

The background features several overlapping circles and arcs in teal and purple. A large teal circle is centered, with a purple circle overlapping its right side. A grey circle is partially visible on the left. Thin teal and purple lines form arcs across the page.

**Monitoring Technology
Compatibility
Assessment**

Kairos Aerospace

March 2024



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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		Kairos Aerospace
MiQ Application	Section 3.2.1	Facility Scale Inspection
Deployment Method	Section 4.1 – <i>Table 3 Detection Technology Specification (Bullet 2)</i>	Aerial Surveys – Manned aircraft (fixed wing)
Sensor	Section 4.1 – <i>Table 3 Detection Technology Specification (Bullet 1)</i>	Kairos Aerospace LeakSurveyor utilizes sensors with integrated infrared imaging spectrometer and optical RGB photography to detect and quantify emissions. The sensor is deployed in a “lawn mower” configuration.
PERFORMANCE SPECIFICATIONS		
Emission Source Coverage	Section 3.2.1- <i>Item 1</i>	Kairos measures emissions from elevated sources and underground sources (buried pipelines) once methane reaches the atmosphere.
Measurement Frequency	Section 3.2.1- <i>Item 1</i>	Periodic
Attribution Level	Section 3.2.1- <i>Item 4</i>	Equipment Group
Published Test Protocol	Section 4.1 – <i>Table 3 Detection Technology Specification (Bullet 4)</i>	2022 Stanford Single Blind Testing: Comprehensive evaluation of aircraft-based methane sensing for GHG mitigation
MDL @ 90% PoD (Min MiQ MDL requirement is 25kg/hr)	Section 3.2.1- <i>Item 3</i>	25 kg/hr is Kairos’ stated Production sector Sensitivity. By changing deployment characteristics Kairos can achieve 10kg/hr (90% PoD) detection sensitivity. See Equivalency Determination below for additional detail

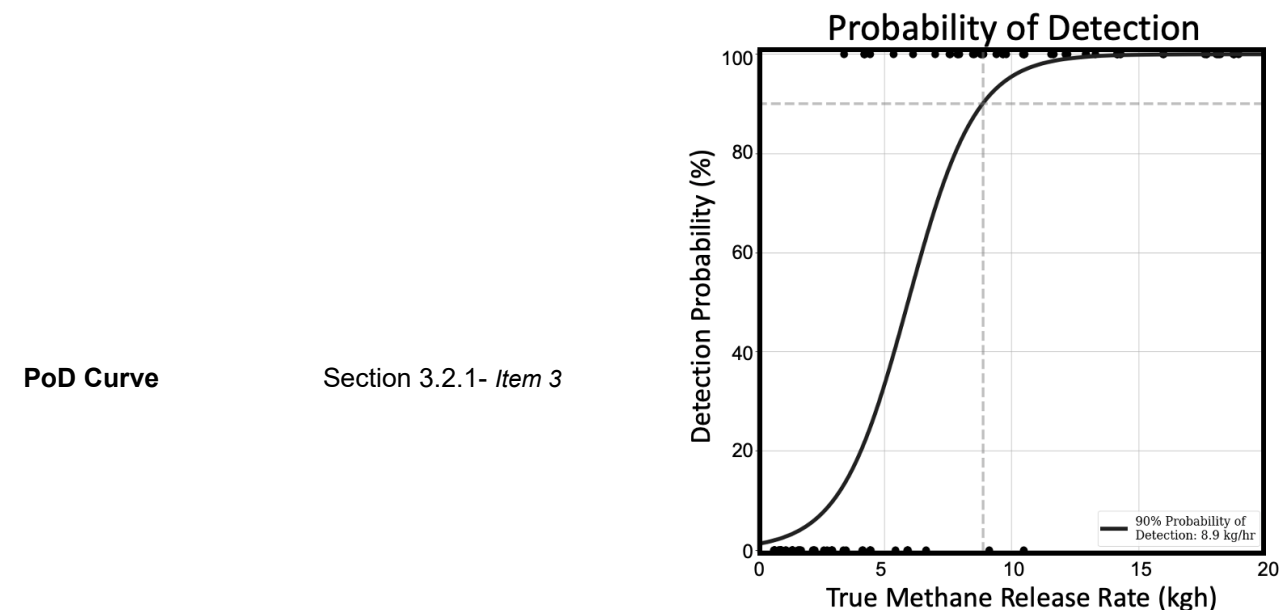


Figure 1. PoD Curve produced using published data collected during a single-blinded, controlled release study (Abbadi et al., 2023).

TECHNOLOGY LIMITATIONS		
Operational Limitations	Section 4.1 – <i>Table 3 Detection Technology Specification (Bullet 3)</i>	Parameters such as flight speed, height above ground level (1500’ minimum), ground reflectivity and wind speed near the ground impact the detection sensitivity.
Environmental Limitations	Section 4.1 – <i>Table 3 Detection Technology Specification (Bullet 3)</i>	Presence of high ground winds (>20mph), standing water and temperatures outside of -5 to 40 deg C range influence the detection sensitivity of Kairos sensors. Survey flights operate under visual flight rules (VFR), which limit deployment during heavy precipitation and other adverse weather conditions.

EQUIVALENCY DETERMINATION

Kairos MDL at 90% PoD and spatial resolution meets the requirements for Facility Scale Inspections and can be utilized to comply with the pre-defined MTD strategies identified in the MiQ Standard.

Applicability

Section 3.2.3

A Producer/Operator utilizing Kairos for MiQ Certification may be able to implement a deployment frequency that differs from the pre-defined strategies by completing an equivalency determination.

Please refer to the [MiQ Equivalency Table](#) for additional information or contact MiQ.

RECONCILIATION CONSIDERATIONS

Kairos can attribute individual emission plumes to a single area or equipment group. A Producer/Operator utilizing this technology must follow up with a ground inspection to attribute emissions accurately to an equipment or component level.

Reconciliation

MI Section 3.3 - *Item 4*

This technology quantifies emission rate using the Kairos algorithm which takes into consideration the imaged plume characteristics and wind speed. See *Kairos Methane Emission Quantification* in Additional Documents section for a detailed description of the algorithm.

Due to the nature of periodic screening technologies, Producers/Operators will need to conduct a Causal Examination using operational and maintenance data to understand the origin, cause, and duration of a detected event.

ADDITIONAL DOCUMENTS

Kairos Methane Emissions Quantification

<https://kairosaerospace.com/wp-content/uploads/2021/03/Kairos-Emissions-Quantification-v7.4.pdf>

2019 Joint study with Pioneer Resources – cost effectiveness of periodic aerial surveys

<https://kairosaerospace.com/wp-content/uploads/2021/01/SPE-201312-MS-10212020-1.pdf>

Document Status

Table: Version History

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