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ISOTECH LABORATORIES INC

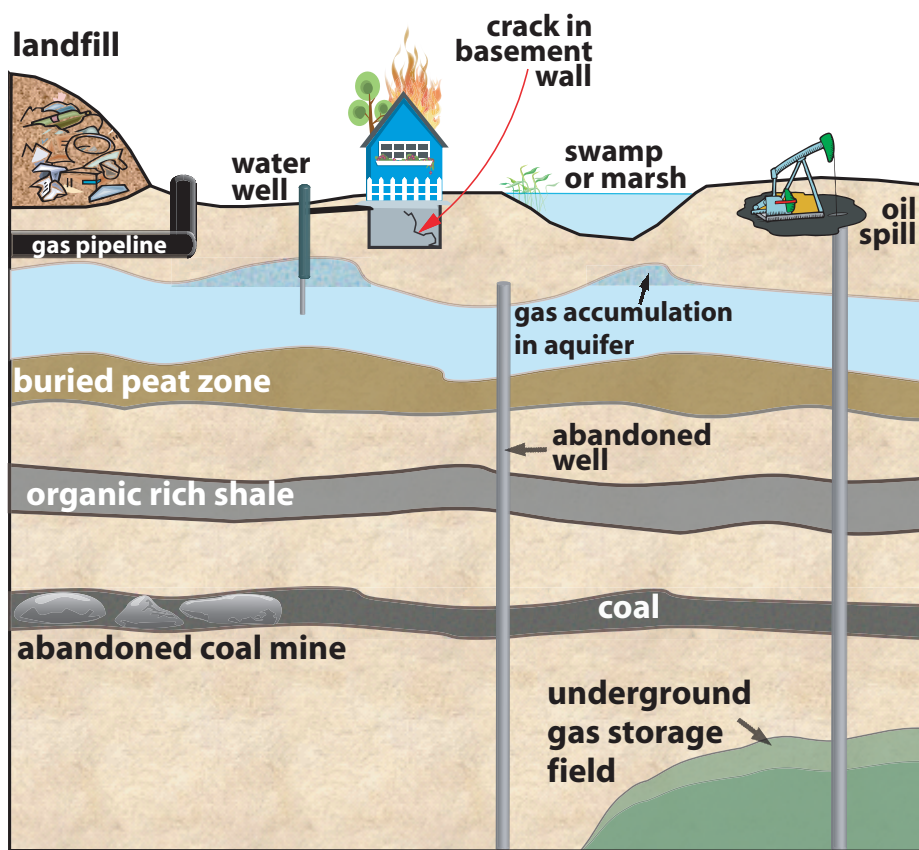
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Stray Gas Identification



What is "Stray Gas"?

Plants which occur where you do not want them are called "weeds". Gases that occur where you do not expect or want them are considered "stray gases". The most common stray gases are methane (CH_4) and carbon dioxide (CO_2). Stray gases may be naturally occurring, or they may be manmade. How one deals with them depends upon the source.



Problems associated with stray gas

- Contaminated groundwater
- Asphyxiation
- Fires
- Explosions

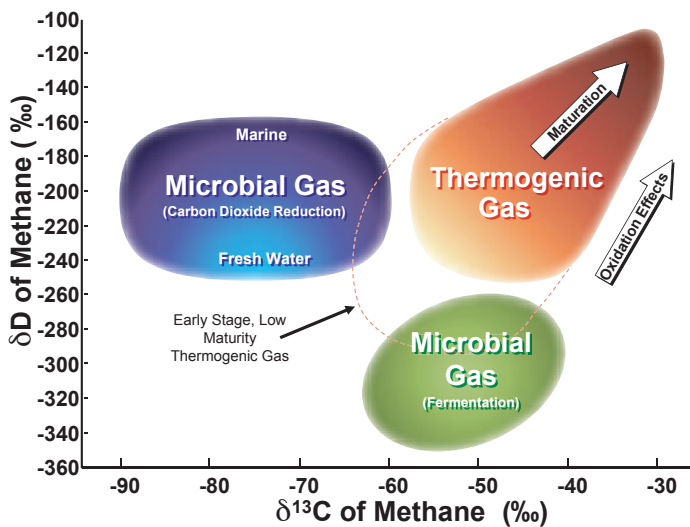
Potential sources of stray gas

- Leakage from natural gas pipelines
- Leakage from underground gas storage reservoirs
- Sanitary Landfills
- Swamps and marshes
- Glacial drift gas
- Mines and mine spoil
- Decomposition of oil and gasoline spills
- Leakage of active or abandoned oil and gas wells
- Buried coals and shales

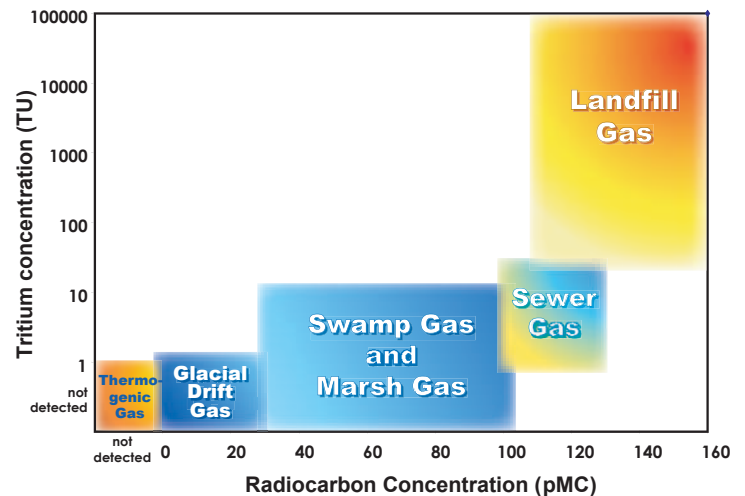
How can isotopic analysis identify stray gas?

- The stable isotopes of methane ($\delta^{13}\text{C}$ and δD) can provide information on the mechanism of formation. For instance, stable isotope analysis can help to determine whether a gas is biogenic or thermogenic.
- Radiocarbon, or ^{14}C , is produced in the upper atmosphere by cosmic rays and occurs in all organic materials that existed as living plants or animals within the last 40,000 to 50,000 years, allowing the identification of methane formed from glacial deposits
- A large spike of ^{14}C was injected into the atmosphere in the 50's and 60's by nuclear bomb testing and provides a "tag" for organic materials less than about 50 years old. This elevated ^{14}C concentration provides an excellent way of identifying landfill gas.
- Although tritium (^3H) was also produced by bomb testing, the primary source of tritium in landfills is disposal of certain items with luminous paints. Tritium is site specific as it depends on the nature of the refuse.

Fingerprinting of Gases



Differentiation of Microbial Gases



How can Isotech help with your stray gas problem?

Isotech scientists pioneered the use of isotopic analysis for stray gas identification and developed the techniques that have now become the industry standard. We can advise you on how to collect samples and can provide sample containers that will ensure that the samples collected are reliable and meet all analytical requirements. Isotech has state-of-the-art facilities for carrying out all of the isotopic analyses outlined above, and we offer many other services in addition to the stray gas analyses. If you have need of other isotopic analyses, please contact us for a complete list of available services. Our staff collectively has over 200 years of hands-on experience in isotopic analyses.

Turnaround Time and Cost for Analysis

BG-1 analysis package

Includes a complete compositional analysis as well as $\delta^{13}\text{C}$ and δD of CH_4 and $\delta^{13}\text{C}$ of CO_2

Standard	20 business days	\$450
Priority	10 business days	\$675
RUSH*	6 business days	\$900

BG-2 analysis package

Includes everything in BG-1 and adds ^{14}C of CH_4

Standard	35 business days	\$1,120
Priority	20 business days	\$1,680
RUSH*	Please call for availability & price	

BG-3 analysis package

Includes everything in BG-2 and adds ^3H of CH_4 **

Standard	30 business days	\$1,220
Priority	15 business days	\$1,830
RUSH*	Please call for availability & price	

*Advance arrangements required for RUSH SERVICE

**Requires large samples