

3745-27-12 Explosive gas migration monitoring for a sanitary landfill facility.

(A) Applicability and implementation. This rule applies to the following:

- (1) The owner or operator of a sanitary landfill facility in operation on or after June 1, 1994.
- (2) The owner or operator, subsequent owner, lessee, or other person who has control of the land on which the closed landfill is located, of any previously licensed closed landfill, that ceased acceptance of waste prior to June 1, 1994, and after July 1, 1970, and is so situated that a residence or other occupied structure is located within one thousand feet horizontal distance from emplaced wastes.
- (3) Persons specified in paragraph (A)(2) of this rule who become subject to the requirements of this rule because a new occupied structure was built within one thousand feet, shall submit an "explosive gas monitoring plan" within one year of construction of the occupied structure. The plan shall be implemented within sixty days of approval or in accordance with a schedule approved by the director.
- (4) Persons subject to this rule on the effective date of this rule may revise their "explosive gas monitoring plan," in accordance with paragraph (H)(2) of this rule.
- (5) For the purposes of this rule, "occupied structure" means an enclosed structure where one or more human beings may be present, but does not include structures that are open to natural free air circulation such that the explosive gas hazard is minimized.
- (6) For the purposes of this rule, the "explosive gas monitoring plan" is implemented upon the commencement of explosive gas sampling in accordance with this rule.
- (7) This rule does not apply to the following:
 - (a) A sanitary landfill or closed sanitary landfill that exclusively disposes, or disposed, of solid waste generated on the premises where the landfill or closed landfill is located.
 - (b) A sanitary landfill or closed sanitary landfill that exclusively disposes, or disposed, of solid wastes generated on one or more premises owned by the person who owns the landfill or closed landfill.
 - (c) A sanitary landfill or closed sanitary landfill owned or operated by a person other than the generator of the wastes that exclusively disposes, or disposed of, either of the following:
 - (i) Nonputrescible solid wastes.
 - (ii) Nonputrescible wastes generated by a single generator at one or more premises owned by the generator.
 - (d) For the purposes of this paragraph, "nonputrescible solid wastes" are those solid wastes that do not generate explosive gases during decomposition. Nonputrescible solid wastes include residual wastes with the exception of residual wastes generated from pulp and papermaking operations as identified by paragraph (B)(3) of rule 3745-30-01 of the Administrative Code.

(B) The director shall not approve an "explosive gas monitoring plan" unless he determines the following:

- (1) The explosive gas monitoring plans, specifications, and information, are documented in a manner acceptable to the director. If additional information is necessary to determine whether the "explosive gas monitoring plan" can be approved, the person identified in paragraph (A) of this rule shall supply such information as a precondition to further consideration.

- (2) The document must show that the explosive gas monitoring system is designed and capable of being constructed and operated in accordance with this rule and with any terms and conditions of an approved explosive gas monitoring plan.

An "explosive gas monitoring plan" submitted to the director for approval, notwithstanding its deficiencies, shall be considered and acted upon if sufficient information is provided and the director can determine whether the criteria set forth in this paragraph are satisfied.

- (C) The "explosive gas monitoring plan" shall contain the items specified in paragraphs (D) and (E) of this rule.

- (D) For a sanitary landfill facility subject to paragraph (A) of this rule, the content of the explosive gas monitoring system design document shall include the items specified in paragraphs (D)(1) to (D)(5) of this rule in that order.

- (1) Completed application form as prescribed by the director.

- (2) Site environs:

- (a) Detailed scale topographical map(s) [1" = 200 feet] of the site showing the following:

- (i) The property boundary and facility boundary of the sanitary landfill facility and the horizontal limits of solid waste placement.
- (ii) A zone encompassing the landfill defined by the locus of points extending outward one thousand feet from the horizontal limits of waste placement and parallel to the limits of waste placement. A second similar zone defined by a locus of points extending outward two hundred feet from the horizontal limits of waste placement and parallel to the limits of waste placement.
- (iii) All property boundaries, property ownership, political subdivisions, and zoning classifications within the one thousand foot zone.
- (iv) On-site and off-site structures within the one thousand foot zone.
- (v) All potential explosive gas migration pathways within the one thousand foot zone that are manmade including, but not limited to, roads, railroads, underground utilities, mines, field tiles, storm sewers, water lines, electric cables, and pipelines.
- (vi) All other potential sources of explosive gas within the one thousand foot zone including, but not limited to, oil and gas wells, other landfills and any swamps.

- (b) Legal description of landfill property.

- (c) The following geological information:

- (i) The ground water table depth in the proximity of the fill, fluctuations in ground water levels, and factors that influence ground water level fluctuations.
- (ii) Discussion of site and surrounding area topography.
- (iii) Discussion of any natural site characteristics that may act as natural impervious boundaries to gas migration or allow natural venting of gas.
- (iv) Discussion characterizing all potential explosive gas migration pathways identified in paragraphs (D)(2)(a)(v) and (D)(2)(c)(vi) of this rule and their associated explosive gas hazard.

- (v) Discussion and identification of any other sources of explosive gases within the one thousand foot zone which may potentially cause subsurface migration of explosive gas.
- (vi) Geologic cross section of the perimeter of the landfill property showing the potential natural pathways. Cross sections shall equal the depth of the fill at the defined points.

(3) Landfill characteristics:

- (a) Lowest elevation of waste placement, if known.
- (b) Depth of excavation, if known.
- (c) Discussion of historical operations of landfill, including dates of origin, operation, and closure, previous landfill ownership, previous landfill operators, and previous or current regulatory authorizations granted for the site.
- (d) Discussion of any records or information regarding the type of wastes disposed of at the site.
- (e) Discussion of site construction details to include the type and characteristics of the liner (if any), type and characteristics of final cover, and an evaluation of existing cover conditions.
- (f) Description of any existing and operating gas extraction or gas venting system.
- (g) Description of any existing explosive gas monitoring system and an evaluation of its effectiveness.

(4) Review of explosive gas generation potential:

- (a) Review and summary of historical records pertaining to explosive gas investigations, visual/olfactory inspections or complaints, incidents of dead vegetation, odor problems, or snow melt possibly due to gas presence.
- (b) Discussion of the latest explosive gas investigation for this site. (Investigative methods may include barhole sampling, monitoring probes in the landfill, and site observations of odor, final cover damage, and vegetative effects due to gas migration.)

(5) Description of the proposed explosive gas monitoring system, including the following:

- (a) Proposed permanent monitor and punch bar station locations, depths, screen intervals, and identification designations.
 - (i) For sanitary landfill facilities subject to paragraph (A)(1) of this rule, the owner or operator shall use the following:
 - (a) Permanent monitors or punch bar stations in such locations and in such numbers that explosive gas migration through the unconsolidated stratigraphic unit or fractured bedrock pathway towards the facility boundary will be detected. A punch bar may be used if the explosive gas pathway does not represent a potential hazard to an occupied structure.
 - (b) For occupied structures located within the horizontal limits of waste placement, explosive gas alarms in the occupied structure upon the consent of the owner of the occupied structure.
 - (c) For occupied structures located within two hundred feet of the horizontal limits of waste placement, explosive gas alarms in the occupied structure upon the consent of the owner of the occupied structure and either permanent monitor(s) or punch bar stations between the

landfill and the structure in such locations and in such numbers that explosive gas migration through the unconsolidated stratigraphic unit or fractured bedrock pathway towards the structure will be detected. A punch bar may be used only if the explosive gas pathway does not represent a potential hazard to the occupied structure.

- (d) For occupied structures located within one thousand feet of the limits of waste placement, permanent monitor(s) or punch bar stations may be used between the landfill and the structure in such locations and in such numbers that explosive gas migration through the unconsolidated stratigraphic unit or fractured bedrock pathway towards the structure will be detected. A punch bar may be used if the explosive gas pathway does not represent a potential hazard to the occupied structure.
 - (e) For occupied structures located within one thousand feet of the limits of waste placement where permanent monitors or punch bar stations cannot be properly located, explosive gas alarms in the occupied structure upon the consent of the owner of the occupied structure.
- (ii) For a sanitary landfill facility subject to paragraph (A)(2) of this rule, the person listed in paragraph (A)(2) shall use the following:
- (a) For occupied structures located within the horizontal limits of waste placement, explosive gas alarms in the occupied structure upon the consent of the owner of the occupied structure.
 - (b) For occupied structures located within two hundred feet of the horizontal limits of waste placement, explosive gas alarms in the occupied structure upon the consent of the owner of the occupied structure and either permanent monitor(s) or punch bar stations between the landfill and the structure in such locations and in such numbers that explosive gas migration through the unconsolidated stratigraphic unit or fractured bedrock pathway towards the structure will be detected. A punch bar may be used only if the explosive gas pathway does not represent a potential hazard to the occupied structure.
 - (c) For occupied structures located within one thousand feet of the limits of waste placement, permanent monitor(s) or punch bar stations may be used between the landfill and the structure in such locations and in such numbers that explosive gas migration through the unconsolidated stratigraphic unit or fractured bedrock pathway towards the structure will be detected. A punch bar may be used if the explosive gas pathway does not represent a potential hazard to the occupied structure.
 - (d) For any occupied structure located within one thousand feet of the limits of waste placement where permanent monitors or punch bar stations cannot be properly located, explosive gas alarms in the occupied structure upon consent of the owner or the occupied structure.
- (b) Methods of construction, materials used in construction, installation procedures and quality assurance measures, and security measures to be utilized. The selection of the design, materials, and methods of construction for the permanent monitors shall be demonstrated to be able to detect the migration and to determine the concentration of explosive gas in the unconsolidated stratigraphic unit or fractured bedrock pathway. All permanent monitors shall be designed to eliminate the potential contamination or dilution of explosive gas samples or contamination of ground water.
- (c) Location and installation of new and replacement permanent monitors. If the person identified in paragraph (A) of this rule must install a new permanent monitor or replace a damaged or inaccessible permanent monitor then he shall observe the following requirements:

- (i) A new permanent monitor, located and constructed in accordance with the approved "explosive gas monitoring plan," shall be installed within one year of new occupied structures or explosive gas pathways being built within one thousand feet of solid waste placement, or topographic or other changes occurring in the vicinity of the landfill, such that a potential for explosive gas migration towards any occupied structure is created.
 - (ii) A damaged or inaccessible permanent monitor shall be replaced in accordance with the approved "explosive gas monitoring plan" before the next monitoring event.
 - (iii) The materials and construction of the new or replacement permanent monitor shall be in accordance with the "explosive gas monitoring plan" pursuant to paragraph (D)(5)(b) of this rule.
 - (iv) The replacement permanent monitor shall be located to monitor the same pathway and shall be located in the same vicinity as the damaged permanent monitor.
 - (v) The installation of the new or replacement permanent monitor shall be certified in accordance with paragraph (F) of this rule.
- (d) Procedure for abandonment of permanent monitors shall be in compliance with rule 3745-9-10 of the Administrative Code, if applicable. A damaged or inaccessible permanent monitor or a permanent monitor which does not meet the requirements of paragraph (D)(5)(b) of this rule shall be abandoned in accordance with the approved "explosive gas monitoring plan."
- (e) For the purposes of this rule, a "permanent monitor" is a monitor which will perform throughout the duration of the monitoring period and which meets the performance standards established in paragraph (D)(5)(a) and (D)(5)(b).
- (f) Location and installation of new and replacement punch bar stations. If the person identified in paragraph (A) of this rule must locate a new punch bar station or relocate an inaccessible punch bar station, then he shall observe the following requirements:
- (i) A new punch bar station shall be located by the next monitoring event after a new occupied structure or explosive gas pathway is built within one thousand feet of solid waste placement, if an explosive gas pathway does not represent a potential hazard to the occupied structure. Otherwise a permanent monitor shall be installed in accordance with paragraph (D)(5)(c) of this rule.
 - (ii) An inaccessible punch bar station shall either be relocated in the same vicinity or replaced by a permanent monitor before the next monitoring event.
 - (iii) The location of the new or relocated punch bar station shall be certified in accordance with paragraph (F) of this rule.
- (E) The explosive gas monitoring, sampling and reporting procedures document shall be written with such detail and clarity as to be readily understandable by monitoring personnel conducting sampling at the site. Appropriate sections and appendices shall be referenced in the text. Necessary appendices are listed in paragraph (E)(5) of this rule and shall be prepared by the person preparing the document. This document shall address the following areas in the following organizational format:
- (1) Monitoring frequency. Permanent monitors and punch bar stations shall be monitored at the following minimum frequencies:

- (a) Quarterly, except as specified in paragraphs (E)(1)(b) to (E)(1)(d) of this rule.
 - (b) Monthly prior to closure if any portion of the sanitary landfill is not lined with a flexible membrane liner.
 - (c) For a sanitary landfill facility subject to paragraph (A)(2) of this rule, semiannually between the end of five years' post-closure and the director's granting authorization under paragraph (G) of this rule to cease monitoring.
 - (d) Upon approval by the director, for a sanitary landfill facility subject to paragraph (A)(1) of this rule and regulated under Chapter 3745-29 or Chapter 3745-30 of the Administrative Code, monitoring frequencies after the fifth year of post-closure care may be decreased to semiannual monitoring if the owner or operator can demonstrate that semiannual monitoring will detect off-site migration of explosive gases and is protective of human health and the environment.
- (2) Parameters to be monitored including detailed step-by-step instructions of the proper procedures to be utilized in conducting monitoring. The following parameters shall be monitored at all permanent monitor locations and punch bar stations, as noted, in the following order:
- (a) Gas pressure in the permanent monitor.
 - (b) Initial combustible gas concentration in per cent methane by volume (% CH₄ v/v). The monitoring equipment shall have a detection limit below twenty-five percent of the lower explosive limit. For the purposes of this rule "initial" means immediately after the gas pressure measurement so as not to inadvertently vent the monitor.

[Comment: The monitor should not be vented prior to measuring the concentration of combustible gas.]
 - (c) Water level in the permanent monitor.
 - (d) Ambient barometric pressure.
 - (e) Ambient air temperature.
 - (f) Observed weather conditions (sunny, overcast, recent precipitation, snow cover, etc.).
 - (g) Relative humidity.
- (3) Detailed step-by-step instructions of how to validate and evaluate field sampling results, including comparing the sampling results to the appropriate explosive gas threshold limit as established in paragraph (E)(5)(a) of this rule.
- (4) Detailed step-by-step discussion of how to report sampling results to appropriate authorities. Results shall be submitted to the appropriate district office of Ohio EPA and the local health district on a form prescribed by the director. The results shall be submitted within fifteen days of the date of sampling, unless the contingency procedures, pursuant to paragraph (E)(5) of this rule, are being followed.
- (5) Contingency procedures which shall provide for the following:
- (a) Establishment of either of the following explosive gas threshold limits:
 - (i) One hundred per cent of the lower explosive limit (5% CH₄ v/v) at or within the facility boundary.

- (ii) Twenty-five per cent of the lower explosive limit (1.25% CH₄ v/v) in structures.
- (b) Detailed step-by-step discussion of how appropriate authorities will be notified upon the detection of explosive gas which equals or exceeds the explosive gas threshold limits in paragraph (E)(5)(a) of this rule, including, if appropriate, telephone numbers. The person identified in paragraph (A) of this rule shall immediately notify the appropriate local public safety authorities such as the local health district, fire department, police department, and the appropriate Ohio EPA district office.
- (c) The extent to which monitoring frequency will be increased, which shall at a minimum be weekly, upon validated finding of explosive gas concentration above the threshold limit.
- (d) Describe any additional monitors to be installed.

[Comment:] The additional monitors may be monitoring wells, alarms, or use of a punch bar.

- (e) Detailed discussion of the criteria to be used to determine when contingency monitoring is no longer warranted. The criteria shall include a minimum of four sequential monitoring events which no longer exceed the explosive gas threshold limit, over a minimum period of two weeks, and may establish a lower threshold limit for ceasing contingency procedures. Upon submitting the report detailed in paragraph (E)(5)(g)(iii) of this rule, the person identified in paragraph (A) of this rule may cease following the contingency procedures.
- (f) Detailed discussion of steps to be taken to ensure protection of human health and the environment.

[Comment:] This may include an escalating course of action such as adjusting the active gas extraction system, installation of alarms in buildings, installation of vents or barriers or expanding the active gas extraction system, to installation of a new active gas extraction system. For a sanitary landfill facility subject to paragraph (A)(1) of this rule, as the steps are implemented, the closure and post-closure cost estimates may need to be updated in accordance with rule 3745-27-15 of the Administrative Code. If at any point it appears that the steps as approved in the "explosive gas monitoring plan" are not effective in protecting human health and the environment, the director may issue orders to take further actions pursuant to paragraph (I) of this rule.

- (g) Detailed discussion of reporting procedures.
 - (i) Within seven days of the initial detection of explosive gas concentration above the threshold limit, submit to the appropriate Ohio EPA district office and the local health district, the monitoring results and the description of the steps taken or to be taken to ensure protection of human health and the environment. Steps to be taken to ensure protection of human health may include installation of explosive gas alarms in occupied structures upon the consent of the owner of the occupied structure.
 - (ii) Every thirty days from the date of the initial detection of explosive gas concentrations above the threshold limit, until the criteria to no longer follow contingency procedures are met, submit to the appropriate Ohio EPA district office and the local health district, a report containing the following:
 - (a) Analysis and summary of the results from the contingency monitoring, including the lateral extent of explosive gas concentration above the threshold limit and a characterization of the explosive gas pathway(s). Characterization of the pathway shall include degree of saturation and porosity (textural classification or fracturing); and the possible causes of the increase in gas concentrations, such as landfill operational procedures, gas control system failure or

upset, climatic conditions, or closure activity.

(b) Summary of the steps taken to ensure protection of human health and the environment and an analysis of their effectiveness.

(iii) When criteria to no longer follow contingency procedures are met, submit to the appropriate district office of Ohio EPA and the local health district a report containing the following:

(a) Analysis and summary of the results from the contingency monitoring, including the lateral extent of explosive gas concentration above the threshold limit and a characterization of the explosive gas pathway(s). Characterization of the pathway shall include degree of saturation and porosity (textural classification or fracturing).

(b) Consideration of possible causes of the increase in gas concentrations, such as landfill operational procedures, gas control system failure or upset, climatic conditions, or closure activity.

(6) Appendices, each of which must be prepared by the person preparing the document and placed at the end thereof:

(a) Appendix A: reporting forms.

(b) Appendix B: Copies of letters of notification to the appropriate authorities stating that they will be notified if explosive gas concentrations exceed the threshold limits. The letters should include details as to the location of the sanitary landfill facility, proximity of occupied structures and the threshold limit values. Copies of letters to every owner of an occupied structure seeking consent to install an explosive gas alarm in accordance with paragraph (D)(5)(a) of this rule.

(c) Appendix C: geologic boring logs utilized in development of paragraph (D)(2)(c)(vi) of this rule.

(d) Appendix D: reserved for the certification report required under paragraph (F) of this rule.

(e) Other appendices as necessary.

(F) Upon installation of new or replacement permanent monitors, a certification report shall be submitted with the initial reporting of the monitoring results in accordance with the approved "explosive gas monitoring plan." The certification report shall include the following:

(1) Record drawing showing the locations of all punch bar stations and permanent monitors with their associated identification designations.

(2) Geologic logs from the installation of each permanent monitor.

(3) Depth and length of screened intervals for each permanent monitor.

(4) For persons subject to paragraph (A)(2) of this rule with an "explosive gas monitoring plan" approved on or before the effective date of this rule, a geologic cross section of the perimeter of the side of the landfill property if a new occupied structure was built within one thousand feet of solid waste placement and there is no cross section for that side in the approved "explosive gas monitoring plan."

(G) After monitoring for twenty years after closure for a sanitary landfill facility subject to paragraph (A)(2) of this rule, or after monitoring for thirty years after closure for a sanitary landfill facility subject to paragraph (A)(1) of this rule, the person identified in paragraph (A) of this rule may submit a written request to the director for authorization to discontinue monitoring and to abandon any permanent monitors in accordance

with the approved "explosive gas monitoring plan." Authorization to discontinue monitoring and abandon any permanent monitors may be granted upon the director's finding that there is no significant likelihood of future explosive gas formation and migration sufficient to require contingency procedures.

[Comment. A residual solid waste facility required to comply with this rule is still obligated to monitor for explosive gas migration in accordance with paragraph (G) of this rule even though the post-closure care period may be shorter.]

(H) Revising the "explosive gas monitoring plan."

- (1) Upon the demolition of an occupied structure, or the elimination of a potential explosive gas migration pathway, or other circumstances which may eliminate the potential hazard to occupied structures, the person identified in paragraph (A) of this rule may submit a written request to the appropriate district office of Ohio EPA for concurrence to discontinue monitoring or abandon the affected permanent monitor(s) or punch bar stations.
 - (2) The person identified in paragraph (A) of this rule shall submit a written request to alter the explosive gas monitoring, sampling and reporting procedures in the approved "explosive gas monitoring plan" to the appropriate district office of Ohio EPA for concurrence prior to implementation.
- (I) Upon the director's finding that explosive gas formation and migration threaten human health, safety or the environment, he may order the person identified in paragraph (A) of this rule to perform such measures to abate or minimize the formation or migration of explosive gas.
- (J) The director may require the installation of additional punch bar stations or permanent monitors or abandonment of permanent monitors as necessary to monitor explosive gas pathways or eliminate the potential contamination of ground water.
- (K) For a sanitary facility subject to paragraph (A)(1) of this rule and subject to Chapter 3745-27 of the Administrative Code, The "explosive gas monitoring plan" "certification reports, all monitoring results and contingency reports, and all revisions shall be submitted into the operating record in accordance with rule 3745-27-09 of the Administrative Code.

Five Year Review (FYR) Dates: 04/23/2014 and 04/23/2019

CERTIFIED ELECTRONICALLY

Certification

04/23/2014

Date

Promulgated Under: 119.03
Statutory Authority: 3734.02, 3734.041, 3734.12
Rule Amplifies: 3734.02, 3734.041, 3734.12
Prior Effective Dates: 11/17/1988 (Emer.), 3/9/1989 (Emer.), 6/12/1989,
6/1/1994, 8/15/2003