



## **Confined Space Rescue Facilitator Guide**

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Midwest Consortium for Hazardous Waste Worker Training

## Acknowledgments

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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. Several other member institutions of the Midwest Consortium contributed to revisions of this program. See <http://med.uc.edu/eh/academics/training/mwc> for a listing of contacts at each member institution and additional information.

We encourage you to comment on these materials. Please give your suggestions to those teaching the program in which you are now enrolled, or forward them to the Midwest Consortium for Hazardous Waste Worker Training, University of Cincinnati, P.O. Box 670056, Cincinnati, OH 45267-0056 or click on 'contact us' at <http://med.uc.edu/eh/academics/training/mwc>.

## Warning

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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

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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 rights & responsibilities, rescue scene management, the 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.

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# Rights & Responsibilities

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## Overview

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- OSHA data (Annual Stats)
  - A low of 81 deaths in 1998 to a high of 100 deaths in 2000
  - Nearly 6,000 injuries
- Explain that a majority of deaths and injuries are related to hazardous atmospheres
- Explain that a large number is due to hazardous energy sources
- Discuss NIOSH estimates that over 60% of fatalities are would-be rescuers which include:
  - Co-workers/family
  - Police
  - EMS
  - Fire
  - ERT

- Discuss the Detroit Incident
  - Radiator plant in Wyandotte
  - 17-year old worker overcome by hydrochloric acid in a degreasing pit
  - Seven firefighters were hospitalized for chemical burns
  
- Discuss the Norfolk Incident
  - A contractor who was overcome while preparing a fuel cofferdam
  - An emergency response from a local fire department which had fire fighting, but not confined space rescue training and equipment
  - Resulted in the death of the civilian contractor, the death of a fire captain and injury to another firefighter
  
- Explain the rules adopted by state/federal organizations which are meant to protect people entering confined spaces.
  - Confined Space Hazards
  - ERT capabilities and limitations
  - Confined Space Rescue Incident
  
- Explain the terminal objective
  
- Explain the Enabling Objectives
  - Recognition
  - Hazmat
  - Causes
  - Laws and standards
  - Capabilities and limitations

### 1-1 Confined Space Identification

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#### **Types of Spaces**

- Illustrate confined spaces that are common to most communities
- Discuss where these spaces exist within the participant response area
- Ask participants to identify other confined spaces in their response area

### Definitions

- Discuss some common features found in the space previously identified
  - Size
  - Limited entry
  - Not for continuous occupancy
- Explain that all 3 must exist for a confined space

### Permit Required Confined Space

- Explain the criteria for permit confined spaces
  - Classified as a confined space
  - Additional hazard or hazards
  - Atmosphere, engulfment, shape, other hazards

### Non-Permit Confined Space

- Explain the criteria for Non-Permit confined spaces
  - Will not contain atmospheric hazards
  - Will not have the potential to contain any serious hazard
- Note: Give examples of each type of space

### Entry

- Explain how “entry” is defined
  - Occurs as soon as any part of the entrant’s body breaks the plane of the opening
  - Putting your head in to look may result in becoming overcome by a toxic gas
  - Reaching into the opening may result in becoming entrapped or entangled in moving equipment

### Permit Systems

- Explain the requirement of an employer providing a permit system
  - Discuss the requirements of a rescue team and permits

- Discuss the importance obtaining the space permit at rescue scenes
- Review the information found on a Confined Space permit
  - Ask participants to identify information found on the permit that could be useful to rescuers
  - Rescue team should work form a checklist which includes the safety issues found in a permit

### **Alternate Entry Spaces**

- Explain the definition of Alternate Entry Space
- Explain the requirements that can be relieved if following alternate entry procedures

## 1-2 Hazard Recognition

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Explain the following ideas:

- oxygen deficient and oxygen enriched atmospheres
- flammable atmospheres
- toxic atmospheres
- IDLH atmospheres
- hazardous energy
- physical hazards
- temperature extremes
- insecure footing
- noise
- presence of animals
- overhead hazards
- biological hazards

### **Hazard Control**

- Explain the term avoidance and provide an example
- Explain removal and provide an example
- Explain control and provide an example
- Explain PPE and provide examples



## 1-3 Common Causes of Confined Space Accidents

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- Review the common causes of confined space accidents, using the acronym **FAILURE**

## 1-4 Capabilities and Limitations

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Review the levels of confined space rescue: Awareness, Operations and Technician

## 1-5 Duties of Host Employers

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- Review duties of host employers

### **Rescue Plans**

Review the elements of a rescue plan

## 1-6 Laws and Standards

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- Review NFPA Standard 1670, including levels of response

### **Activity 1-1 Rights & Responsibilities**

Show video of confined space rescue incident. Divide class into groups and have groups answer questions in Participant Guide.

## Module Summary

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Answer any questions

# Rescue Scene Management

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## Overview

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- Discuss the chaos that is often associated with rescue scenes
- Explain that when first responders make proper assessments and take command and control of the scene, chaos comes to an end
- Explain that the 4-phase SOG allows the ERT to gain control and manage the emergency scene
  1. Properly initiated Initial Actions are the foundation of success
  2. Plan Development provides an easily recognizable outline of the operational events
  3. Sustained Actions implement the action plan and are the heart of the rescue operation
  4. Termination provides a safe conclusion to the incident and ensures readiness for the next response
- Present a Power Point of the Incident Action Plan Worksheet and review the 4 phases
- Show a video of a confined space incident. Have the participants discuss each item found in the 4-phases <http://www.youtube.com/watch?v=ESn8y1k3H6k>
- Explain the Terminal Objective
- Explain the Enabling Objectives
- 4-Phase SOG

- Functional Components
- Operations Worksheets
  
- Explain the five functions of the Incident Command System
  - Command
  - Operations
  - Planning
  - Logistics
  - Finance
  
- Discuss how each would fit into an Operations Level confined space rescue command structure
- Explain how the ICS would expand for a Technician Level response

### 2-1 Standard Operating Guideline

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- Explain that Initial Actions are Awareness Level functions, as well as Operations and Technician

#### **Discuss Phase I: Initial Actions**

- Safe approach
- Incident Command
- Site assessment
- Scene control
  
- Discuss **approach** methods
  - Direction
  - Apparatus – 100 feet
  - Proper PPE to approach space
  - Seek witnesses, workers, attendants
  - Use of approach worksheets
  
- Discuss **notification** methods
  - Establish command
  - Implement the response system and BIR
  - Command location and staging
  - Initial action assignments

- Discuss the information sources that should be used to **identify** the situation. List them on a chart pad.
- Discuss reconnaissance and the information Recon personnel gather. List on chart pad.
- Discuss the goal of **isolation**

### Zoning

- Barrier tape for Hot Zone (50 ft. perimeter)
- Work Zone
- Control access points

### Control people in the area (**Evacuation**)

- Treat and control surface victims when possible.
  - Communicate with and provide fresh air and self-rescue assistance to trapped victims.
  - Direct untrained rescuers out of unsafe areas
  - Remove spectators
  - Allow only assigned rescue workers in zone
- Discuss the goal **protection**
    - Block/barricade traffic
    - Shut down heavy equipment that will adversely affect rescue
    - Ventilate the area if needed
    - Barricade downed wires and call power company
    - Lockout/tagout (rescue) hazardous energy
    - Zone and call utility companies
    - Remove trip hazards
  - Discuss how all of the above are exterior hazards

**SOG (Phase II: Plan Development)**

- Discuss the definition of **size-up**
  - Gathering information
  - Decision made based on information
  
- Discuss the major decisions that need to be made
  - Operational mode
  - Strategic mode
  - Incident Level
  - Resources
  
- Explain the limitations of Awareness Level
- Discuss activities that can be performed at the Operations Level

*Note: Ask participants to explain limitations*

- Explain activities that can be performed at the Technician Level
- Discuss the resources that may be available
  - On-Scene
  - On-Duty
  - Mutual Aid
  - State/Provincial/Federal
  
- Explain that once Incident Commander determines Operational Mode, Strategic Mode, Incident Level, and Resource requirements, the IC can assign and implement Sustained Actions.

**SOG (Phase III: Sustained Actions)**

- Explain the elements of the briefing, including Emergency Signals and Scene Awareness
- Prior to beginning Sustained Actions, the IC brings the group together to share the following:
  - **Emergency Signals** (Evacuate, stop, rescue, OATH)
  - **Scene Awareness** (Hazards, PPE, site details, action plan, decontamination)
- Explain that an additional briefing takes place prior to entry (offensive) operations. The IC or his Rescue Team Officer must **brief the entry team** on the following:
  - Safe entry conditions
  - Entry PPE
  - Team assignments
  - Support readiness
  - RIT readiness
  - Additional equipment
- Explain how worksheets should be used to assist the Incident Commander

**SOG (Assigned Tasks)**

- Discuss methods used for **hazard mitigation**
  - Air monitoring
  - Rigging
  - PPE
  - Energy Control/Power Lockout (ECPL)
  - RIT
- Discuss methods used to **locate** a victim
  - Look and listen
  - Clues
  - Eyewitnesses
  - Camera

- Discuss methods used to **access** a victim
  - Ladder
  - Rigging
  - Other access points
- Discuss methods used to **stabilize** a victim
  - Ventilation
  - Patient care
  - Air supply
  - Transfer device
- Discuss methods to **transfer** a victim
  - Disentanglement/extrication
  - Removal systems
  - Transport methods

### **SOG (Phase IV: Termination)**

- Discuss the dangers of Termination Phase
  - Emotional letdown
  - Lack of concentration
  - Fatigue
- Discuss on-scene personnel issues
  - Safety
  - Accountability
  - Rehabilitation
  - Debriefing
- Explain that the debriefing should be a short, positive summary of what took place. It should include:
  - Operational Mode (Rescue or Recovery)
  - Strategic Mode (Offensive or Defensive)
  - Incident Level (Awareness, Ops, Tech)
  - Resources Used (On-Scene, On duty, mutual aid, government)

- Conduct a sample debriefing
- This afternoon we successfully conducted an operations level rescue. We used offensive (entry) operations and had assistance from the local fire department and private ambulance. There were no injuries, and our only problem was with the first air monitor.
  - Were there any safety concerns?
  - Were there any procedural issues?
  - Good job and thank you for your effort

### Follow-Up Procedures

- Discuss follow-up procedures for personnel
  - Post-Incident Analysis
  - Incident Critique
  - Critical Incident Stress Debriefing
- Discuss the importance of placing the **equipment** back into a state ready for deployment
  - Recover all equipment that can be gathered safely
  - Account for all equipment in inventory
  - Recondition, repair or clean equipment that has been used
  - Place re-useable equipment back in proper storage place. Replace or re-order damaged or missing equipment.
- Discuss methods for **Site Control Transfer**
  - Responsible person
  - Briefing on conditions
- Explain the importance of this step
  - Hazards
  - Prevent reoccurrence
- Review **Incident Documentation** procedures
  - Reports
  - Narratives



### 2-2 Functional Components

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Review the functional components of the ICS, including Incident Commander, Operations, Planning, Logistics, and Finance

### 2-3 Operation Worksheets

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- Explain that Operation Worksheets are provided as part of the course. Explain each of the following:
  - Incident Action Plan (IAP)
  - Approach & Identification Assessment Worksheet
  - Resource List Worksheet
  - Planning Worksheet
  - Rescue Team Officer Checklist
  - Technical Rescue Incident Report

### Activity 2-1: Rescue Scene Management

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- Explain the purpose
- Explain the directions
- Assemble the class near a confined space or show the confined space video
- Ask each participant to complete the 3-page Activity Checklist on their own
- Have each person give a report to the class
- Discuss the answers with the class

Continue with Activity 2-1

**Debrief:** Each member of the class must be prepared to serve as the Incident Commander

**Learning Point:** Equipment to support the Incident Command System must be located together in a compartment of a vehicle or cart

### Chapter Summary

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- Explain the summary
  - 4-Phase SOG
  - Functional Components of ICS
  - Operations Worksheets
  
- Complete administrative details
  - Provide agenda for next day's activities
  - Logistics
  - Clean up
  - Accountability (PAR)
  
- Activity 2-1 and 4-Phase SOG Skills Checklist

## Initial Response

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- Explain the importance of actions taken by the Initial Responders. When things begin well, they generally go well.
- Explain that these actions can dictate the success or failure of the entire rescue operation.
- Explain that this unit covers the basics for Initial Actions and Plan Development.

**Directions:** *Prior to beginning unit, place training mannequin in confined space with harness and retrieval line in place.*

- Explain the Terminal Objective
- Explain the Enabling Objectives
  - Notification
  - PPE
  - Isolation
  - Identification
  - Protection
  - Plan Development
  - Non-Entry Rescue

### 3-1 Command for Initial Actions (Notification)

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- Explain the need for first arriving personnel to begin command at an incident
- Explain the importance of operating under an Incident Management System
- Discuss the transfer of command policy in place
- Explain Command duties for initial actions.
  - Establish command
  - Begin Approach Assessment
  - Provide a Brief Initial Report (BIR)
  - Identify command and staging location
  - Assign duties and identify appropriate PPE
  - Initiate response system and request internal and, if appropriate, external resources.

### 3-2 Personal Protective Equipment

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- Explain the need for minimum PPE requirements for first responders
- Explain the need for early hazard recognition and the potential upgrade of first responder PPE
- Explain that the use of Hazmat suits and other specialized PPE is beyond the scope of this Operations Level program
- Discuss types of PPE available to protect ERT personnel operating outside of the space (Initial Actions)
- Discuss limitations and suitability of PPE by donning the following:
  - Respiratory protection – SCBA
  - Body protection – Nomex coveralls
  - Head protection – Nomex hood/helmet
  - Eye protection – safety glasses
  - Hand protection – leather work gloves
  - Foot protection – leather work boots
  - Hearing protection – ear plugs
  - Fall protection – harness
  - Lighting – flashlight/calumine stick
  - Atmospheric monitor

- Explain the concept of PPE minimums for respiratory and body protection
- Continue the PPE demonstration for head and eye protection
- Emphasize how PPE must be stowed and stored for rapid deployment
- Continue the PPE demonstration for :
  - Hand Protection
  - Foot Protection
  - Hearing Protection
  
- Continue the PPE demonstration for :
  - Fall Protection
  - Lighting
  - Atmospheric Monitoring

## Activity 3-1: Notification and Command

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- Explain the purpose
- Explain the directions
- Conduct this activity as a guided discussion at the confined space
  - Establish command
  - Approach Assessment
  - Brief Initial Report
  - Staging
  - Initial Actions
  - PPE
  
- Have each participant perform the duties of the Incident Commander

**Debrief:** When things begin well, they usually go well.

## 3-3 Isolation: Scene Control Procedure

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- Discuss the importance of controlling the rescue site
- Discuss the minimum size needed for the Hot Zone (rescue area)
- Discuss the **duties of Isolation personnel**
  - Eye protection – safety glasses
  - PPE
  - Hot Zone
  - Evacuation
  - Control
  - Staging
  - Warm Zone
  - Entry Point
  - No Entry Zones

- Discuss the following isolation zones. Review the personnel and equipment allowed in each zone.
  - **Rescue Area (Hot Zone)**
  
- Discuss the following isolation zones. Review the personnel and equipment allowed in each zone.
  - **No Entry Zone**
  - **General Area (Warm Zone)**
  - **Staging**
  
- Discuss methods used to evacuate and care for the people who may be in the zones (**Control**).
  - Surface victims
  - Trapped victims
  - Untrained rescuers
  - Bystanders
  - Workers
  - Emergency responders

## Activity 3-2: Isolation

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- Explain the purpose.
- Explain the directions.
- Conduct this activity as a guided discussion at the confined space.
- Discuss the goal of isolation and complete the skills checklist.
- Have each group perform the duties assigned to Isolation.

**Debrief:** Operations Worksheets ensure that no duties are forgotten.

### 3-4 Identification: Reconnaissance Procedures

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- Explain the importance of the goal of Identification
  - Accurate information gathering
  - Accurate decisions
  
- Explain the **duties of the Recon Team**
  - PPE
  - Approach Assessment
  - Victim Contact
  - Atmospheric monitoring
  - Report to IC
  
- Explain the layout and use of the **Approach Assessment Worksheet**
  - Approach
  - Situation
  - Hazards
  - Space details
  - Victim assessment
  - Resources
  
- Explain the importance of **atmospheric monitoring**
- Explain the 4 sensors
  - Oxygen
  - Carbon Monoxide
  - Flammable
  - Hydrogen Sulfide
  
- Explain acceptable entry levels for work (provide the following as a representative company SOG)
  - Oxygen: 19.5% to 23.5%
  - Flammable: less than 10% of LEL
  - Carbon Monoxide: 35 ppm
  - Hydrogen Sulfide: 20 ppm



- Explain the start-up procedure
  - Location
  - On/Off
  - Screen icons
  
- Demonstrate 4 by 4 monitoring
  - Approach
  - 4 locations
  - 4 foot increments
  - Victim contact
  - Site details
  
- Discuss hazards associated with this work
  - Avoid water
  - Avoid contaminants
  - Time at each point
  
- Have each participant conduct 4 by 4 monitoring of the space
  - Turn monitor on/off
  - Point out 4 functions on screen
  - Place monitor into 4 initial locations
  - Attempt victim contact
  - Identify other hazards
  - Identify site details

## Activity 3-3: Reconnaissance (Approach & Identification)

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- Explain the purpose
- Explain the directions
- In groups complete the following workshops:
  - Approach Assessment Worksheet
  - Atmospheric monitoring of space
  - Victim location and communication
  - Space configuration
  - Reporting findings
- Have each group record their findings on the Worksheets
- Have each group report back to the class

**Debrief:** Recon is important and accuracy counts

## 3-5 Protection: Hazard Control Procedures

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- Explain that hazards can be managed by breaking down into internal and external
- Discuss how actions taken to control hazards are limited by PPE
  - Flammable atmospheres
  - Hazmat, spills
- Discuss **Hazard Control Team duties**
  - PPE selection
  - Manage external hazards
  - Manage internal hazards
- Discuss **external hazards** and methods used to control them
  - Traffic
  - Heavy equipment
  - Atmospheric
  - Downed wires

- Disrupted underground utilities
- Trip hazards
  
- Discuss **internal hazards** that are found in confined spaces
- Explain the purpose of primary confined space **rescue ventilation**
- Explain the purpose of secondary confined space rescue ventilation
- Explain rescue ventilation basics
  - Supply air
  - Direct air to victim's face
  - Ensure continuous/uncontaminated air to the victim
  
- Explain the types of atmospheres that ventilation will improve
  - **Oxygen deficient**
  - **Toxic gases**
  - **Flammable gases**
  
- Review the component parts of confined space ventilation equipment
  - Blower
  - Ducts
  - Saddle vent
  - Elbow
  - Power source, cords
  - Duct tape
  
- Coach participants through the assembly of the component parts
- Discuss **blower placement** considerations
  - Fresh air
  - Noise
  - Obstructions
  - Distance
  - Exhaust
  
- Have participants place the system in operation for rescue ventilation
- Check for proper placement of :
  - Duct work (1 foot over victim's face)
  - Blower placement

- Duct work outside space (no kinks, hard bends)
- With rescue ventilation in place, discuss and demonstrate the following **potential problems**:
  - Patient Considerations
  - Re-circulation
  - Short Circuiting
- Discuss **Atmospheric Monitoring**

### Activity 3-4: Rescue Ventilation

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- Explain the purpose.
- Explain the directions.
- Direct each group to assemble the ventilation components for rescue ventilation.
- Have each group monitor, assemble, operate, and evaluate a rescue ventilation system.
- Perform 4 by 4 by 4 monitoring before and after air flow is started.
- Discuss the need to monitor changes in conditions following ventilation and throughout the rescue.
- Demonstrate evaluation and control of problems typically found.

**Debrief:** Confined space victims may need fresh air urgently. Ventilation air supply can also cool the victim.

- Explain the need for hazardous energy control at a confined space rescue scene
- Discuss the differences in the Company ECPL procedure and **Lockout for Rescue Procedure**
  - Number of locks and entrants
  - Team lock identification
  - Restart procedure
  - Locking system in “on” position
  - Emergency responder standing guard
  - Locks and team tags
  - Lockout devices
  - Chains (OS & Y)
  - Rescue personnel assigned to control area
- Discuss the types of energy found in the plant: electric, water/steam, hydraulic, pneumatic, gravity/momentum, gas, chemical, stored energy
- Demonstrate how to **identify an energy source** by tracing the system and recognizing system components
- Discuss **Energy Isolation and Control**
- Discuss the use of the hazardous energy control flow chart

## Activity 3-5: Energy Control and Power Lockout for Rescue

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- Explain the purpose
- Explain the directions
- Review PPE requirements for the tour
- Conduct a tour and identify energy sources by tracing
- Identify existing lockouts
- Have the group apply lockout devices
- Discuss hazard removal methods and ventilation
- Review the acronym CARP
  - Control
  - Remove
  - Avoid
  - PPE

## Activity 3-6: Protection and Hazard Control

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- Explain the purpose
- Explain the directions
- Take the class to a pre-designated confined space
- Indicate the type of PPE that will be required
- Assign work groups to mitigate external and internal hazards
- When work groups have completed tasks, explain difference between normal ECPL and Lockout for Rescue

## 3-6 Plan Development

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- Explain the need for a plan of action to coordinate efforts, increase efficiency, and enhance safety
- Discuss information gathered during the Approach Assessment and the importance of that information relating to a plan of action
- Explain **Plan Development duties of IC**
  - Rescue/Recovery determination
  - Offensive/defensive decision
  - Operational level identification
  - Resource capabilities and resource request procedures
  - Strategic goal and tactical objectives (**Control Plan**)
- Using the confined space scenario you have set up for this workshop, demonstrate the Plan Development duties
- Review strategic goals and tactical objectives on the Incident Action Plan Worksheet



## 3-7 Non-Entry Rescue

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- Explain the benefits of non-entry rescue (defensive)
- Discuss situations when non-entry rescue would work
  - Retrieval line in place
  - No obstructions
  - Retrieval system available
  
- Explain the **duties of personnel assigned to non-entry rescue**
  - Rescue methods
  - PPE
  - Life support
  - Self-rescue
  - Retrieval systems
  
- Explain 3 **methods (options) of non-entry rescue**
  - Life support used
  - Assisted rescue
  - Retrieval system use
  
- Discuss the applications of the **retrieval system** in permit spaces
- Explain the concept of the retrieval system chain
- Discuss the chain components and set up the system
  - Retrieval line
  - Transfer device
  - Mechanical advantage
  - Belay
  
- Use participants to set-up tripod. Explain that this will be the overhead anchor for the retrieval system for the non-entry rescue.
- Point out the retrieval line attached to the victim's harness
- Point out the harness on the victim and explain that this is an appropriate transfer device
- Have participants attach Miller 70 to the tripod. Explain that this is a 3 to 1 mechanical lifting device

- Demonstrate the rescue-sender and explain its use as a rope grab device (attach rescue-sender to retrieval line and to Miller 70)
- Use the tail of the retrieval line as a belay (Munter) attached to the victim. It also acts to capture progress of the lift.
- Demonstrate the retrieval system by lifting a load
- Demonstrate the system
  - Staff positions
  - Coach the participants through a non-entry rescue demonstration

## Activity 3-7: Non-Entry Rescue

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- Explain the purpose
- Explain the directions
- The activity begins after all equipment has been placed back on the rescue cart
- The instructor will act as IC and perform Notification duties
- Assign participants to the following:
  - Scene Control (Isolation)
  - Recon (Identification)
  - Hazard Control (Protection)
  - Rescue Ventilation
  - Simple Energy Control
- Critique the rescue, conduct a debriefing, and supervise Phase IV, Termination

**Debrief:** Review the 3 methods of non-entry rescue

- Life support
- Assisted self-rescue
- Retrieval system
- Coach the participants through the steps during the non-entry rescue activity
  - ICS
  - Sources of Information
  - Approach Assessment
  - Site control measures
  - Briefing

**Debrief:** The IC must determine whether a Rescue Team Officer and Safety Officer are needed

- Coach the participants through the steps during the non-entry rescue activity
  - Approach Assessment Worksheet
  - Rescue/Recovery
  - Operational Level
  - Capability of team

- Resources
  - Goals and objectives
  - Incident Action Plan Worksheet
- Conduct the Termination Phase and ensure the completion of the activity
    - Termination
    - Recovery

### Activity 3-8: Non-Entry Rescue (Initial Actions)

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Conduct initial actions for a non-entry rescue. When the activity is completed, ask participants to complete the checklist.

### Activity 3-9: Non-Entry Rescue (Plan Development)

At the conclusion of the non-entry rescue exercise, ask participants to complete the checklist.

### Chapter Summary

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- Explain the Module Summary
  - Notification
  - PPE
  - Scene Control
  - Recon
  - Hazard Control
  - Plan Development
  - Non-Entry Rescue
- Complete the skills checklists for this unit
- Complete any administrative details
  - Agenda
  - Logistics
  - Clean-up
  - PAR

## Rigging

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- Explain the importance of knowing the limitations of equipment designed for confined space rescue rigging
- Explain the high degree of proficiency that must be maintained to minimize the risk of injury or death
- Explain the history of NFPA 1983 and the FDNY rope rescue deaths
- Explain the Terminal Objective
- Explain the Enabling Objectives
- Anchor Systems
- Harnesses
- Belay (Fall Arrest)
- Raising and Lowering
- Tactical Procedures

## 4-1 Knots

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- Explain Operations Level knot craft
  - Specific knots
  - Safety Factors
  
- Explain the knots selected for this program
  - Figure 8
  - Figure 8 on a bight
  - Butterfly
  - Munter Hitch
  - Water Knot
  - Prussik Wrap
  - Double Fisherman
  
- Explain the knot criteria for selection
  - Selection
  - Ease of Tying
  - Ease of inspection
  - Strength
  
- Explain the minimum 10 to 1 safety factor
- Explain the parts of a rope
  - Standing
  - Working
  
- Explain the parts of a knot
  - Bight
  - Loop
  - Round turn

## Activity 4-1: Ropes and Knots

---

- Explain the purpose.
- Explain the directions.
- Demonstrate the construction of the knots.
- Discuss the safety aspects of the knots.
- Discuss how each knot meets the criteria for use.
- Coach the participants in accurate tying.
- Have each member of the group fully tie each knot successfully.
- Explain the importance of the rope and related equipment.

**Debrief:** When things begin well, they usually go well

## 4-2 Anchors

---

- Explain the purpose of an anchor point
- Explain the criteria for **selection**
  - Location
  - Mass
  - Construction
  - Condition
- Conduct a tour of the immediate area and discuss anchor points
  - Location
  - Mass
  - Construction
  - Condition
- Cite examples of suitable anchors as the tour progresses
- Explain **overhead anchors**
  - Permanent
  - Temporary
  - Change of Direction
- Discuss the **advantages and disadvantages**
- Discuss **permanent overhead anchors**

- Beams
- Truss members
- Railings
- Other structural
  
- Discuss **temporary overhead anchors**
  - Fire service ladders
  - Tripods for CSR
  
- Discuss temporary overhead anchors
  - Fire service ladders
  - Tripods for CSR
  
- Discuss types of ladder-based temporary overhead anchor points
  - Aerial ladders
  - Ladder gin
  
- Continue with the discussion on temporary overhead anchor points by looking at alternate method for ladder gin
- Continue with the discussion of temporary overhead anchors by looking at A-Frames
- Explain steps in setting up A-Frame
- Explain the **definitions** related to anchors
  - Bombproof Anchor
  - Substantial Anchor
  - Marginal Anchor
  - Anchor Point.
  
- Discuss anchor attachments
  - Definition
  - Webbing-based
  - Manufactured slings
  - Strength
  - Safety factor
  
- Discuss edge protection for anchor attachments



## Activity 4-2: Anchor Points

---

- Explain the purpose
- Explain the directions
- Complete the anchor tour and presentation
- Demonstrate the selection and creation of anchor points using the 3 methods
  - Manufactured
  - Quick Sling
  - Wrap 3, Pull 2
- Emphasize edge protection
- Coach the participants through the tasks listed on the checklist

## Activity 4-3: Overhead Anchor

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- Explain the purpose.
- Explain the directions.
- Demonstrate the set-up and operation of an overhead anchor system (ladder based).
- Repeat and coach as time permits.
- Have the groups assemble and operate an overhead anchor-based rope rescue system.
- Coach the participants through the tasks listed on the checklist

## 4-3 Harness

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- Explain the OSHA requirements for CSR harnesses
  - Full body
  - Can invert
  - Entry harnesses
- Discuss the advantages of rescue harnesses
  - NFPA Class I, II, III

- Padding
  - Several attachment points
  - Easy to don
- Discuss inspection and storage methods
  - Demonstrate the donning, doffing, inspection and storage methods

## Activity 4-4: Harness

---

- Explain the purpose
- Explain the directions
- Demonstrate the donning, doffing, inspection, stowing, and storage of a rescue full-body harness
- Coach the participants in the steps
- Let each participant don the harness. Suspend each person on a system.

## 4-4 Belay/Fall Arrest

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- Explain fall protection
- Explain the conditions that might require fall protection
  - High angle
  - Steep angle
- Discuss the types of belay methods
  - Munter hitch
  - Tandem Prussik
  - Traverse 540
- Discuss the limitations
  - 1 person load
  - 2 person load

- Demonstrate the set up and operation of a **Munter Hitch Belay**
  - Anchor location
  - Anchor attachment
  - Suitable carabiner
  - Carabiner orientation
  - Munter Hitch application
  - Edge protection
  - Hand position for lowering operation
  - Rope management
  
- Discuss the lowering and raising operation guidelines for the Munter Hitch
  - No distractions
  - Rope management
  - Suitable slack
  - Brake hand
  - Taking-up slack
  - Edge protection
  - Coach each participant in the rigging and operation of the Munter Hitch Belay
  
- Explain the **Tandem Prussik Belay**
  - Anchor selection
  - Anchor attachment
  - LRH
  - Prussik attachments
  - Pulley for raise
  - Edge protection
  
- Demonstrate the raising and lowering guidelines for the Tandem Prussik Belay
  - No distractions
  - Rope management
  - Proper slack
  - Hand positions
  - Adjustment
  - Hazards

- Coach each participant in the set up and operation
  - No distractions
  - Rope management
  - Proper slack
  - Hand positions
  - Adjustment
  - Hazards
  
- Explain the **Traverse 540 Rescue Belay**
  - Push pin release
  - Front/back plate
  - Release lever
  - Connecting point
  - Oblong pulley
  - Stationary wedges
  - Release lever
  
- Explain the raising and lowering operation guidelines for the Traverse 540
  - No distractions
  - Rope management
  - Proper slack
  - Hand positions
  - Release lever operation
  - Hazards
  
- Coach each participant in the set up and operation of Traverse 540

## Activity 4-5: Belay/Fall Arrest

---

- Explain the purpose.
- Explain the directions.
- Allow participants time to practice rigging and operating belay systems.
- Operate a Mechanical Advantage based lowering and raising system with a rope bag as a load.
- Rotate participants and repeat

## 4-5 Raising/Lowering Systems

---

- Explain that confined space entry often requires the use of raising and lowering operations
- Explain the flexibility that rope-based systems provide
- Discuss the limitations of raising and lowering systems at the Operations Level
  - 30 feet
  - NFPA rope and pulleys
  - 3:1, 4:1
  - Pre-packaged systems
- Discuss the importance of knowing when space requirements are beyond Operations Level rope techniques

*NOTE: Refer to the bold text on vertical limitations.*

## Activity 4-6: Raising and Lowering Systems

---

- Explain the purpose
- Explain the directions
- Coach the participants in the construction of MA's
- Discuss the limitations of each system
- Demonstrate the raising and lowering of a load (rope bag)
- Demonstrate the commands
- Provide for a belay

## Activity 4-7: Miller 70

---

- Explain the purpose
- Explain the directions
- Explain the Miller 70 system
  - Components
  - Strength rating
  - Care
  - Maintenance
  - Limitations
- Demonstrate its use
  - Attaching to elevated anchor points
  - Team raise technique
  - Lowering (one person)
- Coach the participants through the set-up and use of the Miller 70
- Complete the skills checklist

## 4-6 Tactical Procedures (according to NFPA 1670?)

---

- Explain the **raise and lower chain**
- Explain the limitations of CSR (Operations Level) raise and lower systems
  - One person load
  - 30 feet
  
- Discuss the elements of the briefing
  - Positions
  - Objective
  - PPE
  - Emergency communications
  
- Discuss the importance of good **communications**
- Explain the **position designations**
  - Rescue Team Officer (RTO)
  - Belay
  - Rescuer
  
- Continue to explain the position designations
  - Brake
  - Edge
  - Haul Team
  
- Explain how **verbal commands** are conducted
  - RTO sends command to a position, “Belay ready?”
  - Position repeats the command when ready as in, “Belay ready!”
  
- Explain verbal commands for a raise/lower operation
  - Position check (operational readiness)
  - Belay
  - Lowering

- Continue to explain how verbal commands are conducted
  - Raising
  - Problems
  
- Explain whistle/horn commands and conditions requiring their use
  - Stop
  - Brake
  - Raise
  - Lower
  - Resume
  - Evacuate
  
- Explain the **safety checks** completed by the RTO
  - Physical/Visual
  - Load Test
  - Critical Point Test
  - Audible/Visual Confirmation

## Activity 4-8: Raising/Lowering System Operations

---

- Explain the purpose
- Explain the directions
- Have each group operate the system to raise and lower a load
- Staff all positions
- Demonstrate the commands
- The instructor should act as the IC
- Rotate IC's and positions
- When the rotations are complete, direct the IC to implement Phase IV:  
Termination
- Complete the skills checklist

**Debrief:** Commands require practice on a frequent basis to be effective



## Chapter Summary

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- Explain the module summary
  - Knots
  - Anchors
  - Belay
  - Raise/Lower Systems
  - Tactical Procedures
  
- Complete any administrative details
  - Agenda
  - Logistics
  - Clean-up
  - PAR
  
- Complete skills checklists 4-1 through 4-8

## Entry Team Operations

---

- Explain the following points
  - Entry operations increase the risk to rescuers
  - The selection of entry team members is very important
  - Size, strength, stamina and mental clarity must be evaluated
  
- Rescuers need to understand and be able to perform:
  - Selection and donning of PPE
  - Entry team duties
  - Rescue Team Officer duties
  - Communication techniques
  - RIT duties
  - Patient care and packaging
  
- Explain the Terminal Objective
- Explain the Enabling Objectives
  - Duties of an Entry Team Member
  - Patient Packaging Techniques
  - Duties of a Rescue Team Officer
  - Duties of a Rapid Intervention Team member

## 5-1 Entry Team Duties

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- Explain that Entry Team duties are based on a memory aid: Locate, Access, Stabilize, and Transfer (LAST). An important part of LAST is the ability to provide patient care and packaging.
- Discuss the duties of the Entry Team for Locate
  - Reconnaissance of the area
  - Sources of information
  - Victim location
  - Entry points
- Discuss duties of the Entry Team for Access
  - Ladders
  - Retrieval lines
  - Suspended lines
  - Access points
  - Two-prong approach
  - Transfer device selection
- Discuss Entry Team duties associated with Stabilize
  - Patient care
  - Fresh air and airway
  - Rescue or recovery
  - Local medical protocols
  - Patient transfer device
- Discuss Entry Team duties related to Transfer
  - Entanglement or entrapment
  - Apply transfer device
  - Internal rigging
  - Hazard control and review
  - Communication
  - Removal operation

## 5-2 Patient Packaging

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- Explain that the space is the limiting factor in patient care, rather than the capability of the rescuers
- Discuss events that could cause injuries in confined spaces
- Discuss the resulting injuries
- Discuss time and the complexity of removing the victim
- Discuss the treatment that can be provided, given the space limitations

## Activity 5-1: Patient Packaging and Transfer Devices

---

- Explain the purpose of the activity
- Explain the directions
- Demonstrate the application of patient packaging devices provided by the AHJ
- In groups, allow each participant the opportunity to practice application and removal of patient packaging devices
- Coach the participants, as necessary
- Demonstrate the inspection and proper stowing method after use
- Ask participants to complete the skills checklist in the Participant Guide

## 5-3 Rescue Team Officer Duties & Checklist

---

- Explain that RTO duties include Pre-Entry Safety, Communications, and Supervision
- Explain how the performance of RTO duties can be enhanced by using a checklist
- Explain that during the entry operation, the instructor will demonstrate the use of the RTO checklist
- Discuss **Pre-Entry Safety** considerations
  - Entry conditions and hazard control
  - Entry Team and RIT plans
- Discuss **Entry Team Equipment** such as minimal PPE needs for operation level entries
- Dress out an instructor, technician or participant in minimum entry level PPE
- Discuss the need to stabilize and transfer patients in confined spaces
- Demonstrate stabilize and transfer devices provided by the AHJ
- Explain the need for the entry line and the NFPA criteria (lifeline)
- Explain the multiple purposes of an **entry line**
  - Retrieval
  - Belay
  - Tracking
  - Communications
- Demonstrate the following:
  - Attachment and use as a retrieval line.
  - Attachment and use as a belay line.
  - Belay line switch for “first in/first out” applications.
  - Use as a tracking line.
  - Use as a communication line, including the OATH system.
- Explain the importance of continuous **communications**
  - Reduce confusion
  - Reduce anxiety
  - Speed the operation
  - Reduce the risk

- Explain the need for primary and secondary communication
  - Ensure that communication is continuous
  - OSHA and NFPA 1670
- Discuss the types of primary and secondary communications
- Discuss the need to test communications prior to entry in the space
- Discuss the RTO duty to ensure instant communications
- Discuss the need for **supervision** and coordination during entry (rescue) operations
- Explain that RTO duties include the following:
  - Entry and removal
  - Air supply
  - Personnel
  - Communications
  - Safety and health
  - Evacuation plan
- Discuss the elements of the RTO Checklist, including the following:
  - Pre-Entry Briefing
  - Entry Operations
  - Air Supply Record

## 5-4 Rapid Intervention Team Duties

---

- Explain the OSHA “2 in/2 out” rule and RIT
  - Personnel sufficient to perform a rescue
  - Adequate training
  - Adequate PPE
  - Suitable equipment
  - Appropriate location
  - Limited extra duties
  
- Discuss RIT duties at the Operations Level
  - Staged
  - PPE donned and tested
  - Tracker
  - Timer
  - Two prong access
  - Monitor space conditions
  - Ensure Entry Team emergency support



## Activity 5-2: Entry Team Operations

---

- Explain the purpose
- Explain the directions
- The instructor will serve as the Incident Commander
- Use the Operations Worksheets and assign participants to the positions to conduct an Entry Team operation
  - Entry Team
  - Belay
  - Haul Team
  - RIT
  
- Conduct the Entry Team Operation
- Rotate positions and repeat
- Coach the Incident Commanders
- Complete the skills checklist
- When the rotations are complete, direct the IC to implement Phase 4, Termination

**Debrief:** Operations Level skills are the basis for all Technician Level operations

## Chapter Summary

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- Explain the module summary
- Entry Team Duties
- Patient Packaging
- Rescue Team Officer Duties
- RIT Duties
- Complete any administrative details.
- Agenda
- Logistics
- Clean-up
- Personnel Accountability Report
- Complete course documentation.
- Program evaluations
- Skills checklist
- Instructor evaluation of ERT
- Invoices