



Gases & More Gases



Greater Houston
Chapter

Subsurface structures are not always free of contaminants, sometimes because of the nature of the project and sometimes because adequate precautions are not taken. Therefore, safeguards should be taken to clear the atmosphere within these structures before operations begin.

What types of gases are we talking about? Man-made gases, naturally occurring gases, gases escaping from surrounding buildings, and gases coming from subterranean faults can all be encountered by workers in confined spaces.

The most common gases workers could encounter are:

- Fuel gases, such as manufactured gas, natural gas, or liquefied petroleum gases.
- Vapors, stemming from liquid fuels and solvents, such as naphtha or gasoline.
- Gases from fermentation of organic matter, such as methane, carbon dioxide, hydrogen sulfide, and mixtures deficient in oxygen.
- Combustion, such as carbon dioxide or carbon monoxide from engine exhaust.
- Gases and volatile substances within industrial drainage.
- Gases formed after sewer explosions and fires.
- Gases from the use of nitro explosives.

Because mixtures of these contaminants are common, explosion, fire, and asphyxiation hazards may all be encountered in the same underground structure. They can be flammable, poisonous, or suffocating.

Test, Test, Test

Testing for dangerous gases is complicated. What do you test for? How do you test? What equipment should be used? Where do you get this type of training? Who is qualified to test?

- At a minimum, employers must assure that employees know the types of gases they could encounter in their territories, are trained to properly use gas detection equipment, and are tested periodically on testing methods and equipment.
- Various types of instruments determine the presence of dangerous gases. Competent personnel should supervise when instruments are taken into an untested atmosphere. The key here is “competent” person.

Ventilation/Flushing

- Covers to manholes/shafts/pits/tunnels/etc. should be removed in contaminated areas, and thermal draft should circulate the gases and vapors. In most cases, blowers will probably be required to achieve natural airflow.
- Although continuous ventilation may not be necessary after tests have shown that the accumulated gas has been cleared, constant use of air blowers and atmospheric testing in underground structures will assure adequate oxygen and that no combustible gases or vapors exist.
- If testing indicates the presence of continuous leakage into the underground structure, correct the trouble source before permitting workers in the structure.

Personal Protective Equipment

- Under hazardous conditions, employees working in manholes should wear lifelines, and at least one worker should be positioned at the surface where he/she can see or hear the workers in the manhole.
- The worker at the surface should also be properly equipped with hoisting equipment and training to render assistance in case of an emergency.
- The “standby” person should be solely responsible for monitoring the manholes/pits/shafts/tunnels/etc. (and the personnel), and should not be assigned any other duties while personnel are in the manhole or other subsurface structure.

Entry into manholes and/or other confined spaces should be in accordance with a formal, written procedure (entry permit). A checklist should be used to assure that each precautionary step is completed prior to entry.

Consult OSHA General Industry Standard (29 CFR) 1910.146 (Permit Required Confined Space), and OSHA Construction Industry Standard (29 CFR) 1926.21 (et al), for guidelines applicable to personnel entering such sub-surface structures, etc.

Always consider a subsurface structure (confined space) as contaminated until tested because any confined space may be clear one day (or minute) and contaminated the next.