CHAPTER 15 – CONFINED SPACE ENTRY

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CHAPTER 15 - CONFINED SPACE ENTRY

A. INTRODUCTION

1. Workplaces may contain a space(s) that are considered to be "confined" because the configuration hinders the activities of employees who must enter into, work in, or exit from the space(s). In many instances, employees who work in confined spaces also face increased risk of exposure to physical injury from hazards such as entrapment, engulfment, and/or hazardous atmospheric conditions. Confinement, limited access, and restricted airflow may result in hazardous conditions that would not normally arise in an open workplace.

2. This Chapter applies to all Smithsonian Institution (SI) personnel required to enter and conduct work in confined spaces. This Chapter outlines the policies and procedures for all individuals associated with confined space entry operations. Confined space entry operations shall be performed in accordance with the Occupational Safety and Health Administration (OSHA) standard 29 Code of Federal Regulations (CFR) 1910.146, “Permit-Required Confined Spaces.”

B. CHAPTER-SPECIFIC ROLES AND RESPONSIBILITIES

1. Safety Coordinator (in conjunction with OFMR Safety Office, where applicable) shall:
   a. Develop and implement a Facility-Specific Confined Space Entry Plan.
   b. Review and update the Facility-Specific Confined Space Entry Plan to conform to current OSHA standards.
   c. Ensure compliance with the Plan by periodic inspection of entry sites and canceling permits where unsafe conditions are present.
   d. Ensure practice rescue exercises are performed annually.
   e. Assist work area supervisors with:
      (1) Providing confined space training;
      (2) Identification of confined spaces;
      (3) Identifying confined spaces that require a permit for entry;
      (4) Labeling Permit-Required Confined Spaces (PRCS).
   f. Ensure that the plan is included in specifications of contracted work in the facility.

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

a. Know confined space hazards including information on the route(s) of exposure (e.g., inhalation, dermal absorption, contact, ingestion), signs of exposure and symptoms, and consequences of exposure.

b. Verify emergency plans and specified entry conditions such as permits, tests, procedures, and equipment before allowing entry.

c. Terminate entry and cancel permits when entry operations are completed or if a new condition exists.

d. Verify that rescue services are available, and the means for summoning them are operable.

e. Take measures to remove unauthorized entrants.

f. Ensure that entry operations remain consistent with the entry permit and acceptable entry conditions are maintained.

g. Authorizing entry by signing the Entry Authorization space on the PRCS Entry Permit after all conditions for a safe entry have been met.

h. Document that all training requirements for a specific confined space entry have been met by signing the pre-entry authorization space on the PRCS entry permit.

3. Supervisors shall:

a. Identify confined spaces and hazards within areas under their control where only authorized personnel are to enter.

b. Ensure rescue service personnel are available and capable of responding to an emergency in a timely manner.

4. Employees as Authorized Entrants. An Authorized Entrant is an employee who is authorized by the employer to enter a permit space, and who shall:

a. Know confined space hazards, including information on the route(s) of exposure (e.g., inhalation, dermal absorption, contact, ingestion), signs of exposure and symptoms, and consequences of exposure.

b. Receive training in proper use of equipment, including:

   (1) Atmospheric testing and monitoring equipment;

   (2) Ventilating equipment needed to obtain acceptable entry conditions;

   (3) Communication equipment necessary to maintain contact with the attendant;

   (4) Personal protective equipment (PPE) as needed;

   (5) Lighting equipment as needed;

   (6) Barriers and shields as needed;
(7) Equipment (e.g., ladders) needed for safe entry and exit;
(8) Rescue and emergency equipment as needed; and
(9) Any other equipment necessary for safe entry into and rescue from a PRCS.

c. Exit from the PRCS as soon as possible when:
   (1) Ordered by the authorized person;
   (2) He or she recognizes the warning signs or symptoms of exposure;
   (3) A prohibited condition exists; or
   (4) An automatic alarm is activated.

d. Alert the attendant when a prohibited condition exists or when warning signs or symptoms of exposure exist.

5. **Employees as Attendants.** An Attendant is an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant’s duties assigned in the employer’s permit space program. An Attendant shall:

a. Remain outside the PRCS during entry operations unless relieved by another authorized attendant.

b. Perform non-entry rescues when specified by the rescue procedure.

c. Know existing and potential hazards, including information on the mode of exposure, signs, or symptoms, and consequences of exposure.

d. Maintain communication with and keep an accurate account of those workers entering the PRCS.

e. Monitor activities inside and outside the PRCS to determine if it is safe for entrants to remain in the space.

f. Order evacuation of the PRCS when:
   (1) A prohibited condition exists;
   (2) A worker shows signs of or symptoms of exposure;
   (3) An emergency outside the confined space exists; and
   (4) The attendant cannot effectively and safely perform required duties.

g. Summon rescue and other services during an emergency.

h. Ensure unauthorized people stay away from the PRCS or exit immediately if they have entered the PRCS.

i. Inform authorized entrants and the entry supervisor if any unauthorized person enters the PRCS.

j. Perform no other duties that interfere with the attendant's primary duties.
6. **Office of Safety, Health and Environmental Management (OSHEM)** shall perform an annual review covering all confined space entries performed during a 12-month period to ensure employees participating in entry operations are protected from Permit-Required Confined Spaces (PRCS) hazards.

C. **HAZARD IDENTIFICATION.** Confined spaces need to be identified, characterized and evaluated for hazards before entry.

1. **Identify.** All confined spaces located within a facility or under the facility's control shall be identified. A **Confined Space** is any space that has the following characteristics:
   a. It is large enough or configured so that an employee can bodily enter and perform assigned work.
   b. It has limited or restricted means for entry or exit.
   c. It is not designed for continuous employee occupancy.

2. **Characterize as Non-Permit or Permit-Required.**
   a. Once all confined spaces have been identified, the Safety Coordinator shall determine if a confined space entry permit is required, based on C.3 and C.4 below.
   b. All employees shall be made aware of these confined spaces through training provided by supervisors. Assistance in this training shall be provided by Safety Coordinator. Refer to Section F, “Training”, of this Chapter.

3. **A Non-Permit Confined Space** is a confined space that does not contain, nor has the potential to contain, any hazard capable of causing death or serious physical harm. Examples of non-permit required confined spaces include; certain air plenums and pipe chases, attics, walk-in freezers or refrigerators, and some building crawl spaces.

4. **A Permit-Required Confined Space (PRCS)** is a confined space that is potentially hazardous. A PRCS has one or more of the following characteristics:
   a. Contains or has the potential to contain a hazardous atmosphere.
   b. Contains a material that has the potential for engulfing an entrant.
   c. Has an internal configuration such that an entrant may be trapped or asphyxiated by inwardly-converging walls, or by a floor that slopes downward and tapers to a smaller cross-section; or
   d. Contains any other recognized serious health or safety hazard, including (but not limited to):
      (1) Fall hazards;
(2) Unguarded machinery;
(3) Extreme heat or cold;
(4) Steam pipes or chemical lines;
(5) Hazardous noise levels; and/or
(6) Electrical hazards (e.g. exposed live wires).

5. **Once a confined space has been identified as permit-required, the hazards that may be present within the confined space must be identified and evaluated.** Confined space hazards can be grouped into the following categories:

   (1) Oxygen-deficient atmospheres
   (2) Flammable atmospheres
   (3) Toxic atmospheres
   (4) Mechanical and physical hazards

   a. Every confined space must be evaluated for these four types of hazards. The three types of atmospheric hazards are often the most difficult to identify since they may not be detected without the assistance of monitoring equipment.

   b. Oxygen-Deficient Atmospheres – refer to Section E, “Hazard Assessment.” The oxygen level inside a confined space may be decreased as the result of either consumption or displacement. There are a number of processes that consume oxygen in a confined space:

      (1) Oxygen is consumed during combustion of flammable materials, as in welding, cutting, or brazing.
      (2) A more subtle consumption of oxygen may occur during bacterial action (e.g., in a fermentation process).
      (3) Oxygen may be consumed during chemical reactions (e.g., the formation of rust on the exposed surfaces of a confined space).
      (4) The number of people working in a confined space and the amount of physical activity may influence oxygen consumption.
      (5) Oxygen levels may be reduced as the result of oxygen displacement by other gases.

   c. Flammable Atmospheres

      (1) Flammable atmospheres are generally the result of flammable gases, vapors, dust mixed in certain concentrations with air, or an oxygen-enriched atmosphere. Oxygen-enriched atmospheres are those atmospheres that contain an oxygen concentration greater than 23.5%. An oxygen-enriched atmosphere will cause flammable materials such as clothing and hair to burn violently when ignited.
(2) Combustible gases or vapors may accumulate within a confined space when there is inadequate ventilation. Gases that are heavier than air may accumulate in the lower levels of a confined space. Therefore, it is important to conduct atmospheric tests near the bottom of all confined spaces.

(3) The work being conducted in a confined space may generate a flammable atmosphere (e.g., spray painting, spray coating, use of flammable solvents for cleaning). Welding or cutting with oxygen-acetylene equipment may also be the cause of an explosion in a confined space, and shall not be allowed without a hot work permit (refer to Chapter 14, “Hot Work Management and Permit System”, of this Manual). Oxygen and acetylene hoses may have small leaks in them that may generate an explosive atmosphere, and shall be removed from the confined space when not in use. The atmosphere shall be tested continuously while hot work is being conducted within the confined space.

d. Toxic atmospheres may be present within a confined space as the result of one or more of the following conditions:

(1) The product stored in the confined space. When a product is stored in a confined space, the product may be absorbed by the walls and give off toxic vapors when removed, or when cleaning the residual material. The product may also produce toxic vapors that will remain in the atmosphere due to poor ventilation.

(2) The work being conducted in the confined space. Toxic atmospheres may be generated as the result of work being conducted inside the confined space. Examples of work include: welding or brazing with metals capable of producing toxic vapors, painting, scraping, sanding, etc. Many of the solvents used for cleaning and/or degreasing produce highly toxic vapors.

(3) Areas adjacent to the confined space. Toxic fumes produced by processes near the confined space may enter and accumulate in the confined space. For example, if the confined space is lower than the adjacent area and the toxic fume is heavier than air, the toxic fume may "settle" into the confined space.

e. Mechanical and Physical Hazards

(1) Problems such as rotating or moving mechanical parts or energy sources may create hazards within a confined space. All rotating or moving equipment (e.g., pumps, process lines, electrical sources, auger type conveyors, moving parts inside mixers, etc.), within a confined space must be identified.

(2) Physical factors such as heat, cold, noise, vibration, and fatigue may contribute to accidents. These factors must be evaluated for all confined spaces.
(3) Excavations may present the possibility of engulfment. Employees shall be protected from cave-ins by sloping, benching, or shoring systems when the depth of the excavation is more than four feet, in accordance with 29 CFR 1926.652. In some circumstances, air-monitoring may also be required.

D. HAZARD CONTROL

1. A confined space entry plan shall be developed by the Safety Coordinator (and in conjunction with the OFMR Safety Office for facilities in which OFMR is the primary entrant organization). Safety Coordinators and supervisors must evaluate their workplaces to determine if a confined space is a permit-required confined space (refer to Attachment 1 “Permit-Required Confined Space Decision Flow Chart”). If it is not a Permit-Required Confined Space (PRCS), use normal work procedures.

2. The Safety Coordinator is responsible for ensuring that a Confined Spaces Entry plan, per requirements of this Chapter, is implemented for every confined space.

3. If a work area does contain a PRCS, the supervisor must inform exposed employees of the existence, location and the hazards the PRCS poses. Employees may be informed by posting danger signs such as "DANGER - PERMIT-REQUIRED CONFINED SPACE - AUTHORIZED ENTRANTS ONLY," or using an equally effective notification method.

4. Alternate procedures for employee entry into a PRCS may be used under certain conditions. For example, if the entry supervisor can demonstrate with monitoring and inspection data that the only hazard is an actual/potential hazardous atmosphere that can be made safe for entry using continuous forced air ventilation, that confined space may be exempt from some requirements (e.g., permits, attendants). However, even in these circumstances, the entry supervisor must test the internal atmosphere of the confined space for oxygen content, flammable gases and vapors, and the potential for toxic air contaminants before any employee enters it. The supervisor shall also provide continuous ventilation, and verify the required measurements are performed before entry.

5. Non-permit confined spaces do not contain atmospheric hazards or have the potential to contain any hazard capable of causing death or serious physical harm. Nevertheless, safe work procedures are to be employed by staff performing the work within these spaces.

   a. If employees will not enter and work in a PRCS, the work area supervisor shall take effective measures to prevent employees from entering these spaces.

   b. Non-permit required confined spaces shall be re-evaluated when changes occur in their use or configuration and, where appropriate, shall be reclassified as a PRCS.
c. A space with no potential to have atmospheric hazards may be classified as a non-permit required confined space only when all hazards are eliminated.

6. Permit-Required Confined Space (PRCS) Permit System

a. All employees shall be instructed by supervisors that entry into a PRCS is prohibited without an authorized entry permit. Employees must list their names on the authorized permit before they will be allowed to enter a PRCS.

b. When a PRCS must be entered, a PRCS entry permit shall be completed and authorized by the entry supervisor prior to entry into the PRCS. This permit shall serve as certification that the confined space is safe for entry. A PRCS entry permit shall not be authorized until all conditions of the permit have been met. Sample Confined Space Entry Permits are located in Attachment 2.

c. The PRCS entry permit must be posted at all entrances or otherwise made available to entrants before they enter a PRCS. The PRCS entry permit shall verify that pre-entry preparations have been completed. The duration of a PRCS entry permit shall not exceed the time required to complete an assignment. PRCS entry permits shall include:

   (1) Name of PRCS to be entered, authorized entrant(s), eligible attendants, and individuals authorized to serve as entry supervisors;

   (2) Atmospheric test results;

   (3) Tester's initials/signature;

   (4) Name and signature of supervisor who authorizes entry;

   (5) Purpose of entry and known confined space hazards;

   (6) Measures to be taken to isolate the confined space and to eliminate or control space hazards;

   (7) Name and telephone numbers of rescue and emergency services, and means to be used to contact them;

   (8) Date and authorized duration of entry;

   (9) Acceptable entry conditions;

   (10) Communication procedures and equipment to maintain contact during entry;

   (11) Additional permits (e.g., hot work, excavation, etc.) that have been issued authorizing work in the confined space;

   (12) Special equipment and procedures, including PPE and alarm systems; and

   (13) Any other information needed to ensure employee safety.

7. Cancelled PRCS Entry Permits
a. The entry supervisor shall cancel a PRCS entry permit when an assignment is completed or when a new condition exists.

b. New conditions shall be noted on the canceled PRCS entry permit and used in revising the Facility-Specific Confined Space Entry Plan.

c. The supervisor shall forward all canceled PRCS entry permits to the Safety Coordinator, who shall keep canceled PRCS entry permits on file for at least one year.

8. Controlling Electrical/Mechanical Confined Space Hazards

a. If activation of electrical or mechanical equipment may cause injury, each piece of equipment shall be manually isolated to prevent inadvertent activation before employees enter or while they work in a PRCS (refer to Chapter 23 “Lock-Out/Tag-Out Program”, of this Manual).

b. To prevent vapor leaks, flashbacks, and other hazards, employees shall completely isolate the PRCS. To completely isolate a confined space, the closing of valves is not sufficient.

(1) All pipes must be physically disconnected or isolation blanks bolted in place.

(2) Other special precautions must be taken in cases where flammable liquids or vapors may re-contaminate the PRCS.

(3) The blanked/ disconnected pipes shall be inspected and tested for leakage to check the effectiveness of the procedure.

c. Other systems of concern include: steam valves, pressure lines, and chemical transfer pipes.

E. HAZARD ASSESSMENT

1. Before an employee enters the PRCS, the atmosphere shall be tested with a calibrated direct-reading instrument for (in this order):

a. Oxygen content - the normal atmosphere is composed of approximately 21 percent (%) oxygen and 79% nitrogen. An atmosphere containing less than 19.5% oxygen shall be considered oxygen-deficient. Oxygen-enriched atmospheres are those atmospheres that contain an oxygen concentration greater than 23.5%. An Oxygen Level Meter shall be used to monitor oxygen levels in the PRCS.

b. Flammable gases and vapors - an atmosphere becomes flammable when the ratio of oxygen to combustible material in the air is neither too rich nor too lean for combustion to occur. A Combustible Gas Indicator shall be used to monitor the Lower Explosive Limit (LEL) in the PRCS.

c. Potential toxic air contaminants – the hazard evaluation shall provide information on the potential toxic air contaminants requiring testing. Toxic
air contaminants may include (but are not limited to): carbon monoxide (CO), hydrogen sulfide (H₂S), and volatile organic compounds (VOCs).

2. There shall not be a hazardous atmosphere within the space whenever any employee is inside the PRCS.

3. Gases that are heavier than air may accumulate in the lower levels of a confined space. Therefore, in addition to conducting atmospheric tests at the top and middle of all confined spaces, it is also important to conduct tests near the bottom of the space.

4. The atmosphere shall be tested continuously while any hot work is being conducted within the confined space.

5. Combustible gas direct reading instruments are to be factory calibrated by the manufacturer, at least once per year, to ensure proper operation and accuracy of the unit. Annual factory calibration will also certify that the sensors and other internal components are operating accurately.

F. PERSONAL PROTECTIVE EQUIPMENT (PPE)

1. Personal protective equipment (PPE) shall be required if engineering controls and/or work practice controls do not adequately protect employees. Specific PPE requirements shall be based on the hazards identified in the PRCS, and in accordance with the general requirements of Chapter 17, “Personal Protective Equipment”, of this Manual.


G. CONFINED SPACE ENTRY PLAN

1. The OSHA standard requires that a written Confined Space Entry Plan to include:
   a. Measures to prevent unauthorized entry into the PRCS;
   b. Identification and evaluation of the PRCS hazards before allowing employee entry;
   c. Acceptable entry conditions, in accordance with the permit.
   d. Testing of atmospheric conditions in the PRCS before entry operations and monitoring of the space during entry;
   e. Performing tests for atmospheric hazards in this sequence:
      (1) Oxygen;
      (2) Combustible gases or vapors; and
      (3) Toxic gases or vapors;
2. Provisions requiring the stationing of at least one attendant outside the PRCS for the duration of entry operations;

3. Provisions to coordinate entry operations when employees of more than one employer are working in the PRCS;

4. Plan to include mechanisms or procedures for a system for the preparation, issue, use, and cancellation of PRCS entry permits;

5. Review established annual entry operations to include established entry procedures and revisions to the Confined Space Entry Plan as necessary; and

6. Procedures to be followed by any attendant who is required to monitor multiple spaces will follow during an emergency in one or more of those spaces.

7. Detection of hazardous conditions - if a hazardous condition is detected during entry, employees must immediately leave the confined space. The Safety Coordinator shall evaluate the confined space to determine the cause of the hazardous atmosphere and modify the plan as necessary.

8. Safety Coordinators should utilize the tools available on the Department of Labor, OSHA website. The OSHA Confined Spaces Advisor provides guidance to help protect workers from the hazards of entry into permit-required confined spaces. The Advisor will help you determine if a space is covered by OSHA's Permit-Required Confined Spaces regulation. The system provides options to review the definitions of technical terms, to review answers to frequently asked questions, and to review the regulatory text. The site can be accessed through the link [www.dol.gov/elaws/confined.htm](http://www.dol.gov/elaws/confined.htm).

H. INFORMING CONTRACT EMPLOYEES

1. The Safety Coordinator shall implement a process to ensure that contracted work involving facility confined spaces is routed to him/her for approval prior to start of work.

2. The Safety Coordinator shall inform any contractors hired to enter a PRCS about:
   a. The confined space and PRCS entry requirements;
   b. Any identified hazards;
   c. The employer's experience with the space, such as knowledge of hazardous conditions; and
   d. Precautions or procedures to be followed when in or near the PRCS.

3. When employees of more than one employer are conducting a PRCS operation, the affected employers shall coordinate entry operations to ensure that affected employees are protected from confined space hazards. The employer shall also give contractors any other pertinent information regarding
hazards and operations in the PRCS and be debriefed at the conclusion of
the PRCS entry operation.

I. EMERGENCY PROCEDURES

1. Harnesses and Retrieval Lines
   a. Authorized entrants who enter a PRCS must wear a chest or full body
      harness with a retrieval line attached to the center of their backs near
      shoulder level or above their heads. Wristlets may be used if the
      employer can demonstrate that the use of a chest or full body harness is
      not feasible or creates a greater hazard.
   b. The entry supervisor shall ensure the other end of the retrieval line is
      attached to a mechanical device or a fixed point outside the PRCS. A
      mechanical device must be available to retrieve an entrant from vertical
      type PRCS more than 5 feet deep.

2. Material Safety Data Sheets (MSDS). If an injured entrant is exposed to a
   substance for which a Material Safety Data Sheet (MSDS) is kept at the
   worksite, the MSDS shall be made available to the medical facility personnel
   treating the exposed entrant.

3. Rescue Service Personnel
   a. All rescuers shall be trained and certified to perform rescue operations
      that may occur in a permit-required area. Rescuers shall also be trained
      in first aid and CPR. OSHEM shall ensure practice rescue exercises are
      performed yearly, and rescue service personnel shall be provided access
      to PRCS locations so they may practice rescue operations. Rescuers
      shall also be informed of the hazards of the PRCS.

J. TRAINING

1. Before the initial work assignment begins, the supervisor shall be responsible
   for ensuring all workers who are required to work in a PRCS receive
   appropriate training, and remedial refresher training on an annual basis,. All
   employees performing PRCS duties must acquire the understanding,
   knowledge, and skills necessary for the safe performance of the duties
   assigned. Safety Coordinators are to be trained as well. After confined
   space training, the supervisor shall ensure employees have acquired the
   understanding, knowledge, and skills necessary to safely perform their duties
   as defined in the “Chapter-Specific Roles and Responsibilities” section of this
   Chapter. Additional training is required when:
   a. The job duties change;
   b. A change occurs in the Facility-Specific Confined Space Entry Plan, or the
      PRCS operation presents any new hazard; and
c. An employee's job performance shows deficiencies.

2. Rescue service personnel also require training in cardiopulmonary resuscitation (CPR) and first aid. The supervisor shall certify this training has been provided.

3. After completion of training, the employer shall keep a record of employee training. The training record shall include the employee's name, the trainer's signature, and the date of the training.

K. REQUIRED INSPECTIONS AND SELF ASSESSMENTS

1. The Facility Safety Coordinator shall ensure compliance with the Confined Space Entry Plan by periodic inspection of entry sites and canceling PRCS entry permits where unsafe conditions are present.

2. OSHEM shall perform an annual review covering all confined space entries performed during a 12-month period to ensure employees participating in entry operations are protected from PRCS hazards.

L. RECORDS AND REPORTS

1. The Safety Coordinator shall maintain, review and update the Confined Space Entry Plan to conform to current OSHA standards.

2. The Safety Coordinator shall keep canceled entry PRCS entry permits on file for at least one year.

3. Employee confined space training records for performance of the PRCS duties assigned.

4. Rescue services personnel first aid and CPR certification.

M. REFERENCES


3. U.S. Department of Labor, Occupational Safety & Health Administration, “Confined Space Hazards,”

4. OSHA Permit-Required Confined Spaces Expert Advisor [link to OSHA website].
Permit-Required Confined Space Decision Flow Chart

- Does the workplace contain PRCS as defined by §1910.146(b)?
  - YES: Inform employees as required by §1910.146(c)(2).
    - NO: Will permit space be entered?
      - YES: Will contractors enter?
        - NO: Will host employees enter to perform entry tasks?
          - YES: Does space have known or potential hazards?
            - NO: Consult other applicable OSHA standards.
              - YES: Can the hazards be eliminated?
                - NO: Can the space be maintained in a condition safe to enter by continuous forced air ventilation only?
                  - NO: Prepare for entry via permit procedures.
                    - NO: Verify acceptable entry conditions. (Test results recorded, space isolated if needed, rescuers/means to summon available, entrants properly equipped, etc.)
                      - YES: Permit issued by authorizing signature. Acceptable entry conditions maintained throughout entry.
                        - NO: Entry tasks completed. Permit returned and canceled.
                          - YES: Audit permit program and permit based on evaluation of entry by entrants, attendants, testers and preparers, etc.
                            - CONTINUE
                          - NO: Permit not valid until conditions meet permit specifications.
                            - CONTINUE
                      - NO: Emergency exists (prohibited condition). Entrants evacuated, entry aborts. (Call rescuers if needed.) Permit is void. Reevaluate program to correct/prevent prohibited condition. Occurrence of emergency (usually) is proof of deficient program. No re-entry until program (and permit) is amended. (May require new program.)
                        - CONTINUE
                    - NO: Coordinate entry operations as required by §1910.146(c)(8)(i) and (d)(11). Prevent unauthorized entry.
                      - YES: Task will be done by contractors’ employees. Inform contractor as required by §1910.146(c)(8)(i), (ii) and (iii). Contractor obtains information required by §1910.146(c)(9)(i), (ii), from host.
                        - NO: Prevent authorization entry.
                          - CONTINUE
                      - NO: Both contractors and host employees will enter the space.
                        - CONTINUE
                    - NO: Prevent employee entry as required by §1910.146(c)(3). Do task from outside of space.
                      - CONTINUE
                - NO: Space may be entered under §1910.146(c)(5).
                  - CONTINUE
  - NO: Not a PRCS. 1910.146 does not apply. Consult other OSHA standards.
    - CONTINUE
- STOP
- STOP
- STOP

1. This step is contingent on the previous step's outcomes and may require additional decision-making based on the specific circumstances.
**Confined Space Entry Permit**

**Smithsonian Institution**

**CONFINED SPACE PERMIT**

Service Work Order #: 2008-xxxxxx

**NAME OF BUILDING AND CONTACT NUMBER:**

Parent Building: 
Project Title: 

**ATMOSPHERIC HAZARDS:**

- [ ] Oxygen Deficiency
- [ ] Combustible Gas
- [ ] Toxic Contaminants
- [ ] Physical Hazard
- [ ] Mechanical
- [ ] Heat
- [ ] Electrical
- [ ] Noise

**AUTHORIZED ENTRANTS**

<table>
<thead>
<tr>
<th>DATE TRAINED</th>
<th>SOURCE ISOLATION (NO ENTRY)</th>
<th>VENTILATION MODIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pump or Lines Divided</td>
<td>Mechanical</td>
</tr>
<tr>
<td></td>
<td>Disconnected or Blocked</td>
<td>Natural Ventilation Only</td>
</tr>
</tbody>
</table>

**Personal Protective Equipment Required**

<table>
<thead>
<tr>
<th>Entrainants:</th>
<th>Type of Gas Monitor</th>
<th>Controlled</th>
</tr>
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</table>

**Communication Procedures to Contact / Emergency Service**

Safety Watch:

**Required Precautions Checklist**

- [ ] Turns power and fire alarms off
- [ ] Respiratory equipment in place
- [ ] Gas Free Technician and Field Safety to assess
- [ ] Mandatory Pre-Entry Briefings Conducted by Supervisor

**TEST**

<table>
<thead>
<tr>
<th>TEST</th>
<th>ACCEPTABLE ENTRY CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen (O2)</td>
<td>19.5 to 23.5 %</td>
</tr>
<tr>
<td>Explosive Gas</td>
<td>&lt; 10% LEL</td>
</tr>
<tr>
<td>Hydrogen Sulfide (H2S)</td>
<td>&lt; 10 PPM * 15 PPM</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>&lt; 35 PPM</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO2)</td>
<td>&lt; 2 PPM * 5 PPM</td>
</tr>
<tr>
<td>Aromatic Hydrocarbon</td>
<td>&lt; 1 PPM * 5 PPM</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td></td>
</tr>
<tr>
<td>Ammonia</td>
<td>&gt; 35 PPM</td>
</tr>
</tbody>
</table>

**TIME**

- [ ] * Short term exposure. Limit up to 15 minutes + 5 hr. Time Weighted Avg. 10 hr. (congest with appropriate respiratory protection)

**Traffic Control**

- [ ] Ramrods
- [ ] Flags
- [ ] Signs

**Special Training**

Make note of any special training by providing type, trainer and date trained.

**Special Requirements and Permits**

<table>
<thead>
<tr>
<th>CHECK (X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
</tr>
<tr>
<td>NO</td>
</tr>
<tr>
<td>NA</td>
</tr>
</tbody>
</table>

- [ ] LockOut / TagOut Required - Proper procedures will be used and noted in the LOTO Log
- [ ] Utility Requirement Notification Form Required - Notification Form 5-NFMR003H Attached
- [ ] Work Permit Form Required - Permit Form 5-NFMR003H Attached

**Requirements: Work Supervisor Area Monitoring & Gas Free Technician / Confined Space Supervisor's Final Inspection (Completed After Confined Space Work)**

- [ ] Performed Work in a Safe Manner
- [ ] Monitor Work in Progress
- [ ] Work Area Cleared & Equipment Stowed Away
- [ ] No Personnel Injured Reported

**Work Authorization**

- [ ] Confined Space Permit Posted & Turned Into API
- [ ] Has System Isolation Permit Required (Attached)
- [ ] Lockout / Tagout Required and Used
- [ ] Notified Security Control Room Operator (Work Completed)
- [ ] Inspected Area After Work (Back to Normal)
- [ ] Notified Tenant / Dept Head (Work Completed)
- [ ] Proper Procedures & PPE Used (No Work Storage)

**Confined Space Supervisor, Project Manager &/or CQIR Comments (Prior to turning in Permit to Building Management)**

Example: The confined space area was tested and monitored as required. The inspection and repairs were successful and completed on time. For Additional Information Contact David Jones x-xxx-xxxx.

**Name/Title Confined Space Supervisor &/or President Initial**

Initial
Attachment 2

Confined Space Entry Permit

CONFINED SPACE PERMIT FORM

GENERAL INSTRUCTION

Summary:
The Confined Space Permit Form is to be used for all maintenance, repairs, modifications and upgrades when confined space requirements exist. All work must be authorized and approved through the appropriate zone management and/or designated persons. Using this form should help prevent miscommunication and assure continuity of work among various shops and departments within the Office of Facility Engineering and Operation (OFEO).

Purpose:
This permit is to be used for all maintenance, repairs, modification and/or upgrades in order to minimize communication failures and work disruptions. It also helps to ensure all appropriate shops and departments are contacted while confined work is being performed. This form helps ensure that codes and regulation are followed while maintaining historical records of work.

Instructions:
1. Tracking Control#: Control Number DWO#: Select the appropriate control number and enter the tracking number. The OFEO will use an DWO for the tracking number. The tracking number will be used for a reference to work which allows us to put historical records for labor and material cost. All individuals in the Office of Facility Maintenance & Reliability (OFMR) working on this permit should use the same number.
2. In-House and Contractor – check either or both if work involves in-house and outside contract work.
3. Name of Building – select from the drop down list the location of work. If unable to find a proper location use the blank and type in the building name.
4. Project Title – show project title if applicable.
5. Permit Issued To and Requested By – Permit issued to specify the individual who will be responsible for coordinating all shops in order to accomplish work. The requested by identified who is asking to have the work done. Provide a name number (xxx xxx-xxx).
6. Requester and Phone – use this block for the requester’s name that work is being requested. Example: Work request may come from Building Management, Safety Office and/or the Office of Engineering, Design and Construction.
7. Exact Location of the Valve/Zone – enter the valve location and identification number. Copy of this permit will be placed at the valve location at a visible site.
8. Area Covered – provide some detail of the zones and/or areas affected by this work.
9. Reason for Entry – select from the drop downs and provide an emergency phone number (xxx xxx-xxx). The Confined Space Entry Supervisor and/or Project Manager/Contractor shall print first, last name and sign requesting confined space entry work. Provide the permit start date and time, permit expire date and time by using the drop downs.
10. Notification - Precautions Taken (check as appropriate) – Use the list and check those that are appropriate. The Work Supervisor/Leader will provide notification to the Building Security Control Officer, Building Management, and Work Management Center (WMC) by providing a copy of the permit prior to any work other than extreme emergencies. Other precautions are noted whether or not hot work is allowed or permitted, lookout & lanyard and/or other permits required.
11. Additional Comments – use this block to provide more specific information.
12. Authorized By – The Confined Space Permit must be approved by the Zone Manager or designated person. Provide the first, last name and title (print) and initial.
13. Atmospheric Hazards – Identify by checking box. Enter names or authorized entrants and attendants. Use drop downs to select [yes, no, or n/a] for source isolation and ventilation modifications.
14. Personal Protective Equipment – select by using drop downs or entering equipment. Answer communication questions and show type of Gas Monitor Used. The gas monitor must be in calibration – answer by selecting drop down.
15. Test and Acceptable Entry Conditions – monitor the confined space hourly for conditions. Indicate n/a if not appropriate. Show time and initial. Traffic Controls – answer by checking what measures have been taken.
17. Special Requirements and Permits – Check [yes, no, or n/a] whether or not other permits are required.
18. Work Supervisor and Gas Free Tech – provide follow up on confined space work and initial.
19. Confined Space Entry Supervisor – use this block to make additional comments if needed.
20. Confined Space Entry Supervisor, Project Manager and/or DOTR authorized by first, last name (print) and initial.

15-17
Sample Confined Space Entry Permit (2)

PERMIT VALID FOR 8 HOURS ONLY. ALL COPIES OF PERMIT WILL REMAIN AT JOB SITE UNTIL JOB IS COMPLETED

<table>
<thead>
<tr>
<th>DATE:</th>
<th>SITE LOCATION and DESCRIPTION:</th>
</tr>
</thead>
</table>

PURPOSE OF ENTRY

<table>
<thead>
<tr>
<th>SUPERVISOR(S) in charge of crews</th>
<th>Type of Crew</th>
<th>Phone #</th>
</tr>
</thead>
</table>

COMMUNICATION PROCEDURES

RESCUE PROCEDURES (PHONE NUMBERS AT BOTTOM)

* BOLD DENOTES MINIMUM REQUIREMENTS TO BE COMPLETED AND REVIEWED PRIOR TO ENTRY*

<table>
<thead>
<tr>
<th>REQUIREMENTS COMPLETED</th>
<th>DATE</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock Out/De-energize/Try-out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line(s) Broken-Capped-Blanked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purge-Flush and Vent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secure Area (Post and Flag)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breathing Apparatus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resuscitator - Inhalator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standby Safety Personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Body Harness w/&quot;D&quot; ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Escape Retrieval Equip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Extinguishers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting (Explosive Proof)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective Clothing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respirator(s) (Air Purifying)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Items that do not apply enter N/A in the blank.
**RECORD CONTINUOUS MONITORING RESULTS EVERY 2 HOURS**
CONTINUOUS MONITORING** Permissible _________________________________

<table>
<thead>
<tr>
<th>TEST(S) TO BE TAKEN</th>
<th>Entry Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCENT OF OXYGEN</td>
<td>19.5% to 23.5%</td>
</tr>
<tr>
<td>LOWER FLAMMABLE LIMIT</td>
<td>Under 10%</td>
</tr>
<tr>
<td>CARBON MONOXIDE</td>
<td>+35 PPM</td>
</tr>
<tr>
<td>Aromatic Hydrocarbon</td>
<td>+ 1 PPM * 5PPM</td>
</tr>
<tr>
<td>Hydrogen Cyanide</td>
<td>(Skin) * 4PPM</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>+10 PPM *15PPM</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>+ 2 PPM * 5PPM</td>
</tr>
<tr>
<td>Ammonia</td>
<td>*35PPM</td>
</tr>
</tbody>
</table>

* Short-term exposure limit: Employee can work in the area up to 15 minutes.
+ 8 hr. Time Weighted Avg.: Employee can work in area 8 hrs (longer with appropriate respiratory protection).

REMARKS: ____________________________________________________________________________________

<table>
<thead>
<tr>
<th>GAS TESTER NAME AND CHECK #</th>
<th>INSTRUMENTS(S) USED AND/OR TYPE</th>
<th>MODEL</th>
<th>SERIAL AND/OR UNIT #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SAFETY STANDBY PERSON IS REQUIRED FOR ALL CONFINED SPACE WORK

<table>
<thead>
<tr>
<th>SAFETY STANDBY PERSON(S) ENTRANT(S)</th>
<th>CHECK # SPACE ENTRANTS(S)</th>
<th>CONFINED CHECK #</th>
<th>CONFINED SPACE CHECK #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SUPERVISOR AUTHORIZING - ALL CONDITIONS SATISFIED:
________________________________________________________________________________________

DEPARTMENT/PHONE _____________________________________________________________
AMBULANCE 911
FIRE 911
Safety ______________________
Gas Coordinator ______________