

Permit Required Confined Space Program

I. Purpose

The comprehensive Permit Required Confined Space Program is developed to protect West Virginia University employees and contractors who are required to enter permit required confined spaces during the course of their work.

The purpose of the program is to identify and create awareness of the various permit required confined spaces at WVU. A complete understanding of permit required confined space hazard identification, evaluation, and control measures is required for employees who may enter a permit required confined space.

The program is intended to fulfill the requirements of the permit required confined space standard set forth by the Occupational Safety and Health Administration (OSHA) in 29 CFR 1910.146.

The program shall be used in conjunction with other West Virginia University Environmental Health and Safety Programs. Associated safe work practices include but are not limited to, personal protective equipment, the handling of hazardous materials, the isolation of energy sources, and special work permits.

II. Scope and Application

This program includes all aspects of a permit required confined space entry program as described in 29 CFR 1910.146, including: identification and classification of spaces, monitoring and evaluation, control of hazards, posting of spaces, training of employees, responsibilities and duties, emergency procedures, contractor requirements, and review of program.

III. 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.

Attendant – the 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 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 – a space that meets ***all three*** of the following criteria:

- It is large enough and so configured that an employee can bodily enter and perform assigned work; and
- 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.); and
- Is not designed for continuous 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.

Engulfment – the surrounding and effective capture of a person by a liquid or finely divided (flow able) 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 – the document that is provided by the employer to allow and control entry into a permit space and contains the information necessary for proper entry and documentation.

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 terminating entry if necessary.

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 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, and 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:

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

- Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

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.

- 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 that comply with the Hazard Communication Standard, §1910.1200, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

Host employer – any employer who arranges to have the employees of another employer (contractor) perform work for them.

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

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.

NOTE: 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, possible fatal collapse 12 - 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.

NOTE: 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 sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

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

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-required confined space – 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-sections; or
- Contains any other recognized serious safety or health hazard.

Permit-required confined space program (Confined Space Entry Program) – the 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 – the employer'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 – 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 – 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.

IV. Types of Confined Spaces:

➤ **Permit Required Confined Spaces**

A space that has one or more of the following characteristics in addition to the criteria for a confined space:

- ▶ Contains or has the potential to contain a hazardous atmosphere, or
- ▶ Contains a material that has the potential for engulfing an Entrant, or
- ▶ Has an internal configuration that may cause an employee to become trapped, or asphyxiated by inwardly converging walls or by a flow which sloped downward and tapers to a smaller cross section, or
- ▶ Contains any other recognized serious safety or health hazard

Permit required confined spaces may only be entered by personnel who are appropriately trained and adhere to the requirements noted in this program. See Appendix A for Permit Required Confined Space Entry Permit.

Examples of Permit Required Confined Spaces at West Virginia University may include but are not limited to:

- ▶ Sewer Manholes
- ▶ Storm water Manholes
- ▶ Feed Bins
- ▶ Grain Silos
- ▶ Grease Pits
- ▶ Air Handling Units as designated

➤ **Non-Permit Required Confined Spaces**

A Non-Permit Confined Space contains only secondary hazards which are not anticipated to cause death or other serious physical harm under normal operating conditions. A non-permit confined space does not contain a hazardous atmosphere or have the potential to contain a hazardous atmosphere under normal operating conditions.

Conditions inside of a non-permit required confined space can change given the activities that are undertaken (i.e. welding, cutting or the use of pesticides, and chemicals). In cases where additional hazards are introduced, permit required confined space procedures are applicable. A space classified as a permit-required confined space may be reclassified as a non-permit confined space under the following procedures:

- ▶ 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, space is reclassified as a non-permit required confined space as long as the non-atmospheric hazards remain eliminated
- ▶ If it is necessary to enter a permit space to eliminate hazards, entry shall be performed as specified in Section VIII, *Entry/Operating Procedures for A. Permit Required Confined Space*. If testing and inspection demonstrate that the hazards have been eliminated, the space may be reclassified as a non-permit required confined space for the time period the hazards remain eliminated.

NOTE: Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards as described in Section X. Hazard Elimination and Control procedures for Atmospheric and Ventilation hazards.

- ▶ A Competent Person completes documentation that contains the date, the location of the space, and their signature stating that the hazards have been eliminated. The certification shall be made available to each employee entering the space.
- ▶ If hazards arise within a space that has been reclassified as a non-permit required confined space, all employees in the space shall exit immediately. The space is re-evaluated and a determination made on classification.

➤ **Utility Tunnels**

The West Virginia University steam distribution tunnel system presents a unique situation in regards to confined space entry procedures and compliance with OSHA's Permit Required Confined Space Standard 29 CFR 1910.146. It is difficult to define the entire system as a confined space and it is equally difficult to identify specific areas or passages as confined spaces.

Given this set of unique factors, the steam tunnel systems are labeled as a **Utility Tunnel**. To enter a Utility Tunnel:

- ▶ Obtain permission from supervisor.
- ▶ Complete a Utility Tunnel Entry Permit.

A **Utility Tunnel Entry Permit** is required for entry into the steam tunnel system. (*See Appendix B for Utility Tunnel Entry Permit*).

V. Roles and Responsibilities

The Permit Required Confined Space Program roles and responsibilities are identified and delineated below. The duties and responsibilities of the entrants, attendants, supervisors, and other groups at West Virginia University play an

important role in supporting the successful implementation and maintenance of this program. The success of the entire Permit Required Confined Space Program relies on the WVU employees adhering to and following this procedure. All employees are charged with providing full support to this Program.

A. Environmental Health and Safety

Environmental Health and Safety (EHS) provides expert technical guidance to support safe entry into any confined space

- Design, develop, implement and maintain a Permit Required Confined Space Program for WVU.
- Review, revise, and audit program elements as necessary.
- Label and identify confined and permit required confined spaces.
- Provide guidance to West Virginia University Employees concerning any questions that they have concerning the Permit Required Confined Space Program.
- Provide technical guidance on the selection of personal protective equipment and entry equipment.
- Update and make changes to the program and inventory as new spaces are classified.
- Manage and update the information in the confined space inventory database. Ensure appropriate staff have access to the confined space inventory database.
- Coordinate the Confined Space training with entrants, attendants, supervisors and others in the individual departments as developed by Safety and Health Extension.
- Assure that the Morgantown Fire Department has an updated Confined Space Inventory.
- Coordinate emergency response training drills as necessary.
- Provide safety expertise and regulatory guidance.
- Provide technical expertise and assistance in air monitoring.
- Maintain entry permits and training records.

B. Safety and Health Extension – Facilities Safety and Training

- Develop curriculum and provide confined space training.
- Assist in confined space hazard evaluations for Facilities Management.
- Assist in monitoring equipment selection.
- Assist in needed confined space program updates.

C. Contractor – See Section XIV

D. Individual Departments Heads

- Implement and maintain this program and provide needed tools for adherence to this program.

- Ensure employees and contractors know the requirements of CFR 1910.146 and are aware of the requirements of the WVU Permit Required Confined Space Program.
- Inform contractors of entry requirements if their work will involve entering into a permit required confined space.
- Assure employee participation in the Permit Required Confined Space Training.
- Contact Environmental Health and Safety to identify and assess suspected confined spaces.
- Attend training as necessary.
- Assure employees on job sites follow program and training requirements.
- Provide management commitment and operational support for the successful implementation and maintenance of this program.

E. 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 terminating entry if necessary.

- Attend confined space training and follow requirements of the training and confined space program prior to assuming Entry Supervisor duties.
- Assure that all personnel involved in the work are trained in accordance with 29 CFR 1910.146 as well as other required regulations.
- Inform Authorized Entrants and Attendants of the potential hazards associated with entering each space.
- Responsible for ensuring that air monitoring equipment is in proper working order and is maintained and functioning according to the manufacture’s specifications.
- Verify all tests specified by the permit are conducted and all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
- Assure that the confined space entry permit is completed and that all other requirements are met.
- Assure that entry permit is posted at the confined space and made available to all persons involved in the confined space entry.
- Coordinate confined space entry operations with contractor if work involves WVU and contractor employees in the same confined space.
- Determine and provide all necessary safety equipment.
- Check that the entry operations are consistent with those outlined in the confined space plan.
- Complete permit required confined space entry permit form.
- Submit entry permit within five working days once entry activity is complete to:

Environmental Health and Safety
 PO Box 6551
 Morgantown, WV 26506
 or
 Fax: 304-293-7257

- Authorize the termination of the entry and cancel the permit as necessary.
- Verify that rescue services are available and means for summoning them are operable.

F. Authorized Entrant – an employee who is authorized by the employer to enter a permit required confined space.

- Attend confined space training prior to assuming Authorized Entrant duties.
- Check the confined space inventory to determine the classification, potential hazards, and entry requirements for that space prior to starting the work.
- Understand all the hazards associated with working in the identified space.
- Know of the signs and symptoms of exposure.
- Wear and utilize the proper safety equipment to include personal protective equipment (PPE) as required by the task.
- Maintain constant communication with the Attendant.
- Assure that appropriate methods of hazard control are practiced; including lock-out-tag-out, hot work permits, and ventilating a hazardous atmosphere.
- Exit the confined space whenever:
 - ▶ An order to evacuate is given by the attendant or the entry supervisor.
 - ▶ The entrant recognizes any warning signs or symptoms of exposure to a dangerous situation.
 - ▶ The entrant detects a prohibited condition.
 - ▶ An evacuation alarm is activated.

E. Attendant – the 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 space program.

- Attend confined space training prior to assuming Attendant duties.
- Determine from the confined space inventory database if the space is a permit required confined space.
- Know the hazards that may be faced during entry, including information on the mode, signs, or symptoms, and consequences of exposure.
- Know the behavioral effects of hazard exposure in authorized entrants.
- Track and communicate with authorized entrants at all times.
- Remain outside the permit space during operation until relieved by another attendant.
- Continually monitor hazards both inside and outside the space to determine if it is safe for authorized entrants to remain in the space.
- Test the atmosphere with a four gas meter and ensure that the required conditions are met, prior to entering the space.
- Keep unauthorized persons from entering the space.
- Re-test the space prior to allowing re-entry under the following circumstances:
 - ▶ The space is temporarily closed.
 - ▶ After breaks or any other times when the space has been unoccupied.

- Maintain communication with the entrants in the event problems arise.
- Order the entrant to exit immediately if a prohibited condition exists.
- Perform non-entry rescue **only**.
- Determine if entrant requires assistance to escape the permit space and, if necessary, summon rescue services (911).
- Performs no duties that might interfere with the attendant's primary duty to monitor and protect authorized entrants.

VI. Identification and Evaluation of Confined Spaces

EHS has identified confined spaces on the WVU campus. Spaces are identified as confined or permit required confined spaces with potential hazards noted. An identification number is assigned to each space. This information can be found on the EHS Web site under Confined Space Inventory database.

A. Tunnels, Utility Tunnels, Elevator Pits, Air Handlers, and Vaults

- A confined space not otherwise classified.
- Identification of these spaces is difficult to define and normal confined space procedures are impractical and do little to protect the health and safety of employees that must enter for routine maintenance and inspection.
- Identification, location and entry shall be by other equally effective means of the location and conditions required to work in these spaces (i.e., tagging system, and other methods as mentioned in this document).
- Employees shall be trained as to the identification, recognition and procedures required to work in these spaces.
- The WVU Utility Tunnel System presents a unique situation in regards to confined space entry procedures. Although not defined as a permit required confined space, authorization and procedures must be established for the safety of employees who must enter and work in these spaces.
- The WVU Utility Tunnel Entry Permit is located on the EH&S web site and must be completed for any entry into these Utility Tunnels.

B. Identification of New Spaces and Re-Evaluation

Contact EHS (304-293-3792) whenever a confined space is changed, created, modified and/or permanently changed.

NOTE: Temporary changes do not require contacting EHS unless there is a question or concern regarding method for entry or permit changes.

C. Confined Space Labeling

Permit required confined spaces are posted with the following signage.



Non-permit confined spaces are marked by a smaller posting that states, “Confined Space, ID #”. Introducing additional hazards to a non-permit confined space may change that space to a permit required space. Contact Environmental Health and Safety if you have questions.

D. PRT Space Labeling

The location of the various confined spaces located on PRT sites and under their control and supervision presents a challenge in proper identification and marking due to the various space locations and their access. The current paper or painted warning labels that EH&S utilizes, though attractive, do not provide the desired longevity due to our weather conditions as well as their exposure to the amount of foot traffic that is currently encountered.

The PRT has identified their respective spaces and have developed an identification numbering system that includes brass or copper identification tags that are superior in longevity and wear. In addition, the Staff and employees at the PRT sites are currently familiar with this numbering and identification system and the various confined spaces located on their property.

OSHA 1910.146 (C), (2) states that the employer shall notify exposed employees by posting danger signs or by any other equally effective means, of the existence, danger and location of permit spaces. The current training, confined space inventory and marking system that has been established by the PRT for its employees, provides the intent of current OSHA requirements for the notification of exposed employees.

VII. Confined Space Entry Permit

The Entry permit is the written or printed document provided by WVU to allow and control entry into a permit required confined space. The entry permit is located in Appendix A.

The completed permit shall be made available at the time of entry to all authorized entrants.

A permit tag may be used in lieu of a confined space permit for specialized troubleshooting activity in an identified specific area.

VIII. Entry/Operating Procedures

A. Permit Required Confined Spaces

- Identify need to enter permit required confined space.
- Utilize appropriately trained personnel only.
- Complete Confined Space Entry Permit (see Appendix A).
- Provide appropriate equipment.
- Establish communication systems.
- Authorized attendant shall remain outside permit space.
- Post completed Confined Space Permit or Tag at site.

Confined Space Entry Permit includes: (See references in following sections)

- Identification of the space.
- Purpose of entry.
- Date.
- Length of the permit.
- Names and signatures of the authorized entrants and the attendant.
- Name and signature of supervisor who authorized the entry.
- Results of atmospheric monitoring.
- Acceptable entry conditions.
- Hazard Elimination and Control.
- Rescue procedures.
- Communication procedures.
- PPE to be used.
- Other permits and safety measures to be observed.
 - ▶ Specialized Entry Permit Tags- Where work is specialized and will include troubleshooting, a permit tag will be completed as indicated in the Confined Space Training for the special areas.

New Hazard to Confined Space

- ▶ If a new hazard is introduced during the course of work in the space, the permit must be modified, revalidated, and a new permit completed for entry .
- ▶ The entry permit must be kept at the work site over the course of the entire operation.
- ▶ If the job runs longer than what was previously listed on the permit or beyond that particular shift a new permit is needed.

When the job is completed, the permit must be returned to the supervisor. The **Entry Supervisor keeps a copy** of the permit and **forwards a copy** within five working days to:

Environmental Health and Safety
PO Box 6551
Morgantown, WV 26506
or

Fax: 304-293-7257

B. Atmospheric Testing/Monitoring

- Air monitoring must be performed by a trained employee prior to entering any permit required confined space to evaluate potential atmospheric hazards and determine if acceptable entry conditions exist.
- The atmosphere shall be tested to determine if a hazardous condition or oxygen deficiency or enrichment exists.
- At minimum oxygen, combustible gases, carbon monoxide and hydrogen sulfide must be monitored.

The atmospheric monitoring will be performed using a four-gas meter that offers real time sampling results as well as audible and visible alarms to warn the user of dangerous situations. The low and high limits are preset to the levels set forth by OSHA Standards which are:

- Oxygen content less than 19.5% and greater than 23.5%
- Combustible gases-Greater than 10% LEL (lower explosive limit)
- Hydrogen Sulfide-Greater than 10 ppm (parts per million)
- Carbon Monoxide-Greater than 35 ppm

***Note:** if it is thought that sampling is needed for another type of toxic atmosphere contact Environmental Health and Safety prior to entry*

Air testing must be done prior to entry and in the following order.

Note: All conditions must be simultaneously met.

- 1. Oxygen Content.** Results greater than 19.5% but less than 23.5 %.

***Note:** Oxygen must be checked first before checking for combustible gases because combustible gas sensors require adequate oxygen levels for accurate operation.*

- 2. Flammable/combustible gas content.** Results must indicate less than 10% of the LEL (lower explosive limit).

- 3. Toxic gases** such as carbon monoxide and hydrogen sulfide levels. Results should indicate Hydrogen Sulfide concentrations less than 10 ppm (parts per million) and carbon monoxide concentrations less than 35 ppm.

- If the pre-entry testing shows that there is no hazardous atmosphere or oxygen deficiency/enrichment within the space, and there is no reason to believe that there is a chance for one to develop, and other potential hazardous conditions have been removed or controlled, the space may be entered, and work can begin.
- Environmental Health and Safety is available to provide technical expertise and assistance in air monitoring.

C. Monitoring in a Stratified Atmosphere

- Atmospheric measurements shall be taken from the **top, middle, bottom,** and within stratified atmospheres following the procedures set forth in OSHA 1910 146, Appendix B.
- Different gasses accumulate at different levels in a given space. For example, methane is lighter than air and will usually be found higher; at the top of a space. Likewise, hydrogen sulfide is heavier than air and will tend to collect on the bottom portion of a space.

D. Continuous Air Monitoring

Air quality inside the space must be continuously monitored due to the potential for changing atmospheric conditions. These results are to be recorded on the entry permit. To meet this requirement a four-gas meter is used to continuously monitor the atmosphere inside the space. The preceding shall be done by using one of the following methods:

- Place the monitor inside with the worker.
- Place the monitor inside, set up a remote alarm outside with the attendant.
- Set up the remote sampling tube with the worker and set up the monitor outside with the attendant.

If unacceptable levels are measured, the space must be vacated immediately. The space must be re-tested and determined that it is safe to re-enter the space.

IX. Calibrating and Maintaining Air Monitoring Equipment

- All monitoring equipment must be properly calibrated and maintained in good working condition by the designated WVU employee(s).
- All calibrations shall be done according to the manufacturer's specifications.
- At a minimum, calibrations shall be done on at least a quarterly basis or more frequently as use increases.
- Calibration logs for each instrument shall be kept up-to-date and inspected regularly to ensure their accuracy.
- Entry supervisors are responsible for ensuring that the air monitoring equipment is in proper working order.
- Prior to purchasing monitoring equipment, contact EHS for air monitoring equipment standardization specifications.

X. Hazard Elimination and Control

The Entry Supervisor will identify all potential hazards concerning the permit required confined space. Each hazard will be eliminated or controlled. Hazards may exist in any of the following categories:

A. Atmospheric Hazards

Forced fresh air ventilation is the first option for correcting an atmospheric hazard. Place the ventilator outside the space with the inlet six to ten feet from the entrance to the permit required confined space. Extend the flexible duct from the outlet of the ventilator into the area. Ideally the end of the duct should be suspended approximately two feet above the bottom of the space. Ventilate the space for at least ten minutes and test the atmosphere. Continue until the atmosphere is acceptable. Ventilation should continue during the entire permit required confined space operation. If the space is oxygen deficient and ventilation will not correct the problem, personnel will need to wear air supplied respirator protection and they must be Self Contained Breathing Apparatus trained and medically monitored. If a flammable vapor or gas is present the space may need to be inerted (*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. NOTE: This procedure produces an IDLH oxygen-deficient atmosphere.*).

B. Ventilation:

- Force fresh air into space.
- Make sure source air is fresh.
- Get air flow to bottom of space.
- Use continuously.

C. Contents and Residues

Contents should be removed from the space when possible. Entrants must assume that residues may be present and protect themselves from contact with harmful materials.

- Remove contents.
- Clean space.
- Isolate space.
- Protect personnel from contact with materials.

D. Potential Energy

Potential energy sources must be secured. Potential energy sources include:

- Electrical equipment and circuits.
- Hydraulic equipment and systems.
- Pneumatic equipment and systems.
- Mechanical equipment and systems.
- Gravity operated equipment and systems.

Note: Follow the procedures in the Lockout/Tagout policy when appropriate.

E. Environment in the Space

Entrants will need to address any safety issues. Examples include:

- Slippery surfaces.
- Extreme temperatures.
- Extreme surface temperatures.

F. Configuration of the Space

The configuration of the space can make safe operations more difficult. Use particular care when any of the following are present:

- Unusual shape or slope.
- Low overhead clearance.
- Drop offs in floors.
- Complex layout.

G. External Hazards

External hazards such as vehicle traffic, machinery, equipment, and processes may increase the hazards of the confined space entry. External hazards must be secured prior to entering the confined space.

XI. Training Requirements

All employees involved with permit-required confined space work must be trained to assure the knowledge, understanding, and skills necessary for the safe performance of their duties.

Employee training records will be maintained by Environmental Health and Safety. Training is required as follows:

- Before the employee is assigned any duties.
- Before a change in assigned duties.
- Whenever there is a modification to the procedure, duties, or a review that points to inadequacies, all affected employees will be informed of any changes.
- Whenever the employer believes that an employee displays inadequacies of knowledge or the use of procedures.

For training coordination call Environmental Health and Safety Training Specialist at 293-6737.

XII. Rescue Procedures

West Virginia University uses a non-entry rescue procedure for its employees. Any means of rescue shall be done from outside the space by the use of retrieval devices.

If rescue operations require entering a space, the professional services of the Morgantown Fire Department are to be used.

A. Confined Space Evacuation/Emergency Procedures for Onsite Personnel

In the event of an emergency the following steps shall be preformed:

- Notify the entry supervisor immediately if an evacuation is necessary due to hazardous conditions.
- Contact the Morgantown Fire Department (9-911 campus phone 911 all other).
- Provide exact location of emergency and a short description of the situation.
- Perform a non-entry rescue if possible.
- Resist entering space for any reason.
- Remain at the location.
- Remain a safe distance away.
- Order Entrants to evacuate the space immediately whenever:
 - ▶ A prohibited condition is identified.
 - ▶ If the signs and symptoms of exposure or uncontrolled hazards are identified.
 - ▶ A situation outside the space that could endanger those inside is observed.
 - ▶ If the attendant has to leave the space to perform work duties interfering with the attendant responsibilities.

B. Non-Entry Rescue

- Used only if the rescue means does not create a greater hazard.
- Entrants shall use a full body harness with a rescue line attached.
- Wristlets may be used if the harness is infeasible or creates a greater hazard.
- The retrieval line must be attached to a mechanical lifting device or a fixed point in such a manner that rescue may begin as soon as the attendant becomes aware of a problem.
- A retrieval device must be used for vertical entries greater than 5 feet deep.
- Environmental Health and Safety is responsible for ensuring that the rescue procedures are reviewed as necessary.

XIII. Confined Space Entry Equipment

The entry equipment that is needed is based on the hazards in the space at the time of entry and the hazards that are created by the work being performed. Maintenance of the entry equipment is the responsibility of the supervisor or their designee. The following is a partial list of equipment maintained by West Virginia University:

- Rescue Rated Tripods

- Full body harnesses
- Mechanical Lifting Devices
- Ventilation Equipment including blowers and flexible ductwork
- Intrinsically safe lighting equipment
- Communication devices
- Air Monitoring Equipment

XIV. Contractor Guidelines for Confined Space Entry

Contractors whose work involves entering any permit required confined space shall, at a minimum;

- Comply with the requirements of OSHA's Confined Space Standard (29 CFR 1910.146).
- Contractors may develop their own confined space plan as long as it meets all criteria set forth in the OSHA standard.
- Coordinate confined space entry and program specific efforts with the WVU project engineer/manager when both contractor and WVU employees are entering the confined space.

The following is a list of responsibilities that are required of all contractors who enter permit required confined spaces at West Virginia University.

- Provide all entry equipment.
- Follow established entry and rescue procedures.
- Verify that all workers understand their responsibilities.
- Ensure that employees are trained as per 29 CFR 1910.146.
- Maintain all permits as required by WVU and provide a copy to EHS (Environmental Health and Safety, PO Box 6551, Morgantown, WV 26506-6551 or Fax: 304.293.7257) upon completion of work.
- Do not enter any permit required confined space without prior approval.

The WVU department utilizing the services of a contractor is responsible for providing the contractor with documentation of the known and potential hazards associated with entering a given space. Contact EHS for permit required confined space identification.

XV. Program Evaluation

The Confined Space Program is reviewed as necessary by the Environmental Health and Safety. The program coordinator from Environmental Health and Safety will act as the primary facilitator for this review. Findings of this review will be used to update and make changes to the program as needed. The review is scheduled as needed or if one of the following situations arises.

- Employee or contractor concern.
- Unauthorized entries.
- A near miss or injury while entering the space.
- A change in the configuration of the space.

- The introduction of a new space.
- The identification of a condition not covered by the permit.

XVI. Record Retention

Item	Records Location	Retention Period
Confined Space Permits and Tags	EH&S	1 year
Employee Training Records	EH&S	30 years
Equipment Calibration	EH&S/FM	5 years

XVII. Appendices and Attachments

Appendix A – Confined Space Entry Permits (***Complete ONE (1) of the following***)

1. WVU Confined Space Entry Permit
2. SHE Confined Space Entry Permit
3. OSHA 1910.146 Appendix D-1 Confined Space Entry Permit

Appendix B – Tunnel Entry Permit

Appendix C – Hot Work Permit

E. Personal Protective and Safety Equipment

<input type="checkbox"/>	37. Retrieval line/hoist	<input type="checkbox"/>	46. Hard hat	<input type="checkbox"/>	50. Safety harness
<input type="checkbox"/>	38. Hearing protection	<input type="checkbox"/>	47. Eye/foot protection	<input type="checkbox"/>	51. Fire extinguisher
<input type="checkbox"/>	39. GFI In wet environment	<input type="checkbox"/>	48. Gas/Oxygen/Toxicity Detector(s)	<input type="checkbox"/>	52. Ventilation equipment
<input type="checkbox"/>	40. Explosion proof lighting	<input type="checkbox"/>	49. Grounded Electrical Equipment		
<input type="checkbox"/>	41. Respirators (specify): _____				
<input type="checkbox"/>	42. Protective clothing (specify): _____				
<input type="checkbox"/>	43. Gloves (specify): _____				
<input type="checkbox"/>	44. Communication equipment (specify): _____				
<input type="checkbox"/>	45. Others (specify): _____				

F. Atmospheric Monitoring

Note: Continuous/periodic tests shall be established before starting job. Any questions pertaining to test requirements, contact your supervisor or WVU Environmental Health & Safety.

Test must be taken in the following order: Test to be Taken	Limit	Test Results					Equip. Name	Serial No.	Cal. Date	Initials
53. % of OXYGEN (O ₂)	19.5-23.5%									
54. % of LEL flammable concentrations	<10%									
55. CARBON MONOXIDE (CO)	<25 ppm									
56. HYDROGEN SULFIDE (H ₂ S)	<10 ppm									
57. OTHER										
58. TIME										

G. Entry Procedures

<input type="checkbox"/>	59. Attendant understands duties	<input type="checkbox"/>	63. Entrant understands exit requirements
<input type="checkbox"/>	60. Attendant has communication to rescue personnel	<input type="checkbox"/>	64. Entrant has lifeline
<input type="checkbox"/>	61. Rescue plan is in place		
<input type="checkbox"/>	62. Pre-Entry Briefing: I/We have reviewed this permit and are aware of the hazards and precautions necessary for performing the designated work in the confined space authorized by this permit: <i>(Signed by all entrants & attendants)</i>		

Name (Signature)

Name (Signature)

65. Certification: I certify that all known existing and potential hazards have been evaluated, necessary protective measures have been taken, and acceptable environmental conditions exist.

NOTE: If all requirements and conditions to safely enter a permit required confined space are not obtained, entry into the space is denied.

Printed Name: _____ Signed: _____ Date: _____
(Entry Supervisor)

66. Emergency Phone Numbers **9-911 campus phones, 911 all other phones.**

Other: Rescue Team _____ Police _____ Fire _____

67. Permit Cancelled/Closed at: _____ on: _____ by: _____
(Entry Supervisor)

Comments: _____

Return Completed Permit to: Environmental Health and Safety
PO Box 6551
Morgantown, WV 26506

or Fax to: 304-293-7257

External Hazards <input checked="" type="checkbox"/>			Control Used Indicate all that are used to control any of the external hazards							
			Fans or ventilation	Exhaust collection	Stabilizers	Barricades	Other (Specify)			
Vapors from equipment (vehicles, processes, etc)										
Vibration										
Moving objects, vehicles										
Other (list)										
Personal Protective Equipment Used			Hearing Protection	Respirators	Gloves	Hard hat	eye/foot protection	Safety Harness	Protective clothing (specify)	Other (specify)
Check all that apply <input checked="" type="checkbox"/>										
Safety Equipment Used			Retrieval line/ hoist	GFI (wet environment)	explosion proof lighting	Grounded electrical equipment	Fire extinguisher	Ventilation equipment	Other (Specify)	
Check all that apply <input checked="" type="checkbox"/>										
Complete by checking and completing all applicable items before entry and signing below										
Procedure of hazards and control methods for entry into Confined Space has been reviewed										
Hazards of Confined Space Reviewed with Confined Space Entry team										
Attendant has communication to entrant and rescue personnel (Morgantown Fire Dept where applicable.)										
Attendant understands duties and equipment monitor operations										
Entrant understands exit requirements, emergency escape, duties, safe practices										
Entrant has lifeline										
Rescue Plan and Materials are in place										
All Team members are to sign below										
Name (Signature)					Name (Signature)					
Certification: I certify that all known existing and potential hazards have been evaluated and controlled and acceptable environmental conditions exist										
Entry Supervisor:			Signature:			Date:				
Emergency Phone #s										
9-911-Internal WVU Phone					911-Cell Phone or external phone					
Permit Closed or Cancelled			at		Date:		Time:		Entry Supvr.:	

Return Completed Permit to:

WVU Environmental Health and Safety, P.O. Box 6551, Morgantown WV 26506 or Fax to 304-293-7257

Appendix D-1 to §1910.146 - Confined Space Entry Permit

Confined Space Entry Permit:

/ / : a.m. p.m. / / : a.m. p.m.
 Date Issued Time Issued Date Expires Time Expires

Job Site / Space I.D.

Job Supervisor

Equipment To Be Worked On

Work To Be Performed

Stand-By Personnel

1. Atmospheric Checks: Time: : a.m. p.m.

Oxygen: % Explosive: , , % L.F.L. Toxic: PPM

2. Tester's Signature:

3. Source Isolation (No Entry): N/A Yes No **4. Ventilation Modification:** N/A Yes No
 Pumps or lines blinded, disconnected, or blocked Mechanical
 Natural Ventilation Only

5. Atmospheric Check After Isolation And Ventilation:

Oxygen: % > 19.5%
 Explosive: % L.F.L. < 10%
 Toxic: PPM < 10 PPM H₂S
 Time: : a.m. p.m.

Tester's Signature:

6. Communication Procedures:

7. Rescue Procedures:

8. Entry, Standby, and Back Up Persons: Yes No
 Successfully Completed Required Training?
 Is It Current?

9. Equipment N/A Yes No
 Direct Reading Gas Monitor - Tested
 Safety Harnesses and Lifelines for Entry and Standby Persons
 Hoisting Equipment
 Powered Communications
 SCBAs for Entry and Standby Persons
 Protective Clothing
 All Electric Equipment Listed
 Class I, Division I, Group D and Non-sparking Tools

10. Periodic Atmospheric Tress: Oxygen: , _____ % Time: : a.m. p.m.

Oxygen: , _____ % Time: : a.m. p.m. Oxygen: _____ % Time: : a.m. p.m.
 Explosive: , _____ % Time: : a.m. p.m. Explosive: , _____ % Time: : a.m. p.m.
 Explosive: , _____ % Time: : a.m. p.m. Explosive: , _____ % Time: : a.m. p.m.
 Toxic: _____ % Time: : 171 a.m. p.m. Toxic: _____ % Time: : 171 a.m. p.m.
 Toxic: _____ % Time: : 171 a.m. p.m. T o x i c : _____ % Time: : 171 a.m. El p.m.

We have reviewed the work authorized by this permit and the information contained herein. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column.

This permit is not valid unless all appropriate items are completed.

Permit Prepared By: (Supervisor)

Approved By: (Unit Supervisor)

Reviewed By: (Cs Operations Personnel)

(Printed Name)

This permit to be kept at job site. Return job site copy to Safety Office following job completion.
 Copies: White Original (Safety Office) Yellow (Unit Supervisor) Hard (Job Site)

**WEST VIRGINIA UNIVERSITY
OFFICE OF ENVIRONMENTAL HEALTH AND SAFETY
UTILITY TUNNEL ENTRY PERMIT**

The West Virginia University Utility Tunnel System presents a unique situation in regards to confined space entry procedures. It is difficult to define the entire system as a confined space and it is equally difficult to identify specific areas or passages as confined spaces. In addition, normal confined space entry procedures are both impractical and do little to protect the health and safety of employees entering the University's utility tunnel system. However, authorization and procedures must be established for the safety of those employees who must enter these types of spaces.

SCOPE:

University Employees

- This Utility Tunnel Entry Permit must be followed by any WVU employee who will enter the Utility Tunnel System for any purpose.
- WVU employees must follow the elements of the Permit Required Confined Space program if outside hazards are introduced or if existing hazards warrant additional safety precautions.

Outside Entities

- To gain entry approval, outside entities shall contact the appropriate Project Manager or the Facilities Management Plumbing Shop (304-293-8125).
- The entry of any outside entity/contractor shall adhere to or exceed the requirements of the WVU Utility Tunnel Entry Permit.
- A Permit Required Confined Space Program is required if outside hazards are introduced or if existing hazards warrant additional safety precautions.

Environmental Health and Safety
PO Box 6551
One Waterfront Place
Morgantown, WV 26506-6551

TUNNEL ENTRY PERMIT INFORMATION

The employee's immediate supervisor shall be notified prior to any entry.

The employees and their supervisor shall discuss the nature and sequence of task(s) to be performed and the types of hazards that may be encountered.

Each group (2 or more entrants) must carry, at a minimum, a four-gas personal oxygen monitor. The monitor must operate at all times while inside the tunnel.

The attendant shall have in their possession the emergency number for the Morgantown Fire Department **(9-911 WVU Internal Phone or 911 from cell phone or external phone)**.

Environmental Health & Safety **(304-293-3795)** will be contacted prior to and at the completion of tunnel entries.

A copy of the completed tunnel permit shall be forwarded to EH&S for tracking purposes.

Reason for Entry:					
Location:					
Supervisor:					
Potential Hazards					
Entrants: (Minimum of 2 entrants required)					
Attendant: (Shall monitor entry and progress of activities)					
Lighting Provided: (Sufficient Lighting shall be provided and utilized for entry and work)					
Communications Provided: (Viable communications between the attendant and the entrants shall be maintained)					
Date:		Time In:		Time Out:	



West Virginia University
Environmental Health and Safety
HOT WORK PERMIT

**BEFORE INITIATING HOT WORK, ENSURE PRECAUTIONS ARE IN PLACE!
MAKE SURE AN APPROPRIATE FIRE EXTINGUISHER IS READILY AVAILABLE!**

This Hot Work Permit is required for any operation involving open flames or producing heat and/or sparks. This includes, but is not limited to: Brazing, Cutting, Grinding, Soldering, Thawing Pipe, Torch-Applied Roofing², and Cadwelding.

<p style="text-align: center;">INSTRUCTIONS</p> <p>A. Verify precautions listed at right (or do not proceed with the work).</p> <p>B. Complete and retain this permit.</p>	<p>Required Precautions Checklist</p>			
<p>HOT WORK BEING DONE BY:</p> <p><input type="checkbox"/> EMPLOYEE</p> <p><input type="checkbox"/> CONTRACTOR _____</p>	<p><input type="checkbox"/> Available sprinklers, hose streams, and extinguishers are in service/operable.</p> <p><input type="checkbox"/> Hot work equipment in good repair.</p> <p>Requirements within 35 ft. (10 m) of work.</p>			
<p>DATE:</p>	<p><input type="checkbox"/> Flammable liquids, dust, lint, and oil deposits removed.</p> <p><input type="checkbox"/> Explosive atmosphere in area eliminated.</p> <p><input type="checkbox"/> Floors swept clean.</p>			
<p>LOCATION/BUILDING & FLOOR:</p>	<p><input type="checkbox"/> Combustible floors wet down, covered with damp sand or fire resistant sheets.</p> <p><input type="checkbox"/> Remove other combustibles where possible. Otherwise protect with fire resistant tarpaulins or welding screens.</p> <p><input type="checkbox"/> All wall and floor openings covered.</p> <p><input type="checkbox"/> Fire resistant tarpaulins suspended beneath work.</p>			
<p>TYPE OF JOB/OBJECT:</p>	<p>Work on walls or ceilings/enclosed equipment.</p> <p><input type="checkbox"/> Construction is noncombustible and without combustible covering insulation .</p> <p><input type="checkbox"/> Combustibles are moved 30 feet away from any wall (both sides).</p> <p><input type="checkbox"/> Danger does not exist by conduction of heat into another area.</p> <p><input type="checkbox"/> Enclosed equipment cleaned of all combustibles</p> <p><input type="checkbox"/> Containers purged of all flammable liquids/ vapors. (verified by gas detection instrument).</p>			
<p>PERSON PERFORMING HOT WORK:</p>	<p>Fire watch/hot work area monitoring.</p> <p><input type="checkbox"/> Firewatch will be provided during and for 30 minutes after work including any breaks.</p> <p><input type="checkbox"/> Firewatch is supplied with suitable extinguishers</p> <p><input type="checkbox"/> Firewatch is trained in use of this equipment and sounding alarms.</p> <p><input type="checkbox"/> Fire watch may be required for adjoining areas above, and below.</p> <p><input type="checkbox"/> Monitor hot work area for 30 minutes after job is complete.</p> <p><input type="checkbox"/> Confined space entry permit when required</p> <p><input type="checkbox"/> Area is provided with ventilation.</p> <p><input type="checkbox"/> Ample ventilation to remove smoke/vapor from work area.</p> <p><input type="checkbox"/> Lockout/tagout required.</p>			
<p>I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for work.</p> <p>SIGNATURE: _____</p>				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; padding: 5px;">PERMIT EXPIRES:</td> <td style="width: 30%; padding: 5px;">Date:</td> <td style="width: 55%; padding: 5px;">Time: _____ <input type="checkbox"/> AM <input type="checkbox"/> PM</td> </tr> </table>	PERMIT EXPIRES:	Date:	Time: _____ <input type="checkbox"/> AM <input type="checkbox"/> PM	
PERMIT EXPIRES:	Date:	Time: _____ <input type="checkbox"/> AM <input type="checkbox"/> PM		
<p>THIS PERMIT IS GOOD FOR ONE SHIFT ONLY</p>				
<p>Notes:</p> <ol style="list-style-type: none"> 1. When used in accordance with NFPA 51B, this permit is to be used for, but not limited to, the following: welding, cutting, grinding, open-flame soldering, and thawing pipe. 2. Torch applied roofing is exempt from NFPA 51B per 1-2.3. 				