

# **CleanConnect LeakFinder System EPA Alternative Test Method Application: Executive Summary**

## **Focus**

This document is part of the CleanConnect LeakFinder system application package for regulatory approval as a periodic screening alternative test method as per NSPS OOOO Rules Section §60.5398b(d).

**CleanConnect.ai**  
Seeing is Believing

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## 1. Alternative Test Method Desired Approval Details

Application Category	Desired Approval Detail
Company Name	CleanConnect.ai
Applicant Contact Information	David Conley
Product Name	CleanConnect LeakFinder
Applicability	Broadly applicable
Work Practice	Periodic Screening
Measurement Type	Stationary Remote Sensor
Emission Rate Threshold	≤5 kg/hr
Spatial Resolution	Component-level

Table 1. Desired application approval details

## 2. Technical Summary

CleanConnect is seeking approval for the CleanConnect LeakFinder system as a broadly applicable, remote periodic screening method to detect methane emission sources.

The CleanConnect LeakFinder system is used to screen for leaks at oil and gas sites requiring leak detection and repair (LDAR). The physical hardware of the system is the Minerva platform which contains an optical gas imaging (OGI) camera affixed to a pan and tilt device which allows for the camera to collect OGI video footage in a circular path of 360 degrees and a tilt of 180 degrees. In addition to the OGI camera, the Minerva platform is equipped with edge computers. The Minerva platform is installed at an elevated position at the site requiring monitoring such that it can look down on the equipment.

The OGI camera, via the pan and tilt device, autonomously screens the site in a rotational “tour”, stopping, and recording OGI video footage, at predefined “tour stops”. Tour stops are decided collaboratively between CleanConnect and the operator such that all equipment requiring LDAR is sufficiently monitored. The OGI video footage collected at each tour stop is sent to the intelligent edge data center (also located within the Minerva platform). There, the OGI video footage is passed through the CleanConnect detection algorithm in real time.

The CleanConnect detection algorithm is a proprietary deep learning “computer vision” algorithm, meaning the algorithm has been trained to “see” certain characteristics of incoming OGI video. At a high level, the algorithm works by assessing the characteristics of the pixels in each frame of the OGI video, such as the pixel’s color and how quickly these colors are changing from one frame to the next. CleanConnect has trained the model with more than 1,000,000 hours of OGI video, ensuring that the algorithm has “learned” which patterns of pixel behavior are indicative of methane emissions. Currently, the detection algorithm will identify all emissions and the operator, through their expertise of the site

and knowledge of scheduled or allowed emission in combination with access to the CleanConnect OGI video footage, will classify all flagged emissions as either fugitive or allowed.

The CleanConnect detection algorithm is the centerpiece of the LeakFinder system. The cameras used, where they are installed, and the nature of their screening tours may vary between deployments, however, all OGI video will be interpreted by the CleanConnect detection algorithm.

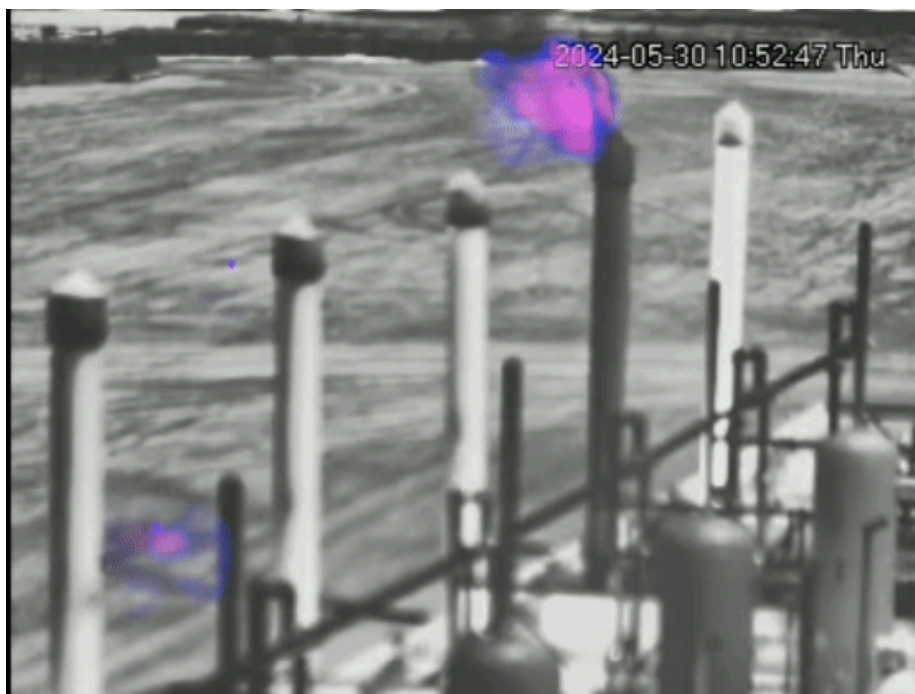
As the primary data product collected by the CleanConnect LeakFinder system is OGI video footage, the system operates on the same sensing principle as traditional, regulatorily approved, handheld OGI surveys. Briefly, OGI cameras are infrared (thermal) cameras which can visualize methane and various other organic gasses which are inherently invisible to the human eye. As such, the CleanConnect LeakFinder system leverages the same OGI footage a traditional OGI operator would, only instead of a human operator interpreting the footage, the CleanConnect LeakFinder system employs an autonomous detection algorithm.

### **3. Applicability**

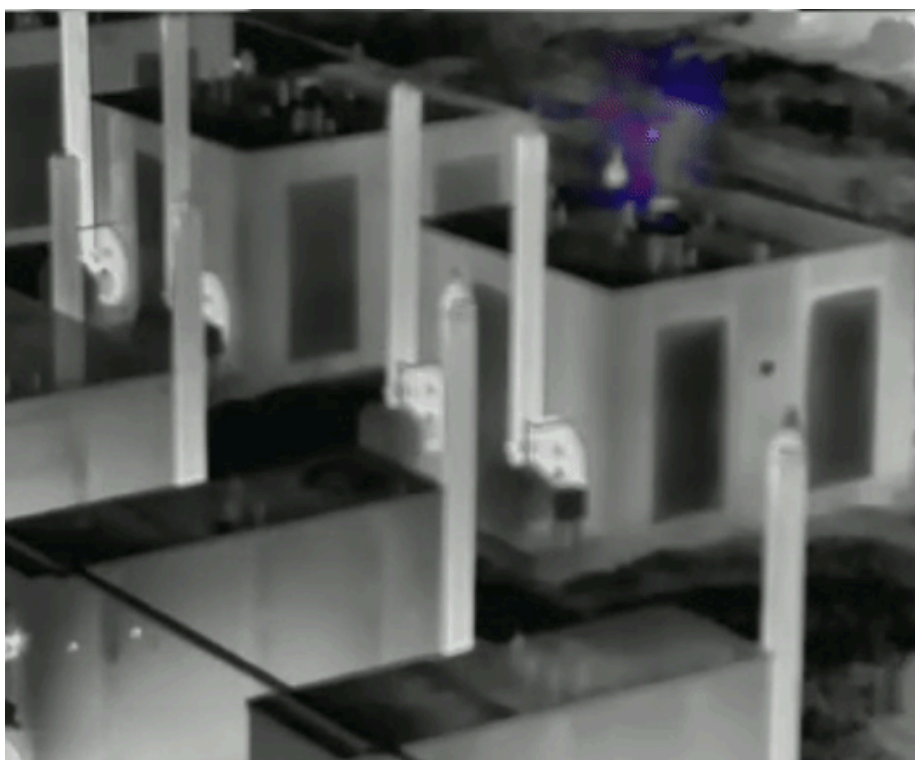
CleanConnect, as the applicant entity, directly represents the CleanConnect LeakFinder technology being applied for as an approved alternative test method through the holistic alternative test method application which this description of technology document is part of. The CleanConnect LeakFinder system is offered through a sales business model in which operators purchase the monitoring system for continuous monitoring at their oil and gas operations.

The CleanConnect LeakFinder system has been deployed successfully across major basins in the US. Some of CleanConnect's clients include Chevron, XTO, Mewbourne, Marathon Oil, Sequitur, PureWest Energy, Triple Crown Resources, etc. Examples of successful emissions across major US basins follow:

**Colorado (Denver Julesburg Basin):**



**Wyoming (Powder River):**



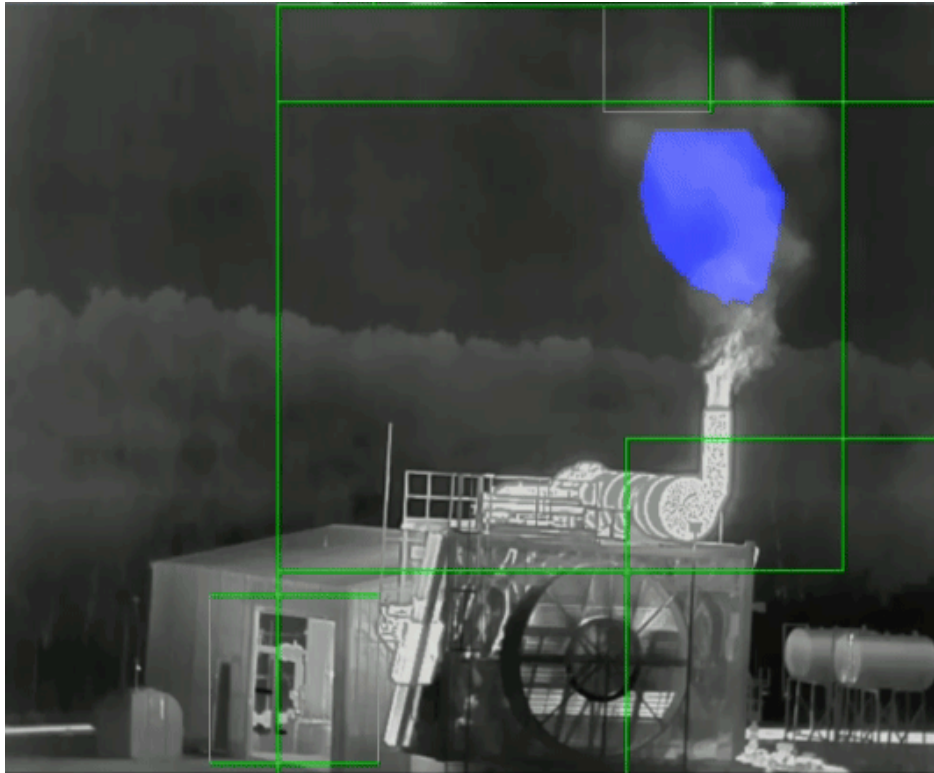
**Texas (Permian):**



**New Mexico (Delaware):**



OH = Uintah



PA = Marcellus



#### 4. Notes of the MATM Review Team

N/A

#### 5. Updates to the Application

N/A

#### 6. Summary of Submitted Documents

##### 6.1. Application Documents

EPA ATM “Bucket”	Document Title	Submission Location	Document Summary
Bucket 1: Executive Summary	CleanConnect LeakFinder System EPA Alternative Test Method Application: Executive Summary	Publicly facing portal	An overview of the holistic application. Provides an overview of desired approval, underlying technology, and attached documents
Bucket 2: Description of Technology	CleanConnect LeakFinder System EPA Alternative Test Method Application: Description of Technology	Publicly facing portal	A detailed description of the CleanConnect LeakFinder technology including, physical instrumentation, algorithms, work practice, and a discussion of the testing done to establish the detection threshold
Bucket 2: Description of Technology	CleanConnect LeakFinder System EPA Alternative Test Method Application: Visual Workflow	Publicly facing portal	A visual workflow of the CleanConnect LeakFinder system. An overview figure is provided followed by detailed flow charts outlining key steps in the dataflow: Data collection, data manipulation, and data reporting. These figures can also be found in the Description of Technology document.

Bucket 3: Supporting Information	-	Publicly facing portal	See Section 6.2 of this Executive Summary document for a full accounting of all Supporting Information referenced throughout the Description of Technology documents.
Bucket 4: Formal Alternative Test Method	CleanConnect LeakFinder System Formal EPA Alternative Test Method	Publicly facing portal	The formal alternative test method application document.

## 6.2. Supporting Information

ID	Category	Document Title	Description
01	Regulatory Application (Colorado, US)	CleanConnect Alternative Approved Instrument Monitoring Method (AAIMM) Application (Supporting Information 1)	The CleanConnect proposal to CDPHE for the approval of use of the CleanConnect autonomous OGI system (not yet referred to as the LeakFinder system) as an alternative to regulatory-approved LDAR technologies (Approved Instrument Monitoring Methods) in Colorado.
02	Patent	2023-04-20 334.0001 Patent Application (CleanConnect patent application, Supporting Information 02)	The CleanConnect patent describing the CleanConnect LeakFinder system. The name change to "CleanConnect LeakFinder" happened after this patent.
03	Publicly Facing Documentation (White Paper)	Mehdi Korjani, M., Conley, D., Smith, M., (2024) Temporal Deep Learning Image Processing Model for Natural Gas Leak Detection Using OGI Camera (Supporting Information 03)	A white paper providing an overview of the CleanConnect detection algorithm.
04	Regulatory Application (Colorado, US)	Controlled Release Testing 1 Full results (Supporting Information 04)	Full, tabular results of the first round of controlled release testing included in the

			CO-AAIMM application (Supporting Information 1)
05	Regulatory Application (Colorado, US)	Controlled Release Testing 2 Full results (Supporting Information 05)	Full, tabular results of the second round of controlled release testing included in the CO-AAIMM application (Supporting Information 1)
06	Regulatory Application (Colorado, US)	Controlled Release Testing 3 Full results (Supporting Information 06)	Full, tabular results of the third round of controlled release testing included in the CO-AAIMM application (Supporting Information 1)