



## INDIANA UNIVERSITY

OFFICE OF THE EXECUTIVE VICE PRESIDENT  
FOR UNIVERSITY ACADEMIC AFFAIRS

University Environmental Health and Safety

# Permit-Required Confined Space Program

## January, 2018

### 1. INTRODUCTION

#### 1.1. Purpose

Indiana University Environmental Health and Safety (IUEHS) has developed this Program to protect employees and ensure effective implementation, operation, and recordkeeping of the University Permit-Required Confined Space Program (PRCSP) in compliance with the Occupational Safety and Health Administration (OSHA) regulation [29 CFR 1910.146](#).

#### 1.2. Scope

This Program applies to any Indiana University employee who is required to enter an area that has been identified as a permit-required confined space.

### 2. AUTHORITY AND RESPONSIBILITY

#### 2.1. University Environmental Health and Safety (IUEHS) is responsible for:

- 2.1.1. Developing the written Permit-Required Confined Space Program, revising the Program as necessary, and reviewing the Program annually;
- 2.1.2. Providing training for all IU personnel who enter or work near permit-required confined spaces;
- 2.1.3. Assisting departments (upon request) in calibrating, approving and making recommendations for all monitoring equipment, safety equipment, training programs and materials for safe entry and work operations;
- 2.1.4. Assisting in identifying permit-required confined spaces on IU campuses;
- 2.1.5. Assisting in inspecting permit-required confined space locations for determination of potential hazards and controls (see Appendix B for guidance);
- 2.1.6. Reviewing completed permits; and
- 2.1.7. Reviewing entry operations periodically.

#### 2.2. Department and Supervisors are responsible for:

- 2.2.1. Designating employees who have active roles (entrants, attendants, entry supervisors, etc.);
- 2.2.2. Identifying permit-required confined space(s) encountered by employees, submitting a list of the permit-required confined spaces identified to IUEHS, contacting IUEHS when additional permit-required confined spaces are identified, and notifying affected employees;
- 2.2.3. Reporting potential permit-required confined spaces to IUEHS;
- 2.2.4. Updating the permit-required confined space list whenever there are changes affecting work conditions or whenever new permit-required confined spaces are identified and submitting the changes to IUEHS;
- 2.2.5. Providing necessary personal protective equipment (PPE) to employees;
- 2.2.6. Ensuring affected employees receive training appropriate for their permit-required confined space duties;
- 2.2.7. Maintaining appropriate employee training and permit-required confined space entry permit records;

- 2.2.8. Taking appropriate disciplinary action whenever an employee fails to follow safety precautions outlined in this Program;
- 2.2.9. Conducting briefing and de-briefing with any contracting company on the permit-required confined space they are hired to work in;
- 2.2.10. Ensuring that permit-required confined space entry equipment is properly maintained and stored;
- 2.2.11. Ensuring that all entry permits are completed, reviewed, and signed upon termination of entry; and
- 2.2.12. Submitting entry permits to IUEHS upon termination of entry.

**2.3. Employees** are responsible for:

- 2.3.1. Notifying the supervisor of any permit-required confined space encountered not currently on the permit-required confined space list;
- 2.3.2. Reporting jobs requiring entry into permit entry permit-required confined spaces to the supervisor;
- 2.3.3. Notifying the supervisor whenever work operations may require a hot work permit or work operations may result in chemical exposure or generation of hazardous atmosphere and address appropriately;
- 2.3.4. Attending permit-required confined space training; and
- 2.3.5. Complying with duties assigned to them when working as entrants and attendants of permit-required confined spaces.

**2.4. Authorized Entrants** are responsible for:

- 2.4.1. Having knowledge of the hazards and potential hazards associated with the specific permit-required confined space including mode of exposure (e.g. respiratory, dermal), signs or symptoms, and consequences of exposure prior to entry;
- 2.4.2. Properly using all equipment (including personal protective equipment) which is necessary for safe entry operation;
- 2.4.3. Maintaining (verbal, radio, wired) communication with attendant to enable the attendant to monitor the status and to enable the attendant to alert him/her of the need to evacuate the space; and
- 2.4.4. Exiting from permit-required confined space when ordered by attendant; when experiencing signs and/or symptoms of exposure; when a prohibited condition exists; or when the monitoring alarm sounds.

**2.5. Attendants** are responsible for:

- 2.5.1. Having knowledge of the hazards and potential hazards associated with the specific permit-required confined space including mode of exposure (e.g., respiratory, dermal), signs or symptoms, and consequences of exposure prior to entry;
- 2.5.2. Remaining outside the permit-required confined space until termination of the entry operation, or until relieved by another qualified attendant;
- 2.5.3. Maintaining an accurate count of authorized entrants within the permit-required confined space;
- 2.5.4. Maintaining communication with the authorized entrant(s) to monitor his/her status and to alert the entrant of any need to evacuate the space;
- 2.5.5. Monitoring activities inside and outside the space to determine if it is safe for entrants to remain in the space or order evacuation if the attendant:
  - 2.5.5.1. Detects a prohibited condition;
  - 2.5.5.2. Detects behavioral effects in the authorized entrant as a result from exposure to atmospheric hazards;
  - 2.5.5.3. Detects a condition outside the space that could endanger the authorized entrant(s); and
  - 2.5.5.4. Cannot effectively and safely perform all required duties of an attendant.
- 2.5.6. Performing no other duties that interfere with primary attendant duties;
- 2.5.7. Performing non-entry rescues as required by the specific entry permit; and
- 2.5.8. Summoning rescue services if needed.

**2.6. Entry Supervisors** are responsible for:

- 2.6.1. Having knowledge of the hazards and potential hazards associated with the specific permit-required confined space including mode of exposure (e.g., respiratory, dermal), sign or symptoms, and consequences of exposure that may be faced during entry;
- 2.6.2. Completing and signing the entry permit;

- 2.6.3. Verifying that the appropriate entries have been made on the permit that all tests specified have been conducted, and all equipment specified on the permit is in place, before endorsing the permit and allowing entry to begin;
- 2.6.4. Terminating the entry and canceling the permit when the entry operation has been completed or a prohibited condition arises in or near the space;
- 2.6.5. Verifying that rescue services are available during a permit-required space entry and that the means for summoning them are operational;
- 2.6.6. Removing unauthorized individuals who enter or who attempt to enter the permit-required confined space during entry operations; and
- 2.6.7. Ensuring that the entry operations remain consistent with the terms of the entry permit and that acceptable entry conditions are maintained.

\*NOTE: As defined by 29 CFR 1910.146 and this Program, entry supervisors also may serve as an attendant or as an authorized entrant, if that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during an entry operation.

### **2.7. Responding Fire Department** shall provide:

- 2.7.1. Rescue and emergency equipment for safe entry into and rescue from permit-required confined spaces in a timely manner in relation to the hazards identified;
- 2.7.2. Immediate rescue during permit-required confined space entries that occur where entrants wear respirators in permit-required confined spaces that contain an IDLH atmosphere; and
- 2.7.3. All equipment necessary for a rescue.

## **3. Program Elements**

Different types of permit-required confined spaces trigger different types of requirements and procedures. The different types of areas that are covered in this Program are defined as follows:

**Confined space** means a space that:

- Is large enough to bodily enter and perform assigned work;
- Has limited means of entry or egress; and
- Is not designed for continuous human occupancy.

There are two types of confined spaces – permit-required and non-permit-required confined spaces. This Program specifically applies to permit-required confined spaces. If you have questions or concerns regarding a non-permit-required confined spaces, contact IUEHS for your respective campus.

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

- Contains or has a potential to contain a hazardous atmosphere;
- Contains a material that has the potential for engulfing an entrant;
- Has an internal 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 section; or
- Contains any other recognized serious safety or health hazard.

**Non-permit-required confined space** means 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.

### **3.1. General Requirements for Permit-required Confined Space (PRCS)**

All permit required permit-required confined spaces shall be formally assessed and a permit entry form will be completed every time the space is entered (Appendix C). The following must be conducted before any employee enters the permit-required confined space:

- 3.1.1. Implement any measures necessary to prevent unauthorized entry;
- 3.1.2. Identify and evaluate the hazards of the permit-required confined space(s) before entry;
- 3.1.3. Develop and implement the means, procedures, and practices necessary for safe permit-required confined space entry operations, including, but not limited to, the following:
  - 3.1.3.1. Specify acceptable entry conditions;
  - 3.1.3.2. Make monitoring and testing information available to any employees who may work in or around the permit-required confined space;
  - 3.1.3.3. Isolate the permit-required confined space;
  - 3.1.3.4. Purge, inert, flush, or ventilate the permit-required confined space as to eliminate or control atmospheric hazards;
  - 3.1.3.5. Provide for pedestrian, vehicle or other barriers as necessary to protect entrants from external hazards; and
  - 3.1.3.6. Verify that conditions in the permit-required confined space are acceptable for entry throughout the duration of an authorized entry.

Note: The University shall provide safety equipment at no cost to employees using it.

**3.1.4. Prevention of Unauthorized Entry**

Unauthorized entry into permit-required confined spaces shall be prevented. Prevention measurements include training, signs and security measures. Any employee working in or around permit-required confined spaces shall attend permit-required confined space awareness training.

**3.1.5. Hazard Identification**

IUEHS and the affected department representatives will identify all areas of Indiana University that come under the definition of a permit-required confined space.

**3.1.6. Hazard Communication**

Signs shall be posted where feasible near permit-required confined spaces to prevent any inadvertent or unauthorized entry. These postings shall be permanently affixed to the wall or door of the space and shall be large enough to be plainly visible to any entrant.

In locations where permanent notices cannot be logically placed (sewer manhole or vaults located in roadways), temporary signs shall be posted along with the necessary barricades and fences in plain view during the entire time the entrance to the permit-required confined space is removed.

The signs shall read DANGER–Permit-required confined space, Do Not Enter or using other similar language that satisfies the requirement.

**3.1.7. Identify Employees**

Departments must designate employees who have active roles (authorized entrants, attendants, and entry supervisor) in entry operations and identify the duties of each role. At least one attendant must be identified and stationed outside the permit-required confined space for the duration of the entry operation.

Only trained attendants, authorized entrants, and entry supervisors shall work in and around a permit-required confined space. Training shall meet the requirements established by IUEHS.

**3.1.8. Equipment**

Equipment, including testing, monitoring, communication and personal protective equipment, shall be provided, maintained and properly used.

**3.1.9. Rescue**

Non-entry retrieval equipment shall be set-up and utilized where there exists a potential for an IDLH atmosphere, engulfment, vertical entries, or any other recognizable serious health hazard unless use of such retrieval equipment would create an additional hazard.

**3.1.10. Isolation of Permit-Required Confined Spaces**

Prior to entering any permit-required confined space, all serious safety or health hazards known or suspected in the space shall be purged, drained and otherwise reduced to a zero-energy state by relieving any stored energy including steam lines. Hot environments shall be ventilated and cooled to ambient temperature prior to entry. Sources of hazardous materials (either solid, liquid or gas) shall be isolated and secured by locking and tagging valves, use of blind flanges, plugging, or otherwise eliminated from use. Electrical sources or machinery whose inadvertent operation would cause injury shall be locked and/or tagged out (further lock-out information can found within IU's Control of Hazardous Energy Program).

**3.1.11. Permit-Required Confined Space Covers and Barricades**

When a permit-required confined space has both top and bottom openings, or access hatches or manways in both high and low positions, it is preferable to use the bottom or low entrance for safety reasons whenever practical. Permit-required confined space openings shall be guarded by railing, temporary covers, or other barriers that will warn and prevent against an accidental fall as well as preventing foreign objects from falling into the space.

**3.1.12. Air Monitoring Instrumentation and Test Procedure**

Air monitoring instrumentation shall be operated, maintained, and calibrated according to the manufacturer's instructions. The use, maintenance, and calibration shall be performed ONLY by trained personnel and records shall be kept describing maintenance and calibration.

The following protocol shall be followed when performing air sampling and monitoring for permit-required confined space entry authorization:

3.1.12.1. Prior to any use within a permit-required confined space, the instrument must be checked and calibrated according to the manufacturer's instructions, including field testing and fresh air testing, as required.

3.1.12.2. When pre-entry testing or continuous monitoring is required as a condition of the permit-required confined space entry permit, the atmosphere within the permit-required confined space shall be tested for oxygen deficiency, combustible gases and vapors, and any other toxic air contaminants that may be potentially present (in that order). The minimum acceptable levels of air quality are listed on the permit-required confined space entry permit and below:

Oxygen level:	Not less than 19.5% nor greater than 23.5% by volume
Combustible gas:	Concentration shall not exceed 10% of the lower explosive limit/lower flammable limit (LEL/LFL).
Toxic gas:	Concentration shall not exceed the toxic guidelines of OSHA.

3.1.12.3. If the standards listed above cannot be met, then the permit-required confined space shall not be entered. If the space is occupied and the continuous air monitor detects air quality falling outside of these acceptable standards, then the work must cease, the space evacuated, and a supervisor must be contacted immediately. The space may not be re-entered until the atmosphere returns to acceptable levels as measured by the air monitor.

3.1.12.4. Sources of ignition or sparks shall not be introduced into any permit-required confined space until air sampling and testing has determined that the space is free from a flammable or explosive atmosphere.

### 3.1.13. Permit-Required Confined Space Ventilation

Ventilation shall be required whenever preliminary air sampling detects a hazardous or potentially hazardous atmosphere. The ventilation shall be accomplished by discharging fresh, uncontaminated air into the space for the duration of occupancy.

When preliminary sampling indicated the atmosphere within the permit-required confined space is within acceptable limits, ventilation is not required.

The use of ventilation equipment to control fumes, dust, vapors, mists, or other corrosive or toxic materials to a concentration below the permissible exposure limit (PEL) within the space is preferred to the use of personal respiratory devices. The only time personal respiratory devices shall be used is when ventilation proves to be impractical, ineffective, or to provide an additional level of safety. Compliance with the [IU Respiratory Protection Program](#) is mandatory for respirator users.

### 3.1.14. Personal Protective Equipment (PPE)

All personal protective equipment shall be selected, used, inspected, and cleaned according to the manufacturer's recommendations and any applicable OSHA regulations. When special protective equipment is required for specific hazards, contact IUEHS for assistance in selecting the proper equipment. The department conducting the entry is responsible for the cost, maintenance, and proper usage of the PPE.

A comprehensive evaluation must be completed for all hazards that may be encountered. Every reasonable effort will be made to eliminate or control the hazards before permitting entry into the permit-required confined space.

Personal protective equipment (PPE) will not be substituted for hazard elimination if feasible. If required, PPE will be used to protect the entrant from potential hazards. All required PPE will be provided by Indiana University and it is the responsibility of all affected employees to use the equipment properly. If in doubt as to the correct PPE or if any question as to the adequacy of the provided protection for a given task, the employee will contact their supervisor before entry operations (further PPE information can be found within IU's Personal Protective Equipment Programs and Policy or by contacting IUEHS for your respective campus).

### 3.1.15. Hot Work in Permit-required Confined Spaces

Any welding, brazing, cutting, heating, and grinding operations within a permit-required confined space requires a hot work authorization on the permit-required confined space entry permit. Continuous ventilation and air monitoring shall be performed during hot work when the potential exists for the creation of a hazardous atmosphere.

Welding operations or any other spark-producing work shall not be performed if 10% or more of the lower explosive limit/lower flammable limit (LEL/LFL) of any combustible gas exists in the permit-required confined space. Fire extinguishers shall be available at the worksite and a person standing fire watch is required. Welding cylinders and electric welding machines shall be kept outside the permit-required confined space, whenever possible (further Hot Work information can be found within [IU's Hot Work Program](#)).

## 3.2. Permit-Required Confined Space Planning

Indiana University employees will pre-plan before entering a permit-required confined space. Planning must include provisions for the following:

- 3.2.1. The task to be conducted within the permit-required confined space;
- 3.2.2. Employees involved and their specific responsibilities;
- 3.2.3. Evaluation of the possible hazards within the space. This includes information on atmospheric hazards, hazardous energies, and the possibility of engulfment and the risk of falling;
- 3.2.4. Requirements for making the space safe, including: isolation, ventilation, atmospheric monitoring and guarding;
- 3.2.5. Equipment needed for entry, possibilities including: personal protective equipment (PPE) appropriate for the hazards that may be encountered, personal monitors, ventilation equipment, rescue equipment/apparatus, radios, spark proof tools, fall protection, and lights;
- 3.2.6. Communication (verbal, radio, wired) between the entrant and the attendant; and
- 3.2.7. Emergency procedures including:
  - Knowing the locations of emergency exits (if applicable);
  - Nearest location of fire suppression and AED equipment;
  - Knowing the telephone number and procedures to summon emergency help; and
  - Developing a description of your location to provide to emergency services.

## 3.3. Entry Permit System

### 3.3.1. Entry Permit Requirements

The entry permit that documents compliance with this Program and authorizes entry to a permit-required confined space is located in Appendix C. A permit-required confined space entry permit must be completed for each PRCS entry by employees and must be completed before entry into the space. The permit must be signed by the on-site entry supervisor.

If the permit-required confined space conditions remain the same, the permit will be valid for up to eight hours. No permit will be issued for more than one work shift or eight hours; whichever is shorter. Following the completion of entry operations, a copy of the canceled permit will be sent to IUEHS.

Before entry is authorized, the following shall be completed and documented on the entry permit form (see Appendix C):

- The permit-required confined space to be entered;
- The purpose of entry;
- The date and authorized duration of entry;
- The authorized entrant(s);
- The attendant(s);
- The hazard(s) of the space;
- The hazard control or elimination measures (lockout/tagout, purging, ventilation, blocking, etc.);
- The acceptable conditions of entry;
- Initial and periodic atmospheric testing, if applicable;
- Rescue and emergency contingency plans;
- Communication procedures;
- Equipment needed; and
- The entry supervisor's signature authorizing entry.

The entry permit shall be made available at the time of entry by posting it at the entry portal or by any other equally effective means to confirm that pre-entry preparations have been completed.

#### 3.3.2. Permit Termination

The entry supervisor shall terminate entry and cancel the entry permit when:

- The entry operation covered by the entry permit has been completed; or
- A condition that is not allowed under the entry permit arises in or near the permit-required confined space.

NOTE: The initiating department shall provide IUEHS with a copy of the cancelled entry permit. Any problems encountered during an entry operation shall be noted on the permit so that appropriate revisions to the Permit-required Confined Space Program can be made.

### 3.4. Entry Procedures

- 3.4.1. Entry supervisor initiates the permit-required confined space entry permit and ensures the appropriate items listed below are noted on the permit;
- 3.4.2. Ensure that the proper isolation has been accomplished;
- 3.4.3. Ensure that the initial ventilation purge has been completed, if applicable;
- 3.4.4. Conduct the required atmospheric testing and proceed only if conditions are safe;
- 3.4.5. Ensure that continuous ventilation is in place and the appropriate air monitoring equipment is on hand and working correctly, if applicable;
- 3.4.6. Assemble all required tools and equipment;
- 3.4.7. Station an attendant outside the PRCS with the capability of maintaining communication with the entrant;
- 3.4.8. Don all required PPE;
- 3.4.9. Enter the permit-required confined space;
- 3.4.10. Evacuate the space if an evacuation order is given by the attendant or if there is any indication of ill effects such as dizziness, irritation, etc. If anything does not appear safe, the space must be evacuated immediately; and
- 3.4.11. All work within the permit-required confined space shall be conducted in an alert and cautious manner, always looking for signs of danger.

### 3.5. Permit-Required Confined Space Evacuation

An entrant's evacuation from a permit-required confined space shall take place when any of the following conditions occur:

- An attendant or entry supervisor gives the order to evacuate;
- The entrant recognizes any symptom of exposure or warning sign of a dangerous situation;
- An attendant or entrant observes a potential problem that can affect the entrants, such as failure of a control device or PPE; and/or
- Activation of an alarm that signals a hazardous change in atmospheric conditions.

**In the event that an entrant becomes unconscious, attendants shall not attempt to enter the space to perform rescue.** Rescue services that can be performed safely from outside of the permit-required confined space (e.g. hoisting a harnessed entrant) shall be undertaken. Other entrants in the space shall immediately exit the space and only provide such assistance as will not endanger themselves. The attendant shall immediately contact Indiana University Police Department for the respective campus to summon the local fire department by one of the following:

- Calling 9-1-1 from a campus phone;



- Calling police dispatch from a cell phone; or
- Radio for help.

Inform dispatch that this is a permit-required confined space rescue and explain all of all hazards that may be present during the rescue. This information shall be communicated to the fire department.

At off campus locations, the attendant must call local fire and rescue services directly by calling 9-1-1 from a cell phone. The telephone number must be in the attendant's possession prior to any entry. In no case shall the attendant be required to relay emergency information through a third party unless the third party location is fully staffed during the entire entry.

Emergency rescue services will be provided for all permit-required confined space emergencies by the local fire department Confined Space Rescue Team, or local fire and rescue services at off campus locations.

### **3.6. Reclassifying Permit-Required Confined Space to Non-Permit-Required Confined Space**

A permit-required confined space can be reclassified to a non-permit-required confined space if there are no actual or potential hazards and if all the other hazards within the space are eliminated without entry into the space.

Note: Control of atmospheric hazards through continuous forced air ventilation does not constitute elimination of the hazards.

Note: If a PRCS is to be reclassified to a "non-permit required confined space", the entry supervisor will document this determination by completing the applicable work sheets found in Appendix D of this Program. Signed copies of these documents will be placed in the inspection file for reference in developing plans for future visits to the same site.

Complete Appendix D to certify that the hazards have been eliminated and that space is safe for entry.

### **3.7. Emergency Procedures**

The requirements of this Program are provided to eliminate or control any hazards before and during entry operations. However, in spite of all these precautions, hazards may arise which could incapacitate an entrant and prevent his or her self-rescue.

Permit-required confined space rescues are extremely dangerous operations that must only be performed by properly trained and equipped individuals. It is well known that most fatalities that occur are would-be rescuers who rush into a permit-required confined space without receiving proper training and/or without instituting the appropriate precautions. It cannot be stressed enough that entry rescues must only be performed by properly trained and equipped employees.

Indiana University will use local Fire Departments (911) for the respective campuses to perform entry rescues.

## **4. Training and Recordkeeping**

Training will be provided so that all affected Indiana University employees who may need to enter permit-required confined space, or are responsible for acting as an attendant or entry supervisor

understand potential hazards, and obtain the skills necessary for safe performance of their assigned duties. Training will be provided to each affected employee, in case of any of the following:

- Before the employee is first required to work in permit-required confined space;
- When there is a change of assigned duties;
- When there is a change in the regulations affecting permit-required confined space entry that presents a hazard about which an employee has not previously been trained;
- When different air monitoring or retrieval equipment is purchased and made available for use in permit-required confined space entry;
- When the authorized supervisor has reason to believe either that there are deviations from the permit-required confined space entry procedures or that there are inadequacies in the employee's knowledge or use of the permit-required confined space entry procedures; or,
- When refresher training is deemed necessary by IU-EHS.

#### **4.1 Permit-Required Confined Space (PRCS) Program Training**

Full permit-required confined space training will include instruction of affected employees on the following topics:

- 4.1.1. The differences in responsibilities between the entrant, attendant, and entry supervisor;
- 4.1.2. Types of permit-required confined spaces that may be encountered in various field activities;
- 4.1.3. Components of the written PRCS program;
- 4.1.4. Components of the entry permit system;
- 4.1.5. Atmospheric testing equipment including its use, calibration, and maintenance;
- 4.1.6. Atmospheric testing protocol:
  - 4.1.6.1. Oxygen, combustibles, toxic;
  - 4.1.6.2. Pre-entry, frequent, or continuous testing; and
  - 4.1.6.3. Check all levels of the space.
- 4.1.7. Methods for the control or elimination of any atmospheric hazards:
  - 4.1.7.1. Inerting;
  - 4.1.7.2. Draining;
  - 4.1.7.3. Purging and cleaning; and
  - 4.1.7.4. Continuous forced air ventilation.
- 4.1.8. Procedures the employees must follow if they detect a hazard;
- 4.1.9. The evaluation process to be used if they detect a hazard;
- 4.1.10. The use of entry equipment; and
- 4.1.11. Personal protective equipment required:
  - 4.1.11.1. Full body harness;
  - 4.1.11.2. Respiratory Protection;
  - 4.1.11.3. Chemical protective clothing; and
  - 4.1.11.4. Eye and face protection.

Indiana University employees covered by this Program that are required to act in the capacity of an entrant, attendant, or supervisor during permit-required confined space entry, will receive training to maintain proficiency of these subjects. Additional or refresher training will be required every three years.

#### **4.2 Permit-Required Confined Space Awareness Training**

Training will be provided so that all affected Indiana University employees who may work near a permit-required confined spaces understand potential hazards and obtain the skills necessary for safe performance of their assigned duties.

#### **4.3 Recordkeeping**

All completed permits as required by 29 CFR 1910.146 will be maintained by IUEHS. IUEHS will maintain records associated with permit-required confined space inspection, training, and any compliance related records.

## 5. REFERENCES

- [29 CFR 1910.146](#)
- [29 CFR 1910.147](#)
- [IU Control of Hazardous Energy](#)
- [IU Hot Work Program](#)
- [IU Personal Protective Equipment Programs and Policy](#)
- [IU Respiratory Protection Program](#)

## 6. REVISIONS

New Document – December 8, 2015

Revised Document – January, 2018

## APPENDIX A- GLOSSARY

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

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

**Authorized Entrant:** An employee who is authorized by the employer to enter a permit-required confined 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 is a space that:**

1. Is large enough and so configured that an employee can bodily enter and perform assigned work.
2. Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
3. 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 inline 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(s) internal or external to the permit-required confined space which could endanger entrants.

**Engulfment:** The surrounding and effective capture of a person by a liquid or finely divided solid (flowable) 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 act by which a person intentionally passes through an opening into a permit-required confined space, and subsequent work activities in that space. The entrant is considered to have entered 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 to allow and control entry into a permit-required confined space and that contains the information specified in Appendix C.

**Entry Supervisor:** The person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit-required confined space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry.

Note: 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-required confined space), injury, or acute illness from one or more of the following causes:

1. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL).

2. Airborne combustible dust at a concentration that meets or exceeds its LFL.

Note: 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.

3. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent.
4. 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 this part [29 CFR] and which could result in employee exposure in excess of its dose or permissible exposure limit.

Note: 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.

5. Any other atmospheric condition that is immediately dangerous to life or health.

Note: 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, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

**Hot Work Permit:** The employer's written authorization to perform operations which could provide a source of ignition, such as riveting, welding, cutting, burning or heating.

**Immediately Dangerous to Life or Health (IDLH):** Any condition which poses an immediate threat of loss of life; may result in irreversible or immediate severe health effects; may result in eye damage; irritation or other conditions which could impair escape from the permit-required confined space.

**Immediate Severe Health Effects:** Any acute clinical sign(s) of a serious, exposure-related reaction manifested within 72 hours after exposure.

**Inerting:** The displacement of the atmosphere in a permit-required confined space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Note: This procedure produces an IDLH oxygen-deficient atmosphere.

**Isolation:** The process by which a permit-required confined 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 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.

**Non-Permit-Required 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 percent oxygen by volume.

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

1. Contains or has a potential to contain a hazardous atmosphere.
2. Contains a material that has the potential for engulfing an entrant.
3. 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-section.
4. Contains any other recognized serious safety or health hazard.

**Permit-required Confined Space Program:** The employer's overall program for controlling, and where appropriate, for protecting employees from, permit-required confined space hazards and for regulating employee entry into permit-required confined spaces.

**Permit System:** The employer's written procedures for preparing and issuing permits for entry and for returning the permit-required confined space to service following termination of entry.

**Prohibited Condition:** Any condition in a permit-required confined space that is not allowed by the permit during the period when entry is authorized.

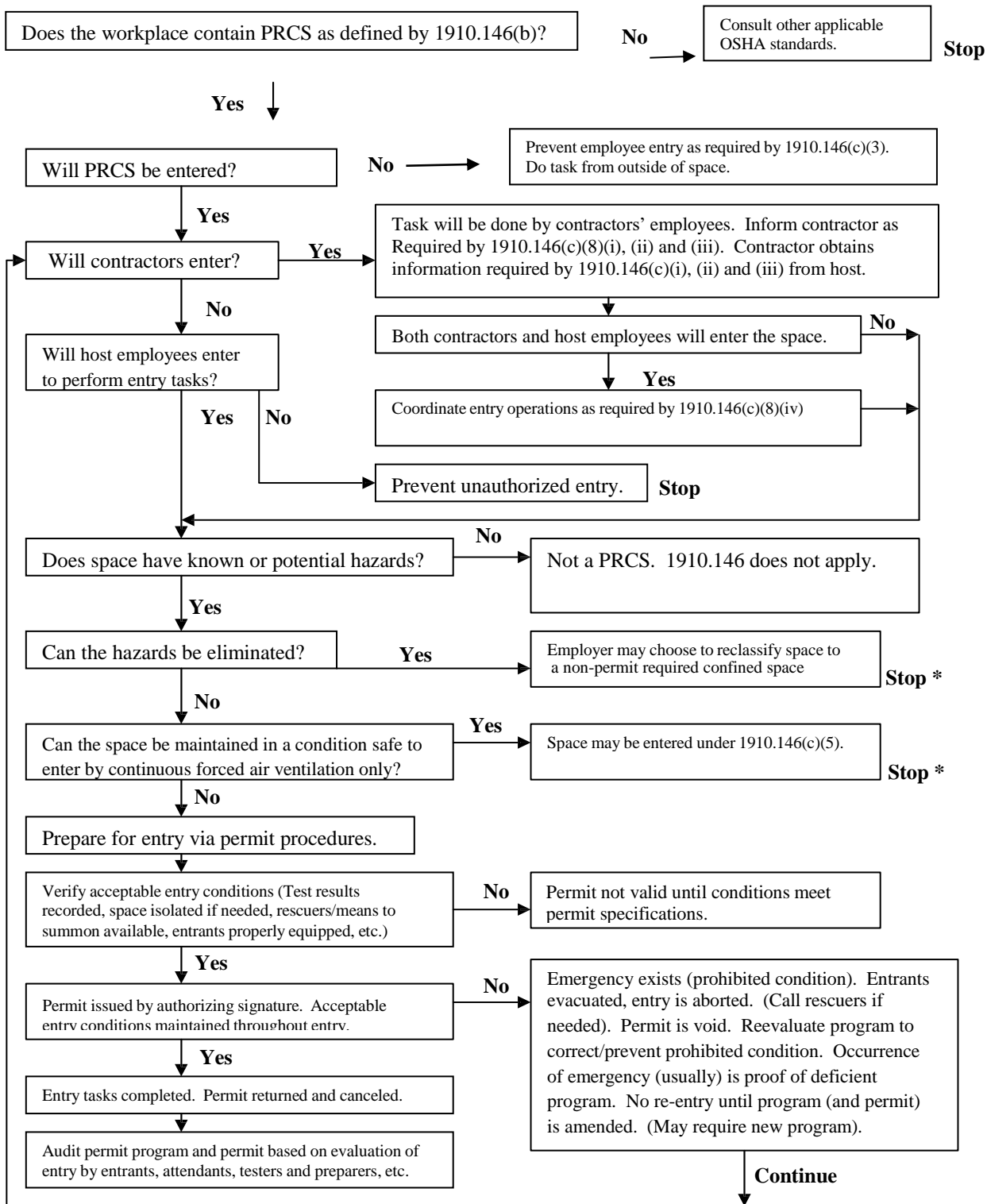
**Rescue Service:** The personnel designated to rescue employees from permit-required confined spaces.

**Retrieval System:** The equipment (including a retrieval line, chest or full body harness, wristlets, and a lifting device or anchor) used for non-entry rescue of persons from permit-required confined spaces.

**Testing:** The process by which the atmospheric hazards that may confront entrants of a permit-required confined space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit-required confined space.

Note: Testing enables employers 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.

## APPENDIX B - Permit-Required Confined Space Decision Flow Chart



\*Spaces may have to be evacuated and re-evaluated if hazards arise during entry. Additionally, permit requirements may depend on changing conditions within each permit-required confined space.



## APPENDIX C - PERMIT ENTRY FORM

Space to be Entered:	Date:
	Permit Expiration Date/Time:

Purpose of Entry:

Authorized Attendant(s):

Authorized Entrant(s):

Entry Supervisor:

Permit Space Hazard(s) (Check all that exist)	No	Yes		No	Yes
Flammable Gases or Vapors (greater than 10% of the lower flammable limit)			Mechanical Hazards		
Oxygen Deficiency (<19.5%)			Electrical Hazards		
Oxygen Enriched (>23.5%)			Materials Harmful to the Skin		
Toxic Gases or Vapors (greater than permissible exposure limit)			Engulfment		
Other: (list)					

**Hazard Controls (Circle all that exist):**

Lockout/Tagout	Purging	Ventilating	Inerting
Flushing	Block/Bleed	Blanking or Blinding	Barriers

**Equipment Required for Entry and Work (Specify all that apply):**

Respiratory Protection	Lifeline and Safety Harness
Protective Clothing	Hearing Protection
Spark Resistant Tools	Communication
Ventilation	Other

Required Acceptable Testing Conditions	Pre-Entry Results	Additional Testing Results				
		Time:	Time:	Time:	Time:	Time:
Oxygen Level (>19.5% and <23.5%)						
Flammability (<10% LEL)						
Carbon Monoxide (<25 ppm)						
Hydrogen Sulfide (<10 ppm)						
Other:						

Atmospheric Testing Equipment Used: (Model/Type/Serial #):

Atmospheric Testing Performed By:	Phone:
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**Rescue Information**

<b>Personnel/Service: (Circle all that apply)</b> Police Department Fire Department Fire Protection Services Outside Attendant	<b>Rescue Equipment:(List)</b>	<b>Phone Numbers:</b> Police Department – 911 Fire Department – 911
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**Authorization:** I certify that all required precautions have been taken and necessary equipment is provided for safe entry and work in this permit-required confined space.

Entry Supervisor Signature:	Time:	Date:
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**Distribution of Copies: (1) Original to Department (2) EHS Office (3) Copy to:**

<b>Additional Permits Required (Hot work, Electrical, etc.)?</b>	<b>YES</b>	<b>NO</b>
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## APPENDIX D - Indiana University Reclassification Work Sheet

*This work sheet is intended to be used to certify that the hazards have been eliminated and the space is safe for entry. If an entry is needed to eliminate or verify the elimination of a hazard, then a full PRCS permit is required. Once it has been determined that all the hazards have been eliminated, than the space can be reclassified as a non-permit space.*

- 1) Permit space location: \_\_\_\_\_
- 2) Have employees received permit space training? Yes No
- 3) a. Are there any hazardous atmospheres present or potentially present? List: Yes No  
 b. Is continuous forced air ventilation needed to maintain acceptable levels? Yes No  
 c. Is air monitoring required? Yes No  
 If yes, record test results:

### 4) Atmospheric Testing Record

Substance	Acceptable level	Readings
Oxygen	19.5% - 23.5%	_____
Explosive (Gas/Vapor)	<10% LEL	_____
Carbon Monoxide	<25 PPM	_____
Hydrogen Sulfide	<10 PPM	_____
Explosive Dust	<LEL (5' Visibility)	_____

- a. Is atmospheric testing equipment calibrated? Yes No  
 Date of calibration: \_\_\_\_\_

**If hazardous atmospheres are present or ventilation is needed to control levels, then reclassifying the space is not possible. It is necessary to eliminate the atmospheric hazard to reclassify.**

- 5) Is an engulfment hazard present? Yes No  
 If yes, what control measure is used to eliminate the hazard? \_\_\_\_\_
- 6) Is there an entrapment hazard? Yes No  
 If yes, list the steps to be taken to eliminate the hazard. \_\_\_\_\_
- 7) Have all hazardous energy sources (including chemical and physical hazards) been eliminated? Yes No

Check isolating methods used to eliminate the hazard(s):

- \_\_\_ De-energize equipment  
 \_\_\_ Locking out  
 \_\_\_ Tagging out  
 \_\_\_ Blank, blinds, double blocks, bleed lines and disconnecting lines  
 \_\_\_ Other procedures

The above listed isolation techniques are generally used in combination to ensure elimination of the hazard(s).

8) Is it necessary to enter the permit space to determine if the hazard has been eliminated? Yes No

*Note: If yes, then the entry must be performed in accordance with a full PRCS permit is required.*

Permit spaces that contain or have the potential to contain hazardous atmospheres may also be reclassified as non-permit spaces if the source of the hazardous atmosphere can be eliminated during the entire entry operation. After the space is isolated, purged, and ventilated from outside, it must be entered to test the atmosphere and inspect conditions within the space in order to ensure that the hazards have indeed been eliminated. This entry must be conducted in accordance with the full PRCS permit program (Once again, control of hazardous atmosphere is not the same as elimination.). This reclassification would also be valid only as long as hazards remain eliminated.

9) Is there a procedure to reevaluate the space if hazardous atmosphere does develop? Yes No

*Describe procedure:* \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Signature of Reclassifying Individual

\_\_\_\_\_  
Date