



## **Confined Space Entry Program**

Public Safety Department  
Environmental, Health and Safety (EHS) Division  
Standard Operating Procedure (SOP) #19

# Lafayette College Confined Space Entry Program

Public Safety Department – Environmental, Health and Safety (EHS) Division

Standard Operation Procedure (SOP) #19 – Revised September 2020

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## Purpose and Scope

To protect Lafayette College employees and outside contractors from the hazards of entry into confined spaces located on campus. This document establishes the required practices and procedures that must take place prior to entering and while working within a permit-required confined space.

## Referenced Documents

Occupational Safety and Health Administration (OSHA) Permit Required Confined Space standard, 29 CFR 1910.146.

## Definitions

Acceptable entry conditions – the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

Attendant – an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the this document.

Authorized entrant – an employee who is authorized by Lafayette College to enter a permit-required confined space.

Blanking or blinding – the absolute closure of a pipe, line or duct, by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Confined Space – a confined space that possess potential hazards that could result in serious injury or death and are therefore subject to all provisions of this Program before entry is allowed. A confined space is a space that meets all of the following conditions:

- Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
- Is not designed for continuous employee occupancy.

Double block and bleed – the closure of a line, duct or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Emergency – any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.

Engulfment – the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be inhaled to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

# Lafayette College Confined Space Entry Program

Public Safety Department – Environmental, Health and Safety (EHS) Division

Standard Operation Procedure (SOP) #19 – Revised September 2020

---

Entry – the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry permit – the written or printed document that is provided by Lafayette College to allow and control entry into a permit space and that contains the information specified in paragraph (f) of 29 CFR 1910.146 Permit-Required Confined Spaces.

Entry supervisor – 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.

**Note:** An entry supervisor also may serve as an attendant or as an authorized entrant as long as that person is trained and equipped as required by this Program for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

Hazardous atmosphere – an atmosphere which exposes employees to a risk of death, incapacitation, and impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

- Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit;
- Airborne combustible dust at a concentration that meets or exceeds its LFL;  
**Note:** This concentration may be approximated as a condition in which the dust obscures vision at a distance of five feet (1.52 m) or less.
- Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
- Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this part and which could result in employee exposure in excess of its dose or permissible exposure limit:  
**Note:** An atmospheric concentration of any substance that is not capable of causing death, incapacitation, and impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.
- Any other atmospheric condition that is immediately dangerous to life or health.  
**Note:** For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Safety Data Sheets that comply with the Hazard Communication Standard, 1910.1200 of this part published information and internal documents can provide guidance in establishing acceptable atmospheric conditions.

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

Immediately Dangerous to Life or Health (IDLH) – any condition which poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

# Lafayette College Confined Space Entry Program

Public Safety Department – Environmental, Health and Safety (EHS) Division

Standard Operation Procedure (SOP) #19 – Revised September 2020

---

**Note:** Some materials - hydrogen fluoride gas and cadmium vapor, for example - may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure, the victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be immediately dangerous to life or health.

Inerting – the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

**Note:** This procedure produces an IDLH oxygen-deficient atmosphere.

Isolation – the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

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

Non-permit confined space – a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

Oxygen deficient atmosphere – an atmosphere containing less than 19.5 % oxygen by volume.

Oxygen enriched atmosphere – an atmosphere containing more than 23.5 % oxygen by volume.

Permit-required confined space – a confined space that has one or more of the following characteristics:

- Contains or has potential to contain a hazardous atmosphere;
- Contains a material that has the potential for engulfing an entrant;
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
- Contains any other recognized serious safety or health hazard.

**Note:** These spaces require a written permit prior to entry. The process of generating the permit forces supervisors, entrants, and attendants to work together and carefully consider the potential hazards associated with the space in advance, and prepare controls appropriate to the space and entry work activities.

Permit-required confined space program – Lafayette College's program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

Permit system – Lafayette College's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

# Lafayette College Confined Space Entry Program

Public Safety Department – Environmental, Health and Safety (EHS) Division

Standard Operation Procedure (SOP) #19 – Revised September 2020

---

Prohibited condition – any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

Rescue service – the personnel designated to rescue employees from permit spaces.

Retrieval system – the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Testing – the process by which the hazards that may confront entrants of a permit space are identified and evaluated, testing includes specifying the tests that are to be performed in the permit space.

**Note:** Testing enables Lafayette College both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during entry.

Responsibilities

## Responsibilities

### Environmental, Health and Safety

- Serve as primary resource and contact on confined space issues.
- Review and update the College's Permit Required Confined Space Entry program annually.
- Identify and evaluate each hazard of the permit spaces, including determination of severity.
- Establish and implement the means, procedures, and practices by which the permit spaces can be entered safely.
- Assist in training employees on the requirements of this SOP and OSHA's Permit Required Confined Space standard.

### Department Head

- Ensure that new hires and transfers who are required to work in permit spaces receive training on entering and working in confined spaces.
- Be familiar with this SOP and ensure that proper procedures and practices are followed.
- Work directly with Supervisors and the Assistant Director of Public Safety to maintain and update this SOP as necessary.
- Hold Supervisors accountable for following this SOP and the requirements of OSHA's Permit Required Confined Space standard.

### Supervisor

- Train employees so attendants, authorized entrants and personnel authorizing or in charge of entry can work safely in and around the permit space.
- Provide, maintain and ensure the proper use of the equipment necessary for safe entry, including testing, monitoring, communication and personal protective equipment.
- Ensure that the procedures and equipment necessary to rescue entrants from permit spaces are implemented and provided.
- Ensure that all pedestrian, vehicle or other barriers necessary to protect entrants from external hazards are provided.

# Lafayette College Confined Space Entry Program

## Public Safety Department – Environmental, Health and Safety (EHS) Division

Standard Operation Procedure (SOP) #19 – Revised September 2020

---

- Ensure that contractors who plan to send employees into a permit space are provided with all available information on permit space hazards; on efforts to comply with this standard; and on any other workplace hazards, safety rules and emergency procedures of which the contractor needs to be aware in order to comply with this standard.
- Post signs near permit spaces to notify employees what hazards may be present and that only authorized entrant may enter the permit spaces.

### Individual Authorizing Entry (IAE)

- Determine that the entry permit contains the requisite information before authorizing or allowing entry.
- Determine that the necessary procedures, practices and equipment for safe entry are in effect before allowing entry.
- Determine, at appropriate intervals, that entry operations remain consistent with the terms of the entry permit, and that acceptable entry conditions are present.
- Cancel the entry authorization and terminate entry whenever acceptable entry conditions are not present.
- Take the necessary measures for concluding an entry operation, such as closing off a permit space and canceling the permit, once the work authorized by the permit has been completed.
- Remove unauthorized personnel who are in or near entry permit spaces.

**Note:** The Individual Authorizing Entry may also serve as an authorized entrant or attendant for an entry if they have the proper training.

### Authorized Entrant (AE)

- Know and understand the hazards which may be faced during entry.
- Recognize the signs and symptoms of exposure to a hazard.
- Understand the consequences of exposure to a hazard.
- Maintain contact with the attendant.
- Notify the attendant when the entrants self-initiate evacuation of a permit space.
- Be aware of the personal protective equipment, such as retrieval lines, respirators or clothing, needed for safe entry and exit.
- Use the provided personal protective equipment properly.
- Be aware of the external barriers needed to protect entrants from external hazards and of the proper use of those barriers.
- Exit the permit space, unless it is physically impossible to do so, when:
  - The attendant orders evacuation;
  - An automatic alarm is activated;
  - The authorized entrants perceive that they are in danger.

### Attendant

- Remain stationed outside the permit space at all times during entry operations;
- Maintain an accurate count of all persons in the space;
- Know of and recognize potential permit space hazards, monitor activities inside and outside the permit space to determine if it is safe for entrants to remain in the space;
- Maintain effective and continuous contact with authorized entrants during entry;

# Lafayette College Confined Space Entry Program

## Public Safety Department – Environmental, Health and Safety (EHS) Division

Standard Operation Procedure (SOP) #19 – Revised September 2020

---

- Order authorized entrants to evacuate if any prohibited or hazardous conditions develop during entry;
- Summon rescue and other emergency services as soon as the attendant determines that authorized entrants need to escape from permit space hazards;
- Take the following actions, as necessary, when unauthorized persons approach or enter a permit space while entry is underway;
  - Warn the unauthorized persons away from the space;
  - Request the unauthorized persons to exit immediately if they have entered the permit space; and
  - Inform the authorized entrants and any other persons designated by the employer if unauthorized persons have entered the permit space.
- Do not enter the permit space to attempt rescue of entrants;
- Properly use any rescue equipment provided for their use and perform any other assigned rescue and emergency duties, without entering the permit space.

### Confined Space Entry Procedures

All confined spaces on campus have been classified as permit-required confined spaces. However, many of these spaces carry very low hazard potential and generally may be entered safely following the procedures listed below and applicable safe work practices such as energy control (lockout/tagout) and fall protection.

1. Contact the Mechanical Trades Supervisor (X-5378) or the Steam Plant Supervisor (X-5379) and inform that you need to enter a permit-required confined space (Appendix C of this SOP lists our permit-required confined spaces).
2. The supervisor or someone trained as an Individual Authorizing Entry (IAE), will complete the Pre-Entry Checklist (Appendix A).
  - a. If conditions are in compliance with the requirements of the Pre-Entry Checklist and there is no reason to believe conditions may change adversely, the IAE will sign the checklist.
  - b. The space is now re-classified as a non-permitted confined space and entry is permitted. The completed checklist will remain at the site until entry is complete. Entry into a non-permitted space does not require an attendant.
3. If conditions are **not** in compliance with the Pre-Entry Checklist or there is reason to believe that conditions may change adversely, the space remains classified as a permit-required confined space and the IAE will notify their supervisor and EHS and begin completing the Confined Space Entry Permit (Appendix B). The supervisor and EHS will review entry procedures and coordinate with emergency responders, including Lafayette College Public Safety and the Easton Fire Department prior to approving entry.

# Lafayette College Confined Space Entry Program

Public Safety Department – Environmental, Health and Safety (EHS) Division

Standard Operation Procedure (SOP) #19 – Revised September 2020

---

## Emergency Rescue Procedures

In case of an emergency and/or injury within a confined space:

1. **Do not enter the confined space.**
2. Contact Public Safety via two-way radio or via emergency line (610-330-4444).

Emergencies during a confined space entry can have catastrophic consequences if entrants, attendants, and potential rescuers have not developed a plan of action in advance. Appropriate means for rescue must be established prior to entry, selected from the following degrees of rescue procedures.

### Self-Rescue

Entrant self-rescue generally provides the most effective means of escaping a recognized confined space hazard. Self-rescue must immediately be implemented whenever an entrant, fellow entrant, or attendant recognizes the presence of a hazardous atmosphere, any signs or symptoms of over-exposure, or any other serious space hazards. Self-rescue must also be implemented in the event of forced ventilation system failure during entry. Self-rescue requires entrants to safely stop whatever they are doing and exit the space in the most expedient and safe manner possible. Self-rescue is simple, fast, provides individuals with the ability to alert fellow workers, and does not require anyone else to enter the space, thereby avoiding the endangerment of more people. The obvious drawback is that it requires the entrant to be conscious and physically mobile, and therefore unsuited for entrants who have suffered serious exposure or injury.

### Non-Entry Rescue

When self-rescue is not possible due to unconsciousness or incapacitation of an entrant, non-entry rescue should be initiated. Under this method, mechanical equipment is used to physically extract, lift, pull, or otherwise remove entrants from the confined space without requiring any additional persons to enter into the space. Non-entry rescue equipment typically consists of a body harness, non-conductive cable or rope, winch, and tripod that can be operated from outside of the confined space by the attendant. Non-entry rescue reduces the risk of collateral injury to rescuers, but is only effective on simple vertical or clear horizontal spaces. Since mechanical retrieval of unconscious or incapacitated entrants from complex, convoluted spaces can cause serious injuries from entanglement, strangulation, and blunt force impacts, this method of retrieval must be carefully evaluated before implementation.

### Entry Rescue

Entry rescues are the most dangerous form of confined space rescue since they require additional persons to enter into the very space that caused injury or over-exposure to the entrant(s). Entry rescue may only be attempted by appropriately trained individuals possessing active certification in and knowledge of first aid/CPR, self-contained breathing apparatus, rescue/retrieval equipment, and rescue training. Lafayette College relies on the Easton Fire Department for entry rescues.



# Pre-Entry Checklist

## Lafayette College - Confined Space Entry Program

*This checklist must be used prior to entering any confined space to determine if a confined space permit is required.*

<b>Date:</b>	<b>Time:</b>	<b>Location:</b>
<b>Purpose of Entry:</b>		
<b>Description of Work:</b>		

### Surrounding Area Evaluation

Questions	Yes	No
Did your evaluation of the surrounding area show it to be free of hazards such as drifting vapors from tanks, vehicles, motors, piping, or sewers?	<input type="checkbox"/>	<input type="checkbox"/>
Does your knowledge of industrial or other discharges indicate this area is likely to remain free of dangerous air contaminants while occupied?	<input type="checkbox"/>	<input type="checkbox"/>
Have you been trained in the operation of the gas monitor being used?	<input type="checkbox"/>	<input type="checkbox"/>
Has the gas monitor been calibrated according to the manufacturer's requirements (within the last year)?	<input type="checkbox"/>	<input type="checkbox"/>

### Atmospheric Monitoring

(record initial monitoring results prior to entry)

Hazard	Initial Reading	Acceptable Yes	Acceptable No
<b>Oxygen</b> (Acceptable: 19.5% - 23.5%)		<input type="checkbox"/>	<input type="checkbox"/>
<b>LEL</b> (Acceptable <10%)		<input type="checkbox"/>	<input type="checkbox"/>
<b>CO</b> (Acceptable <35 ppm)		<input type="checkbox"/>	<input type="checkbox"/>
<b>H<sub>2</sub>S</b> (Acceptable <10 ppm)		<input type="checkbox"/>	<input type="checkbox"/>

### Confined Space Work Evaluation (complete prior to entry)

Questions	N/A	True	False
Atmospheric conditions are within acceptable limits of the above hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organic solvents will not be used in the work procedure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Open flame torches will not be used in the work procedure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Entrants will not be exposed to the seepage of gas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The work being performed in the confined space will not create a hazardous atmosphere or condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All hazards have been isolated (electrical, piping, mechanical, duct work, hydraulic, pneumatic).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A hot work permit is not necessary.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The entrant has a two-way radio.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The authorized entrant has been instructed on rescue/emergency procedures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If any part of this checklist is left blank, answered **no or false**, or there is reason to believe that the conditions may change adversely, **do not enter** and contact your supervisor for further instruction.

If all questions are answered yes or true and there is reason to believe conditions may not change adversely, sign below, maintain this checklist at the job site and enter the confined space.

\_\_\_\_\_  
Signature of Individual Authorizing Entry

\_\_\_\_\_  
Date

**\*Each department must maintain copies of completed entry forms for at least 2 years.**

**EMERGENCY PROCEDURES: Do not enter the space. Contact Public Safety by two-way radio or call 610-330-4444**

# Confined Space Entry Permit

## Lafayette College - Confined Space Entry Program

<b>Date:</b>	<b>Time:</b>	<b>Location:</b>
<b>Purpose of Entry:</b>		
<b>Description of Work:</b>		
<b>Description of Space:</b>		
<b>Entrants</b>	<b>Attendants</b>	<b>Contractor Name</b>

### Ventilate Confined Space

Is continuous mechanical ventilation operating within the space?	N/A	Yes	No
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### Test Atmosphere Prior to Entry

Hazard	Initial Reading	Acceptable Yes	Acceptable No
Oxygen (Acceptable: 19.5% - 23.5%)			
LEL (Acceptable <10%)			
CO (Acceptable <35 ppm)			
H <sub>2</sub> S (Acceptable <10 ppm)			

### Identify Hazards in the Space (circle all that apply)

Flammable   Irritant   Solid   Corrosive   Dust   Liquid   Toxic   Asbestos   Gas
Other: _____

### Isolate Hazards (do not enter to perform)

Hazard Type	N/A	Yes	No
Electrical (lockout/tagout)			
Piping (lockout/tagout, blinded, block & bleed)			
Pneumatic (lockout/tagout, disconnect, lockout & bleed)			
Mechanical (block linkage, disconnect linkage)			
Duct work (lockout/tagout, disconnect ducts, lock dampers)			
Hydraulic (lockout/tagout, disconnect lines, bleed)			
Vehicular (railing/cones installed around manhole)			

# Confined Space Entry Permit

## Lafayette College - Confined Space Entry Program

Questions	Yes	No
Are you trained in the operation of the gas monitor being used?		
Has the gas monitoring instrument been calibrated as recommended by the manufacturer (once/year)?		
Did you test the atmosphere of the confined space prior to entry?		
Will the atmosphere be continuously monitored while the space is occupied?		
Did you determine if a Hot Work Permit is necessary? If so, did you obtain a Hot Work Permit?		
Does the attendant have a two-way radio?		
Did you instruct the authorized entrant on the emergency procedures?		

**If any part of this permit is left blank, answered no, or there is reason to believe that conditions may change adversely, do not enter.**

If all parts of this permit are complete and answered yes and there is reason to believe conditions may not change adversely, sign below, maintain permit at job site. Entry shall not occur until these procedures have been reviewed, approved, and signed by the individuals listed below.

\_\_\_\_\_  
Signature of Individual Authorizing Entry

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of EHS

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Supervisor

\_\_\_\_\_  
Date

**\*Each department must maintain copies of completed entry forms for at least 2 years.**

**POST COMPLETED PERMIT AT JOBSITE (permit is valid for only one shift)**

**EMERGENCY PROCEDURES: Do not enter the space. Contact Public Safety by two-way radio or call 610-330-4444.**

# Permit-Required Confined Spaces

These spaces may be reclassified as non-permitted spaces after successful completion of our Pre-Entry Checklist.

## Campus-Wide

1-50	Sewer Manholes (approx. 50)
50-100	Steam Manholes (approx. 50)
101-137	Electric Manholes (37)
138-172	Telephone Manholes (35)
173-198	Heating, Venting, and Air Conditioning (HVAC) Systems

## Steam Plant

199	Fuel Oil Tank
200	Boiler #2 (includes firebox & steam drum)
201	Boiler #3 (includes firebox & steam drum)
202	Boiler #5 (includes firebox & steam drum)
203	Boiler #6 (includes firebox & steam drum)
204	DA Tank
205	Condensate Tank

## Other Campus-Wide

206	Simon Center Manhole 19 (west)
207	Simon Center Sewer Pit (east)
208	Pardee Manhole
209	Williams Art Center Manhole
210	Farber Hall Tunnel
211	Farber Hall Elevator Shaft
212	Keefe Hall Sewer Manhole
213	Fisher Field Pit (water main shutoff)
214	Hugel Hall Neutralization Pit
215	Metzger Fields Well Pit
216	Colton Chapel - Dan O'Neil Plaza Manhole (water for fountain)