



CONFINED SPACE PROGRAM		
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- **SUBJECT:**
 - ✓ Confined Space
- **REGULATORY STATUTES:**
 - ✓ 29 CFR 1910.146 Confined Space

Purpose: The purpose of this program is to protect the employees of Case Western Reserve University, who must enter into, work in, and exit from confined spaces, from the risks of exposure to serious hazards such as entrapment, engulfment and hazardous atmospheric conditions.

General: Case Western Reserve University (CWRU) will ensure that all potential hazards are inspected before entrance into a confined space. This standard practice instruction is intended to address the inspection process and to identify potential hazards within confined spaces.

Responsibility: The Case Western Reserve University Directors of EHS or their designees are solely responsible for all facets of this program and has full authority to make necessary decisions to ensure success of the program. The Directors of EHS are the sole persons authorized to amend these instructions and are further authorized to halt any operation where there is danger of serious personal injury.

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I. Purpose

- a. The purpose of this program is to ensure the safety of all employees when working in confined spaces through proper training and atmospheric monitoring. When entering a permit-required confined space all requirements of this document shall be met. Declaring a permit required confined space shall follow the flow chart or be determined as listed below.
- b. A confined space is an enclosed space which:
 - i. Is large enough and so configured that an employee can bodily enter and perform assigned work
 - ii. Has limited or restricted means for entry or exits
 - iii. Is not designed for continuous employee occupancy
- c. A permit required confined space is a confined space as determined above that has one or more of the following characteristics:
 - i. Contains or has a known potential to contain a hazardous atmosphere
 - ii. Contains a material with the potential for engulfing an entrant
 - iii. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or a floor which slopes downward and tapers to a smaller cross-section
 - iv. Contains any other recognized serious safety or health hazard

II. Definitions

- a. **Acceptable entry conditions-** means 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 and work within the space.
- b. **Attendant-** means an individual stationed outside a permit space who monitors the authorized entrants and who performs all attendants' duties assigned in the CWRU permit space program.
- c. **Authorized entrant-** means an employee who is authorized by CWRU to enter a permit space.
- d. **Blanking or blinding-** means the absolute closure of a pipe, line, or duct by the fastening of a solid plate that completely covers the bore and is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.
- e. **Confined space** -means a space that:
 - i. Is large enough and so configured that an employee can bodily enter and perform assigned work; and
 - ii. Has limited or restricted means for entry or exit (i.e.; tanks, vessels, silos, storage bins, hoppers, vaults and pits); and
 - iii. Is not designed for continuous employee occupancy.

- f. **Double block and bleed-** means 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.
- g. **Emergency-** means any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.
- h. **Engulfment-** means the surrounding and effective capture of a person by a liquid or finely divided (flow-able) substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.
- i. **Entry-** means 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 when any part of the entrant's body breaks the plane of an opening into the space.
- j. **Entry permit-** means the written or printed document provided by the employer to allow and control entry into a permit space.
- k. **Entry supervisor-** means the person 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 part.

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

- l. **Hazardous atmosphere-** means an atmosphere having one or more of the following characteristics:
 - i. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL).
 - ii. Airborne combustible dust at a concentration that meets or exceeds its LFL
- m. **Hot work permit-** means the employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.
- n. **Immediately dangerous to life or health (IDLH)-** means any condition that poses an immediate or delayed threat, would cause irreversible adverse health effects, or would interfere with an individual's ability to escape unaided from a permit space.
- o. **Inerting-** means the displacement of the atmosphere in permit space by a non-combustible gas to such an extent that the resulting atmosphere is non-combustible.
- p. **Isolation-** means 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 and bleed system; lockout or tag out of all sources of energy; or blocking or disconnecting all mechanical linkages.

- q. **Line breaking-** means 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.
- r. **Oxygen deficient atmosphere-** means an atmosphere containing less than 19.5 percent oxygen by volume.
- s. **Oxygen enriched atmosphere-** means an atmosphere containing more than 23.5 percent oxygen by volume.
- t. **Permit-required confined space (PRCS or permit space)-** means any space that has one or more of the following characteristics:
 - i. Contains or has potential to contain a toxic and /or hazardous atmosphere;
 - ii. Contains a material that has the potential for engulfing an entrant;
 - iii. Has internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section; or
 - iv. Contains any other recognized serious safety or health hazard.
- u. **Permit-required confined space program (permit space program)** means the employer's overall program for controlling, protecting employee in, permit space hazards and for regulating employee entry into permit spaces for their safety.
- v. **Permit system** means the employer's written procedure for preparing and issuing permits and for returning the permit space to service following termination of entry.
- w. **Prohibited condition** means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.
- x. **Rescue service** means the personnel designated to rescue employees from permit spaces (Cleveland Fire Department).
- y. **Retrieval system** means the equipment used for rescue of persons from permit spaces.
- z. **Testing** means 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 done in the permit space.

*****NOTE:** *Testing enables employers both to devise and implement adequate control measures for the protection of an authorized entrant and to determine if acceptable entry conditions are present immediately before, during entry, and occupancy.*

III. Responsibilities

a. Case Western Reserve University

- i. Case Western Reserve University shall provide CWRU Employees all the necessary equipment as required by OSHA 29 CFR, Part 1910.146 (d)(4)(i) through (d)(4)(ix). Establish a written program in accordance with the entire Federal Regulations, Title 29, Part 1910.146.

b. Environmental Health & Safety Manager (EHS)

- i. EHS shall be responsible for the development, documentation and the administration of the Case Permit-Required Confined Space Program. A Safety Officer shall serve as the Confined Space Program Administrator.
- ii. The Safety Office shall:
 1. Develop a written standard operating procedure
 2. Evaluate locations and determine classifications
 3. Provide guidance to entrants, attendants and rescue services
 4. Provide training to entrants and attendants
 5. Maintain training records
 6. Maintain equipment inventory
 7. Evaluate completed permits and program annually

c. Designated Entry Supervisor(s)

- i. The designated entry supervisor is anyone who has been given written authority and sanctions in lieu of the customary supervisor
- ii. The director of facility service personnel is responsible for the following:
 1. Having knowledge of the hazards and potential hazards associated with the specific permit space including mode of exposure (e.g., respiratory, dermal), sign or symptoms, and consequences of exposure that may be faced during entry.
 2. Verifying that the appropriate entries have been made on the permit and that all tests specified have been conducted, and all equipment specified on the permit is in place, before endorsing the permit and allowing entry to begin.
 3. Terminating the entry and canceling the permit when the entry operation has been completed or a prohibited condition arises in or near the space.
 4. Verifying that rescue services are available and that the means for summoning them are operational.
 5. Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations.
 6. Ensuring that the entry operations remain consistent with the terms of the entry permit and that acceptable entry conditions are maintained.

d. Entrant

- i. The entrant is any employee who is breaking the plane of a designated confined space.
- ii. This person shall:
 1. Know the hazards involved, including information of mode of exposure, signs or symptoms, and consequences of the exposure.
 2. Know the proper use of equipment which includes, but, is not limited to testing/atmospheric monitoring equipment, ventilation, communications, personal protective equipment (PPE), lighting, barriers and shields, ladders, rescue and emergency equipment and any other equipment necessary for safety entry into and rescue from permit spaces.
 3. Communicate with attendant as necessary to monitor status and/or alert entrant the need to evacuate a space.

e. Attendant

- i. An attendant is a person who is designated to evaluate and communicate with an entrant.
- ii. An attendant shall:
 1. Be aware of the hazards involved, including information of mode of exposure, signs or symptoms, and consequences of an exposure.
 2. Be aware of possible behavioral effects of an exposure suffered by an entrant.
 3. Be aware of all persons within a space and continually maintain an accurate count and the means used to identify an entrant.
 4. Remain outside the permit space during entry operations until relieved by another attendant.

f. Rescue and Emergency Services

- i. Rescue services shall be provided by Cleveland and Cleveland Heights Fire Departments. The direct contact numbers for these are: 216-621-1212 (Cleveland) and 216-321-1212 (Cleveland Hts) or may be contacted through Protective Services from phone 216-368-3333 or Radio on "Emergency" Channel.
- ii. Non-entry rescue may be done by the attendant after the call has been placed of emergency services.
- iii. Monthly inspections can be conducted by qualified persons designated by the department. Monthly inspections should be documented; include all items described for the daily inspections, as well as the following:
 1. Deformed, cracked or corroded members and braces, or missing fasteners.
 2. Cracked or worn sheaves, drums, sprockets, clamping devices, bumpers, etc.

IV. Confined Space Equipment

- a. Some equipment shall be used as confined space equipment that is utilized during normal working conditions, such as Motorola radios. Other equipment that is strictly used as fall protection (i.e. harness and lanyards) is also used in confined space work.

- i. **Atmospheric Testing Equipment**

- 1. The Multi-Rae Plus shall be the instrument used to sample the air. These units are available at the CWRU EHS Department. The said instrument shall be equipped with the confined space probe with a water stop filter. This shall be “fresh air” calibrated prior to sampling in the atmosphere in the designated location. Sampling shall be conducted as instructed by the entry supervisor or by following the permit guidelines.
 - 2. This instrument shall remain on the entrant until work has been completed and all personnel have been removed from the location.

- ii. **Motorola Radio**

- 1. The Motorola radios will be the first choice of communication between entrant and attendant. The channel shall be tested prior to entry and verified on the permit. If at any time communication is lost, entrant shall establish face-to-face verbal communication with the attendant and/or entry supervisor. At that time the supervisor shall determine the form of communication that will be used for re-entry or terminate the permit and remove all personnel from the location. The security channel shall be tested prior to entry to establish and verify communication to emergency services. Currently Case is utilizing the MTX 9250 series radios and repeaters.

- iii. **Harnesses, Belts and Other Restraints**

- 1. Fall and retrieval equipment shall be donned prior to entry. Any part of the body breaking the “plain” shall have this equipment and have previously met the atmospheric qualifications. Prior to donning the entrant shall check the stitching, buckles, eyelets and fasteners to ensure the usability. Each item will be inspected for mildew, wear, damage or other deterioration. The manufactured date shall not exceed 5 years as per the appropriate CFR. If the 5 year date has passed, the equipment shows wear or was involved in a fall the equipment shall be removed from service and/or destroyed.
 - 2. The aggregate weight of the wearer and tools shall not exceed 310 pounds. In this case the tools shall be lowered separately from the entrant.

- iv. **Tripod and Wenches**

- 1. The tripod shall be inspected for any bent parts, missing items, chains secured and pins inserted correctly in the corresponding holes. The wench shall be inspected for usability, frayed cable or bird-caged cable, bent or unusable crank handle and connector clasps. Any part found to be unsatisfactory shall be removed and marked as such or destroyed. Upon placement of tripod, ground shall be free of any debris or obstructions. Foot pads

shall be firmly planted on level ground. Legs shall be extended out completely, chain restraints shall be in place as shall the leg extension pins. Wench shall be firmly mounted to the tripod and the pulley(s) also to the top or sides.

v. **Barrier/Exclusion Equipment**

1. Many items may be used as barriers, including vehicles, Cushman carts and buildings.
2. Utilization of orange cones and caution tape expressing confined space shall be used when appropriate. The exclusion zone shall be large enough to contain all equipment, attendant and an area large enough to perform a rescue. Suggested radius or square for an entry will be a minimum of ten (10) feet. Proper posting shall be used to defer any unwanted traffic and advise the public that there is a hazardous area.

vi. **PPE and Respiratory Protection**

1. Personal protection shall be determined prior to entry. The department unit/supervisor shall review the permit and location to decide what PPE is appropriate. Mandatory PPE shall include safety glasses, gloves, hard hat, and safety toe shoes if falling objects or the ability of the entrant to fall exists. A Tyvex suit may be used in a dirty environment, but may be required if certain hazards are present.
2. A respirator or PAPR shall be required if there is an apparent risk of exposure to asbestos or any other type of airborne respiratory hazard. Supplied Air (SA) shall only be used under the direction of the Safety Department, and under no circumstances shall any employee of Case Western Reserve University enter an immediately dangerous to life and health atmosphere (IDLH).

V. Entry Requirements

- a. Entry requirements are essential to the safety and well fair of each employee. This procedure must be followed in order to establish a safe working atmosphere with a successful entry and egress from an established location.

i. **Monitoring Requirements**

1. Using the Multi-Rae Plus multi-gas detector as previously mentioned, the entry team (entrant, attendant and supervisor) may establish the presence of flammable and toxic gases and to what extent the oxygen concentration value is inside of any given location.
2. The acceptable oxygen concentration is 19.5% through 23.5%.
 - A. **Oxygen Deficient Atmosphere:** If the oxygen level is below 19.5%, which is referred to as an oxygen-deficient atmosphere, there are two options available:
 01. Do Not Enter!

02. Ventilate to restore **and** maintain the acceptable oxygen concentration. If ventilating is used, Safety must be notified and it must be documented on the permit.

B. **Oxygen Enriched Atmosphere:** If an oxygen level above 23.5%, which is referred to as an oxygen-enriched atmosphere, is present, follow the same procedures as stated above. An oxygen-enriched atmosphere will support combustion and may ignite with the smallest of sources. For example the static discharge from your body is enough to ignite this atmosphere. Currently there are no known PPE materials to protect a person from fire in this type of atmosphere.

C. **Flammable Atmosphere:**The presence of a flammable gas in the atmosphere is surveyed with the multi-gas detector. It measures the LEL or lower explosion limit, which OSHA has set at 10%. If an alarm alerts we must look at the task being performed in order to establish what action level should be taken. At no time will an employee enter when the 10% has been exceeded. The steps that should be taken shall be the same as stated above.

D. **Toxic Gases:** The presence of toxic gases/vapors is also detected with the multi-gas detector in the same manner as per flammables and the oxygen concentration. The alarm will sound at the preset limit; the limit is different for several different toxins. The steps shall be followed as stated above.

ii. **Permit Requirements**

1. All fields are required to be filled out prior to entry. Entry is established using the findings listed. All personnel must be documented and their rolls/responsibilities clearly stated. All parties listed must sign; affirming that all entry requirements in this program and the permit have been met.
2. Any questions about the location, permit, or equipment shall be communicated to Safety and noted on permit prior to entry. If there are any doubts, entry shall be delayed until an investigation has been conducted and all parties are satisfied.

iii. **Contractors and Sub-Contractors**

1. Contractors are any person/persons not specifically employed by Case Western Reserve University, but hired to conduct business on Case premise on a job-to-job basis. Sub-contractors are a third party hired within a contractor to perform business on Case premise.
2. Case Western Reserve University shall recognize a program presented from a contractor/sub-contractor as long as it meets the requirements stated in the law.
3. Contractors/Sub-Contractors shall also recognize CWRU Program and adhere to the permitting requirements set fourth within this program. Contractors/sub-contractors shall make available upon request any training documents, equipment certifications, and any

other items deemed necessary to assess ones competence, in order to ensure Cases' program and the law are followed. While on the premise of Case Western Reserve University contractors/sub-contractors are subject to random inspection.

iv. **Right-to-Know**

1. All contractors and sub-contractors shall be given a right-to-know training course before any business is conducted. The training shall be valid for the period of one (1) year within a specified location. If work shall impede into an unspecified location, the location is separate from the location (different building) or the one year period has been exceeded a re-training class shall be required

VI. Recordkeeping and Review Requirements

- a. CWRU shall maintain all permits as required by law and shall make available to any governing body within a timely manner.
- b. An employee within the CWRU EHS Department having the appropriate credentials shall review all completed permits and make needed adjustments on the permit. The program itself shall be reviewed and adjustments shall also be added. Notification shall be given to all affected parties. Once the review is complete the said individual shall sign and date program.
- c. Annual training will be conducted for all maintenance staff.

VII. Locations

- a. Locations shall be labeled with proper signage. Locations shall be investigated annually and upon request. Non-permit locations could possibly be upgraded to a permit required location, during or prior to an entry, if hazards are found to be in the location. Permit required locations may also be downgraded after specific requirements have been established during an investigation.
- b. At this time the CWRU EHS Department has established that all intake air handlers shall be deemed a confined space. Only the operations that affect the atmosphere within the space (i.e. hot work) during such time as occupied entrants shall conform to the Hot Work regulations within a confined space 29CFR1910.252 (a)(4).

i. **Permit Required Locations**

1. Back flow vault located behind lot #53 (south)
2. Water – main feed located East entrance of lot #53
3. Water main vault located at Adelbert Road directly in front of 1 to 1 Fitness
4. Fire protection vault located on the front lawn of 1 to 1 Fitness.
5. HSC water main vault located on the front lawn – dorm fire and lawn sprinkler
6. Water main vault located in the Adelbert Road yard area – for Macro and Quad
7. Sewer manhole located at Adelbert Road sidewalk N.E. corner in front of Macro

8. DCW and fire vault located on the sidewalk of Pathology just outside of the transfer vault
*** NOTE*** Gas is also in vault***
9. Sewer and acid dilution vault located in the front lawn of Biology *** NOTE *** Acid may be present***
10. Water vault located 20 feet from sewers on grass hill by Millis sidewalk
11. Water backflow vault located on the S.E. corner on the lawn of Adelbert Hall
12. Sewer manhole located N.E. corner by Adelbert Road at Adelbert Hall
13. Manhole on the North side at Adelbert Hall
14. Water meter vault located at Baker on the East side in the middle of sidewalk
15. Manhole located at Amasa Stone parking lot near Quad
16. Water meter backflow vaults (2) located at Crawford in the N.E. near information booth
17. Manhole water valve located in the S.E. of Crawford parking lot before Quad
18. Sewer manhole located N.W. corner grassy area of Pardee
19. Sewer manhole located in the N.W. corner on the blacktop of Pardee
20. Sewer manholes (2) located on the Quad near Tomlinson patio on grassy knoll
21. Transformer vault located at Tomlinson
22. Sewer manhole located in front of Tomlinson in shrubbery cover, behind wall
23. Sewer manholes (2) located on the Quad side walkway North entrance of Yost
24. Fountain vaults (2) located at Pardee S.W. side
25. Sewer and meter vault located in sidewalk on Cedar Road at University West
26. DC main water manhole located in the grass on the left side of the Service Building
27. Manhole of the old water main located near Med Center driveway at Health Services
28. Water main located near Med Center driveway at Health Services
29. Manhole located near Med Center in driveway at Health Services
30. Meter manhole located on grassy knoll of Old med Park
31. DW and fire manholes (2) located on Circle Drive near Fire stand pipe at HSC
32. Water main manhole located at HSC on the Cornell side in sidewalk
33. Water meter pit and fire protection located at HSC North side by emergency drive
34. Transformer vault located at Thwing
35. Sewer manhole located in front window well of Thwing
36. Sprinkler pit located in the tree lawn near Euclid Ave. at Claude Foster Park
37. Water meter vault located in front of Mather House by the curb
38. Sewer manhole located on the front lawn of Mather House
39. Sewer manhole located at the S.E. corner by light pole at Mather Dance
40. Transformer vault located at Mather Dance
41. Storm manhole located at Mather tennis courts

42. Sewer manholes (2) located in the grass on the North side of Mather Gym
43. Transformer vault located at Guilford
44. Fire main manhole located on the North side in the sidewalk at Guilford
45. Dorm water manhole located North at the tree lawn of Guilford
46. Fountain vault located in front lawn of Guilford
47. DWC vault located on Bellflower Road in front of old tennis courts ***Not in use***
48. DWC vault manhole located by the front entrance steps at Freiburger
49. Water meter vault located at the curb on Bellflower in front of Clark Hall
50. Acid dilution system for New Med located in basement adjacent to Nursing Service entrance.
51. Acid dilution system for Biology located in front lawn facing Adelbert Road.
52. Acid dilution system for Old Med located in the sidewalk areas facing Rainbow Babies and Childrens Hospital one on the East and the other on the West , 30 feet down from finish grade of sidewalk.
53. Acid dilution system for Millis located in the basement tunnel, there are three 6' diameter 8' high tanks spaced 100 feet apart.
54. Acid dilution system for Morley located behind the building in the roadway.
55. Acid dilution system for Smith Chemistry located inside building on the first floor near the service elevator.
56. Acid dilution system for Pathology located within the vault in the West lawn area.
57. Abandoned acid dilution systems for Wickenden and Glennan .

ii. **Non-Permit Required Confined Space Locations**

1. Sewers (3) located on Adelbert and Circle Drive near lot #53 *** Note*** 2 in sidewalk and 1 in lawn***
2. Sewer located at the N.W. corner old Med in lawn
3. Sewer located at the S.W. corner of RB&C in lawn
4. Sewer located in the shrubbery near the stairs upon front entrance to McDonald House
5. Sewer located in front of BRB in driveway
6. Sewer located in the lawn area across from Old Med near RB&C
7. Sewer located in the sidewalk on the N.E. side of Schmidt leading into Millis
8. Sewer located on the N.W. corner of Pathology
9. Sewer located near transformer on the North side of Pathology
10. Crawl space below 1st floor on the West end located in Pathology
11. Sewer located on the lawn area of the West corner of Adelbert
12. Storm sewer located in the driveway across from the automatic gate at Adelbert Hall
13. Sewer located in the drive of the parking lot of Amasa Stone

14. Sewer located at the driveway entrance off Euclid Ave. at Crawford
15. Storm sewer located in the garage driveway to East Blvd. at Crawford
16. Sand Interceptor located in the mechanical room of the N.E. corner of Crawford
17. Sewers (2) located at the garage entrance to Crawford
18. Sewer located in the sidewalk of the entrance driveway of University West
19. Sewers (2) located at the corner of Cedar (N.E. side) driveway of University West
20. WG-14 located in the Old Med Building
21. Fan exhaust and intake pit located in HSC podium
22. Snake and sewer manhole located in driveway N.W. corner of Med Center
23. Storm sewer manhole located on the N.W. corner in the grassy area of HSC
24. Exhaust fan rooms located in the BRB
25. 7th floor exhaust fans located in New Med
26. Sump pump in chiller room located in New Med
27. Sump pump "EB-65" located in New Med
28. Perimeter tunnel located in Medical side of the Campus
29. Sanitary sewer located in the tree lawn in front of Thwing
30. Manhole located in the tree lawn in front of Thwing
31. Storm sewer located next to water main vault on Bellflower Road