



GUIDANCE DOCUMENT #531

Division of Materials & Waste Management
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Locating Explosive Gas Monitors

Applicable Rules

MSW: OAC 3745-27-12(C)(5)(a)

ISW: OAC 3745-27-12(C)(5)(a)

RSW: OAC 3745-27-12(C)(5)(a)

Tires: Not Applicable

Purpose

The purpose of this guidance document is to address two issues that have come up regarding monitor placement. These are:

- where to locate explosive gas monitors when the horizontal limits of solid waste placement (LSWP) are the same as, or are encroaching on, the facility's boundary.
- when is it suitable to use punch bar probes.

Applicability

This guidance document is applicable to owners and operators of solid waste landfills (SWLFs).

Background

The 2003 rule revisions made extensive changes to where permanent explosive gas monitors, punch bar stations, and alarms are to be placed. Paragraph (C)(5)(a) of Ohio Administrative Code Rule 3745-27-12 establishes these standards, which include placement of permanent monitors or punch bar stations between the horizontal LSWP and the facility boundary, between the horizontal LSWP and an occupied structure, and the placement of alarms in occupied structures within 200 feet of the horizontal LSWP. Use of punch bars is limited to those situations where there is no pathway presenting a potential risk to an occupied structure.

The explosive gas threshold limit is 100% of the lower explosive limit (5% CH₄ v/v) at or within the facility boundary and 25% of the lower explosive limit (1.25% CH₄ v/v) in structures.

WHEN THE LIMITS OF SOLID WASTE PLACEMENT IS THE FACILITY BOUNDARY

The Division of Materials and Waste Management (DMWM) has encountered several scenarios involving older SWLFs where the proper installation of explosive gas monitors is difficult or not possible because:

- The horizontal LSWP are close to the facility boundary; or
- The horizontal LSWP extend all the way to the facility boundary; or
- The owner of an occupied structure will not give consent for explosive gas alarms to be installed.

In the first situation, the limited physical distance between the horizontal LSWP and the facility boundary makes it difficult to install explosive gas subsurface monitors to properly monitor for gas migration towards the adjacent property(ies). The rules do not provide options for owners and operators in this situation.

¹ Note: This document was originally published on the date noted above. DMWM re-issued the document to make it consistent with current formatting and publication standards after evaluating the content and determining it is still relevant and appropriate. No substantive changes were made to the document.

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In the second situation, installing subsurface monitors on the facility property to satisfy the requirements, would mean installing the monitors in waste. Monitoring explosive gas in waste would be acceptable for determining gas generation, but not for monitoring gas migration. However, if all other viable options have been exhausted, DMWM will accept monitors located within waste. In such situations, the owner or operator may find themselves constantly doing contingency monitoring, and may be required to institute measures to ensure protection of human health and the environment (e.g. passive venting or active extraction). DMWM recognizes that, while the owner or operator may have made a good-faith attempt to fulfill his/her requirements under OAC 3745-27-12, the dangers associated with the gas migration have not been mitigated.

In the first or second situation, if subsurface monitors cannot be installed to monitor migration towards an occupied structure, there will be alarms in the structure, if the owner consents.

- For structures within 1000 feet of the horizontal LSWP, the rules require alarms if subsurface monitors cannot be installed.
- For structures within 200 feet of the horizontal LSWP, the rules require both subsurface monitors and alarms. The subsurface monitors provide a means for assessing the risk to the structure on a periodic basis, whereas the alarms provide 24 hour monitoring of conditions within the structure. If circumstances are such that either the subsurface monitor or the alarm cannot be installed, some measure of migration monitoring is provided by whichever monitor is installed, but with a possible higher risk to the structure. Thus more frequent subsurface monitoring may be warranted.

For the third situation described above, the rules do not contain provisions that address the inability to install alarms in occupied structures. This leaves some question as to what obligations still remain for the owner or operator of the SWLF. Some contend that the owner or operator has fulfilled all obligations to monitor gas migration towards the occupied structure. Others contend that owners and operators in this situation should automatically be required to implement measures to ensure protection of human health and the environment (e.g. passive venting or active extraction) to protect the adjacent property owner. DMWM recognizes that, while the owner or operator may have made a good-faith attempt to fulfill his/her requirements under OAC 3745-27-12, the dangers associated with the gas migration have not been mitigated.

After considering the issues, DMWM identified three potential solutions for locating explosive gas monitors. These solutions are discussed in the Procedure section below.

USE OF PUNCH BARS

There are three methods typically used for explosive gas monitoring: alarms in structures, permanent monitors (typically a probe), and punch bar stations. Probes are constructed much like ground water monitoring wells. Punch bar stations are locations where a punch bar (metal rod approximately 4 feet long with a hammer) is driven into the ground, removed, and tubing attached to a gas meter is inserted into the hole. The depth of punch bar stations is limited to the length of the metal rod and ability to drive the rod into the ground; whereas the depth of probes is not similarly limited.

Explosive gas monitoring has been a requirement for SWLFs since 1988. At some sites, where probes and punch bar stations are located next to each other, different results were obtained. The probe would detect gas, but the punch bar station would not. This situation raised the question whether punch bar stations were adequate to monitor for explosive gas migration. While updating the rules, DMWM decided that use of punch bars was not suitable in situations where a pathway posed a potential threat to a structure.

A pathway is a zone of in-situ or added fill material that is a path of least resistance for gas migration, thus becoming a preferential pathway that may pose a risk to an occupied structure if located nearby. Examples of pathways are sand seams and water/sewer line backfill. Such pathways need to be identified by obtaining a thorough knowledge of the site's geology and situation (e.g. through publically available information or specific site investigation), and be monitored. Note that other utility line backfills, such as around cable and electric lines, are usually not of a granular nature and are compacted, thus typically not presenting a preferential pathway to gas migration.

Although use of a punch bar is adequate for monitoring general migration through the soil matrix near the surface, it is not effective in monitoring pathways beyond the reach of the punch bar. As a result, the explosive gas monitoring rule requirements were revised to limit the use of punch bar stations in favor of using probes. A probe can go to the depth

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necessary to monitor the pathway, and is not subject to the strength of the person using the punch bar and the hardness of the soil.

Procedure

WHEN THE LIMITS OF SOLID WASTE PLACEMENT IS THE FACILITY BOUNDARY

OAC 3745-27-12(C)(5)(a) does not define what constitutes proper placement of explosive gas monitors, nor does it contain provisions regarding the obligations of the owner or operator when explosive gas alarms cannot be installed in an occupied structure within two hundred feet of the horizontal LSWP. DMWM has identified three such situations when placing explosive gas subsurface monitors between the limits of solid waste placement and the facility boundary is not feasible.

- If the subsurface monitor(s) cannot be located on the facility property or along the facility boundary, the owner or operator can request permission from the adjacent property owner to locate monitors on the adjacent property. If there is an occupied structure on the adjacent property, then monitors should be located between the limits of solid waste placement and the structure in such a way as to detect explosive gas migration towards the structure. The explosive gas threshold should be the same as OAC 3745-27-12(E)(5)(a)(i) which is 100% of the lower explosive limit (5% CH₄ v/v).
- If an occupied structure is located within 200 feet of the limits of solid waste placement and subsurface monitor(s) cannot be located between the landfill and the structure (either on or off-site), then monitoring will be solely through the explosive gas alarms installed in the occupied structure upon consent of the owner of the structure. If an occupied structure is located within 1000 feet of the limits of solid waste placement and subsurface monitor(s) cannot be located between the landfill and the structure (either on or off-site), then as provided by rule, explosive gas alarms can be installed in the occupied structure upon consent of the owner of the structure. Alarms should be installed in the manner suggested by the manufacturer and in sufficient numbers and locations so as to adequately detect the presence of explosive gas.
- If explosive gas alarm(s) cannot be installed in the occupied structure because the property owner will not give consent, then the owner or operator should install subsurface monitor(s) within the limits of solid waste placement. While DMWM recognizes that a monitor located in this manner will be detecting gas generation and not gas migration, if gas is detected by the monitor, triggering the contingency plan, the owner or operator may be ordered to abate or minimize the formation of or migration of explosive gas.

USE OF PUNCH BARS

The 2003 rule revisions limited the use of punch bar stations to those situations where the pathway does not represent a potential hazard to an occupied structure and the pathway must be within reach of the punch bar.

The pathway must be shallow enough that the punch bar can intercept it. If the pathway is overlain by a soil more resistant to gas migration, such as clay overlying sand or backfill, or a saturated zone overlying an unsaturated zone, the punch bar must be able to pass through the overlying layer and penetrate into the pathway, and not just be close to it. If the punch bar is unable to pass through the overlying layer, the monitoring results are unlikely to represent the true situation and risk of gas migration. Even if gas is detected, the concentrations are likely to be lower than in the pathway.

Contact

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Disclaimer

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