Respiratory protection during potential hydrogen sulfide gas exposure

The last issue of The Manager presented materials about the possible increased risk of exposure to a hazardous gas called hydrogen sulfide. The intent of that publication was to remind readers about the risks associated with working around any manure storages and handling systems (include free-air storages), pump stations and liquid tankers. Exposure potential tends to be highest during agitation, clean-out and in inadequately ventilated confined spaces, especially during warmer weather or when manure itself may be warm or hot — like with anaerobic digester effluent. Additional risk may be present when gypsum is used in barns and becomes part of a bedded pack or mixed with liquid manure and then stored long-term.

Regardless of gypsum use, stored manure can produce dangerous and lethal levels of hydrogen sulfide (H\textsubscript{2}S) gas, and unsuspecting farmers and their family members have died due to exposure. There is evidence that increased risk to human health and life may be present when a readily available source of sulfur, such as gypsum, is mixed with stored manure. This is because there is additional potential for formation of H\textsubscript{2}S gas from the sulfur. Since inhaling H\textsubscript{2}S can be fatal, raising awareness of this potential to farmers and others working in and immediately around liquid manure and bedded packs is critically important.

The Occupational Safety and Health Administration (OSHA) Web site has a fact sheet posted on H\textsubscript{2}S gas exposure at: www.osha.gov/OshDoc/data_Hurricane_Facts/hydrogen_sulfide_fact.pdf. This fact sheet indicates the concentrations of H\textsubscript{2}S gas and the associated type of respiratory protection that should be used to protect health and safety if potential exposure is unavoidable. We felt it would be useful to the farm community to have this formal safety information, especially since there are very specific respiratory protection requirements for confined spaces.

Some protective measures must be implemented before entering confined spaces where H\textsubscript{2}S and other atmospheric hazards may be present.

1. Air must be tested for oxygen deficiency, explosivity, and the presence and concentration of H\textsubscript{2}S (and other toxic gases, such as ammonia) by a qualified person using air monitoring equipment, most specifically a multi-gas meter that detects these atmospheric hazards. This type of equipment was used by local fire department staff to test air quality around manure storages in central NYS in the fall of 2013. Testing should also determine if fire/explosion precautions are necessary.

2. If any atmospheric hazards, such as oxygen deficiency, explosivity, H\textsubscript{2}S or other toxic gases are present, the space/area must be ventilated continually to remove the hazard(s) and supply sufficient oxygen to support life. This is always a good idea, whether or not H\textsubscript{2}S is suspected, and is preferable to using respiratory protection.

3. If the atmospheric hazard(s) cannot be removed, the person entering the space/area must use appropriate respiratory protection, as outlined below, and any other necessary personal protective equipment, rescue and communication equipment. See the list of further resources online at http://nasdonline.org.

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Entering dangerous atmospheres: A level of H\textsubscript{2}S gas at or above 100 ppm is Immediately Dangerous to Life and Health (IDLH). So also is a concentration of oxygen less than 19.5%.

Entry into IDLH atmospheres by farmers, their employees, family members and others should be avoided since safe entry can only be made using:

1. A full face-piece pressure demand self-contained breathing apparatus (SCBA) with a minimum service life of thirty minutes.

2. A combination full-face piece pressure demand supplied-air respirator with an auxiliary self-contained air supply. A full face-piece respirator will also prevent eye irritation. If air concentrations of H\textsubscript{2}S are elevated, eye irritation and light sensitivity may become serious issues. Workers in areas containing hazardous atmospheres, including H\textsubscript{2}S, must be monitored for signs of overexposure.

Michigan State University Extension has additional resources online at http://nasdonline.org.

FYI

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