



EAST TENNESSEE STATE UNIVERSITY

Facilities Management

Policy Number: 700.3

Title: Confined Spaces Policy

Implementation Date: 2005

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Introduction

This plan applies to all confined spaces and provides requirements to protect ETSU employees from hazards of entering and working in confined spaces.

This plan complies with the requirements of the OSHA/TOSHA Confined Spaces Standard, CFR 1910.146.

Anyone having questions concerning this plan may contact the Environmental Health and Safety Office, 439-7784 or Facilities Management, 439-7900.

Definitions

Acceptable entry conditions - the conditions that must exist in a permit space to allow entry and assure safe entry and work conditions in the space.

Action Level - is the concentration of a monitored chemical/parameter that requires a corresponding action, i.e. if a monitored chemical exceeds the respirator protection factor, personnel must evacuate the CS.

Attendant - an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the permit required space program.










Authorized entrant - an employee who is authorized by the employer to enter a permit space.

Blanking or blinding - the absolute closure of a pipe, line, or duct by the fastening of a solid plate that completely covers the bore and is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Confined Space (CS) - A confined space is an area that is large enough and so configured that an employee can enter to perform work assignments; has restricted means for entry or exit; and is not designed for continuous employee occupancy. There are two types of confined spaces: Permit-required confined space and non-permit required confined space.

NOTE: Any open pit or trench in excess of four feet deep will be considered a permit-required confined space until tested and found to be free of atmospheric hazards and engulfment hazards.

Confined Spaces - examples include:

-  boilers
-  ditches and trenches in excess of 4 feet deep
-  enclosed drainage ditch entry points
-  elevator shafts
-  manholes
-  process equipment
-  sewers
-  storage tanks
-  ventilation ductwork

Confined Space Inventory - an inventory of the permanent confined spaces. Inventory information includes confined space identification number, location, and available hazard information. Additional information may also be added such as control points.

Compressed Air - a compressed gas used for such work as gas welding. For the purposes of confined space entry, compressed air does not include breathing air contained in an airline, escape bottle, or SCBA.

Double block and bleed - the closure of a line, duct, or pipe by closing and locking two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Emergency - any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.

Engulfment - the surrounding and effective capture of a person by a liquid or flowable solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Entry - the action by which a person passes through an opening into a permit-required confined space.

Note: Entry is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry permit - the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains pre-specified information as required by the OSHA standard.

Hazardous atmosphere - an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury, or acute illness.

Hot work permit - the employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

Immediately dangerous to life or health - (IDLH) any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space. Examples of IDLH conditions: Unknown atmosphere, oxygen deficient atmosphere ($< 19.5\% \text{ O}_2$), oxygen enriched atmosphere ($> 23.5\% \text{ O}_2$), atmospheres with $> 10\%$ LEL, or chemicals at concentrations \geq IDLH concentration determined by NIOSH.

Inerting - the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible. Inerting produces an IDLH oxygen-deficient atmosphere.

Isolation - the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

Line breaking - the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Oxygen deficient atmosphere - an atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen enriched atmosphere - an atmosphere containing more than 23.5 percent oxygen by volume.

Permit-required confined space - a confined space that has or has the potential for hazardous atmospheric conditions (toxic, flammable, asphyxiating), engulfment,

inwardly converging walls or floors configuration, or any other recognized serious hazard. Examples of these spaces include (but are not limited to) tanks, process vessels, sumps, sewers, pits, boilers, and ventilation systems. In some instances, trenches, dikes, and ditches over four feet deep will also be considered confined spaces.

Permit-required confined space program - (permit space program) the overall program for controlling, and, where appropriate, for protecting employees from permit space hazards and for regulating employee entry into permit spaces.

Permit system - written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

Prohibited condition - any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

Real time instrument - an instrument that measures a chemical concentration and can be read shortly after the measurement. Examples of real time instruments are the ITX Multi-gas meter.

Rescue service - the personnel designated to rescue employees from permit spaces.

Retrieval system - the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Testing - the process by which the hazards that may confront entrants of a permit space are identified and evaluated.

Procedures

Trained Personnel

Attendant - is responsible for remaining outside of one or more permit spaces, maintaining communication with CS entrants, monitoring the entrants for signs and symptoms of exposure, restricting access to unauthorized personnel, and requiring personnel to evacuate the CS if hazardous conditions occur or the attendant cannot perform his duties.

Entry Supervisor (ES) - has overall responsibility for the safety of the entry team and completing any permits required to perform the entry and associated work. The ES contacts Health & Safety providing them with relevant information such as CS location, purpose of entry, and tools/equipment to be used in the space. The ES is trained for his duties as Entry Supervisor, assembles a qualified CS team and ensures that all controls listed on the entry permit are in place and that the

monitoring results are within the acceptable concentrations, before authorizing initial entry. Ensures that the pre-entry briefing is performed and includes signs and symptoms of exposure. Prohibits entry into areas with potential CS hazards until after the space is evaluated and identified hazards controlled. The ES reviews the entry requirements and initials the space next to each condition that is verified as being controlled. The ES also completes the Debriefing Record as part of the CS close-out and submits it to Health & Safety.

Entrant - does not enter unless trained in confined space entry. Performs the entry in accordance with the CSEP, i.e. remains in communication with the attendant, knows the CS hazards, knows the symptoms of exposure, evacuates the CS if exposure symptoms or additional hazards are detected, and notifies the attendant if exposure symptoms occur or additional hazards are detected. Wears required monitoring instruments and evacuates the CS if the instrument alarms.

Health & Safety - Identifies confined spaces and maintains the inventory list. Ensures that each permanent CS is posted. Identifies the hazards and testing requirements on the CSEP. Keeps air monitoring equipment in the Office of Environmental Health and Safety. Performs annual review of permits.

All permit-required confined spaces listed on the inventory will be identified by signs indicating: DANGER - PERMIT-REQUIRED CONFINED SPACE - DO NOT ENTER. The sign colors will be red, black, and white as specified by 29 CFR 1910.145(d)(2). No employee will enter a permit-required confined space without proper notification to Health Safety, and preparation of the required permit and specified pre-entry testing.

Confined Space Entry Permit (CSEP)

Before entry into an area known or suspected to be a confined space the Entry Supervisor shall contact Health & Safety and then complete the Confined Space Entry Permit (Attachment A).

Health & Safety will help the Entry Supervisor by identifying hazards associated with entry. Health & Safety will consider the historical CS hazards, equipment and activity hazards, and control measures to determine testing requirements, testing frequency and maximum airborne concentrations for entry. Continuous monitoring will be required for sewer entries and other areas where CS isolation cannot be achieved and there is a potential source of airborne contaminants.

The Confined Space Entry Permit (CSEP) will be valid for one shift or as specified on the permit.

The Entry Supervisor will perform initial testing to determine if the CS atmosphere meets the entry criteria.

The Entry Supervisor verifies that all required controls are in place and initials the corresponding boxes.

If the entry lasts for more than one shift, the Entry Supervisor for the next shift will ensure that the atmosphere is re-tested and the hazards controlled before allowing his team to enter the CS. **Exception:** If the CS has been reclassified as a non-permit CS.

Using the permit information, the Entry Supervisor informs the entrants and attendant of the potential hazards, requirements for entry, communications method, exposure symptoms (if any), rescue procedures, and other relevant information.

The entrants and attendant sign the permit. The ES ensures that the permit is posted at the work site while the confined space entry is being performed.

If the hazards of the space or the work to be performed is changed, or if any prohibited condition exists; the entry will be terminated and Health & Safety notified.

While working in a permit-required confined space, all workers should be observed closely by the entry supervisor and/or attendants for signs of difficulty. If the worker exhibits any unusual behavior, exposure signs/symptoms, or physical difficulty, the supervisor or attendant will require the employee to exit the area immediately. This will terminate the permit until additional testing and evaluation is performed.

After the entry is completed, the authorized supervisor shall fill in the termination time and date, sign the permit and return it to Health & Safety.

Health & Safety retains the permits for annual review.

Confined Space Entry Permit

The Confined Space Entry Permit includes the following information:

- The permit space to be entered (description/location) and the purpose of the entry;
- The date and authorized duration of the entry permit;
- The names of the authorized entrant(s), the authorized attendant(s), the authorized entry supervisor responsible for the space;
- The confined space hazards and associated control measures.
- The acceptable entry conditions, and the results of initial and periodic atmospheric testing, including the names or initials of the tester and the time tested;
- The rescue and emergency services to be summoned and how to contact them;
- The communication procedures to be used by authorized entrants and

- attendants (including visual contact, voice contact, radio contact, motion detector, or other means); and,
- The equipment required for entry, along with any other necessary information and any other permits issued in conjunction with the confined space permit, such as a Hot Work Permit.

Pre-Entry Atmospheric Testing

Prior to entry, the space will be monitored, using real time instruments, in the following order, unless measured simultaneously.

- Oxygen Levels - the oxygen level of the space will be between 19.5% and 23.5% Oxygen. An oxygen level below 19.5% will be considered oxygen deficient and an asphyxiation hazard (IDLH). An oxygen level above 23.5% will be considered oxygen enriched and a flammable hazard (IDLH)
- Combustible gas/vapor - Any combustible gas/vapor/mist above 10% of its Lower Explosive Limit (LEL) will be considered a flammable hazard (IDLH).
- Toxics - Any level above the Permissible Exposure Limit (PEL) established by OSHA or a level exceeding any other applicable Federal or State standard will be considered an atmospheric hazard.

Atmospheric testing will be conducted for the initial evaluation, after installation of engineering controls (such as ventilation or inerting), and at the specified frequency specified on the CSEP. Testing shall be from the top to bottom over the area to be entered. If atmospheric testing is outside of the required range, additional controls are required to enter. Ventilation is the preferred control.

If work in the confined space continues for more than one shift, and continuous monitoring is not used, atmospheric tests shall be repeated before entry, each shift, unless otherwise specified on the entry permit. More frequent analysis may be required based on conditions.

Reclassification of a Permit-Required Confined Space

ETSU treats all confined spaces as permit required spaces until initial testing. If the space meets all of the conditions below, the CS may be reclassified as a non-permit space by Health & Safety.

If the CS is reclassified, the Health & Safety Specialist shall certify that it meets all reclassification requirements by making a signed and dated notation on the permit stating that the CS was reclassified as a non-permit CS. The permit will be used to document the evaluation, and define the period for which the space may be entered

as a non-permit CS. Changing the work being performed or changing conditions requires a reevaluation of the CS.

A permit-required confined space may be reclassified as a non-permit space under the following conditions:

- pre-entry testing performed from outside the space shows no hazardous atmosphere;
- there is no potential for the development of a hazardous atmosphere;
- there are no other hazards in the space; or,
- hazards can be eliminated without entry into the space.
(Ventilation does not meet this requirement.)

The reclassification is in effect for as long as the hazard(s) remain eliminated. If an unexpected hazard arises during the entry, the entry will be immediately terminated.

Lockout/Tagout

In a permit-required confined space where the potential for an uncontrolled energy release (electrical or mechanical) exists, the lockout/tagout policy as outlined in “ETSU Physical Plant Lockout/Tagout Policy” will be applicable.

Use of Power Tools or Lights

All electrical tools will either be of low voltage design (battery operated) or used with a ground fault circuit interrupter.

Adequate low voltage lighting must be provided or used in conjunction with a ground fault circuit interrupter. In some situations, it may be necessary to require explosion proof lighting. Where necessary, this will be specified on the permit.

All tools and equipment operated off of temporary wiring or extension cord(s) will be protected with a ground fault circuit interrupter.

Isolation of Lines

Various means of isolating lines (steam, chemical, water, etc.) carrying solids, liquids, or gases to the space may be used. These include:

- double block and bleed;
- slip blinds;
- blanks; or,
- physical separation and misalignment at connections closest to the space, with ends capped, blinded, or plugged.

Permit-Required Confined Space Communication

All identified permit-required confined spaces will be posted with signs to prevent unauthorized entry and to facilitate hazard identification except as noted below. Exceptions: Sewers and ventilation systems will not be posted.

During entry, confined space openings will be barricaded or roped off to prevent personnel or objects from falling into the space. A trained attendant will be provided for all permit-required confined space entries.

Prior to entry, a system of communication between the entrant and attendant and between the attendant and rescue team will be determined. Communications between the entrant and attendant could consist of visual observation, voice communications, hand signals, motion detector alarms, radio contact, or other forms. If portable radios or cellular telephone are relied upon to call for assistance, the Attendant shall test the equipment by calling from the CS location prior to entry.

Prohibited Conditions

Any entry by unauthorized personnel.

The use of internal combustion engines inside a confined space.

The use of compressed gas cylinders inside of a confined space (excluding breathing air used for respiratory protection) or leaving compressed gas lines unattended.

The use of fuel burning heaters (unless vented and specified on the entry permit and used with continuous atmospheric monitoring) inside confined spaces.

Rescue attempts by untrained or improperly equipped rescuers.

Use of Air purifying respirators in IDLH atmospheres.

Powered winches (electrical, pneumatic, hydraulic, or internal combustion engines) for personnel rescue.

Entry into a permit-required confined space possessing an engulfment hazard without a retrieval system.

Entry into a permit-required confined space without the assignment of an authorized attendant.

Any activity not identified on the entry permit.

Employee Training

Training Requirements

All employees involved in permit-required confined space shall be trained prior to work assignments.

General Training Requirements

Training records will be maintained for the length of employment of the trainee. These records will include the employee's name, the signature of the trainer, and the training date.

Rescue

Rescue procedures will be determined prior to entry into a permit-required confined space. Rescue activities that require CS entry shall be performed by the Johnson City Fire Department. JC FD has looked at our spaces in the powerhouse and agreed to be our rescue services. Non-entry rescues may be performed by the Attendant using the rescue line attached to the entrants harness.

Authorized entrant and attendant training will include confined space hazard recognition, symptom recognition, and the importance of self-rescue.

Whenever feasible, the confined space should be outfitted for non-entry rescue.

No ETSU employees have been trained in confined space rescue and should never attempt a confined space rescue.

Emergency services will be activated by calling 911. The permit will list 911 as the number to call to contact emergency services.

Responsibilities

Facilities employees that are exposed to confined spaces.

Contact Persons

Associate Vice President
Director of Facilities Management Operations
Director of Environmental Health & Safety
Health & Safety Specialist

Forms

Attachment A – Confined Space Entry Permit

Approved by: _____

Laura Bailey, Associate Vice President, Capital Planning and Facilities Services

Date approved: _____

ATTACHMENT A (Front side)

ETSU Confined Space Entry Permit						
Date Written:		Description/Location:				
Purpose:						
Tools/Equipment:						
Atmospheric Testing - to be filled out by Entry Supervisor (ES)						
Instrument						
___ MSA Altair:						
___ Other						
Date:						
Time:						
Oxygen 19.5-23.5%						
Combustibles < 10%						
Hydrogen Sulfide < 10 ppm						
Carbon Monoxide <10 ppm						
Entry Supervisor verifies that all required controls are implemented and initials each line before allowing CS entry.						
Requirement if checked		Specifics	ES initials			
Trained Personnel						
Pre-job Briefing		hazards, exposure symptoms, etc.				
Air Monitoring		___ Initial, ___ Continuous, ___ Every Shift, ___ Other:				
LOTO mechanical hazard(s)						
LOTO electrical hazards						

Vapor Controls (chemical, water, gas, steam)		___ Drain, ___ Flush, ___ Ventilation, ___ Isolate Pipes	
Fire/Explosion Controls		___ Inerting, ___ Control Ignition Sources (Rated tools, bonding)	
Communication		___ Voice, ___ Radio, ___ Cell Phone	
Permits		___ Hot Work	
Barricade at Entrance			
PPE			
Fall Protection (> 6 ft)			
Non-Entry Retrieval			
GFCI or battery power		Lighting, tools, equipment	
CSEP posted at worksite			
Additional Instructions:			
Stop entry if unacceptable or prohibited condition(s) detected. Inform Health & Safety of Unusual Occurrences			
Health & Safety Specialist Approval (Can be through phone conversation) 439-7784			
Printed Name		Date	

ATTACHMENT A(Back Side)

CS Team Members								
Function	Printed Name			Signature				
Entry Supervisor								
Authorized Attendant								
Authorized Entrant(s)								
Entrant*	In	Out	In	Out	In	Out	In	Out

CS Classification Change (Completed by Health & Safety)								
___ To Non-Permit CS. All CS hazards eliminated without entry. No forced ventilation required. Personnel need CS entrant training to enter, but no attendant required.								
Printed Name			Signature			Date		
Debriefing Record (Completed by Entry Supervisor)								
Unanticipated hazards ___ Detected, ___ Not Detected								
Controls Added:								
Suggested Improvements:								
Printed Name:			Signature:			Date:		
RETURN TO HEALTH & SAFETY WHEN ENTRY IS COMPLETE.								
IN CASE OF EMERGENCY CALL 911								