Rosemount™ 470XA Gas Chromatograph

Landfill Gas Analysis using the Rosemount 470XA

Application Note

The Rosemount 470XA Gas Chromatograph is a compact, economical and reliable solution designed to simplify natural gas analysis in fiscal and custody transfer applications. The flexibility of the 470XA platform enables focused applications including those in emerging operations surrounding the generation, transportation, and use of landfill gas as it becomes part of our renewable energy resources.

Know the Quality of your Landfill Gas

Landfills, through the decomposition of waste materials, produce gas with a multitude of versatile uses. This gas can function as fuel for boilers, dryers, and heaters, act as a power source for engines and turbines, or even be sold as part of a natural gas network. Shifting towards these practical applications is favored over the traditional methods of flaring or venting, as these contribute to the development of greenhouse gases and negatively impact the environment.

For landfill operators looking to employ the gas in various operations or sell it into a natural gas network, understanding the constituent parts of the gas and their respective levels is crucial. A tried-and-true solution is provided by an Emerson Gas Chromatograph (GC), which delivers detailed compositional analysis and concentration levels of the gas stream in a reliable, robust design.

Figure 1 - Typical Landfill Site

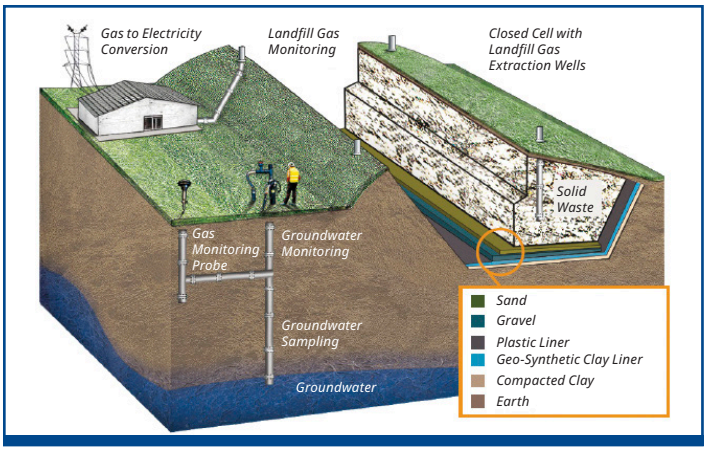

Figure 2 *The LF8 option on the Rosemount 470XA configures the GC for measurement of biogas components and calculation of their resulting energy value.*

Methane (CH_4) and carbon dioxide (CO_2) are often the two components with the highest concentration levels found in landfill gas applications. Traces of oxygen (O_2), nitrogen (N_2) and water (H_2O) are typically found, and in some cases, even hydrogen sulfide (H_2S) at a concentration of several hundred ppm or higher.

Table 1 - Typical Ranges of Landfill Gas 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	0–2,000 ppm	Permit Reporting

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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.

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.

Selecting the Right GC

The Rosemount 470XA is a versatile GC that will perform well in a number of applications. The key to getting it set up and tested at the factory for the landfill gas application is to order the LF8 option at the fourth level of the model structure. (The model structure would thus read 470XA-x-xxx-LF8-x-xx-x-x where the x's are options particular to the product application). This ensures the 470XA is assembled with the correct column sets and configured with the proper valve timings to separate the biogas components for the accurate measurement and reporting.

The LF8 application on the Rosemount 470XA measures the most common components of interest in landfill and biogas applications – $C0_2$, CH_4, N_2, and O_2, while tolerating up to 1.5% H_2S (15,000 ppm) in the sample stream. The measured ranges are shown in Table 2.

Table 2 - Component Ranges Measured in the LF8 Analysis

Component	Measured Range (Mole %)
Carbon Dioxide	0–50
Methane	0–60
Nitrogen	0–30
Oxygen	0–15

If measuring the concentration of H_2S along with the other components is required, Emerson offers potential solutions with the Rosemount 770XA. For more information about landfill gas applications or to learn more about Rosemount Gas Chromatographs, please contact your local representative or visit our website.

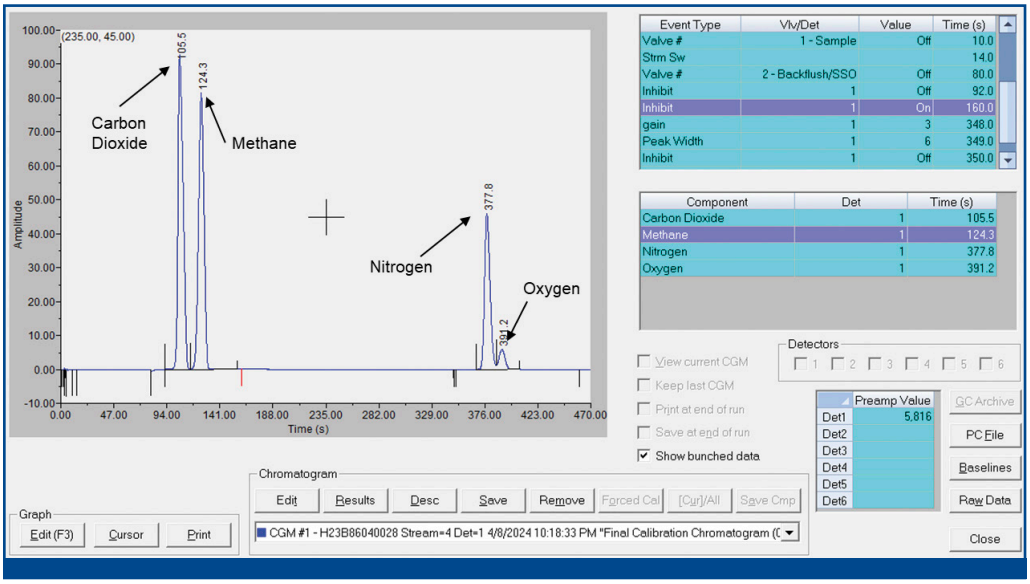

Figure 3 *A typical chromatogram produced by the Rosemount 470XA LF8 Landfill gas analysis.*

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