Confined Spaces: A Training Program For Employees

Employee Handbook
Authorized Entrant Duties

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Employee Handbook: Authorized Entrant Duties

Part A: Overview Session

1. Overview of Permit-Required Confined Spaces Standard

Permit-Required Confined Spaces is a new standard requiring specific practices and procedures that will protect general industry employees from the potential hazards of entering permit-required confined spaces.

All of general industry, including manufacturing, chemical plants, refineries, agricultural services, transportation, utilities, wholesale and retail trade are covered by the standard.

Requirements of the standard include: identification of confined spaces and informing employees of their existence, entry permits, a written permit space program, and training for individuals with active roles in confined space work. This includes the following employees:

- authorized entrants
- attendants
- entry supervisors
- rescue and emergency services personnel.

The standard covers approximately 1.6 million workers who actually enter confined spaces each year, as well as another 10.6 million people who work at sites where confined spaces exist.

Some kind of confined space can be found in over 240,000 workplaces. The work that is done inside of these spaces varies from inspection and testing of equipment, to welding, painting, and general maintenance.

Each year about 63 people die as a result of working in a confined space. OSHA feels that the new standard will prevent 85% (54) of those tragedies, and about 5,000 serious confined space injuries.

Permit-Required Confined Spaces for General Industry is effective as of April 15, 1993.

☞ ***Learning Activities:*** *List 3 confined spaces at your facility:*

-
-
-

List your job duties in or around permit spaces.

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-
-

2. Definitions and Abbreviations

The four main definitions of this new regulation are as follows:

Confined space—a space large enough and so configured than an employee can bodily enter and perform assigned work. In addition, a confined space has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy.

This could mean:

a. small, narrow or cramped passageways
b. entry or exit is by means of a ladder
c. other equipment in the space may make evacuation and rescue difficult.

Examples of confined spaces include:

- bins
- boilers
- crawl spaces
- degreasers
- ducts
- furnaces
- hoppers
- incinerators
- pipelines
- pits
- reactor vessels
- scrubbers
- sewers
- silos
- tanks
- tunnels
- utility manholes
- vats
- vaults
- vessels
- and, other areas with limited means of entry.

Permit-required confined space or **permit space**—a confined space that has, or may have, one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere. This could mean that the oxygen content of the space is inadequate, or that toxic or explosive gases, fumes, or vapors are present.
- Contains a material that has the potential for engulfing an entrant. For example, a bin filled with sawdust is an engulfment hazard.
- 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.
- Contains any other recognized serious safety or health hazard, such as turning, exposed blades on equipment, or a hole where a worker could drop through to another level.

Note: *A permit space has one or more features that require the worker to take special precautions. These spaces are considered an immediate health and safety risk.*

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 the employer to allow and control entry into a permit space and that contains the information specified by this section.

Other Confined Space Definitions

Acceptable Entry Conditions—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 of one or more permit spaces who monitors the authorized entrants and who performs all the attendant's duties assigned in the employer's permit space program.

Authorized Entrant—an employee who is authorized by the employer to enter a permit 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.

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 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.

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,
- authorizing entry,
- overseeing entry operations, and
- terminating entry as required by this section.

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 section 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 that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (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% of its lower flammable limit (LFL)
- airborne combustible dust at a concentration that meets or exceed its LFL

Note: *This concentration can be approximated to a condition where dust obscures vision at a distance of 5 feet or less.*

- atmospheric oxygen concentration below 19.5% or above 23.5%
- atmospheric concentration of any substance for which a permissible exposure limit (PEL) 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 PEL

Note: *An atmospheric concentration of any substance that is not capable of causing death, incapacitation, 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 immediately dangerous to life or health.

Note: *For air contaminants where OSHA has not determined doses or permissible exposure limits, other sources of information, such as MSDSs, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.*

Hot Work Permit—an employer'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 that :

- poses an immediate or delayed threat to life
- would cause irreversible adverse health effects
- would interfere with an individual's ability to escape unaided from a permit space.

Note: *Some materials, such as hydrogen fluoride gas and cadmium vapor, may produce immediate effects that, even if severe, can pass without medical attention; however, sudden, possibly fatal collapse can occur up to 12 to 72 hours after exposure. In fact, the victim may feel normal after they recover from the temporary effects until they collapse. Such material, in hazardous quantities, are immediately dangerous to life or health.*

Inerting—the displacement of the atmosphere in a permit space by a non-combustible gas (such as nitrogen) to such an extent that the resulting atmosphere is non-combustible.

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
- 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 Program or **Permit Space Program**—the employer's written overall program for controlling and, where appropriate, for protecting employees from permit space hazards, and for regulating employee entry into permit spaces.

Permit System—the employer's written procedure for preparing and issuing permits and for returning the permit space to service following termination of entry.

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 space.

> ***Note:*** *Testing enables employers 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.*

Abbreviations (Listed alphabetically, not in order of importance)

ANPR	Advance Notice of Proposed Rulemaking
ANSI	American National Standards Institute
APR	Air Purifying Respirator
CSP	Certified Safety Professional
DHHS	Department of Health and Human Services
DOL	Department of Labor
EPA	Environmental Protection Agency

FACE Fatal Accidents Circumstances and Epidemiology
IDLH Immediately Dangerous to Life or Health
LEL Lower Explosive Limit
LFL Lower Flammable Limit
NFPA National Fire Protection Association
NIOSH National Institute for Occupational Safety & Health
NPRM Notice of Proposed Rule Making
OSHA Occupational Safety and Health Administration
OSHRC Occupational Safety and Health Review Commission
PE Registered Professional Safety Engineer
PEL Permissible Exposure Limit
PPE Personal Protective Equipment
SAR Supplied Air Respirator
SCBA Self-Contained Breathing Apparatus
TLV Threshold Limit Values
UEL Upper Explosive Limit

3. Hazards of Permit-Required Confined Spaces

The main goal of the standard is to protect workers from the hazards associated with confined spaces. Confined space hazards can be:

A. atmospheric
B. engulfment
C. physical.

A. Atmospheric Hazards

According to accident reports, hazardous atmospheres account for most of the deaths and injuries in confined spaces. These atmospheres can be either asphyxiating, toxic, or flammable/explosive.

- **Asphyxiating Atmospheres**

Asphyxiation, or suffocation, accounts for 47% of all confined space deaths. Normally, the air we breathe contains 20.9% oxygen.

***Note**: When an oxygen level falls below 19.5% there is an asphyxiation danger.*

Here are some work situations that may reduce the oxygen level:

- Certain chemical reactions, such as metal oxidation—rust. Metal oxidation is common in tank cleaning operations because the chemicals in the cleanser can react with the wall of the tank.

- Oxygen is replaced by other gases. Nitrogen is an example of a gas that may replace oxygen. If a vessel has been used to transport nitrogen, the oxygen level may be inadequate.
- Oxygen is consumed by burning processes such as, welding or flame cutting operations.
- Simple repair or clean-up jobs may also reduce the oxygen level, such as exposure to fumes from open containers of solvent within the confined space.

***Note**: Oxygen levels should be monitored continuously.*

- **Toxic Atmospheres**

Regardless of the oxygen level, the toxic effect of certain gases, vapors or fumes can occur. The most common toxic materials found in permit spaces are: carbon monoxide and hydrogen sulfide.

Hydrogen sulfide (H_2S) has the odor of a rotten egg. Be aware however, that the fumes dull the sense of smell, which could cause you to believe the danger has passed.

Carbon monoxide (CO) on the other hand has no odor and must be detected with a monitor.

Due to decaying organic material, both carbon monoxide and hydrogen sulfide can be present in sewer systems and septic tanks.

Toxic atmospheres may also result from the activities within the confined space. Vapors from cleaning solvents or fumes from welding can present a danger to confined space workers.

- **Flammable/Explosive Atmospheres**

Within a confined space, the combination of a flammable gas, vapor, or dust, with oxygen and an ignition source can produce a very dangerous atmosphere.

A flammable/explosive atmosphere might contain:

- methane or acetylene gases
- solvent or fuel vapors
- coal or grain dust.

***Note**: In these atmospheres a spark from a tool or a discharge of static electricity may be all that is needed to create an explosion.*

Material Safety Data Sheet information should be available at all times on any substances found in confined spaces. The MSDS will help identify the hazards of these substances.

B. Engulfment Hazards

Engulfment or entrapment occurs when a worker becomes trapped by a dry, loose, bulk material. This can happen in vats, bins or vessels that contain such materials as sand, sawdust, or grain. The most immediate danger with this situation is asphyxiation or suffocation.

C. Physical Hazards

Confined space accidents and deaths can also occur if energy sources are not properly secured and isolated from the space. Because of this potential:

- all valves and electrical equipment must be properly locked out according to the OSHA Lockout/Tagout Standard
- connecting pipes should be blanked off, separated, or sealed
- pipelines must be flushed, drained and isolated to prevent unexpected exposure to contaminants.

Other physical hazards of confined spaces include:

- heat stress
- falls from ladders or railings
- falling objects
- wet surfaces
- noise
- becoming wedged in a narrow part of the structure.

4. General Requirements of the Standard

(1) All permit-required confined spaces in the workplace must be identified.

(2) Unauthorized entry into permit spaces must be prevented.

(3) Permit space hazards must be identified and evaluated before employees are permitted to enter.

(4) Development and implementation of procedures and practices needed for safe permit space entry. These include, but are not limited to:

a. **Specifying acceptable entry conditions**. This ensures that the hazards have been identified, and that acceptable limits have been set. These conditions must be met before entry is permitted.

b. **Isolating the permit space**. This includes the use of proper lockout/tagout procedures to control electrical and mechanical hazards.

c. **Purging, flushing, and/or ventilating the space** to eliminate or control hazards.

d. **Using barriers** to protect unauthorized entrants from external hazards.

e. **Verifying that conditions are acceptable for entry**.

(5) All workers with active roles in and around permit spaces must be provided with the proper training and equipment. These workers include authorized entrants, attendants, entry supervisors, and rescue and emergency services personnel.

Equipment, to be provided and maintained by the employer, should include any or all of the following:

- testing and monitoring devices
- ventilating equipment
- communication devices
- personal protective equipment
- proper lighting
- barriers and shields
- ladders
- rescue equipment (unless supplied by off-site rescue services).

(6) Test and monitor permit space conditions. Atmosphere must be checked for oxygen first, followed by combustible gases and vapors, then toxic gases and vapors.

(7) An attendant must be stationed outside the permit space as long as an authorized entrant remains inside. Attendants control and monitor all entry operations and maintain on-going contact with authorized entrants.

***Note**: If the only risk to entrants is a hazardous atmosphere that can be eliminated by purging or ventilating, attendants may not be required. Purging/ventilating cleans the air within the permit space so that the atmosphere is no longer hazardous to life and health, and therefore is safe for employees to breathe. Your supervisor will indicate whether this situation applies to any confined spaces within your workplace.*

(8) If one attendant must monitor multiple spaces, a procedure must exist to allow that attendant to respond to an emergency while another employee takes over the attendant's duties for the other spaces.

(9) Persons with active permit space roles must be identified, their duties clearly spelled out, and proper training provided.

(10) Since rescue attempts account for over 60% of all confined space fatalities, a procedure must be in place for an emergency service (on-site or off-site) to rescue entrants from permit spaces and provide care to those who are rescued. This plan must also prevent unauthorized workers from attempting a rescue.

(11) A process for the use of entry permits must be developed.

(12) Contractors must be informed by the host employer about the permit spaces and related hazards, as well as the entry procedures and precautions that are used at that facility.

(13) A procedure must be in place for concluding entry operations.

(14) All elements of the permit space program must be reviewed at least annually and revised as needed.

5. Permit System and Entry Permits

A **permit system** defines how permits are prepared, issued, and canceled.

Entry permits document and verify that entries are conducted properly.

The entry permit must contain the following information:

- confined space site
- reason for entry
- date and time period of permit
- names or other means of identifying entrants
- names of attendants and entry supervisor
- permit space hazards
- measures used to isolate, remove or reduce confined space hazards such as lockout/tagout procedures, purging, ventilating, inerting, flushing
- acceptable entry conditions
- all test results with name or initials of tester(s)
- name of rescue service and how to contact it
- communication system to be used between attendant and entrant
- all equipment needed for entry
- other information needed to ensure worker safety
- any additional permits issued for work in the permit space (i.e., a hot work permit).

A permit system requires that:

1. The entry permit be signed by the entry supervisor before anyone can enter. This signature confirms that all safety procedures have been reviewed and that entry is permitted.

2. The permit be posted or made available to the authorized entrants. This notifies the entrant:

    - that all pre-entry safety checks have been completed
    - of the hazards associated with the permit space.

3. Permits be issued only for the length of time needed to complete the job listed.

4. When the assigned task is completed, the permit be canceled by the entry supervisor.

5. Canceled permits be kept for at least one year. They are used to assist with the annual permit space program review.

6. Training Requirements

One of the major factors contributing to confined space fatalities and injuries is a lack of awareness on the part of the entrant that the atmosphere in a confined space can be hazardous, even lethal. In addition, many untrained, but well meaning individuals try to rescue a fallen co-worker without fully understanding the hazards involved or the procedures required for safe entry and rescue. Because of this, training is required. The standard requires that training be completed:

a. Before a worker can be assigned a permit space job.

b. Before any changes in work assignment are made, or whenever a new hazard changes permit space operations.

***Note**: Additional training may not be needed if a worker has already been trained in the new duties or procedures and if the employer believes the employee understands and can perform the appropriate permit space procedures.*

c. If an employer feels that entry procedures are not being followed, or if a worker does not appear to have the skills needed to safely do the job.

d. As 'performance oriented.' In other words, training must zero in on the skills needed to safely perform specific job duties.

Part B: Authorized Entrant Training

Training for authorized entrants is intended to teach the skills needed for safe entry into permit-required confined spaces.

Goal and Objectives of Authorized Entrant Training

Goal: To ensure that each authorized entrant understands his/her duties and has the skills needed to safely perform them.

Objectives:

1. Review hazards of permit spaces.
2. Review the personal protective equipment needed for safe entry.
3. Discuss roles of the attendant, entry supervisor, and rescue personnel.
4. Discuss methods of maintaining communication with attendant.
5. Review permit space exit procedures.

Authorized Entrant job duties as defined by OSHA:

1. Know the hazards you may face during entry of a permit space, including how exposure occurs, as well as signs, symptoms, and consequences of exposure.
2. Properly use equipment as required by the standard.
3. Communicate with the attendant as needed so that the attendant can:
   - monitor your status
   - alert you of the need to evacuate the permit space.
4. Alert the attendant whenever you recognize:
   - any warning sign or symptom of exposure to a dangerous situation
   - a prohibited condition.
5. Exit a permit space as quickly as possible whenever:
   - an order to evacuate is given by the attendant or the entry supervisor
   - you recognize any warning sign or symptom of exposure to a dangerous situation
   - you detect a prohibited condition, or
   - an evacuation alarm is activated.

Review of Authorized Entrant Duties

1. **Know the hazards** you may face during entry of a permit space, including how exposure occurs, as well as signs, symptoms, and consequences of exposure.

☞***Learning Activities***:

List the permit spaces you may enter at your facility and the hazards that may be contained in these areas.

Permit Space	**Hazards (atmospheric, engulfment, physical)**
1.	
2.	
3.	
4.	

Now, using Material Data Safety Sheets or other information provided by your instructor, look up the hazards you may encounter in a permit space and write down the following:

- the hazard
- the method of exposure (for example, via the skin or by inhalation)
- the most common signs or symptoms of exposure.

Hazard	**Method of Exposure**	**Signs/Symptoms of Exposure**
1.		
2.		
3.		
4.		

2. **Properly use equipment as required by the standard.**

   Equipment, which shall be provided and maintained by your employer, includes any or all of the following:

   - testing and monitoring devices
   - ventilating equipment
   - communication devices
   - personal protective equipment
   - proper lighting
   - barriers and shields
   - ladders
   - rescue equipment (unless supplied by off-site rescue services).

Testing and Monitoring Devices

If you monitor the permit space, you must know how to properly use monitors, alarms, dosimeters, and/or sampling pumps. In short, you must understand the equipment you use.

Monitors are either area or personal. Area monitors are fixed at a particular site, while personal devices are worn by authorized entrants inside a permit space. All equipment must be safe, in other words, designed so that it does not spark or cause combustible gases, vapors or fumes to ignite.

Some monitors provide specific readings, while others use audio or visual alarms to indicate a dangerous atmosphere. Regardless of the type, all instruments should be tested and calibrated on a routine basis to ensure accuracy.

Atmospheric testing should be done in the following order:

- oxygen level
- combustible gases and vapors
- toxic gases and vapors.

***Note**: No one should ever attempt to enter a permit space without first testing the atmosphere within. All levels of the permit space should be monitored. In order to be aware of any changes in the permit pace, continuous monitoring is strongly advised and may be required by OSHA.*

Ventilating Equipment

Once the hazards that may be in a permit space have been identified, the atmosphere must be properly purged and/or ventilated. Purging should be done when conditions require, such as if the space is a flammable liquid container. Then the permit space atmosphere is ventilated before an employee is allowed to enter. This cleans the air within the permit space so that it is no longer IDLH and is safe to breathe.

☞ ***Learning Activity***

Practice the steps involved in properly setting up an air ventilating blower system.

Communication Devices

Maintaining on-going communication with the attendant outside the permit space is vital to a safe operation. There is a wide variety of makes and models of communication equipment and systems. As an authorized entrant, you must know how to use and be very familiar with whatever communication devices or methods are utilized at your facility.

Personal Protective Equipment

Depending on the atmosphere and the permit space requirements, a self-contained breathing apparatus (SCBA), or a supplied-air respirator (SAR) is usually the gear of choice. Airline-type respirators may also be used. However, there is a very real danger of pinching or severing the airline hose. If you use an airline mask, it is recommended that you also carry a small SCBA escape unit.

Whatever equipment is worn, you must know how to properly use it. This includes ensuring a proper fit of the face piece and knowing how to monitor the air supply.

☞ ***Learning Activity***

List the type of masks or respirators you may use in permit spaces.

Permit Space	**Type of Mask/Respirator Needed**
1.	
2.	
3.	

In addition to respirators, personal protective equipment could include a variety of gear from fully encapsulating suits and gloves to hard hats and ear plugs.

☞ ***Learning Activity***

List the different types of personal protective equipment used in your particular job.

Permit Space/Job	**Personal Protective Equipment Needed**
1.	
2.	
3.	

Proper Lighting, Barriers, Shields, Ladders

Your instructor will discuss and show the most commonly used items at your facility.

Rescue Equipment (unless supplied by off-site rescue services)

Non-entry rescue requires the use of a retrieval system, which means that you must wear a chest or full-body harness with retrieval line attached. If a full-

body device creates a hazard, wristlets may be used. In this case, your employer must be able to prove that the use of a chest or full-body harness is not feasible and that wristlets are the safest and most effective alternative.

The other end of the retrieval line is attached to a fixed point outside the permit space. This allows for the rescue operation to start as soon as the rescuer becomes aware of the situation. Where vertical permit spaces are over 5 feet deep, a mechanical device must be available for non-entry rescue.

☞ ***Learning Activity***

Practice putting on a full-body harness and/or wristlets used at your facility.

3. Communicate with the attendant as needed so that the attendant can:

- monitor your status
- alert you of the need to evacuate the permit space.

The attendant's job is to maintain on-going communication with you, the authorized entrant. This can be done with two-way radios, TV, or other continuous electronic monitoring equipment, in combination with alarms and voice contact. A voice link is very important. For instance, a change in your speech pattern or a deviation from the agreed upon communication procedure can alert the attendant that you are in danger and should be evacuated.

The attendant is your connection with the outside and will remain there until the work is completed and you have safely evacuated the permit space.

4. Alert the attendant whenever you recognize:

- any warning sign or symptom of exposure to a dangerous situation
- a prohibited condition (any condition in a permit space that is not allowed by the permit during the period when entry is allowed).

<u>It is absolutely essential that you be aware of the hazards you face while in a permit space and the signs of exposure.</u> This information may be found on the entry permit. Acting on this knowledge by promptly alerting the attendant and exiting the permit space greatly increases your chances of a safe evacuation.

5. **Exit a permit space** as quickly as possible whenever:

- an order to evacuate is given by the attendant or the entry supervisor
- you recognize any warning sign or symptom of exposure to a dangerous situation
- you detect a prohibited condition, or
- an evacuation alarm is activated.

Prompt action can save lives. Permit spaces can become lethal in a matter of seconds. It is absolutely essential that you exit a permit space as soon as any of these four conditions occur.

***Note**: OSHA believes that self rescue will often provide your best chance of escaping a permit space when a hazard is present.*

*Employee:*_____ *Instructor:*_____

*Company/Division:*_____ *Date:*_____

Authorized Entrant Test

***Directions**: Read each statement carefully and circle the response that most fully answers the question.*

1. There is danger of asphyxiation or suffocation if the oxygen level falls below:
   A. 20.9%
   B. 19.5%
   C. 17.5%
   D. 22%

2. Permit-required confined space training is required for all:
   A. Authorized entrants and attendants
   B. Entry supervisors and rescue personnel
   C. Authorized entrants, attendants and rescue personnel
   D. Both A and B

3. The acceptable oxygen level for a confined space range set by OSHA is:
   A. 19.5% to 23.5%
   B. 19.5 to 22%
   C. 17.5%-23.5%
   D. None of the above

4. Atmospheric hazards should be checked in the following order:
   A. 1) Oxygen, 2) toxic gases and vapors, 3) combustible gases and vapors
   B. 1) Combustibles, 2) toxic substances, 3) oxygen level
   C. 1) Oxygen, 2) combustible gases and vapors, 3) toxic gases and vapors
   D. The order is not significant, but all three areas must be checked

5. When testing permit space atmospheres for hazardous substances:
   A. Check at least the top most level and the lowest level of the space
   B. Check all levels of the space
   C. Check levels continuously
   D. Both B and C

6. As an authorized entrant you should know the following about the hazards of a given permit space:
   A. What they are and the signs and symptoms of exposure
   B. What they are, signs and symptoms of exposure, and the consequences of exposure
   C. What they are, how you can be exposed, signs, symptoms and consequences of exposure
   D. What they are and how you can be exposed

7. A flammable/explosive atmosphere could contain:
   A. Methane or acetylene gases
   B. Solvents or fuel vapors
   C. Coal or grain dust
   D. Any of the above

8. The oxygen level in a permit-required confined space can be reduced by:
   A. Rust, welding, transporting nitrogen and simple clean-up work
   B. Rust, welding, or flame cutting operations
   C. Transporting nitrogen, rust, or welding
   D. None of the above

9. A permit-required confined space is:
   A. A confined space that has or may contain one of the following hazards: atmospheric, engulfment, design, or other serious safety/health hazard
   B. A space that is large enough to enter and work in, has a restricted entry or exit, and is not meant for continuous occupancy
   C. A space that is large enough to enter and work in and has a restricted entry or exit
   D. A confined space that has or may contain a hazardous atmospheric or an engulfment hazard

10. You should exit from a permit space whenever:
   A. As soon as your work is complete
   B. An evacuation alarm is sounded or an evacuation order is given by the attendant or the entry supervisor
   C. You recognize a warning sign/symptom of exposure, or a prohibited condition
   D. All of the above

Company specific questions:

1.
   A.
   B.
   C.
   D.

2.
   A.
   B.
   C.
   D.

3.
   A.
   B.
   C.
   D.

4.
   A.
   B.
   C.
   D.

5.
   A.
   B.
   C.
   D.

6.
   A.
   B.
   C.
   D.