Alternative test Method (MATM-0011)

May 13, 2025

1.0 Scope and Application

1.1 Scope

This method outlines the procedure for using the CleanConnect LeakFinder Periodic Screening Alternative Test Method (ATM) to comply with §60.5398b (40 CFR part 60) requirements. The CleanConnect LeakFinder system is an alternative method to the current Best System of Emission Reductions (BSER), and it applies to fugitive monitoring and inspection and monitoring of covers and closed vent systems under 40 CFR part 60 subparts OOOOa, OOOOb, and OOOOc.

1.2 Application

The CleanConnect LeakFinder MATM carries out stationary, remote monitoring using an automated Optical Gas Imaging (OGI) camera-based system to monitor emissions. The CleanConnect LeakFinder OGI camera is housed in the Minerva Sensor-Fusion(™) Platform (aka the Minerva Platform). The CleanConnect LeakFinder system is OGI camera agnostic so long as the OGI camera meets the requirements laid out in §60.5397b(c)(7)(i). Therefore, the OGI camera used by the CleanConnect LeakFinder system operates under the same principles as those used for handheld inspections to meet the requirements of §60.5397b(7)(i-vii).

1.3 Method Sensitivity

The deployment of the CleanConnect LeakFinder system, as described in this protocol, will achieve a 90% probability of detecting an emission source emitting at a rate of 5 kg/hr. This sensitivity has been validated via single-blind testing. The CleanConnect LeakFinder system achieved greater than 90% detection of controlled releases of 2 kg/hr (98.8 scf/hr) at distances of 40m to 120m from the CleanConnect Minerva Platform OGI camera to the controlled release point.

The CleanConnect LeakFinder system is an alternative test method (ATM) with component-level spatial resolution with direct line of sight to the emitting component and area spatial resolution without a direct line of sight to the component. The CleanConnect LeakFinder system can achieve component-level spatial resolution using the optical zoom capability of the Minerva Platform OGI camera coupled with the visual nature of the system (Operators can localize emissions down to the component level through OGI video).

1.4 Data Quality Objectives

Adherence to the requirements of this method will ensure the data supporting the CleanConnect LeakFinder system's objective will be accurate and of quality. The CleanConnect LeakFinder system's objective is to periodically screen for fugitive emissions at oil and gas infrastructure, alerting on detected

emissions. The screening frequency of infrastructure in scope, as per the minimum detection threshold of 5 kg/hr and 40 CFR part 60 subparts OOOOa, OOOOb, and Emissions Guidelines (EG): OOOOc, for the Oil and Natural Gas Sector Operations.

2.0 Summary of Method

The CleanConnect LeakFinder system is used to screen for leaks at oil and gas sites requiring monitoring for methane leaks. OGI video footage is collected using a permanently installed, autonomous OGI camera housed in the Minerva Platform. The OGI footage is then passed through a detection algorithm consisting of a proprietary gas leak detection model and a-priori auxiliary models. The detection algorithm and all supporting models leverage deep learning / neural networks to "see" emissions in the autonomous OGI camera's footage and isolate these emissions from potential false positives (crew operations, other operational procedures, vehicles, cloud cover, etc.). As the central hardware in the system is an OGI camera, the system operates on the same, well-understood sensing principles as traditional and regulatorily approved handheld OGI LDAR methods.

2.1 The OGI camera component of the Minerva Platform and larger CleanConnect LeakFinder system is installed following the procedures outlined in Appendix B of this method. The Minerva Platform OGI camera installation allows for 360 degrees of visibility. The number of required cameras is dependent on the amount of equipment and the size of the site being monitored.

2.2 The OGI camera 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 screening is sufficiently monitored. Incoming OGI video footage is sent to the intelligent edge device (also located within the Minerva Platform). There, the OGI video footage is passed through the CleanConnect detection algorithm in real time. Tours are completed during the Periodic Screening Window, a 7-day block of time during which the CleanConnect LeakFinder system autonomously and continuously screens for emissions.

2.3 The CleanConnect detection algorithm is a proprietary "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 pixel velocity in each frame of the OGI video, such as the pixel's radiance and how quickly these pixels are changing from one frame to the next.

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.

2.4 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. 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.

2.5 From the Intelligent Edge Data Center, all OGI video and metadata are uploaded to the CleanConnect cloud-based platform. It is through this platform that CleanConnect will store and distribute OGI video and metadata to the Operator via a dashboard. If a detectable emission is present, CleanConnect Leak Finder can detect it, log relevant data, and notify the Operator in less than 5 minutes.

3.0 Definitions and Abbreviations

3.1 Definitions

3.1.1 *Additional Data* means data used when classifying Detection Events and includes data collected by the Operator to aid in emission event classification. This could include an investigation into activities at the facility the Operator is not immediately aware of (e.g., vacuum/pumping truck operations). This can also include the use of the CleanConnect Live View feature which will allow the Operator to manually position the OGI camera to better diagnose the emission associated with the Detection Event.

3.1.2 *Area-level Survey* means a monitoring survey of all your fugitive emissions components located within a 3-meter radius of the location of the periodic screening's confirmed detection using either OGI or EPA Method 21 to appendix A-7 of this part. You must follow the procedures in your monitoring plan when conducting the survey.

3.1.3 *Autonomous365(™) means* the suite of software from CleanConnect.ai that include gas detection, liquid leak detection, fire/smoke detection, tank-level monitoring,

3.1.4 *Component-level Survey* means a monitoring survey of all the fugitive emissions components located within a 1-meter radius of the location of the periodic screening's confirmed detection using either OGI or EPA Method 21 to appendix A-7 of this part. You must follow the procedures in your monitoring plan when conducting the survey.

3.1.5 *Detection Event* means a Potential Event that surpasses the Threshold (referred to as a "confirmed detection" in 40 CFR 60.5398b(d)(5)). Once a Potential Event is elevated to a Detection Event the Operator and CleanConnect are alerted via email to its presence. In addition, after the 7-day screening window, the Operator receives a summarized report of all Detection Events encountered which can be used for EPA reporting requirements. Detection Events are also logged and accessible through the CleanConnect LeakFinder dashboard.

3.1.6 *Existing Data* means data used when classifying Detection Events and includes the CleanConnect LeakFinder OGI footage, Supervisory Control and Data Acquisition (SCADA) data if available, knowledge of known allowed process emissions or emissions from regulated sources (e.g., blowdowns), etc. Often, the Operator can classify the emission associated with a Detection Event with only Existing Data.

Furthermore, the Clean Connect OGI footage alone is often sufficient material for an Operator classifying an emission as a leak or a known allowable emission.

3.1.7 *Feature Vectors* means the computing device may numerically represent the pixels in the image frames that comprise the infrared video data and form the Feature Vectors using the numeric representations. Details of the pixels which inform the vectorization include the color (RGB value) and how rapidly this color changes from frame to frame. This is the key concept of the CleanConnect LeakFinder detection algorithm: It "looks" for emissions in the video data by assessing the numeric values of the video's pixels, and the nature of how these numeric values change from frame to frame.

3.1.8 *Intelligent Edge Data Center* means a decentralized computing facility located close to the "edge" of a network—meaning near the source of data generation (e.g., users, devices, or sensors)—that incorporates advanced technologies like artificial intelligence (AI), machine learning (ML), and automation to process, analyze, and manage data locally. Unlike traditional centralized data centers, which rely on sending data to a distant cloud or core facility, Intelligent Edge Data Centers optimize performance by handling data processing at or near its point of origin.

3.1.9 *LeakFinder*(™) is a system comprising the OGI camera, housed inside the Minerva Sensor-Fusion(™) Platform (aka Minerva hardware), plus the computer vision models (software), which run on the edge computing device housed inside of Minerva. This also includes the user-interface used by end users to monitor, diagnose, report, and log detection information. The LeakFinder user interface is part of a software suite called Autonomous365.

3.1.10 *Live View* is a feature of the Minerva Platform feature that allows an Operator to take over a Minerva Platform OGI camera, pan, tilt and zoom features in real-time. This aids in diagnostics of an alert. For example, an Operator may want to further diagnose a leak event by zooming in on the source of the leak. Because the Minerva Platform has a minimum of 3x optical zoom and auto-focus, this makes it easy to pinpoint exact sources.

3.1.11 *Minerva Platform* means the Minerva Sensor-Fusion(™) Platform (aka the Minerva Platform) components are described in Section 6.0 of this method.

3.1.12 *Operator* means the Operator of a facility that is being monitored. These are CleanConnect's customers.

3.1.12 *Periodic Screening Window* means a 1 week (7 calendar day) window of time during which the CleanConnect LeakFinder system autonomously and continuously screens the site. The screening window begins on the 1st day of the periodic screening interval defined by the site monitoring plan.

3.1.13 *Potential Event* means any visual emission event the CleanConnect LeakFinder system has identified and has persisted for more than 20 seconds during a Tour Stop.

3.1.14 *Threshold* means a Potential Event has been observed for more than 75% of the Tour Stops in a 4-hour period or however long it takes to achieve at least 5 valid Tour Stops (whichever is longer)

3.1.15 *Tour* means the CleanConnect LeakFinder OGI Camera has rotated the entire 360° in its observational path and completed all planned observations, it has completed a Tour.

3.1.16 *Tour Stop* means the process of the CleanConnect LeakFinder OGI Camera observing a predefined field of view for a set duration of time (a minimum of 2 minutes). Each Tour is composed of a certain number of Tour Stops. See Appendix B of this method for a detailed description of how Tour Stops are established (count and locations).

3.1.17 *Trained and Qualified* means an Operator(s) conducting the emission classification must be trained in both interpreting CleanConnect LeakFinder OGI footage and associated data as well as qualified to understand all routine operations at the monitored site. See Appendix D of this method for further information about Operator training.

3.2 Abbreviations

3.2.1 API: Application Programming Interface.

3.2.2 CFR: Code of Federal Regulations

3.2.3 GPS: Global Positioning System

3.2.4 LDAR: Leak detection and repair

3.2.5 NWS: National Weather Service

3.2.6 OGI: Optical Gas Imaging.

3.2.7 PPE: Personal Protective Equipment

3.2.8 SCADA: Supervisory Control and Data Acquisition

4.0 Method Interferences and Envelope of Operation

The method performance can be affected by factors such as obstructions in the line of sight of the OGI camera, and high wind speeds. Therefore, the Periodic Screening Window of the system is 7 days, to ensure an adequate number of valid measurements, such as wind direction shifting such that methane emissions are visible (blown within the line of sight) by the Minerva Platform OGI.

4.1. Line of Sight Obstructions

The CleanConnect LeakFinder system requires direct line of sight to a methane emission to “see” it and flag it as a Potential Event and ultimately Detection Event. A few obstructions can exist including crew members, vehicles on site, existing site infrastructure, or other emissions sources (for example, an allowable emissions source may obscure the plume of a fugitive emissions source). These obstructions are minimized through strategic placement of the CleanConnect Minerva Platform, including installation of multiple Minerva Platforms if necessary, as defined in Appendix B of this method.

4.2 False Positives

Movement not related to methane plumes, cloud cover, sunlight reflections, etc. in the OGI video footage can be originally mis-interpreted as emissions by the CleanConnect LeakFinder detection algorithm. The CleanConnect LeakFinder detection algorithm has been extensively trained to filter out these potential false positives, however, in the rare case a false positive is assigned a Detection Event, the Operator can flag it as such via the CleanConnect dashboard or their internal tracking software depending on their reporting practice.

4.3 Enclosed Monitoring. LeakFinder does not see through enclosed buildings. Therefore, if a site is being monitored using LeakFinder has equipment which requires monitoring located inside large buildings, those will require a Minerva camera system inside the building or they will be inspected with OGI or EPA Method 21 at the applicable inspection frequency for the given site.

4.4 Wind Speed. LeakFinder has been tested up to 20mph with positive results. As noted in the technology description, Minerva comes with a built-in gimbal to reduce camera shake in high wind conditions. Even without the gimbal, the system can be used reliably up to 20 mph as indicated in the testing results.

4.5 Maximum Viewing Distance. LeakFinder was tested and validated up to 120m distance. This radius covers 98% of upstream facilities in the United States. Field validation data is available in the Description of Technology document (see 16. Reference).

4.6 Ambient Temperature. LeakFinder was tested in temperatures from -40 to +120 degrees F. Details of the testing can be found in Appendix A of this method.

4.7 Precipitation. LeakFinder was tested in various conditions including wind, rain, fog and snow. Details of the testing can be found in Appendix A of this method. Severe precipitation can occlude system visibility and in these instances invalidate that Tour Stop.

4.8 Further details about Field-Validated Envelope of Operation can be found here in Appendix A of the method.

5.0 Safety

The CleanConnect LeakFinder system is a fully automated system that does not require regular on-site personnel, minimizing the safety risks typically associated with standard field operations for emissions monitoring. The two main safety risks related to this method are the installation and system maintenance of the Minerva Platform and its mounting system. The sections below describe the safety risks associated with both.

5.1 Minerva Platform Installation

Appendix B of this method describes the platform installation, configurating, and siting details.

5.2 Field Operations (maintenance)

Installation procedures and rare on-site maintenance procedures, including swapping out the Minerva Platform (if required), carry the same safety risks as any oil and gas facility activity. These risks include exposure to hazardous gasses such as methane and other toxic substances. Following all safety protocols during installation and maintenance activities will mitigate these risks. This begins with thorough hazard assessments before starting any field work. Ensuring all personnel are equipped with appropriate personal protective equipment (PPE) is also essential. This includes gas detectors, fire-resistant clothing, hard hats, safety glasses, steel toed boots, and gloves. By adhering to stringent safety measures, the risks associated with installation and maintenance activities in oil and gas facilities can be significantly reduced, ensuring the safety and well-being of all personnel involved.

6.0 Equipment and Supplies

The CleanConnect LeakFinder system hardware components consist of the following elements:

6.1 Minerva Sensor-Fusion^{TM} Platform (Minerva Platform): The Minerva Platform is CleanConnect's proprietary hardware which houses an OGI camera, a pan and tilt device, and edge computing devices ("Intelligent Edge'' data center). The Minerva Platform is attached to an elevated platform via a mounting bracket. Figures 6.1 and 6.2 show the external and internal view of the Minerva Platform respectively, while the following provide further details on the associated components:

6.2 OGI camera and IP67 Enclosure: The CleanConnect LeakFinder system is OGI camera agnostic so long as the camera meets the requirements laid out in 40 CFR part 60 §60.5397b(c)(7)(i). Specifically, the camera must be capable of imaging a gas that is half methane, half propane at a concentration of 10,000 ppm at a flow rate of ≤60 g/hr. from a quarter inch diameter orifice at the regulated minimum distance. The IP67 Enclosure is a weatherproof enclosure which ensures operation in adverse meteorological conditions.

6.3 Pan and tilt device: The pan and tilt device autonomously rotates the camera in a circular observation path known as a Tour. The circular path must encompass 360 degrees, and the tilt must be capable of 180 degrees of vertical movement.

6.4 Mounting Bracket: The camera system requires an elevated view to "look down" on operational activities. It is typically mounted at least 10 feet above the tallest equipment on site.

6.5 Optical Cameras: Autonomous365 has a suite of autonomous monitoring offerings in addition to LeakFinder. These optical and additional IR cameras are typically used in other visual AI models and fall outside the scope of this application.

6.6 Edge Computing Device: The on-site computing system which is where the detection algorithm is applied to incoming OGI video footage. An Nvidia-powered Jetson edge device model AGX or higher. It is at the edge computer that the CleanConnect detection algorithm is applied to incoming OGI video footage to "look" for methane leaks. Figure 6.2 provides an internal view of the Minerva Platform, showing the location of the edge computing devices.

Figure 6.1. External view of the Minerva Platform, the primary physical component of the CleanConnect LeakFinder system.

Figure 6.2. Internal view of the Minerva Platform showing the location of up to 4 edge computing devices.

6.7 The CleanConnect detection algorithm: A novel, proprietary deep learning image processing model that uses videos captured by the OGI camera and support models to detect methane leaks. The detection algorithm can effectively "see" fugitive emissions. The algorithm is applied to OGI video footage at the Intelligent Edge Data Center.

6.8 Meteorological station**:** A National Weather Service (NWS) traceable, or equivalent, on-site meteorological capable of measuring wind direction and magnitude, temperature, relative humidity, [anything else pertinent]. In the instances where no meteorological station is present, meteorological data must be provided from the nearest NWS site using OpenWeatherMap.org or similar service.

6.9 The CleanConnect cloud-based platform (dashboard)**:** Where OGI footage of Detection Events is uploaded. Operators and CleanConnect can access OGI footage of Detection Events via the cloud-based platform.

7.0 Reagents and Standards

Each Minerva system is QA/QC'd prior to installation following the procedures outlined in Appendix B of this method.

8.0 Data Collection and Method Input Sourcing

8.1 After installation and prior to conducting any compliance measurements, ensure the Minerva system is appropriately designed, installed, and configured following the guidelines established as described in Appendix B of this method.

8.1.1 Verify the Minerva system OGI camera is recording alerts following the post installation procedures.

8.1.2 Verify the system is conducting automated Tour Stops consistent with the site-specific monitoring plan.

8.1.3 If the system is not operating consistently with requirements in this method or the monitoring plan, take corrective action prior to any compliance measurements as specified in Section 9.

8.2 Compliance Measurements

8.2.1 Sampling and analysis of the data, for compliance purposes, shall start on the approximate date identified in the site-specific monitoring plan.

8.2.1 Any time periods where the environmental or operational characteristics are outside the envelope of operation as described in Section 9 and Appendix A, must not be used for compliance measurements.

8.2.2 There must be at least 15 valid Tours in a 7 day period. This provides at least 3 independent monitoring windows of 5 Tours each from which an Detection Event can be triggered.

8.2.3 If the minimum Tour Stops are not achieved as defined in 8.2.2, notify the Operator that the Periodic Screen is invalid and the Operator must conduct a regulatory Method 21/OGI inspection of the facility or specific subset of the facility.

8.3 Follow the monitoring plan as outlined in Appendix A.

9.0 Quality Control

Table 9-1: Quality Assurance and Quality Control Metrics

QA / QC Target	QC Procedure	Acceptance Criteria	Frequency of QC Procedure	Corrective Action If Required
OGI Camera System	Automated system health check every 1 minute	Camera operational, communicating, and recording	Continuous & automated	Remote troubleshooting; on-site repair if needed
Detection Source Identification	Operator review via previous Tour Stop or Live View feature	Operator can clearly determine leak source	Each Detection Event	Manual OGI inspection if source remains uncertain
Wind Speed Monitoring	Tour Stop average wind speed measured by system anemometer	Wind speed <=20 mph	Each Tour Stop	Tour Stop data invalid
Communication System	Device connectivity check	System Dashboard is Green Indicating No Communication Issues	Continuous	Troubleshoot and restore connectivity
Detection Algorithm Performance	Automated review of model accuracy	Algorithm successfully detects known emissions	Continuous	Reverted to previous version while software updates are being completed.
Data Logging & Storage	Automated system check for data integrity	All Detection Events are logged correctly	Continuous	Restore missing data from backup and troubleshoot storage issue

Alert Notification System	Test alert transmission to Operator dashboard	Alerts received within 10-minutes of transmittal	Weekly	Investigate and resolve delays in alert delivery
Camera Tour Path Validation	Review of recorded Tour Stops vs. expected paths	Camera follows designated monitoring path	Weekly: Prior to each 7-day screening period	Adjust or reconfigure camera Tour settings
Maximum Viewing Distance	Determined Using Siting Process - Appendix B	<= 120 meters	Monthly	Adjust Tour Stop Configuration - Zoom
Precipitation	Monitor precipitation	no equipment located within the field of view is visibly occluded	Continuous monitoring	Discard Tour Stop videos that have any equipment visibly occluded. Use next acceptable Tour Stop video
Temperature	Monitor temperature	-40 to +120 F	Continuous monitoring	Discard Tour Stop videos that are not clear. Use next acceptable Tour Stop video

10.0 Calibration and Standardization

10.1 Calibration Procedures

The OGI camera housed in the Minerva Platform is calibrated prior to installation following the procedures outlined in Appendix B of the Method. The LeakFinder system continually checks the health of the OGI camera, making sure that it is recording and that the video is clear. The system also checks for Tour Stop slippage and other quality assurance and quality control parameters per Table 9-1.

10.2 Standardization:

10.2.1 Training Requirements. Training requirements align with regulatory standards to ensure Operators meet compliance qualifications. The Clean Connect system is designed to support regulatory compliance, and Operators are trained to adhere to these standards effectively These our outlined in Appendix D. The customer onboarding documents provide detailed training and are included in the confidential business information (CBI).

11.0 Analytical Procedure

[Reserved]

12.0 Detection and Alerting

12.1 Detection

The CleanConnect LeakFinder system detects fugitive emissions via the CleanConnect LeakFinder detection algorithm. The LeakFinder detection algorithm uses inputs described below. It is through these processes which the system detects emissions. The CleanConnect LeakFinder detection algorithm is a combination of neural networks (both a-priori and developed internally by CleanConnect) which operate in tandem to autonomously detect methane emissions in OGI video footage.

12.1.1 Meteorological Data:

Meteorological data (See Section 6.8) includes environmental telemetry data like temperature, pressure, wind speed, wind direction, clouds, visibility, humidity, and dew point. The environmental telemetry metrics improve machine learning model performance and help the machine learning model better understand the condition of environments during system Tour Stops. Sensor data is collected from telemetry devices already present on oil and gas sites.

12.1.2 Video Data:

The video data is a numerical representation of the infrared or optical video data. The Intelligent Edge Data Center vectorizes the infrared or optical video data to generate Feature Vectors.

12.1.3 Computer Vision models that enable detection

The four models described below operate simultaneously, “using” each other's results to ultimately detect methane emissions. The individual models (motion, object, background, and gas leak detection) interact through a process referred to as model fusion. For example, the gas leak detection model may originally classify video footage of an Operator as an emission, but during model fusion as the models interact, the object detection model would then remove this incorrect classification of an emission, thus avoiding a false positive.

12.1.3.1 Motion Detection Model: A machine learning model trained to ingest video data inputs and identify motion in the infrared or optical video data.

12.1.3.2 Background Detection Model: A machine learning model trained to ingest video input data and identify the background environment in the infrared or optical video data allowing other features depicted in the infrared or optical video data to potentially be classified as background environment.

12.1.3.3 Object Detection Model: A machine learning model trained to ingest input data and segment the image in the infrared or optical video data to identify and classify natural gas storage, extraction, and or transfer equipment.

12.1.3.4 Gas Leak Detection Model (TDLP-NG): A machine learning model trained to ingest feature input data and identify gas leaks in the infrared or optical video data.

12.2 Alerting

Alerting happens continuously during the Period Screening Window and as described in Sections 12.2.1 through 12.2.3. During this window, the CleanConnect LeakFinder system first autonomously scans for Potential Events. A Potential Event is any emission identified by the CleanConnect LeakFinder system which has persisted for more than 20 seconds. Each Potential Event is tracked by the CleanConnect LeakFinder system.

12.2.1 The CleanConnect LeakFinder system will automatically elevate a Potential Event to a Detection Event if the Potential Event surpasses the Threshold as defined in Section 3.1.14.

12.2.2 During the Periodic Screening Window, all time stamped OGI video footage and associated wind speed data (via weather APIs) must be collected by the CleanConnect LeakFinder system and this information must be automatically uploaded to the CleanConnect dashboard. In addition, Potential Events and Detection Events are flagged as such within the dashboard and can be observed at a later time by the Operator.

12.2.3 The Periodic Screening Window culminates in a screening summary report being sent to the Operator at the end of each day. The screening report can also be sent to CleanConnect for ongoing system improvement at the discretion of the Operator (it is not required). The screening summary report will contain all data necessary for the Operator to fulfill the reporting requirements of 40 CFR 60.5424b. Including: Date of screening, results (Detection Events, emitting equipment group, etc.), and method and technology used. Fields will be present in the report which can be easily populated upon completing the Emissions Classification (Section 15) including the classification of emissions associated with Detection Events, and details of Follow-up OGI information if necessary. Alternatively, Operators can use the screening summary report in combination with internal tracking systems to meet 40 CFR 60.5424b reporting requirements.

13.0 Method Performance

Method performance was evaluated across 3 rounds of controlled release testing.

13.1 Detection Algorithm Testing

The CleanConnect LeakFinder detection algorithm does not require live, incoming OGI video to function. Archival OGI footage can be passed through the algorithm, which will then assess if emissions are present in the footage. By providing the detection algorithm with pre-recorded OGI video, the detection algorithm can be effectively tested. The detection algorithm was tested using OGI video footage sourced from (Wang et al 2022) and (Wang et al 2020). The CleanConnect detection algorithm correctly classified 89% from 92 total number of videos analyzed.

13.2 Detectability Testing at Variable Rate and Ranges

CleanConnect conducted blinded controlled release testing on two separate production facilities in Weld County. During testing, a fuel gas line was used as the methane emission source and flow rate was confirmed using a dual chamber flow meter. Releases were set off by the Operator using a combination of different emission rates and different distances from the CleanConnect LeakFinder OGI camera. Facility Operators were in charge of the controlled releases, the timing and emission rate of which were blinded to CleanConnect. The average time of each emission (a given emission rate at a given distance) was 2 minutes. The CleanConnect LeakFinder system operated as it normally would during the testing window. At 30 yards 100% of emission releases were detected with the smallest emission successfully detected of 0.19 kg/hr. At 40 yards 33% of emission releases were detected with the smallest emission successfully detected of 0.95 kg/hr and the largest emissions leak not detected being 2.86 kg/hr. At 80 yards 66% of emission releases were detected with the smallest emission successfully detected of 2.86 kg/hr and the largest emissions leak not detected being 0.95 kg/hr. At 100 yards 50% of emission releases were detected with the smallest emission successfully detected of 2.86 kg/hr and the largest emissions leak not detected being 0.95 kg/hr.

13.2.1 Methodology: CleanConnect conducted blinded controlled release testing on two separate production facilities in Weld County. During testing, a fuel gas line was used as the methane emission source and flow rate was confirmed using a dual chamber flow meter. Releases were set off by an Operator on site. A combination of emission rates and distances of the CleanConnect LeakFinder OGI camera to the emission source were tested. Facility Operators oversaw the controlled releases, the timing and emission rate of which were blinded to CleanConnect. The average time of each emission (a given emission rate at a given distance) was 2 minutes. The CleanConnect LeakFinder system operated as it normally would during the testing window with the notable exception that autonomous reporting went to Highwood and the Operator in charge of testing prior to CleanConnect. The Operator signed off on all testing results.

13.3 Detectability Testing at Fixed Rate and Variable Ranges

Testing occurred at a centralized production facility in the Denver Julesburg basin. The goal of the testing was to evaluate detection capabilities at fixed emission rates and distances further than those tested in prior controlled release testing. Multiple controlled natural gas release points were used throughout testing at distances ranging from 40m up to 120m from the CleanConnect OGI camera. The release rate was kept consistent at 2 kg methane / hr for each release to keep the distance component as the primary variable being explored. 15 releases were conducted at 40, 60 and 80m distances, each

followed by a non-release period with both periods lasting approximately 5 minutes each. Testing at further distances, 100 and 120m, only saw 8 and 10 releases respectively. Greater than 98% (62/63) of the controlled releases were detected. Table 1 is a summary of all results from this round of testing."

14.0 Pollution Prevention

The method does not require a specific pollution prevention protocol. No physical samples are collected, which avoids generating waste. Additionally, the method reduces regular site visits, reducing transportation-related emissions compared to traditional methods.

15.0 Data Management and Record Keeping

Data management & recordkeeping are automated by the CleanConnect system. Data is stored on a local edge device and in the cloud. Figure 17.3 shows the diagram of data flowing from the local edge device to the cloud.

15.1 Local Edge Data. Raw camera and meteorological data is processed on a local edge device. The raw data inputs are available to the Operator for 72-hours. This allows for “instant replays” up to 72-hours. Once an actionable alert is determined on the edge, the alert data is sent to the cloud (15.2). 72-hours for processing, instant replay, etc. They could look at the continuous video feed up to 72-hours.

15.2 Cloud data. Alert data is sent to the cloud from the edge device. Alert data consist of 2-minute OGI video clips and the associated metadata (time, date, location, Tour Stop, meteorological information, leak quantification, etc.). This data is kept in cloud storage for a minimum of 5-years.

15.3 Siting data and configuration data is defined in Appendix B of this method. This data is kept permanently.

15.4 Customer exported data. The Autonomous365 system has an API that allows the Operator to pull the edge data into their cloud storage. Once the Operator takes in the raw video data, CleanConnect.ai has no control of that data. The Autonomous365 system is not reliant on Customer Exported Data.

16.0 References

16.1 Zavala-Araiza, D., Alvarez, R., Lyon, D, et al. 2017. “Super-emitters in natural gas infrastructure are caused by abnormal process conditions.” Nat Commun 8, 14012 (2017). https://www.nature.com/articles/ncomms14012.p

16.2 Clean Connect Description of Technology. https://methane.app.cloud.gov/

16.3 Minerva System Specifications. https://prod.autonomous365.ai/home

17.0 Tables, Diagrams, and Flow Charts

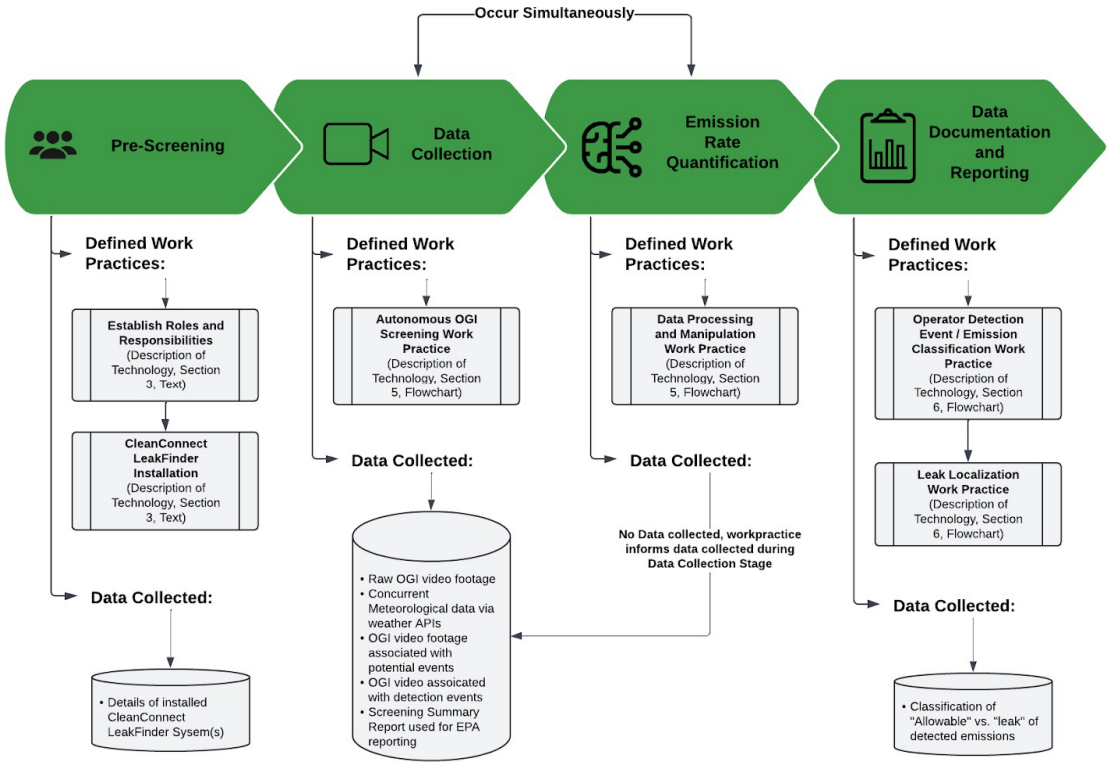


Figure 17.1 Visual workflow of the complete CleanConnect LeakFinder system process. References to other practices are detailed in the following sections.

Definitions:

Tour: When the CleanConnect LeakFinder OGI Camera has rotated the entire 360° in it's observational path and completed all planned observations, it has completed a tour.

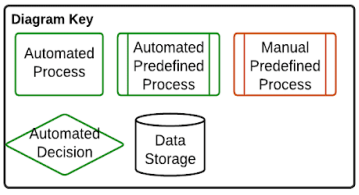
Tour Stop: Each tour is composed of a certain number of tour stops. A tour stop is the process of the CleanConnect LeakFinder OGI Camera observing a predefined field of view for a set duration of time (a minimum of 2 minutes).

Potential Event: Any visual emission event the CleanConnect LeakFinder system has identified and has persisted for more than 20 seconds (no longer than 20 seconds elapse between detection during a given tour stop).

Threshold: The threshold is surpassed when a potential event has been persistently observed for 4 hours with no more than 1 break in observation (if the CleanConnect LeakFinder system passes through two consecutive tours without "seeing" a potential detection, it is no longer a potential event).

Detection Event: A potential event that surpasses the threshold (referred to as a "confirmed detection" in 40 CFR 60.5398b). Once a potential event is elevated to a detection event the operator and CleanConnect are alerted via email to it's presence. In addition, after the 24 hour screening window, the operator and CleanConnect receive a summarized report of all detection events encountered which can be used for EPA reporting requirements. Detection Events are also logged and accessible through the CleanConnect LeakFinder dashboard.

Screening Summary Report: A report automatically provided to CleanConnect and the operator. The report will contain all data necessary for the operator to fulfill the reporting requirements of 40 CFR 60.5424b. Including: Date of screening, results (Detection events, emitting equipment group, etc.), and method and technology used. Fields will be present in the report which can be easily filled in upon completing the Emissions Classification Work Practice (See *Operator Detection Event / Emission Classification Work Practice* flowchart) including the classification of emissions associated with detection events, and details of Follow-up OGI information. Alternatively, operators can use the screening summary report in combination with internal tracking systems to meet 40 CFR 60.5424b reporting requirements.



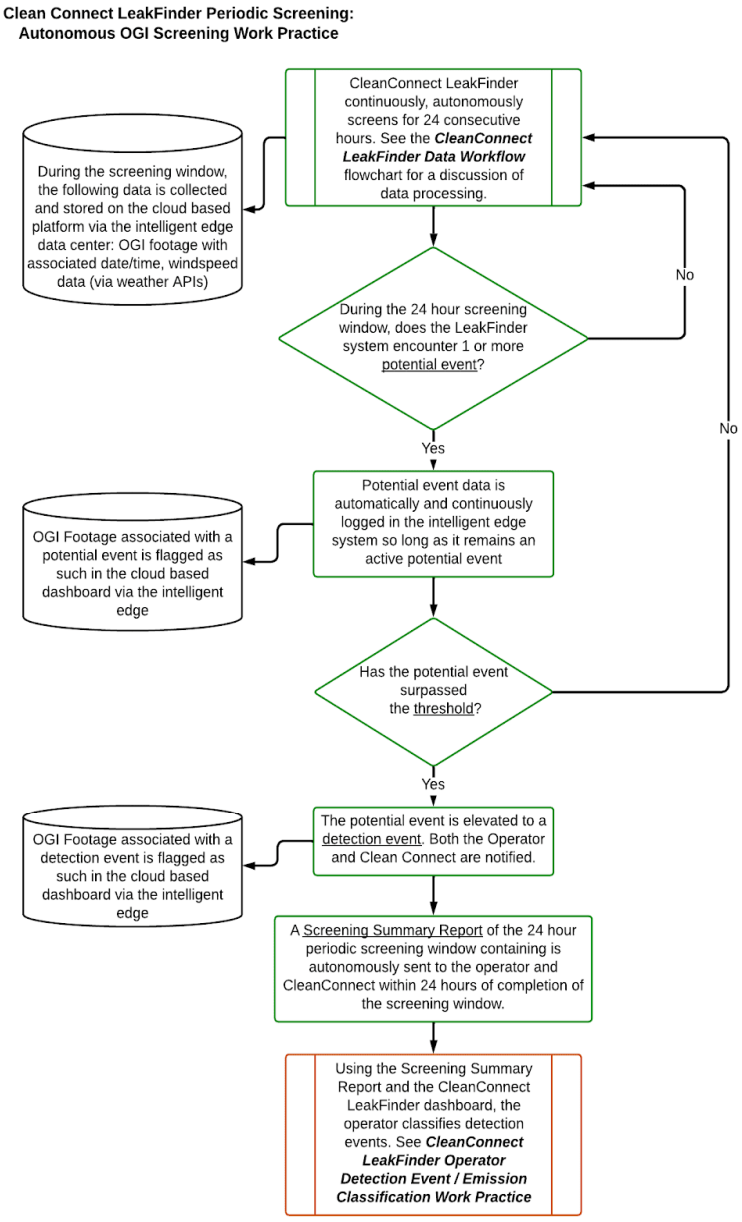


Figure 17.2 The CleanConnect LeakFinder Periodic Screening Autonomous OGI Screening practice.

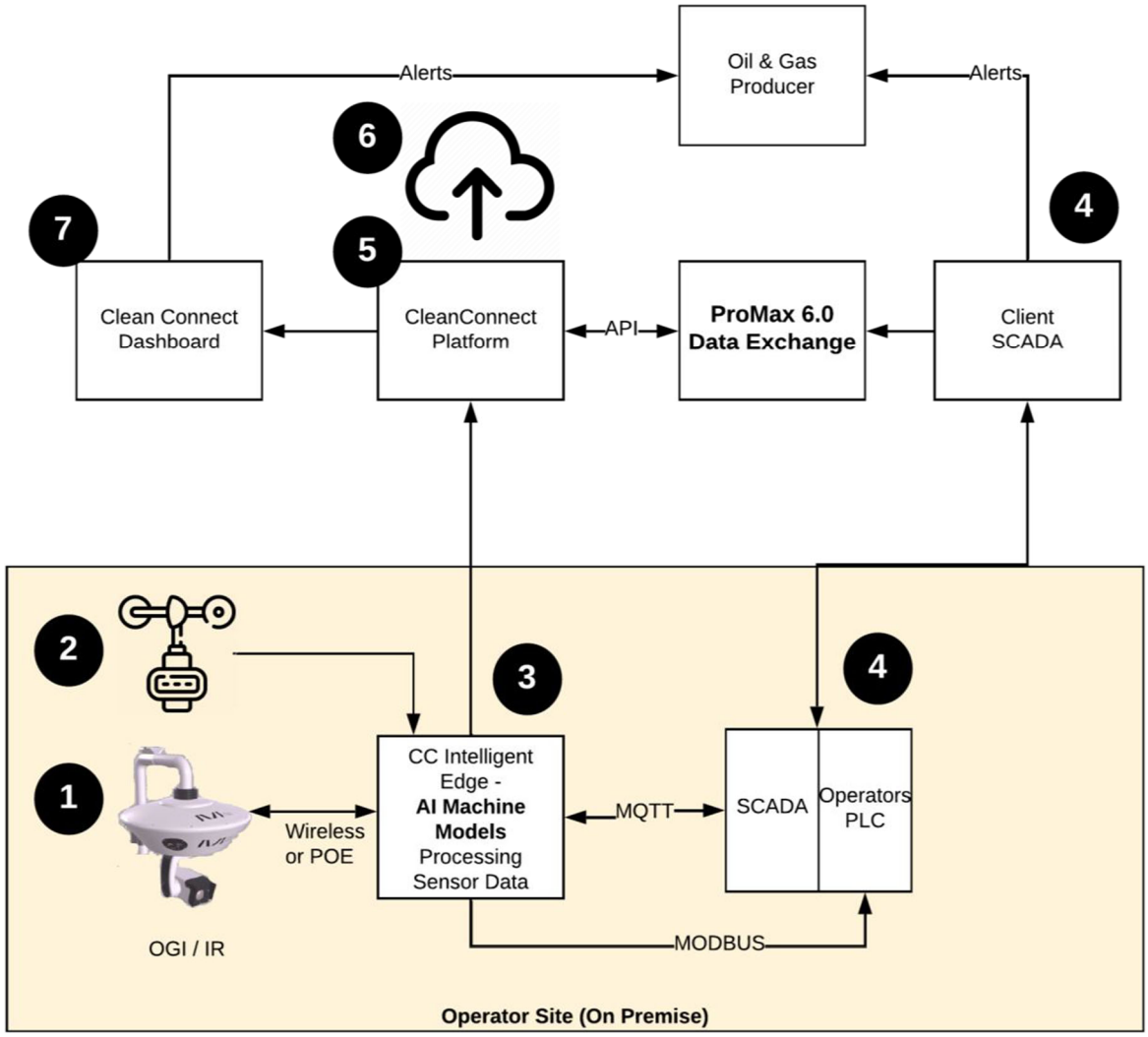


Figure 17.3: Data Flow Diagram

Appendix A: Method's Field-Validated Envelope of Operation

The following section refers to details as described in this published white paper titled "Gas Leak Paper by Korjani - Dec 2023" .

Our model employs leak identification algorithms to determine the presence of gas leaks. These algorithms calculate the probability of detected motion indicating a gas leak based on long-term and short-term background subtraction, detected motion, motion duration, equipment location, and telemetry data. To minimize false positives, we have developed image segmentation and object detection models to identify known objects, such as equipment, people, and cars, within the video footage. To train our model we collect more than 10,000 short videos from real fields and include simulated data with known rate-controlled gas release in different situations. Data consist of a wide range of weather situations including different temperature, wind speed, humidity in sunny, rainy, and snowy fields.

We validated our model by conducting experiments involving actual footage from the field. The model achieved a 98% true positive rate, and a 100% true negative rate, correctly refraining from sending an alarm for all non-releases.

Additionally, we developed a postprocessing algorithm capable of estimating the gas leak rate based on the volume of gas leaks observed in the video footage and their distance from the camera. Our experimental results demonstrate that the detected leak rates exhibit an accuracy exceeding 78%.

By employing this deep learning image processing model, natural gas extraction systems can significantly enhance their ability to detect gas leaks promptly, reducing revenue losses and mitigating environmental impact.

The following operating envelope information are highlights from the report:

A1 Weather Effects. Weather conditions play a role in the detection of gas leaks and the estimation of their rates.

A1.1 Wind speed. Table A1 includes wind speeds up to 20mph using real-world data. Wind speeds above 20mph decreases our confidence level on a probability of detection rate. Motion analysis of gas plumes may be hindered under high wind speeds which can disperse gas plumes rapidly, making detection and accurate rate estimation challenging.

A1.2 High temperatures may cause thermal interference with detection technology during the summer, and it could have negative effects even on the camera performance.

A1.3 Pressure or humidity may not play a big role compared to wind and temperature in clear weather. Obviously, detection in rain and snow may not be as good as in a clear environment.

A1.4 Precipitation. We analyzed three weather conditions (Clear, Rain and Snow) under different humidity, pressure, temperature and wind conditions.

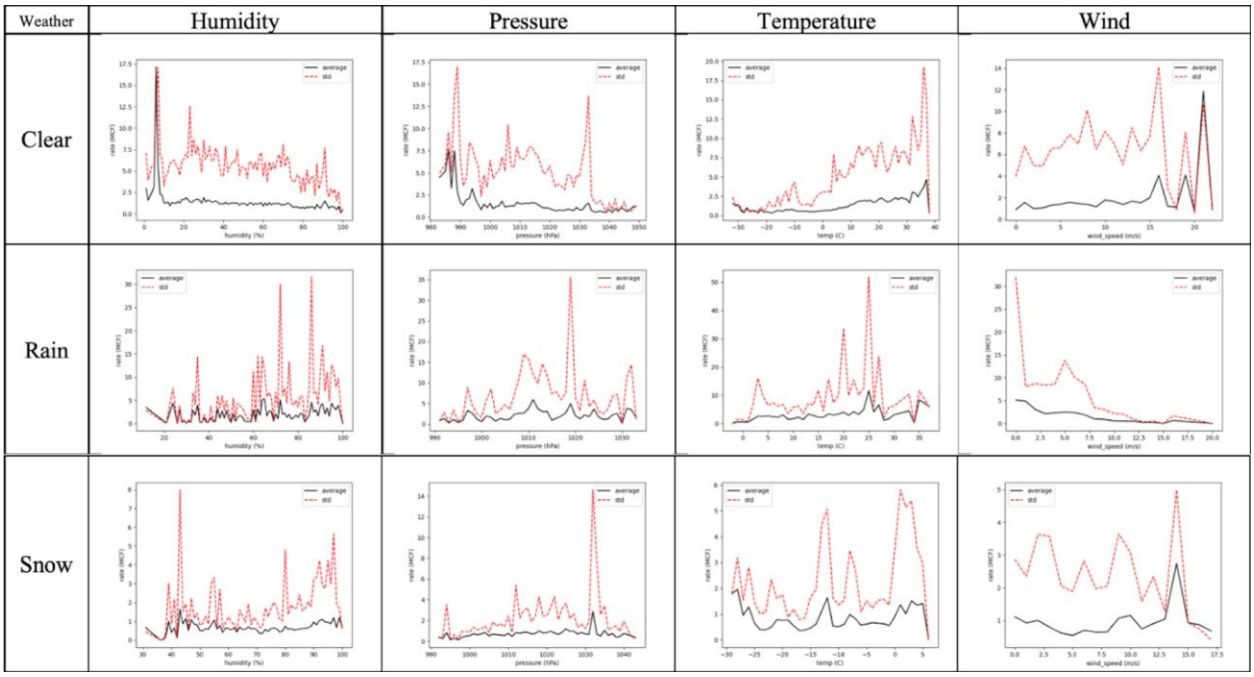


Figure A1: Effect of weather (clear, rain, snow) on rate estimation under different humidity, pressure, temperature and wind.

A2. Mitigating Weather Effects.

A2.1 Software. Our approach to considering different weather conditions is to utilize statistical models that incorporate atmospheric data to normalize the impact of weather conditions. We trained a machine learning model on top of the leak detection to estimate leak rates under various weather conditions, allowing the model to learn the patterns that correspond to leaks irrespective of the prevailing weather. Our model takes into account sensor data and compensates for the reduced visibility in adverse conditions such as rain or snow by relying more on other indicators of leaks that are less sensitive to weather, like the chemical signature captured by advanced sensors.

A2.2 Hardware. The Minerva housing system introduced significant improvements to the heating and cooling systems to minimize temperature impacts and is 3rd-party certified to -35° to +75C° (167F°). The housing is 3rd-party IP67 rated to handle wind, snow, and dust. The built-in gimbal is designed to hold the camera steady in winds up to 40mph.

Appendix B: Siting Details

This section describes the pre-install engineering, connectivity, tower location, siting, and Tour Stop configuration.

B1 Pre-Installation Engineering

The tower location placement is relative to furthest equipment must be noted. since the method has a maximum viewing distance of 120m. Any equipment that resides in a large scale building won't be covered by the system and any equipment obscured by large scale building will not be covered and subject to its own regulatorily required periodic inspection.

B1.1 Prior to installation of the physical components of the CleanConnect LeakFinder System (Minerva Platform, mounting pole if required) and commencement of periodic screening, roles and responsibilities are established. Parties with responsibilities in the proposed CleanConnect LeakFinder alternative test method are CleanConnect and the owner/Operator of the site at which the CleanConnect LeakFinder system is installed (this may be an oil and gas Operator for well production facilities, or the company that owns/operates a natural gas compressor station).

B1.1.1 QA/QC. All hardware is QC checked at CleanConnect's field headquarters prior to shipping to the customer's location. We make sure that the OGI camera is able to detect gas by doing a controlled release in our QA/QC facility following the procedure outlined in OOOOa/b/c.

B1.1.2 We also QA/QC the pan/tilt/zoom unit, communications, edge device, and other components.

B1.2 Connectivity.

B1.2.1 Ensure CleanConnect data can be uploaded to the cloud-based platform. Based on available communications, we recommend integrating with the client's communications or we specify a remote communication, like a Starlink.

B1.2.2 As they are housed in the same platform, the OGI camera and the Intelligent Edge Data Center are in constant communication while the data center uploads OGI video and Detection Event data to the cloud platform using a wired internet connection. Typically, uploads are done through a wired connection, however, ultimately it is the responsibility of the Operator to ensure the CleanConnect data can be uploaded, for example, some deployments have relied on p2p radio.

B1.3 Tower location.

B1.3.1 The CleanConnect Minerva Platform(s) is installed at an elevated position(s) around the site to be periodically screened. The setup process varies from site-to-site and is highly collaborative between CleanConnect and the Operator. It is crucial that the CleanConnect Minerva Platform is installed at an elevated position. Being able to "look down" on the equipment requiring screening from an elevated vantage point allows the system to have optimal line-of-sight on equipment regardless of wind direction (in some rare cases, due to obstructions, wind must be from a certain direction for the emission to be visible, however, the 7 day periodic screening in combination with typical methane emissions plume

dispersion provides sufficient time for favorable wind direction). Typically, CleanConnect will install a tower, the top of which is affixed with the Minerva Platform, however, existing elevated site infrastructure can be used if possible.

B1.3.2 The presence of the Minerva Platform and the elevated mounting tower installed on the site can introduce a few safety risks such Traffic obstruction, Structural Hazards, Electrical Hazards, Visibility and Operational Safety. To mitigate these risks, we build a digital twin configuration tool (See B2). The height of the Minerva system at 40-70 feet keeps it outside of C1D1 hazardous classification.

B1.3.3 Proximity to Active Flare: The OGI camera should NOT be placed within 80 feet of an active flare. The intense heat signature can cause a blackout effect in the imaging, making it difficult to inspect equipment located beyond the flare.

B1.3.4. Proximity from tanks should be a minimum of 40 feet.

B1.4. Optimal Placement: To mitigate such limitations, the digital twin software (Luminary) is used to calculate the optimal tower placement, ensuring that zones are configured to avoid interference from heat sources like active flares while maintaining effective coverage. In other words, we've made the process nearly foolproof to reduce likelihood of sub-optimal tower & camera placement.

B2 Siting Using Clean Connect's Digital Twin

B2.1 Our digital twin system allows us to set up the tower & camera location so that we can assess what equipment can and can't be monitored based on tower location

B2.2 To address the concern about non-visible components, the siting methodology in our digital twin system explicitly accounts for potential blind spots through its ''Zone Display" feature (see image 1 below).

B2.3 This feature enables the system to identify and map areas that are not visible due to obstructions or system limitations.

B2.4. We work collaboratively with the Operator to refine our tower & camera location for optimal viewing using the digital twin as a reference guide.

B2.5 As shown in the image 8.1 below, the areas that are not covered by Clean connect are clearly conveyed to the Operators so that these areas can be monitored by alternative means to demonstrate compliance with regulatory requirements. The customer must acknowledge, by digital signature, on the tower location and Tour Stops prior to the physical installation procedure.

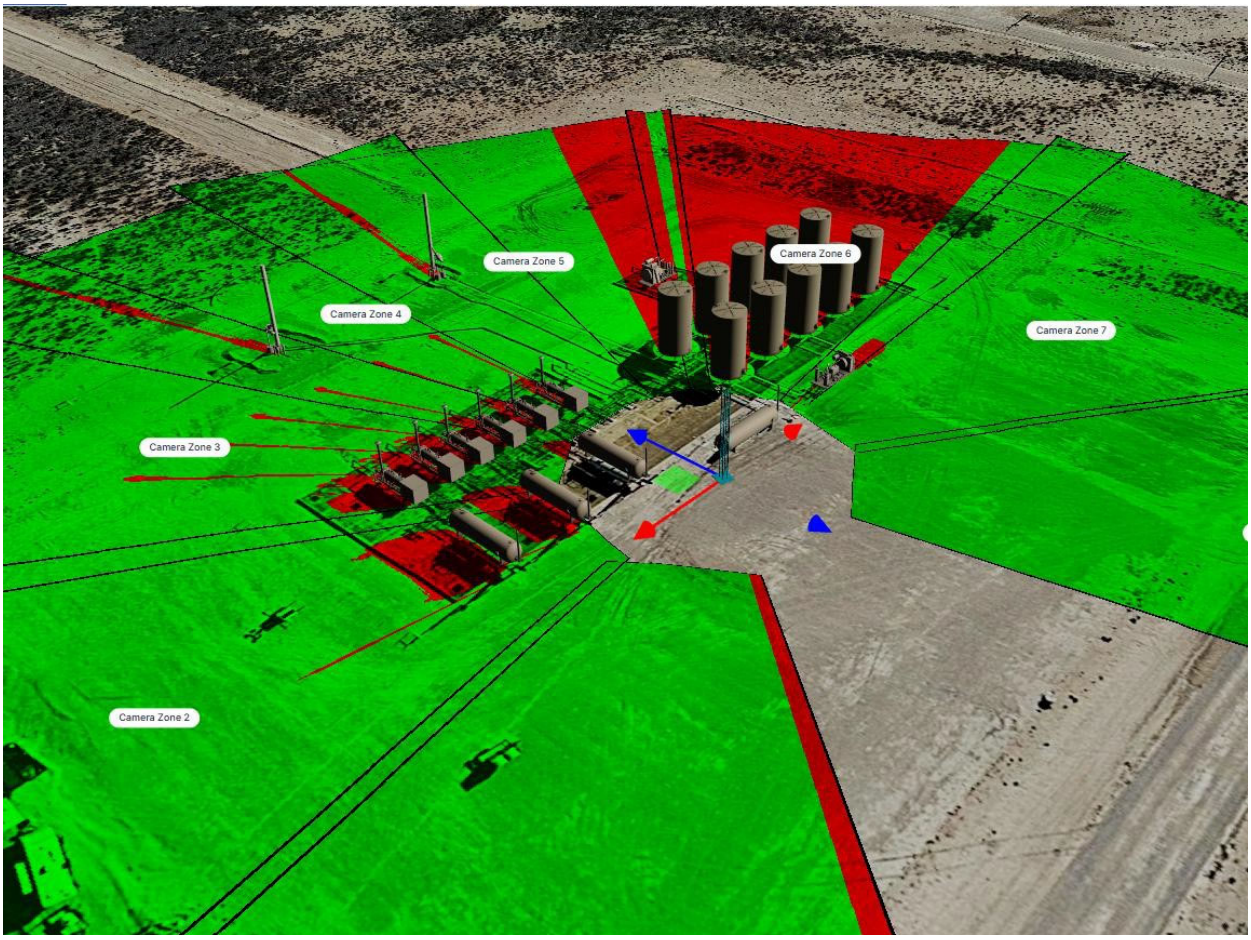


Figure B.1: Tower/camera location configuration tool (Luminary digital twin). Shows camera zones, coverage (green), blind spots (red).

B2.5 Quantity of Cameras.

B2.5.1 The number of required Minerva Platforms, and their locations, is dependent on the layout of equipment (potential line of sight obstructions) and the size of the facility being monitored. The key siting tool used during the installation process is the CleanConnect Digital Twin software. Digital Twin creates a 3D representation of the site which is to be screened by the CleanConnect LeakFinder system. Using digital twin, CleanConnect can model lines of sight of the OGI camera and choose optimal installation locations. The siting methodology in the Digital Twin system explicitly accounts for potential blind spots through the “Zone Display” feature (see image above). This feature enables the system to identify and map areas that are not visible due to obstructions or system limitations.

B2.6 In combination with the siting methodology of the Digital Twin software, CleanConnect considers the following when deciding on the number of installed devices, and their locations:

B2.6.1 Site type: The CleanConnect LeakFinder system can be used for periodic screening for leaks from fugitive components, covers and closed vent systems under 40 CFR part 60 subparts OOOOa, OOOOb and OOOOc..

B2.6.2 Number of devices and coverage: Field deployment experience has shown that most sites are effectively monitored with 1 elevated Minerva Platform. The larger the site and the more equipment requiring monitoring, the more likely additional platforms will be required. The number of stops for a given camera's Tour will also be influenced by the area requiring monitoring.

B3 Setting up OGI camera Tour Stops

B3.1 Tour Stops are created so that all unobstructed potential fugitive sources are monitored as per EPA 40 CFR Part 60. See Figure B1 above.

B3.2 Criteria used in configuring Tour Stops:

B3.2.1 Required Emission Sources: Tour Stops are strategically placed to focus on areas required to monitor for fugitive emissions.

B3.2.2 User-defined Tour Stop descriptions allows Operators to easily identify site & source location for alert & reporting purposes.

B3.3 Operational Factors: Stops are also determined by operational priorities, such as access limitations, safety constraints, and equipment that requires frequent monitoring.

B3.3.1 NOTE: Tour Stops are defined so that each component can be seen clearly in the field of view. There are no limitations on detection on the edge of the FOV boundaries.

B3.3.2 The positioning of the OGI camera is critical, and the relative distance to the equipment group being inspected determines how the zone is captured. NOTE: For each Tour Stop, the Operator can change the pan, tilt and zoom. The Minerva OGI camera has a built-in 3x optical zoom and auto-focus, which enables the Operator to see component-level objects clearly at 120m. NOTE: Minerva comes with an optional 10x optical zoom that can detect components at 400m (this option was made available after the testing data in the ATM).

B3.4. Tour Stop duration & number of Tour Stops.

B3.4.1 A Tour is defined by the number of zones that need to be captured

B3.4.2 Each Tour Stop (or zone) has a minimum duration of 2 minutes to ensure sufficient data collection.

B3.4.3 Depending on the size of the facility, the number of zones can range from as few as 2-3 stops for small sites to over 30 for larger, more complex facilities.

B3.5 How many stops occur in a 24-hour period, and how does "Thresholding" apply?

B3.5.1 To calculate the total stops in a 24-hour period:

B3.5.1.1 Multiply the number of zones per Tour by the duration of each stop (e.g., 30 zones x 2 minutes = 60 minutes per Tour).

B3.5.1.2 Then determine how many Tours can be completed in 24 hrs based on this cycle time. For example:

B3.5.1.3 If each Tour takes 60 minutes, the system can complete 24 Tours in a day. For smaller setups (3 zones x 2 minutes = 6 minutes per Tour), up to 240 Tours could be conducted in a day. Typical installations perform 20-24 Tours per day.

B3.6 Tour Stop Summary. We work collaboratively with the Operator to identify the ideal number and location of CleanConnect Minerva Platform installations as well as number and location of Tour Stops (the Operator has the ability to name Tour Stops for tracking purposes once they have been established) on a per-site basis. Collaboration is necessary as the logistics of site monitoring (number of Minerva Platforms, Minerva Platform locations, number of Tour Stops, etc.) are highly variable across different sites, and Operator expertise on their site is required. Although a collaborative process, the responsibility of ensuring all equipment and components which require monitoring are adequately monitored with the CleanConnect Leak Finder system ultimately falls to the Operator. As noted above, any equipment not covered by clean connect (i.e. in a building or structure or obscured by a large object) must meet its regulatory monitoring requirements by an alternative method.

B4.0 Installation of Minerva camera systems

B4.3 The CleanConnect.ai support team verifies the installation is powered on and communicating.

B4.4 Configuration. The Tour Stop configuration (B3) is then loaded into the camera/edge device. This validates both the connectivity and the camera is functioning properly.

B4.5 Validation of Installation. The CleanConnect.ai support team can validate the correct tower & camera placement. The support person can view the live camera viewing angles and confirm that they match the virtual camera viewing that was configured in the digital twin.

B4.6 Activate Monitoring. Once validated by the Clean Connect QA team, the monitoring system is set to live and the LeakFinder system will start monitoring the site. The camera & site also appears in the Autonomous365 Camera Network Management Console.

B5. Post Installation

B5.1 The system performs automated hardware checks every minute.

B5.2 If the system fails the automated hardware check as described in Table 9-1 of the ATM, we notify the certified installers. This frequency of camera swaps will cover any routine calibration concerns. The certified installer does a thorough inspection of system components during camera swap-outs to guarantee functionality.

B5.3 Monitoring edge computing. The system ensures that the edge device is functioning properly and has access to the cloud for proper algorithm function and record keeping. Remote management is supported, so 99% of all problems can be resolved remotely by the support staff.

B5.5 Network management. A database of all installed camera systems, the facilities they are installed at and their specific install locations is maintained at all times.

Appendix C: Site Monitoring Plan

This section refers to the site monitoring plan required when using the LeakFinder system. Please refer to Figure 17.2 The CleanConnect LeakFinder Periodic Screening Autonomous OGI Screening practice.

C1. Method deployment. This alternative method is applied at customer's oil & gas facilities throughout the US. This method outlines the procedure for using the CleanConnect LeakFinder Periodic Screening Alternative Test Method (ATM) to comply with §60.5398b (40 CFR part 60) requirements

C2. Component-Level Screening Using OGI. The CleanConnect LeakFinder system is an alternative test method (ATM) with component-level spatial resolution with direct line of sight to the emitting component and area spatial resolution without a direct line of sight to the component. The CleanConnect LeakFinder system can achieve component-level spatial resolution using the optical zoom capability of the Minerva Platform OGI camera coupled with the visual nature of the system (Operators can localize emissions down to the component level through OGI video).

C3. Continuous automated OGI surveys. This method uses automated OGI surveys, performed every 20-60 minutes. The frequency and length of surveys are dependent on the number of Tour Stops (see Appendix B: Siting for defining Tour Stops). The system operates continuously, running 24/7 and is capable of detecting maintenance activities as they occur. This functionality provides significant value to Operators, allowing them to track and log maintenance events directly into the database for future reference and analysis. This real-time visibility ensures that all activities are accurately documented, streamlining operational oversight.

C4. Screening Window. CleanConnect LeakFinder periodic screening data collection takes place during what is from here on referred to as "the Periodic Screening Window". The Periodic Screening Window is a 7-day window where the CleanConnect LeakFinder system continuously and autonomously screens all equipment, requiring monitoring at a site, for leaks.

The 7 day screening window begins on the 1st day of the periodic screening interval defined by the site type.

C5. Alert timelines. Alerts are sent to Operators within 5-minutes of the actual Detection Event. Alerts are sent via text, email, and to their Autonomous365 dashboard, which is typically monitored by a control room Operator.

C5.1 Notifies the Operator when an emission is detected (Detection Event) during the Periodic Screening Window via cellular and/or SCADA networks and the CleanConnect dashboard.

C5.2 Emission Threshold Example:

C5.2.1 If an emission goes undetected for 25 consecutive seconds during a 2-minute Tour Stop due to a line-of-sight obstruction but is detected for the remainder of the stop, the system would still meet the definition of "Threshold." This is because the system requires only 20 seconds to analyze and confirm a leak.

C5.2.2 The 25 seconds of undetected emissions do not compromise the system's ability to accurately identify the leak during the remaining observable period.

C5.2.3 With 95 seconds of visibility remaining, well above the required 20 seconds for analysis, the system can reliably detect and quantify the emission.

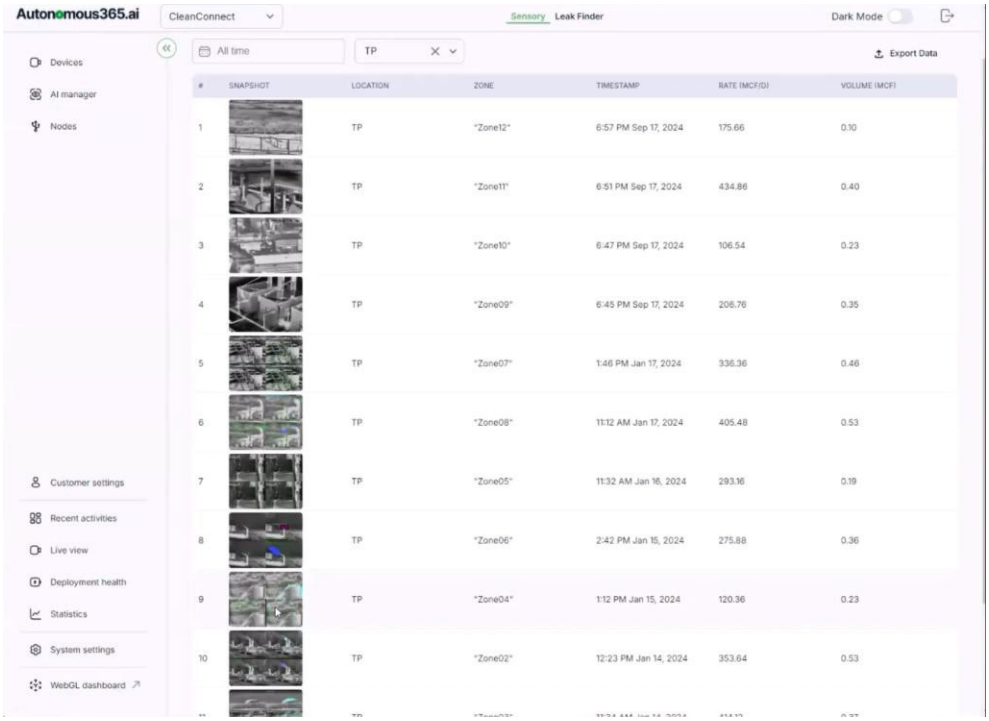


Figure C1: Autonomous365 Dashboard

C5.3 Autonomous365 Dashboard.

Alerts are sent to the Operator in near real time to the Autonomous365 dashboard for further diagnosis. The Operator can watch the video, view the metadata, and optionally, click on the Live View of the OGI camera to further diagnose the Detection Event.

C5.4 Instant replay. Within 72-hours, the Operator can review the raw OGI footage from the edge device. This may help with diagnosis of Detection Events when a video alert clip doesn't fully identify the emission source. NOTE: This feature is rarely needed. Detection Events that are sent to the Autonomous365 dashboard are kept for 5-years. (see C8 below).

C6. Classification Practice

The CleanConnect LeakFinder system is not capable of classifying Detection Events as either an allowable emission or a leak. A Trained and Qualified Operator expertise is required to perform this classification (See Appendix D: Training).

When classifying Detection Events, the Operator will begin by reviewing Existing Data. Existing data refers to the CleanConnect LeakFinder OGI footage, SCADA data if available, knowledge of known allowable process emissions or emissions from regulated sources (e.g., blowdowns), etc. Past CleanConnect LeakFinder system deployments have shown that, often, the Operator can classify the emission associated with a Detection Event with only Existing Data. Furthermore, the Clean Connect OGI footage alone is often sufficient material for an Operator to classify an emission as a leak or a known allowable emission.

If the Operator cannot classify the Detection Event using Existing Data, they will acquire Additional Data. Additional Data refers to data collected by the Operator to aid in emission event classification. This could include an investigation into activities at the facility the Operator is not immediately aware of (e.g., vacuum/pumping truck operations). This can also include the use of the Minerva Live View feature which allows the Operator to manually position the OGI camera via the CleanConnect dashboard to better diagnose the emission associated with the Detection Event.

If the Operator classifies the Detection Event as an allowed process emission, the Operator must log the Detection Event as such in either via the CleanConnect dashboard.

If the Operator classifies the detection as a leak, the leak localization process commences. If the Operator is unsure of the nature of the Detection Event, it is assumed to be a leak.

C5.2 Leak Localization

The leak localization occurs as required (if Detection Events were classified as leaks, or, the Operator was unable to ascertain the emission source of a Detection Event, during the emission classification throughout the duration of the Periodic Screening Window. The leak localization begins after the Periodic Screening Window has elapsed and after the Operator has classified a Detection Event during the screening window as a leak, or, was unable to ascertain the source of emissions. The details the localization of leaks so they can be repaired.

The Operator will use both existing and Additional Data to attempt to pinpoint the expected location of the leak. This could include the OGI video footage collected during the Periodic Screening Window, new, live footage viewed when using the Live View feature, or any other form of data available on site.

Regardless of whether an Operator cannot localize the leak such that repairs can be carried out, a close-range inspection following the procedure outlined in EPA CFR 60.5397b, and 60.5398b(b)(5)(iv) must be conducted (a handheld OGI or Method 21 survey is conducted). In addition, if an emission source which has been classified as a leak has not been repaired during the course of the Periodic Screening Window, it must be re-verified with a close range inspection following EPA CFR 60.5397b, and 60.5398b(b)(5)(iv).

C5. Repairs. Once the leak is localized, it is repaired following procedures outlined in EPA CFR 60.5397b(h). Repair verification which occurs outside the Periodic Screening Window is carried out using a handheld OGI camera. Repairs are done by the Operator either remotely or on site. If done remotely, the repair is logged and verified automatically on the next Tour Stop.

C6. Verifying Repairs. The LeakFinder system uniquely identifies leaks and has a built-in repair workflow system. This allows the system to automatically follow-up on repairs within the 7-day screening window, identify if a component is no longer leaking, and close out repair tickets.

C7. Operator Training. Control room Operators require training to interpret these events, as the system intuitively highlights maintenance activities, often through clear visual or alert mechanisms. The ease of use ensures that even new Operators can quickly recognize when maintenance is taking place, reducing the potential for misinterpretation or confusion. See Appendix D: Training for more information

C8. Recordkeeping plans and lengths. All records of Detection Events, fugitive leaks, and repairs and stored in the CleanConnect cloud system and are kept for a minimum of 5-years. The associated metadata (time, date, location, Tour Stop, and more) allow the Operator to retrieve the information as needed. We also have a natural language query system to allow quick retrieval based on metadata information.

C8.1 If a client has upgraded to our ProveZero system, we track all associated telemetry data, which allows us to associate fugitive emissions, non-fugitive emissions and calculate mass balance using ProMax 6 data exchange. This assists in generating empirical Subpart W reports.

Appendix D: Training Plan

D1. Training requirements align with regulatory standards to ensure Operators meet compliance qualifications. The Clean Connect system is designed to support regulatory compliance, and Operators are trained to adhere to these standards effectively.

D2. The CleanConnect team employs a combination of hands-on practice and verbal instruction to train Operators in leak classification. Once a control room Operator passes the proficiency exam, they become certified. The training manuals, videos are included in a customer's private portal.

D3. The training & certification process includes presenting Operators with various examples of events across all model types, including:

D3.1 Fire & Smoke

D3.2. Gas Leaks

D3.3 Liquid Leaks

D3.4 Hard Hats

D3.5 Tank Levels

D3.6 License Plate Recognition

D3.7 User Diagnostic Training. The user is trained to further diagnose detections using available metadata, SCADA data, and the use of the Live View feature (the ability for the Operator to take control of the remote pan, tilt, zoom of the OGI camera). This allows the Operator to diagnose detections at the component, area, and site level.

D4. User Proficiency Exam. Operators are then quizzed on identifying true positives, false positives, and false negatives, with the objective of improving their accuracy in identifying leaks using the user interface (UI) reports. Users are assessed by showing videos and metadata of various conditions. They are scored based on their ability to demonstrate:

D4.2.1 Determining if a leak is present

D4.2.2 Identifying leaks in video footage.

D4.2.3 Providing timestamps for when leaks occur in the video footage.

D4.2.4 Measuring the duration of leaks.

D5. Avoiding Detection Misclassifications

D5.1 Clear training requirements are essential to minimize errors or inconsistencies in leak classifications, which could otherwise affect compliance or operations decisions.

D5.1.1 To address this:

D5.1.2 Operators are exposed to multiple false-positive events, enabling them to recognize and anticipate common misdetections.

D5.1.3 Side-by-side video comparisons are conducted, highlighting the differences between true positives and false positives.

D6. Training certifications are valid for 1-year. Users must be re-trained and certified every year. Clean Connect will maintain the training certificate for each trainee.