

Executive Summary

Company Name	SLB
Submission Point of Contact Name	Drew Pomerantz
Product Name	Methane Lidar Camera
Technology Type	Periodic Screening
Target Applicability	Broadly applicable across the sector
Target Emission Leak Rate Thresholds	1, 2, 3, 5, 10, and 15 kg/h

Summary Description of Technology

The methane lidar camera is a periodic screening technology that detects and quantifies methane emissions from oil and gas facilities. In a typical deployment, the camera is mounted on a tall mast to get a vantage point above most of the equipment. The camera emits a laser beam to scan for emissions within finite fields of view and iterates through scan plans to cover all emission sources. For every scan, the camera creates images showing measurements of photon count (intensity), lidar range, computed path-integrated methane concentration, and a superimposed image of the methane concentration on the photon count. The camera uses a plume detection algorithm to detect emissions and identify continuous regions of elevated methane. Upon leak detection, the camera uses a mass balance algorithm to quantify the mass emission rate from the calculated path-integrated methane concentration and the local wind velocity obtained via an anemometer connected to the camera.

The method's performance is minimally impacted by factors such as cloud cover, temperature difference, topography, and wind field. Therefore, the method is broadly applicable over a range of geographies and facility types. It can be used to monitor a range of methane sources, including the collection of fugitive emission components, covers, and closed vent systems. It can be applied at a range of facility types, including at wellsites, centralized production facilities, compressor stations, and other production/processing and transmission/storage facilities. It can be applied broadly across the oil and gas sector, including all onshore basins in the US, as well as other sectors with methane emissions.

List of Documents Submitted in the Application

In addition to this Executive Summary, three main documents are submitted to the public portal:

1. The description of technology, with the file name "Description of Technology – MLC Periodic.pdf"
2. The formal alternative test method, with the file name "Alternative Test Method – MLC Periodic.pdf"
3. The visual workflow, with the file name "Visual Workflow – MLC Periodic.pdf"

Those documents reference three pieces of confidential business information, submitted separately as CBI:

1. A description of how machine learning is used to analyze data from the methane lidar camera, with the file name "CBI – Methane Lidar Camera Models and Machine Learning Procedures.pdf"
2. An installation manual, with the file name "CBI – Methane Lidar Camera Installation Manual.pdf"
3. A hazard analysis and risk control document describing operating practices and engineering controls in place to ensure safe operation of the camera, with the file name "CBI – Hazard Analysis and Risk Control (HARC) – LiDAR Camera.pdf"

In addition, the Supporting Documentation contains several documents demonstrating successful deployment of the methane lidar camera across US basins. These files are all submitted as CBI:

1. A summary of the performance of the methane lidar camera at METEC, as part of the 2023 ADED tests. This document demonstrates the camera's ability to detect emissions of 0.84 kg/h with 90% probability. The file name is "CBI – METEC_analysis.pdf"
2. A summary of the environmental conditions that impact the performance of the methane lidar camera, and a description of the range of environmental conditions present across US basins. The file name is "CBI – basin compatibility.pdf"
3. A summary of the environmental characteristics of all US basins, with a focus on the environmental characteristics with the greatest impact on the performance of the methane lidar camera. The file name is "Basin Environmental Characteristics.xlsx"
4. A summary of the performance of the methane lidar camera across a range of US basins spanning different environmental characteristics. The file name is "Field_deployments.pdf"

Finally, several public documents are submitted as supporting documentation:

- Published patents, with the file names:
 - "QLM_patent_GB2586075A.pdf"
 - "QLM_patent_GB2607646.pdf"
 - "QLM_patent_US11644576.pdf"
 - "QLM_patent_US20230324430A1.pdf"
- Technical paper, with the file name
 - "QLM-Single-Photon-Lidar-Gas-Imagers-for-Practical-and-Widespread-Continuous-Methane-Monitoring – Copy.pdf"
- Conference presentations, with the file names:
 - "QLM for PERF 2024.pdf"
 - "Severn Trent QLM EGU presentation.pdf"
- Product sheet, with the file name
 - "SEES Methane Lidar Camera.pdf"