Knot Tying
- Anchor Selection and Use
- Donning Rescue Harness
- Belay/Fall Arrest
- Raising and Lowering Systems
- Tactical Procedures

Entry Team Operations

Given a confined space rescue scenario, the participant will demonstrate the positions required for entry team operations, according to NFPA 1670.

As a member of a workshop group, the participant will demonstrate:

- 5-1: Identify the duties of an Entry Team Member
- 5-2: Demonstrate patient packaging techniques
- 5-3: Identify the duties of a Rescue Team Officer
- 5-4: Identify the duties of a Rapid Intervention Team (RIT) member

Module Overview

Whenever rescue team members are required to enter a confined space and face the hazards that created the need for the rescue in the first place, the level of risk rises dramatically. The selection of entry team members must be carefully made. They must be trained and experienced in the type of entry that will take place, using the appropriate personal protective equipment and rescue equipment. The rescue entrant's physical characteristics, such as size, strength and stamina must be evaluated, as well as his or her psychological ability to perform.

In order to carry out entry team operations, rescue team members must understand and be able to perform proper donning of PPE, entry team duties, rescue team officer duties, confined space communication techniques, and Rapid Intervention Team duties.

5-1 ENTRY TEAM DUTIES

The entry team duties include locating, accessing, stabilizing, and transferring the patient. The entry team shall consist of at least two qualified rescue personnel. Whenever possible, entry personnel shall work inside the space using the "Buddy System" (two-in) and Rapid Intervention Team (two-out). These duties are described below: Locate, Access, Stabilize, and Transfer (LAST)

Locate

The entry team evaluates victim location (see Locate procedure) and moves as a team towards the probable victim location during search and entry reconnaissance operations.

Access

- Consider the use of fixed or portable ladders for quick access
- Always attach a retrieval line to the rescue entrant's harness and have a lifting device readily available
- Utilize suspended line (rope systems/cable retrieval systems) when necessary
- Access point decisions are based on information available on victim location, the safety of the opening, atmospheric readings, and the ease of recovery
- Consider a two-prong access approach to reach the victim, whenever possible.
- Select a transfer device for the patient(s)

Stabilize

- The amount and level of patient care to be administered inside the space is based on patient needs, availability of room, and hazards present
- Work quickly to establish airway and supply fresh air as needed
- Evaluate and report the patient's condition to determine rescue or recovery risks
- Provide appropriate levels of emergency medical care (local protocols)
- Take a patient transfer device appropriate for the situation

Transfer

- Transfer operations include extrication from entanglement or entrapment and patient removal from the space

- Apply appropriate patient packaging (transfer) device to the patient.
- Develop and certify internal rigging.
- Work from safe areas when possible.
- Communicate and coordinate the extrication and removal operation.

5-2 Patient Packaging

Confined spaces present many hazards to people who enter them. A quick assessment of conditions will provide you with knowledge that can be used in the development of a rescue profile. Poor atmospheric conditions top the list of threats to life and health. Other hazards associated with confined spaces include:

- Electrical Equipment
- Moving Machinery
- Contents of the space
- Restricted Entry and Movement within the Space
- Shape of the Space

The injuries associated with a confined space are usually the result of hazardous conditions or a health problem of the entrant. To protect the victim of a confined space incident, OSHA requires that: "*Each member of the rescue service shall be trained in basic first aid and CPR. At least one member of the service holding current certification in first aid and CPR shall be available.*"

The extent of treatment provided the victim is most often dictated by the limitations of the space, not the abilities of the rescuers. Also, the time and difficulty of removal become elements of injury management. Patient packaging devices are used to increase the rescue profile of the victim. Once the patient is removed from the space, higher levels of care become practical. The Incident Commander should assign personnel to receive the patient so care can continue. Rescuers should delay their exit from the space because support personnel are tending to the patient.

ACTIVITY 5-1: Patient Packaging and Transfer Devices

Purpose: To allow participants the opportunity to practice methods of patient packaging.

Directions: Given a patient packaging device, the participants will demonstrate the care for a victim of a confined space incident, according to the manufacturer's criteria.

Patient Packaging and Transfer Devices	Yes	No
1. Indicate whether or not you participated in a discussion of the following medical needs of a confined space rescue victim.		
A. Severity?		
B. Extent of injury?		
C. Complexity of the space?		
D. Degree of care needed?		
2. Did you discuss the difficulties involved with accomplishing patient packaging?		
3. Indicate whether or not you participated in the application of the following patient packaging devices.		
A. SKED?		
B. LSP?		
C. Wristlets?		
D. Cinch?		
E. Webbing (Hasty Harness)?		
4. Did you discuss the difficulties involved in patient removal?		

5-3 RESCUE TEAM OFFICER DUTIES

The Rescue Team Officer (RTO) is responsible for supervision, safety, and communications with the Entry Team. The RTO directly supervises the Entry Team and the Rapid Intervention Team. The RTO also coordinates the entry operation with support personnel, such as rigging, hazard control, reconnaissance, and medical.

Pre-Entry Safety

- Entry Conditions and Hazard Control

The Rescue Team Officer must ensure that the entry conditions are acceptable. This decision is based on a risk and benefit analysis. The RTO must consider every available method to mitigate hazards in order to protect the Entry Team.

- Entry Team and RIT Plans

The Entry Team and Rapid Intervention Team must have a plan that clearly provides for all operations, including Locating, Accessing, Stabilizing and Transporting all victims in the space. The equipment that is available must be able to support the Entry and RIT plans.

Entry Team Equipment

Minimum equipment for Operations Level entry shall include personal protective equipment, stabilize and transfer devices for the patient, and an entry line.

Personal Protective Equipment

As a result of entry limitations placed on Operations Level confined space rescues, PPE requirements include, as a minimum:

- Full body rescue harness
- Helmet with chin strap (rescue style preferred)
- Nomex coveralls (fire turnouts can be used)
- Gloves (Nomex under leather preferred)
- Fresh air breathing apparatus (SCBA or SABA)
- Communication systems (primary and secondary)

- PASS device
- Intrinsically safe lights (primary and secondary)
- Protective footwear

Stabilize and Transfer Devices

The Entry Team must be equipped to stabilize the patient and to transfer the patient out of the space.

- Stabilize Equipment: air breathing apparatus; C-Spine immobilizer, as needed; splint for fractures, as needed; and 4x4 pads for bleeding control, as needed.

- Transfer Equipment: improvised devices (rapid removal) and manufactured devices (patient).

Entry Line

The Entry Team must be connected to an NFPA rated rope, known as the entry line. This multi-purpose line can be used for retrieval, belay, communications, and tracking.

- Retrieval: The entry line may be used to retrieve the patient or the entry team from the space. For vertical retrievals, the line should be attached to the front belay ring of the rescue harness. The rear (dorsal) D-ring is another acceptable point of connection on a rescue or full body harness. For horizontal retrievals, the line should be connected to wristlets attached to the wrists or ankles. To retrieve patients from the space, connect the line to the patient packaging attachment point.

- Belay: The entry line may be used as a belay (fall arrest) when used in vertical environments. Line attachment considerations include the front belay ring on a rescue harness, the rear ring on a full body, work harness, and appropriate points of attachment on patient packaging. If a single entry line is used to belay consecutive entry personnel, members must be proficient at switching belay connections to facilitate the “first in/first out” concept of air supply safety.

- Tracking: The entry line allows the RTO to track the movement, direction, and location of the entry team. This becomes increasingly important in Technician Level rescues when the entry team may leave the view of the RTO.

- Communications: In Operations Level confined spaces, the entry line may be used for communications. A simple rope tug method, like the OATH system, can provide an effective means of communication.

O	1 Tug	OK
A	2 Tugs	Advance
T	3 Tugs	Take Up
H	4 Tugs	Help

Communications

It is essential that continuous communications exist during entry team operations. The safety and efficiency of confined space rescue operations often hinge on good communications. A primary means of communication must be selected, and a secondary (back-up) system must be in place in case of failure of the primary system. In addition, all personnel on scene must understand emergency communications. Typical primary and secondary communications systems include:

- Portable Radios (safe for existing conditions)
- Face-to-Face or Voice Relay
- Hand Signals
- Rope Tugs (OATH)
- Whistles
- Carbon Dioxide Air Horns
- Sign Boards
- Hard Wired Systems

Note: Primary and secondary systems must be tested once the entrant(s) enter the space.

Emergency communications are typically sent by air horn or whistle. They include:

- Stop: 1 long blast
- Resume: 1 long followed by 1 short blast
- Evacuate: 3 long blasts repeated until all personnel have evacuated.

Supervision

The RTO must provide supervision and coordination throughout the entry operation. The RTO is the first line supervisor of the following:

- Entry and Removal – Coordination of the Rescue Plan
- Air Supply – Monitors and records the time on air. Ensures an air check every five minutes when SCBA is used
- Personnel – Assigns and rotates entry team personnel
- Communications – Ensures and provides constant communications with the Entry Team while they are in the space
- Safety and Health – Ensures the monitoring and maintenance of the safety and health of entry personnel during the operation
- Evacuation Plan – Provides an evacuation plan and is responsible for its implementation

Rescue Team Officer Checklist

PRE-ENTRY (Briefing)	
Entry Conditions _____ _____ _____	Hazard Control Method _____ _____ _____
☐ **Entry Team Equipment** (PPE, Patient (stabilize and transfer, entry line)	☐ **RIT Equipment**
☐ **Entry Plan** L _____ A _____ S _____ T _____	☐ **RIT Plan** _____ _____ _____ _____
Communications Primary _____ Secondary _____ Emergency _____	**Support Team Readiness** • Rigging • Hazard Control • Reconnaissance

ENTRY OPERATIONS

- ☐ Coordinate safe entry and removal operations
- ☐ Monitor and record air supply (SCBA-every 5 min.)
- ☐ Rotate entry personnel
- ☐ Maintain communications with Entry Team
- ☐ Ensure safe and healthy conditions in space
- ☐ Implement evacuation as needed

AIR SUPPLY RECORD

Entry Team Member	Time on	Check #1	Check #2	Check #3	Time Off
1.					
2.					
3.					
4.					

5-4 RAPID INTERVENTION TEAM DUTIES

Duties of the RIT include the following:

- Stages with PPE and entry equipment completely donned and tested
- Tracks entry team location and time in
- Ensures a secondary means of access and egress when possible
- Monitors the space for changing conditions
- Ensures readiness of entry team emergency stabilization procedures, including air monitoring, fire suppression, ventilation, and escape routes

ACTIVITY 5-2: Entry Team Operations

Purpose: To allow participants the opportunity to practice the skills necessary to make perform an Operations Level confined space entry and rescue.

Directions: Given a confined space scenario, the participant will demonstrate and apply the principles of Entry Team Operations, as presented in this Module.

Entry Team Operations	Yes	No
1. Did you identify and don PPE for an Operations Level entry?		
2. List the PPE that you used.		
3. Did you demonstrate the duties of an Entry Team member?		
4. Check the duties you performed. ☐ Locate ☐ Stabilize ☐ Access ☐ Transfer		
5. Did you demonstrate the duties of a Rescue Team Officer?		
6. Check the duties you performed. ☐ Ensure acceptable entry conditions ☐ Ensure readiness of RIT ☐ Designate PPE levels ☐ Ensure readiness of rigging and entry support ☐ Assign and brief personnel ☐ Ensure rehab of personnel ☐ Supervise entry operations ☐ Ensure primary and secondary communications		
7. Did you demonstrate the duties of an RIT member?		
8. Check the duties you performed. ☐ Stage with PPE donned and tested ☐ Monitor the space ☐ Track entry team location and time in ☐ Ensure readiness of entry team stabilization ☐ Ensure secondary means of access and egress		
9. List primary communications used.		
10. List secondary communications used.		

Module Summary

In this Module, you learned about entry rescue operations in Operations Level confined spaces (NFPA 1670). You learned the duties of Entry Team members, Rescue Team Officers, and Rescue Attendants. You also practiced the skills associated with these duties. Next, you learned about and performed the duties of the Rapid Intervention Team. Finally, you learned about and used communications that are essential to safe and efficient entry operations.