



MANAGING CONFINED SPACES IN ARMY HEALTHCARE FACILITIES

TECHNICAL INFORMATION PAPER No. 59-076-0417

PURPOSE. To describe procedures for identifying confined spaces in Army healthcare facilities and for managing the associated risks of entering and working in confined spaces.

BACKGROUND.

According to the U.S. Department of Labor, about 92 workers die of injuries received from working in confined spaces each year. A 33-year-old employee died in a hospital laundry confined space while cleaning plastic debris off the inside surface of a clothing dryer with a chisel. The employee entered the large industrial dryer through a small opening that measured 25 inches high by 40 inches wide. Other employees in the area were not aware that the man was inside the dryer. When the automated system was activated, 200 pounds of wet laundry was delivered to the dryer, the dryer door slammed closed, and the 6-minute, heated, drying cycle began. The employee suffered severe body burns and blunt head trauma resulting in his death.

Events such as the one described above, make it vital for all workplaces with confined spaces, including healthcare facilities, to establish a Confined Space Entry Program.

WHAT IS A CONFINED SPACE?

A confined space—

- Is large enough and configured so that an employee can completely enter the space to perform work; including inspections, testing, repair, or cleaning;
- Has limited or restricted openings for entry and exit; and
- Is not intended for continuous employee occupancy.

Limited or restricted openings for entry and exit means —

- Employees must crawl, climb, twist, or be constrained in a narrow opening;
- Employees must follow a lengthy path or otherwise take unique measures to enter or leave; or
- The entrance may become sealed or secured against opening from the inside.

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Some confined spaces may have multiple, small and difficult-to-pass-through entrances and exits. Likewise, some confined spaces may have large access openings requiring the use of ladders, hoists, or other devices to access the space.

Some examples of confined spaces in healthcare facilities are—

- Boilers
- Elevator shafts
- Air handlers and duct work
- Utility tunnels and chases
- Crawl spaces
- Utility vaults
- Hoppers
- Manholes
- Trash compactors and material balers
- Dock leveler pits
- Cart washers

WHAT IS THE DIFFERENCE BETWEEN A NON-PERMIT CONFINED SPACE (NPCS) AND A PERMIT-REQUIRED CONFINED SPACE (PRCS)?

A NPCS is a confined space that—

- After evaluation, the space is determined to have no potential hazards capable of causing death or serious physical harm; or
- The hazards were eliminated by engineering controls.

A PRCS is a confined space that—

- Contains or has the potential to contain a hazardous atmosphere;
- Contains a material that has the potential for engulfing an employee;
- Has inwardly converging walls or a floor that slopes downward and tapers to a smaller cross-section such that an employee could be trapped or asphyxiated; or
- Contains any other recognized serious safety or health hazard.

A qualified individual should evaluate each confined space prior to entry to determine if it is a PRCS. A qualified individual is someone who, through training, education, and experience, is knowledgeable in the work to be performed, competent to judge the hazards involved, and skilled in specifying effective controls and protective measures.

When assessing the hazards in a confined space, the qualified individual should consider: the past and current uses of the confined space; means of entry and exit; existing or potential

hazardous atmospheres; potential for changing conditions and activities in the confined space along with the adjacent areas; and existing or potential biological, mechanical, physical, and chemical hazards. Appendix A contains an example of a Confined Space Evaluation Form.

WHAT ARE THE HAZARDS FOUND IN PRCSS?

There are primarily three types of hazards found in PRCSS: physical, atmospheric, and health. These hazards may be present or have the potential to be present. Employers must anticipate, identify, evaluate, and eliminate physical hazards and control or eliminate atmospheric hazards before allowing any employee to enter a PRCSS.

A physical hazard is defined as an existing or potential hazard that can cause death or serious physical harm. Physical hazards include but are not limited to—

- Explosives;
- Mechanical, electrical, hydraulic, and pneumatic energy;
- Radiation;
- Temperature extremes;
- Engulfment;
- Structural damage or defects;
- Noise, when it prevents the ability to communicate or hear warnings;
- Inwardly converging surfaces; and
- Chemicals that can cause death or serious physical harm through skin or eye contact, rather than by inhalation.

An atmospheric hazard is an existing or potential atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to escape without help, injury, or acute illness, resulting from one or more of the following conditions—

- A flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit;
- An airborne combustible dust;
- An atmospheric oxygen concentration below 19.5 percent or above 23.5 percent (oxygen deficiency and oxygen enrichment);
- An airborne concentration of a substance that exceeds any Army occupational exposure limit;
- An atmosphere that presents an immediate danger to life or health (IDLH). In other words, any atmosphere that could result in death or serious injury to an employee caused by oxygen deficiency or enrichment, toxic materials, and flammable or explosive materials. The emphasis is on acute hazards, not chronic hazards.

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Health hazards would include infectious agents, fungi, molds, insects, plants, animals, etc. which could lead to serious illness or death.

The Occupational Safety and Health Administration (OSHA) and National Institute for Occupational Safety and Health (NIOSH) documentation during the period of 1980-2004 show that the majority of confined space incidents with fatalities involved atmospheric contaminants. It is important to know that over 50 percent of employees who died in confined spaces were attempting to rescue other employees.

WHO IS RESPONSIBLE FOR MANAGING CONFINED SPACES IN ARMY HEALTHCARE FACILITIES?

Installation Safety Officer. The Installation Safety Office—

- Collaborates with Preventive Medicine Services and the Department of Public Works to generate a written confined space program consistent with the OSHA's Confined Space Standard;
- Develops and maintains a current inventory of all confined spaces and identifies all of those which are PRCSS;
- Develops a confined space training program that includes periodic assessment of the effectiveness of the employee training program and the maintenance of written training records;
- Monitors PRCSS entries for compliance with the OSHA's Confined Space Standard; and
- Performs periodic written performance assessments of the Confined Space Program and corrects deficiencies identified by the performance assessments.
- Note at some installations the unit or hospital safety manager is required to manage the PRCSS Program.

Installation Fire Chief. The Installation Fire Chief—

- Creates a Confined Space Rescue Team;
- Trains personnel assigned to the Confined Space Rescue Team;
- Provides the team with appropriate personal protective equipment (PPE) and rescue equipment;
- Provides emergency response to confined space incidents; and conducts a minimum of one practice rescue exercise annually based on the configurations of the PRCSS' configurations.
- Note at some installations, the rescue team maybe provided by trained units other than the installation fire department.

Public Health Services. Public Health Service—

- Evaluates and analyzes PRCSS before any entry is attempted;
- Verifies all entry and continues monitoring specified by the entry permit have been conducted; and
- Verifies all procedures, PPE, and equipment specified by the permit are in place.
- Note: some Installation Public Health Services may only provide oversight and training to PRCS personnel performing these roles.

Healthcare Facility Manager. The Facility Manager together with the Hospital Safety Manager—

- Work with the Installation Safety Office to identify all NPCSS and PRCSS in the facility;
- Verify correct signage is posted near PRCSS and that effective measures are taken to prevent employees from entering PRCSS without following proper procedures;
- Verify all contracts have appropriate language to make sure contractors comply with all Army, DOD, and Federal regulations;
- Inform all contractors (general and sub) about the confined space (classification NPCSS or PRCS), any hazards and the operations near the space that could impact entry into the PRCS, and the precautions or procedures used to protect employees working in or near the confined space;
- Conduct pre-entry planning with the contractor to identify who will provide emergency rescue and medical services;
- Verify all entry permits are completed and approved before entry into a PRCS; and
- Maintain a dialogue with the contractor concerning hazards, problems encountered or created, and corrective measures taken during the course of an entry.

HOW SHOULD CONFINED SPACE HAZARDS BE MANAGED?

The OSHA's PRCS standard, 29 CFR1910.146, specifies the actions that employers must take to protect employees when entering a PRCS. These actions include—

Evaluating the Workplace

A qualified person must conduct an initial survey of the facility to identify locations or equipment that meet the definition of a confined space. Furthermore, periodic surveys should be conducted to keep the confined space inventory current. For example, changes in the use, configuration, conditions, or activities may introduce new safety and health hazards in a NPCSS and require the space to be reclassified as a PRCS.

Posting Warning Signs.

The OSHA requires employers to identify all PRCS. Posting a sign reading “DANGER – PERMIT REQUIRED CONFINED SPACE, DO NOT ENTER” is an acceptable method for informing employees of the confined space classification.

Developing a Written Confined Space Program.

Employers must develop and put into effect a written confined space program when their employees enter PRCSs. Affected employees must be involved in the development and implementation of the PRCS Program. Fundamental procedures that must be addressed in a PRCS Program are—

- Labelling PRCSs;
- Securing PRCSs;
- Performing atmospheric tests, evaluating hazards, and assessing risk prior to entry;
- Issuing entry permits;
- Training employees;
- Assigning accountability and defining specific roles of entrants, attendants, entry supervisors, rescuers, and those qualified to monitor the atmosphere in the PRCS;
- Eliminating and controlling hazards (elimination, engineering controls, administrative controls, and PPE);
- Using and maintaining equipment (testing and monitoring equipment, ventilating equipment, communications equipment, lighting equipment, PPE, barriers and shields, equipment used to access the space, and rescue and emergency equipment);
- Designating rescue and emergency services;
- Coordinating entry with contractors and other employers; and
- Concluding entry and canceling the permit procedures.

Preventing Unauthorized Entry.

Employers that decide to prohibit employees from entering PRCSs must use effective measures to keep employees from entering PRCSs. Measures may include permanently closing the space and installing locks or barriers supplemented by training employees and posting danger signs.

Eliminating Hazards.

The OSHA’s permit-required confined space standard allows employers to reclassify a PRCS to a NPCS when the hazards are eliminated. Some ways an employer can eliminate hazards and void a PRCS include—

- Controlling or eliminating all physical and atmospheric hazards (documentation certifying all hazards have been eliminated is required);

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- Installing a continuous forced-air ventilation system (the atmosphere inside the confined space must be periodically tested during entry to verify that there are no hazards present); and
- Performing continuous atmospheric monitoring inside the confined space to verify no hazards are present.

Employers must follow all procedures required by their PRCS Program when employees enter the PRCS to eliminate hazards.

Implementing a Permit Program.

A permit is a written authorization to enter a PRCS and perform work. The purpose of the permit is to arrange a systematic review for actual or potential hazards in the PRCS, to document measures that must be taken to protect authorized entrants from hazards, and to communicate this information to the entry supervisor and other employees involved in or working close to the entry operation. It also allows authorized entrants to verify that each protective measure has been completed before entering the PRCS. Information that must be present on each permit includes—

- Date(s) and location(s) of entry;
- Names of the authorized entrants (may be identified in rosters, sign-in/sign-out sheets, entry badges, tag boards, etc.), current attendants, and current entry supervisor;
- Type of work to be performed;
- Hazards to be controlled or eliminated before entry;
- Acceptable entry conditions (e.g., hot work permits, lockout/tagout requirements, oxygen, flammable gas and vapor, and toxic substance levels that must be met before the PRCS is safe for entry);
- List of all measures taken to protect employees that enter the PRCS along with a notation that these measures have been completed before entry;
- Safety equipment and safety precautions needed to perform the work;
- Identification of the instrument used to perform atmospheric tests, the type of atmospheric tests required, the individual performing the test, date and time of the test, and the initial and periodic test results;
- Communication procedures used by attendants and entrants;
- Procedures for summoning emergency responders and preventing unauthorized individuals from entering the PRCS;
- Type of equipment necessary to perform a rescue operation;
- Duration for the permit; and
- The entry supervisor's signature authorizing entry.

Permits are only good for the time needed to complete the work or for one work shift, whichever is less. The entry supervisor must cancel the permit when the entry operations are completed, at the end of the work shift, or when changes involving work conditions or work activities arise that were not addressed in the original permit are introduced into the PRCS. All cancelled permits must list any problems encountered during the entry operation and must be maintained for 1 year. This information is invaluable when employers complete their annual PRCS program review and must decide whether changes are needed.

Training Employees.

The OSHA has acknowledged that a leading cause of accidents resulting in employee death is the lack of employee awareness of dangers associated with PRCS entry. Records show that employees that entered PRCS were unaware of the possibility that the atmosphere inside could be immediately dangerous to life or health. In some cases, employees did not recognize the symptoms of exposure to life-threatening atmospheres. In other historic cases, employees did not understand that there are occasionally no obvious symptoms. Employees that attempted to rescue fallen coworkers inside PRCSs were often unaware of the hazards involved and of the procedures for safe rescue.

The OSHA requires a performance-oriented approach for PRCS training. Upon completion of training, authorized entrants, attendants, entry supervisors, and rescue personnel must have the understanding, knowledge, and skills necessary for the safe performance of their assigned duties. Any employee that is not a member of a PRCS entry operation but may still perform work near the PRCS needs to be trained for awareness (including contractors). In addition, employees who use equipment involved in PRCS monitoring (e.g., gas meters, etc.) need to be trained in the proper use and application of the equipment.

Employees must attend PRCS training before being assigned duties and participating in an entry operation. In addition, employees must attend refresher training—

- Before there is a change in assigned duties (reassignment, new equipment, new techniques, etc.);
- Before there is a change in a PRCS operation that presents a hazard for which the employee has not previously been trained;
- When inadequacies are detected in the employee's knowledge or in the use of the relevant PRCS entry procedures;
- When the employer detects deviations from the PRCS entry procedures.

Employers must certify employees' training attendance and maintain written training records listing each employee's name, the signature or initials of the trainers, and the dates of PRCS training.

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Providing Rescue and Emergency Services.

Employers must develop and implement a rescue plan to remove entrants from the PRCS during an emergency. The rescue team can be members of the work place or from an outside organization. The team must be able to communicate with attendants, respond to an emergency in a timely manner, and be both equipped for and proficient in performing rescue services including cardiopulmonary resuscitation and basic first-aid. In addition, the rescue team must have access to all PRCSs to plan for and practice rescue operations.

CONCLUSION

Most Army hospitals and outpatient clinics contain areas or equipment that meet the definition of a confined space. Healthcare safety professionals and facility managers must be familiar with the PRCS safety and health requirements and work with installation personnel to prevent unauthorized access to PRCSs. Finally, it is also vital for employees to be aware of hazards associated with confined spaces and the safe work practices necessary to manage these hazards.

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References:

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American National Standards Institute/American Society of Safety Engineers Z117.1-2009, Safety Requirements for Confined Spaces, 27 July 2009

The National Institute for Occupational Safety and Health (NIOSH) Facility Assessment and Control Evaluation (FACE) Program, Custodian Dies in a Confined Space in a Hospital Laundry, 12 February 1992

AR 420-1, Army Facilities Management, 24 August 2012

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DA PAM 40-403, The Army Industrial Hygiene Program, 2 April 2013

**APPENDIX A
CONFINED SPACE EVALUATION FORM**

CONFINED SPACE EVALUATION FORM			
Name		Date	
Job Title		Phone	Building Number
Area Evaluated			
Building/Area		Room No.	
Location		Key No.	
Complete for Confined Spaces			
Size: Can a person get completely inside the space? Notes:		YES	NO
		<input type="checkbox"/>	<input type="checkbox"/>
Access/Egress: Can a person walk in or out standing up? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Occupancy: Is the space designed for continuous human occupancy? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Will employees enter the space? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Does space have known or potential hazards? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Can all hazards be eliminated (continuous forced air ventilation will maintain those permit spaces with atmospheric hazards safe for entry? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Can continuous forced air ventilation eliminate or control atmospheric hazards and maintain the space safe for entry? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Complete for Permit-Required Confined Spaces			
Hazard:		YES	NO
Is the atmosphere flammable, toxic, or contain too much or too little oxygen? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Is there potential for engulfment? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Is it shaped so that a person could become trapped? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Are other safety or health hazards present (mechanical, chemical, thermal, electrical, biological, etc.)? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Current Status			
Is the area currently posted as a confined space? Notes:		YES	NO
		<input type="checkbox"/>	<input type="checkbox"/>
Is the area currently posted as a permit-required confined space? Notes:		<input type="checkbox"/>	<input type="checkbox"/>
Hazard Assessment			
<input type="checkbox"/> Not a confined space <input type="checkbox"/> Non permit required confined space <input type="checkbox"/> Permit required confined space		Verified by <hr/> Date	