SAFETY AND HEALTH PROGRAM

Confined Space Entry

1.0 INTRODUCTION

Confined Space Entry is a serious workplace hazard, capable of causing serious employee injury. It is the policy of the Pennsylvania State University (PSU), Office of Physical Plant to protect all employees, students, and other personnel from potential hazards associated with Confined Space Entry Work. This will be accomplished through compliance with the work practices described herein and by effective application of engineering controls, administrative controls, and the use of personal protective equipment.

2.0 PURPOSE

The purpose of this program is to outline procedures that provide safe means for entering confined spaces. This procedure will identify the precautions to be utilized to ensure employee safety when working in confined spaces.

3.0 SCOPE

This program applies to all PSU OPP employees who may be required to enter a confined space at any university property.

4.0 REFERENCES


5.0 DEFINITIONS

Confined Space - Any enclosed space in the work place is considered a confined space if it has three specific features:

1. An enclosed space, that is large enough and configured so that an employee can bodily enter to perform work. Small machine enclosures or inspection portals only large enough for an employee’s head or shoulders do not qualify as confined spaces.

2. The space has limited or restricted openings for entry and exit. Generally, doorways one can walk through are not considered limited openings since they would not prevent rapid evacuation.
3. The space is not designed for continuous human occupancy. This generally limits confined spaces to those entered infrequently or periodically for inspection, maintenance, cleaning or repair.

Examples of confined spaces are, but not limited to: tanks, vessels, silos, storage bins, hoppers, vaults, pits (greater than four feet deep), boilers, compartments, ducts, sewers, pipelines, distribution tunnels, manholes, grease traps, dumpster trucks, trenches, and diked areas.

**Permit-Required Confined Space** - A confined space which requires an entry permit issued by an entry supervisor. A permit-required confined space has one or more of the following characteristics:

a) It contains or has the potential to contain a hazardous atmosphere (i.e., oxygen deficiency, hydrogen sulfide, carbon monoxide, chlorine or combustible gases);

b) It contains a liquid or finely divided solid material with the potential for surrounding or engulfing an entrant;

c) It has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or a sloped floor tapering to a smaller cross section; or

d) It contains any other recognized serious safety or health hazard.

OPP could encounter two types of Permit Required Confined Spaces.

a) **Mechanical/Electrical (Physical) Hazard Permit-Required Entry** - A space with mechanical/electrical or physical conditions which may pose an immediate threat of loss of life, may result in irreversible or immediate health effects, or may result in injury which could prevent escape from the space. Physical hazards include energy sources, heat stress, falls from ladders, falling objects, and wet surfaces.

b) **Dangerous Air (Atmospheric) Permit-Required Entry** - A space that has insufficient ventilation that may cause oxygen deficiency or accumulation of dangerous air contaminants (flammable/explosive, toxic, or otherwise injurious or incapacitating substances).

Although two classes of confined spaces are defined, a particular space may have characteristics of both. In these cases, entry procedures for both classes must be followed. **Appendix A** lists examples of permit-required confined spaces that may be found throughout the University Properties. This listing is not all-inclusive. Additions and deletions will be made by EHS or the OPP Safety Coordinator as appropriate. **Appendix C** provides additional confined spaces at specific OPP Locations.

**Non-permit Confined Space** - A *non-permit confined space* is 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.
Entry Supervisor - A person responsible for determining if acceptable entry conditions are present at a permit-required confined space where entry is planned. He/she authorizes entry, oversees the entry operations, and terminates entry as required. The Entry Supervisor must also know the hazards of confined spaces and verify that all tests have been conducted and all procedures and equipment are in place before endorsing a permit. The entry supervisor can be the attendant in some cases.

Entrant – Person who is entering the space to perform work or for any other reason.

Attendant - A qualified individual stationed outside one or more permit spaces who has the knowledge of the hazards of confined spaces and the behavioral effects of potential exposures. The Attendant also monitors and maintains on-going contact with the authorized entrants and performs non-entry rescues or summons rescuers if necessary.

Oxygen Deficiency - Oxygen deficiency is defined as a space with air that has an oxygen concentration of less than 19.5% by volume.

Flammable Atmosphere - An atmosphere containing gases or vapors at a concentration greater than 10% of its lower explosive limit (LEL).

Oxygen Enrichment - An oxygen concentration above 23.5% - this creates an extremely flammable environment.

Toxic Atmosphere – atmosphere that due to the nature of the material in the air, will cause injury to an individual entering the space. The most common air toxins that may be encountered at PSU are chlorine, methane, ammonia and hydrogen sulfide.

6.0 PROCEDURES

6.1 Permit-Required Confined Space Entry Requirements

a. All permit-required confined spaces shall be posted and labeled as such.

b. A permit shall be completed in writing by the entry supervisor to authorize and approve the entry. The permit specifies the location and type of work to be done, and certifies that authorized personnel have evaluated hazards, and necessary protective measures have been taken to ensure the safety of each worker. The permit is valid only for the time required to accomplish the purpose described on the permit.

c. Employees who enter a permit-required confined space must not have any diseases or disabilities that would make it more hazardous for them to work within the confined space. Also, employees must have the ability to see and hear warnings such as lights, buzzers, or sirens.
6.2 Permit-Required Confined Space Entry Procedures

Before entry into any permit-required confined space, the following general procedures must be followed:

(1) A Confined Space Entry Permit must be completed by the entry supervisor. All copies of the permit shall be maintained by the Entry Supervisor while work is being performed in the confined space. Upon completion of the work, one copy will be given to the supervisor/foreman responsible for the work in the confined space; the original will be forwarded to the OPP Safety Coordinator. These files will be maintained for a minimum of one year.

(2) Barriers shall be provided as necessary to prevent entry by unauthorized personnel and to protect entrants from external hazards.

(3) Communication shall be maintained between the designated attendant and the entrant while working in the confined space.

(4) Air monitoring shall be performed prior to entering the space, then every 15 minutes during the entry work. The results shall be documented on the permit. Results for oxygen level, LEL, and any hazardous gases shall be checked if applicable. If oxygen consuming equipment is used in the work within the space, the space must be monitored continuously rather than every 15 minutes. Also, if the initial monitoring resulted in any out of range readings, the monitoring must then be done continuously after the space has been cleared for entry.

Gas monitoring instruments must be calibrated by designated person(s) who are trained in accordance with the manufacturers' recommendations. If the instrument has not been calibrated, the supervisor/foreman must be notified in order to take corrective action. Equipment will be labeled with calibration requirements, and a calibration log maintained for each instrument. The Utility Meter Technician A located at the Waste Water Treatment Plant will be responsible for calibrating the air monitoring equipment.

Entry into a confined space is prohibited until the appropriate tests have been completed. Results will be recorded on the Confined Space Entry Permit.

(a) If the confined space has gas levels within safe limits, employees may proceed into the confined space. While employees are in the confined space, atmospheric testing shall be performed at least every 15 minutes or continuously if employees have an indication that continuous sampling is warranted.

(b) If the confined space test is positive for any of the hazardous materials and/or oxygen deficiency, the space will be evacuated and ventilated until new test
results are within the safe range. Entry into the space is not permitted until results are within the safe range. Continuous monitoring is required for the detected gas or oxygen deficiency for the duration of the work.

(c) Purge ventilation for specific confined spaces may be used in lieu of air testing if procedures are developed in conjunction with Environmental Health and Safety (EHS) for ventilation of the spaces.

Note: Under certain conditions, entry into dangerous atmosphere spaces may be required. Only those specially trained in the use of self-contained breathing apparatus will be allowed in these spaces.

(5) All lines and equipment in the confined space which carry or control dangerous substances or energy must be disconnected and tagged out or locked out of operation to prevent accidental activation. When complete isolation is not possible, specific written safety procedures that are authorized by the supervisor/foreman will be followed.

(6) An attendant shall be assigned to monitor the entry from the entrance point. At no point shall the attendant leave the entrance point, or lose communication with the entrant.

(7) Confined Space Emergency procedures must be present at the site.

6.2.1 Confined Space Emergency Procedures

A rescuer going to the aid of an employee who is in a confined space must determine the extent of assistance required by the victim. Emergency rescue into a confined space may be necessary and will only be performed by personnel who are trained in Confined Space Rescue. When rescue is beyond the capability of employees, assistance should be obtained by dialing 911 or other appropriate emergency contact number(s) to request emergency rescue assistance (notify EHS as soon as possible). The Penn State Haz Mat Team has been identified as the responding agency for confined space rescue. If telephone service is not readily available, radio the Work Control Center to request assistance in contacting 911.

7.0 TRAINING

7.1 No employee shall work in or serve as an attendant in any confined space unless they have been trained in confined space entry and fully trained in this program. EHS or a designated person will conduct the initial training on confined space entry and on the confined space equipment. The annual training will be conducted by the supervisor in conjunction with the OPP Safety Coordinator. Because of trade specialization, the supervisor is responsible for covering the site specific confined space entry training.
OPP

7.2 The OPP Office of Human Resources will maintain permanent training records. The supervisor will maintain a list of qualified employees for each of their departments. When the supervisor issues a Confined Space Entry Permit, the training records of the confined space entry crew shall be reviewed to ensure that the employees meet the requirements outlined in this program. All records are subject to review.

8.0 CONTRACTORS

8.1 Safety programs used by contractors on PSU jobsites must meet or exceed all applicable guidelines of this Safety Program.

8.2 Contractors will be required to comply with applicable Safety and Health regulations such as OSHA, NFPA, EPA.

8.3 Contractors may be required to submit copies of their Safety Program to EHS or the Safety Coordinator upon request.

9.0 RECLASSIFICATION OF A PERMIT REQUIRED SPACE (MODIFIED PERMIT)

9.1 Every confined space initially identified as a permit-required space must be considered as such until further investigation reveals the nature and extent of its specific hazards at any particular time.

9.2 If a mechanical/electrical hazard can be successfully locked out, that hazard is considered eliminated.

9.3 If the only risk to the entrants is a hazardous atmosphere that can be eliminated by purging or ventilating, attendants are not required. Purging/ventilating cleans the air within the confined space so that the atmosphere is no longer hazardous to life and health, and therefore is safe for employees to breathe.

9.4 Under certain conditions, if the permit-required space poses no actual or potential atmospheric hazards and if all physical hazards within the space are eliminated without entry into the space, the permit-required space may be reclassified as a “non-permit confined space” for as long as the hazards remain eliminated.

9.5 The supervisor must document the basis for determining that all hazards in a permit-required space are eliminated. This will include the date of the determination, the location of the space, and the signature of the supervisor making the determination.
10.0 RESPONSIBILITIES

10.1 Managers

1. Managers have the primary responsibility to maintain a safe work environment within their jurisdiction, by monitoring and exercising control over their assigned areas.
2. Ensure that health and safety responsibilities are carried out in their work groups. This includes assuring compliance with applicable Confined Space Entry Procedures.
3. Ensure implementation of the Confined Space Entry Program.
4. Provide financial support for the Confined Space Entry Program.

10.2 Environmental Health and Safety

1. Provide assistance with any revisions to the OPP Confined Space Program.
2. Provide guidance for proper selection and use of appropriate air monitoring equipment, ventilation equipment and ancillary safety devices as required.
3. Periodically audit operations, documentation, and training to ensure compliance with the program.
4. Assist each OPP work group in identifying confined spaces and entry restrictions.
5. Assist in providing initial training and training programs.

10.3 Safety Coordinator

1. Be thoroughly informed of the Confined Space Program, rules and procedures and how it specifically applies to their responsibilities and authority.
2. Perform investigations of any confined space related incidents.
3. Administer training on an annual basis in conjunction with the supervisor.
4. Work in conjunction with managers and supervisors in determining and labeling of confined spaces.
5. Make revisions to this program that are specific to OPP.

10.4 Supervisors

1. Be thoroughly informed of the Confined Space Program, rules and procedures and how it applies to their areas of responsibility and authority.
2. Periodically review work practices to ensure compliance.
3. Take prompt corrective action when unsafe conditions, practices, or equipment is reported or observed.
4. Identify areas and locations that are confined spaces and report them to the OPP Safety Coordinator.
5. Identify personnel who may enter confined spaces, and ensure that they are trained.
6. Ensure proper maintenance of equipment.
7. Ensure permits are properly completed.
8. Ensure identified confined spaces are properly posted with warning signs.
9. Maintain records of employee training and equipment maintenance.
10. Contact EHS with any questions concerning classification of a space or any entry questions.
11. Maintain copies of entry permits.
12. Review and update confined space locations annually and notify Safety Coordinator in writing if any changes are identified this includes adding or removing confined space locations.
13. Conduct periodic inspections of confined space entry procedures in order to maintain safe and healthful conditions and address any deficiencies that are identified.

10.5 Employees

1. Follow all confined space entry procedures.
2. Do not perform any function or operation that is considered hazardous, or is known to be hazardous without proper instruction and authorization.
3. Report all unsafe conditions, practices, or equipment to the supervisor or Safety Coordinator.
4. Only use equipment and materials approved or provided by the supervisor.
5. Properly wear or use prescribed protective equipment.
6. Properly store and maintain equipment used for confined space entry.
7. Immediately report equipment malfunctions to supervisor.
8. Follow all provisions of the confined space entry program and procedures.

11.0 Attachments:

Appendix A. Typical Permit-Required Confined Spaces
Appendix B. Confined Space Entry Permit
Appendix A

List of Identified General Permit Required Confined Spaces

1. All Manholes which must be entered to perform work.
2. Insides of Boilers, tanks and vaults at Steam Plants.
3. Grain or Feed Silos.
4. Crawl Spaces under buildings.
5. Some excavation trenches can be classified as a confined spaces also.
7. Digesters at WWTP
8. Any other spaces that meet the definition of a Confined Space as described in section 5.0 of this program.
9. Some air handling units that meet the definition.
10. Ducts or pipelines.
Appendix B

Confined Space Permit