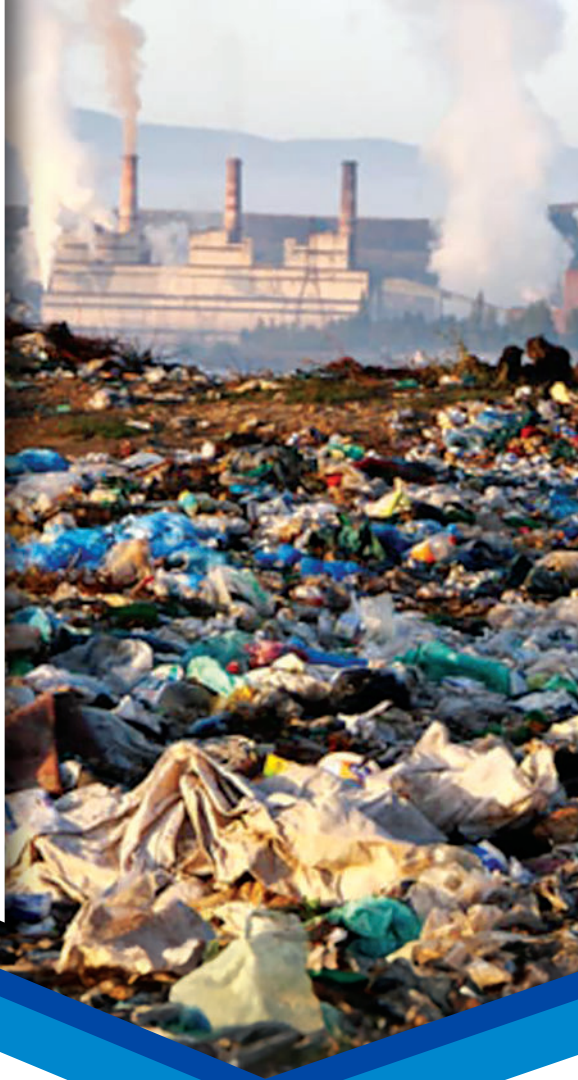


# How to prevent fines for methane leaks in landfills using a drone equipped with TDLAS Laser Falcon sensor technology.



In recent years, the focus on methane emissions from landfills has intensified due to stricter regulations by the **EPA** in the United States. **The Biden-Harris Administration has emphasized the urgency of addressing methane pollution by implementing comprehensive standards to combat climate change and protect public health.** This places a crucial responsibility on landfills to comply with new regulations and highlights the need for advanced methane detection methods.



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The EPA's proactive stance is evidenced by its intensified efforts to impose fines on landfills for methane leaks. For instance, the landfill at Niagara Falls has recently been fined **\$671,000** for exceeding the 50 megagrams methane emissions limits. As regulatory pressures mount, landfills grapple with the financial repercussions of these fines.

Moreover, the economic implications extend beyond regulatory penalties. Landfills that harness methane for power generation stand to lose environmentally beneficial energy resources and potential revenue streams when methane leaks occur.

Also, daily alterations within the landfill structure, including the tearing of membranes, pose significant obstacles to traditional methods of methane retention.

Beyond the regulatory and economic consequences, methane leaks raise tangible issues within local communities. The associated odors, often indicative of methane leaks, decrease residents' tolerance.

## Current Challenges

Landfills have constantly tried to solve the problem of methane leaks using methods like Stationary monitoring systems and ground crews equipped with handheld sensors. Still, these systems are costly and have several limitations.

Substantial capital investment is required for stationary monitoring systems, with installation costs starting from approximately **\$150,000**. Feasibility issues may arise due to site limitations. Furthermore, their capacity to provide only approximate coordinates of a methane leak proves insufficient for efficient maintenance, leaving the maintenance team with the arduous task of locating and fixing the leak.



WISPR System Ranger Pro drone equipped with Laser Falcon methane detector

Moreover, ground crews equipped with handheld sensors present their own set of challenges. Not only are they costly and time-consuming, but the data they collect can be unpredictable in quality. The operational risks associated with traversing landfill environments, including heavy machinery, trucks, mud, and the presence of wild animals, create additional hurdles for ground crews in their quest to identify and mitigate methane leaks. In light of these shortcomings, it becomes evident that a more adaptable approach to methane detection is imperative for effectively managing landfill emissions.

## Drone Technology

Drones equipped with **TDLAS Laser Falcon** sensors are a game-changing solution to the shortcomings of traditional methane detection methods, offering advantages in efficiency and effectiveness.

Using drones circumvents the need for ground-based installations, making them adaptable to any landfill without constraints. Their swift deployment is a feature, with monitoring flights quickly executed in automated mode daily or even more frequently. The flight mission needs to be fully planned once in flight planning software, and **once**

# Comprehensive Solution

SPH Engineering's comprehensive methane detection solution is the **Laser Falcon G2 sensor**, a technology capable of detecting methane concentrations ranging from 1 to 50,000 ppm x m at distances of up to **100 meters**. This advanced sensor is integrated for **real-time data**, it facilitates **prompt identification and response** to leaks, validated through side-by-side tests with classic methane sniffers.

Implementing **fully automated flights**, orchestrated through flight planning software **UgCS**, guarantees a consistently high level of **data quality** while minimizing the risk of human errors. The methane concentration data is accessible in open formats, enabling seamless integration into **GIS systems, DroneGIS**, or platforms like **Google Earth**.

Simple, out-of-the-box solution with the **WISPR Ranger Pro**.

**SPH Engineering provides our clients with comprehensive training covering all aspects, from flight planning to methane data processing.**

With a low initial investment of approximately **\$50,000**, our drone-methane detection bundle provides a cost-effective and efficient solution that can be launched within six weeks, positioning your organization at the forefront of environmentally conscious landfill management.

planned, the same mission can be rapidly launched every day in less than **5 minutes**, providing agility in promptly responding to methane leaks.

The operation can be made without disruption to the delivery of trash, pushing of debris, and installation of topping material. Furthermore, drones equipped with **TDLAS Laser Falcon** sensors offer a solution with remarkable coverage capabilities. They can survey **5 hectares** in just **one hour**, which is over **6 times faster** than ground crews and **2 times faster** than sniffer drones. This accelerated pace not only increases the frequency of methane emission statistics but also surpasses conventional methods, ensuring more timely responses to emerging issues.

The drone is above the ground and can detect the plumes easier, due to the size of the plume spread in the air, VS an individual passing by a crack in the topping material, which is a small and more direct exit.

The georeferenced data captured by drones allows maintenance teams to facilitate swift and accurate interventions to rectify the issues. Notably, eliminating the human factor in data collection ensures consistency and repeatability, providing reliable methane data daily.

With only one person required to operate the drone and process the data, the operational efficiency of this solution is further underscored. Integrating drones into landfill methane detection addresses the shortcomings of existing methods and offers the industry much more cost-effective solutions.

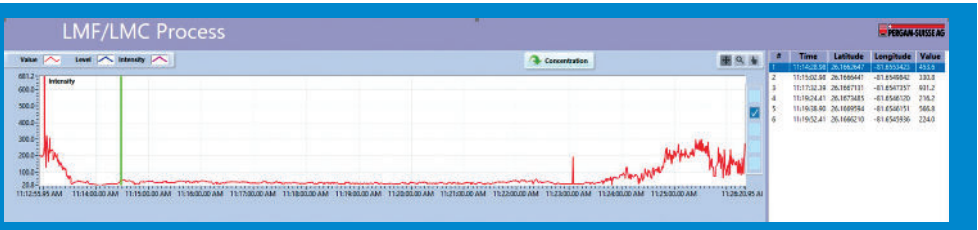
\*TDLAS (tunable diode laser absorption spectrometer) uses laser reflections to detect methane

# Success story

Large landfill operator in Florida incorporated into their operations a methane detection solution, which comprises the **Drone Wispr Ranger Pro** with the **SkyHub onboard computer** and **Laser Falcon TDLAS sensor**, the company could identify methane leaks. The primary cause of these leaks was compromised membrane integrity due to construction works. During the pilot phase, they

double-checked drone measurements with EPA-approved handheld devices, confirming the accuracy of drone measurements. The company's ability to rapidly pinpoint leaks was essential for ensuring compliance and protecting profits.

Implementing the **SPH Engineering** solution involved straightforward integration and importing files from **SkyHub** to LMC Process software. (data example)



The program's user-friendly interface facilitated data analysis, enabling users to adjust observed white noise at specific altitudes, set drone line-following distances, and define values indicating potential leaks. This precision in data adjustment proved instrumental in highlighting concentrations above the desired leak level. The extracted data, encompassing time, latitude, longitude, and concentration values, could be easily saved in text or CSV format. The versatility of uploading data to a GIS system or analyzing it visually in Google Earth emerged as a valuable asset for the company, showcasing the success and efficiency of our drone-based methane detection solution in swiftly identifying and addressing leaks in complex environments.

