**County of Henrico**

**Permit-Required Confined Space Program**

**Department of \_\_\_\_\_\_\_\_\_\_\_**



**Date: \_\_\_\_\_\_\_\_\_\_\_\_**

**Permit-Required Confined Space Program**

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# Objective

The objectives of this written Confined Space Program are to protect the health and safety of all Henrico County employees who enter into and/or work in close proximity to permit-required confined spaces, and meet the Virginia Occupational Safety & Health (VOSH) Permit-Required Confined Space Standard 29 CFR 1910.146. County of Henrico employees working for the Department of *(\_\_\_\_ABC\_\_\_\_\_\_)* are specifically covered by this written program.

1. **Policy**

County of Henricopolicy prohibits entry into permit-required confined spaces without first identifying and, if necessary, eliminating or isolating all potential hazards. Before workers enter a permit-required confined space, the Entry Supervisor or other Competent Person at the site will make every effort to eliminate or isolate all existing or potential hazards. This is done in order to reclassify the confined space using alternative procedures establish by the VOSH standards or to classify the space as “non-permit-required”. The procedures set forth in this program must be followed by all Department of *(\_\_\_\_ABC\_\_\_)* employees prior to entering any confined space. A qualified contractor shall be hired for confined space entry and all necessary work within the confined space if the atmosphere within the confined space is Immediately Dangerous to Life and Health (IDLH).

1. **County of Henrico**

The County has overall responsibility for the work site. If a contractor is hired and controls the Department’s jobsite, the site supervisor must notify the Contractor’s designated representative about each applicable permit-required confined space present on the site, its location, and any hazards it poses.

1. **Assignment of Responsibility**

The County of Henrico has delegated the overall responsibility for Confined Space Safety to each affected Department Head and/or his/her designees.

A Department may divide or assign shared responsibility for ensuring all employees adhere to the Permit-Required Confined Space Program requirements as set forth by 29 CFR 1910.146.

1. **Entry Employer**

The Entry Employer is the Department and/or any Contractor that employs or directs employees who will enter any confined space. The Department/Division and/or Contractor are responsible for the safety of all employees who will be assigned to work inside, or around, confined spaces. When the Department or Division and/or a Contractor both have employees working inside or around the same confined space, each is considered to be the Entry Employer for the specific employees they employ/direct; and both employers will work cooperatively to ensure the safety of all persons working in and around the confined space.

If it is necessary for Department or Division employees to enter a permit-required confined space, the Entry Supervisor, or designee, will ensure that the Competent Person and/or Entry Supervisor has a copy of the Confined Space Entry Program and Entry Permit available at the entry site. The Entry Supervisor, or designee, will also ensure employees understand all aspects and content of the Confined Space Entry Program. Additionally, all affected Department/Division personnel shall understand their responsibilities with the implementation of the program at their jobsites.

1. **Confined Space Definition**

**A confined space** is a space that: **1)** is large enough and so configured that an employee can bodily enter and perform assigned work; **2)** has limited or restricted means for entry or exit; and, **3)** is not designed for continuous human occupancy. Examples of confined spaces include but are not limited to manholes, sewers, storm drains, water mains, pipelines, drilled shafts, enclosed beams, digesters, lift stations, underground utility vaults, tunnels, wind turbines, concrete pier towers, transformer vaults, tanks, process vessels, bins, pits, silos, boilers, incinerators, ventilation or exhaust ducts, pipe chassis, crawl spaces, and attics.

**A permit-required confined space** means a confined space that either: **1)** contains or has the potential to contain a hazardous atmosphere; **2)** contains a material that has the potential for engulfing an entrant; **3)** 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, **4)** contains any other serious safety or health hazard.

**Note:** All confined spaces are considered a permit-required confined space until evaluated by the Entry Supervisor or other qualified person to determine if it may be reclassified as an alternative entry or non-permit required confined space.

1. **Duties and Responsibilities**
	1. **Responsibilities of Department Heads, Supervisors, and/or Designees:**

Department Heads, Entry Supervisors, and/or their designees [with guidance as needed from the Office of Emergency Management and Workplace Safety (EMWS)] are responsible for the development and administration of the Confined Space Entry Program for all of their affected employees. In meeting these responsibilities, Department Heads and/or designees shall do the following:

1. Oversee the written Confined Space Entry Program and revise the program as necessary.
2. Maintain records of employee training.
3. Provide guidance and training for the proper selection and use of atmospheric testing equipment, respiratory protection equipment, and personal protective equipment to meet the requirements of this program.
4. Audit all work procedures annually (using canceled permits) to evaluate the overall effectiveness of the Confined Space Entry Program.
5. Assist in identifying all confined spaces encountered by employees.
6. Provide guidance for the proper selection and use of appropriate safety and rescue equipment to meet Confined Space Entry Program requirements.
	1. **Duties of Entry Supervisors:**

Entry Supervisors or other Competent Person(s) shall identify and evaluate all locations that have, or may have, spaces that can be classified as “confined” spaces.

The Entry Supervisor is a Competent Person, such as a foreman or crew leader, who is responsible for classifying confined spaces, determining if entry conditions are acceptable, authorizing entry, and overseeing entry and exiting operations. An Entry Supervisor may also serve as an attendant or entrant if he/she has been trained and is equipped to perform the task(s).

The Entry Supervisor shall perform the following:

1. Identify and evaluate the hazards of the confined space(s) before entry.
2. Classify confined space(s) as “permit-required”, “alternate procedure”, or "non-permit required.” Use of the “**Confined Space Pre-Entry Checklist and Certification**” form included in this program (Attachment A) or a similar classification form is not mandatory but is often helpful with the proper assessment of confined space(s) that have not been classified before.
3. Post danger/warning signs to prevent unauthorized entry of spaces to notify other employers and employees of the existence, location, and hazards of the confined space.
4. Ensure the entry permit is complete and that atmosphere/gas monitoring and other tests have been conducted before signing the permit that allows entry.
5. Identify personnel who are authorized to enter the confined space(s).
6. Identify the employees under his/her supervision who are required, if necessary, to wear respiratory protection.
7. Implement isolation or Lockout/Tagout procedures to eliminate energy hazards in the space.
8. Verify all permit-required and alternative entry confined spaces are continuously monitored utilizing atmospheric testing equipment.
9. Verify forced air ventilation is continuously flowing in all permit-required and alternative entry confined spaces.

10) Provide instructions and additional training to employees who may enter confined spaces if conditions or hazards exist for which employees have not been trained previously.

11) Provide instruction on the proper use of equipment required for the work.

12) Inform personnel about potential respiratory hazards in confined spaces.

13) Verify that a non-entry rescue plan has been prepared and Henrico Fire Department rescue services are available for entry rescue into the permit-required confined space(s).

14) Conduct a pre-entry briefing for attendants and entrants about the specific hazards that may be encountered.

15) Ensure equipment used to enter confined spaces is in proper working order.

16) Maintain records of equipment maintenance and employee training.

17) Conduct work site inspections to verify compliance with entry procedures.

18) Stop unauthorized individuals from entering or attempting to enter the space.

19) Issue and cancel entry permits.

* 1. **Duties of Attendants:**

An Attendant is an individual stationed outside the permit-required confined space. He/she must have the following knowledge and responsibilities:

1. Familiar with and understand the hazards that may be faced during entry.
2. Aware of behavioral changes entrant(s) may display after any exposure incident.
3. Continuously monitor entrant(s).
4. Remain outside the confined space unless relieved by another attendant or entrant(s) exits the space.
5. Assists and communicates with entrant(s) without entering the space.
6. Assess activity inside and outside the space to ensure it is safe for entrant(s) to remain in the work area.
7. Alert entrant(s) when the confined space must be vacated.
8. Summon HFD rescue and emergency services as soon as it is obvious the entrant(s) need help to escape the confined space.
9. Perform non-entry rescue using the tripod and/or other retrieval systems.
10. Prevent unauthorized entry into the confined space while entrant(s) are working.
11. Perform no duties that might interfere with the ability to assess and protect entrant(s).
12. Never enter a confined space to perform or assist with a rescue.
	1. **Duties of Authorized Entrants:**

Authorized Entrants are individuals who enter a confined space to do assigned tasks. Authorized Entrants must:

1. Be familiar with and understand hazards of working in a confined space.
2. Know how to use all safety equipment that is necessary for entry.
3. Communicate on a regular basis with the attendant so that his/her status can be monitored and to alert the entrant of the need to evacuate the space if needed.
4. Alert the attendant of hazardous conditions or situations within the space.
5. Evacuate the space immediately when ordered by the attendant or entry supervisor, or if the entrant detects a prohibited hazardous condition.
6. Report equipment issues or malfunctions to the attendant or entry supervisor.
7. Understand emergency procedures when unforeseen incidents occur in a space.
8. **Procedures for Entering a Permit-Required Confined Space**

The Entry Supervisor and/or Competent Person shall have the ability to identify every confined space under the jurisdiction of his/her department/division and the knowledge to classify it as a permit-required, alternate procedure, or non-permit required. When permit-required confined spaces are identified, the Entry Supervisor will also be responsible for the following:

* 1. **Preventing Unauthorized Entry:**

To prevent unauthorized entry into any permit-required confined spaces, the Entry Supervisor must post warning signs, erect barriers as needed, and notify the controlling contractor and other onsite employers of the location(s) and dangers posed by each permit-required confined space.

* 1. **Identifying Permit Space Hazards:**

The Entry Supervisor will identify and evaluate the hazards in a confined space before it is classified. All confined spaces must be classified before allowing an employee(s) to enter.

The following hazards shall be identified prior to entry into a confined space:

1. Atmospheric hazards

(a.) Oxygen deficient or enriched (Less than 19.5% or more than 23.5% oxygen)

(b.) Flammable atmospheres

(c.) Toxic atmospheres

1. Electrical hazards
2. Mechanical hazards
3. Engulfment hazards
4. Physical hazards (falls, debris, tripping and slipping)
5. Unexpected start-up of machinery or equipment
6. Pneumatic or hydraulic hazards
7. Burn hazards
8. Heat stress hazards
9. Noise hazards
10. Other known or foreseeable hazards
	1. **Safe Entry Practices:**

Entry Supervisors shall use the entry permit to implement and control procedures for safe confined space entry operations. These include, but are not limited to:

1. Designating Attendants and Entrants who have completed the proper training and are authorized to enter the permit-required confined spaces.
2. Determining any known or potential confined space hazards.
3. Specifying acceptable entry conditions and testing of the space with a gas monitor to determine if acceptable entry conditions exist.
4. Testing the atmosphere directly above the space entrance with a gas monitor before removing the cover.
5. Eliminating conditions that make it unsafe to remove an entrance cover.
6. Allowing employees to read atmospheric testing results of the space.
7. Eliminating or isolating physical hazards within the permit-required space.
8. Controlling atmospheric hazards by purging, flushing, and/or ventilating the permit-required space.
9. Alerting entrants if atmospheric conditions change and/or the ventilation system is no longer effective.
10. Providing pedestrian or traffic barriers (as necessary) to protect workers from external hazards.
11. Conducting pre-entry briefings with employees regarding hazards and safety issues.
12. Verifying conditions in the confined space are acceptable through atmospheric testing and visual observations.
	1. **Controlling Hazards:**

Hazards shall be controlled by the following:

1. Eliminate or isolate physical hazards and energy sources (by lockout/ tagout, disconnect linkage, etc.).
2. Use appropriate personal protective equipment (PPE).
3. Test atmospheric conditions in the confined space with a gas monitor for the duration of entry operations.
4. Provide continuous ventilation of the confined space (if conditions require it) for the duration of entry.
5. Use of an early-warning system that continuously monitors the confined space for non-isolated engulfment hazards (such as a flash flood).
6. Assign an attendant outside all permit-required confined spaces for the duration of entry operations.
	1. **Equipment Requirements:**

Entry Supervisors must ensure the following equipment is provided when necessary:

1. Gas monitors and other testing equipment that have been properly calibrated and maintained.
2. If necessary, ventilation equipment of the proper size and type to handle continuous air circulation in the confined space.
3. Electronic communications equipment that has been properly maintained and is suitable for the work site.
4. Appropriate personal protective equipment (PPE) for the work.
5. Lighting that illuminates the confined space well enough for employees to work and exit safely. Intrinsically safe lighting is mandatory if the space has the potential to contain a flammable or combustible atmosphere.
6. Barriers capable of guarding the space opening and to cover, or make safe, any exposed hazards the employee may contact within the space.
7. Ladders or another means for entering and exiting the space shall be readily available.
8. Non-entry rescue equipment, such as a tripod, mechanical retrieval equipment, and body harness for non-entry rescue must be present when the space is greater than 5 feet in depth (approximately 1.52 meters).
9. **Written Permit System**

A written permit is required prior to entry into permit-required confined spaces. All entry permits shall be filled out completely by the Entry Supervisor and must include his/her printed name and signature.

The completed entry permit must be available for review by each entrant or his/her authorized representative prior to time of entry. This may be accomplished by posting the permit at the entry access portal or by another equally effective method.

The duration of the permit may not exceed the time required to complete the assigned task identified on the permit, or eight hours. The Entry Supervisor must:

1. Terminate entry and cancel the permit when the work is complete;
2. Suspend or cancel the entry permit and reassess the confined space if an unacceptable entry condition is encountered; and,
3. Cancel the entry permit if a prohibited condition arises in or near the confined space.

Each canceled entry permit shall be retained in Departmental files for at least one year. Filed permits should be used to facilitate periodic reviews of the Permit-required Confined Space Program. Any problems encountered during an entry operation shall be noted on the pertinent permit so that appropriate revisions to the permit confined space program can be made prior to a similar entry operation.

1. **Training**

All employees assigned to confined space entry must receive effective training that ensures they possess the understanding, knowledge, and skills necessary for the safe performance of their assigned duties.

Confined space entry training shall be provided for all employees designated to be competent persons, entry supervisors, attendants, and authorized entrants. The training shall be provided:

1. In a language with a vocabulary employee(s) understand;
2. Before the employee receives his/her initial assignment;
3. Before there is a change in assigned duties;
4. Whenever there is a change in confined space operations that presents a hazard to an employee who has not previously had that specific training;
5. Whenever deviations from confined space entry procedures or inadequacies in employee knowledge are detected; and,
6. At least annually, or as needed as per Departmental policy.

Confined space training shall verify that employees understand the hazards and procedures necessary to protect themselves from the known or anticipated hazards. In addition, the employees must understand their assigned duties as listed under “Duties and Responsibilities” in this program as well as any other duties they might perform.

Employees are required to understand they are never authorized to enter any confined space to perform rescue operations and must understand the dangers of attempting such a rescue.

Department Heads, and/or their designees, shall certify that confined space training has been completed under the requirements of the VOSH standard, 29 CFR 1910.146. Training records shall contain each employee's name, the trainer’s name, and the dates the training was completed. This documentation shall be accessible to employees, their authorized representatives, the Office of EMWS, or any other authorized person, such as a VOSH inspector.

Only trained competent persons, entry supervisors, attendants, and authorized entrants shall be authorized to work in and around a permit-required and other confined spaces.

1. **Rescue and Emergency Services**

The rescue service for all Henrico County Confined Space Entries is the Henrico Fire Department (HFD). The HFD will be made aware of any hazards that are, or may be, present when called on to perform rescues. HFD shall be responsible for equipping and training the personnel conducting confined space rescues.

The Entry Supervisor shall coordinate rescue procedures with HFD prior to each entry.

**Rescue Procedures:**

1. Contact HFD Communications to alert them that a Confined Space Entry has been scheduled. Provide HFD Communications with the location, start time, and anticipated duration of the entry. Provide HFD with the telephone phone numbers of the Entry Supervisor and Attendant(s).
2. Record Communication Center’s contact name, his/her title with the contact’s phone number in the appropriate spaces on the Confined Space Entry Permit.
3. The HFD Contact Person shall alert the Entry Supervisor and/or Attendant(s) if HFD cannot respond to a Confined Space Entry emergency promptly.
4. Practice rescue exercises shall be conducted and documented annually between HFD and the employees in training.

**Non-Entry Rescue:**

1. Except for HFD personnel, non-entry rescue is the ONLY authorized method of rescue from a confined space. Non-HFD employees shall **never** enter a confined space to attempt a rescue.
2. Retrieval systems/methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not facilitate the rescue of the entrant.
3. Non-entry rescue retrieval systems shall meet the following requirements:
4. A lifeline shall be attached to a mechanical retrieval system or fixed point outside the confined space so that a rescue can begin as soon as possible. A mechanical device shall be used to retrieve an entrant from any vertical permit space greater than 5-feet deep. The use of a lifeline is acceptable only for confined spaces less than 5-feet deep.
5. A chest or full body harness shall be worn by each entrant. The retrieval line (cable or rope) shall be attached at the center of the entrant's back near shoulder level or another appropriate point on the body.
6. The Entry Supervisor will confirm, prior to entry, that the HFD is on stand-by to provide emergency assistance in the event a non-entry rescue fails.
7. Safety Data Sheets will be provided to the rescue team and medical personnel if an injured entrant is exposed to chemicals during entry.

4) If non-entry rescue becomes necessary, the Entry Supervisor or Attendant shall:

1. Summon the HFD at 9-1-1;
2. Attempt non-entry rescue with the mechanical retrieval system or lifeline;
3. Continuously ventilate the confined space;
4. Monitor the situation and be prepared to provide the HFD rescuers with the following:
5. Number and status of victims along with activities being performed
6. The time the incident occurred
7. Existing/potential hazards along with current atmospheric testing data
8. Name of any chemicals/materials that were being used
9. Other applicable information
10. **Confined Space Reclassification and Alternate Entry Procedures**

If a confined space meets all of the following criteria, it can be reclassified to a non-permit required confined space:

1. The confined space poses no actual or potential atmospheric hazard(s), and all hazards can be eliminated without entering the space.
2. Atmospheric testing and inspection demonstrate that all hazards have been eliminated.
3. It has been documented by a qualified person that the basis for determining that all hazards have been eliminated through certification. This document shall contain the date, location of the space, and signature of the making the determination.

If the following occur, the confined space cannot be reclassified:

1. If it is necessary to enter the confined space to eliminate hazards, this entry must be performed under the requirements of Henrico’s Permit Required Confined Space Program. Reclassification of the space is prohibited.
2. If hazards arise within a permit-required space that has been reclassified to a non-permit space, anyone in the confined space must exit. Under such conditions, the Competent Person must reevaluate the confined space to determine whether it will revert to a permit-required confined space. Otherwise, the space is permit-required.

**Note: Control of atmospheric hazards through forced air ventilation does not constitute elimination of the atmospheric hazards. Reclassification of a permit-required confined space is difficult. If there is any doubt as to the feasibility and validity of reclassification, the space shall remain permit-required.**

Employees who enter confined spaces that have been reclassified as non-permit entry need not implement and comply with the permit-required or alternative entry procedures.

The non-permit certification shall be made available to each employee who enters the space. (See page 19).

1. **Sanitary Sewer and Stormwater System Entry**

If applicable, Sanitary Sewer and Stormwater System entry differs in three vital respects from other permit entries including: (1) a way to isolate the space to be entered completely rarely exists; (2) the atmosphere may suddenly and unpredictably become lethal (toxic, flammable or explosive) due to causes beyond the control of the entrant or Entry Supervisor; and, (3) experienced sewer and stormwater system workers are particularly knowledgeable in entry unlike most other workers who more rarely perform permit space entries.

Employees who work in sewers/stormwater systems must be trained in sewer entry procedures thoroughly. These employees must demonstrate that they will follow these entry procedures exactly as defined.

The following criteria apply to sanitary sewer and stormwater system confined space entries:

1. Appropriate “Men Working” signs, traffic cones, barricades or markers must be placed around the job-site prior to starting the work.
2. If the sewer/system is located in street or highway travel lanes, or within 5-feet of a street (flagging standard) or highway lane(s), all employees outside of the confined space shall wear fluorescent safety vests and hard hats.
3. The Entry Supervisor should monitor current weather conditions so an entrant is not subjected to flash flooding or high water.
4. All underground sewer lines and/or manholes shall be tested for hydrogen sulfide, methane gas and oxygen deficiency prior to any person entering the confined space.
5. If possible, test the atmosphere above the manhole prior to removing the cover to ensure the area is safe.
6. Remove all manhole covers with an appropriate lifter both “upstream” and “downstream” of the work location for large confined spaces and/or to assist with space ventilation.
7. An atmospheric testing instrument shall be worn by the entrant **at all times** to monitor the atmosphere in his/her immediate working environment. If several entrants are working in the same immediate location, one testing meter, used by the lead entrant, is acceptable.
8. Use the atmospheric testing instrument in advance of the entrant's direction of movement, to warn of any deterioration in atmospheric conditions.
9. All underground sewer lines and manholes shall be tested for hydrogen sulfide, methane gas and oxygen deficiency prior to any person entering the confined space.
10. Should the atmosphere remain hazardous after the manhole covers have been removed and ventilated for a reasonable period of time, the following procedures shall be used:
11. A source of fresh air capable of ventilating the space shall be positioned to provide constant air exchanges in the manhole, sewer line or stormwater system.
12. Use a sewer saddle vent device (when possible) to provide continuous ventilation. This will minimize the reduction in the size of the manhole during entry and exit. It also reduces the need to remove air ventilation hoses during rescue operations.
13. Do not permit exhaust from internal combustion engines near or upwind of the blower. Re-test the atmosphere to confirm the space is acceptable for entry.
14. An exhaust blower can be positioned to force contaminated air from a manhole, sewer line or stormwater system line if natural dilution with fresh air does not reduce the atmospheric contamination to an acceptable level.
15. Entry is prohibited if atmospheric testing data remain above acceptable limits after reasonable efforts to ventilate the space have been done. Consult with the Department Head, or his/her designee, or the Office of EMWS to determine if the entry should be rescheduled, or if a qualified contractor should be hired to complete the work.
16. **Concluding Entry Operations**

The Competent Person or Entry Supervisor will determine when confined space entry operations have been completed. He/she shall verify an entrant(s) has exited the confined space and the space shall be closed. If the confined space was permit-required, the Entry Supervisor will cancel the permit with the date, time, and signature at the bottom of the permit. This includes alternative entry and non-permit confined spaces as well.

1. **Program Review and Revisions**

Department Heads and/or their designees, shall do an annual review of confined space entry operations. Any issues detected during the annual review shall be corrected and additional training provided (when appropriate) to effected employees before subsequent confined space entries can be authorized.

1. **Definitions**

**Acceptable Entry Conditions**: Conditions in a permit space that allow entry and ensures employees within the space can safely enter and work.

**Alternate Procedures Confined Space:** Confined space where any actual or potential hazardous atmosphere can be controlled by continuous forced air ventilation, and where all physical hazards have been eliminated or isolated to ensure the confined space is safe to enter.

**Alternate Entry Procedures:** Procedures used when the only hazard of a confined space, (based upon monitoring and inspection data), is an actual or potentially hazardous atmosphere in which continuous forced air ventilation alone is all that is necessary to maintain the permit required confined space for safe entry.

**Attendant(s):** Individual(s) who is(are) stationed outside a permit space who monitors the authorized entrant(s) and who performs all attendant duties under the Confined Space Program.

**Authorized Entrant**: Employee authorized to enter a permit-required confined space.

**Barrier:** Physical obstruction that blocks or limits access to a confined space and may include the adjacent work area.

**Blanking or Blinding**: Absolute closure of a pipe, line, or duct by the fastening of a solid plate (e.g., a spectacle blind or skillet blind) that covers the bore and that can withstand the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

**Competent Person:** Individual who can identify existing and predictable hazards in the surroundings. This includes unsanitary, hazardous, and/or dangerous working conditions. He/she has the authorization to take prompt corrective measures to eliminate hazards.

**Confined space**: Space that:

1. Is large enough and so configured that an employee can bodily enter and perform assigned work; and,
2. Has limited or restricted means for entry or exit, including, but not limited to, tanks vessels, silos, storage bins, hoppers, vaults, and pits; and,
3. Is not designed for continuous occupancy.

**Control:** Action taken to reduce the level of hazards inside a confined space using engineering methods (i.e., ventilation), to reduce the hazard level. **Note: Personal protective equipment is not a control.**

**Controlling Contractor:** Contractor with overall responsibility for confined space safety.

**Double Block and Bleed**: Closure of a line, duct, or pipe by closing and locking (or tagging out) two in-line valves and by opening and locking (or tagging out) a drain or vent valve in the line between the two closed valves.

**Early-Warning System:** Method that is used to alert authorized entrants and attendants that an engulfment hazard may be developing. Examples include alarms activated by remote sensors and lookouts with radios/mobile telephones to alert authorized entrants and attendants.

**Emergency**: Unforeseen occurrence (including failures of hazard control or monitoring equipment) or event, internal or external to the confined space, which could endanger entrants.

**Engulfment**: Effective capture of a person by liquid or finely divided (flowable) solid substances that can be aspirated into the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing. Examples of engulfment hazards include sand and grain.

**Entry**: Occurs when a person passes through the entrance plane of a permit-required confined space opening. Entry includes ensuing work activities in the confined space and ends only when the entrant bodily exists the confined space.

**Entry Permit**: A standardized written document allowing and controlling all of the confined space work for a specific day/time period.

**Entry Permit System**: Written procedures for preparing and issuing entry permits. Also specifies how permit spaces are returned to service following termination of entry and designates, by name or title, the individuals who may authorize entry.

**Entry Rescue:** Occurs when a rescue service, such as the Henrico County Fire Department, enters a permit space to rescue an entrant or entrants.

**Entry Supervisor**: Qualified person (e.g., a foreman or crew chief) responsible for determining whether conditions are acceptable for an entry. Entry Supervisors authorize entries, oversee entry operations, and terminate entry as required by the VOSH standard. Entry Supervisors may also serve as an attendant or entrant if properly trained and equipped.

**Hazard:** Unsafe physical or atmospheric conditions present, or that may become present, in the confined space.

**Hazardous Atmosphere**: Atmosphere that may expose entrants to risk of death, incapacitation, impairment of ability to self-rescue (escape unaided from a space), injury, or acute illness from one or more of the following causes:

1. Flammable gas, vapor, or mist more than 10 percent of its lower flammable limit (LFL);
2. 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 5 feet (1.52 m) or less.

1. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
2. Atmospheric concentration of any substance that may exceed a permissible exposure limit; and,
3. Any other atmospheric condition that is Immediately Dangerous to Life or Health (IDHL).

**Note**: An airborne concentration of a substance that will not cause death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this definition.

**Note**: Whenever OSHA or NIOSH (National Institute for Occupational Safety & Health) has not determined a dose or permissible exposure limit, a Safety Data Sheet, published data, and/or internal documents can be used for guidance in establishing acceptable atmospheric conditions.

**Hot Work:** Work operations capable of providing a source of ignition (e.g., riveting, welding, cutting, burning, and heating).

**Hot Work Permit**: Written permit issued by a responsible person that authorizes hot work operations capable of providing a source of ignition that may or may not be performed in a confined space.

**Immediately Dangerous to Life or Health (IDLH)**: Any condition that poses an immediate danger or will cause death or irreversible health effects and/or would interfere with an entrant’s ability to escape unaided from a confined space.

**Inerting**: Displacement of the atmosphere in a confined space with a noncombustible gas (e.g., nitrogen) to yield a resulting atmosphere that is noncombustible.

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

**Isolate or Isolation**: Process used in a confined space to protect entrants against the release of energy and/or material into the space, or contact with a physical hazard. Blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; double block and bleed systems; lock out or tag out of all sources of potential energy; etc. are all examples of hazard isolation.

**Limited or Restricted Means for Entry or Exit:** Condition with potential to impede an entrant’s movement into or out of a confined space. Trip hazards, poor illumination, slippery floors, inclined surfaces, ladders, etc. are examples of conditions that may limit or restrict entry or exit.

**Line Breaking**: Opening of pipes, lines, or ducts which have been carrying a substance capable of causing injury. Substances typically include flammable liquids, corrosive or toxic materials, inert gases, or any fluid at a volume, pressure, or temperature capable of causing injury.

**Lock out:** Placement of a lock out device on an energy isolating device, such as a breaker, in accordance with an established procedure, to ensure the energy isolating device and the equipment being isolated cannot be energized until the lock out device is removed by the authorized person.

**Lower Flammable Limit (LFL) or Lower Explosive Limit (LEL):** Minimum concentration of a substance in air needed for an ignition source to cause a flame or explosion.

**Monitor or Monitoring:** Process used to identify and evaluate the hazards after an entrant enters the space. Atmospheric testing is performed in a periodic or continuous manner after the completion of the initial reading or evaluation of the space.

**Non-Entry Rescue:** Occurs when a person, usually the attendant, retrieves an entrant from a permit space without entering it, usually by tripod or lanyard.

**Non-Permit Confined Space**: Space that meets the definition of a confined space but does not meet the requirements for a permit-required confined space.

**Oxygen Deficient Atmosphere**: Atmosphere containing less than 19.5% oxygen by volume.

**Oxygen Enriched Atmosphere**: Atmosphere containing more than 23.5% oxygen by volume.

**Permit-Required Confined Space**: Space that meets the three criteria and has one or more of the following characteristics:

1. Contains or has a potential to contain a hazardous atmosphere;
2. Contains a material that has the potential for engulfment of an entrant;
3. 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; or,
4. Contains any other recognized serious safety or health hazard.

**Permit-Required Confined Space Program**: Written program for controlling and protecting employees from permit-required confined space hazards. Also specifies procedures for safe employee entry into permit-required spaces.

**Permit System**: Written procedure for preparing and issuing entry permits and for returning the permit space to service following termination of entry.

**Physical Hazards:** Existing or potential hazards that can cause death or serious harm. Examples include, but are not limited to, explosives; mechanical, electrical, hydraulic and pneumatic energy; radiation; temperature extremes; engulfment; noise; and inwardly converging surfaces. Physical hazards also include chemicals that can cause death or serious harm through skin or eye contact (rather than by inhalation).

**Prohibited Condition**: One or more unsafe conditions within a confined space that is not allowed during an entry.

**Qualified Person:** Individual who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

**Rescue Service**: Personnel designated to rescue entrants from permit spaces. For County of Henrico, the Fire Department (HFD) has been designated as the rescue service.

**Retrieval System**: Equipment (retrieval line, chest or full-body harness, wristlets, if appropriate, and lifting device or anchor) that would be used for non-entry rescue of entrants.

**Tag out:**

1. Placement of a tag out device on a circuit or equipment that has been de-energized, in accordance with an established procedure, to indicate that the circuit or equipment under controlled may not be operated until the tag out device is removed by an authorized person.
2. Tag out is used when:
	1. Tag out provides equivalent protection to lockout; or,
	2. Lock out is infeasible and the employer has relieved, disconnected, restrained and otherwise rendered safe all of the stored (residual) energy.

**Test or Testing**: the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing enables the departments to devise and implement adequate control measures for the protection of authorized entrants, as well as determining if acceptable entry conditions are present immediately prior to and during entry.

**Ventilate or Ventilation:** Controlling a hazardous atmosphere using continuous forced-air mechanical systems.

**XVII. Entry Procedure Checklist:**

Complete these steps before, during, and after a confined space entry:

**Step 1**

Obtain a clean copy of this Permit-Confined Space Entry Form (two pages).

**Step 2**

Notify the Henrico Fire Department before the  **Confined Space Entry** begins.

**Step 3**Verify Confined Space Gas Detection Meter has been calibrated and is in working order.

**Sep 4**Complete the top portion of the Permit-Confined Space Entry Form.

**Sep 5**Ensure all rescue equipment (e.g. tripod, body-belt, lanyard) is in place prior to entry.

**Step 6**

Monitor the confined space with the Gas Detection Meter prior to entry. The Entry Supervisor shall sign the permit authorization section on the bottom of the permit to ensure all actions and conditions necessary for safe entry have been performed.

**Step 7**

Employees entering the confined space must wear a Gas Detection Meter after pre-entry atmospheric tests. Employees should also wear a full body harness and a lanyard attached to the rescue tripod if the space is greater than five feet in depth. Employee shall enter the space with a radio and any other necessary personal protective equipment.

**Step 8**

Employee can enter the confined space once Step 7 is completed. The entrant and attendant should complete the Hazards of Confined Spaces and Special Requirements Section of the Permit-Confined Space Entry Form once the employee is within the confined space. The entrant should also gather the % Oxygen, % Explosive Gases, Carbon Monoxide, and Hydrogen Sulfide readings and communicate them to the attendant to place on the Permit Form.

**Step 9**

The attendant shall maintain in constant communication with the entrant until the entrant has exited the confined space.

**Step 10**

The attendant should contact Supervisor once the entrant has exited the confined space.

**Step 11**

The Permit-Confined Space Entry Form should be given to the Entry Supervisor to file in the Department’s Confined Space Records.

**Confined Space Pre-Entry Reclassification and Certification**

This form helps determine if a confined space is a permit-required, alternative procedure confined space, or non-permit confined space. This evaluation must be performed by the *Entry Supervisor or Competent Person* who is knowledgeable about safe entry into confined spaces.

Work Location: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_ Time: \_\_\_\_\_\_

Purpose of Entry \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Atmosphere tested with (identify gas monitor) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Data: Oxygen: \_\_\_\_\_\_\_\_\_% Flammable \_\_\_\_\_\_\_\_\_\_%LEL

 H2S \_\_\_\_\_\_\_\_\_\_PPM CO \_\_\_\_\_\_\_\_\_PPM Other: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_PPM

1. Identify any physical hazards:
	1. Electrical \_\_\_ i. Chemical \_\_\_
	2. Mechanical \_\_\_ j. Pipelines \_\_\_
	3. Hydraulic \_\_\_ k. Welding/cutting \_\_\_
	4. Pneumatic \_\_\_ l. Falls \_\_\_
	5. Radiation \_\_\_ m. Obstructions \_\_\_
	6. Temperature extremes \_\_\_ n. Converging surfaces \_\_\_
	7. Engulfment \_\_\_ o. Other: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_
	8. Noise \_\_\_ p. Other: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_

 **YES NO**

1. Have all physical hazards been eliminated, isolated,

or locked or blocked out? \_\_\_ \_\_\_

1. Are there any existing or potential atmospheric hazards? \_\_\_ \_\_\_
2. If #3 is YES, will forced-air ventilation control the hazard? \_\_\_ \_\_\_
3. Has the weather been checked for possible flash flooding? \_\_\_ \_\_\_

Atmosphere tested after isolation and ventilation

Data: Oxygen: \_\_\_\_\_\_\_\_\_% Flammable \_\_\_\_\_\_\_\_\_\_%LEL

 H2S \_\_\_\_\_\_\_\_\_\_PPM CO \_\_\_\_\_\_\_\_\_PPM Other: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_PPM

***For******the purpose of this entry this confined space is*:** ***Select one:***

**Permit-required** -- the full permitting process must be implemented. \_\_\_\_\_

**Alternate-procedure** – continuous ventilation and gas monitoring must

be used, and all physical hazards must be eliminated or isolated. \_\_\_\_\_

**Non-permit** – does not meet the requirements for permit-required. \_\_\_\_\_

Entry Supervisor: Print name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**County of Henrico Confined Space Entry Permit**

**Section I:**

|  |  |
| --- | --- |
| **Confined Space Name:** | **Purpose of Entry:** |
| **Entry Date:** |
| **Entry Start Time:** |  | **Entry Stop Time:** |  |
| **Authorized Duration of Entry:** | **\_\_\_\_\_\_\_\_\_\_\_ Hours**  |
| **Rescue and Emergency Services:** | **Henrico County Division of Fire** |
| **Contact Method:** | **\_\_\_\_ Cellphone \_\_\_\_ Land Line** |
| **Contact Person’s Name:** | **On Duty Assistant Chief** |
| **Contact Phone Number:** | **514-9755** |
| **Time of Call to Contact Person:** |  |
| **Entry Supervisor Phone Number:** |  |
| **Attendant & Entrant Communications:** | **Every 15-Minutes and As Needed** |
| **Communications Method:** | **\_\_\_\_ Direct Oral \_\_\_\_ Hand Radio** |
| **Confined Space Over 5 Feet Deep:** | **\_\_\_\_ Yes \_\_\_\_ No** |
| **Tripod or Other Lifting Self-Rescue Equipment Used if Over 5 Feet Deep:** | **\_\_\_\_ Yes \_\_\_\_ No** |
| **Lifeline Used if Over 5 Feet Deep and Other Safety Hazards Exist:** | **\_\_\_\_ Yes \_\_\_\_ No** |

**SECTION II: Pre-Entry Checklist**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Yes** | **N/A** |  | **Yes** | **N/A** |  |
|  |  | **Entry area is free of debris and objects** |  |  | **Non-Sparking tools used** |
|  |  | **Warning barriers and signs are in place** |  |  | **Low Voltage (less than 25 v) lighting used** |
|  |  | **Atmospheric monitoring conducted** |  |  | **Electrical equipment rated for explosive atmospheres** |
|  |  | **All hazardous sources have been neutralized/locked out** |  |  | **No compressed gas cylinders in the confined space** |
|  |  | **Hot work permitted (welding, grinding, etc.)** |  |  | **Host employers and/or contractors notified** |
|  |  | **All energy sources have been neutralized/locked out** |  |  | **Entry and emergency procedures reviewed** |
|  |  | **The space has been drained and flushed** |  |  | **All personnel have been trained (classroom/exercise)** |
|  |  | **Forced air or exhaust ventilation is provided** |  |  | **All personnel have been informed of potential hazards** |
|  |  | **Electrical equipment is grounded** |  |  | **Attendant stationed at entrance and properly instructed** |
|  |  | **Ground Fault Circuit Interrupters (GFCI) provided** |  |  | **Rescue equipment on location and easily accessible (depth over 5 ft.)** |

**SECTION 2: Atmospheric Testing Equipment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument Type:** |  | **Instrument Name:** |  |  |
| **Instrument Number:** |  | **Person Performing Test:** |  |  |
| **Calibration Date:** |  |  |  |  |
|  |

**SECTION 3: Personal Protective Equipment**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Yes** | **No** |  | **Yes** | **No** |  | **Yes** | **No** |  |
|  |  | **Hard Hat** |  |  | **Protective Clothing** |  |  | **Communication Equipment:** |
|  |  | **Eye/Face Protection** |  |  | **Hearing Protection** |  |  | **Respirator (type):** |
|  |  | **Boots** |  |  | **Retrieval Line** |  |  | **Fire Extinguisher (type):** |
|  |  | **Gloves** |  |  | **Harness & Lifeline** |  |  | **Other (type):** |

**SECTION 4: Authorization**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Entry Supervisor’s** **Name:****Signature:** |  |  |  |  |  |
|  | **Print Name** |  | **Initials** |  | **Date** |  |
| **Attendant** |  |  |  |  |  |  |
| **Attendant** |  |  |  |  |  |  |
| **Entrant** |  |  |  |  |  |  |
| **Entrant** |  |  |  |  |  |  |
| **Entrant** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
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