Monitoring Technology Compatibility Assessment

Kuva Systems

March 2024

Purpose

The MiQ Foundation, as the Standard holder, has developed this monitoring technology compatibility assessment to streamline market research conducted by Operators and other stakeholders to assess the compatibility of methane monitoring technologies against the requirements in the Monitoring Technology Deployment pillar of the MiQ Standard.

This document does not endorse or reflect the personal views of the MiQ Foundation and is not intended to be exhaustive. The sole aim of this document is to provide stakeholders with an impartial summary mapping the characteristics of methane monitoring technologies and methods to MiQ requirements. This document does not guarantee that a monitoring technology or method will be compliant for a specific deployment of that technology or method. MiQ Auditors may reference the information in this document while conducting MiQ Audits, but still must assess each deployment individually. MiQ encourages Operators to carry out additional independent assessments of technologies and methods for their specific deployments.

MiQ has conducted the following assessment based on best available data, vendor-provided documentation, and published studies at the time of preparation. MiQ reserves the right to make updates to the documentation on a periodic basis to conform with new MiQ Standard updates and updated vendor documentation.

MiQ is not liable for any information provided or technology capabilities guaranteed by the technology provider.

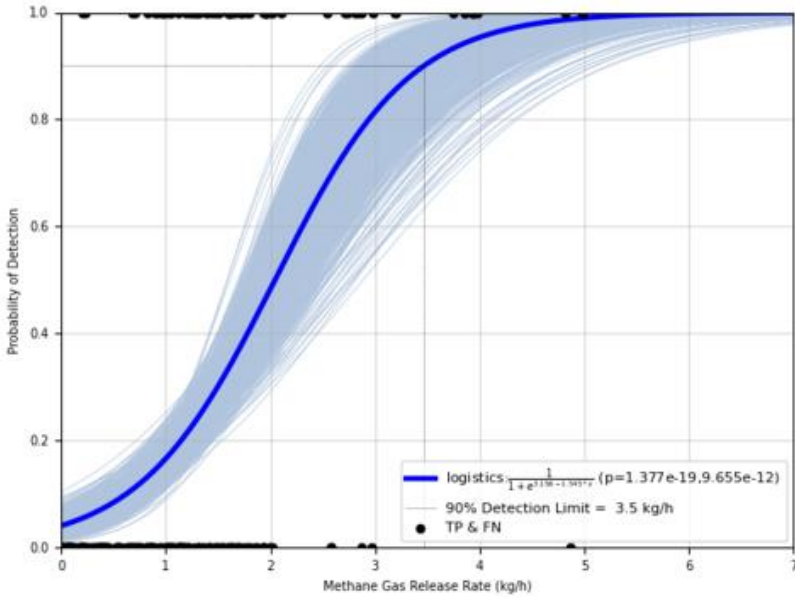
CRITERIA	STANDARD REFERENCE	DESCRIPTION
GENERAL INFORMATION		
Name		Kuva Systems
MiQ Application	Section 3.2.1	Facility Scale and Source Level Inspections
Deployment Method	Section 4.1 – *Table 3 Detection Technology Specification (Bullet 2)*	Continuous Monitoring Systems (CMS) – Shortwave InfraRed camera with visible RGB camera, integrated cell modem and anemometer. Kuva also offers a non-ground penetrating tower for ease of deployment without excavation, approvals, etc.
Sensor	Section 4.1 – *Table 3 Detection Technology Specification (Bullet 1)*	Kuva camera utilizes a shortwave infrared sensor to detect and quantify emissions. Typically, one camera is installed per site. The camera provides colourized images and quantification of methane and VOC emissions
PERFORMANCE SPECIFICATIONS		
Emission Source Coverage	Section 3.2.1- *Item 1*	Kuva cameras detect and measure emissions directly without the use of inverse dispersion models, from all sources, including elevated sources and underground sources (buried pipelines) once methane reaches the atmosphere.
Measurement Frequency	Section 3.2.1- *Item 1*	Continuous. The Kuva camera scans an entire site a minimum of 20 times per hour (currently limited to equipment within 270 degrees field of view). The measured data is transmitted to a Kuva cloud dashboard.
Attribution Level	Section 3.2.1- *Item 4*	Equipment level
Published Test Protocol	Section 4.1 – *Table 3 Detection Technology Specification (Bullet 4)*	2022 ADED METEC Results (Kuva is solution J): https://doi.org/10.26434/chemrxiv-2022-4hc7q-v3
MDL @ 90% PoD (Min MiQ MDL requirement is 25kg/hr)	Section 3.2.1- *Item 3*	3.5 kg/hr. See Equivalency Determination below for additional detail.
PoD Curve	Section 3.2.1- *Item 3*	
TECHNOLOGY LIMITATIONS		
Operational Limitations	Section 4.1 – *Table 3 Detection Technology Specification (Bullet 3)*	Kuva cameras rely on solar irradiation as an IR source and hence are limited to daytime monitoring only. In addition, each camera covers a circle with a diameter of 240m.
Environmental Limitations	Section 4.1 – *Table 3 Detection Technology Specification (Bullet 3)*	Presence of high wind, no solar irradiation, precipitation, and low reflectance background such as standing water influence the detection and quantification sensitivity of Kuva sensors.
EQUIVALENCY DETERMINATION		

Figure 1. Kuva PoD Curve METEC

Applicability	Section 3.2.3	An Operator using CMS over a subset of Sites (<100%) can implement a monitoring strategy for Source Level and/or Facility Scale inspections using Kuva CMS' that differs from the pre-defined strategies in Table 2 of the MTD Subsidiary Document 3 of the MiQ Standard. Please refer to the MiQ Equivalency Table for additional information or contact MiQ.
RECONCILIATION CONDISERATIONS		
Reconciliation	MI Section 3.3 – *Item 4*	Kuva can attribute emissions at the equipment level with their proprietary low-cost camera design which looks for hydrocarbon signatures at ever pixel. The imaging system provides operators with an image sequence of the leak with a correlated time stamp. A Producer/Operator utilizing this continuous monitoring system may need to follow up with a ground inspection to attribute emissions accurately to an individual source if the emissions timeseries and SCADA are unable to confirm the source via a desktop study. This technology determines emission rate using proprietary spectroscopic imaging which quantifies and visualizes leak location, volume, and release rate. The imagery is annotated with colour overlay measurements of gas density at each pixel and validated with visualization tools prior to their transfer. Producers/Operators can use either the emission rate provided by Kuva or engineering calculations, whichever is deemed best available data, to quantify detected emissions. Due to the nature of continuous monitoring technologies, Operators can set alerting thresholds and get real time data of detected events via email, SCADA and/or dashboard. This data allows Operators to infer emission duration and emission source. Causal Examination using operational and maintenance data may be required to understand cause and origin of a detected event.
ADDITIONAL DOCUMENTS		
Kuva News and Resources		https://www.kuvasystems.com

Document Status

Table: Version History

Version	Date	Summary of Change
1.0	2023-08 2024-03	First Publication 1st Paragraph of Applicability section revised to remove ambiguity.