

Murphy's Laws of Gas Detection

Knowing what can go wrong can help save lives

By THOMAS SUSKI

Murphy's Laws offer a pessimistic and humorous view of the world. These oftentimes cynical statements remind us that "if anything can go wrong, it will." The purpose of this article is to present some amusing reminders to be proactive about gas detector maintenance. After all, there's nothing funny about an unsafe workplace.

LAW #1: If anything can go wrong with your gas detector, it will.

This summarizes the others that follow. The good news: the perils of these laws can be avoided through routine bump testing, calibration and review of data.

LAW # 2: The chance of dropping a gas detector is directly proportional to the height of the ladder to be climbed.

Drops and bumps can damage electronics, circuitry or sensors. In some gas detectors, even normal handling over time can cause enough vibration and shock to affect them. Too often, a visual inspection does not reveal the damage.

LAW # 3: If there is only one mud puddle at a job site, a gas detector will fall into it ... face down.

A submerged gas detector may be damaged by liquid seeping into its case. Even if the gas detector is tested to withstand the effects of submersion, mud may block the tiny openings in the sensor membrane. The blocked sensor membrane then acts like a blindfold and prevents the detector from seeing gas.

LAW # 4: If sensor poisons or inhibitors are located anywhere in a facility, a gas detector will come into contact with them.

Catalytic hot-bead LEL sensors are particularly vulnerable to poisoning or inhibition. The most common poisons are lead, silicone, phosphorus and sulfur. Electrochemical toxic gas sensors are also vulnerable to poisoning. Exposure to solvent vapors and highly corrosive gases can damage the sensor's ability to detect the target gas. This effect can happen gradually, even by chronic exposure to low levels of these substances.

LAW # 5: Gas sensors don't like extreme temperatures almost as much as humans.

Harsh operating or storage conditions can affect sensor accuracy. Although most gas detectors can electronically compensate for temperature changes, extreme temperature swings may still affect electrochemical sensor performance.

LAW # 6: If someone damaged a gas detector on the last shift, the person using it this shift doesn't know about it.

Many people don't like to admit mistakes or they may be unaware their gas detector was damaged. If it looks fine to them, they may not feel the need to tell anyone.

LAW # 7: The day a gas detector is not bump tested is the day it will fail.

A recent study analyzed data from over 27,000 gas detectors. One part of the study looked at bump test failures, bump test frequency and alarm events. The group found a clear

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link between bump test frequency and gas detector failure. On any given day, 1 in every 2,500 untested instruments will fail to respond to a dangerous concentration of gas. Increasing the number of days

between tests increases that chance of failure. It is the quickest and most accurate way to check if the gas detector will go into alarm when it should. It is best to bump test gas detectors prior to each day's use, especially if gas detectors in your fleet are shared among team members.

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Avoiding the effects of Laws 1-7

Bump testing will uncover many functionality problems. A bump test exposes each sensor to an amount of gas that would trigger the gas detector's lowest alarm set point. It is the

A failed bump test means that the gas detector either did not alarm, or its readings did not match the test gas concentration. When this happens, a full calibration must be performed. Calibrating the gas detector adjusts its reference point to the test gas. Then it will read more accurately and go into alarm as expected.

LAW # 8: If team members change gas detector alarm settings, they won't tell anyone.

Here's how it happens. Workers in an area with low levels of toxic and/or combustible gas want to keep working. They rationalize that the levels aren't enough to kill them. Instead of trying to eliminate the problem, they simply change the low alarm setting to something higher. Then they can finish their work without being bothered by a loud gas detector alarm.

If they forget to reset the alarm, the next person to use the same gas detector will be unaware of any increased risk.

LAW # 9: If team members turn off gas detectors while they are alarming, they won't tell anyone.

Why would someone turn off a gas detector in alarm instead of leaving the area? It's hard to imagine why this happens, but it does. The aforementioned study found that users turned off gas detectors in high alarm 0.26 percent of the time.


LAW # 10: The chance that OSHA will inspect your facility is inversely proportional to how prepared you are for such a visit.

Labor Secretary Hilda Solis has stated that strong enforcement will be part of OSHA's focus. More inspectors will be hired and more inspections are planned. As a result, many organizations are taking a good look at how complete their records are.

Avoiding the Effects of Laws 8-10

Review data about gas detector maintenance, alarms and usage to help you prove compliance and spot potential problems. Many gas detectors log data that can be read from a menu screen and manually transferred into a notebook or spreadsheet. More efficient methods include datalink or docking systems and special software that can transfer the information to a computer. Earlier this year, a hosted software service introduced the concept of viewing data and trends graphically on a secure Web site.

What we can learn from Murphy


Of course these "laws" are not true for every gas detector, every day. But hopefully they remind us that gas detectors play an important role in protecting workers' lives. Keep a regular schedule of bump testing, calibrating and reviewing data to ensure the safety of your team. Promoting these practices says that safety is a priority. When workers believe this, they are more likely to act with safety in mind. 

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