

# Landfill Gas Analysis Using Gas Chromatographs

## Know the quality of your landfill gas

As a by-product of decomposition of waste materials, landfills generate gas that can be used in multiple purposes, such as fuel boilers, dryers and heaters, power generators for engines and turbines, or even be sold into a natural gas network. Using the gas in any of these applications is preferred over the historical practice of flaring or venting. Flaring or venting contributes to greenhouse gas development and affects the environment.

To utilize landfill gas in operations, or to sell it into a natural gas network, the landfill operator must understand the components that are present in the gas stream as well as their concentrations. A Gas Chromatograph from Emerson provides suppliers and end users with these stream compositional analysis and concentrations in a rugged, proven design.

Methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>) are often the two components with the highest concentration levels found in landfill gas applications. Traces of oxygen (O<sub>2</sub>), nitrogen (N<sub>2</sub>) and water (H<sub>2</sub>O) are typically found, and in some cases, even hydrogen sulfide (H<sub>2</sub>S) at a concentration of several hundred ppm.

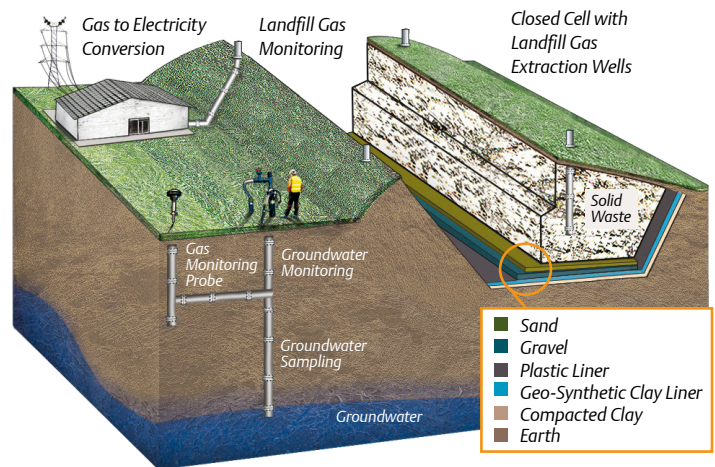
**Table 1 - Typical Ranges of Stream Components**

Stream Components	Typical Ranges	Monitoring Interest
Methane	50–80%	Primary Source of Energy Content
Carbon Dioxide	20–40%	Greenhouse Gas Emissions Monitoring
Oxygen	0–10%	Safety and Decomposition Performance
Nitrogen	0–10%	Status of the Landfill
Hydrogen Sulfide	0–2000 ppm	Permit Reporting



**Figure 2 - The Rosemount 700XA GC Provides Landfill Gas Composition Analysis and Concentration Levels of Each Gas Component**

**Figure 1 - Typical Landfill Site**



Knowing the concentrations of each of the typical landfill gas components determines the appropriate method of gas treatment, blending or usage. These concentrations may also be required as part of operating permits or quality regulations as defined by a local air quality board or environmental agency.

### Examples of appropriate landfill gas usage include:

- Processed landfill gas with high energy content and low impurities may be sold into a natural gas network.
- Industrial equipment may be fueled by landfill gas with a defined range of energy value (CV or BTU) to ensure efficient and reliable operation. Variances outside of these defined ranges will result in equipment damage or reduced performance.
- If the non-methane components of the landfill gas are too high, the landfill gas may be too 'lean' for proper engine performance, requiring the addition of natural gas or other fuel source.
- If the H<sub>2</sub>S content is higher than equipment rating or regulatory agency permissible level, it will need to be removed. The only way to safely determine the continuous H<sub>2</sub>S level is by using an online analyzer because manual testing may miss variances or present unsafe concentrations for human exposure. In addition, traditional H<sub>2</sub>S analyzers that rely on lead acetate tape with mechanical systems require a great deal of maintenance and can add environmental and safety concerns, requiring proper handling of lead.
- High oxygen (O<sub>2</sub>) levels can indicate a serious operational risk or an issue with the landfill's degradation process.

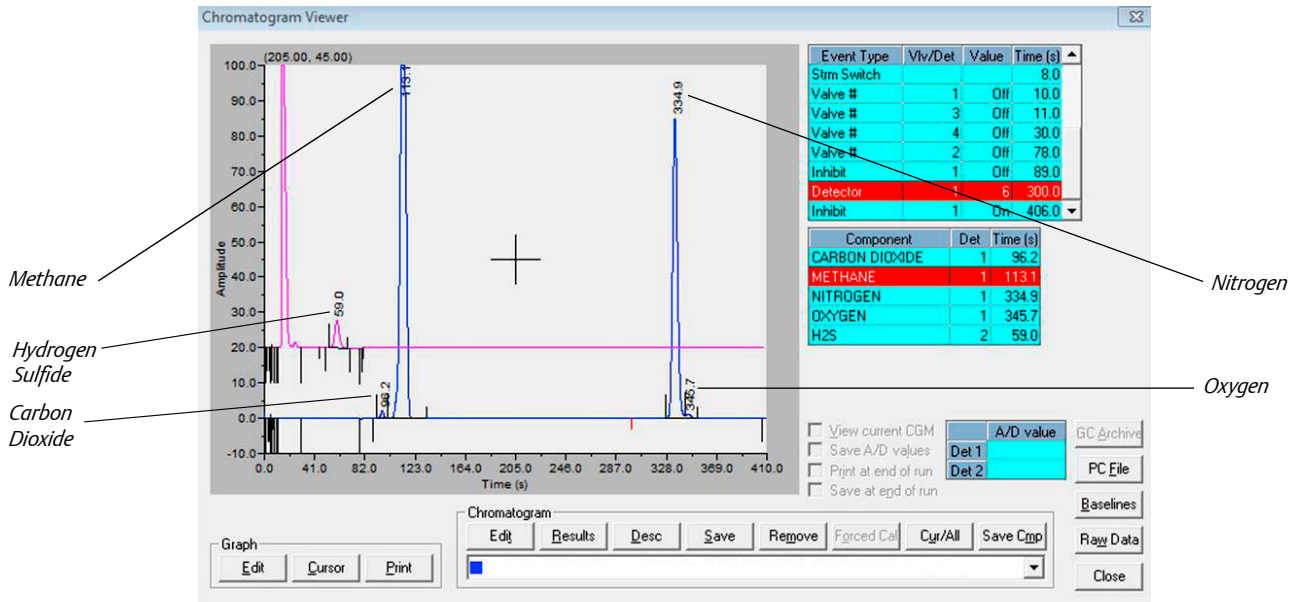
## Ensure Accurate Landfill Gas Composition Analysis

For landfill gas suppliers and end users, contracts and permits often require energy values and individual component concentrations to fall within defined ranges. To ensure the requirements are being met, a Rosemount Gas Chromatograph can be installed to continuously provide the current values of the individual components or energy content. Designed and tested for maximum up-time dependability and ease of use in even the most

extreme weather conditions, often without the added cost of an enclosed shelter, a Rosemount GC provides highly accurate and comprehensive gas composition measurement, empowering operators to optimize landfill gas output.

For more information about landfill gas applications or to learn more about Rosemount Gas Chromatographs, please contact your local representative or visit our website.

Figure 3- Typical Landfill Gas Chromatogram Showing Gas Components



**Global Headquarters**  
 Emerson Automation Solutions  
 10241 West Little York, Suite 200  
 Houston, Texas 77040  
 USA  
 Toll Free + 866 422 3683  
 + 713 396 8880  
 + 713 466 8175  
 gc.csc@emerson.com  
 www.Emerson.com/RosemountGasAnalysis

[LinkedIn.com/company/Emerson-Automation-Solutions](https://www.linkedin.com/company/Emerson-Automation-Solutions)  
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