Kansas Department of Health and Environment
Bureau of Waste Management
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# Landfill Gas Sampling for Reduction and/or Termination of Postclosure Care

**Technical Guidance Document SW-2014-G2**

This document addresses gas sampling at landfills with a gas collection and control systems for the purpose of determining when certain postclosure care activities may be reduced and/or terminated.

## Background

The owner or operator of any municipal solid waste landfill (MSWLF) is responsible for long-term care of the site for at least 30 years after the facility closes. For MSWLFs that are subject to full Subtitle D regulation, the reduction and/or termination of postclosure care (PCC) activities will be based on a PCC Reduction and/or Termination Plan. The plan should be prepared by the facility according to Technical Guidance Document SW-2014-G1 and must be approved by the Kansas Department of Health and Environment (KDHE). If a landfill has a gas collection and control system (GCCS), changes in the composition of the landfill gas (LFG) over time (trend analysis) may be used to determine when certain PCC activities may be reduced and/or terminated.

This document addresses landfill gas sampling for the purposes of reducing and/or terminating postclosure care activities required by the solid waste statutes and regulations. The Clean Air Act, as administered by the KDHE Bureau of Air, has additional requirements for gas collection systems at MSWLFs.

## Landfill Gas Parameters

The use of LFG to characterize municipal solid waste (MSW) stabilization is based on the premise that LFG is one of the key end products of the reaction between MSW, microbes, and moisture. The recommended LFG sampling parameters are: flow rate, methane, nommethane organic compounds (NMOC), carbon dioxide and oxygen. In addition, temperature and pressure measurements are necessary to convert the measured flow rate to a flow rate at standard conditions.

## Landfill Gas Sample Collection

All wells within the unit being considered for reduction and/or termination must be sampled. Typically gas well sampling occurs one well at a time. If a unit is being investigated for reduction and/or termination, then all the wells in the unit should be sampled. If more than one unit is being investigated, then all the wells in all the units must be sampled, preferably one unit at a time.

The most representative sample will be collected as close to the generation point as possible; ideally as soon as the LFG leaves the waste. This is not possible except through the use of gas extraction wells. Typically, the released LFG will accumulate in the gas wells which make up the GCCS. If the LFG is flowing, the most representative LFG will be that which is collected after the well volume has been purged by the removal process.

A sample cannot be collected if the gas is not flowing due to well malfunction (e.g., structural damage due to settling, or blockage due to flooding and/or microbial buildup). Structural damage to the well is not usually correctable, but blockage due to flooding can be corrected by removing accumulated liquid from the well, and blockage due to microbial buildup may be corrected by conditioning the well with

chemicals. These efforts should be coordinated with the KDHE Bureau of Air and the Bureau of Waste Management (BWM).

Typically, LFG is collected using grab samples, i.e., single samples taken at specific times. The technology of the GCCS will determine the means by which samples are taken. Care must be exercised to avoid introducing air into the landfill mass. This will dilute the LFG and create an environment in the stored MSW which can inhibit gas production and increase the possibility of MSW ignition. The typical gas well is vertical, which means that gas is collected along the perforated length of pipe. Since all wells are required to operate under negative pressure, air (i.e., oxygen) enters the top part of the well's radius of influence. A well's control valve can be used to reduce the vacuum on the well so that the oxygen content of the gas can be decreased.

**Frequency and Timing of Measurements**

The ability to define trends in LFG composition and flow rate will depend on the frequency of measurements. More frequent measurements will allow a better determination of LFG composition and flow rate in each unit of landfill operation. In general, the more data, the greater the confidence in the prediction of PCC reduction and termination dates.

Although not required, KDHE recommends initial quarterly sampling of LFG from each unit to provide adequate data for trend analysis. This information may be used to determine the kind of data to be collected, the long-term frequency of data collection (at least annually) and the proposed methodology for appraising the data in terms of establishing PCC reduction and/or termination. Appropriate (non-parametric) statistical methods must be used to make long-term predictions of LFG composition and flow rate.

It is best to conduct LFG sampling at the same time as leachate sampling from the same unit(s) so that useful correlations can be made between the two sets of data for characterizing MSW stabilization.

**Quality Assurance (QA) Procedures**

Minimum requirements for the collection and analysis of environmental samples are found in the Quality Management Plan (QMP) for the Division of Environment and BWM. Sample collection and analytical procedures are located in Part III of BWM's QMP. The QMP is available at: www.kdheks.gov/environment/qmp/qmp.htm.

Key concerns for LFG sampling are recording of collection locations and sampling results (composition and flow rate parameters including system temperature and pressure). It is important that the instruments used for field analyses be properly calibrated.

Each MSWLF with a GCCS is unique in terms of its design and operation. Typically the GCCS evolves with the completion of each unit. This is especially true for the materials of construction and control devices used for the components of the GCCS. KDHE recognizes this diversity but encourages each landfill owner or operator to continually improve the quality of their system. This will ensure that quality sampling results can be obtained.

Additional documents concerning PCC reduction and/or termination are available on the PCC Policies and Guidance web page at: www.kdheks.gov/waste

For additional information regarding the proper management of solid or hazardous waste in Kansas, you may visit the Bureau of Waste Management website at http://www.kdheks.gov/waste/ or contact the Bureau at: (785) 296-1600, bwm_web@kdheks.gov, or the address at the top of this document.