



# Identification of Fugitive or Stray Gas Sources

## Advanced techniques for the characterization of Surface Casing Vent Flow and Gas Migration

Fugitive or stray gases refer to unwanted natural gas occurrences in and around industrial facilities such as well heads and injection sites. Typically related to compromised well casing or geologic seals, the release of fugitive gases can have significant environmental and economic implications for operators. Therefore accurate characterization of these gases is essential to ensure successful remediation.

AGAT Laboratories' Stable Isotope Geochemistry Lab specializes in the isotopic and geochemical characterization of natural gases. Stable isotope analysis is a powerful tool for determining the sources and processes affecting natural gases and ideally suited to identify the origins of fugitive gases. At AGAT Laboratories, we provide fast and reliable stable isotope analysis using our industry-leading Isotope Ratio Mass Spectrometer (IRMS). Additionally, our team of dedicated isotope geochemists offer geochemical interpretation to help clients fully realize the value of their datasets.

## Understanding Surface Casing Vent Flow and Gas Migration

- **Surface Casing Vent Flow (SCVF):** Refers to the migration of gas or fluids between the surface casing and the next casing string, typically escaping through the surface casing vent. This condition occurs when gas from a producing formation or other zones enters the annulus due to issues like poor cementing or casing integrity, leading to potential well integrity risks. Identifying SCVF is crucial as it can indicate casing leaks that may compromise well performance, environmental safety, greenhouse gas emissions, and regulatory compliance.
- **Gas Migration (GM):** Refers to the movement of gas from a subsurface formation through pathways outside the wellbore, typically along the cement or between casing strings. This can occur when the well's cementing fails to form an effective seal, allowing gas to escape from the producing formation or other zones and migrate to shallower formations or even the surface.

AGAT's unique approach helps identify SCVF and GM at the surface and narrow down the likely leak locations using the following methodology:

## 1. Fundamental Interpretation

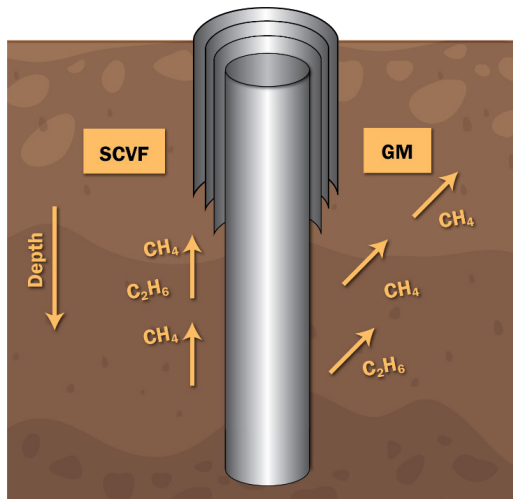
- **Measurement:** We measure the molecular composition and stable carbon isotope ratios ( $\delta^{13}\text{C}$ ) of light hydrocarbon gases and  $\text{CO}_2$ . Hydrogen isotopes ( $\delta^2\text{H}$ ) can also be analyzed, when requested.
- **Interpretation:** With these data, we determine the microbial (biogenic) versus thermogenic origins and potential mixing of gas samples.

## 2. Extended Interpretation

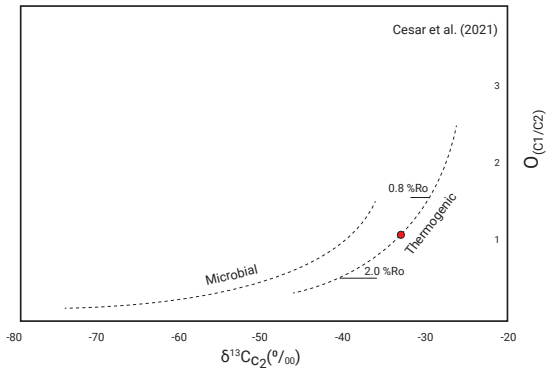
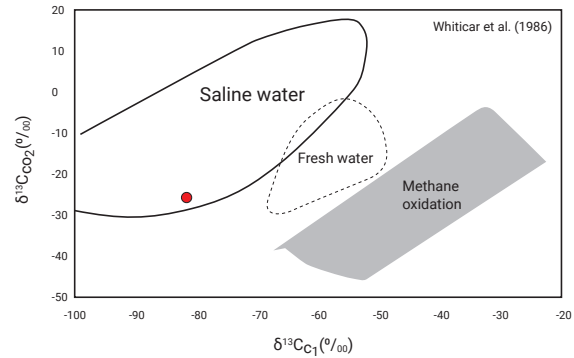
**Collaboration:** We work with you to understand more about your asset, including:

- Location and field details
- Stratigraphy of the well or nearby/offset wells
- Important geological structures in the area
- Historical and current production data (including non-hydrocarbon fluids like water)

With the combination of geochemical data and supporting well information, the accuracy of the interpretation increases, providing greater success rates for well remediation.



Characterization of Surface casing vent flow (SCVF) and gas migration (GM), two forms of fugitive gases, using stable isotope and geochemical analysis for enhanced remediation.



Examples of classification diagrams for gas origin.

## Why Choose AGAT Laboratories Ltd?

- **Fast Turnaround Times:** Our services are based in Calgary, allowing us to deliver results quickly, minimizing downtime and helping you make timely decisions.
- **No Reliance on External Labs:** All analyses are performed in-house, giving us full control over the quality and speed of our services.
- **Experienced Team:** Our team includes geoscientists with years of specialized experience in SCVF analysis and the Alberta Oil Field, ensuring you receive expert advice and accurate results.
- **Proven Track Record:** With decades of experience supporting Alberta's oil industry, AGAT Laboratories has a deep understanding of the region's unique geological challenges.

### Geochemistry Services

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