Confined Space Entry

Environmetal Safety & Health - Safety Center

Author: R. Chiodi 03/21/1997 rev 04/16/2000

Confined Space Entry

Why are we here?

OSHA and this company require that all employees who must enter into confined spaces receive training as to the hazards, procedures and equipment required to do so safely.

Confined Space Entry

Definitions:

The entrant is the person who enters a confined space.

The attendant is the person who stays with the entrant outside the confined space, and is responsible for assisting the entrant in exiting the confined space, and calling for emergency assistance when required.

The safety representative is the qualified person who evaluates the hazards, prescribes required equipment and precautions and issues the Confined Space Entry Permit.

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Confined Space Entry

Goals and Objectives:

At the end of this session you will:

- be familiar with the hazards and requirements of “safe” confined space entry.
- pass a 10 question quiz with a score of 100%.

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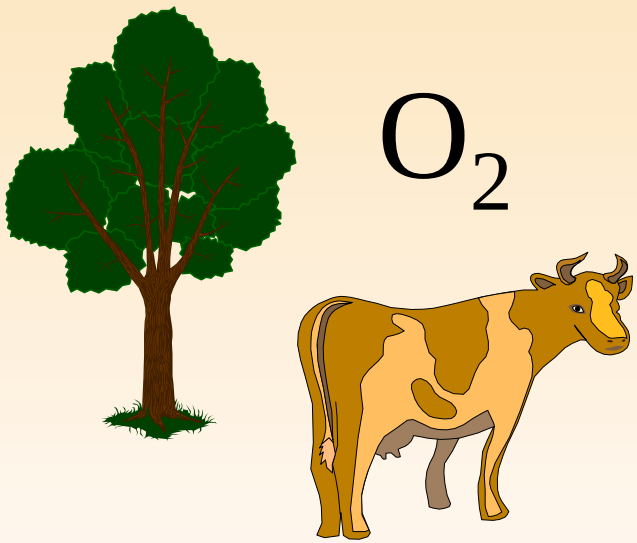
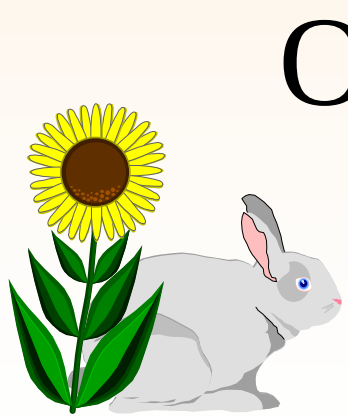
Confined Space Entry - Hazards



Both animal and plant life require oxygen to live. One of the primary hazards of entering confined spaces is oxygen deficiency.

When oxygen is present in concentrations less than 19.5% the atmosphere is said to be oxygen deficient.



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Confined Space Entry - Hazards

Oxygen can also be present in concentrations that are too high.

Oxygen in concentrations greater than 23% is too oxygen rich and can cause combustible materials to ignite very quickly.

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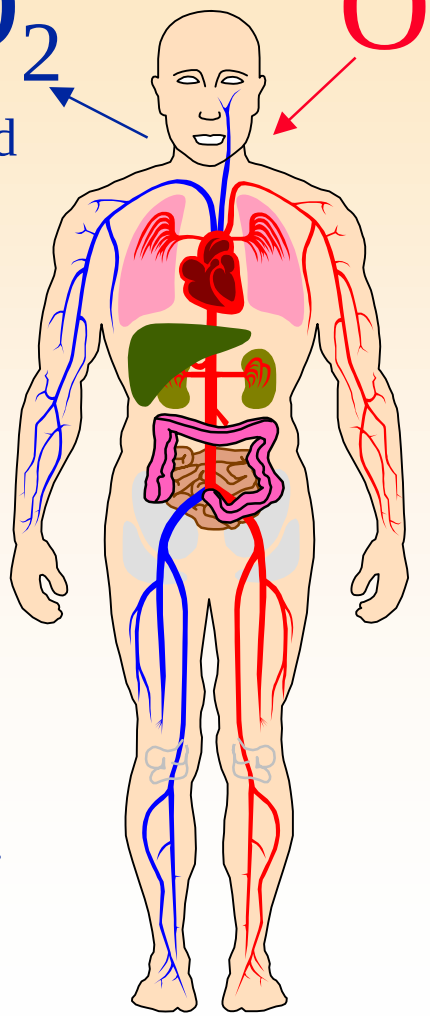
Confined Space Entry - Hazards

Oxygen deficiency can be caused by several processes:

Consumption:	oxygen is used up by the person who is in the confined space and turned into carbon dioxide.
Displacement:	denser materials push the oxygen out of the occupied space.
Reaction:	oxygen is reacted with other materials to make other compounds.

Confined Space Entry - Hazards

CO_2 O_2



After oxygen is delivered to body organs and used by organ cells, it reacts with carbon to make carbon dioxide. Red blood cells carrying carbon dioxide turn blue. Carbon dioxide is carried back to the lungs by the red blood cells and exhaled into the surrounding atmosphere.

The human body requires oxygen to carry out cellular metabolism. Oxygen is brought in through the lungs and transported to cells of body organs by the red blood cells. When blood is rich in oxygen it turns red.

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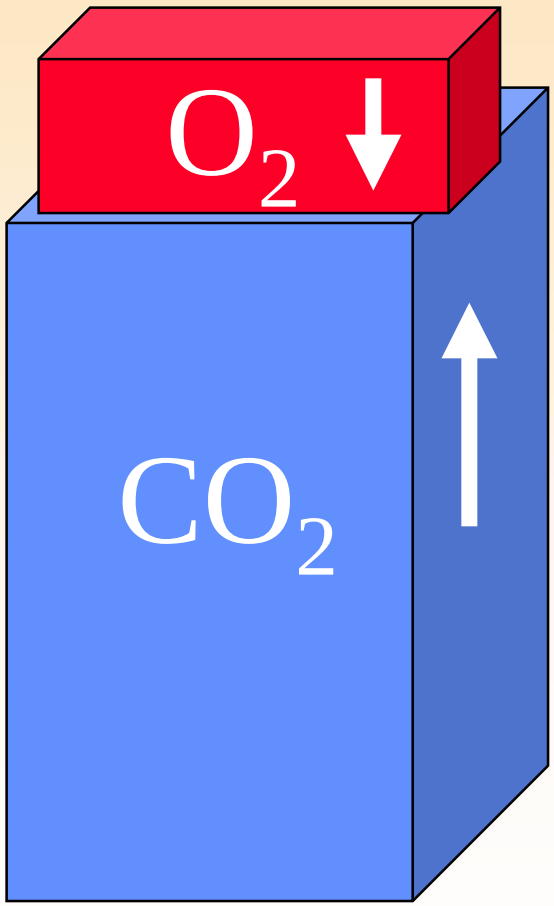
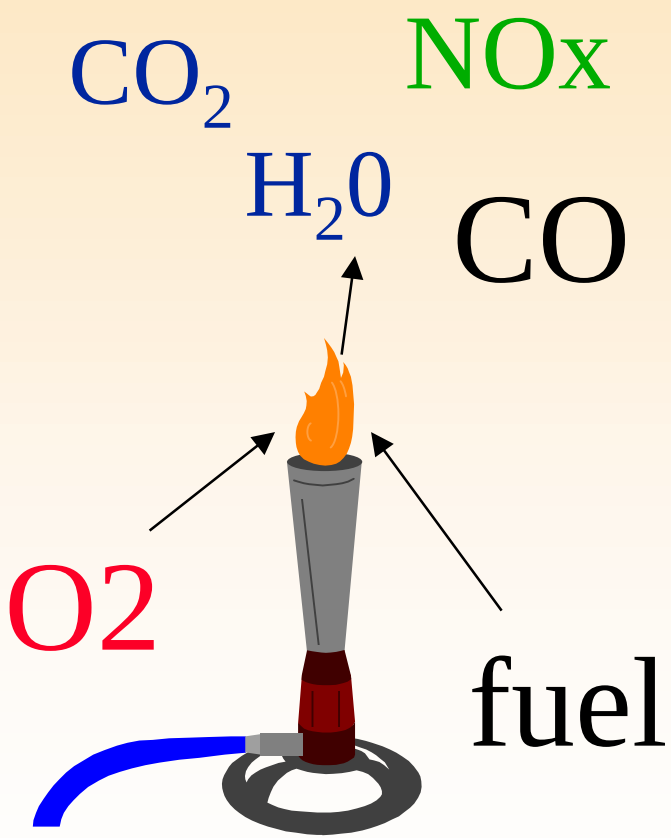
Confined Space Entry - Hazards



Given a fixed amount of oxygen as you would have in a confined space, respiration of oxygen causes carbon dioxide to increase. When oxygen decreases to less than 19.5%. the atmosphere is said to be oxygen deficient, putting occupants of the confined space at risk of losing consciousness and death.

Confined Space Entry - Hazards



Processes which operate by the principle of combustion use up oxygen much faster than the human respiration.

Products of combustion vary with the fuel that is present and the temperature of the combustion reaction. Welding, burning natural gas, propane, gasoline, and diesel engines are examples of combustion processes.

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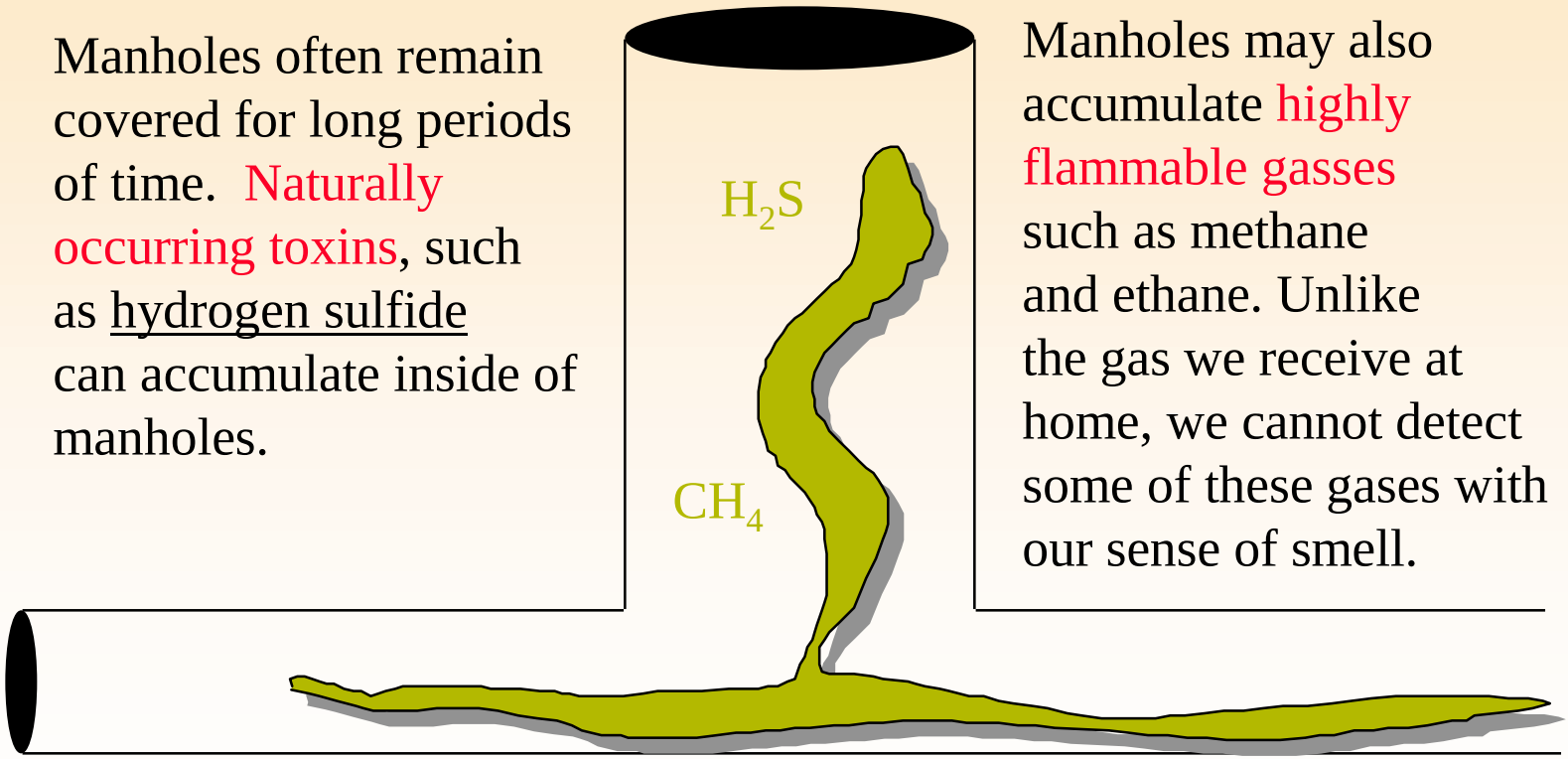
Confined Space Entry - Hazards

Manholes often remain covered for long periods of time. Naturally occurring toxins, such as hydrogen sulfide can accumulate inside of manholes.



Manholes may also accumulate highly flammable gasses such as methane and ethane. Unlike the gas we receive at home, we cannot detect some of these gases with our sense of smell.

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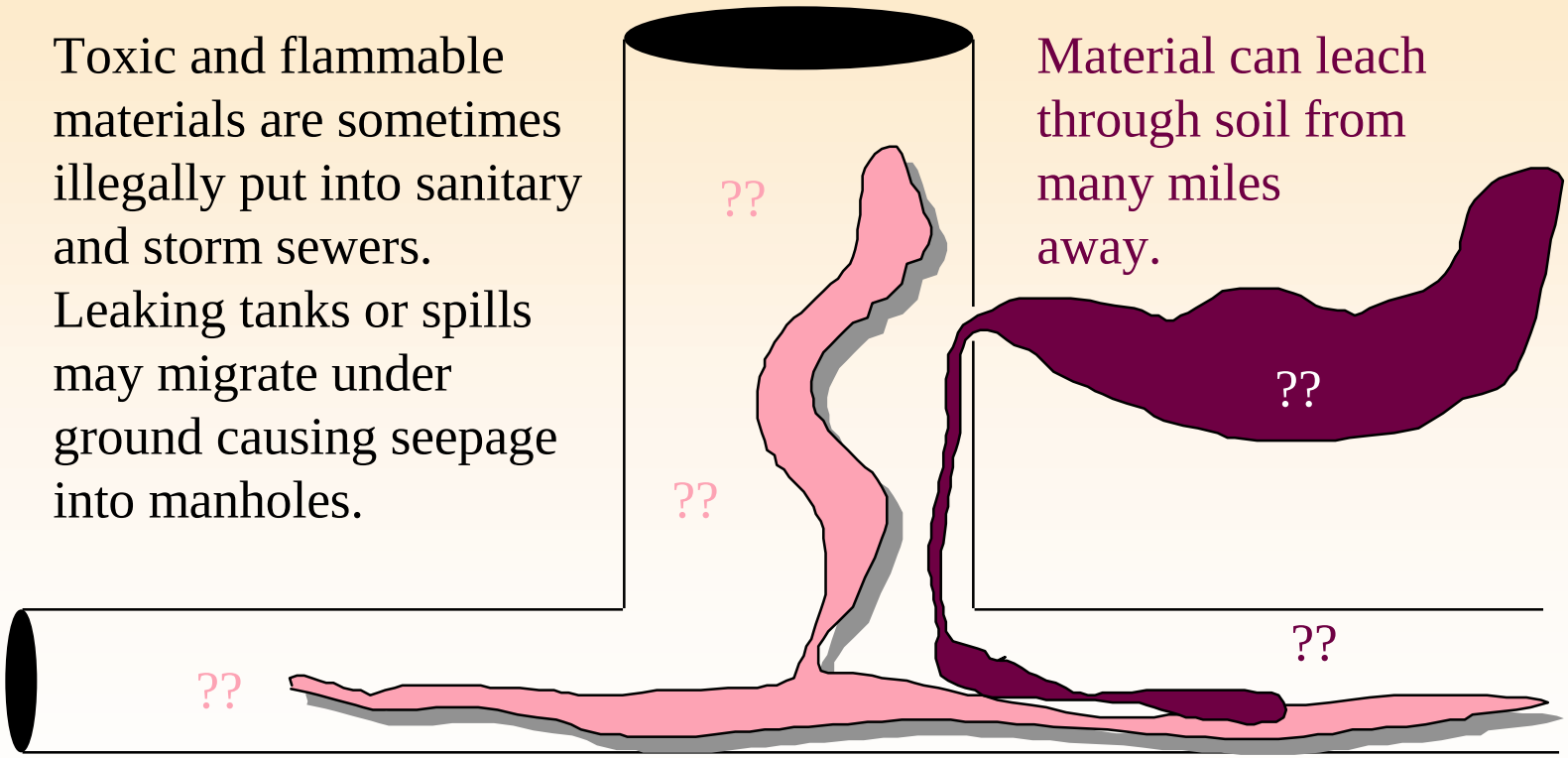
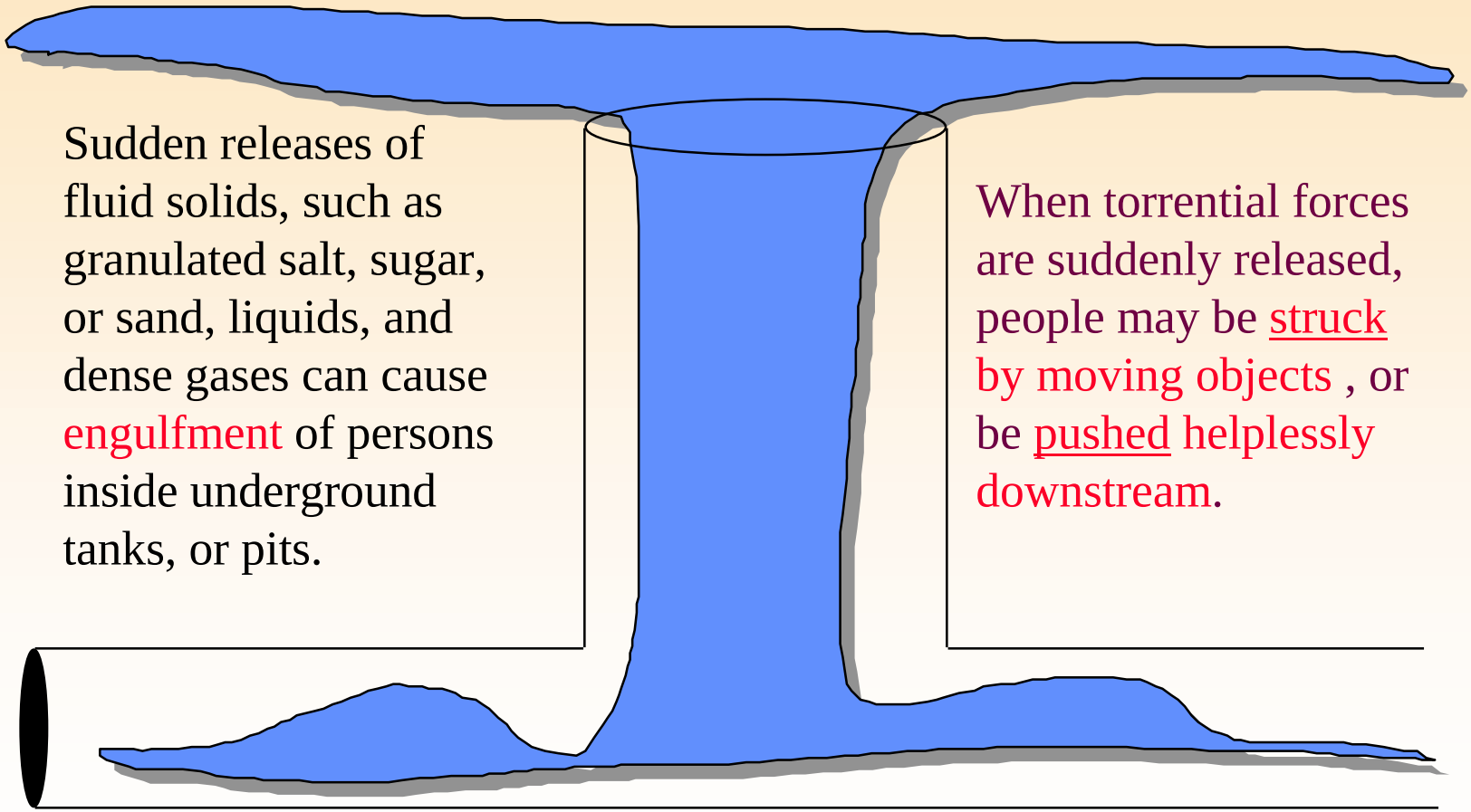
Confined Space Entry - Hazards

Toxic and flammable materials are sometimes illegally put into sanitary and storm sewers. Leaking tanks or spills may migrate under ground causing seepage into manholes.



Material can leach through soil from many miles away.

Confined Space Entry - Hazards

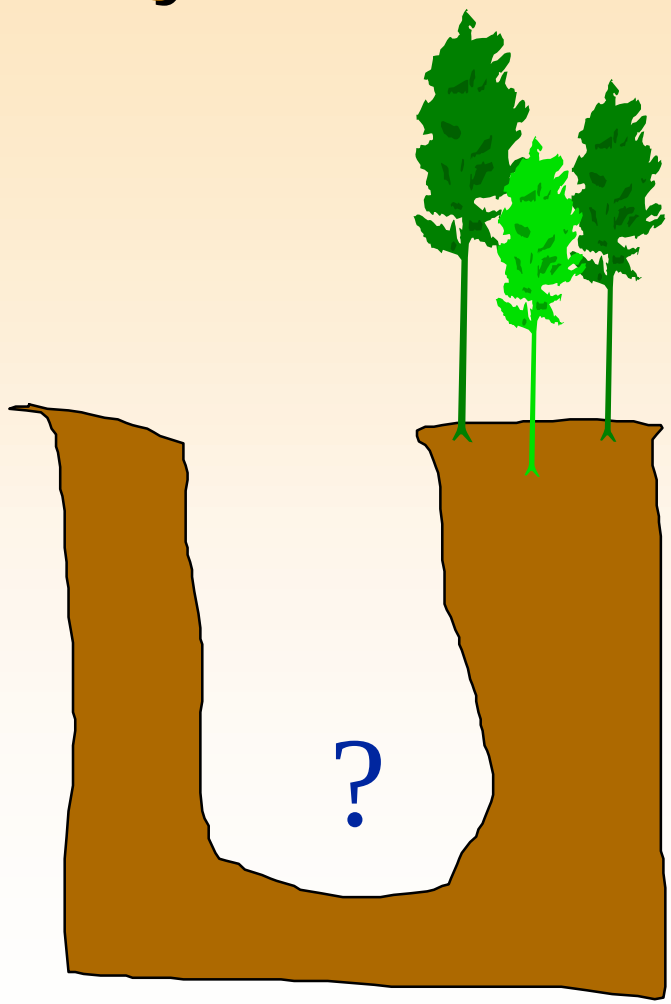


Sudden releases of fluid solids, such as granulated salt, sugar, or sand, liquids, and dense gases can cause engulfment of persons inside underground tanks, or pits.

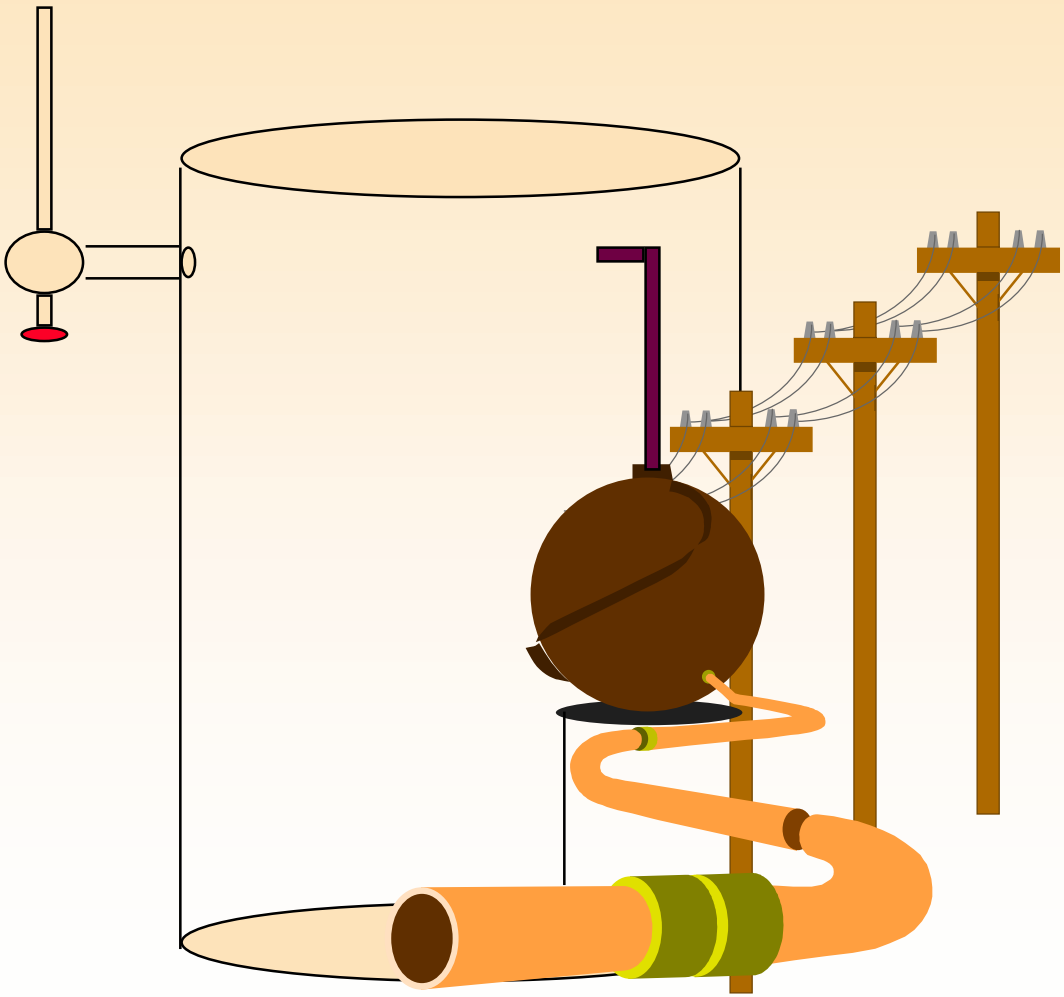
When torrential forces are suddenly released, people may be struck by moving objects , or be pushed helplessly downstream.

Confined Space Entry - Hazards

Trenches, ravines and other excavations may also be considered confined spaces, if there is a potential for accumulation of toxic gases, engulfment and/or the depletion of oxygen.



Confined Space Entry - Hazards



Many confined space entries involve a complex set of exposures to mechanical, electrical, pressure and chemical hazards.

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Confined Space Entry

The entry of a confined space begins with a Confined Space Entry Permit.

Confined Space Entry Permit

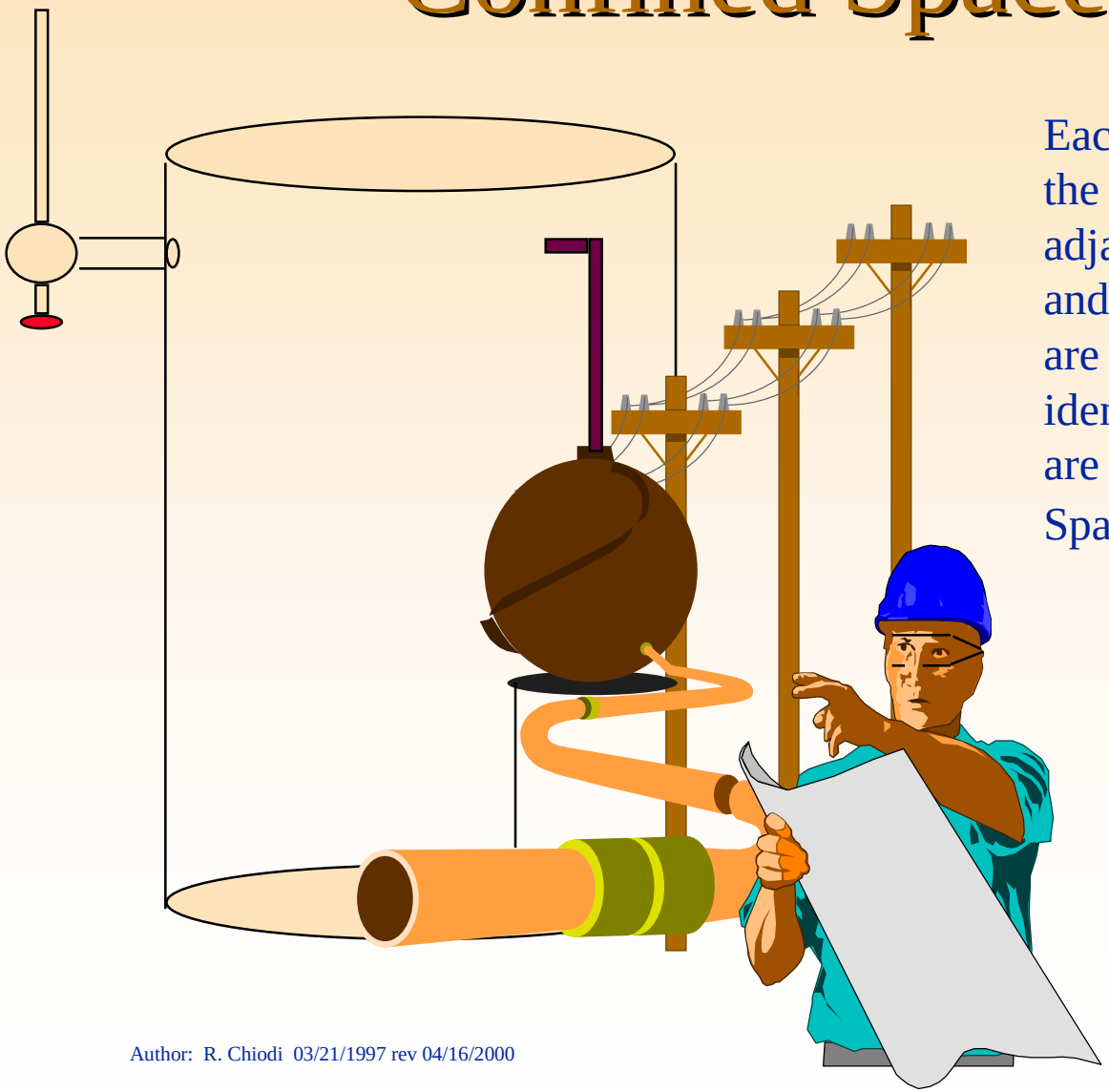
Location and Description of Confined Space:

Reason for Entry:

Permit Issued to (Name of Company/Organization):

The permit system requires that a qualified safety representative visit the work location and evaluate the conditions under which entry will be made.

Confined Space Entry



Each process hazard to which the entrant may be exposed, adjacent operations or processes, and scheduled activity are reviewed. For each hazard identified, countermeasures are detailed on the Confined Space Entry Permit.

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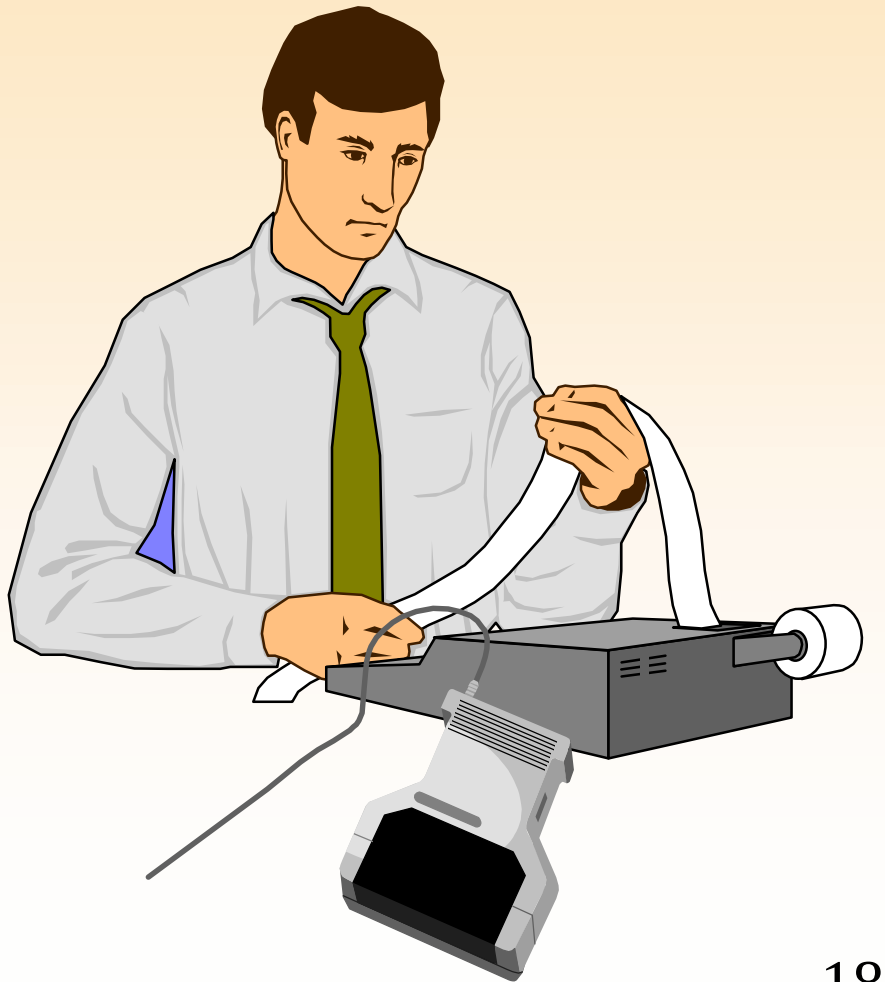
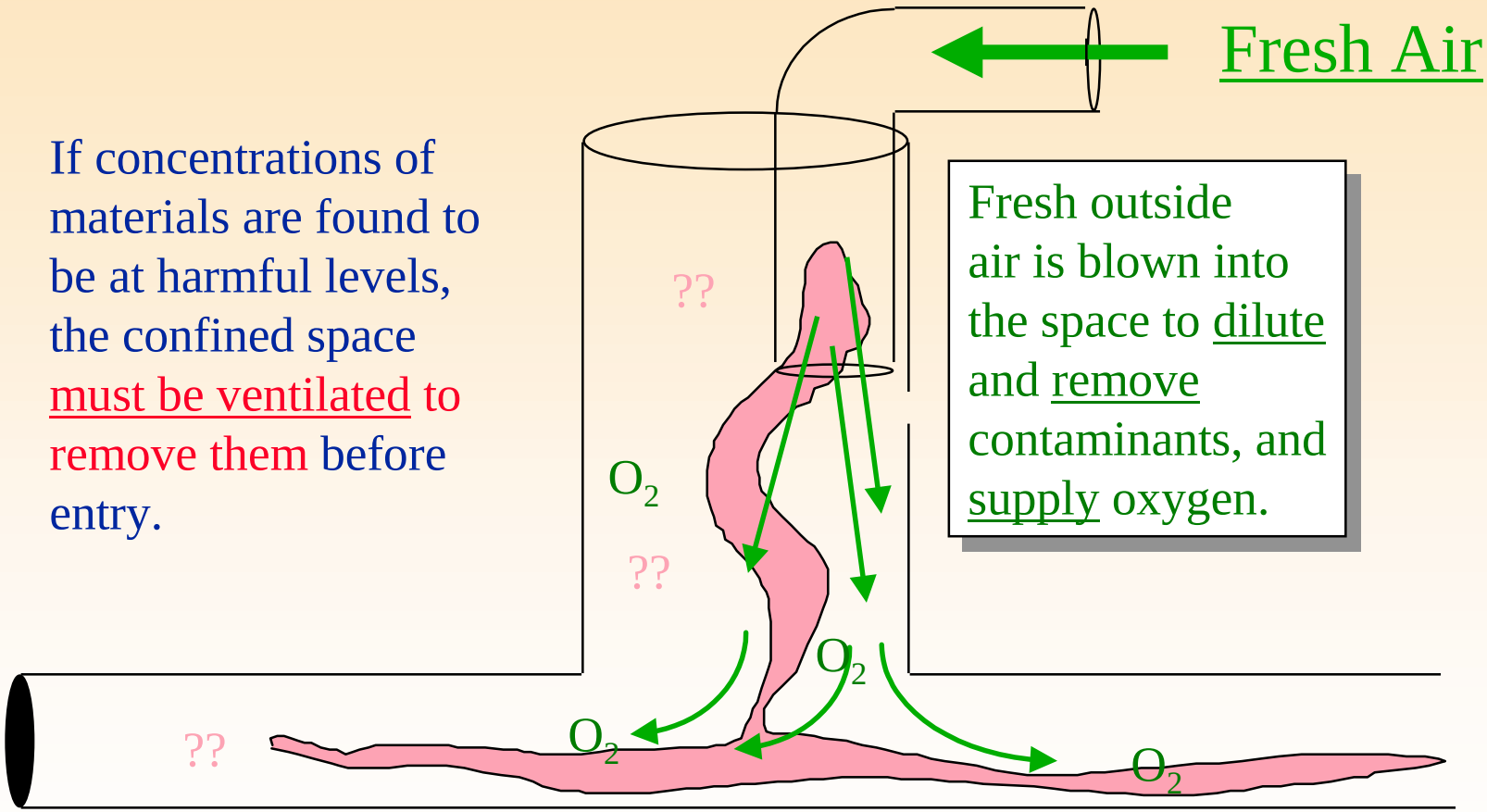
Confined Space Entry

The safety representative tests the space for hazardous concentrations of known harmful substances, such as hydrogen sulfide, carbon monoxide, and flammable liquid or gas. The concentration of oxygen is measured at the same time.



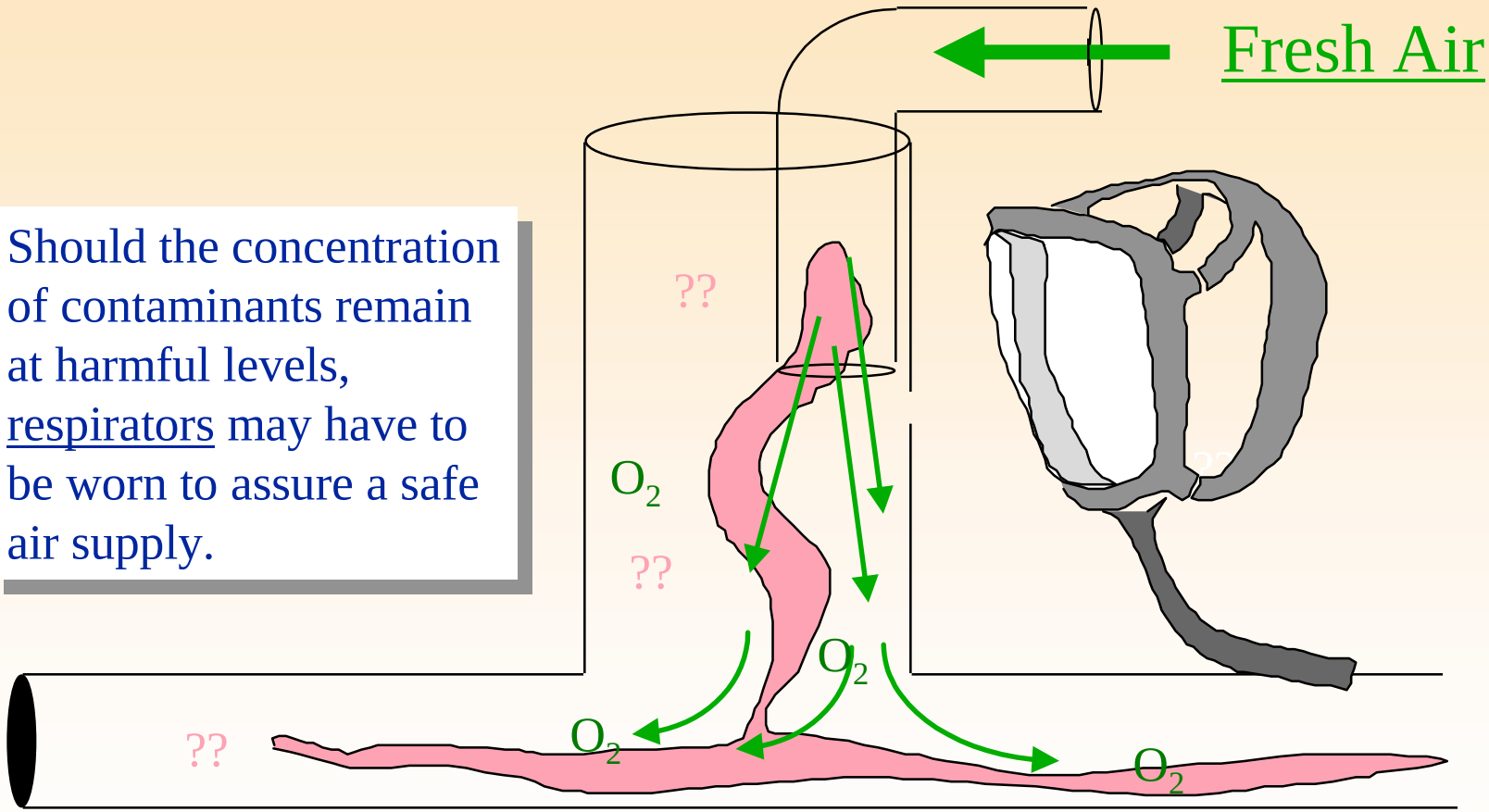
Confined Space Entry - Hazards

If concentrations of materials are found to be at harmful levels, the confined space must be ventilated to remove them before entry.



Confined Space Entry - Hazards

Should the concentration of contaminants remain at harmful levels, respirators may have to be worn to assure a safe air supply.



Confined Space Entry

Means of emergency rescue must be readily available to the confined space entry attendant for emergency extrication of entrants.

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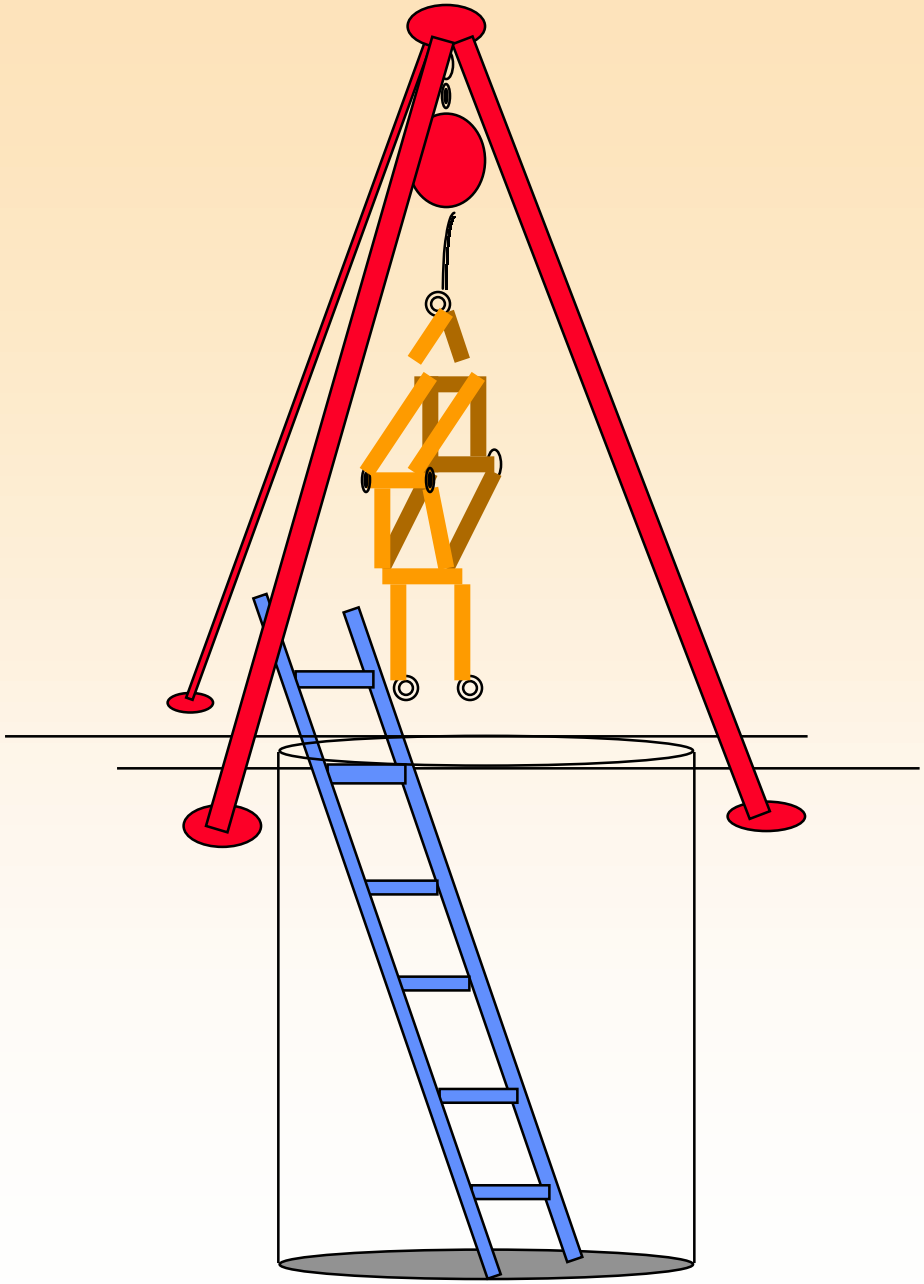

Confined Space Entry

A means must be provided for both safe normal entry or exit , and emergency extrication. Tripods with hoist, lifeline, and full body harness are often used for emergency extrication. Ladders may be used for ordinary entry and exit.

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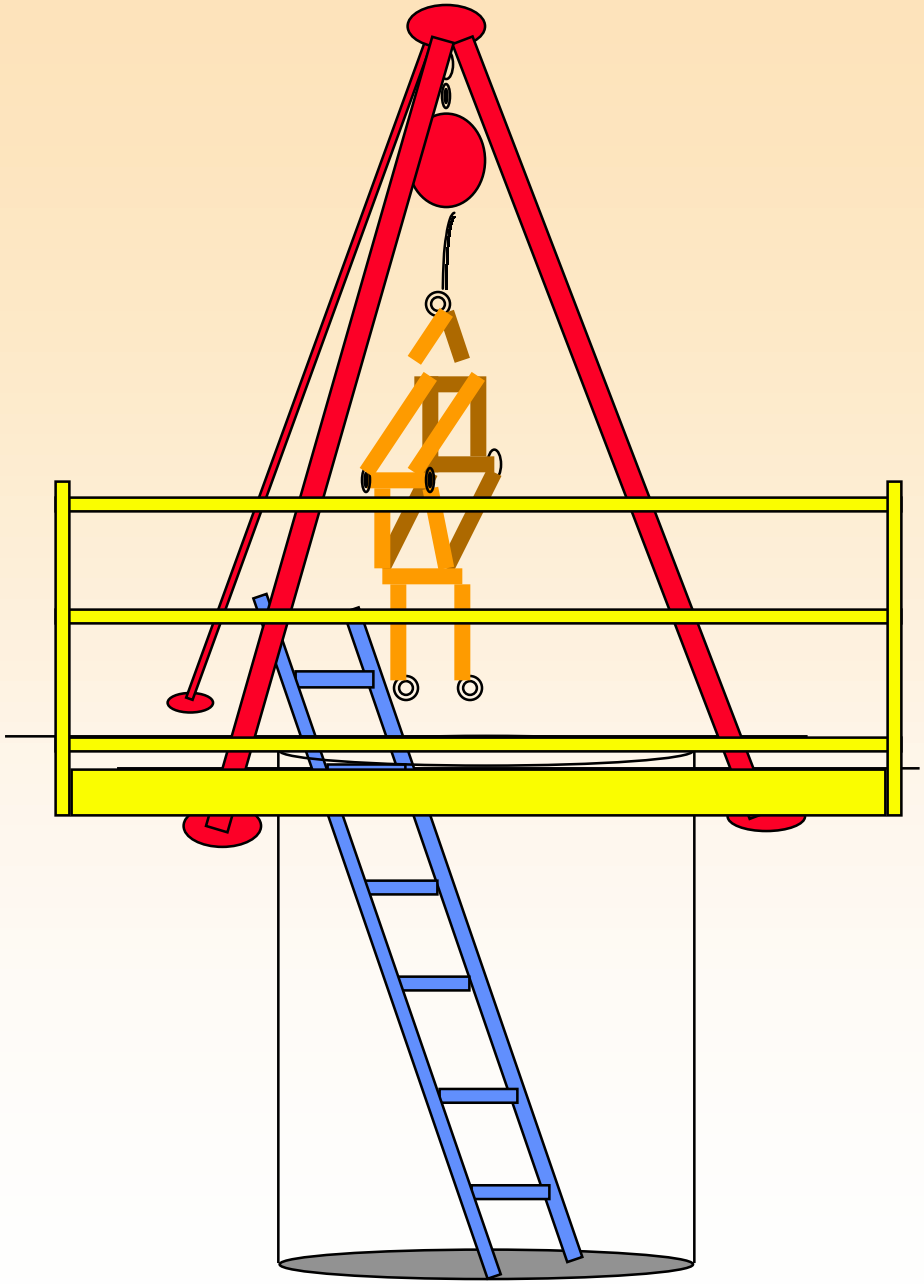

Confined Space Entry

Barriers to prevent passers-by and the curious from falling into the opening must be put in place.

Holes and openings must be closed or guarded when not attended.

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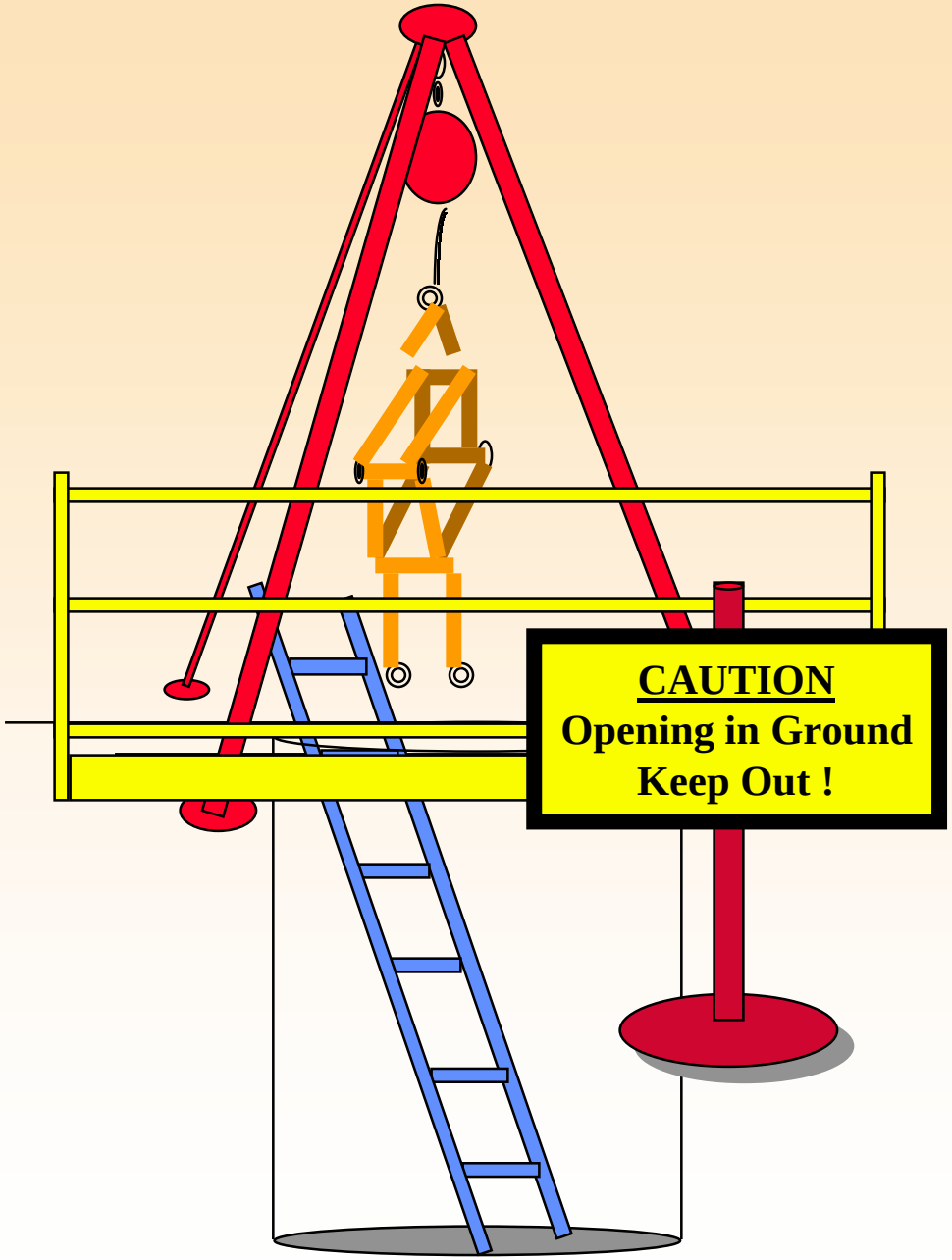
Confined Space Entry



Place warning signs where pedestrians can see them.

Signs must state the hazard and the required action.

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Confined Space Entry

Confined Space Entry Permit

Requirements

Eye protection	yes	no
Respiratory protection	yes	no
Continuous Ventilation	yes	no
Body Protection	yes	no
Hand Protection	yes	no
Foot Protection	yes	no
Weather Protection	yes	no

Required countermeasures include personal protective equipment for hazards expected to be found within the confined space.

Eye and head injuries are always a potential, therefore safety glasses and hard hats are required wear for entrants.

Other conditions may require the use of respirators, safety shoes, protective gloves, and other personal protective equipment.

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Confined Space Entry

Confined Space Entry Permit

Requirements

Ground Fault Interruption	yes	no
Lockout of Hazardous Energy Sources	yes	no

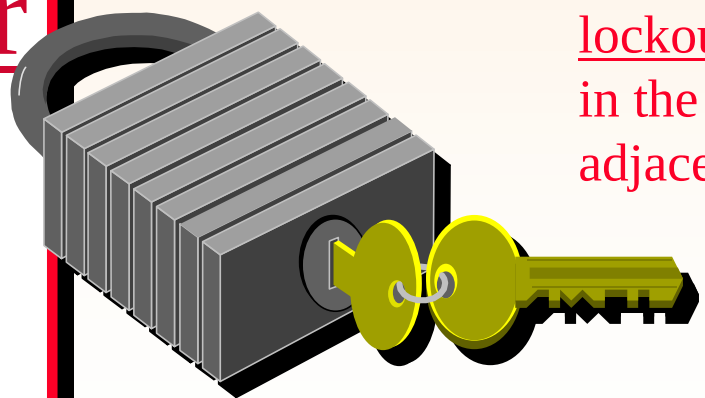
Required countermeasures also include prevention of electrical shock hazards due to loss of earth ground for portable tools. GFCI's are required for portable electric tooling.

There may also be a need to lockout and tag equipment both in the confined space and on adjacent equipment and processes.

o

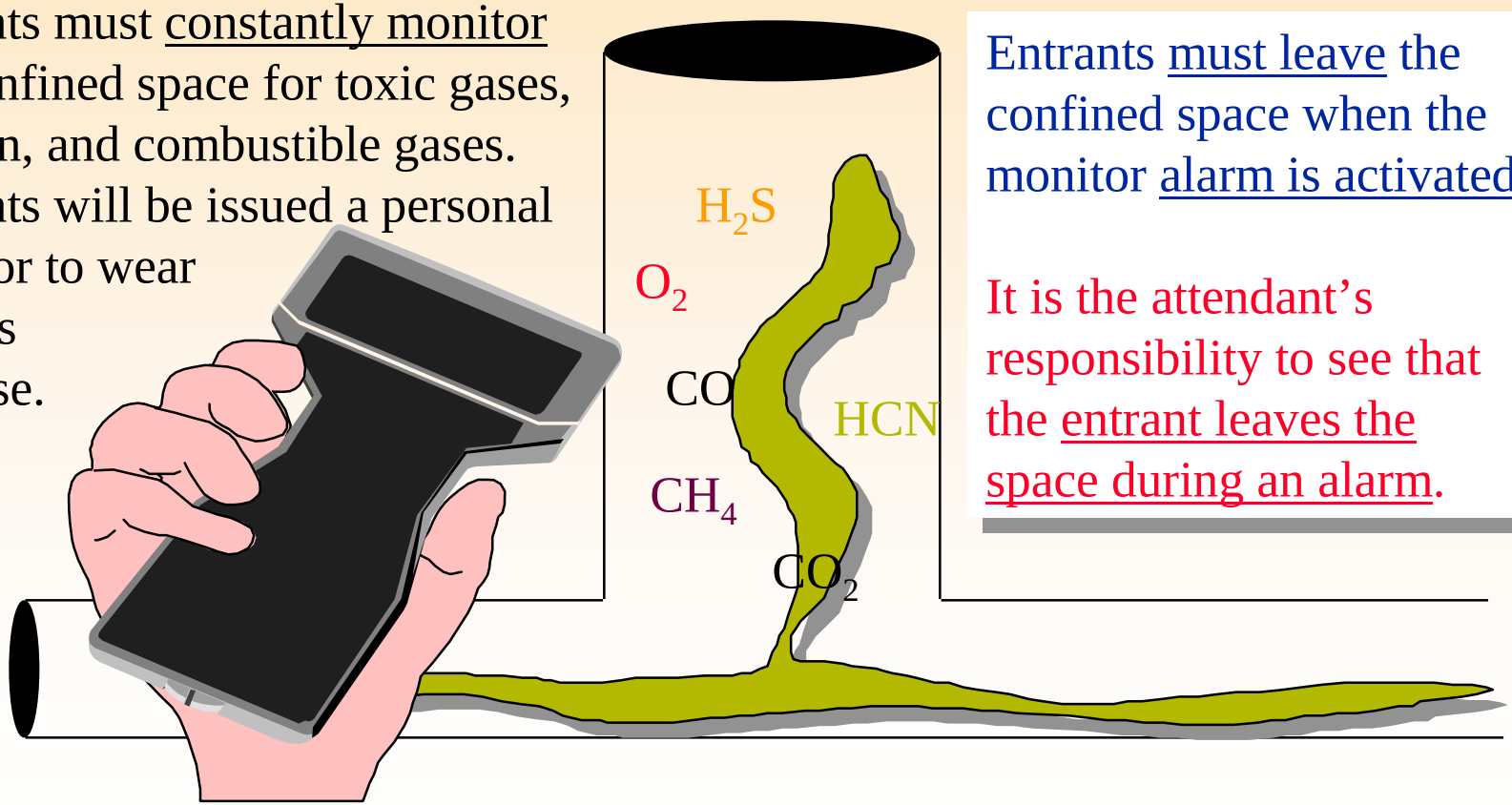
Danger

Do not use!



Confined Space Entry

Entrants must constantly monitor the confined space for toxic gases, oxygen, and combustible gases. Entrants will be issued a personal monitor to wear for this purpose.



Entrants must leave the confined space when the monitor alarm is activated.

It is the attendant's responsibility to see that the entrant leaves the space during an alarm.

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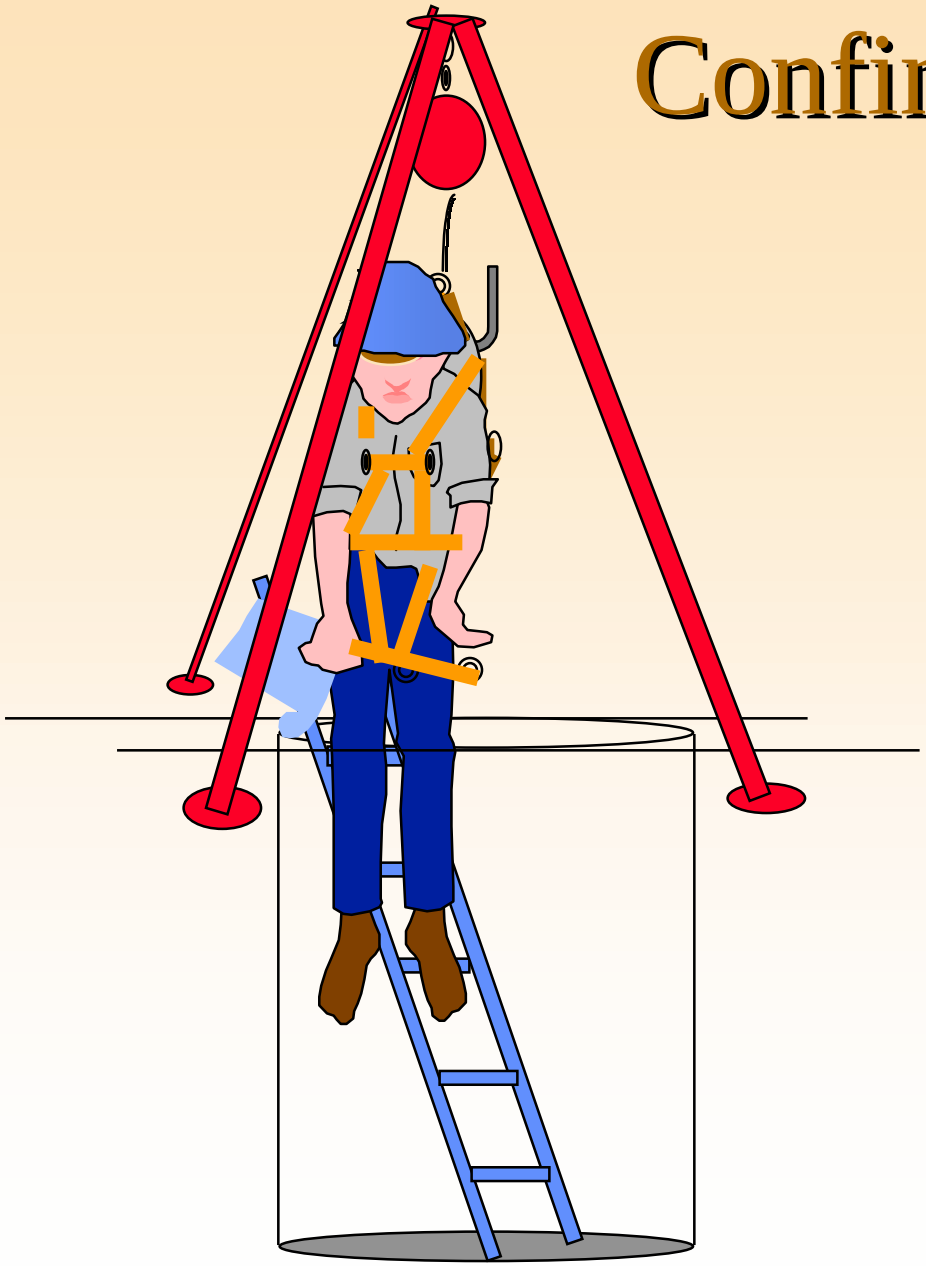
Should conditions develop which require extrication, and the entrant cannot get out of the confined space on their own, the attendant must call for emergency assistance at once!

Confined Space Entry



The attendant should attempt to remove the entrant from the confined space using tripods, hoist, and lifelines. Attendants are NOT TO ENTER CONFINED SPACES. Lethal hazards may be present within the confined space. Only properly equipped and trained emergency rescue personnel may enter confined spaces to make rescues.

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Confined Space Entry - Summary

Confined space entry hazards can include:

- the presence of toxic substances
- insufficient oxygen, or too much oxygen
- engulfment
- presence of combustible gases and liquids
- process or equipment related hazards.
- conditions changing from nonhazardous to hazardous.

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Confined Space Entry - Summary

Confined Space Entry Permit

Location and description of confined space:
Reason for entry:
Permit issued to:
Supervisor's Name:
Attendant's name:
Permit issuer's name:
% oxygen: **% lower explosive limit:** **ppm CO:** **H_2S:**

Requirements

Emergency Rescuer	yes	no
Continuous Gas Monitor	yes	no
Barrier for ground openings	yes	no
Warning Signs	yes	no
Safety Harness with life line	yes	no
Tripod / Hoist / Pulley	yes	no
Access (ladders/other)yes	no	
Eye protection	yes	no
Respiratory protectionyes	no	
Continuous Ventilation	yes	no
Body Protection	yes	no
Hand Protection	yes	no
Foot Protection	yes	no
Weather Protection	yes	no
Ground Fault Circuit Interrupters	yes	no
Lockout of Hazardous Energy	yes	no

Required countermeasures are determined by a qualified safety professional.

Once the required countermeasures are in place, a permit is issued by the safety representative and the confined space may be safely entered.

Should an emergency arise during the entry, the attendant notifies an emergency response team and attempts to extricate the entrant.

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Confined Space Entry -Summary

CAUTION
Confined Space Safe Work Permit Required

Confined spaces are required to be labeled. Some spaces may have been overlooked. Contact your safety representative when in doubt. It is up to you to obey signs and to follow permit procedures before entry.

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Where to Get Help?

The supervisor of a confined space entry should be contacted for any equipment necessary to complete the task at hand.

Safety Representatives are responsible for answering questions about the confined space entry permit, countermeasures, sampling methods, and instrumentation.

References and Sources for More Information

OSHA 29CFR 1910.146 Permit - Required Confined Spaces