

# Construction Hazards

## WHAT YOU DON'T SEE WILL HURT YOU



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**GAS** Detection

Every day, people drive down highways and streets looking at the towering cranes and scaffoldings on construction sites surrounding their cities. They pass the lines of contractors' trailers and notice the sign posted on the fence at the entrance to the job site that reads "298 DAYS SINCE LAST LOST-TIME ACCIDENT." Looking up, they see iron workers walking across beams hundreds of feet above the street. They admire the workers' courage knowing that at every moment they are in grave danger of falling from the structure to the street below, claiming their lives.

The sight of men and women scurrying around the job site wearing harnesses, hard hats and safety glasses are evidence of the dangers construction workers face every day and the steps they take to protect themselves against the falls, collapsing structures and flying debris that are all understood to be part of the job. Not so apparent, are the silent, unseen atmospheric hazards that exist on nearly every construction job site. The lack of oxygen, the potential for poisonous vapours and the presence of explosive gases present threats to unprotected construction workers and can injure or claim a life as quickly as a slip from an 80-story skyscraper.

Nearly all construction projects entail excavation work at some point during the job. Whether you are excavating the foundation for a new office building or digging the trench in a city street for a new wastewater pipeline, opening the ground can unleash a variety of atmospheric hazards from the earth. The potential for hitting a pocket of natural gas exists during any digging operation. High concentrations of methane accumulated in these pockets will dilute in open air and become explosive quickly. The spark from the tooth of the shovel's bucket striking a rock can touch off an explosion and fire of catastrophic proportion, potentially engulfing the machine operator and any other workers in the area.

Decaying organic materials that are uncovered or found at the bottom of the hole or trench may be producing poisonous gases such as hydrogen sulphide or carbon dioxide, or robbing the atmosphere of oxygen. In some cases, vapours from other unknown sources may seep into the excavation through fissures in the earth, displacing the breathable air. Workers in the hole may become incapacitated quickly if the oxygen concentrations drop below 16% of volume. It is not always apparent where the danger comes from. Recently a worker was fatally injured while installing a valve in a newly constructed manhole. The oxygen concentration in the pit was found to be less than 5% of volume. The source of the oxygen displacement could not be determined at the time of the accident and remains unknown.

The more traditional acts of construction are not without gas hazards either. Propane gas or diesel powered construction equipment can inject deadly carbon monoxide or NOX vapours into the atmosphere. In cold weather, the use of torpedo heaters on the job site can create carbon monoxide or deplete the oxygen from the air. Explosive gases may leak from compressed gas cylinders used for welding or cutting operations, or workers may be exposed to toxic vapours created from those operations. A worker who is only slightly impaired from a low level exposure to a toxic gas will be more prone to making that deadly slip from the 80th floor.

Finishing operations also present unique dangers to construction workers. For instance, painters wearing supplied air respirators are in danger of being exposed to poisonous fumes in the very air that is intended to provide them with safety. Carbon monoxide from gasoline or diesel compressors, or from the exhaust of nearby vehicles may be compressed into the air supply and fed directly to the worker through the respirator.

Finally, maintenance operations may present much greater hazards than the original construction work did. A contractor who returns to the site of a storage tank construction project to make routine repairs may be exposed to the dangers presented by whatever material was stored inside the tank since it was put into service. These hazards may be explosive in nature, toxic or could simply be caused by a lack of oxygen that was produced while the tank was being purged with an inert atmosphere in an effort to be certain that the explosive danger was removed.

So now that we have an understanding of the blind dangers faced by employees involved in construction operations, how do we protect them? How do we ensure that the environment surrounding the job is safe for work? It's simple.

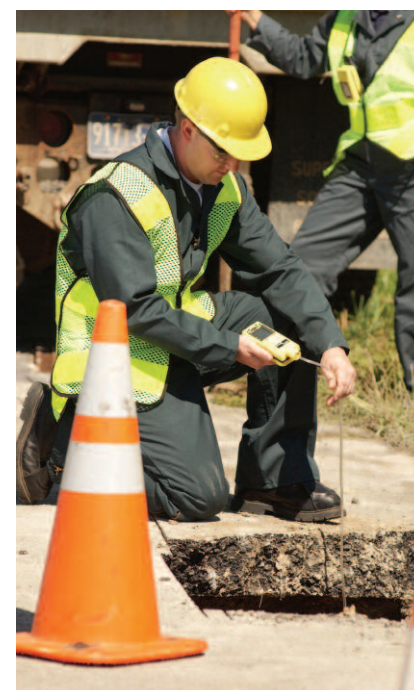
Portable gas monitors are readily available which are designed to protect workers from all of these unseen hazards. Safety standards governing the construction field, as well as general industry, require that workplace atmospheres be tested using these monitors in order to ensure safe working conditions.

Multi-gas instruments are designed to protect workers from the dangers of oxygen depletion and the build up of explosive gases and toxic vapours such as carbon monoxide or hydrogen sulphide. If you are threatened by other toxic gases such as sulphur dioxide, nitrogen dioxide or chlorine, don't worry. Sensors and instruments are available to protect workers from those hazards too. They are designed to be as unobtrusive as possible, rugged enough to withstand the rigors of everyday construction environments, and easy to use. A machine operator digging a trench can easily be warned of a build up of combustible gas if he is carrying a personal monitor designed to detect explosive gases in the atmosphere around him. A worker with the proper gas monitoring equipment always has the ability to make certain that the air at the bottom of the hole is safe to breathe before he jumps down into the pit.

However, it is not enough to take your gas monitor, make a quick check of the atmosphere, and throw your instrument back under the seat of the truck. Atmospheres in construction environments can change quickly and danger can come at any time. The only way to guarantee full time protection on the job, is to have the instrument working for you for the entire job.

Likewise, it is not enough to simply grab your monitor and go to work either. The only way that you can be certain that the instrument you choose will safely detect and protect you from the gases that it is designed to protect you from, is to challenge it with known concentrations of those gases. This challenge, or "bump test" should be performed on the instrument prior each days use or change of work shift. Seriously. If you knew that the instrument that you just picked up was fished out of the mud at the bottom of the pit during the previous shift, would you want to rely on it to save your life if you haven't tested it first? Make sure that the instrument you pick up is working properly so that you can do your job with the security that your protector is doing its job as well.

The next time you strap on your harness, pick up your safety glasses and don your hard hat, make sure that your gas monitor is with you and ready to work as well. Be sure that you are not the blind worker who makes sign read "0 DAYS SINCE LAST LOST TIME ACCIDENT!"



### About the Author

David Wagner is responsible for Industrial Scientific's engineering department, including engineering design and development of new products for Industrial Scientific portable and fixed system product lines. Mr. Wagner has been with the company since 1986, serving in various capacities including Electrical Engineer, Product Manager, Manager of Customer and Product Services, and Manager of Service Operations. Mr. Wagner earned his BS in Electrical Engineering from The Pennsylvania State University and MS in Management and Technology from Carlow University.

