Permit-Required Confined Space Entry Program
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Introduction

Forward

In 1970, the United States Congress established the right of workers to "safe and healthful working conditions" through the Occupational Safety and Health Act. This act created the Occupational Safety and Health Administration (OSHA). House Bill 308 incorporates by reference all federal OSHA standards found in the Code of Federal Regulations (CFR), Title 29 Parts 1910, 1926 and 1928 as Ohio Public Employment Risk Reduction Standards. All adopted Ohio Employment Risk Reduction Standards are found in Chapter 4167 of the Ohio Revised Code and the Ohio Administrative Code.

This program has been established by Bowling Green State University to comply with OSHA’s Permit-Required Confined Spaces Standard, 29 CFR 1910.146.

Objective

The objective of this program is to provide safe and healthful working conditions for BGSU employees and outside contractors working in permit-required confined spaces as defined by OSHA. Because personnel involved in permit-required confined space work may face many hazards, this program establishes safety requirements and procedures for entry and operations inside these spaces.

Applicability

This program applies to all BGSU permit spaces and contains requirements for practices and procedures to protect BGSU employees and outside contractors from the hazards of work in permit-required confined spaces.

Responsibilities

Employees who have been designated as Authorized Entrants, Entry Supervisors, or Attendants are required to participate in training offered by Environmental Health and Safety (EHS) before engaging in permit-required confined space work operations. The duties of these persons are described below:

Sr. Industrial Hygienist’s Duties

The Sr. Industrial Hygienist is in the EHS department and shall:

- Evaluate workplaces to identify confined spaces and determine if permit-required by evaluating the hazards associated with these spaces.
- Reevaluate a space when notified that there are changes in the use or configuration of a non-permit space, and if necessary, reclassify the space as a permit-required space.
- Reevaluate a space when notified that there are changes in the use or configuration of a permit-required space, and if necessary, reclassify the space as a non-permit space.
- Ensure record keeping, employee training, and testing requirements per this program are met.
- Review the Permit-Required Confined Space Entry Program and any cancelled permits at least annually to ensure employees participating in entry operations are protected from permit space hazards.
• Perform monthly calibrations of air monitoring equipment.

• Perform or delegate any other duties that arise and have not already been assigned.

Entrant’s Duties

An authorized entrant is a BGSU employee who has been trained by EHS or an approved trainer in permit-required confined space work operations.

Entrant(s) shall:

• Know the hazards that may be faced during entry, including information on the signs, symptoms, and consequences of all potential exposures.

• Properly use equipment as required in this program.

• Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space.

• Alert the attendant whenever they recognize any warning signs or symptoms of exposure to a dangerous situation or detect a prohibited condition.

• Exit from the permit space as quickly as possible whenever:
  o An order to evacuate is given by the attendant or the entry supervisor
  o The entrant recognizes any warning signs or symptoms of exposure to a dangerous situation
  o The entrant detects a prohibited condition
  o An evacuation alarm is activated

Attendant's Duties

An attendant is a BGSU employee trained by the EHS department or an approved trainer in permit-required confined space work operations. At least one attendant shall be posted outside the permit space into which entry is authorized for the duration of entry operations.

Attendant(s) shall:

• Know the hazards that may be faced during entry, including information on the signs, symptoms, and consequences of all potential exposure(s).

• Be aware of possible behavioral effects of hazardous exposures to authorized entrants.

• Continuously maintain an accurate count of authorized entrants in the permit space and ensure that the correct means are used to identify authorized entrants.

• Remain outside the permit space during entry operations until relieved by another attendant.
• Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space.

• Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space. Immediately evacuate authorized entrants from the space under any of the following conditions:
  o If the attendant detects a prohibited condition
  o If the authorized entrant exhibits any unusual behavior, which may or may not be the result of a hazard exposure
  o If the attendant detects a situation outside the space that could endanger the authorized entrants
  o If the attendant cannot effectively and safely perform all their required duties
    *Note: If entrants are instructed to evacuate, document the time and reason on the permit. Notify the Entry Supervisor.*

• Summon rescue and other emergency services as soon as it is determined that authorized entrants may need assistance to escape from permit space hazards.

• Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:
  o Warn the unauthorized persons that they must stay away from the permit space.
  o Advise the unauthorized persons they must exit immediately if they have entered the permit space.
  o Inform the authorized entrants and the Entry Supervisor if unauthorized persons have entered the permit space.

• If applicable, perform non-entry rescue as specified in this Program.

• Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

• Either the Attendant or Entry Supervisor shall call the Bowling Green Fire Division prior to entering a permit-required confined space to inform them of the location, nature of work, and approximately how long the work will take.
Entry Supervisor’s Duties

The Entry Supervisor shall:

- Know the hazards that may be faced during entry, including information on the signs, symptoms, and consequences of all potential exposure(s).

- Verify that all tests have been conducted and all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.

- Terminate the entry and cancel the permit upon completion of confined space work operations.

- Verify that the means for summoning rescue services are operable.

- Determine whenever responsibility for a permit space entry operation is transferred to other employees and at intervals dictated by the hazards and operations performed within the space that the entry operations remain consistent with terms of the entry permit and acceptable entry conditions are maintained.

- Ensure acceptable entry conditions.

- Perform Lockout/Tagout procedures for the space, if applicable.

- Flush, ventilate, or purge the permit space as necessary to eliminate or control atmospheric hazards.

- Provide pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards. This may include, but is not limited to, the following methods: cones, signs, caution tape, barricades, and arranging for traffic control.

- Review all air sampling results and request that additional samples be taken if Entry Supervisor feels it is warranted.

- When necessary, access into permit spaces shall be by the use of ladders, platforms or other safe means other than climbing onto equipment, pipes, or containers. A-frame step ladders are not acceptable. Instead, an extension ladder should be used that will extend at least 3 feet above the opening for safe entry and exit.

- Work operations involving fall hazards shall require compliance with BGSU’s Fall Protection Program.

- Assure proper personal protective equipment is used in compliance with BGSU’s Personal Protective Equipment Program.

- Issue Confined Space Entry Permits.

- Either the Entry Supervisor or Attendant shall call the Bowling Green Fire Division prior to entering a permit-required confined space to inform them of the location, nature of work, and approximately how long the work will take.
**Project Manager**

When Bowling Green State University (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the BGSU Project Manager or their designee shall:

1. Inform the contractor of the location of those permit spaces contained in the workplace.

2. Inform the contractor that permit space entry is allowed only through compliance with a permit space program meeting the requirements of 29 CFR 1910.146.

3. Apprise the contractor of the hazards identified and Bowling Green State University’s experience with the permit-required space(s).

4. Apprise the contractor of any precautions or procedures that Bowling Green State University has implemented for the protection of employees in or near permit spaces where contractor personnel will be working.

5. Coordinate entry operations with the contractor when both BGSU employees and contractor personnel will be working in or near permit spaces. This coordination will involve the development of procedures so that employees of one employer do not endanger other employees.

6. Debrief the contractor at the conclusion of the entry operations regarding whether the permit space program was followed and regarding any hazards confronted or created in permit spaces during entry operations.

**Contractor**

In addition to complying with the permit space requirements, each contractor who performs permit space entry operations shall:

- Obtain any available information regarding special permit space hazards and entry operations from BGSU for the permit spaces they intend to enter before entry.

- Coordinate entry operations with the Project Manager or designee when both host personnel and contractor personnel will be working in or near permit spaces.

- Inform the Project Manager or designee of the permit space program that the contractor will follow and of any hazards confronted or created in permit spaces.

- Once permit space entry has concluded, ensure a copy of the cancelled permit is given to BGSU’s Project Manager or designee.

**Program Enforcement**

BGSU employees and contractors are required to comply with all aspects of this program where applicable. A violation of a University employee’s responsibility must be reported to the employee’s supervisor for appropriate action. A violation of a contractor’s responsibility must be reported to the appropriate BGSU Project Manager for action.
Permit Required Confined Spaces

BGSU Spaces

The Sr. Industrial Hygienist shall evaluate workplaces to determine if confined spaces are permit-required and to identify and evaluate the hazards associated with these spaces. The following resources may be used at the discretion of the Sr. Industrial Hygienist during the evaluation:

- The confined space flow chart found in Appendix B
- Consultation from a consultant of choice when necessary
- Other data concerning potential hazards in confined spaces found in relevant literature

Spaces identified as Permit-Required Confined Spaces will require the use of a permit detailing procedures that must be taken to enter the space (See Appendix A).

Employees will be informed of permit-required confined spaces by posted signage or by any other equally effective means to identify the existence and location of the permit spaces. One or both of the following will be utilized by BGSU to satisfy this requirement:

- Posting signage reading "Danger--Permit-Required Confined Space, Do Not Enter" or other similar language
- Maintaining a master list of identified confined spaces, permit status, and any associated hazards identified and communicating this information to affected personnel

Completed permits are available for review at the following locations:

- Location of the permit-required confined space (during entry operations)
- Campus Operations
- Design and Construction
- Environmental Health and Safety

The Sr. Industrial Hygienist must be notified when there are changes in the use or configuration of a non-permit space that might increase the hazards to entrants. The Sr. Industrial Hygienist will reevaluate the space and, if necessary, reclassify it as a permit-required space.

Unclassified Spaces

Unclassified spaces shall not be entered until they have been classified. Contact the Sr. Industrial Hygienist immediately for a confined space assessment.

Access Restrictions

Effective measures shall be taken to prevent employees and the general public from unauthorized entry into permit spaces. One or more of the following methods shall accomplish this: affixing placards, signs, stickers, or other identification at the entrance of permit-required confined spaces or by a physical means (e.g. wall or floor plating secured with screws or bolts), training, etc.
Permit Required Confined Spaces Entry Procedures

A permit is issued by an Entry Supervisor whenever work operations are planned within a space that has been identified as a permit-required confined space. All permits shall be obtained and prepared in accordance with the following permit system.

General Requirements

1. Prior to entering any permit-required confined space, either the Attendant or Entry Supervisor shall call the Bowling Green Fire Division to inform them of the location, nature of work, and approximately how long the work will take. Good locations to document this would be under “Personnel Awareness” and “Other” on the permit.

2. At least 2 employees are required to perform permit-required confined space entries: one employee to enter the space (entrant) and at least one employee to remain outside the space to perform monitoring and oversight activities (the attendant). An entry supervisor is required to perform specific procedures and is not required to be present during the entire entry. The Attendant can also be the Entry Supervisor as long as all duties of both positions can safely and effectively be performed.

3. To ensure accessibility of the confined space entry and rescue equipment, only one confined space entry permit will be active during any 8-hour shift. A new permit may be issued during the same shift only after the preceding permit has been cancelled.

4. Before entry into a permit space is authorized, a confined space entry permit shall document that all required measures listed in this program are completed. The Entry Supervisor shall sign the entry permit to authorize entry.

5. The completed permit shall be made available, at the time of entry to all authorized entrants, by posting the permit at the confined space access openings. This posting will confirm to entrants that the pre-entry preparations have been completed.

6. The duration of the entry may not exceed the time documented on the permit.

7. Any work inside a permit-required confined space that involves burning, welding, or similar operations that are capable of initiating fires or explosions, requires a “hot work permit” in addition to the entry permit (See BGSU’s Hot Work Program).

8. The Entry Supervisor shall be notified if any problems are encountered during an entry operation and the problem(s) shall be noted on the permit, along with any corrective measures.

9. The Entry Supervisor shall terminate entry and cancel the entry permit when:
   - The entry operations covered by the entry permit have been completed or;
   - A condition arises in or near the permit space that is not allowed under the entry permit.

10. Each cancelled entry permit shall be kept on file in the issuing department for at least one (1) year to facilitate the review of the permit-required confined space program or forwarded to the EHS department to file. The review process will be conducted by the Sr. Industrial Hygienist.
Permit Entry Procedures

The entry permit identifies all required information and measures that must be taken by the Entry Supervisor and the Entry Personnel and includes the following:

- Date & time of entry
- Date & time cancelled
- Name of space to be entered
- Location/department to be entered
- Purpose of entry
- Permit space hazards
- Preparation for entry
- Methods for controlling space hazards
- Personnel awareness
- Additional permits needed (if applicable)
- Atmospheric testing procedures
  - Each box represents a suggested measuring point when conducting pre-entry air monitoring in vertical permit-required spaces. If it is a fairly narrow space, one in the center, middle, and bottom would be sufficient. This is where one needs to exercise some judgment. Some gases are lighter than air and some are heavier. Also, pockets of gas can form. Therefore, it is important to test at different depths and sides of spaces. Below is an example of potential measuring points for a vertical tank indicated by small rectangles:
• Equipment required for entry and work (See Appendix C for a list of equipment that shall be used in permit-required confined spaces as appropriate)
• Means of communication for entrants and attendants
• Signatures and dates of authorized entrants, attendants, and entry supervisor

*NOTE: Please see Appendix A for BGSU’s Permit-Required Confined Space Entry Permit and Appendix D for Space Specific Procedures*
Emergency Response

The Bowling Green Fire Division is the primary rescue team for BGSU. Under no circumstances is anyone other than the Bowling Green Fire Division to enter a permit-required confined space to perform rescue operations. A rescue outfit has not been determined for the BGSU Firelands campus in Huron, Ohio because management at that location has opted to not enter permit-required confined spaces or under permit operations.

If any problems occur during work operations (e.g., the entrant exhibits any unusual behavior, passes out, or contact cannot be established between the attendant(s) and entrant(s)), the attendant will immediately contact Public Safety (this is achieved by dialing 419-372-2346 on a cell phone or 2-2346 or 911 using a campus phone), whom will dispatch the Bowling Green Fire Division. The attendant shall remain in contact with Public Safety until help arrives. Please note that calling 911 from a cell phone will put you in touch with the Wood County Sheriff’s Office. They may or may not dispatch the Bowling Green Fire Division first. If they don’t, they will route the call to BGSU’s Public Safety. These extra steps will likely result in lost response time.

General Requirements

The Bowling Green Fire Division shall be provided with the following:

- Knowledge of locations and access to all permit spaces from which rescue may be necessary, so that appropriate rescue plans and practice rescue operations can be developed.

- Information regarding the hazards that rescue workers may confront when called on to perform rescue operations at BGSU.

- Training for fire department members in their assigned duties.

- Information regarding hazardous substances to which an entrant could be exposed to (e.g., Safety Data Sheets, if applicable). The SDSs or written information shall also be made available to the medical facility treating the exposed entrant. Applicable SDSs shall be provided with the permit at the site.

Rescue Personnel Requirements

The Bowling Green Fire Division personnel entering the confined space to perform emergency rescue shall be:

- Trained in confined space rescue operations

- Properly-fitted with a NIOSH-approved air-line respirator, with emergency egress bottle or SCBA, and be trained and certified in their use

Non-Entry Rescue (Retrieval System)

To facilitate rescue of an entrant(s), the BGSU attendant(s) shall attempt using non-entry retrieval systems or methods, unless it would increase the overall risk of the entrant or attendant or would not contribute to the rescue of the entrant.

For vertical space entries exceeding 5ft, each authorized entrant shall use a full body harness with a retrieval line that attaches at the center of the entrant's back near shoulder blade level. Wristlets or a chest harness may be used in lieu of a full body harness if the full body harness is infeasible or creates a greater hazard and that the use of wristlets or a chest harness is the safest and most effective alternative. It is preferable that the retrieval
line stay attached to the harness at all times but if this creates a greater hazard (i.e. when traveling long distances in different directions or where snagging or entanglement can occur such as in a tunnel system), the retrieval line can just be lowered into the space so it is available for hookup in the event of an emergency.

The retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces that are more than 5ft deep. Any time a hoist is used for lifting/lowering an entrant, such systems shall be backed-up with a lifeline that is independent of the hoist mechanism and cable.
Employee Information and Training

The Sr. Industrial Hygienist will ensure all those involved in confined space entry and/or work have been trained on the requirements of this program and hazards associated with the spaces. This person will also ensure that each affected employee is trained:

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

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

The Sr. Industrial Hygienist shall certify through record keeping that employee training and testing required by this program have been accomplished.

The rescue service (Bowling Green Fire Division) shall be trained to perform the assigned rescue duties. BGSU will help to ensure mock rescue drills are performed annually on-site in our spaces.
Program Evaluation

The Sr. Industrial Hygienist shall review the Permit-Required Confined Space Entry Program and any cancelled permits at least annually to ensure employees participating in entry operations are protected from permit space hazards. If no entries are made during a 12-month period, no review is required. Only EHS can add, delete, or modify any provisions of this program. Requests for changes in the program may be submitted in writing to the Sr. Industrial Hygienist.

This document shall be revised whenever a review of entry operations indicates that the Permit-Required Confined Space Entry Program may no longer adequately protect employees. Such revisions shall take place before subsequent entries are authorized.

The following circumstances shall warrant a review of the program prior to the annual requirement:

- Any unauthorized entry of a permit space
- Detection of a permit space hazard not covered by the permit or detection of a condition prohibition by the permit
- The occurrence of an injury or near-miss during entry
- A change in the use or configuration of a permit space
- Employee complaints about the effectiveness of the program
- Any other circumstance the Sr. Industrial Hygienist feels should warrant review of the program
## Appendix A - Permit-Required Confined Space Entry Permit

<table>
<thead>
<tr>
<th>Date &amp; Time of Entry:</th>
<th>Date &amp; Time Cancelled:</th>
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*Completed permit must be posted at point of entry.*

<table>
<thead>
<tr>
<th>Space to be entered:</th>
<th>Location/Department:</th>
<th>Purpose of Entry:</th>
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### Permit Space Hazards:
- (check all that apply)
  - Oxygen deficiency (less than 19.5%)
  - Oxygen enrichment (greater than 23.5%)
  - Electrical shock
  - Flammable gases/vapors (greater than 5% LEL/LFL)
  - Airborne combustible dust (less than 5ft visibility)
  - Material harmful to skin (specify):
  - Engulfment (could flow over and enclose entrant, i.e. water)
  - Toxic gases/vapors (greater than 50% of TLV/PEL – specify):

### Preparation for Entry:
- (check after completed)
  - Notified affected department(s) of service interruption

### Methods for Controlling Space Hazards:
- (check all that apply)
  - Lockout/Tagout
  - Blank/Blind
  - Purge/Clean
  - Ventilation
  - Barriers
  - Other (specify):

### Personnel Awareness:
- Pre-entry briefing on specific hazards and control methods (check after completed)
- Notified all affected employees
- Notified all affected contractors
- Other (specify):

### Additional Permits:
- Check if required (must be attached)
  - Hot Work
  - Other (specify):

### Atmospheric Testing:
- (Results must be recorded initially. Then, follow the Testing section starting on page 6 of the Tunnel Entry Procedure for testing frequency thereafter.)

<table>
<thead>
<tr>
<th>Sampling Equipment Type:</th>
<th>Serial Number:</th>
<th>Date Calibrated:</th>
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<tbody>
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</table>

### Time

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<tr>
<th>O₂ Level (19.5%&lt;O₂&lt;23.5%)</th>
<th>Flammability (less than 5% LEL)</th>
<th>CO (less than 6 PPM)</th>
<th>Other (specify): ________________</th>
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<table>
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<tr>
<th>Testers Initials</th>
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</table>

### Equipment Required for Entry and Work:
- (specify)

- Special Personal Protective Equipment:
  - Rescue Equipment:  
  - Other:

### Means of Communication for Entrants and Attendants:
- (Circle all that apply)
  - Verbal
  - Hand Signals
  - Radio/Nextel
  - Other

<table>
<thead>
<tr>
<th>Authorized Entrants</th>
<th>Authorized Attendants</th>
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</thead>
<tbody>
<tr>
<td>(Print Name)</td>
<td>(Print Name)</td>
</tr>
<tr>
<td>(Signature)</td>
<td>(Signature)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Authorized Entry Supervisor (MUST BE A TRAINED SUPERVISOR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I certify that all required precautions have been taken and necessary equipment is provided for safe entry and work in this confined space.</td>
</tr>
<tr>
<td>Print Name:</td>
</tr>
</tbody>
</table>
Appendix C - Equipment

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

- Testing and monitoring equipment to measure atmospheric conditions in and around confined spaces.
- Ventilating equipment needed to obtain acceptable entry conditions.
- Communications equipment necessary to enable the authorized entrant(s) and attendant(s) to maintain constant communication and to enable an attendant to summon rescue services without leaving his/her post.
- Personal protective equipment when feasible engineering and work practice controls do not adequately protect employees.
- Intrinsically safe lighting equipment needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency.
- Approved equipment, such as ladders, needed for safe egress by authorized entrants.
- Approved self-rescue, non-entry rescue, and applicable emergency equipment.
- Any other equipment necessary.

The following provisions are required for equipment use in permit-required confined spaces:

- Equipment necessary for safe permit-required confined space work operations shall be made available at no cost to employees.
- Each department entering a permit-required confined space shall provide equipment necessary for safe entry/egress and explosion-proof and non-sparking producing tools where applicable. Consult BGSU’s Sr. Industrial Hygienist for specific questions related to equipment use in confined spaces and permit-required confined spaces.
- The equipment must be maintained and calibrated according to the manufacturer’s instructions.
- The employee's department shall provide any necessary personal protective equipment.
- If welding, cutting, or brazing in a confined space, a hot work permit will need to be obtained (this is in addition to the entry permit) and the following precautions followed per BGSU’s Hot Work Program:
  - To prevent accidental contact, arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine be disconnected from the power source.
  - In order to eliminate the possibility of gas escaping through leaks or improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the gas supply to the torch...
positively shut off at some point outside the confined space area whenever the torch is not to be used for a substantial period of time, such as during a lunch hour or overnight. Where practical, the torch and hose shall also be removed from the confined space.

- When welding or cutting is being performed in any confined space, the gas cylinders and welding machines shall be left on the outside. Before operations are started, heavy portable equipment mounted on wheels shall be securely blocked to prevent accidental movement.

*Please consult BGSU’s Hot Work Program for additional information.*
Appendix D - Space Specific Entry Procedure

Procedure to Enter Utility Tunnel System

The University Tunnel System is **NOT** continuously designated as a Permit-Required Confined Space, however, permits are required for certain activities within the tunnel system as with any non-permit space when hazards are introduced by certain activities.

*Parameters of the Space:*

Entry into the University Tunnel System for the purposes of routine inspection and project design does not constitute entry into a Permit-Required Confined Space.

If entry is made into the University Tunnel System for the purpose of performing non-routine maintenance activities, the Tunnel System shall be designated a permit-required confined space and entry into the tunnel shall be in accordance with 29 CFR 1910.146 Permit Required Confined Spaces and Bowling Green State University (BGSU) Procedures. Non-routine maintenance activities include, but are not limited to:
• Repair or replacement of gas lines
• Repair or replacement of electric lines
• Asbestos abatement activities (contractors)

| • Hot Work (See BGSU’s Hot Work program) |
| • Repair or replacement of systems (e.g. water, drain, steam, etc.) |

Non- Permit Required Entries

Equipment Required for Entry

• Radio

Entry into Tunnel System

1. Identify work to be performed.
2. Evaluate hazards.
3. Identify hazard control methods as indicated below.
4. Assemble all necessary equipment and personnel to perform the entry.
5. Verify that communication methods are functional.
6. Report to Campus Operations front desk that entry into the tunnels is taking place. Provide location and approximately how long the job will take.
7. Implement remaining hazard control and verification.
8. Complete work.
9. Exit tunnels.
10. Report to Campus Operations front desk that entry into the tunnels has been terminated. If the Campus Operations front desk has not heard back from the entrant in the amount of time they specified for the work, they are to call the entrant. If they are unable to get a hold of the entrant, they are to summon rescue services immediately. This can best be accomplished by calling 419-372-2346 using a cell phone or 2-2346 or 911 from a campus phone.

NOTE: It is recommended as a best practice that the entrant have a fully functional, running, 4 gas air monitor on them before and during tunnel entry.
Permit Required Entries

**Equipment Required for Entry**

<table>
<thead>
<tr>
<th>Equipment Required for Entry</th>
<th>Equipment Required for Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Confined Space Trained Entrant(s)</td>
<td>• Confined Space Trained Attendant</td>
</tr>
<tr>
<td>• Confined Space Trained Supervisor</td>
<td>• Full Body Harness</td>
</tr>
<tr>
<td>• Mechanical Retrieval Device (e.g. Rescue Tripod) if vertical entry/egress will be attempted</td>
<td>• Lifeline (1 per entrant) if vertical entry/egress will be attempted in a space that is 5ft or deeper</td>
</tr>
<tr>
<td>• Four (4) Gas air monitor (Oxygen, Lower Explosive Limit, Carbon Monoxide, Hydrogen Sulfide)</td>
<td>• Personal Protective Equipment (PPE) appropriate for the hazards present</td>
</tr>
<tr>
<td>• Necessary Lockout/Tagout Equipment</td>
<td>• Radio</td>
</tr>
</tbody>
</table>

NOTE: The Entry Supervisor and Attendant can be the same person as long as all required duties can be performed effectively. So, at a minimum, two people must be involved in every permit-required confined space entry.

**Vertical Entry and Horizontal Travel in Tunnel System**

1. Identify work to be performed.
2. Evaluate hazards.
3. Identify hazard control methods as indicated below.
4. Assemble all necessary equipment and personnel to perform the entry.
5. If hazard control and verification of controls can be performed prior to entry, do so. Entry shall not take place if hazards cannot be controlled prior to entry and if any of these hazards can expose an employee to the risk of death, incapacitation, or impairment of ability to self-rescue.
6. Begin pre-entry air monitoring. This will establish a baseline to compare monitoring that is conducted in the space while work is being performed to ensure that a hazardous atmosphere has not been created.
7. Entry Supervisor completes permit and reviews hazards and controls with the entire entry team.
8. Post permit and attendant at every potential entry point within 100 feet of the work location.
9. Set up the mechanical retrieval device as close as possible to the actual work location.
10. Have entrants don necessary personal protective equipment.
11. Place entrants into the space. Note: At least one (1) entrant shall have a fully functional, running, 4-gas air monitor on them during the entry. This monitor shall be used until the work is completed and employees have exited the tunnel. If multiple entrants are present and they will be working in different sections of the tunnel system, each person or group shall have a fully functional, running, 4-gas air monitor on them.
12. Verify that communication methods are functional.
13. Implement remaining hazard control and verification.
14. Complete work.
15. Exit tunnels.
16. Entry Supervisor will review entry with entire entry team and note any abnormalities that arose during the entry.
17. Entry Supervisor cancels permit. Permits shall be filed with the department who entered (or hired a contractor to enter) for Environmental Health and Safety to review once a year.
18. Clean up work area and return all equipment to proper location.
Note: Air monitoring is continuous throughout the entry. The attendant shall receive regular reports of the air monitoring levels from the entrant wearing the 4-gas meter. The attendant shall document these levels on the BGSU Confined Space Permit.

**Horizontal Entry and Horizontal Travel in Tunnel System**

1. Identify work to be performed.
2. Evaluate hazards.
3. Identify hazard control methods as indicated below.
4. Assemble all necessary equipment and personnel to perform the entry.
5. If hazard control and verification of controls can be performed prior to entry, do so. Entry shall not take place if hazards can not be controlled prior to entry and if any of these hazards can expose an employee to the risk of death, incapacitation, or impairment of ability to self-rescue.
6. Begin pre-entry air monitoring. This will establish a baseline to compare monitoring that is conducted in the space while work is being performed to ensure a hazardous atmosphere has not been created.
7. Entry Supervisor completes permit and reviews hazards and controls with the entire entry team.
8. Post permit and attendant at every potential entry point within 100 feet of the work location.
9. Have entrants don necessary personal protective equipment.
10. Entrants can now enter the space. Note: At least one (1) entrant shall have a fully functional, running, 4-gas air monitor on them during the entry. This monitor shall be used until the work is completed and employees have exited the tunnel. If multiple entrants are present and they will be working in different sections of the tunnel system, each person or group shall have a fully functional, running, 4-gas air monitor.
11. Verify that communication methods are functional.
12. Implement remaining hazard control and verification.
13. Complete work.
14. Exit tunnels.
15. Entry Supervisor will review entry with entire entry team.
16. Note any abnormalities that arose during the entry.
17. Entry Supervisor cancels permit. Permits shall be filed with the department who entered (or hired a contractor to enter) for Environmental Health and Safety to review once a year.
18. Clean up work area and return all equipment to proper location.

Note: Air monitoring is continuous throughout the entry. The attendant shall receive regular reports of the air monitoring levels from the entrant wearing the 4-gas meter. The attendant shall document these levels on the BGSU Confined Space Permit.

**Control of Hazards:**

**Oxygen Deficient** – Oxygen levels less than 19.5% are to be considered oxygen deficient and Immediately Dangerous to Life or Health. No entry will commence until oxygen levels are at acceptable limits as explained in the Testing Section Below. Whenever oxygen levels deviate from acceptable limits, BGSU Environmental Health and Safety shall be consulted prior to entry.

**Combustible Gas/Dust** – Lower explosive limit levels greater than 5% shall be cause for termination of entry and further evaluation of the space. Whenever lower explosive limit levels deviate from acceptable limits, BGSU Environmental Health and Safety shall be consulted prior to entry.
**Toxic Atmosphere** – Any discrepancy in the oxygen or lower explosive limit as explained in the Testing section below shall be cause for additional investigation into the potential presence of other toxic materials. If other toxic materials are found, additional air monitoring may be needed. If additional air monitoring indicates the presence of materials at or near a toxic threshold, entry shall not commence until appropriate controls, such as ventilation, can be put in place and subsequent air monitoring indicates that the space atmosphere is safe to enter.

**Chemical Exposure** – All Material Safety Data Sheets for any material potentially impacting the space shall be consulted. If there are any questions, consult BGSU Environmental Health and Safety.

**Biological Hazard** – Personal protective equipment will be utilized based upon the type of biological hazard present. This may be an issue if sewage lines need to be worked on (e.g. if there is a leak or break in the line).

**Electrical Energy** – When applicable, all electrical and mechanical energy sources shall be locked and tagged out of service and verified to be de-energized prior to entry into the space. When Lockout/Tagout procedures are called for, all personnel involved in the space entry, including the attendant and entry supervisor, are required to place their personal lockout device on each energy source prior to the entrant’s entry into the space. Consult BGSU’s Lockout/Tagout Policy for applicability.

**Physical Hazards** – Physical hazards specific to the work task shall be identified and discussed at the pre-entry briefing. Examples of hazards include sharp objects, wet surfaces, abrasive surfaces, etc. Controls to eliminate physical hazards shall be discussed with those involved in the entry and implemented prior to entry.

**Structural Hazards** – Ensure that personnel are connected via a lifeline secured to a fixed point outside of the space during entry. The attendant is required to communicate with the entrant(s) every 15 minutes and to document communication on the BGSU Confined Space Permit.

**Hot Surfaces** – If working on or near hot surfaces, allow them to appropriately cool prior to entry into the space.

**Heat Stress** – It is imperative that personnel entering the space be familiar with the symptoms of heat stress because it can be fatal. Symptoms include the following:

- mental confusion
- loss of consciousness
- a body temperature of 106 degrees F or higher
- extreme weakness or fatigue
- nausea
- clammy and moist skin
- fainting
- delirium
- convulsions or coma
- hot dry skin which may be red, spotty, or bluish
- giddiness
- headache
- a pale or flush complexion

If any of these symptoms occur, have the individual stop work immediately and call 911 or 2-2346 from a campus phone or 419-372-2346 from a cell phone. Take the individual to a cool place to rest. Guidelines for preventing the onset of symptoms include:
drinking plenty of water, even as much as one quart/hour – do not wait until employees are thirsty
• alternating work and rest periods – workers should be given periodic rests in a cool area

• scheduling work during the cooler parts of the day if possible
• providing appropriate protective clothing

• wearing light-colored cotton clothing to better allow body heat to escape if possible
• using personal cooling devices, i.e. cooling bandanas, self-cooling suits, etc.

**Ergonomic Stressors** – Personnel entering the space shall utilize ergonomically sound practices and tools. These include avoiding bending, stooping, squatting and/or repetitive motion for excessive amounts of time.

**Inadequate Lighting** – Provide adequate lighting. In atmospheres where there is a potential for a flammable atmosphere (approaching 10% LEL), intrinsically safe lighting and electrical components must be utilized.

**Falling/Dropping** – Personnel greater than 4 feet above the next surface, including attendants, shall utilize fall protection equipment. The nature of the fall protection will vary based upon the nature of the work being performed.

**Traffic** – Barricade area around space entrance a sufficient distance to prevent unauthorized pedestrian and vehicle (including forklift) traffic.

**Permit:**

The permit will not be issued and entry will not commence until it has been determined that all potential hazards are at safe levels and all authorized personnel indicated on the permit have been trained in their duties. Lockout/tagout will be performed properly, oxygen and toxic gas levels will be safe, all needed equipment & PPE will be available and in good working order, and method of rescue will be determined prior to the permit being issued. The duration of the permit will not exceed the time needed to perform the tasks listed as the reason for the entry. The exception will be made only when it is necessary to enter the space in order to adequately control hazards. If entry into the space is necessary to control hazards, then control of the hazards shall be the first operational responsibility upon entry. Entry shall not take place though if hazards cannot be controlled prior to entry and if any of these hazards can expose an employee to the risk of death, incapacitation, or impairment of ability to self-rescue.

The completed permit shall be made available at the time of entry to all authorized entrants or their authorized representatives by showing them the completed permit prior to entry and posting it near the entry portal. This allows the entrants to confirm that pre-entry preparations have been completed and allows all members of the entry team easy access to the completed permit. A best practice is to post the completed permit at all entry portals within 100ft of the work being performed.

An entry permit is considered terminated or cancelled when:

- The entry operations covered by the entry permit have been completed
- A condition arises in or near the permit space that is not allowed under the entry permit (If this occurs, the entry permit will need to be evaluated before the next entry, but not to exceed one year.)

Permits shall be filed with the department who entered (or hired a contractor to enter) for Environmental Health and Safety to review once a year.
**Surveillance:**

Throughout the duration of the permit, an authorized attendant will remain within sight and control of all entry/egress points within 100 feet of the actual work area. Their duties include monitoring the safety of the entrant(s), performing the on-going air testing and documentation, and keeping all unauthorized individuals out of the space. They will not be distracted from their duties as an attendant due to other duties being assigned. They will not leave the entrance of the space for any reason while the entrant is inside without first being relieved by another authorized attendant specified on the permit.

In the case of the space becoming unsafe for occupation due to the levels of oxygen or toxic gases moving outside of the acceptable limits, the attendant will immediately tell the entrant(s) to evacuate the space. If the attendant observes any other condition that indicates the occupancy of the space to be unsafe (including but not limited to the entrant appearing to be drowsy or incoherent, or external factors such as gas/diesel powered vehicles in close proximity), they will order the entrant(s) to immediately evacuate the space. Any situation causing early evacuation of the space must be noted on the permit as an issue encountered for discussion and correction before the next entry of that space or within one year.

If the attendant orders the entrant(s) to leave the space but they are unable to do so unassisted, the attendant must begin non-entry rescue procedures. This entails notifying first responders and the permit entry supervisor that rescue operations are needed. Bowling Green Fire Division personnel perform the confined space entry rescue procedures. The attendant will not enter the space to attempt rescue, but can call emergency personnel who are trained in this type of rescue.

If an individual attempts unauthorized entry into the space, the attendant will immediately order them away from the space. If the individual does not stop their attempted entry into the space, the attendant will call the campus Public Safety Office via cell phone (372-2346) or a campus telephone (911 or 2-2346) to have the unauthorized individual removed from the space. Any attempted unauthorized entry, whether successful or not, must be noted on the permit as an issue encountered for discussion and correction later (before the space is entered again or within one year).

**Testing:**

Prior to the permit being issued, the space will be tested using a proper meter to determine whether the levels of oxygen and toxic gasses are at a safe level. Documentation of the testing along with dates performed shall be kept on file and made available to all members of the entry team. All authorized entrants will be allowed to observe/participate in the testing process. The permit will not be issued until the levels detected are agreed upon to be safe. Testing will continue during the entry period to ensure that the levels remain at a safe concentration.

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Acceptable Levels</th>
<th>Actions if Levels Are Unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>20.8%</td>
<td>Do Not Enter/Evacuate</td>
</tr>
<tr>
<td>Lower Explosive Limit</td>
<td>Less than 10%</td>
<td>Do Not Enter/Evacuate</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>Less than 25 PPM</td>
<td>Do Not Enter/Evacuate</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>Less than 10 PPM</td>
<td>Do Not Enter/Evacuate</td>
</tr>
<tr>
<td>Other Toxics</td>
<td>Less than 50% of TLV/PEL</td>
<td>Do Not Enter/Evacuate</td>
</tr>
</tbody>
</table>

To control a toxic atmospheric hazard, the air within the space needs to be monitored continuously beginning 15 minutes prior to the actual entry and ending upon termination of the entry. Documentation of the air monitoring results will occur at the following frequency:
**Oxygen**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.8%</td>
<td>Document air monitoring results at 15 minute increments.</td>
</tr>
<tr>
<td>Other than 20.8%</td>
<td>Evacuate space and determine cause of discrepancy. Ventilate the space as necessary.</td>
</tr>
</tbody>
</table>

NOTE: 20.8% is listed as a recommended level. Attendants should make certain that the oxygen level outside the space (normal atmosphere) is the same as the level inside the space. If the inside level deviates from the outside level, the space should not be entered or should be evacuated if entry has already commenced. The cause of the discrepancy should then be determined.

**Lower Explosive Limit**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 5%</td>
<td>Evacuate space and determine cause of discrepancy. Ventilate the space as necessary.</td>
</tr>
<tr>
<td>2% - 5%</td>
<td>Document air monitoring results at 5 minute increments.</td>
</tr>
<tr>
<td>Less than 2%</td>
<td>Document air monitoring results at 15 minute increments.</td>
</tr>
</tbody>
</table>

**Carbon Monoxide**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 6 PPM</td>
<td>Evacuate space and determine cause of discrepancy. Ventilate the space as necessary.</td>
</tr>
<tr>
<td>3 - 6 PPM</td>
<td>Document air monitoring results at 5 minute increments.</td>
</tr>
<tr>
<td>Less than 3 PPM</td>
<td>Document air monitoring results at 15 minute increments.</td>
</tr>
</tbody>
</table>

**Other Toxics**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 50% of TLV/PEL</td>
<td>Evacuate space and determine cause of discrepancy. Ventilate the space as necessary.</td>
</tr>
<tr>
<td>25% - 50% of TLV/PEL</td>
<td>Document air monitoring results at 5 minute increments.</td>
</tr>
<tr>
<td>Less than 25% of TLV/PEL</td>
<td>Document air monitoring results at 15 minute increments.</td>
</tr>
</tbody>
</table>

**Rescue:**

*Non-Entry Rescue* – This is achieved through the use of a full body harness attached to the back at shoulder blade height. The harness is attached via lifeline to the mechanical retrieval device.
The rescue team will consist of the attendant, who will begin non-entry rescue when needed, the permit entry supervisor (unless one person was used for both Attendant and Entry Supervisor), and at least one emergency rescue worker who has been trained in CPR/1st aid.

**Entry Rescue** – This is achieved through entry into the confined space by appropriately trained emergency rescue workers. The necessary entry methods and techniques will be determined by the emergency rescue workers based upon the situation present. The Bowling Green Fire Division is the rescue service responding to any emergencies within a confined space. At no time will a BGSU employee enter a confined space to perform an emergency rescue.