OFFICE OF AIR QUALITY PLANNING AND STANDARDS
RESEARCH TRIANGLE PARK, NC 27711

March 27, 2025

Dr. Oleg Mikhailov
CEO and Co-founder
Exploration Robotics Technologies, Inc.
333 West Loop Fwy N, Suite 130
Houston, Texas 77204

Dear Dr. Mikhailov:

We are writing in response to your emailed letter dated January 22nd, 2025, in which you request the broad approval of your proprietary technology and associated method for conducting follow-up monitoring surveys associated with the of fugitive emission components[1], inspections of covers and closed vent systems[2], and confirmation of repair of equipment[3][4] at sites subject to the alternative greenhouse gas (GHG) and voltile organic compound (VOC) standards in 40 CFR part 60, Subpart OOOOb - Standards of Performance for Crude Oil and Natural Gas Facilities for Which Construction, Modification or Reconstruction Commenced After December 6, 2022 (Subpart OOOOb). The U.S. Environmental Protection Agency's (EPA) Office of Air Quality Planning and Standards (OAQPS) is the delegated authority for approval/disapproval determinations on any major alternatives to test methods and other compliance determination procedures required under 40 CFR parts 59, 60, 61, 63, and 65.

According to your request, Exploration Robotic Technologies (Xplorobot), Inc., is requesting the use of your proprietary Xplorobot Laser Gas Imager which operates using a tunable diode laser absorption spectrometer (TDLAS) assimilated handheld device to image and quantify methane plumes from individual equipment components at 1653 nm. Specifically, you are requesting the use of your laser gas imager in lieu of optical gas imaging (OGI) or Method 21 (40 CFR part 60, Appendix A). According to the information provided, the spectrometer data is combined with visible imagery to generate a realtime "heat map" overlay of peak columnated concentration, measured in ppm-meters, allowing the user to

[1] §60.5398b(b)(5)(iv)(A)
[2] §60.5398b(b)(5)(iv)(B)
[3] §60.5397b(h)
[4] §60.5416b(b)

identify component level leak locations during the survey. You identify that this technology was recently approved for use as part of the EPA's Oil and Natural Gas Advanced Methane Technology Program under §60.5398b(b) for the alternative periodic screening program on January 14, 2025, as MATM-003[5].

You contend that the sensitivity of your technology would provide equivalent sensitivity as either OGI or Method 21 for use in follow-up monitoring surveys when the alternative periodic screening identifies a confirmed emission. To support your statements that your technology is an equivalent method to OGI and Method 21, you have included supporting information from several studies included in your application[6]:

- Summary of blind testing performed at the Methane Emissions Technology Evaluation Center (METEC; Fort Collins, CO), where the Xplorobot Laser Gas Imager demonstrated a 90% probability of detection (POD) level of 156 g/hr, or 4 slpm. See in Attachment A.

- An orphan wells campaign near Marietta, OH, led by the U.S. Forest Service. This study, claimed as CBI, included 21 wellheads scanned to detect emissions with your instrument, and optical gas imaging camera, and a hi-flow meter. See Attachment B.

- A comparison study of Method 21 and the handheld technology conducted at your Denver test center, with emissions rates ranging between 0.4 and 574 g/hr (as measured by a Hi-Flow device) as seen in Attachment C.

In addition to the supporting data, you have developed a prescriptive protocol (See Attachment D) for follow-up surveys for both follow-up fugitive emission surveys and inspection of storage vessel and closed vent systems and post-repair verification. This protocol is specific to the equipment, definitions, and processes detailed in approved in MATM-003 and includes procedures to further isolate the source of a leak and recordkeeping requirements to document the precise source of emissions. The protocol also includes procedures to verify successful repairs of fugitive emission components, the verification of no identifiable emissions from cover and closed vent systems and includes recordkeeping requirements that document the absence of emissions.

Our previous review of this technology and the associated protocol was under the premise of a periodic screening program and we found the combination of the technology and protocol in that protocol to be appropriate for detecting leaks < 1 kg/hr. Under the protocol in this letter, you contend the same use of the same handheld technology device to identify the source of emissions identified by a periodic screening collected under MATM-003 as equivalent to OGI and Method 21. You claim this is supported by your studies, specifically that:

- The 90% POD of 4 slpm for your handheld technology falls within the 90% POD range of 2.6-7.7 slpm that, according to a peer-reviewed study[7], is observed for Infrared OGI cameras operated

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[5] https://www.epa.gov/emc/oil-and-gas-alternative-test-methods

[6] Supporting evidence was submitted as part of Xplorobot's Application under EPA's Oil and Natural Gas Advanced Methane Technology Program and can be found at https://methane.app.cloud.gov/review/20. Additional supporting was also submitted to the EPA, and some claimed as Confidential Business Information (CBI).

[7] Zimmerle et.al 2020, Detection Limits of Optical Gas Imaging for Natural Gas Leak Detection in Realistic Controlled Conditions, Sci. Technol. 2020, 54, 18, 11506–11514, https://pubs.acs.org/doi/10.1021/acs.est.0c01285 Environ.

by highly experienced LDAR inspectors in the METEC study.

- Your technology has demonstrated the ability to detect 100% of emissions in field conditions ranging from less than 1 g/hr to 1,600 g/hr (as measured with the hi-flow), whereas the infrared OGI camera was not capable of detecting emissions less than 52.7 g/hr in the Orphan wells study.

- Your technology has good correlation with the Method 21 and although the exact quantitative relationship between a local concentration and a column-integrated concentration cannot be determined because the measurement of a column-integrated concentration is impacted by both the distribution of methane in the path of the laser and by the aperture of the laser beam which varies between TDLAS sensors from different manufacturer. You claim your control rate experiments, conducted at the Denver test center, demonstrate that your technologies measurement of 500 ppm-m (from distances between 1 and 5 m) corresponded to 500-ppm measurements by a Method 21.

Based on a thorough review of the information you provided, and our understanding of your technology developed during the review of MATM-003, we are approving your alternative test method request to use your Xplorobot Laser Gas Imager and associated protocol as an alternative to OGI and Method 21 when conducting follow-up actions as described in §60.5398b(b)(5)(iv) and for verification of repairs in §60.5397b(h) and §60.5416b(b). EPA finds that the combination of Xplorobot's component-level screening alternative test method in MATM-003 and the "Protocol for follow-up surveys using the Xplorobot Laser Gas Imager" included in this letter, provides equivalency with the follow-up requirements for those sites subject to the alternative GHG and VOC standards which apply to fugitive emissions components at affected facilities and the inspection and monitoring requirements that apply to covers and closed vent systems when using an alternative technology in §60.5398b.

This approval is predicated on maintaining the design and use of the instrument as detailed in this letter and based on your submittal dated January 22nd, 2025. Owner or operators wanting to use this alternative, must incorporate its use in their monitoring plans subject to alternative § 60.5398b(b)(2).

Because the alternative method described herein may be of used by other entities subject to §60.5398b and we believe it is reasonable to apply it broadly to those sources using MATM-003 to meet the requirements in this section §60.5398b(b), we will post this letter as ALT-158 on the EPA website at https://www.epa.gov/emc/broadly-applicable-approved-alternative-test-methods for use by interested parties.

If you have any questions regarding this approval or need further assistance, please contact Ned Shappley at (919) 541-7903 or shappley.ned@epa.gov.

Sincerely,

STEFFAN JOHNSON

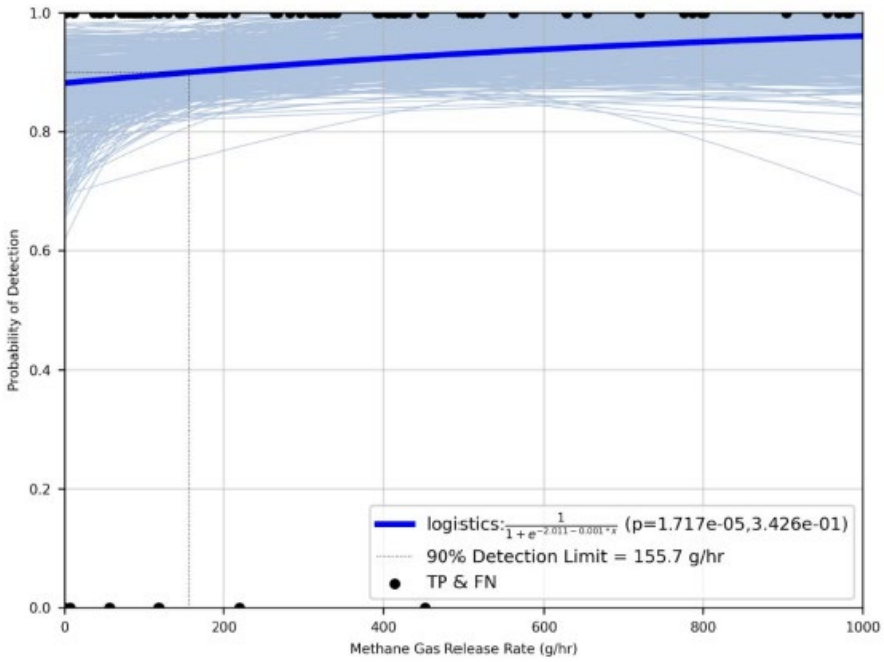
Digitally signed by STEFFAN JOHNSON
Date: 2025.03.27 16:13:56 -04'00'

Steffan M. Johnson, Group Leader
Measurement Technology Group

cc:
Greg Fried, OECA/AED
Elizabeth Leturgey, OECA/OC
Kim Garnett, OAQPS/AQAD
Karen Wesson, OAQPS/AQAD
Regional Testing Contacts

Attachments:
Attachment A: Xplorobot METEC Results
Attachment B: Results from orphan wells campaign near Marietta, OH
Attachment C: Equivalency between Xplorobot Laser OGI and Method 21 sniffer suggesting the 500ppm-m as the Detection Threshold
Attachment D: Protocol for follow-up surveys using the Xplorobot Laser Gas Imager

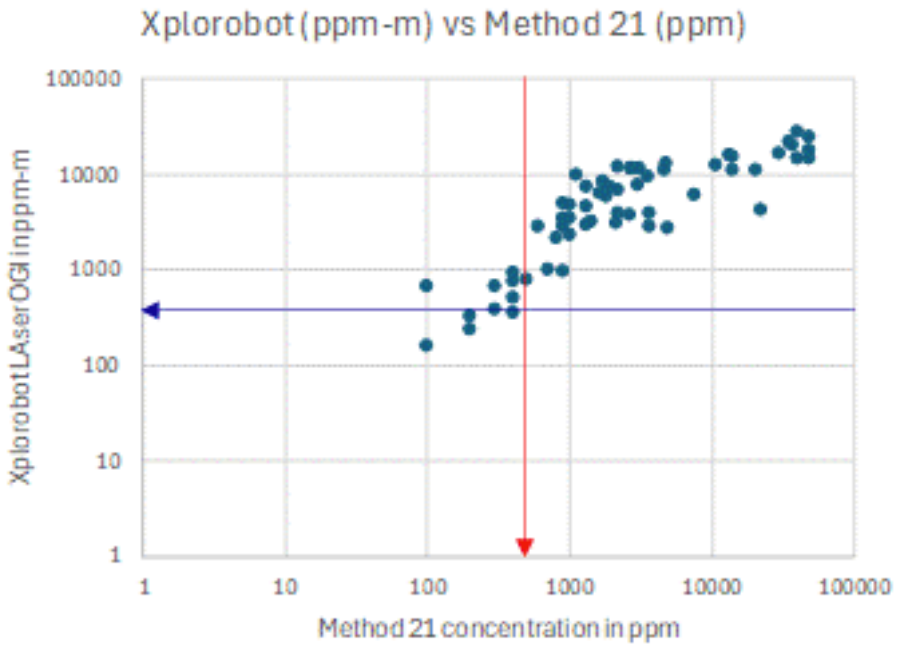
Attachment A – Xplorobot METEC Results



Attachment B: Results from orphan wells campaign near Marietta, OH

Well Name	Rate, g/hr	FLIR Detection	Xplorobot Detection
Porter Run 2	Zero Emission	Zero Emission	Zero Emission
Private #7	<1.0	No detection	Detection
Private #2	<1.0	Not tested	Detection
Rutherford Nancy 2	1.0	No detection	Detection
USA Joy 1	1.0	No detection	Detection
Edward Wiles #3	1.4	Not tested	Detection
USA #19	2.0	Not tested	Detection
Martin James #1	2.0	No detection	Detection
Edward Wiles #3	2.4	Not tested	Detection
Private #3	4.0	Not tested	Detection
Rutherford Nancy 3	8.0	No detection	Detection
Private #1	20.0	Not tested	Detection
Holiday Rueben #6	24.0	No detection	Detection
Zwick Bros #3	24.0	Not tested	Detection
Grace Joy 1	52.7	Detection	Detection
Undocumented 1	58.5	Detection	Detection
Private #5	100	Detection	Detection
Private 8	600	Detection	Detection
Charles Hall #6	800	Detection	Detection
Westbrook WM B	1,200	Detection	Detection
Private #9	1,600	Not tested	Detection

Attachment C: Equivalency between Xplorobot Laser OGI and Method 21 sniffer suggesting the 500ppm-m as the Detection Threshold



ATTACHMENT D

Protocol for follow-up surveys using the Xplorobot Laser Gas Imager

This protocol is intended for use in conducting follow-up actions associated with detection surveys required in § 60.5398b(5)(iv) (40 CFR part 60) after screening events indicate a confirmed emissions event. This protocol is specific to the equipment, definitions, and processes detailed in approved advanced methane alternative test method (MATM-003)[8]

1.0 Procedure for follow-up fugitive emission surveys and inspection of storage vessel and closed vent systems.

1.1 When a confirmed detection of an emission is identified using the procedures and requirements identified in MATM-003, LDAR inspector must take the actions identified in sections 1.1.1 and 1.1.2, as applicable.

1.1.1 If the confirmed detection was from an area that includes fugitive emission component, you must conduct a monitoring survey of all fugitive emissions components located within a 1-m radius of the confirmed emission detection, according to the procedures found in Section 1.2.

1.1.2 If the confirmed detection was from the portion of a site that contains a storage vessel or a closed vent system, you must inspect all covers and all closed vent systems that are connected to all storage vessels and closed vent systems that are within a 0.5-meter radius of the location of the periodic screening's confirmed detection (i.e., you must inspect the whole system that is connected to the portion of the system in the radius of the detected event, not just the portion of the system that falls within the radius of the detected event), according to the procedures in Section 1.3.

1.2. When a confirmed detection of an emission is from an area containing fugitive emission components, the LDAR inspector must conduct the follow-up screening to these sections 1.2.1 - 1.2.4

1.2.1 Scan all components within a 1-m radius of the confirmed emission detection, monitoring the maximum column-integrated concentration of methane displayed on the Xplorobot Laser Gas Imager screen. The Xplorobot Laser Gas Imager displays both the maximum concentration recorded in the vicinity of the confirmed emission and the current sensor reading.

1.2.2 If the current reading of the column-integrated methane concentration and the maximum detected reading is increasing, the LDAR inspector is moving towards the source of the confirmed emission. If the current reading of column-integrated concentration is decreasing and the maximum reading stays the same, then the LDAR inspector is moving away from the confirmed emission source.

1.2.3 Once the component that corresponds to the maximum column-integrated concentration is detected, it is deemed to be the emission source. The LDAR inspector presses the “Record Digital Emission Tag” button on the screen of the Xplorobot Laser Gas Imager to tag the emission source.

[8] https://www.epa.gov/system/files/documents/2025-01/exploration-robotics-alternative-test-method-matm-003.pdf

1.2.4. The LDAR inspector dwells on the emission source for 10 to 15 seconds (timed by the Xplorobot Laser Gas Imager) to accumulate at least 100 methane readings at and around the emission source. This process validates the emission source location and generate a visualization of the methane emission.

1.3 When a confirmed detection of an emission is from a portion of the site that contains a storage vessel or a closed vent system, the LDAR inspector must conduct the follow-up inspection of the cover(s) and closed vent system(s) using the same procedures in section 1.2.1 - 1.2.4, and the required procedures in §60.5398b(b)(5)(iv)(B)(*2*).

2.0 Procedure for re-survey after identification of methane leaks from, and repair of a fugitive emission component, cover, or closed vent system.

2.1. When the repair has been made to a fugitive emission component subject to § 60.5397b(h), the LDAR inspector must use Xplorobot Laser Gas Imager is used to verify the absence of emissions on the component that was previously identified to emit methane during the prior inspection, following the procedure outlined in sections 2.1.1-2.1.5

2.1.1 The LDAR inspector uses the Digital Emission Tag on his Integrated Communication Device to verify the component that requires post-repair inspection.

2.1.2 The LDAR inspector turns on the Xplorobot Gas Imager and initiates inspection.

2.1.3 the LDAR inspector points the Xplorobot Laser Imager at the component that requires post-repair verification and investigates that component for a 10-second dwell time from the distance between 0.5m and 4m.

2.1.4 If emission is detected on that component (column-integrated concentration is measured to be above 500ppm-m), the LDAR inspector creates a Digital Emission Tag for that component and submits it to the Xplorobot Compliance Database for additional repair to be scheduled and completed.

2.1.5. If no reportable emission is detected (column-integrated methane concentration of zero or below 500 ppm-m), the LDAR inspector saves the inspection result and provides the information on the site, equipment, and component for upload to the Xplorobot Compliance Database.

2.2 When the repair has been made to a cover or closed vent system subject to §60.5416b(b)(5) from a use the same procedures described in sections 2.1.1 – 2.1.5 to determine the absence of no identifiable emissions coming from the repair.

2.3 Upon receipt of the re-inspection data in the Xplorobot Compliance Database, a Digital Compliance Record is created for the repaired component and stored in the Xplorobot Compliance Database per § 60.5420b(c) for recordkeeping and per § 60.5424b for reporting.