Diversified Energy Company

Overview of the Proposed NSPS Appendix – K

-Dave Stucker, DEC

Appendix – K

Scope and Application

1) Appendix K covers surveys of process equipment using Optical Gas Imaging (OGI) cameras in oil and gas upstream and downstream sectors.

-Including, but not limited to, valves, flanges, connectors, pumps, compressors, open-ended lines, pressure relief devices, and seal systems.

2) This protocol is applicable to all facility types from the upstream and downstream oil and gas sectors and may apply to well heads, compressor stations, boosting stations, petroleum refineries, gas processing plants, and gasoline distribution facilities when referenced by an applicable subpart.

Appendix K Link

Appendix – K

Equipment and Supplies

An OGI camera meeting the following specifications:

The OGI camera must be capable of detecting methane emissions of 17 g/hr and butane emissions of 18.5 g/hr at a viewing distance of 2 meters, ΔT of 5◦ Celsius in an environment of calm winds (< 1 m/s)

The following items are needed for the initial performance verification:

Methane and Butane test gas, release orifice ¼ inch in diameter, Mass flow controller, industrial fan, met station, temperature-controlled background, thermocouple and readout, and device to measure distance.

Appendix – K

Initial Performance Verification & Operating Envelope

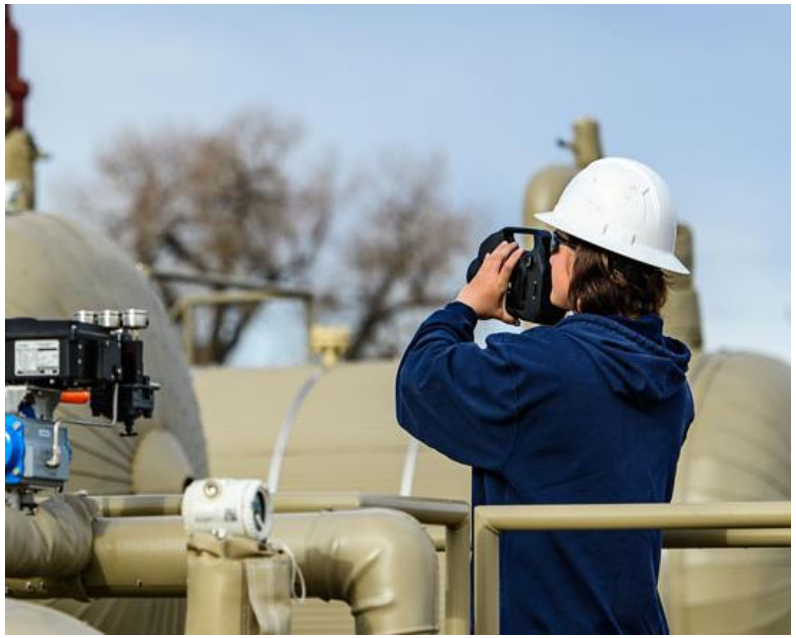
Field conditions such as the viewing distance, wind speed, air temperature, and the background temperature all have the potential to impact the ability of the OGI camera operator to detect the leak.

An operating envelope must be established for field use of the OGI camera. The operating envelope must be confirmed for all potential configurations, such as HSM, available lenses, and handheld vs tripod.

-Each possible configuration requires its own envelope; imaging must not be performed when conditions are outside of the developed operating envelope.

Appendix – K

Development of the Operating Envelope



Development of the operating envelope is to be performed using the test gas composition, flow rate, and orifice diameter described in *Equipment and Supplies;* and must include of the following variables:

ΔT regulated through the used of a temperature-controlled background, viewing distance from the camera to the component, and wind speed (controlled by an industrial fan).

Set up methane flow rate at 17 g/hr, a panel of no less than 4 observers who have been trained using the OGI camera will observe the test gas for each combination of delta-T, distance, and wind speed.

Appendix – K

Camera Operator Training

Company and/or facility is required to have a training plan which ensures and monitors the proficiency of the camera operators. The training plan should include the following:

1) Classroom portion
2) Field training on the camera and external devices
3) Monitoring techniques
4) Best Practices
5) Process knowledge
6) and other regulatory requirements related to leak detection that are relevant to the facility's monitoring efforts.

Appendix – K

QA / QC

Parameter	QA/QC Specification	Acceptance Criteria	Frequency
OGI Camera Design	Spectral bandpass range	Must overlap with major absorption peak of the compound(s) of interest.	Once prior to conducting surveys and any time the compound of interest is expected to change due to process change.
OGI Camera Design	Initial Performance verification	Methane emissions of 17 g/hr and butane emission of 18.5 g/hr	Once prior to conducting surveys.
Developing the Operating Envelope	Observation confirmation	Leak is observed by 3 out of 4 panel observers for specific conditions (wind speed, etc)	Once prior to conducting surveys and prior to using a new camera configuration.
OGI Camera Functionality	Verification Check	Meet the requirements to confirm that OGI Camera loads properly	Each monitoring day, prior to conducting a survey.

Appendix – K

QA / QC

Parameter	QA/QC Specification	Acceptance Criteria	Frequency
Camera Operator Training	Classroom training	Meet the requirements of training with issuing of a certificate of attendance.	Prior to conducting surveys, with an annual refresher, and after prolonged periods (greater than 12 months) of not performing OGI Surveys.
Camera Operator Training	Field training	Meet the requirements of training while maintaining the records of facilities visited by the trainee.	Prior to conducting surveys and after prolonged periods, greater than 12 months, of not performing OGI surveys.
OGI Camera Operator Performance	QA verification video	Record a video that is a minimum of 5 minutes long that documents the procedures the operator uses to survey.	Each monitoring day.
OGI Camera Operator Performance	Quarterly performance audits	Comparative monitoring, no missed persistent leaks over a 4-hr survey as determined by a senior OGI surveyor.	Every 3 months, with at least 1 month between consecutive audits.

Appendix – K

Recordkeeping

Company and/or facility is required maintain records for a period of 5 years. The following records are to be maintained:

1) Site Monitoring Plan
2) Initial camera performance verifications
3) Camera performance and calibrations
4) Camera operating envelope limitations
5) All data to support development of operating envelope
6) Training plan, data of completion of classroom training, date of the passed final field survey following the initial operator field training.
7) Monitoring surveys
8) Quarterly Audits