Trends in Surface Emissions Monitoring and Measuring Device

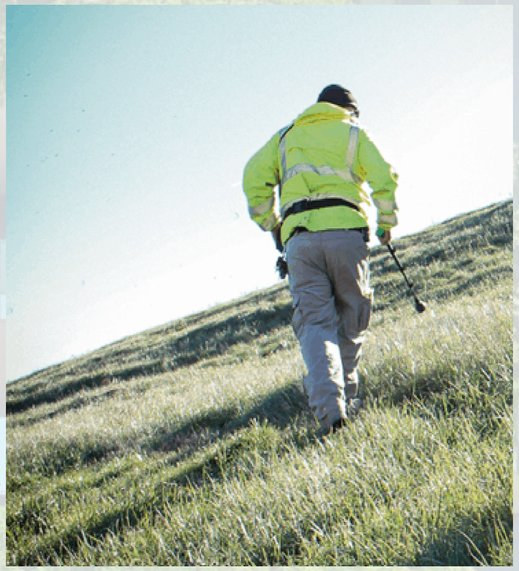
Keshav Parikh E.I.T., Project Consultant
San Diego, California

Objective: The objective of this poster presentation is to demonstrate the differences between various technologies used in surface emissions monitoring and how they have evolved with compliance and labor demands over the years. The presentation is aimed at providing a general overview of the different Surface Emissions Monitoring measuring devices available on the market currently and which methodology may be best suited per an institutions business needs.

What is Surface Emissions Monitoring?

Surface Emissions Monitoring (SEM) is a method of monitoring emissions that are emerging from the surface of the landfill. SEM events are usually performed by a handheld monitoring device that primarily measures methane as a potent landfill greenhouse gas emission. Periodic SEMs are required by landfills as a part of compliance regulations.

A SEM event allows us to monitor and record methane emissions from a portable device by traversing the landfill cover area on a predetermined grid and instantaneously reading the emission at each spot or node. The purpose of this monitoring is to identify areas on the landfill that exceed the regulatory threshold of 500 parts per million by volume (ppmv) above background concentration and to then develop and implement mitigation to address the exceedances.



The Past

Flame Ionization Detectors (FIDs) have historically been used along with Photo Ionization Detectors (PIDs). FIDs run on the principle of detecting organic compound ions during burning of those organic compounds with hydrogen flame. PIDs also work on the same principle but are majorly used to detect volatile organic compounds (VOCs) during emissions monitoring.

Benefits:

- The detection value in ppmv is directly proportional to the number of organic compounds burnt.
- Easier to maintain and cost efficient.

Challenges:

- Heavy (12lb) to carry around for all day monitoring
- GPS positioning system not available in all manufactured devices
- Flame out

The Present

The newer technology to be used for SEM is based on the principle of using infrared (IR) based gas chromatography (GC) and Tunable Diode Laser Absorption Spectroscopy (TDLAS). IR-based devices have greater field applications than TDLAS.

The working principle for IR-based device is using infrared sensors in conjunction with GC for determining emissions.

Benefits:

- Very light weight (3.5lb) for better ergonomics
- Precise and accurate readings with no false alarms
- GPS positioning capabilities with all manufactured device.

Challenges:

- High initial purchasing cost
- Longer initial calibration time

The Future

As drones gain popularity amongst many surveying applications with providing real-time data and accurate positioning, landfill SEMs have a great potential to be benefitted by using this technology.

Drones are featured with methane detectors along with their sensory working principle onboard an unmanned aerial vehicle (UAV). Drones are now equipped with air inlet nozzle which allows the drone to be at a predetermined distance between the ground and nozzle.

Benefits:

- Negligible physical labor, increased monitoring efficiency and very safe to operate.
- Precise and sensitive readings

Challenges:

- Monitoring is affected by adverse weather conditions
- Labor is required for monitoring penetrations

Civil & Environmental Consultants, Inc.

Contact Information:
kparikh@cecinc.com
352-888-0562