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# **PROCEDURE TO EVALUATE AND CLASSIFY CONFINED SPACES IN HOTELS**

**May 1998**

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**PROCEDURE TO EVALUATE AND CLASSIFY  
CONFINED SPACES IN HOTELS - May, 1998**

**INTRODUCTION**

OSHA developed the **Confined Space Standard** to establish safety and health requirements for entry into *confined spaces*. The Standard addresses hazards based on investigations into serious injuries and fatalities occurring in confined spaces. The types of hazards that are encountered in confined spaces include: toxic and explosive atmospheres, and mechanical hazards.

The hospitality industry traditionally did not consider themselves to be a high hazard industry. In essence it really is not, compared to construction, trucking, mining, manufacturing, etc. OSHA's mandate is the wellbeing of the American workforce. It follows the demographics of employees moving from the manufacturing sector, to the service sector. With this new-found interest in applying their existing standards and developing new standards to address issues faced by the service industries, OSHA will become increasingly more involved with hotels than ever before.

Most hotel operators would look upon the Confined Space Standard and immediately dismiss it to be irrelevant to their situation. Few lay people would readily think that there are any confined spaces, or at least any of speak able risk of explosion, suffocation, toxic exposure or mechanical hazards, on a non-manufacturing base property. However, there are certain instances when the Standard does apply to hotels, including elevator pits, sump pump rooms, closed rooms with pipe drainage, pool water treatment areas, and septic or wastewater systems, to list the more common scenarios. Each employer is required to survey the workplace and *identify* each "confined space". Once the confined spaces have been identified, you must *determine* if the space is a *Non-Permit Required Confined Space*, or a *Permit Required Confined Space*, and manage them accordingly.

The key is to understand that “*confined spaces*” by definition can include situations beyond ordinary preconceptions of what a “confined space” is. As you peruse through this document, note the defining qualities of a “confined space”. **This guide is developed specifically for the hotel industry. It assists you in identifying the confined spaces and rendering them “Non-Permit Required Confined Spaces” in order that the facility will not be belabored by the requirements of a “Permit-Required Confined Space”. If you do find that you indeed have a confined space that cannot be rendered a Non-Permit Required Confined Space, please contact our office as the materials necessary to comply with such a space is not specifically covered herein.**

## **SECTION 1: DEFINITIONS**

### **Definition of a Confined Space:**

1. An area that is large enough and so configured that an employee can bodily enter and perform assigned work, AND;
2. An area that has limited or restricted means for entry or exit (for example, water tanks, waste tanks, vessels, storage bins, hoppers, vaults, elevator pits, other pits, etc.), AND;
3. An area that is not designed for continuous human occupancy.

**Non-Permit Confined Space** is defined as a “*confined space*” as defined above, that does NOT contain any atmospheric or mechanical hazards that may result in serious injury or death. Thus, does not require a permit for entry.

### **Additional Terms to Determine if a Space is Permit or Non-Permit Required:**

**Lower Explosive Limit (LEL)** is the minimum concentration of vapor in air below which propagation of a flame does not occur in the presence of an ignition source. The air to fuel ratio is *too lean for ignition* to occur below the LEL.

**Upper Explosive Limit (UEL)** is the maximum concentration of flammable vapor in air above which propagation of a flame does not occur on contact with an ignition source. The air to fuel ratio is *too rich for ignition* to occur above the UEL.

**Oxygen-deficient atmosphere** is an atmosphere having an oxygen concentration of less than 19.5% by volume. A person entering an oxygen deficient may die due to

lack of oxygen (asphyxia). \*This may occur when oxygen is displaced by some other gas, usually a heavier gas that has settled into an enclosed space without adequate ventilation.

**Oxygen-enriched atmosphere** is an atmosphere that contains more than 22% oxygen by volume. Open flames and ignition sources burn more intensely in oxygen-enriched atmospheres.

**Permissible Exposure Limit (PEL)** is the airborne chemical exposure limit that is published and enforced by OSHA for a number of chemicals.

(Actual Definition of Permit Required Confined Space on next page)

**Permit Required Confined Space** is defined as a “confined space” that contains, *or has the potential to contain*, a hazardous atmosphere:

1. A *hazardous atmosphere* that may expose employees to the risk of death, incapacitation, impairment of the ability to escape unaided from a confined space, injury or acute illness from one or more of the following causes -
  - a. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LEL as defined above);
  - b. Airborne combustible dust at a concentration that meets or exceeds its LEL;
  - c. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
  - d. Atmospheric concentration of any substance for which a dose or a permissible exposure limit is listed by OSHA that could result in employee exposure in excess of its dose or Permissible Exposure Limit (PEL);
  - e. Any other atmospheric condition that is immediately dangerous to life or health.
2. Contain a material that has the potential for *engulfing* an entrant. Engulfment is the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated (inhaled) to cause death by

filling or plugging the respiratory system, or that can exert enough force on the body to cause death by strangulation, constriction, or crushing;

3. Have 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;
4. Contain any other recognized safety hazard. The safety hazards can include an *electrical hazard, moving gears or a rotating shaft*, to name a few.

**Confined space entry permit** is a document that is provided by the employer to allow and control entry into a permit space. It contains information specific to the confined space and hazards that are to be encountered upon entry. Permit required confined spaces require such documentation. Permit required confined spaces also require two-way instantaneous communications, buddy system, and on-site rescue emergency system.

## **SECTION 2: FACILITY SURVEY AND HAZARD EVALUATION**

### **Identify confined spaces**

Survey the entire property for confined spaces. Inventory all boilers, storage vessels, furnaces, tanks, manholes, sumps, open pits, diked areas, lagoons, man holes, sewers, tunnels, underground vaults, and elevator pits. Confined spaces come in many shapes and sizes. A *permit required confined space* may not have an entry port. Some may be easy to recognize like a storage tank, while others may not be so easy to identify such as open pits, diked areas or lagoons. Spaces such as an open top water tank or sumps have walls that may restrict the movement of air, this may allow gasses and vapors heavier than air to accumulate and displace oxygen. Be wary of any area that has characteristics that may restrict the movement of air, pockets of hazardous gasses may accumulate. It is always safer to assume an unknown space is a permit required confined space.

### **Hazard Evaluation**

Determine the type of condition that may be associated with the confined space. The hazard may result in an atmospheric and/or mechanical hazard.

***The types of gases that may create an atmospheric hazard include:***

### **Hydrogen Sulfide**

Hydrogen sulfide is a toxic, colorless, combustible gas that is heavier than air. It is formed by the decomposition of organic plant and animal life by bacteria. Hydrogen sulfide poisons a person by building up in the bloodstream. The gas paralyzes the nerve centers in the brain that control breathing. As a result, the lungs are unable to function, and the person is asphyxiated.

Hydrogen sulfide is easily detected by a strong *rotten egg* odor in low concentrations. However, relying on this odor to warn of the presence of hydrogen sulfide can be dangerous. High concentrations can rapidly paralyze the sense of smell. Even low concentrations desensitize the olfactory nerves to the point that an individual may fail to smell the presence of the gas even if the concentration of the gas suddenly increases.

### **Oxygen Deficiency**

Normal air contains 20.9 percent oxygen. When the oxygen concentration falls below 19.5 percent the air is considered oxygen deficient. Entering an oxygen deficient atmosphere will lead to asphyxiation. Oxygen deficiency can be caused by the following:

- Combustion- welding and cutting torches, boilers, burners
- Decomposition of organic matter-rotting food, plant and animal life
- Oxidation of metals-rusting

*Example:* The sump in the basement of the building is connected to the sewer or cesspool system. Any gases that are generated by the decomposition process can seep into the sump via the piping. Inside the sump, the gases can accumulate and *displace the available oxygen or create an explosive atmosphere.*

### **Carbon Dioxide**

Carbon dioxide is a colorless, odorless and non-combustible gas. Elevated levels in the atmosphere will result in asphyxiation. Carbon dioxide is heavier than air and will settle in depressions such as pits and displace the available oxygen. This will result in an oxygen-deficient atmosphere. Carbon dioxide is generated by animal and plant respiration, organic decay and fermentation.

*Example:* Potential areas of concern include but is not limited to unventilated fumes from boilers allowed to accumulate in a confined space.

### **Propane Gas**

Propane is used as a fuel source for mechanical equipment such as forklifts. Propane is heavier than air and will settle in areas of lower elevation. The gas is both colorless and odorless. A foul-smelling odorant is often added when propane is used

as fuel. Propane can displace oxygen resulting in asphyxia. Propane is also a flammable gas that can ignite or explode in the presence of an ignition source.

*Example:* Building and storage configuration is such that propane is stored above an unoccupied space with little to no ventilation. Should there be a propane leak, the fuel is heavier than air, it can possibly flow into that confined space and create a hazardous atmosphere, firstly, it can create an explosive atmosphere when the concentration of fuel to air is optimal for ignition. After passing that concentration level, it can create a toxic atmosphere by displacing all the oxygen.

### ***Other Types of Non-Atmospheric Hazards in Confined Spaces Include:***

#### **Mechanical Hazards**

Confined spaces, because of their often-tight configuration, can place workers in dangerous proximity to physical and electrical hazards. Mechanical hazards that are associated with confined spaces include: rotating shafts; agitators; raw material; live steam; movable platforms; rotating gears; moving blades. A confined space entry permit is required to enter the confined space.

*Example:* The area at the base of the elevator shaft is a confined space. Anyone entering the base of the shaft is exposed to the hazard of being crushed by the descending elevator car. To render this space a non-permit required confined space and merely a confined space, implement Lockout/Tagout to remove the mechanical hazard whenever work is to be performed.

#### **Employee Exposure Assessment**

Determine the type of work (scheduled maintenance, emergency repairs, opening or closing of valves, removing debris and cleaning) that will require the employee to enter the confined space. What is the frequency of entry into the confined space? Daily? Weekly? Monthly? Annually? In emergencies?

#### **Classification of Confined Space**

Once each confined space has been identified, determine if the confined space is a permit required confined space, or a non-permit required confined space. If a confined space has, or has the potential to contain a hazardous atmosphere, it **must** be classified as a permit required confined space. Entry can occur only **after** a confined space entry permit is completed. Please contact Ralph Ciano for guidance concerning the development of a written confined space entry program and a confined space entry permit. Both documents are required by OSHA prior to entry into permit required confined spaces.

If a confined space has mechanical equipment that can create a mechanical hazard the confined space is classified as a permit required confined space. This usually applies to elevator rooms, pits, shafts, HVAC systems, etc. However, there are two options to render these spaces as non-permit required confined spaces. Firstly, if possible, guard the moving parts so that they do not pose a mechanical hazard. If, however, this is not practical, implement Lockout/Tagout whenever work is to be done in these areas. That will remove the mechanical hazard and the space will therefore not be defined as a permit required confined space, but a confined space only.

One can classify a confined space as a non-permit required confined space *if the potential for an atmospheric hazard is found **not** to exist and/or the mechanical hazard is controlled*. Please refer to Section 3 for managing the atmospheric hazard and Section 5 for the mechanical hazard.

**(SECTION 2):  
CONFINED SPACE PROPERTY SURVEY**

DATE OF SURVEY: \_\_\_\_\_

SURVEY CONDUCTED BY: \_\_\_\_\_

<b>Required</b>		<b>Permit</b>
<b><u>Location of Confined Space Identified</u></b>	<b><u>Type of Hazard</u></b>	<b><u>Non-Permit?</u></b>
_____	_____	



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**SECTION 3:  
RECLASSIFICATION OF A POTENTIAL *“PERMIT REQUIRED CONFINED SPACE”*  
INTO A *“NON-CONFINED SPACE”* BY DETERMINING  
THE AIRBORNE CONTAMINANT CONCENTRATION**

This procedure is for confined spaces that are below grade such as: pits; vaults manholes. It is designed to assist you in the classification of a confined space as a non-permit required confined space, whenever possible.

Conduct a survey to identify all chemicals that are being stored, used, or generated, in the area surrounding the confined space. Check for leaking containers and spills. Refer to the material safety data sheets (MSDS) to determine the physical properties of the chemicals. Chemicals that are heavier than air settle in areas of lower elevations (ex: propane is a heavier than air chemical that may be used in the facility). You will need to conduct air monitoring to determine the level of these chemicals within the confined space.

If the confined space is connected to the sewer or cesspool systems, determine the sources of contaminants that may seep into the space. The toxic gases that are being generated within the sewer, cesspool and associated piping may collect within the confined space.

Please refer to Section 3 for a list of typical atmospheric hazards and examples for a list of typical atmospheric hazards and examples.

Once these chemicals are identified and their potential to seep into the confined space is determined, an air sampling strategy can be devised. Refer to Section 4, air sampling worksheet, which will assist you in devising a sampling strategy. When the atmospheric content within the confined space is determined and no atmospheric hazard is found to exist, then the space can be classified as a non-permit confined space.

### **Sampling Equipment**

Equipment that can be used to determine the airborne concentration within the confined space can be ordered from the Lab Safety Supply Company 1 800 356-0783 or any other supplier. Order Diffusion Detector tubes manufactured by Drager or Dosimeter Tubes manufactured by Sensidyne. These tubes accurately measure airborne levels of specific gases. You will need to determine in advance the type of airborne contaminant likely to be encountered within the confined space.

The sampling tubes should be broken at both ends upon immediate use and be placed in the confined space for a sampling time of at least four hours. A color change will occur within the tube. The color change is the result of reactions caused by the gas in question with the chemicals in the tube. This is known as a colorimetric reaction. The colorimetric reaction will proceed along the length of the tube. Follow the manufacturer's instructions when using the colorimetric tubes.

Refer to publications such as the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Booklet, the NIOSH Pocket Guide to Hazardous Chemicals, and the OSHA Permissible Exposure Levels 1910.1000. These documents list the legal and recommended exposure limits for chemicals. Call us at G.C.G Risk Management (212) 431-3000 for assistance in determining the exposure limits. We have these references. This information should be on the Material Safety Data Sheets (MSDS) of the substances you are sampling.

The sampling should be conducted periodically in order to collect data from all four seasons and varying meteorological conditions. **It is recommended that the sampling be conducted over a one-year period, during different meteorological conditions.**

When air sampling consistently determines that the levels of airborne contaminants is below the levels specified in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Booklet, the NIOSH Pocket Guide to Hazardous Chemicals, and the OSHA Permissible Exposure Levels 1910.1000, the confined space can be reclassified. The permit required confined space can be reclassified as a non-permit required confined space. You must make sure to retain all records that support the reclassification.

**SECTION 4:**  
**AIR SAMPLING WORKSHEET**

DATE: \_\_\_\_\_

TIME: \_\_\_\_\_

PERSON SAMPLING: \_\_\_\_\_

MATERIAL OR CHEMICAL SAMPLING FOR: \_\_\_\_\_

MANUFACTURER OF SAMPLING TUBE: \_\_\_\_\_

LOCATION OF CONFINED SPACE: \_\_\_\_\_

LOCATION OF SAMPLE: top\_\_\_middle\_\_\_bottom\_\_\_ OF CONFINED SPACE

OUTSIDE TEMPERATURE: \_\_\_\_\_

WEATHER: \_\_\_\_\_

SNOW COVER: yes \_\_\_\_\_ no \_\_\_\_\_

GROUND FROZEN: yes \_\_\_\_\_ no \_\_\_\_\_

PEL FOR CONTAMINANT: \_\_\_\_\_

SAMPLE END TIME: \_\_\_\_\_

SAMPLE START TIME: \_\_\_\_\_

SAMPLE TOTAL TIME: \_\_\_\_\_ in minutes

CONCENTRATION OF CONTAMINANT: \_\_\_\_\_ parts per million (ppm)  
(Read the number from the scale on the dosimeter tube)

TIME WEIGHTED AVERAGE EXPOSURE: \_\_\_\_\_ ppm  
(Divide the concentration of contaminant by the total time in minutes of sample)

## SECTION 5:

### **RECLASSIFICATION OF A "PERMIT REQUIRED CONFINED SPACE" TO A "NON-PERMIT CONFINED SPACE" BY REMOVAL OF SAFETY HAZARDS WITH THE IMPLEMENTATION OF LOCKOUT PROCEDURES**

If the confined space is classified as a permit required confined space solely due to the existence of a safety hazard created by mechanical equipment (pinch point, crushing), the application of a Lockout/Tagout to prevent the unexpected energizing or start up of the machine or equipment, reclassifies the permit required confined space to a no-permit required confined space. Only after the equipment is locked and tagged out, can the confined space be reclassified, and employees allowed to safely enter and perform the assigned task.

*Example:* The pit of an elevator shaft is classified as a permit required confined space. The mechanical hazard is the movable elevator car which can easily crush an employee.

The application of a lockout/tagout procedure to reclassify the confined space must be certified. The person who installs the Lockout and Tagout equipment is the certifying individual. The certification must include the date, location of the confined space, and the signature of the certifying individual. Section 6 is a form that can be used to reclassify the permit required confined space.

**(SECTION 5:)**

***CERTIFICATION DOCUMENT***  
**RECLASSIFICATION OF A "PERMIT REQUIRED CONFINED SPACE" BY**  
**INSTITUTING LOCKOUT PROCEDURES**

DATE: \_\_\_\_\_

LOCATION OF CONFINED SPACE: \_\_\_\_\_

WHAT METHOD USED TO REMOVE SAFETY HAZARD: \_\_\_\_\_

\_\_\_\_\_

CERTIFYING INDIVIDUAL: \_\_\_\_\_

## **SECTION 6:**

### **EMPLOYEE TRAINING**

The *affected employees* who may enter and work in a confined space must receive training that will impart the understanding, knowledge, and skills necessary for the safe performance of the duties that are required when entering a confined space. Training must include:

- Awareness of the location of each confined space.
- The type of hazard (if any) that is associated with the specific confined space.
- The procedures that are to be followed prior to entering the confined space.
- The confined space entrant must be trained in hazard recognition, and the mode, signs, symptoms, and consequences of overexposure to hazardous atmospheres.
- Entrants must also understand the purpose, proper use and limitations of personal protective equipment, rescue equipment and the tools used in confined space entry.

**SAMPLE TRAINING RECORDKEEPING DOCUMENT**

**Date of Training:** \_\_\_\_\_ **Training Conducted By:** \_\_\_\_\_

<b><u>Name of Employee</u></b>	<b><u>Dept.</u></b>	<b><u>Signature</u></b>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**SECTION 7:  
CONFINED SPACE ENTRY  
SAMPLE POLICY**

**Definition of a Confined Space - An Area That:**

1. Is large enough and so configured that an employee can bodily enter and perform assigned work. The work may include maintenance or repairs of equipment installed in the confined space; AND,
2. Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits); AND,
3. Is not designed for continuous human occupancy.

**Purpose:**

This document provides guidelines to define and identify confined spaces, and protocols to be followed when entering confined spaces.

### **Location of confined spaces:**

A survey of the entire facility is conducted. (See Section 2 for guidelines and sample document). Each location that meets the definition of a confined space is identified. The type of hazard, potential or actual, associated with the confined space should be determined. The hazard can include atmospheric, mechanical or a combination of both.

This information is recorded within the policy.

*Sample document of findings:* As a result of a survey conducted in this facility the (ex: pit, sump, vault) located (identify location) has been designated as a confined space. The type of hazard that may be encountered when entering this confined space is (atmospheric, mechanical or a combination of both).

### **Hazards associated with confined space:**

#### Atmospheric Hazards -

A confined space may have direct access to the sewer or cesspool system. This direct access may permit the accumulation, within the confined space, of toxic gases that are generated by the decomposition of organic material. The toxic gasses may seep into the confined space and accumulate. The toxic gasses may incapacitate or kill an employee(s) who enters the confined space.

#### Mechanical Hazards -

A confined space may house mechanical equipment. Examples of this type of confined spaces may be the base of an elevator shaft, or a machine pit for compacting equipment. Employees who must enter the confined space to perform repairs or maintenance may come into close proximity of rotating or moving equipment. The rotating or moving equipment may result in serious injury or death to the employee.

### **Procedure:**

**Reminder** - The requirement of OSHA's Confined Space Standard is to identify all confined spaces and determine if the space is a **permit required confined space**. If the space is a permit required confined space then specific protocols, equipment and procedures must be in place before a confined space can be entered.

Air monitoring must be conducted in confined space(s) with potential atmospheric hazards, to determine if an actual atmospheric hazard exists. The air monitoring is specific for the type of air contaminant that is suspected. The results of the air monitoring for *each* confined space is available for the employees to review prior to entering the confined space.



When air monitoring determines that an atmospheric hazard **does not** exist in the confined space, the confined space is classified as a non-permit required confined space. Entry into this confined space without an entry permit, is then allowed. A non-permit required confined space does not fall under the scope of OSHA's confined space standard. Please refer to the Section 2: Reclassification of a Confined Space by Determining the Airborne Contaminant Concentration.

If the only hazard associated with a confined space is a mechanical hazard, the permit required confined space can be reclassified a non-permit required confined space by using a Lockout and Tagout procedure to isolate the mechanical equipment and prevent unintentional activation of the equipment. Procedures to develop and implemented a Lockout and Tagout programs are available from G.C.G. Risk Management by calling Ralph Ciano. If Lockout and Tagout procedures cannot be implemented, a confined space entry permit will be required prior to entering the confined space. Please refer to the Section 5: Reclassification of a Permit Required Confined Space by removal of Safety Hazards.

### **Training:**

The affected employees who may enter a confined space should receive training that will impart the understanding, knowledge, and skills necessary for the safe performance of the duties that are required when entering a confined space. The employee should be aware of: the location of each confined space; the type of hazard (if any) that is associated with the specific confined space; the procedures that are to be followed prior to entering the confined space; the designations of non-permit confined space and permit confined spaces is reviewed, whether entry into a confined space requires an entry permit, and the location and findings of air testing that was conducted to determine the airborne hazard associated with a particular confined space.

The training should be certified by recording the employee's name, a summary of the topics covered by the training, the identity and signature of the trainer(s), and the date training was conducted.

### **Contractors:**

All contractors are made aware of the potential hazards at the work site including the hazards involved in confined spaces. Contractors are to work equipped with the necessary elements to work in the confined space, or permit-required confined space, including but not limited to: air monitoring; lockout/tagout; additional continuous ventilation; two-way instantaneous communication; and on-site emergency rescue when warranted.