

# Confined Space Program

Policy 303.23

## 1 Introduction

1.1 The North Carolina Department of Labor, Division of Occupational Safety and Health (NCOSHA) Confined Space Standard requires employers to implement practices and procedures to protect employees from hazards of entry into and work within confined spaces. The specific standards to which Appalachian State University must comply can be found at North Carolina Occupational Safety and Health Standards for General Industry: Code of Federal Regulations, Title 29, Part 146, "Permit-required confined spaces" (29 CFR 1910.146), as adopted in the North Carolina Administrative Code 07F.0101, with amendments. For the remainder of this document, this regulation will be referred to as the "Confined Space Standard" or "1910.146."

1.2 It is the policy of Appalachian State University to provide a safe working environment for its employees and to conduct work in accordance with all applicable North Carolina Department of Labor, Division of Occupational Safety and Health (NCOSHA) standards; Office of State Personnel safety policies and procedures; and University of North Carolina System safety policies and procedures.

## 2 Scope

2.1 The purpose of this Program is to ensure that confined spaces under the control of Appalachian State University are identified, evaluated, and entered safely.

## 3 Definitions

### 3.1 Acceptable Entry Conditions

The conditions that are required to exist in a permit space (these will be listed on the permit). These are the conditions necessary to ensure that employees involved with a permit space entry can do so safely.

### 3.2 Attendant

The trained individual stationed outside the permit-required confined space who monitors the Authorized Entrants and who performs all Attendant duties for the duration of the entry operations. For more details, see the "Responsibilities" section of this document.

### 3.3 Authorized Entrant

The trained individual who enters the permit-required confined space and who has obtained a permit signed by the Entry Supervisor. Also see the "Responsibilities" section of this document.

### 3.4 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 without no leakage beyond the plate.

### 3.5 Bump Test (or Field Function Test)

A process of checking atmospheric testing equipment to ensure that it is detecting the gases it is designed to detect. Involves quickly exposing the equipment to contaminant gases while watching the equipment to see that it responds by showing an increase in concentration.

### 3.6 Calibration

A manufacturer-specified process of checking atmospheric testing equipment to ensure that it is measuring air concentrations properly. Involves first "zeroing" the equipment, then carefully exposing the equipment to known concentrations of gases contained in a compressed gas cylinder. Not the same as a "field function test" or "bump test."

### 3.7 Confined Space

A space that meets all three of the following conditions:

1. Is large enough for a person to bodily enter and perform assigned work.
2. Has limited or restricted means of entry or exit (i.e., exiting the space requires action other than normal walking; for example crawling, squatting, climbing, bending, or use of devices).
3. Is not designed for employees to continually occupy the space.

Some common confined spaces present at Appalachian State University include: manholes; boilers; large air handlers; elevator shafts and pits; large piles of gravel, salt, or sand; storage vaults or silos; sump pits; and underground tunnels and vaults. These are only a few examples.

### 3.8 Double Block and Bleed

The closure of a line, duct, or pipe by using lockout-tagout (LOTO) to close two in-line valves, and by using LOTO to keep open a drain or vent valve located between the two closed valves.

### 3.9 Emergency

Any occurrence or any event inside or outside the permit space that could endanger entrants. The failure of any hazard control or monitoring equipment is an emergency.

### 3.10 Engulfment

The surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be inhaled to cause death by filling or plugging the respiratory system (suffocation), or that can exert enough force on the body to cause death by strangulation, constriction, or crushing. Common engulfment hazards include soil (in pits or large stockpiles), road salt/sand mixtures (in silos or large stockpiles), and gravel (in storage vaults or silos, or large stockpiles).

### 3.11 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. "Entry" has occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

### 3.12 Entry Permit (or Simply "The Permit")

The written or printed document that is provided by the employer to allow and control entry into a permit space. The permit must contain the information specified in 29 CFR 1910.146(f). Appalachian State University's entry permit is included as Appendix A to this Program.

### 3.13 Entry Supervisor

The person with the authority and responsibility to:

1. Determine that acceptable entry conditions are present within a confined space under his/her responsibility or control;
2. Allow entry into the space (by signing a permit);
3. Oversee entry operations; and
4. End the entry (by terminating the permit).

The Entry Supervisor will usually be one of the Shop Supervisors, but may also be other persons who have been trained as confined space Entry Supervisors and who have the authority to direct the actions of Authorized Entrants and Attendants.

The Authorized Entrant or the Attendant may act simultaneously as both Entrant/Attendant and the Entry Supervisor for a given confined space entry, as long as the Entrant/Attendant also has Entry Supervisor training.

For details on Entry Supervisor responsibilities, see the "Responsibilities" section of this document. In summary, the Entry Supervisor is a trained individual with the responsibility to:

1. Determine that acceptable entry conditions are present within a confined space under his/her jurisdiction;
2. Allow entry into the space (by signing a permit);
3. Oversee entry operations; and

4. End the entry (by terminating the permit).

### 3.14 Equipment Calibrator

A person who has appropriate training and experience to perform and document manufacturer-required calibrations (usually monthly calibrations) of atmospheric testing equipment. The Equipment Calibrator will usually also be a Shop/Area Supervisor.

### 3.15 Hazardous Atmosphere

An atmosphere that may expose employees to the risk of death, incapacitation, impairment of the ability to escape unaided from a confined space, injury, or acute illness. Hazardous atmospheres may be created by conditions such as, but not limited to:

1. Flammable gases, vapors, or mists in excess of ten percent (10%) of their lower flammable limit (LFL). (Note, another term for LFL is "LEL" or "Lower Explosive Limit").
2. Airborne combustible dust at a concentration that:
  1. Meets or exceeds the dust's LFL; and/or
  2. Obscures vision at a distance of five feet or less.
3. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent.
4. Noise, ionizing radiation, or chemical substances at atmospheric concentrations at or above the Permissible Exposure Limits (PELs) in 1910 Subparts G or Z, as amended by 13 NCAC 7F.0100.
5. Chemical substances that are capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects can create a "hazardous atmosphere." (If, for example, the PEL of a substance in a confined space is based on acute, serious health effects that may not occur until hours after the exposure (e.g. hydrogen sulfide gas), then the presence of that substance at or above the Action Level or PEL means the confined space has a "hazardous atmosphere." On the other hand, if, for example, the Permissible Exposure Limit of a substance in a confined space is based solely on long-term health effects (e.g. asbestos), then the mere presence of that substance does not mean the confined space has a "hazardous atmosphere." However, that substance may still present a "recognized serious" health hazard that makes the confined space a Permit Space (e.g. non-intact asbestos). In addition, any regulations specific to that substance (such as NCOSHA Asbestos Operations & Maintenance requirements) still apply.)
6. Any other atmospheric condition that is immediately dangerous to life and health. Excessive steam in a confined space, for example, creates a level of heat stress that can be immediately dangerous to life and health.

NOTE: For air contaminants for which NCOSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

### 3.16 Hot Work

1. Operations capable of providing a source of ignition. For example, riveting, soldering, welding, cutting, burning, brazing, and heating. A hot work permit is employer's written authorization to perform hot work. Appalachian State University's Hot Work Program can be found at [Hot Work Program](#)

### 3.17 Immediately Dangerous to Life and Health (IDLH)

Any condition that:

1. Poses an immediate or delayed threat to life;
2. Would cause irreversible adverse health effects; or
3. Would interfere with an individual's ability to escape unaided from a confined space.

NOTE: Some materials (for example, hydrogen sulfide gas, hydrogen fluoride gas, and cadmium vapor) may cause mild or severe short-term effects that may stop on their own, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" after recovering from the short-term, immediate effects until hours later when s/he collapses. When they are or may be present in hazardous quantities, such materials are considered to be IDLH.

### 3.18 Inerting

The replacement of a combustible atmosphere in a permit space with enough of a noncombustible gas (such as nitrogen or argon) to render the permit space's atmosphere noncombustible. NOTE: This procedure produces IDLH entry conditions in the permit space because it also displaces oxygen with the noncombustible gas, resulting in an oxygen-deficient atmosphere.

### **3.19 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 (defined above); mis-aligning or removing sections of lines, pipe, or ducts; a double block and bleed system; lockout or tagout of all energy sources; or blocking or disconnecting all mechanical linkages.

### **3.20 Non-Permit Confined Space ("Non-Permit Space")**

A confined space that does not contain any actual or potential hazards capable of causing death or serious physical harm. Some telecommunications manholes and vaults are currently the only known non-permit confined spaces at Appalachian State University.

### **3.21 Oxygen Deficient**

A concentration of less than 19.5 percent by volume in the air, as measured by an oxygen measuring device.

### **3.22 Oxygen Enriched (or "Oxygen Maximum")**

A concentration of more than 23.5 percent by volume in the air, as measured by an oxygen measuring device.

### **3.23 Permit-Required Confined Space (or "Permit Space")**

A confined space which has any one or more of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere. Three of the most common atmospheric conditions that constitute hazards are oxygen deficiency, combustible gases and vapors, and toxic gases and vapors.
2. Contains a material that has the potential for engulfing an entrant. Some common materials that can engulf and kill are soil, gravel, sand, and road salt.
3. Has an internal configuration that could trap or asphyxiate an entrant, such as inwardly converging walls or a floor that slopes downward and tapers to a smaller cross-section.
4. Contains any other recognized serious safety and/or health hazard, such as active (non-isolated) steam lines.
5. Has been designated as a Permit-required Confined Space by Appalachian State University.

### **3.24 Permit-Required Confined Space Program (or "Permit Space Program")**

This is Appalachian State University's overall written program for controlling (and, where appropriate, for protecting employees from) permit space hazards, and for regulating employee entry into permit spaces.

### **3.25 Permit System**

Appalachian State University's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry. The University's permit system is described in this written Program.

### **3.26 Prohibited Condition**

Any condition in a Permit Space that is not allowed by the permit during the period when entry is authorized.

### **3.27 Qualified Person**

A person who has been trained, equipped, and authorized to perform atmospheric testing on the specific equipment available to him or her. The Qualified Person may also serve as the Authorized Entrant, the Attendant, or the Supervisor, if s/he has been trained and equipped to perform those duties.

### **3.28 Rescue Service**

The entity designated to rescue employees from Permit Spaces. At Appalachian State University, the Rescue Service is the Town of Boone Fire Department. ASU employees shall not enter confined spaces to perform or assist in rescue.

### **3.29 Retrieval System**

The equipment used for non-entry rescue of persons from Permit Spaces. At a minimum, this includes a chest or full-body harness, wristlets if appropriate, a retrieval line, and a lifting device or anchor.

### 3.30 Testing

The process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes the act of specifying the tests that are to be performed in the permit space. Testing enables employers both to create and put into practice the control measures necessary to protect Authorized Entrants, and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

### 3.31 Zeroing

A process of making sure that atmospheric testing equipment is exposed to absolutely no contaminants so that when its scale measures "0," it is actually "seeing" no contaminant. Zeroing must be done as part of calibrating and "bump-testing" gas detection equipment.

## 4 Policy and Procedure Statements

### 4.1 Applicability

#### 4.1.1 General

4.1.1.1 The Appalachian State University Confined Space Program (the Program) applies to all Appalachian State University employees.

4.1.1.2 This Program applies to all activities that involve entry into confined spaces covered by this Program, regardless of whether the purpose of entry is for construction, operations and maintenance, repair, testing, inspection, filling, emptying, cleaning, etc.

4.1.1.3 It is not always clear whether the Confined Space Standard, which is for "general industry" applies to University operations, or whether the less-detailed standard for the "construction industry" applies to some University operations instead. However, the North Carolina Office of State Personnel Workplace Requirements Program Manual for Safety and Health, WRP#1910.146, clearly extends all the requirements of the NCOSHA Permit-Required Confined Space Standard for General Industry to all activities occurring in confined spaces, regardless of whether they are "construction" or not. It also extends the definition of confined space to include all utilities vaults. Page 5.9.1 of WRP#1910.146 reads:

4.1.1.4 This document applies to any operation that requires state employees or contractors to enter, construct, or work inside any boiler, cupola, degreaser, furnace, pipeline, piping station, existing tank, tank car, tower, sewer, manhole, sump, vault, vat, reaction or process vessel, pit, tunnel, septic tank, ships hold, utility vault, or similar type of enclosure or confined spaces. [emphasis added].

#### 4.1.2 Utilities

4.1.2.1 NCOSHA standard 1910.269, Electric Power Generation, Transmission, and Distribution, particularly paragraph (e), requires employers to protect employees from hazards of entry into and work within enclosed spaces containing electrical utilities. The procedures described in 1910.269 are very similar to the Alternate Entry Procedure in this Program. A flow chart that shows how to decide which standard to use for electrical utility confined spaces is given in 1910.269, Appendix A-5.

4.1.2.2 However, the NC Office of State Personnel requires all utilities vaults to be managed as confined spaces. Thus, at ASU, all employees and contractors must follow, at a minimum, either the Alternate Entry Procedure in 1910.146(c)(5) or temporarily reclassified space entry procedure in 1910.146(c)(7), as appropriate. If these simpler precautions do not eliminate the hazards of the utilities confined space, the space must be treated as a permit-required confined space and 1910.146 (the Permit-Required Confined Space Standard) must be followed.

#### 4.1.3 Telecommunications

4.1.3.1 NCOSHA standard 1910.268, Telecommunications (in particular, paragraphs (a), (c), (o), and (s)), requires employers to protect employees from hazards of entry into and work within telecommunications confined spaces such as manholes and vaults. The procedures described in 1910.268 are very similar to the Alternate Entry Procedure in this Program.

4.1.3.2 The Confined Space Standard (1910.146) does not specifically apply to confined spaces used solely for Telecommunications, so in general this Program does not apply to telecommunications confined spaces such as telecommunications manholes and vaults. However, ASU employees must keep in mind that the Section 5(a)(1) of the Occupational Safety and Health Act of 1970 (usually called the "General Duty Clause"), requires the University to protect employees from recognized hazards.

4.1.3.3 Thus, if the simpler precautions in 1910.268 do not eliminate the hazards in the telecommunications confined space, the space must be treated as a permit-required confined space. When this happens, the space does become subject to this ASU Confined Space Program.

4.1.3.4 A simpler way to think of this is, always use at least the Alternate Entry Procedure for Telecommunications confined spaces; and if any additional hazards are or might be present, use the Permit Entry procedure.

#### **4.1.4 Excavations**

4.1.4.1 Although excavated pits and trenches may meet the definition of a confined space, such excavations are not covered under this Program. Instead, excavated pits and trenches are specifically covered under the NCOSHA standard for Excavations, 29 CFR Part 1926, Subpart P.

### **4.2 Responsibilities**

4.2.1 At Appalachian State University, all currently known confined spaces (both Permit Spaces and Non-Permit Spaces) are under the responsibility or control of the Physical Plant. During active construction and renovation, permit spaces in the construction area may be under the control of ASU Design & Construction and/or the contractor performing the work. If confined spaces are identified in the future that are under the of some other department, then this section will be revised as needed.

4.2.2 The following responsible parties have been identified and are described below in alphabetical order:

1. Attendant
2. Authorized Entrant
3. Director, Office of Design and Construction
4. Director, Physical Plant
5. Emergency Contact
6. Entry Supervisor
7. Equipment Calibrator
8. Rescue Service
9. Safety Director
10. Shop or Area Supervisor

4.2.3 The specific responsibilities of each party are described below, in alphabetical order.

#### **4.2.1 Attendant**

4.2.1.1 Attendants to Permit Space entries shall:

1. Follow all applicable policies, procedures, and guidelines in this Program.
2. Review the permit before entry begins and adhere to the conditions of the permit for the Permit Space which s/he is attending.
3. Ensure that all rescue equipment is in good working order prior to entering a Permit Space.
4. Stop entry and notify the Entry Supervisor if any equipment is found in unsatisfactory condition.
5. Ensure the ventilation equipment (and airline, if used) is working properly before and at all times during entry.
6. Know the hazards that may be faced during entry, including means of exposure, signs or symptoms of exposure, behavioral effects of exposure, and consequences of exposure.
7. Keep track of who is in the confined space at all times and ensure that the permit accurately identifies who is in the permit space.
8. Remain outside the Permit Space and in direct contact with Authorized Entrants during entry operations, until relieved by another qualified Attendant.
9. Keep unauthorized people out of the area.
10. Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space.
11. Communicate as needed with entrants to monitor entrant status and to order entrants to leave the space (see next item).
12. Order Authorized Entrants to leave the Permit Space whenever:
  1. A dangerous situation that could endanger the entrants existsoccurs inside or outside the space.
  2. Signs or symptoms of overexposure to hazards, including behavioral effects, in the Authorized Entrant are suspected.
  3. Any condition not allowed by the permit (i.e. a "prohibited condition") occurs.
  4. The atmospheric testing equipment alarms.
  5. The entry permit expires.
  6. The Attendant cannot safely and effectively perform any of the duties included here.
13. Summon rescue and other emergency services as soon as s/he determines that entrants may need help to escape from permit space hazards.

14. Perform non-entry rescue where feasible and safe to do so.
15. Perform no other duties that might interfere with his/her primary duty - to monitor and protect the Authorized Entrants.
16. Take the following actions when unauthorized persons approach or enter a permit space while an authorized entry is under way:
  1. Warn the unauthorized persons to stay away from the permit space.
  2. If the unauthorized persons have entered the permit space, advise them to exit immediately.
  3. Inform the Authorized Entrants and the Entry Supervisor if unauthorized persons have entered the permit space.
17. Record all required information on the permit, and ensure the permit remains in the designated on-site location during entry (this duty may be shared with the Entry Supervisor).
18. Record any problems encountered during an entry operation on the permit, and immediately notify the Entry Supervisor of the problem as soon as possible.
19. Notify the Entry Supervisor of any physical changes to existing confined spaces that could change the nature of the environment in the confined space (e.g. removal or addition of pipes, insulation, sump pumps, etc.).
20. Notify the appropriate Shop/Area Supervisor any time training has been found to be inadequate, so that a request for additional training can be made.

#### **4.2.2 Authorized Entrant**

##### **4.2.2.1 Entrants authorized to enter Permit Spaces shall:**

1. Follow all applicable policies, procedures, and guidelines in this Program.
2. Follow the conditions of the permit for the Permit Space s/he is to enter.
3. Ensure that all equipment is in good working order prior to entering a confined space.
4. Notify the Attendant and/or Entry Supervisor if any equipment is found in unsatisfactory working condition.
5. Know the hazards that may be faced during entry, including means of exposure, signs or symptoms of exposure, and consequences of exposure.
6. Properly use all required equipment.
7. Communicate as needed with the Attendant so that the Attendant can monitor the Authorized Entrants' status, and so that the Attendant can alert Authorized Entrants should the space need to be evacuated.
8. Immediately alert the Attendant, and leave the Permit Space as quickly as possible, any time he or she:
  1. Recognizes any warning sign or symptom of exposure to a dangerous situation; or
  2. Detects a prohibited condition.
9. Immediately leave the Permit Space as quickly as possible whenever s/he or she:
  1. Is ordered to do so by the Attendant or Entry Supervisor.
  2. Recognizes that a dangerous situation exists in the Permit Space.
  3. Recognizes a prohibited condition in the Permit Space.
  4. Realizes the atmospheric testing equipment is alarming any kind of evacuation alarm has been activated.
10. Have the Attendant record problems encountered during entry operation. Said problems should be noted on the permit and communicated to the Entry Supervisor.
11. Notify the Attendant and/or Entry Supervisor of any physical changes to existing confined spaces that could change the nature of the environment in the confined space (e.g. removal or addition of pipes, insulation, sump pumps, etc.).
12. Notify the appropriate Shop/Area Supervisor any time training has been found to be inadequate, so that a request for additional training can be made.

#### **4.2.3 Director, Office of Design and Construction**

4.2.3.1 The Director of the Design & Construction Office, or his/her designee(s), shall ensure that the requirements of 1910.146(c)(8) are coordinated with any contractors hired by the Design & Construction Office who will work in university-owned Permit Spaces. 1910.146(c)(8) requires the University to inform the contractors that Permit Spaces exist in the workplace, of the hazards in that Permit Space, of any precautions to protect University employees working in or near the Permit Space, and request to be informed of the Permit Space Program the contractor will follow.

#### **4.2.4 Director, Physical Plant**

##### **4.2.4.1 The Physical Plant Director or his/her designee(s) shall:**

1. Ensure that adequate funds are available and budgeted to implement the requirements of this Program, including training and equipment purchase and maintenance.
2. Identify the employees affected by this Program.
3. Ensure Physical Plant compliance with this Program.
4. Ensure that all confined spaces are identified and evaluated to determine if they are permit-required.
5. Ensure that non-permit spaces are re-evaluated, and if necessary, re-classified as permit spaces, whenever there is a change in their use or configuration which might increase the hazards to entrants.
6. Ensure all permit-required confined spaces are labeled as such with required warning signs.

7. Designate Entry Supervisors, Qualified Persons, and Equipment Calibrator.
8. Ensure that affected Physical Plant Area/Department Supervisors maintain an up-to-date copy of the Program, including all appendices, in an area accessible by all covered employees.
9. Maintain entry permits required under this Program for at least one year.
10. Review this Program (including all associated appendices) and all entry permits at least once per year, and whenever there is reason to believe that measures taken may not protect University employees (for more detail, see "Review of Permit Space Program").
11. Ensure all changes to any part of this Program (including appendices) are coordinated with the Safety Director (or designee).
12. Arrange for and fund training as required under this Program.
13. Ensure that the map of manholes/tunnels is kept up to date and clearly indicates that all manholes are Permit Spaces.
14. Maintain an up-to-date list of Authorized Entrants, Attendants, and Entry Supervisors and provide the current list to the Safety Director (or designee).
15. Provide a copy of all training records associated with this Program to the Occupational Safety and Health Office.
16. Select the Rescue Service and obtain a written agreement for confined-space rescue services.
17. Review the agreement with the Rescue Service as needed to ensure it is up-to-date and that the Rescue Service can, at a minimum (A recommended, but not required, guide for evaluating the Rescue Service is provided in Appendix F):
  1. Respond in a timely manner, considering the hazards in confined spaces at Appalachian State University.
  2. Function appropriately when rescuing entrants from the types of Permit Spaces at Appalachian State University.
  3. Is equipped for and proficient in rescue-related tasks and equipment.
18. Invite the Rescue Service to participate in an annual exercise simulating a confined-space rescue.
19. Ensure that the Rescue Service has been informed of the hazards it may confront when called on to perform rescues at Appalachian State University, and that the Rescue Service has access to all Permit Spaces from which rescue might be necessary so that it can develop plans and practice rescue operations.
20. Ensure that all air monitoring data is sent to the Occupational Safety and Health Office. A copy of the cancelled Entry Permit may be used for this purpose, or separate printout of monitoring results with the Entrant name(s), entry date and location, and concentrations may be used. Entry Permits where the air concentrations in the Permit Space exceeded background are sent to the Occupational Safety and Health Office to be retained as employee exposure records.

#### **4.2.5 Emergency Contact**

4.2.5.1 The Emergency Contact is the person whom the Attendant would telephone or radio to request emergency or rescue assistance. During normal working hours, the Emergency Contact will be the person assigned to answer phones in the main office. After normal working hours, the Emergency Contact will be a designated person in the Steam Plant.

4.2.5.2 The Emergency Contact shall:

1. Continuously monitor the designated radio frequency until the confined space entry is completed.
2. Stay within a few seconds of a telephone so that s/he can call 8000 and 9-911 immediately in case of an emergency.

#### **4.2.6 Entry Supervisor**

4.2.6.1 Most often, Entry Supervisors at Appalachian State University will be the Shop/Area Supervisor to whom responsible for the Authorized Entrant and Attendant report. The Entry Supervisor shall follow all applicable policies, procedures, and guidelines in this Program. Entry Supervisor responsibilities may be delegated only to someone who has satisfactorily completed Entry Supervisor training.

4.2.6.2 Before signing a permit and allowing entry to begin, the Entry Supervisor shall:

1. Know the hazards that may be faced during entry of that confined space, including means of exposure, signs or symptoms of exposure, and consequences of exposure.
2. Perform atmospheric testing (or verify that atmospheric testing has been completed by another Qualified Person) and confirm that the test results found conditions to be safe for entry.
3. Determine that acceptable entry conditions are present checking that all blanks on the permit have been filled in properly, that all tests required by the permit have been done, and that all procedures and equipment listed in the permit are in place.
4. Verify that Rescue Services are available and that the means of summoning rescue (e.g., cellphone to call Boone Fire Department, or radio to contact Main Office example calling 9-911, or radioing the Emergency Contact) is operating properly.
5. Sign and date the permit, and ensure it is posted at the job site.

4.2.6.3 During entry (which includes occupation of the confined space), the Entry Supervisor shall:

1. Assist the Attendant, if necessary, in removing unauthorized persons who enter or attempt to enter the Permit Space.
2. Whenever responsibility for a Permit Space operation is transferred, determine that entry operations remain consistent with



terms of the entry permit and that acceptable entry conditions are maintained.

3. At intervals appropriate to the hazards and the operations being performed within the Permit Space, determine that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.
4. Terminate the entry (that is, require all personnel in the Permit Space to exit immediately) if any prohibited conditions not allowed in the permit occur.

4.2.6.4 After entry operations are completed or entry is terminated, the Entry Supervisor shall:

1. Cancel the Entry Permit.
2. Provide a copy of the canceled Entry Permit to the Physical Plant Director (or designee).
3. Notify the appropriate Shop/Area Supervisor(s) any time training has been found to be inadequate, so that a request for additional training can be made.
4. Immediately notify the Physical Plant Director (or designee) and the Safety Director (or designee) any time a hazardous atmosphere was encountered, even if mechanical ventilation alone successfully removed the hazardous atmosphere.
5. Immediately notify the Physical Plant Director (or designee) and the Safety Director (or designee) of any problems encountered during a Permit Space entry operation that did or could have endangered the safety of Authorized Entrants so that appropriate revisions to this Program can be made. This includes any "near miss" incidents; i.e., incidents in which no one is actually injured but where an injury would have occurred had the circumstances been slightly different. An example of a "near miss" is an object capable of injuring the Authorized Entrant falls onto the Entrant while s/he occupies the Permit Space, even though the Entrant was not actually injured.

#### **4.2.7 Equipment Calibrator**

4.2.7.1 The Equipment Calibrator will usually be the Shop/Area Supervisor or a properly trained designee. The Equipment Calibrator shall ensure that all monitoring equipment is calibrated in accordance with manufacturer specifications. Calibrations shall be documented in writing and placed where readily visible when using the equipment (for example, in the equipment's storage box, on a tag or label attached to the equipment, etc).

#### **4.2.8 Rescue Service**

4.2.8.1 The Town of Boone Fire Department provides rescue and emergency services for university and university-contracted employees involved in confined space entry. The University has a written agreement with the Town of Boone Fire Department in the event that emergency rescue services are needed. A copy of this agreement is provided in Appendix D. The Boone Fire Department is responsible for documenting its training and for maintaining their training records. ASU employees shall not enter confined spaces to perform or assist in rescue.

#### **4.2.9 Safety & Workers Compensation Office**

4.2.9.1 The ASU Occupational Safety and Health Office shall maintain records as described in "Records and Documentation" in Section V, General Requirements. The Occupational Safety and Health Office shall assist as needed in developing policies, procedures, and training.

#### **4.2.10 Safety Director**

4.2.10.1 The Safety Director or his/her designee shall:

1. Ensure the University's Confined Space Program is compliant with applicable state and federal standards.
2. Notify the Physical Plant Director (or designee) of any regulatory changes that impact the University's Confined Space Program.
3. If confined spaces not under Physical Plant jurisdiction responsibility or control are identified, ensure that the responsible Department is notified of their responsibilities.
4. Review any Permit Space entry permits that were canceled because of presence of a hazardous atmosphere.
5. Upon request, serve as a resource for planning confined space entries, updating this Program, or other confined space related efforts.

#### **4.2.11 Shop or Area Supervisor**

4.2.11.1 Each Shop/Area Supervisor or his/her designee shall:

1. Ensure that all confined spaces under his/her responsibility or control are identified.
2. Ensure that all Permit Spaces are labeled in accordance with this Program. Supervisors are encouraged to contact the Occupational Safety and Health Office to assist in the evaluation of confined spaces.
3. Maintain an up-to-date copy of this Program, including all appendices, in an area immediately accessible to all employees covered by this Program.

4. Ensure that any employees in his/her department who performs any tasks in the Program has received the required training.
5. Ensure that any employee who demonstrates a lack of understanding receives refresher training.
6. Ensure that equipment used to enter confined spaces is maintained in good operating condition and that all manufacturer recommendations are followed.
7. Ensure that any monitoring devices are serviced and calibrated in accordance with manufacturer recommendations by a designated Equipment Calibrator.
8. Ensure that their employees are provided with all necessary personal protective equipment.
9. Coordinate the requirements of 1910.146(c)(8) with any contractors hired by the Physical Plant who will work in Permit Spaces under his/her responsibility or control (e.g. inform the contractors of hazards in that Permit Space, precautions to protect University employees working in or near the Permit Space, and request to be informed of the Permit Space Program the contractor will follow).

### **4.3 General Requirements**

The NCOSHA citation for each general requirement described below is shown in parentheses. Unless otherwise stated, all citations are from Title 29 CFR.

#### **4.3.1 Identification of Confined Spaces (1910.146©)**

4.3.1.1 At Appalachian State University, all currently known confined spaces are under the control of the Physical Plant. These spaces have already been identified. With the exception of manholes, all confined spaces that are Permit Spaces shall be so labeled.

4.3.1.2 In the event that confined spaces are identified in the future by other Departments, the affected Department is responsible for ensuring these spaces are included in, and managed in accordance with, this Program. The affected Department shall provide a copy of the list and/or map identifying such confined spaces to the Physical Plant Director (or designee) and the Safety Director (or designee). Departments are encouraged to contact the Occupational Safety and Health Department for assistance in identifying and evaluating confined spaces.

#### **4.3.2 Labeling of Confined Spaces (1910.146(c)(2))**

4.3.2.1 With the exception of manholes, all Permit Spaces shall be clearly marked with the NCOSHA-required sign, "DANGER -- CONFINED SPACE -- DO NOT ENTER WITHOUT PERMIT."

4.3.2.2 Because labeling of manholes is impractical, the Permit status of manholes is communicated through a map and through training. The map is maintained in the Mechanical Shop of the Physical Plant. Copies may be obtained from the GIS/mapping department at New River Light and Power.

#### **4.3.3 Training (29 CFR 1910.146(g))**

4.3.3.1 All Authorized Entrants, Attendants, and Entry Supervisors shall receive training that provides them with the understanding, knowledge, and skills necessary for the safe performance of their duties. Training shall be provided at the following times:

1. Before the employee is first assigned confined space duties.
2. Before the employee's duties under the confined space program changes (for example, if the employee is to enter a new kind of confined space, if a Authorized Entrant is to be promoted to the duties of Entry Supervisor, etc.).
3. Any time there is a change in operations that presents a hazard on which the employee has not previously been trained.
4. Any time the employee's Entry Supervisor, or other representative of the University, has reason to believe that the employee has not followed the entry procedures specified in this Program.
5. Any time the employee's Entry Supervisor, or other representative of the University, has reason to believe that there are inadequacies in the employee's knowledge or use of procedures in this Program.
6. Training consisting of a mock permit-required confined space entry should occur in any six-month period during which no confined space entries have been performed.

4.3.3.2 Training shall be documented in writing. The training record shall include the employee's name, the signatures or initials of the trainers, and the dates of training.

#### **4.3.4 Equipment (1910.146(d)(4))**

4.3.4.1 The University shall provide and maintain, at no cost to the employee, the following equipment for Permit Space entry:

1. Testing and monitoring equipment (e.g. confined space gas monitors, heat stress monitors, etc.).

2. Ventilating equipment.
3. Communications equipment (e.g. two-way radios or cell phones) to enable the Authorized Entrants and Attendants to communicate, and to allow the Attendant to summon help if needed.
4. Personal protective equipment (e.g. safety glasses where eye hazards exist, such as blowing debris; respirators where respiratory hazards exist, such as disturbing non-intact asbestos; welding goggles for welding; etc.), when engineering and work practice controls will not adequately protect employees.
5. Lighting equipment to enable employees to see well enough to work safely and to exit the space quickly in an emergency.
6. Ground fault circuit interrupters (GFI) to protect Authorized Entrants and Attendants from shock hazards when electrical devices must be used in potentially damp conditions.
7. Barriers and shields to protect Authorized Entrants and Attendants from external hazards such as pedestrians, vehicles, and falling objects.
8. Ladders or other equipment needed to ensure safe ingress and egress by Authorized Entrants.
9. Retrieval equipment as described in detail in the Definitions section of this Program.
10. Rescue equipment needed to provide rescue (except equipment provided by Boone Fire Department) and to prevent unauthorized persons from attempting a rescue.
11. Any other equipment necessary for safe entry into, exit from, and rescue from Permit Spaces.

#### **4.3.5 Contractor Personnel (1910.146(c)(8))**

4.3.5.1 At times, the Physical Plant or the Design and Construction Office may contract with non-university personnel to perform work which would require entry into a Permit Space. At no time shall any University entity other than the Physical Plant or the Design and Construction Office hire contractors for work that requires entering Permit Spaces.

4.3.5.2 The Department who hires the contractor shall perform those duties that NIOSH requires to be performed by the "host" employer in 1910.146(c)(8), that is, the Department they shall:

1. Inform the contractor that the workplace includes a Permit Space and that Permit Space entry is allowed only if the contractor complies with NIOSH 1910.146.
2. Explain to the contractor the characteristics of the space that make it a Permit Space, including hazards identified and the University's experience with that space.
3. Inform the contractor of any precautions or procedures that the University has implemented to protect employees in or near Permit Space where the contractor will be working.
4. Coordinate entry operations with the contractor if both University and contractor personnel will be working in or near the Permit Space.
5. Debrief the contractor after entry operations are over regarding the Permit Space Program followed, and any hazards confronted or created in the Permit Space during entry operations.

4.3.5.3 In addition to complying with the Permit Space requirements that apply to all employers, contractors shall fulfill the requirements of 1910.146(c)(9), that is, they shall:

1. Obtain any available information regarding hazards of and entry operations for the Permit Space contractor personnel will enter from the University Department that hired the contractor.
2. Coordinate entry operations with the University when both University and contractor personnel will be working in or near Permit Spaces.
3. Inform the contracting University Department of the Permit Space Program the contractor will follow (this can be done during entry operations).
4. Inform the contracting University Department of any hazards confronted or created during entry operations (this can be done through a debriefing or during the entry operation). The affected University Department should in turn report any such instances to the Physical Plant Director (or designee) and the Safety Director (or designee).

#### **4.3.6 Review of Permit Space Program (1910.146(d)(14) and (e)(6))**

4.3.6.1 The Physical Plant Director (or designee) will review this written Program at least once every 12 months. The Safety Director (or designee) will review this written Program whenever regulations pertaining to confined space entry are changed, and any time requested to do so by the Physical Plant Director (or designee).

4.3.6.2 In addition, the Physical Plant Director (or designee) and the Safety Director (or designee) will review this written Program together whenever there is reason to believe that the existing Program may not adequately protect University employees. Examples of circumstances requiring Program review are: any unauthorized entry of a permit space; discovering a permit space hazard not covered by the permit; detecting a condition prohibited by the permit; the occurrence of an injury or near-miss during entry; a change in the use or configuration of a permit space; and employee complaints about the effectiveness of the program.

4.3.6.3 The basis of the Physical Plant Director's review is the past 12 months' collection of canceled entry permits. The Physical Plant Director is encouraged to seek input from Entry Supervisors, Authorized Entrants, Attendants, and the Safety Director (or

designee) during his/her annual review of this Program.

4.3.6.4 After each review, this Physical Plant Director or his/her designee will coordinate any changes to the written Program with the Safety Director (or designee).

#### 4.3.7 Rescue Service (1910.146(k))

4.3.7.1 The University has a written agreement with the Town of Boone Fire Department in the event that emergency rescue services are needed. A copy of this agreement is provided in Appendix D. ASU employees shall not enter confined spaces to perform or assist with rescue.

4.3.7.2 Before entering a Permit Space, the Entry Supervisor shall ensure that rescue services are available and that the means of summoning rescue is operating properly. The Boone Fire Department has requested to be notified directly before any Permit Entries where any of the following conditions hold true:

1. Conditions exist that might place high demand on local emergency services (such as home football games, drought, floods, severe weather, etc.).
2. Hazardous gas has been detected in the confined space.
3. The space has been purged with an inert gas prior to entry.
4. Water in the space presents a drowning hazard.
5. There is a potential for wall or ceiling cave-ins.
6. Other particularly hazardous situations exist.

4.3.7.3 If any condition listed above exists, the Entry Supervisor or Emergency Contact shall notify Boone Fire Department of the location, date, and anticipated start and termination times of the permit by calling (828) 262-4520 (if no answer, call (828) 262-4500). When the entry operation is terminated, the Entry Supervisor shall again notify the Fire Department by telephone.

4.3.7.4 **If emergency assistance is needed during an entry, ASU Police have advised that the Attendant (or Entry Supervisor if present) Emergency Contact shall call the Boone dispatchers directly at 9-911** (9-911 if using a campus telephone). The caller should make it clear that the emergency involves confined space entry and request that Boone Fire Department be dispatched immediately.

4.3.7.5 Whenever feasible, the University should invite all Boone Fire Department persons and/or divisions that would be involved in rescue to participate in an annual exercise that simulates a confined space rescue.

4.3.7.6 The Physical Plant Director has responsibility for selecting the Rescue Service. See Director, Physical Plant under Section IV, Responsibilities, for details.

#### 4.3.8 Records and Documentation (1910.146(c)(4), (d), (e)(6), (g)(4))

4.3.8.1 NCOSHA requires a variety of documents to be posted and/or maintained as part of any Confined Space Program. Below is a table that describes each document that must be maintained, its location, and how long it must be kept on file.

Type of Document	Minimum Location(s)	Minimum Retention Time
"Danger" Sign	At entry to Permit Space (except manholes)	Permanent
Cancelled Entry Permits (All)	Physical Plant - Director	1 year or longer (see next)
Air Monitoring Data for entries (including Entrant name, date, location, & concentrations). May use separate data or cancelled Entry Permit. Cancelled Entry Permits (if Entry Cancelled due to Hazardous Atmosphere)	Safety & Worker's Comp. Office	Duration of employment plus 30 years (considered an exposure record if employees entered the confined space) <sup>2</sup>
Calibration Records	Physical Plant - With equipment	Until next calibration (Permanent retention suggested)
Training Records	Safety & Workers' Comp. Office	Duration of employment
Current Written Confined Space Program	Physical Plant - Director Physical Plant - Affected Shops Safety Director (or designee)	Until Program is rendered out-of-date.
Outdated Written Confined Space Program	Physical Plant - Director	Permanently (may be placed in University Archives if desired).

### **4.3.9 Temporary Enclosures (OSHA Technical Information Bulletin T.B. 02-05-30)**

4.3.9.1 Awareness of the hazards of temporary enclosures has increased due to a fatality that occurred in such a space. Enclosed spaces are not confined spaces because they do not have limited means of egress, but nevertheless they can have many of the same hazards. This is especially true when gas-powered or vapor-generating equipment or materials (e.g. welding, painting, adhesives) are used in the space. An example of an enclosed space is a plastic "tent" in which persons performing asbestos removal would work. When work must be performed in such an enclosed space, employees should first become familiar with the hazards of such spaces by reading and understanding OSHA Technical Information Bulletin number T.B. 02-05-30.

### **4.3.10 Isolation, Including Locking and Tagging (1910.146(d)(3)(iii))**

4.3.10.1 No work is to be performed until appropriate locking, tagging, and/or isolation is accomplished to prevent the inadvertent actuation of operations or processes associated with the space which might expose employees to hazardous conditions. See Appendix C for location of Appalachian State University's Lockout-Tagout Program.

4.3.10.2 Before lockout or tagout devices are removed and energy is restored, procedures must be followed and actions taken by the authorized employee(s) to ensure the following:

1. The work area must be inspected to ensure that non-essential items have been removed and that machine or equipment components are operationally intact.
2. The work area must be checked to ensure that all employees have been safely positioned or removed.
3. Before machines are energized, affected employees must be notified that the lockout or tagout devices have been removed.
4. Each lockout or tagout device must be removed from the energy isolating device by the employee who applied the device. Exception: when the authorized employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of the employer, provided that it is verified by the employer that the authorized person is not at the facility; all reasonable efforts have been made to contact the employee to inform them that the lock is being removed; and that the authorized employee has this knowledge before they resume work.

### **4.3.11 Hot Work Permits**

4.3.11.1 The written Hot Work Permit shall be attached to the Entry Permit or the Alternate Entry Form. The Hot Work Permit becomes part of the written Entry Permit record that is reviewed annually. Appalachian State University's Hot Work Program can be found at <https://appsafety.appstate.edu/hot-work-program-and-operational-guidelines>.

## **4.4 Entry Procedures**

### **4.4.1 Permit Spaces**

4.4.1.1 As of the date of this document, Appalachian State University is known to have the following kinds of Permit Spaces:

1. Steam manholes.
2. Steam tunnels.
3. Sewer manholes.
4. Water main manholes.
5. Steam plant pressure vessels (boiler, de-aerator tank, and condensate return tank).
6. Occasionally, large stockpiles of road salt, sand, or gravel.
7. Telecommunications manholes and vaults that have hazards which make them meet the definition of Permit Space (see "Definitions" in Part III of this Program). One example of such a hazard would be a steam line that passes through the telecommunications manhole.
8. Elevator shafts and pits (can usually be reclassified as non-permit space on a case-by-case basis, in accordance with 1910.146(c)(7), when proper lockout-tagout followed).
9. Air handling units, mechanical rooms, and VAC. units that meet the definition of confined space (may be reclassified as non-permit space on a case-by-case basis, in accordance with 1910.146(c)(7), when proper lockout-tagout followed).

### **4.4.2 Procedures for Entering a Permit Space (1910.146(c)(4), (d),(e), (f), (h), (l), (j), and (k))**

4.4.2.1 When entry into a Permit Space is to occur, the Authorized Entrant and Entry Supervisor shall complete an Entry Permit (see Appendix A). The Permit must include all of the following:

1. Identity of the space to be entered.
2. Purpose of the entry.
3. Date and authorized duration of entry.

4. Authorized Entrant(s) who will enter the space, by name.
5. Attendant(s) who will attend the space during entry, by name.
6. Entry Supervisor for the space, by name.
7. Hazards of the Permit Space.
8. Measures to be used to isolate the space.
9. Measures to eliminate or control other potential hazards.
10. The acceptable entry conditions.
11. Results of initial and periodic tests for oxygen, combustible gases, and toxic gases, accompanied by name(s) or initials of tester and date/time tests performed.
12. Rescue services to be summoned and how to reach them.
13. Testing and monitoring equipment and procedures.
14. Communication procedures between Authorized Entrants and Attendants.
15. Personal protective equipment to be used.
16. Other equipment such as ladders or rescue equipment to be provided on-site, if necessary.
17. Any additional permits, such as for hot work, that have been issued.

4.4.2.2 If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MODS) or other similar written information is required to be kept at the workaday, that MODS or written information shall be made available to the medical facility treating the exposed entrant (1910.146(k)(4)).

4.4.2.3 After Permit Space entry operations are completed, the Entry Supervisor shall cancel the permit and provide it to the Physical Plant Director (or designee), where it will be retained at least 12 months for review.

4.4.2.4 All air monitoring data must sent to the Occupational Safety and Health Office to be retained as employee exposure records. A copy of the cancelled Entry Permit with monitoring data attached may be used for this purpose, or separate printout of monitoring results with the Entrant name(s), entry date and location, and concentrations may be used.

4.4.2.5 Appalachian State University shall provide each Authorized Entrant or that employee's authorized representative with the opportunity to observe any monitoring or testing of Permit Spaces just prior to, during, or after entry.

4.4.2.6 An example of the ASU Entry Permit is included as Appendix A to this Program.

#### **4.4.3 Procedures for Alternate Entry (1910.146(c)(5)) into Non-Permit Confined Spaces or certain Permit Spaces**

4.4.3.1 Alternate Entry differs from Permit Space entry in three significant ways:

1. An Attendant is not required.
2. Although a written certification by the Entrant is required, the written Entry Permit with Entry Supervisor's review and signature is not required. See Appendix B.
3. Rescue services need not be verified as available prior to entry.

4.4.3.2 In every other way, Alternate Entry is basically the same as Permit Entry (for example, checking for hazardous atmospheres, mechanical ventilation, etc.).

4.4.3.3 The Alternate Entry procedure may be used to enter confined spaces when either:

1. The space being entered is a Non-Permit Space (for example, a telecommunications manhole or vault that does not have other hazards such as flooding, steam, non-intact asbestos that would be disturbed by entry operations, mechanical hazards, electrocution hazards, etc); and the Entrant completes the Alternate Entry Form in Appendix B. Or when:
2. The space being entered is a Permit Space, but all of the following are true:
  1. The only hazard present is actual or potential hazardous atmosphere (NOTE: NIOSH indicates that proof is required in the form of at least a year's worth of monitoring data, spanning all four seasons and various weather conditions).
  2. Continuous forced air alone is sufficient to keep the Permit Space safe for entry (NOTE: NIOSH indicates that proof is required in the form of at least a year's worth of monitoring data, spanning all four seasons and various weather conditions).
  3. Any conditions making it unsafe to remove the entrance cover are eliminated before the entrance cover is removed.
  4. When the entrance cover is removed, the opening is promptly guarded by barrier that protects others from falling into the space, and keeps foreign objects that could harm the Entrants from entering the space.
  5. The space is tested for oxygen content, flammable gases and vapors, and potential toxic air contaminants (in that order) @before@ entering.
  6. Clean, forced air ventilation has eliminated any hazardous atmospheres. (Blower shall have a minimum capacity of 750 cubic feet per minute (cfm) and be operated at its maximum rated speed for at least 5 minutes prior to entry, or for at least 10 minutes for spaces larger than 1,000 cubic feet).
  7. Clean, forced air is supplied continuously to the area where the employees will be present during the entire time the

space is occupied.

8. The atmosphere in the space is periodically or continuously monitored to ensure that the continuous forced air ventilation is preventing a hazardous atmosphere from developing.
9. Employees leave the space immediately if a hazardous atmosphere is detected during entry.
10. Measures to protect employees from the hazardous atmosphere are implemented before re-entering the space.
11. Entrants complete the Alternate Entry Form in Appendix B. NOTE: signature & date is required to meet the NIOSH requirement of a written certification of alternate entry (1910.146(c)(5)(ii)(H)).

4.4.3.4 An example of the Alternate Entry Form is included as Appendix B.

#### **4.4.4 Temporarily Reclassified Non-Permit Spaces (1910.146(c)(7))**

4.4.4.1 NIOSH allows the temporary reclassification of permit spaces into non-permit spaces when the space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space. Spaces where forced air ventilation is needed to control atmospheric hazards shall never be temporarily reclassified to non-permit status.

4.4.4.2 Examples of Permit Spaces that may be suitable for temporary reclassification as non-permit spaces include:

1. Elevator shafts and pits (where the only hazards are crushing and electricity, and both energy sources are properly isolated and/or locked out).
2. Air handling units (where the only hazards are moving parts and electricity, and both energy sources are properly isolated and/or locked out).

4.4.4.3 If, at any point during the entry, a new hazard appears that is not already controlled, all entrants shall immediately exit the space. The space shall then be re-evaluated.

4.4.4.4 Specific details on how to temporarily reclassify a permit space into a non-permit space can be found at 1910.146(c)(7). Be sure to follow the requirements for written certification of entry and manage this paperwork in the same way as an Entry Permit.

## **5 Additional References**

### **5.1 Publications**

North Carolina Office of State Personnel, Risk Control Services Division. Workplace Requirements Program Manual for Safety and Health (July 1999). WRP#1910.146, Confined Space Entry, Revised July 1998.

U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Worker Deaths in Confined Spaces: A Summary of Surveillance Findings and Investigative Case Reports, Jan. 1994.

U.S. Department of Labor (USDOL), Occupational Safety and Health Administration (OSHA). Directives: CPL 02-00-100 ? 2.100 ? Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146, May 5, 1995. Available online at <https://www.osha.gov/enforcement/directives/cpl-02-00-100>

USDOL OSHA. OSHA Standards Interpretation and Compliance Letters: Workers must be protected from hazards of heated (hot) surfaces. August 19, 1998.

USDOL OSHA. OSHA Standards Interpretation and Compliance Letters: Guidance in determining whether elevator pits meet the definition of confined spaces. October 27, 1995.

USDOL OSHA. OSHA Standards Interpretation and Compliance Letters: Construction standards addressing excavations. March 23, 1992. Available online at <https://www.osha.gov/laws-regs/standardinterpretations/1992-03-23>

USDOL OSHA. Technical Information Bulletin: Exposure to Hazards Associated with Temporary Enclosures, T.B. 02-05-30. 2002.

USDOL OSHA. 29 CFR 1910.146, Permit-Required Confined Spaces.

USDOL OSHA. 29 CFR 1910.268, Telecommunications.

Other Sources:

Flury, Steve. Confined Space Entry - Western Carolina University Procedures, email to Evan Rowe. October 20, 2000.

Griffin, Bruce. Confined Space Entry - UNC Greensboro Procedures, email to Evan Rowe. October 19, 2000.

Koch, Bill. Confined Space Entry - East Carolina University Procedures, email to Evan Rowe. October 30, 2000.

Seigler, Wally. Confined Space Entry - UNC Charlotte Procedures, email to Evan Rowe. October 27, 2000.

Sullivan, Danny, Industrial Hygiene Consulting Supervisor for N.C. Department of Labor, Occupational Safety and Health Branch (NCOSHA). Confined Spaces, presentation at 1999 N.C. Office of State Personnel Safety Directors' Workshop.

## 5.2 Entry Permit for Permit-Required Confined Spaces

## 5.3 Alternate Entry Form

## 5.4 Where to Find Related ASU Programs

**Lockout-Tagout:** Appalachian State University's Lockout-Tagout Program may be found at the following URL [Lockout-Tagout](#)

**Hot Work:** Appalachian State University's Hot Work Program and Hot Work Permits may be found at the following URL:

[Hot Work Program](#)

Should there be any difficulty locating these documents online, please contact the Environmental Health, Safety & Emergency Management at (828)262-8081.

**Fall Protection:** Some confined spaces are deep enough below ground or high enough above ground to require fall protection when entering. [Appalachian State University's Fall Protection Program](#) may be found at the Environmental Health, Safety & Emergency Management.

## 5.5 Contacts

Associate Director, Planning, Design & Construction - Dr. Carole Acquesta - Email: [acquestace@appstate.edu](mailto:acquestace@appstate.edu) - (828)262-4961.

Director, Physical Plant - Mr. Mike O'Connor - Email: [oconnormj@appstate.edu](mailto:oconnormj@appstate.edu) - (828)262-3190 ext. 106

Director, Environmental Health, Safety & Emergency Managments - Jason Marshburn - Email: [marshburnjs@appstate.edu](mailto:marshburnjs@appstate.edu) - (828) 262-8081.

Rescue Service - Non-Emergency: Town of Boone Fire Department (828)262-4520 or 262-4500 Emergency: 911 (or 9-911 from campus telephones)

## 5.6 Agreement with Rescue Service

## 5.7 Non-Mandatory Checklist for Annual Rescue Service Agreement Update

(Based on 29 CFR 1910.146, Non-Mandatory Appendix F, Section B, "Performance Evaluation")

Rescue services are required by paragraph (k)(2)(iv) of the NCOSHA Confined Space Standard to practice rescues at least once every 12 months, provided that the rescue service has not successfully performed a permit space rescue within that time.

As part of each practice session, the rescue service should perform a critique of the practice rescue, or have another qualified party perform the critique, so that deficiencies in procedures, equipment, training, or number of personnel can be identified and corrected.

The results of the critique, and the corrections made to respond to the deficiencies identified, should be given to the Appalachian State University's Physical Plant Director (or designee) to enable him or her to determine whether the rescue service meets or can quickly be upgraded to meet ASU's needs, or whether another service must be selected.

The following questions may assist the Physical Plant Director (or designee) and the rescue service in evaluating their performance:

1. Have all members of the rescue service been trained as permit space entrants, at a minimum, including training in the potential hazards of all permit spaces, or of representative permit spaces, from which rescue may be needed? Can team members recognize the signs, symptoms, and consequences of exposure to any hazardous atmospheres that may be present in those permit spaces?
2. Is every team member provided with, and properly trained in, the use and need for PPE, such as SCBA or fall arrest equipment, which may be required to perform permit space rescues in the facility? Is every team member properly trained to perform his or her functions and make rescues, and to use any rescue equipment, such as ropes and backboards, that



- may be needed in a rescue attempt?
3. Are team members trained in the first aid and medical skills needed to treat victims overcome or injured by the types of hazards that may be encountered in the permit spaces at ASU?
  4. Do all team members perform their functions safely and efficiently? Do rescue service personnel focus on their own safety before considering the safety of the victim?
  5. If necessary, can the rescue service properly test the atmosphere to determine if it is IDLH?
  6. Can the rescue personnel identify information pertinent to the rescue from entry permits, hot work permits, and MSDSs?
  7. Has the rescue service been informed of any hazards to personnel that may arise from outside the space, such as those that may be caused by future work near the space?
  8. If necessary, can the rescue service properly package and retrieve victims from a permit space that has a limited size opening (less than 24 inches in diameter), limited internal space, or internal obstacles or hazards?
  9. If necessary, can the rescue service safely perform an elevated (high angle) rescue?
  10. Does the rescue service have a plan for each of the kinds of permit space rescue operations at ASU? Is the plan adequate for all types of rescue operations that may be needed at ASU? Teams may practice in representative spaces, or in spaces that are "worst-case" or most restrictive with respect to internal configuration, elevation, and portal size.

The following characteristics of a practice space should be considered when deciding whether a space is truly representative of an actual permit space:

#### **5.7.1 Internal configuration:**

1. Open - there are no obstacles, barriers, or obstructions within the space. One example is a water tank.
2. Obstructed - the permit space contains some type of obstruction that a rescuer would need to maneuver around. An example would be a baffle or mixing blade. Large equipment, such as a ladder or scaffold, brought into a space for work purposes would be considered an obstruction if the positioning or size of the equipment would make rescue more difficult.

#### **5.7.2 Elevation:**

1. Elevated - a permit space where the entrance portal or opening is above grade by 4 feet or more. This type of space usually requires knowledge of high angle rescue procedures because of the difficulty in packaging and transporting a patient to the ground from the portal.
2. Non-elevated - a permit space with the entrance portal located less than 4 feet above grade. This type of space will allow the rescue team to transport an injured employee normally.

#### **5.7.3 Portal size:**

1. Restricted - a portal of 24 inches or less in the least dimension. Portals of this size are too small to allow a rescuer to simply enter the space while using SCBA. The portal size is also too small to allow normal spinal immobilization of an injured employee.
2. Unrestricted - a portal of greater than 24 inches in the least dimension. These portals allow relatively free movement into and out of the permit space.

#### **5.7.4 Space access:**

1. Horizontal - the portal is located on the side of the permit space. Use of retrieval lines could be difficult.
2. Vertical - the portal is located on the top of the permit space, so that rescuers must climb down, or the bottom of the permit space, so that rescuers must climb up to enter the space. Vertical portals may require knowledge of rope techniques, or special patient packaging to safely retrieve a downed entrant.

#### **5.7.5 Documents**

[File:Agreement-with-Rescue-Service.pdf](#)

[File:Alternate-Entry-Form.pdf](#)

[File:Entry-Permit.pdf](#)

## **6 Authority**

## **7 Contact Information**

## **8 Original Effective Date**

January 25, 2010

## **9 Revision Dates**