



# Guidance for Planning and Conducting Effective Leak Detection and Repair Surveys with Optical Gas Imaging Cameras

## Key roles and responsibilities for conducting LDAR surveys

Leak Detection and Repair (LDAR) surveys require multiple team members with distinct expertise working in coordination. This factsheet provides high-level, step-by-step guidance for regulators and operators to plan and conduct LDAR surveys with Optical Gas Imaging (OGI) cameras.

The table below describes key roles and responsibilities for each stakeholder conducting LDAR surveys. Each stakeholder plays a role in each of the LDAR survey steps outlined in the next section. Each step lays out the recommended activities, key stakeholders involved, and common pitfalls in their execution.<sup>1</sup> While the exact order and details of the workflow may vary depending on facility type, regulatory jurisdiction, and site conditions, the sequence detailed in this factsheet reflects the foundational components of an effective LDAR survey. For more detailed information on each step, refer to Section 3 of [A Policymaker’s Guide to Implementing Leak Detection and Repair for Methane Mitigation](#).

	<b>LDAR surveyor:</b> Personnel trained and certified by an accredited center or third-party to operate OGI equipment and conduct the survey (i.e., a certified thermographer).
	<b>Onsite personnel:</b> Facility operators and technicians with knowledge of processes, equipment, current operating conditions, and the facility. They provide essential context to interpret detected emissions and, in turn, benefit from near real-time feedback on the condition of the assets they operate.
	<b>Compliance manager:</b> Personnel responsible for ensuring LDAR activities meet regulatory and internal requirements, and that survey results are properly documented, reported, and translated into mitigation actions.

<sup>1</sup> These are based on best practices drawn from [EPA’s Appendix K](#), [EPA’s Guidance for Conducting LDAR Surveys](#), [CATF’s experience performing OGI field surveys](#) and other reputable sources for LDAR development and implementation.

# Steps for planning and conducting LDAR surveys

- 1 Survey planning**  
 Before beginning the survey, all involved stakeholders should align on a plan to ensure the survey is conducted efficiently, safely, and in accordance with the relevant LDAR regulation.

Recommended activities	Key stakeholder(s)
Clearly define team roles and responsibilities prior to the survey.	
Review company-wide LDAR protocol.	
Conduct an opening meeting to review site-specific LDAR plan, which includes the site coverage approach, daily camera verification checks, safety considerations, weather, and operating conditions.	

Common pitfalls	How to avoid them
Lack of trained personnel.	LDAR surveyors and onsite personnel should complete a training program from an accredited center or instructor.
Limited understanding of detection technology.	Operators should fully understand the attributes, strengths, and limitations of the technology they are using.
Insufficient pre-survey planning.	Planning should include a comprehensive inventory of potential emission sources using route maps, process flow diagrams, and P&IDs.

- 2 Facility entry and site verification**  
 At the facility entrance, the LDAR inspection team should begin documenting site conditions and reviewing facility boundaries.

Recommended activities	Key stakeholder(s)
Record arrival information at the facility entrance, including facility name, date, time of arrival, and weather conditions (e.g., ambient temperature, wind speed, and sky conditions).	
For surveys that take over four hours, operators should record weather conditions every two hours. <sup>2</sup> Review the wind direction using the windsock onsite (if any) and refer to it to identify down and upwind locations, and most suitable screening vantage points.	
Take a digital photograph of the entrance.	
Review and validate facility boundaries, which are defined by physical markers like fencelines or bund walls.	
In the absence of clearly defined boundaries, the survey scope should include the main operational areas of the facility, all connected above-ground lines and equipment up to the point where pipelines go underground, and any discrepancies between the actual site layout and the LDAR route map.	




Common pitfalls	How to avoid them
Lack of prior authorization from facility operators for LDAR survey.	Engage facility operators in advance to align survey activities with operational schedules.

<sup>2</sup> U.S. EPA. (2024). Appendix K to Part 60, Title 40, section 9.6.2. <https://www.ecfr.gov/current/title-40/part-60/appendix-Appendix K to Part 60>

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### Component examination

The LDAR surveyor should thoroughly inspect each regulated component using the chosen detection technology (in this case, the OGI camera).

Recommended activities	Key stakeholder(s)
Observe each component from at least two different angles. Use a tripod for stability or telescopic lens for better visualization. <sup>3</sup> The initial screening of components should be performed using enhanced mode (or High Sensitivity Mode if available).	
<p>Spend sufficient time observing each scene.</p> <ul style="list-style-type: none"> <li>■ <b>Simple scenes (10 or fewer components):</b> Observe for at least 15-20 seconds per scene (or 2 seconds per components based on U.S. EPA requirements) before changing the angle, distance, or focus.</li> <li>■ <b>Crowded or complex scenes (more than 10 components):</b> Break the scene into smaller sections by moving closer or changing angles. Observe at least 2 seconds per component per angle, and spend more time if visibility is reduced because of factors such as flare, insulation, or vegetation.</li> </ul> <p>Adjust the viewing distance if there are environmental factors that interfere with component examination (e.g., humidity, refraction due to heat, pollen, etc.). Restart the observation time every time the OGI camera operating modes or viewing angles are changed.<sup>4</sup></p>	
Spend more time observing components as needed. Make judgments on whether to increase observation time based on OGI training. <sup>5</sup>	

Common pitfalls	How to avoid them
Dispersed gas plumes because of changing or high wind speed.	Conduct OGI surveys only within defined maximum windspeeds; postpone surveys or reduce viewing distance if winds are too high.
Inconsistent or insufficient tagging.	Use standardized lockout/tagout procedures and weatherproof, high-visibility tags with unique IDs to support safe and efficient repairs.
Inadequate surveying of components at close enough proximity.	Stabilize camera (e.g. using tripod) and adjust viewing angles to ensure all components are adequately assessed.
Unmanaged safety risks from degraded components or high-risk emissions.	Follow established safety protocols, notify onsite immediately, and suspend inspections in affected areas as needed.
Operator fatigue during surveys.	Take at least a 5-minute break every 30 minutes; <sup>6</sup> have 2 camera operators for extended surveys.

<sup>3</sup> U.S. EPA. (2024). Appendix K to Part 60, Title 40, section 9.4.1. [https://www.ecfr.gov/current/title-40/part-60/appendix-Appendix K to Part 60](https://www.ecfr.gov/current/title-40/part-60/appendix-Appendix%20K%20to%20Part%2060)

<sup>4</sup> U.S. EPA. (2024). Appendix K to Part 60, Title 40, section 9.4.6. [https://www.ecfr.gov/current/title-40/part-60/appendix-Appendix K to Part 60](https://www.ecfr.gov/current/title-40/part-60/appendix-Appendix%20K%20to%20Part%2060)








<sup>5</sup> U.S. EPA. (2024). Appendix K to Part 60, Title 40, section 9.4.5. [https://www.ecfr.gov/current/title-40/part-60/appendix-Appendix K to Part 60](https://www.ecfr.gov/current/title-40/part-60/appendix-Appendix%20K%20to%20Part%2060)

<sup>6</sup> U.S. EPA. (2024). Appendix K to Part 60, Title 40, section 9.5. [https://www.ecfr.gov/current/title-40/part-60/appendix-Appendix K to Part 60](https://www.ecfr.gov/current/title-40/part-60/appendix-Appendix%20K%20to%20Part%2060)

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#### Leak identification and documentation

Once a leak is identified during component examination, the operator must clearly document it.





Recommended activities	Key stakeholder(s)
Record the leak using the OGI camera in thermal imaging mode. The recording should last <b>at least 10 seconds</b> and clearly show the leaking component, the gas plume, and sufficient context to confirm the source of the emissions.	
Take a digital photograph or a short video clip of the leaking component. Some OGI cameras are equipped with both infrared (thermal) and visual (visible light) recording capabilities. When a leak is observed, surveyors should capture thermal and digital footage to enable maintenance teams to precisely identify leaking components within complex infrastructure.	
Log the date, time, location, and name of the leaking component in the inspection record. Record supplemental information such as operating conditions, visible damage, abnormal sounds or vibrations.	 
Not all detected emissions are classified as leaks. Abnormal or excessive venting should be classified as leaks, while intentional process or equipment venting should not be.	
Identify and document the suspected root cause of the emissions. Refer to Appendix B of <a href="#">A Policymaker's Guide to Implementing Leak Detection and Repair for Methane Mitigation</a> for more information on the type of leaks and potential root causes.	
Physically tag the leaking component where accessible and safe.	 

Common pitfalls	How to avoid them
Mischaracterization of leaks or incorrect root-cause identification.	See Appendix B of <a href="#">A Policymaker's Guide to Implementing Leak Detection and Repair for Methane Mitigation</a> for more details on the types of leaks, causes, and possible solutions.
Rushed documentation.	Verify all components are documented by backtracking before identifying the dominant source of the leak.
Poor or nonexistent data management.	Use standardized templates to document leaks and communicate information to compliance and repair teams; LDAR management software can support robust data handling and reporting.
Misclassification of designed-to-vent equipment.	Determine whether emissions are normal operations or the result of malfunctioning/hazardous equipment, and document all releases accordingly.
Failure to tag immediately repaired leaks.	Tag and report all detected leaks, even if repaired during the same visit, to enable follow-up verification.

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#### Survey continuation




Maintain survey integrity as the team moves through the facility.

Recommended activities	Key stakeholder(s)
After documenting a leak, resume the survey.	 
Explicitly record “no emissions detected” for units with no emissions detected (e.g., wells, separator units), as well as the reason for no detections (e.g.: no leaks identified, equipment or section not pressurized/not operating).	 

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**Post-survey verification**

Verify that all components listed in the LDAR route map or other site coverage approach have been surveyed.




Recommended activities	Key stakeholder(s)
Confirm that additional potential emission sources identified during the survey have been inspected and documented.	
Review inspection logs and add any missing information.	
Record relevant observations or issues.	

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**Repair**

Effective repair strategies must balance immediate action with engineering best practices to ensure a quick fix does not inadvertently create greater safety risks.

**This section is not intended to prescribe specific repair procedures, tools, or methods.** We recognize that repair methods must be determined by operators in accordance with site-specific conditions, safety protocols, and regulatory requirements. There are three potential timelines for repair, which are discussed below.

Recommended activities	Key stakeholder(s)
<b>Immediate repairs.</b> Minor leaks may be repaired onsite by trained personnel using appropriate tools; all immediate repairs must be documented, tagged, and re-surveyed.	
<b>Regularly scheduled repairs.</b> If equipment or safety conditions do not allow onsite repair, tag and document the leak and notify facility operators to initiate repairs under controlled conditions.	
<b>Deferred repairs.</b> Leaks requiring major repair, shutdowns, or unavailable parts must be documented and reported on the Delay of Repair (DOR) list with a justification and planned completion date; repair planning should begin promptly.	

Common pitfalls	How to avoid them
Unsafe, immediate repair attempts.	Do not attempt repairs without the required tools, PPE, or training; improper adjustments can escalate a minor leak into a safety incident.
Excessive delay in repair.	Use the DOR list only with clear technical justification, initiate procurement promptly, and actively track repairs to completion.
Failure to document initial repair attempts.	Record all initial repair attempts to meet regulatory timing and verification requirements.
Substandard repairs.	Makeshift fixes or non rated materials are not acceptable; repairs must meet engineering and safety standards.
Neglecting root cause analysis.	Recurrent leaks require investigation beyond tightening (e.g., vibration, thermal stress, gasket issues).
Premature tag removal.	Keep tags in place until resurvey confirms the repair is successful.

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**Re-survey to confirm repairs**

Leaking components should be re-surveyed within 15 days of their repair or according to applicable regulatory compliance requirements. A re-survey of components using the same method and protocols as the original survey is important to verify the effectiveness of corrective actions and ensure any emissions sources have been successfully mitigated. The re-survey should be conducted by the same LDAR surveyor and onsite personnel.

Common pitfalls	How to avoid them
Poor tracking of repairs and follow-up.	Effective LDAR programs require systematic tracking of repairs, resurveys, and verification; strong data management also enables benchmarking across surveys and assets.
Inadequate resurvey after repair.	Resurveys should use multiple viewing angles to confirm emissions have been fully eliminated because sources can migrate within a component after repair.

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**Data review and reporting**

Within a few days of the initial survey, the LDAR survey team should review and consolidate the survey data.

Recommended activities	Key stakeholder(s)
Review all collected survey data, including OGI footage, digital photographs, and field observations.	
Consolidate and reconcile findings. Findings should be recorded in a comprehensive LDAR report in accordance with program and regulatory requirements. For more information about reporting considerations and templates, see section 5 of <a href="#">A Policymaker’s Guide to Implementing Leak Detection and Repair for Methane Mitigation</a> .	
Ensure the same team that conducted the survey reviews and validates the data for consistency and accurate interpretation.	