



# Sampling of Landfill Gas Monitoring Wells

## Overview

This document was prepared by the Missouri Department of Natural Resources' Solid Waste Management Program (SWMP) to provide guidance regarding the quarterly sampling of gas monitoring wells as required by 10 CSR 80-3.010(14) and 10 CSR 80-4.010(14). This guidance applies to all landfills that monitor for methane migration by means of gas monitoring wells. Sampling results must be submitted at least quarterly to SWMP in an electronic format.

## Sampling Equipment

Proper selection of sampling equipment is critical in obtaining true soil gas concentrations. Explosimeter-type instruments are not appropriate for measuring methane in gas monitoring wells, because the amount of oxygen which is present in the well may not be sufficient for the sample to "burn." These instruments will typically give false low readings when high concentrations of methane are present.

It is recommended that instruments used to sample gas monitoring wells have an automatic pump that has the ability to withdraw enough volume to bring a fresh sample of soil gas into the well. It is also beneficial that the instrument reads both oxygen and methane concentrations. Some instruments have the ability to read barometric pressure, which is also desirable.

## Sampling Procedures

Step 1 - Make sure the instrument is properly calibrated. Prepare the instrument for sampling by allowing it to properly warm up as directed by the manufacturer.

Step 2 - Connect the instrument to the well head and begin collecting a sample.

Step 3 - Continue collecting the sample until the reading stabilizes. A stable reading is one that does not vary more than 0.5 percent by volume on the instrument's scale.

Step 4 - A proper reading should have 2 percent oxygen by volume or less. If levels of oxygen are higher, it may indicate that air is being drawn into the system giving a false reading of the true soil gas concentrations. Possible explanations for this problem are:

- A. The gas monitoring well seal has failed;
- B. Well head connectors are leaking; or
- C. A connection at the instrument is leaking.

When the problem is eliminated repeat Steps 1-3. If the problem cannot be corrected, record those values and make sure that the problem is well documented in the report sent to the department.

Step 5 - Record the stabilized reading including the oxygen concentration and barometric pressure, if available.



Obtaining true soil gas concentrations from gas monitoring wells is dependent upon using a consistent proven method. If you have problems using the sampling procedures described, you should contact the department as soon as possible.

## Sampling Times

Sampling times are almost as important as the procedure used to collect the sample. Proper monitoring of the site should include sampling at those times when landfill gas is most likely to migrate. Scientific evidence indicates that weather and soil conditions influence when gas will migrate. For these reasons sampling should be considered when:

- A. Barometric pressure is low and soils are saturated; or
- B. When snow cover is just beginning to melt; or
- C. The ground is frozen or ice covered.

## Records

The Solid Waste Management Regulations require that reports on data collected from wells be submitted to SWMP at least quarterly. The SWMP recommends that gas monitoring be conducted during the months of February, May, August and November and that the results be submitted within 30 days of sampling. The data must be submitted in electronic form. The results submitted should contain:

1. The location of monitoring points.
2. Sample results obtained should include the date the sampling was performed and the barometric pressure, if available. Methane measurements may be given as a percentage of the total air volume or as a percentage of the Lower Explosive Limit (LEL). The following formula can be used to convert a percentage of LEL into a percentage methane by volume:  
$$\% \text{ Methane (by volume)} = \text{LEL (\%)} \div 20$$
3. The amount of time a well is pumped before a stabilized methane reading is taken.
4. The percent volume of O<sub>2</sub> (if the instrument used is capable of measuring).

The form attached to the end of this bulletin may be used to record the information required by the department.

## Conclusions

Missouri has stringent regulations governing landfill gas migration. The department prefers to address the issue of migrating gases before they present a threat to public safety or the environment.

Migrating gases detected above allowable limits at property boundaries do not necessarily mean that there is an immediate threat to public safety. It does mean that there is a potential problem that must be addressed. In order to address such a problem, a permit modification to install a gas collection system may be necessary.

## References

Landtec Landfill Control Technologies, *Landfill Gas System Engineering Design: A Practical Approach*, course notes from Landfill Gas System Engineering Design Seminar, 1994.

Missouri Department of Natural Resources, Flood Grant Team, *Landfill Gas Monitoring Protocol*, available on the Solid Waste Management Program's Web site.

**For more information call or write:**

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