

TABLE OF CONTENTS

Confined Space Program

Introduction.....	1
Purpose.....	1
Scope and Application	1
References	1
Abbreviations	1
Revisions	2
Definitions	2
Establishing Permit Spaces	6
Identifying.....	6
Access Restrictions	6
Permit Space Entry Program.....	6
Process Overview	6
Entry Preparations.....	7
Obtaining a Permit.....	7
Designating Personnel.....	7
Pre-entry Space Evaluation.....	7
Pre-Entry Space Preparations	8
Equipment	8
Provisions	8
Guidelines.....	9
Final Checks	9
Concluding Entry Operations	10
Contractors	10
Permit System	11
Preparation, Issuance, Use, and Cancellation	11
Content Requirements.....	11
Entry Personnel	12
Authorized Entrants Duties	12
Attendant’s Duties	13
Entry Supervisors	14
Confined Space Coordinator (CSC).....	14
Rescue and Emergency Services	15
Equipment	15
Guidelines.....	15
Provisions	15
Rescue Personnel Requirements.....	16
Retrieval Systems	16
Reclassifying.....	16
Alternate Entry Procedures.....	17
Employee Information and Training.....	19
Appendices.....	19

PERMIT-REQUIRED CONFINED SPACES

Written Program

Introduction

PURPOSE

Personnel who are involved in confined space work operations face potential dangers from toxic, explosive, or asphyxiating atmospheres, as well as engulfment. Therefore, Miami University has prepared this Confined Space Program to establish safety guidelines and policies for employees and contractors who work in these potentially hazardous environments.

SCOPE AND APPLICATION

This program applies to all permit spaces established as designated in Miami University's Confined Space Plan. This program contains requirements for practices and procedures to protect Miami University employees and contractors from the hazards of entry into permit-required confined spaces. It is required to be made readily accessible to employees through posting, inserting in a departmental procedures manual, or by providing photocopies upon request. The master copy shall be on file in the Environmental Health and Safety Office.

All policies, provisions, and procedures listed in this program are the responsibility of Miami University. Employees and contractors are required to comply with all aspects of this program. Any employee who willfully violates or disregards provisions of this policy will be subject to disciplinary action as specified by University policy. Any contractor who willfully violates or disregards provisions of this policy will be subject to penalties up to and including removal from the job and/or loss of contract in accordance with the provisions of the contract.

REFERENCES

Occupational Safety and Health Administration. *Code of Federal Regulations*, Chapter 29, Part 1910, Section 146, "Permit-Required Confined Spaces." (29 CFR 1910.146)

ABBREVIATIONS

The following abbreviations appear in this program:

CSC	Confined Space Coordinator
CSEP	Confined Space Entry Permit
EHSO	Environmental Health and Safety Office
IDLH	Immediately Dangerous to Life or Health
LEL	Lower Explosive Limit
PFD	Physical Facilities Department
SCBA	Self-Contained Breathing Apparatus
NIOSH	National Institute of Occupational Safety and Health

REVISIONS

The Environmental Health and Safety Office shall review the Confined Space Program and any canceled permits at least annually to ensure employees participating in entry operations are protected from permit space hazards. (If no entries are made during a 12-month period, no review is required.) Only EHSO can add, delete, or modify any provisions in this program. Requests for changes in the program may be submitted in writing to EHSO.

This document shall be revised whenever a review of entry operations indicates that the Permit Space Entry Program may no longer adequately protect employees. Such revisions shall take place before subsequent entries are authorized. The following circumstances shall require a review of the program:

- Any unauthorized entry of a permit space
- Detection of a permit space hazard not covered by the permit
- Detection of a condition prohibited by the permit
- The occurrence of an injury or near-miss during entry
- A change in the use or configuration of a permit space
- Employee complaints about the effectiveness of the program

DEFINITIONS

Acceptable Entry Conditions: The conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

Alternate Permit Space: A permit-required confined space presenting only a hazardous atmosphere characteristic that can be controlled by mechanical ventilation.

Attendant: A trained employee stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in Miami University's permit space program.

Authorized Entrant: A trained employee who is authorized by Miami University to enter a permit space.

Blanking or blinding: The absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Confined Space: An area that is large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy.

Double Block And Bleed: The closure of a line, duct, or pipe by closing and locking or tagging 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.

Employee: A Miami University faculty member, staff member, student worker, or contractor.

Engulfment: The surrounding and effective capture of a person by a liquid or finely divided (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. Entry includes ensuing work activities in that space and 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 (permit): The written or printed document that is provided by Miami University to allow and control entry into a permit space and that contains the information specified in the "Entry Permit" section of this program.

Entry Supervisor: The person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this program. An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this program for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

Hazardous Atmosphere: An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

- a. Flammable gas, vapor, or mist in excess of 10 percent of its lower explosive limit (LEL);
- b. Airborne combustible dust at a concentration that meets or exceeds its LEL. (This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.)
- c. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent.
- d. Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of 1910 and which could result in employee exposure in excess of its dose or permissible exposure limit.
 - ▲ An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.
- e. Any other atmospheric condition that is immediately dangerous to life or health. For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, 1910.1200 of this part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

Hot Work Permit: Miami University's written authorization to perform operations capable of providing a source of ignition (e.g., welding, grinding, spark-producing equipment).

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.

- ▲ Important: Some materials—hydrogen fluoride gas and cadmium vapor, for example—may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12 to 72 hours after exposure. The victim “feels normal” from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be “immediately” dangerous to life or health.

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.

- ▲ Important: This procedure 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 programs 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.

Lower Explosive Limit (LEL): The lowest concentration (air-fuel mixture) at which a gas can ignite.

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.

Lockout/Tagout: The placement of a lockout and tagout device on an energy isolating device, in accordance with an established procedure, to ensure and indicate that the energy isolation device and the equipment being controlled cannot be operated until the lockout device is removed.

Miami University: The Miami University main campus in Oxford, Ohio and all of its regional campuses.

Non-Permit Confined Space: A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

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 Space (Permit-Required Confined Space): A confined space that has one or more of the following characteristics:

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

Permit-Required Confined Space Program (permit space program): Miami University's overall program for controlling, and, where appropriate, for protecting employees from permit space hazards and for regulating employee entry into permit spaces.

Permit System: Miami University's 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.

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. Testing includes specifying the tests that are to be performed in the permit space and continuous or periodic monitoring. Testing enables Miami University both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

ESTABLISHING PERMIT SPACES

Identifying

- 1** Workplaces shall be evaluated to determine if any spaces are permit-required confined spaces and to identify and evaluate the hazards associated with these spaces. The following resources shall be included in the evaluation:
 - The Confined Space Flow Chart in Appendix A.
 - Atmospheric sampling data.
 - Any other data concerning potential hazards in the space.
- 2** If the workplace contains permit spaces, employees shall be informed by posted signage or by any other equally effective means of the existence and location of the permit spaces.
 - A sign reading “Danger—Permit-Required Confined Space, Do Not Enter” or using other similar language would satisfy the requirement for a sign.
 - A master list of identified confined spaces is available from and shall be maintained jointly by the Confined Space Coordinator and EHSO.
- 3** If the space is not identified as being either a permit-required or non-permit required space, does not appear on the Miami University Confined Space Master List, or its classification is otherwise unknown, it shall be considered a permit-required confined space until an evaluation is conducted in accordance with this program to determine the potential hazards and the appropriate space classification.

ACCESS RESTRICTIONS

Effective measures shall be taken to prevent employees from unauthorized entry into permit spaces. This shall be accomplished by one or more of the following methods: affixing placards, signs, stickers, or other identification means at the entrance to identified confined spaces, training, physical means (e.g., wall or floor plating secured with screws or bolts).

Permit Space Entry Program

PROCESS OVERVIEW

- 1** Determine if the planned work will require employees to enter confined spaces.
- 2** Determine if the work operation will involve entry into permit-required or non-permit required confined spaces by consulting the Miami University’s Confined Space Master List.
- 3** Contact the Confined Space Coordinator and inform him/her of the planned confined space work operation and request a Confined Space Entry Permit.
- 4** Arrange for the required atmospheric testing.
- 5** Designate the appropriate trained personnel who will be involved in the work operation.
- 6** Gather the equipment as specified on the permit for the type of work to be performed.
- 7** Ensure all preparatory measures listed on the permit are completed.
- 8** Obtain permit authorization from the Entry Supervisor and proceed with entry operations.

ENTRY PREPARATIONS

Obtaining a Permit

A CONFINED SPACE ENTRY PERMIT shall be obtained and prepared in accordance with the “Permit System” section of this program (see page 11) whenever work operations are planned within a space that has been identified as a permit-required confined space. Permits will be issued by the Confined Space Coordinator (CSC) or designated alternates.

If the space classification is unknown (i.e., permit-required or non-permit required) a permit will not be issued until the space classification has been established in accordance with this program and is on file with the CSC and EHSO. (See “Establishing Permit Spaces” on page 6.)

Designating Personnel

Authorized Entrants, Entry Supervisors, Attendants, and the Confined Space Coordinator are to have active roles in entry operations. The duties of these persons are described in the “Entry Personnel” section of this program (see page 12). Any employee who falls under one of these classifications is required to participate in a training program prior to engaging in confined space work operations. At least one attendant shall be posted outside the permit space into which entry is authorized for the duration of entry operations.

Pre-entry Space Evaluation

Permit space conditions shall be evaluated as follows before entry operations are conducted:

- 1** Conditions shall be tested in the permit space by EHSO to determine if acceptable entry conditions exist before entry is authorized to begin, except that, if isolation of the space is impractical because the space is large or is part of a continuous system (such as a sewer), pre-entry testing shall be performed to the extent feasible before entry is authorized and, if entry is authorized, entry conditions shall be continuously monitored in the areas where authorized entrants are working.
 - The Confined Space Entry Permit (See Appendix D) specifies the acceptable atmospheric levels that must exist for entry operations to proceed.
- 2** The permit space shall be tested or monitored as necessary by EHSO to determine if acceptable entry conditions are being maintained during the course of entry operations.
- 3** When testing for atmospheric hazards, the atmosphere shall be tested first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors.
 - ☞ Atmospheric testing conducted in accordance with Appendix B would satisfy these requirements. For permit space operations in sewers, atmospheric testing conducted in accordance with Appendix B, as supplemented by Appendix C, would satisfy these requirements.

Pre-Entry Space Preparations

- 1** Ensure acceptable entry conditions.
- 2** Isolate the permit space.
 - Confined spaces that contain equipment or operations that through the activation of electricity, air or hydraulics that may injure an employee or cause property damage shall be isolated by lock-outs and tags or other positive means of preventing an accident per Miami University's Lockout/Tagout Program. Authorized employees shall be contacted for lockout. All electrical and mechanical systems shall be tested prior to entry to ensure actual isolation of the systems.
- 3** Purge, inert, flush, or ventilate the permit space as necessary to eliminate or control atmospheric hazards.
- 4** Provide pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards. This may include, but is not limited to, the following methods: set-up cones, post signs, partition-off the area with caution tape, erect barricades, arrange for traffic control with the Department of Public Safety if entry operations may affect traffic.
- 5** Conditions in the permit space shall be maintained acceptable for entry throughout the duration of an authorized entry.
- 6** Access into the confined space shall be by the use of ladders, platforms or other safe means other than climbing onto equipment, pipes or containers.
- 7** Work operations involving fall hazards shall require compliance with Miami University's Fall Protection Program.
- 8** Confined Space operations involving entry into hot and cold environments may require use of appropriate protective clothing.

Equipment*Provisions*

The following equipment shall be used as appropriate in confined space work operations and shall be issued only to those employees who are trained in their use:

- a. Testing and monitoring equipment to measure atmospheric conditions in and around confined spaces.
- b. Ventilating equipment needed to obtain acceptable entry conditions.
- c. Communications equipment necessary to enable the authorized entrant(s) and attendant maintain constant communication and to enable the attendant to summon rescue services without leaving his/her post.
- d. Personal protective equipment when feasible engineering and work practice controls do not adequately protect employees.
- e. Lighting equipment needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency.
- f. Barriers and shields.

- g. Approved equipment, such as ladders, needed for safe ingress and egress by authorized entrants.
- h. Approved rescue and emergency equipment except to the extent that the equipment is provided by or for rescue services.
- i. Any other equipment necessary for safe entry into and rescue from permit spaces.

Guidelines

Equipment necessary for safe confined space work operations shall be made available at no cost to employees and shall be used and made accessible according to the following guidelines:

- EHSO shall maintain testing and monitoring equipment.
- The Physical Facilities Department shall provide barriers and shields, equipment necessary for safe ingress/egress, explosion-proof and non-spark producing tools.
- The CSC shall maintain and secure the following equipment: communications devices, fall protection (shock-absorbing lanyards), extraction equipment (tripod, winch), body harnesses, self-contained breathing apparatus, explosion-proof lighting, and ventilating equipment.
- The employee's department shall provide any necessary personal protective equipment.
- If the confined space contains, or is suspect to contain, combustible gases, employees shall use explosion-proof or non-spark producing tools ONLY. Welding tanks are *strictly prohibited* in confined spaces.
- Miami University's confined space rescue equipment shall be on standby during any entry operations involving permit spaces.
- Anytime a hoist is used for lifting/lowering of the entrant(s), such systems shall be backed-up with a lifeline that is independent of the hoist mechanism, cable, and seat.

Final Checks/Inspections

Before the entrant enters the confined space, the following checks shall be made:

- 1** The attendant and entrant shall check their communications equipment to ensure that the equipment is functioning properly.
- 2** If the entrant is equipped with SCBA, air-supplied respirator, or other respiratory device, he/she shall inspect that equipment to ensure it is functioning properly.
- 3** The entrant shall conduct a final check of his/her Personal Atmosphere Monitor.
- 4** All personal protective equipment shall be examined for integrity (e.g., holes, rips, tears) and replaced if necessary.
- 5** All monitoring equipment shall be checked for proper function (e.g., fresh batteries).
- 6** When all preparatory measures have been completed, a final check shall be made by the entry supervisor of the entry permit requirements before signing the permit and authorizing entry.

CONCLUDING ENTRY OPERATIONS

- 1 When work operations are complete, the authorized entrant(s) shall inform the attendant that he/she plans to exit the space.
- 2 The attendant shall instruct the entrant(s) to survey the work area and verify that there are no stray tools in the space before exiting.
 - If feasible, all tools should be removed from the space before the entrant(s) exits.
- 3 The attendant shall visually check that all authorized entrants have exited the space.
- 4 The confined space entry point(s) shall be secured by the attendant.
- 5 The entry permit shall be removed, canceled by the Entry Supervisor, and original returned to EHSO within 24 hours or before the end of the following work day.
 - After the permit is canceled, *reentry of the space is prohibited*.
- 6 Return all monitoring equipment to EHSO, if applicable.

CONTRACTORS

- 1 When a department arranges to have contractors perform work that involves permit space entry, the project manager shall:
 - a. Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program that meets or exceeds the requirements of this program.
 - b. Apprise the contractor of the elements, including the hazards identified and Miami University's experience with the space, that make the space in question a permit space.
 - c. Apprise the contractor of any precautions or procedures that Miami University has implemented for the protection of employees in or near permit spaces.
 - d. Coordinate entry operations with the contractor, when both host employer personnel and contractor personnel will be working in or near permit spaces.
 - e. Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.
- 2 In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations shall:
 - a. Obtain any available information regarding permit space hazards and entry operations from Miami University.
 - b. Coordinate entry operations with the CSC, when both host employer personnel and contractor personnel will be working in or near permit spaces.
 - c. Inform CSC of the permit space program that the contractor will follow and of any hazards confronted or created in permit spaces, either through a briefing or contractual agreement.

PERMIT SYSTEM

Preparation, Issuance, Use, and Cancellation

- 1 Before entry into a permit space is authorized, a CONFINED SPACE ENTRY PERMIT shall be prepared to document that all required measures listed in this program are completed.
 - A sample permit is included in the Appendix.
- 2 To ensure accessibility of the confined space rescue and communications equipment, only ONE confined space entry permit will be “active” during any 8-hour shift. A new permit may be issued during the same shift only after the preceding permit has been canceled.
- 3 Before entry begins, the Entry Supervisor identified on the permit shall sign the entry permit to authorize entry.
- 4 The completed permit shall be made available at the time of entry to all authorized entrants by posting at the confined space access opening so that the entrants can confirm that pre-entry preparations have been completed. All adjacent openings shall be monitored/controlled by the confined space permit.
- 5 The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit without approval of the CSC.
- 6 The entry supervisor shall terminate entry and cancel the entry permit when:
 - a. The entry operations covered by the entry permit have been completed.
 - b. A condition that is not allowed under the entry permit arises in or near the permit space.
- 7 Each canceled entry permit shall be retained by EHSO for at least one (1) year to facilitate the review of the Permit-Required Confined Space Program.
 - Any problems encountered during an entry operation shall be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

Content Requirements

The entry permit that authorizes entry to a permit space shall identify:

- 1 The permit space to be entered.
- 2 The purpose of the entry.
- 3 The date and the authorized duration of the entry permit.
- 4 The authorized entrants within the permit space, by name or by such other means to enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space.
 - This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system.
- 5 The employee(s), by name, currently serving as attendant(s).

- 6 The employee, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry.
- 7 The hazards of the permit space to be entered.
- 8 The measures used to isolate the permit space and to eliminate or control permit space hazards before entry.
 - Those measures can include the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.
- 9 The acceptable entry conditions.
- 10 The results of initial and periodic tests (as described in the “Permit-Required Confined Space Program” section (see page 6)), accompanied by the names or initials of the testers and by an indication of when the tests were performed.
- 11 The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services.
- 12 The communication procedures used by authorized entrants and attendants to maintain contact during the entry.
- 13 Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this program.
- 14 Any other information whose inclusion is necessary, given the circumstances of the particular confined space, to ensure employee safety.
- 15 Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

ENTRY PERSONNEL

Authorized Entrants Duties

As defined in this program, an authorized entrant is a Miami University employee or contractor trained in confined space work operations.

All Authorized Entrants shall:

- 1 Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- 2 Properly use equipment as required in this program.
- 3 Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space.
- 4 Alert the attendant whenever he/she:
 - a. Recognizes any warning sign or symptom of exposure to a dangerous situation.
 - b. Detects a prohibited condition.

- 5 Exit from the permit space as quickly as possible whenever:
 - a. An order to evacuate is given by the attendant or the entry supervisor.
 - b. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
 - c. The entrant detects a prohibited condition.
 - d. An evacuation alarm is activated.

Attendant's Duties

As defined in this program, an attendant is a Miami University employee trained and qualified in the attendant duties for a confined space work operation.

The Attendant shall:

- 1 Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- 2 Be aware of possible behavioral effects of hazard exposure in authorized entrants.
- 3 Continuously maintain an accurate count of authorized entrants in the permit space and ensure that the means used to identify authorized entrants (as described in the "Entry Permit" section of this program) accurately identifies who is in the permit space.
- 4 Remain outside the permit space during entry operations until relieved by another attendant.
- 5 Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space.
- 6 Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and order the authorized entrants to evacuate the permit space immediately under any of the following conditions:
 - a. If the attendant detects a prohibited condition.
 - b. If the authorized entrant exhibits any unusual behavior, which may or may not be the result of a hazard exposure.
 - c. If the attendant detects a situation outside the space that could endanger the authorized entrants.
 - d. If the attendant cannot effectively and safely perform all their required duties.
- 7 Summon rescue and other emergency services as soon as it is determined that authorized entrants may need assistance to escape from permit space hazards.

- 8 Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:
 - a. Warn the unauthorized persons that they must stay away from the permit space.
 - b. Advise the unauthorized persons that they must exit immediately if they have entered the permit space.
 - c. Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.
- 9 Perform *non-entry* rescues as specified by Miami University's confined space rescue procedure.
- 10 Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

Entry Supervisors

The Entry Supervisor shall:

- 1 Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- 2 Verify that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
- 3 Terminate the entry and cancel the permit upon completion of confined space work operations.
- 4 Verify that rescue services are available and that the means for summoning them are operable.
- 5 Remove unauthorized individuals who enter or who attempt to enter the permit space during entry operations.
- 6 Determine, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

Confined Space Coordinator (CSC)

The Maintenance Safety Coordinator will serve as Miami University's Confined Space Coordinator (CSC). The CSC will work closely with the EHSO on all aspects of this program.

The Confined Space Coordinator shall:

- 1 Issue Confined Space Entry Permits.
- 2 Maintain a copy of the Confined Space Master List of all confined spaces with their classification, associated risks, and safety requirements. Conduct annual review of the Confined Space Master List with EHSO.
- 3 Coordinate an annual audit of confined spaces to ensure that they are properly marked and tagged.

- 4 Coordinate in conjunction with EHSO and PFD Training Officer, confined space training for PFD employees required to perform confined space entry.
- 5 Maintain and secure the University's confined space entry and rescue equipment.
- 6 Ensure that any employee conducting confined space entry has been properly trained in accordance with this program.

RESCUE AND EMERGENCY SERVICES

Equipment

A designated vehicle containing the University's confined space entry and rescue equipment shall be on stand-by for the duration of the entry operations. The attendant shall be outfitted with special communications equipment to enable him/her to have continuous communication with the authorized entrant(s) and to contact Public Safety directly should the need arise.

Guidelines

The City of Oxford Fire Department will be the primary rescue team for Miami University (tentative 5-95; mutual aid agreement pending). *Under no circumstances is the attendant to enter a confined space to perform rescue operations.*

If any problems occur during work operations (e.g., the entrant exhibits any unusual behavior, passes out, or contact cannot be established between the attendant and entrant(s) within the confined space) the attendant will immediately contact Public Safety, who in turn will contact the Oxford Fire Department (OFD). The attendant shall remain in contact with Public Safety until help arrives.

Provisions

The Oxford Fire Department shall be provided with the following:

- 1 Access to all permit spaces from which rescue may be necessary so that appropriate rescue plans and practice rescue operations can be developed.
- 2 Information regarding the hazards the rescue workers may confront when called on to perform rescue operations at Miami University.
- 3 Rescue equipment necessary for making rescues from permit spaces.
- 4 Training for fire department members:
 - a. In the use of rescue equipment.
 - b. In his/her assigned duties.
 - c. In the training required of authorized entrants.
- 5 Information regarding hazardous substances an entrant might have been exposed to (e.g., a MSDS, if applicable).
 - The MSDS or written information shall be made available to the medical facility treating the exposed entrant.

Rescue Personnel Requirements

The personnel entering the confined space to perform emergency rescue shall be:

- Trained in confined space rescue operations.
- Properly-fitted with a NIOSH-approved air-line respirator with emergency egress bottle or SCBA and be trained and certified in their use.
- Outfitted with a Full-body safety harness with “D” Ring.
- Attached to a lifeline.

Retrieval Systems

To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant.

Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant’s back near shoulder level, or above the entrant’s head. Wristlets may be used in lieu of the chest or full body harness if the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.

The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

Anytime a hoist is used for lifting/lowering of the entrant, such systems shall be backed-up with a lifeline that is independent of the hoist mechanism and cable.

RECLASSIFYING A PERMIT SPACE

A space classified by Miami University as a permit-required confined space may be reclassified as a non-permit confined space under the following procedures:

- 1** If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.
- 2** If it is necessary to enter the permit space to eliminate hazards, such entry shall be performed under the requirements of the permit-required space entry program. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated.
 - ▲ *Important:* Control of atmospheric hazards through forced air ventilation does **not** constitute elimination of the hazards.

- 3 Documentation shall be made of the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space.
- 4 If hazards arise within a permit space that has been reclassified to a non-permit space under this program, each employee in the space shall exit the space. The space shall then be reevaluated to determine whether it must be reclassified as a permit space, in accordance with other applicable provisions of this program.

Alternate Permit Space

Alternate entry procedures can be followed when entering a confined space (referred to as an “alternate permit space”) that meets ALL of the following conditions:

- 1 Before an employee is allowed to enter a permit confined space apart from the requirements of the Permit Space Entry Program, it shall be demonstrated that:
 - a. The only hazard posed by the permit space is an actual or potential hazardous atmosphere.
 - b. Continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry.
 - c. Monitoring and inspection data is developed that supports the demonstrations required by letters (a) and (b) listed above.
 - d. The determinations and supporting data required by letters (a, b, and c) listed above are documented and are made available to each employee who enters the permit space under the terms of this program. Such documentation must be submitted to the CSC and EHSO.
 - e. Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.
 - f. When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.
 - g. Before an employee enters the space, the internal atmosphere shall be tested by the CSC or other qualified employee with a calibrated *direct-reading instrument* for the following conditions in the order given:
 - (1) Oxygen content.
 - (2) Flammable gases and vapors.
 - (3) Potential toxic air contaminants.
 - h. There can be no hazardous atmosphere within the space whenever any employee is inside the space.

- i. Continuous forced air ventilation shall be used, as follows:
 - (1) An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere.
 - (2) The forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space.
 - (3) The air supply for the forced air ventilation shall be from a clean source so not to increase the hazards in the space.
 - j. The atmosphere within the space shall be continuously monitored as necessary to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere.
 - k. If a hazardous atmosphere is detected during entry:
 - (1) Each employee shall leave the space immediately.
 - (2) The space shall be evaluated to determine how the hazardous atmosphere developed.
 - (3) Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.
 - l. The CSC shall verify that the space is safe for entry and that the pre-entry measures required by this program have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification. The certification shall be made before entry and shall be made available to each employee entering the space. The original certification form shall be returned to and maintained on file in EHSO.
- 2** When there are changes in the use or configuration of an alternate permit space that might increase the hazards to entrants, that space shall be reevaluated and, if necessary, reclassified as a permit space. Any such reclassifications shall be made by the Confined Space Coordinator and EHSO and shall be added to the Master Confined Space List.

Employee Information and Training

Training shall be provided so that all employees whose work is regulated by this program acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this program.

Training shall be provided to each affected employee:

- Before the employee is first assigned duties under this program.
- Before there is a change in assigned duties.
- Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained.
- Whenever there are deviations from the permit space entry procedures required by this program or that there are inadequacies in the employee's knowledge or use of these procedures.

The training shall establish employee proficiency in the duties required by this program through testing and shall introduce new or revised procedures, as necessary, for compliance with this program.

EHSO shall certify through recordkeeping that the employee training and testing required by this program has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives. A certificate of completion shall be issued by EHSO to the employees upon successful completion of the training program.

Each member of the rescue service shall be trained to perform the assigned rescue duties. Each member of the rescue service shall also receive the training required of authorized entrants.

Appendices

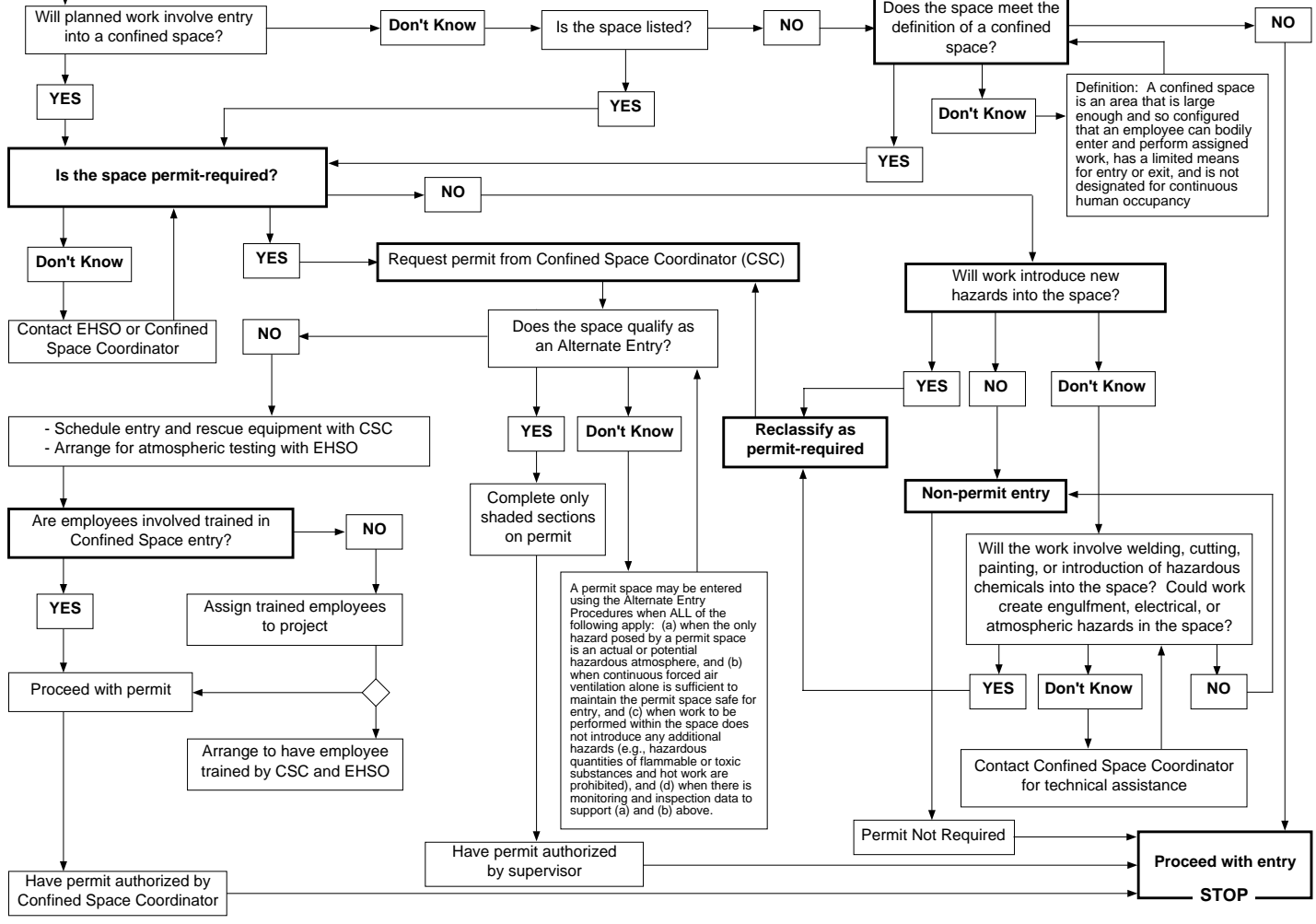
Appendix A	Confined Space Flow Chart
Appendix B	Procedures for Atmospheric Testing
Appendix C	Sewer System Entry
Appendix D	Sample Entry Permit

START HERE
Consult Miami University's Confined Space Evaluation Report

Confined Space Procedures Chart

Environmental Health and Safety Offices
October 1995

Miami University Confined Space Program



PROCEDURES FOR ATMOSPHERIC TESTING

Appendix B

Purpose

Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space and verification that acceptable entry conditions for entry into that space exist.

Procedures

Evaluation Testing

The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these data, and development of the entry procedure, should be done by, or reviewed by, a technically qualified professional (e.g., OSHA consultation service, or certified industrial hygienist, registered safety engineer, certified safety professional, certified marine chemist etc.) based on evaluation of all serious hazards.

Verification Testing

The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration, etc.) should be recorded on the permit in the space provided adjacent to the stipulated acceptable entry condition.

Duration of Testing

Measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer.

Testing Stratified Atmospheres

When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope should be tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

Order of Testing

A test for oxygen is performed first because most combustible gas meters are oxygen dependent and will not provide reliable readings in an oxygen deficient atmosphere. Combustible gases are tested for next because the threat of fire or explosion is both more immediate and more life threatening, in most cases, than exposure to toxic gases and vapors. If tests for toxic gases and vapors are necessary, they are performed last.

SEWER SYSTEM ENTRY

Appendix C

Introduction

Sewer entry differs in three vital respects from other permit entries:

- 1 There rarely exists any way to completely isolate the space (a section of a continuous system) to be entered.
- 2 Because isolation is not complete, the atmosphere may suddenly and unpredictably become lethally hazardous (toxic, flammable or explosive) from causes beyond the control of the entrant or employer.
- 3 Experienced sewer workers are especially knowledgeable in entry and work in their permit spaces because of their frequent entries. Unlike other employments where permit space entry is a rare and exceptional event, sewer workers' usual work environment is a permit space.

Procedures

Adherence to Procedure

The employer should designate as entrants only employees who are thoroughly trained in the employer's sewer entry procedures and who demonstrate that they follow these entry procedures exactly as prescribed when performing sewer entries.

Atmospheric Monitoring

Important: Atmospheric monitoring equipment needs to be calibrated according to the manufacturer's instructions.

- 1 Entrants should be trained in the use of, and be equipped with, atmospheric monitoring equipment that sounds an audible alarm, in addition to its visual readout, whenever one of the following conditions is encountered:
 - a. Oxygen concentration less than 19.5 percent,
 - b. Flammable gas or vapor at 10 percent or more of the lower flammable limit (LFL),
 - c. Hydrogen sulfide or carbon monoxide at or above 10 ppm or 35 ppm, respectively, measured as an 8 hour time-weighted average.
- 2 Substance specific monitoring equipment should be used whenever actual or potential contaminants have been identified. The instrument should be carried and used by the entrant in sewer line work to monitor the atmosphere in the entrant's environment, and in advance of the entrant's direction of movement, to warn the entrant of any deterioration in atmospheric conditions. Where several entrants are working together in the same immediate location, one instrument, used by the lead entrant, is acceptable.

Surge Flow and Flooding

Sewer crews should develop and maintain liaison, to the extent possible, with the local weather bureau and fire and emergency services in their area so that sewer work may be delayed or interrupted and entrants withdrawn whenever sewer lines might be suddenly flooded by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into sewers during emergencies by industrial or transportation accidents.

Special Equipment

Entry into large bore sewers may require the use of special equipment. Such equipment might include such items as atmosphere monitoring devices with automatic audible alarms, escape self-contained breathing apparatus (ESCBAs) with at least 10 minute air supply (or other NIOSH approved self-rescuer), and waterproof flashlights, and may also include boats and rafts, radios and rope stand-offs for pulling around bends and corners as needed.

Confined Space Entry Permit

COPY OF PERMIT WILL REMAIN AT
JOB SITE UNTIL JOB IS COMPLETED

Alternate Entry (Shaded Areas)

A permit space may be entered using the Alternate Entry Procedures when ALL of the following apply: (a) when the **only** hazard posed by a permit space is an actual or potential hazardous atmosphere, and (b) when continuous forced air ventilation alone is sufficient to maintain the permit space safe for entry, and (c) when work to be performed within the space does not introduce any additional hazards (e.g., hazardous quantities of flammable or toxic substances and hot work are prohibited), and (d) when there is monitoring and inspection data to support (a) and (b) above. These alternate procedures are valid as long as the atmospheric hazard is controlled by forced ventilation. If additional hazards arise within the space, or forced ventilation becomes inadequate to control the atmospheric hazard, employees in the space must exit immediately and the space must be reevaluated. **For Permit-required confined space entry, complete ALL sections of this form, including shaded areas.**

Confined Space Identification Number				Entry Date			
Site Location and Description							
Purpose of Entry							
Expected Duration (cannot exceed one 8-hour shift)				Authorized Duration (no more than one 8-hour shift)			
Person In Charge Of Work:				Entry Supervisor:			
Authorized Entrant(s):				Attendant(s):			
Communication Procedures:							

Preparations and Equipment	N/A	Yes	Initials	Preparations and Equipment	N/A	Yes	Initials
Lockout/Tagout - Deenergize				Fire Extinguishers			
Line(s) Broken-Capped-Blanked				Eyewash/Shower			
Purge-Flush and Vent				Protective Clothing			
Ventilation				Lifeline			
Secure Area [Post and Flag]				Full-body Harness with Dee-Ring			
Hot Work Permit				Tripod/Rescue Equipment			
Respiratory Protection				Fall Protection			
Personal Air Monitor				Communications Equipment [attendant and entrant]			
Explosion-proof Lighting				Radio Check [attendant and Public Safety]			
G.F.C.I. Equipment				Accessible Telephone Located by Attendant			
Non-sparking Tools							

PPE Required	Safety Glasses	Hard Hat	Gloves	Safety Shoes	Hearing Protection	Other:
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Atmosphere Monitoring		Pre-Entry Test		During Entry Operations					
Test(s) to be Taken	Permissible Exposure Limit	Time	Reading	Time	Reading	Time	Reading	Time	Reading
Percent of Oxygen *	19.5% to 23.5%								
Lower Explosive Limit *	Under 10%								
Carbon Monoxide *	**35 PPM								
Hydrocarbon *	**1 PPM								
Hydrogen Sulfide *	**10 PPM								
Sulfur Dioxide *	**2 PPM								

Key: *Continuous Monitoring Required - Record Results Every 2 Hours **8-hour Time Weighted Average

Tester(s) Name	Instrument Model/Type	Serial Number

Remarks:

Required Pre-Entry Hazard Elimination Measures Taken	Circle One	
All slip and trip hazards eliminated	Yes	N/A
Atmospheric testing (oxygen, flammable vapors/gases and toxic concentrations) conducted and documented above	Yes	N/A
Access opening obstruction hazards eliminated	Yes	N/A
Sharp edges removed or guarded	Yes	N/A
Physical barriers or barricades installed	Yes	N/A
Forced ventilation can eliminate atmospheric hazards	Yes	N/A
Contents of the space removed	Yes	N/A
Chemical, utility, and outlet lines isolated	Yes	N/A
Lockout, tagout, and tryout procedures implemented	Yes	N/A

Permit Entry Authorization and Alternate Entry Certification

I certify that all existing hazards except atmospheric have been eliminated and that atmospheric hazards shall be controlled by continuous forced ventilation. All above conditions have been satisfied. [Authorization must be from the Confined Space Coordinator if entry is into a permit-required confined space.]

Print Name and Title

Department and Phone Number

Entry Supervisor or Qualified Person Signature

Emergency Procedures: DO NOT enter the space under any circumstances. Radio Dispatcher at Public Safety OR dial x911. Tell the dispatcher that this is a CONFINED SPACE EMERGENCY and provide your exact location. Remain at work site until help arrives.