

# Mobile Gas Leak Detection System

ATVs and JEEP Rubicons available w/equipment



*The working principle of this methane gas leak detector is based on a pulsed beam from a diode laser which is directed at the location or area to be inspected.*

*Applications shown:*

*Marcellus Shale Well Gas Leak Detection  
Transmission Line Leak Detection*

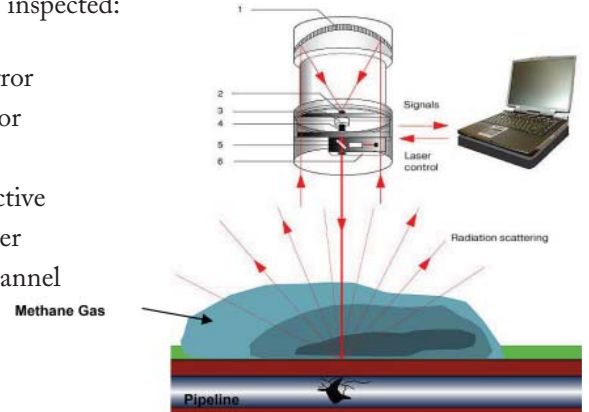


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## Detection Method:

Our vehicle, equipped with Laser Methane Assessment equipment, is a state-of-the-art mobile methane gas detector that is EPA Method 21 compliant. Its main applications are the detection of methane gas emissions associated with landfills, transport and distributions pipelines, compressor stations, gate stations, gas fired equipment and the identification of unknown sources of methane emissions to the atmosphere. The working principle of this methane gas leak detector is based on a pulsed beam from a diode laser, which is directed at the location or area to be inspected:

- 1 – Parabolic Mirror
- 2 – Photo Detector
- 3 – Diode Laser
- 4 – Optical Objective
- 5 – Optical Splitter
- 6 – Reference Channel



The pulsed beam from the diode laser (3) passes the optical objective (4) and is pointed at the location to be inspected. This laser beam, pointed at the pipeline and/or a leak, is reflected and the scattered reflection is collected by a parabolic (1) mirror. The laser beam passes an optical splitter (5). The main part of the beam goes through but a part of the beam is reflected and goes to the reference channel (6) consisting of a cuvette with a standardized gas sample. The photo detector (2) generates a signal which is compared to the signal from the reference channel (6).

When the laser beam passes through a methane gas cloud (leak), the laser light will be absorbed and the resulting deformation of the signal is proportional to the concentration of methane along the measuring path. The laser's wavelength of 1.65  $\mu\text{m}$  corresponds to the first absorption band of methane. The signal generated in this optical unit is processed in the analog/digital card and then analyzed with the gas leak detection software.

A few key advantages of this new methane gas leak detection system are:

- No maintenance
- Remote gas leak detection
- High inspection speed
- Detects only methane

## Equipment:

- 2010 Jeep Wrangler Unlimited Rubicon
- Street Evaluating Laser Methane Assessment "SELMA" Bumper Unit (fixed inspection)
- SELMA Roof Unit (operator directed inspection)

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**Weather:**

- Atmospheric Temperature: 60 F
- Relative Humidity: 52%
- Wind Speed: 5 mph (NE)
- Precipitation: None

**Overall Inspection Route with Leak Identification:**

Green lines indicate inspection pathways. Yellow boxes with Red X's indicate the locations of methane detections > than 300 PPM. The actual detection levels with geoposition are in Blue.

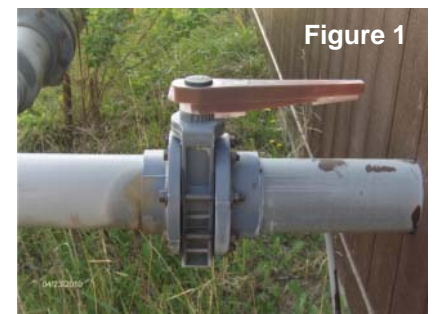


**Area without Collection System- Inspection Route and Leak Identification:**

Date	Time	Latitude	Longitude	Methane Concentration (ppm*m)
4-23-10	10:30:00.50	41.317582	-81.662488	758
4-23-10	11:01:36.62	41.318178	-81.660618	811
4-23-10	11:02:45.56	41.318338	-81.660623	2887
4-23-10	11:03:42.01	41.318303	-81.660618	3650

**Comments:** The detection of 758 PPM was identified as a leak on the Flare Gas Supply System. We further identified and verified the gas leak utilizing a hand held passive infrared camera. The infrared leak video and IR leak report are included as an attachment to this report. The leak is originating from the Gas House Flare Supply Pipe- 6 inch Valve Outlet at Nipple (Figure 1).

The hand held passive infrared camera also identified a leak located on a collection well head (Figure 2) that was not inspected by the mobile due to its location behind the North West corner of the Gas House. An immediate adjustment was made to the vacuum system flow valve which prevented any further loss of methane. Repair to the leaking connection is recommended to prevent the future loss and reduce the amount of ambient air entering the collection system.



The three (3) remaining detections are attributed to an area within and immediately surrounding the area identified by the landfill operator as having a hole in the liner. We recommend the installation of a gas recovery system, cover maintenance and a reinspection of the area.







**Area with Collection System NW of Gas House - Inspection Route and Leak Identification:**

Date	Time	Latitude	Longitude	Methane Concentration (ppm*m)
4-23-10	11:32:49.20	41.318557	-81.664280	899
4-23-10	11:32:55.20	41.318540	-81.664362	870
4-23-10	11:36:01.51	41.318587	-81.662903	1566
4-23-10	11:41:43.17	41.317893	-81.663432	843
4-23-10	11:52:40.11	41.317893	-81.663432	307
4-23-10	11:52:55.01	41.317875	-81.663360	315

**Comments:** The multiple detections in this area identified three discrete areas where methane emissions were > than 300 PPM. We recommend the vacuum collection system negative pressure settings to be checked at the well heads closest to the areas, respectively. If an adjustment to the vacuum system can be made, we recommend adjustment and a reinspection of the areas. If localized well head vacuum is set at the maximum, we recommend cover maintenance followed by a reinspection of the areas.

**Area with Collection System North of Entrance - Inspection Route and Leak Identification:**

Date	Time	Latitude	Longitude	Methane Concentration (ppm*m)
4-23-10	14:44:56.35	41.318768	--81.668410	1806
4-23-10	14:50:23.06	41.318460	-81.668580	2181
4-23-10	14:50:23.54	41.318457	-81.668575	1328

**Comments:** The three detections in this area highlighted two discrete locations where methane emissions were > than 300 PPM. The locations are on the West side slope of the West Roadway. We recommend the vacuum collection system negative pressure settings to be checked at the well heads closest to the areas, respectively. If an adjustment to the vacuum system can be made, we recommend adjustment and a reinspection of the areas. If localized well head vacuum is set at the maximum, we recommend cover maintenance followed by a reinspection of the areas.



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