

## **Attachment A**

### **API Comments on Prepublication Draft Appendix K – Protocol for Using Optical Gas Imaging to Detect Volatile Organic Compound and Greenhouse Gas Leaks**

## **API Comments on Prepublication Draft Appendix K – Protocol for Using Optical Gas Imaging to Detect Volatile Organic Compound and Greenhouse Gas Leaks<sup>1</sup>**

### **I. General Comments on Proposed Appendix K Draft**

1. API supports use of Optical Gas Imaging (OGI) technology because of its potential to reduce equipment leak emissions at a lower cost than through use of traditional methodologies. However, significant modifications are necessary to the proposed Appendix K protocol.

API has worked diligently with EPA to integrate OGI monitoring into rules and to develop the specifics of the methodology. These comments are intended to foster a high-quality generic methodology for use at facilities with large process operations.

API believes significant modifications (as offered herein) to the proposed Appendix K are necessary before it could effectively be implemented for use across downstream oil and gas facilities or other process industries. API's recommended changes are intended to proactively address concerns that the proposed requirements:

- 1) will result in difficulty in finding and retaining, adequate numbers of qualified senior OGI operators;
- 2) that the monitoring, training and proposed QA/QC requirements are overly burdensome and will not lead to more effective leak detection; and
- 3) that the ownership of various requirements, and particularly the recordkeeping requirements, are unclear and unnecessarily burdensome.

API's recommended changes also aim to make the Appendix K requirements more straightforward and efficient.

2. Appendix K requirements, even if revised, are not appropriate for most upstream and midstream operations characterized by a great many small, geographically dispersed and often remote facilities, with a limited number of fugitive equipment components.

Appendix K as drafted is unnecessarily burdensome and ineffective for utilization in upstream production facilities, gathering and boosting compressor stations, and transmission compressor stations as discussed in the main body of API's comments on this proposal<sup>2</sup>. OGI protocols for these facilities

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<sup>1</sup> Posted at [https://www.epa.gov/system/files/documents/2021-11/40-cfr-part-60-appendix-k-proposal\\_0.pdf](https://www.epa.gov/system/files/documents/2021-11/40-cfr-part-60-appendix-k-proposal_0.pdf)

<sup>2</sup> Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review: Proposed Rule 86 *Fed. Reg.* 63110 (November 15, 2021)

should continue to be based on part 60 subpart OOOOa requirements, not Appendix K. The requirements specified in subpart OOOOa that are currently used by operators have consistently proven to be effective and are more appropriate for use in upstream applications.

Appendix K goes beyond the current subpart OOOOa requirements concerning performance specifications, operating envelope, survey time, and records for leaking components and is impractical for upstream operators to implement given the hundreds to thousands of well sites and compressor stations to monitor, the geographic dispersion of these facilities and the lack of on-site resources.

### 3. Appendix K methodology may be suitable for large, complex process operations in other industries.

A. Proposed Appendix K provides a protocol for performing OGI surveys at complex process operations, such as refineries. It is potentially applicable, with the changes we are recommending, not only for refineries and gas plants, but for many similar, complex processes. On promulgation of Appendix K, permitting authorities are likely to immediately begin requiring its use for a variety of such processes. Furthermore, if the final methodology is resource and cost efficient, many facility owners or operators will apply for approval to use OGI as an alternative to current Method 21 monitoring.

Since the proposed Appendix K clearly identifies in proposed paragraphs 6.1.1 and 6.1.2 where a particular OGI camera is sensitive enough to find leaks and rulemaking or Administrator approval would be needed to allow use of OGI for a process not covered by the current rulemaking, it seems counterproductive to include in Appendix K itself a limitation to only oil and gas source categories. Thereby preventing or delaying, others from realizing the benefits of using OGI. We provide additional specifics and our recommendations in Comment II.2.

**B. Assuming reasonable frequency and repair requirements are proposed and our suggested revisions to the proposed Appendix K are implemented, we recommend EPA proceed expeditiously to amend part 63 subpart CC (RMACT 1) to allow use of OGI technology and Appendix K as an alternative to Method 21 for refineries.** In the recent Refinery Sector Rulemaking, EPA proposed allowing for use of OGI as an alternative to Method 21, but did not finalize that proposal because “we have not yet proposed appendix K.”<sup>3</sup> Adding OGI as an alternative to RMACT 1 would significantly reduce the refinery and Agency resources associated with preparing and reviewing Alternative Method of Emission Limitation or Alternative Monitoring requests to allow OGI for those facilities and allow refineries to take advantage of the improvements inherent in Appendix K versus the currently available leak detection and repair (LDAR) Alternative Work Practice (AWP) in Part 60 Subpart A (§60.18(g), (h) and (i)).

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<sup>3</sup> 80 Fed. Reg. 75191 (December 1, 2015)

#### 4. Resource constraints could make OGI using Appendix K impractical and inefficient.

A. The proposed Appendix K protocol imposes overly burdensome monitoring, training, auditing and other QA/QC requirements that reduces the hours a camera operator can spend monitoring and extends the time it takes to qualify or requalify a camera operator. Training requirements associated with the Appendix K protocol could be reduced in API's view without sacrificing the effectiveness of emission detection efforts.

Additionally, Appendix K requires a senior OGI camera operator to train and oversee other OGI camera operators and in some cases to take videos of monitoring operations, requiring at least a senior operator for every 5-10 OGI camera operators doing actual monitoring. This is a problem for any user of Appendix K. We discuss this in more detail in paragraph B of this comment and throughout these comments.

The establishment of significant and excessive overhead by the proposed Appendix K compared to part 60 subpart OOOOa and other current OGI monitoring requirements reduces the economic advantage for moving to this alternative. OGI technology offers the potential to play a significant role in reducing methane and VOC emissions, reducing leak durations and lowering the cost of monitoring. Imposing additional overhead does not significantly increase leak detection and repair effectiveness, but does increase costs and inefficiencies.

B. A senior OGI camera operator is defined in Section 3.0 of the proposed Appendix K as a "camera operator who has conducted OGI surveys at a minimum of 500 sites over the entirety of their career, including at least 20 sites in the past 12 months, and has completed or developed the classroom, computer or on-line camera operator training as defined in Section 10.2.1."

Paragraph 10.2.2 requires a senior OGI operator to:

- conduct 10 surveys while being observed by a trainee,
- conduct 40 side -by-side surveys with each trainee,
- observe 50 surveys performed by the trainee, and
- perform a follow-up survey as a final test of a new trainee.

Thus, the senior OGI operator is tied up for the duration of trainee classroom training and for 101 surveys per trainee. Additionally, there are proposed quarterly performance audit requirements, which would require at least a day (two 4-hour surveys) of a senior OGI operator's time for each operator being audited. There will be a huge demand for senior OGI operators, and those operators will be doing training and audits rather than monitoring for leaks. While we recommend reasonable reductions in these individual duties that would still assure well-trained OGI camera operators conduct monitoring surveys, we believe the demand for senior OGI camera operators will exceed supply for the foreseeable future and will be an on-going challenge. Conceptually, our desire is to have our most experienced camera operators monitoring for leaks a significant portion of their time, not spending all their time training or auditing. That can only be accomplished if there is an adequate supply of such senior people and if those senior people have enough field monitoring time to keep their skills sharp.

We therefore recommend that, in addition to reducing the time senior operators must spend on training and auditing, the criteria for the senior OGI operator designation be revised. As we specifically address throughout these comments, we believe the functions planned for this operator category can be performed by OGI camera operators with a reasonable amount of current field experience, and such a change in the senior operator criterion will assure enough qualified people will be available to perform the necessary training and auditing functions. Furthermore, the resulting larger pool of senior operators would permit rotating personnel efficiently through monitoring, training and audit functions.

To accommodate this change, we suggest a revised definition of senior “OGI camera operator” in Comment II.6, which removes the requirement as to the career experience of the individual and converts the 20-site current experience requirement to 100 hours.

### 5. Use of drones as an OGI camera platform

Drones are currently being developed, and in some cases, being used to perform OGI monitoring. They are particularly useful and efficient for monitoring dispersed small sources (e.g., in tankfields) and elevated, hard to reach equipment. **We request that the rulemaking clarify that use of drones is allowed if Appendix K requirements are met and, as discussed in Comment II.1, by removing the limitation in Appendix K that the camera be “hand-held.”** While the type of mount needs to be considered in determining if a separate operating envelope is needed for camera configurations used with that mount, this clarification should make it clear that if operating envelope, dwell time and related requirements appropriate for a particular camera model and configuration are met it does not matter how the camera is mounted. **To affect this clarification, we recommend drones be included as an example of a camera platform in the definition of camera configuration and in proposed paragraph 8.3.**

### 6. While not appropriate for inclusion in Appendix K, fixed continuous monitors should be addressed in referencing rules where appropriate.

In some situations, continuous leak monitoring systems are justified and starting to be used instead of periodic monitoring with portable OGI cameras. As discussed in the main body of these comments, where such systems might be desirable for some situations, the referencing subpart (in this case proposed subparts OOOOb and OOOOc) should address that approach as an alternative to periodic OGI monitoring.

## II. Specific Comments and Recommendations on Appendix K

### 1. General Terminology

A. The OGI camera addressed by Appendix K is identified as a “hand-held, field portable infrared camera” throughout the proposal. Field portable cameras that are capable of being hand-held are sometimes mounted on tripods (as indicated in the draft definition of “Camera Configuration” and elsewhere in the proposal) or mounted on a drone, or are set down on a surface or mounted on a harness worn by the operator; those variants could be interpreted as not being “hand-held.” Since operating envelopes can be developed for any of these mounting approaches, we believe it is more appropriate to specify that Appendix K addresses “field portable infrared cameras,” and that it is unreasonable and adds significant inefficiency to require that the camera be hand-held. **We therefore recommend the modifier “hand-held” be deleted from Appendix K everywhere it occurs as a OGI camera descriptor.** Use of the term as an example of an OGI camera operating condition (e.g., in the definition of “Camera Configuration”) is appropriate and need not be deleted, though we suggest “drone” be added as an alternative example of a camera mount in those two cases where “hand-held” and “tripod” are identified as example camera mounts.

B. Many places in Appendix K refer to “regulated components.” But there will be locations where there are components regulated under other rules (e.g., a HON process unit located within a refinery) or by non-equipment leak portions of the referencing rule or permit (e.g., process vents) that might be within an OGI’s operating envelope. **Thus, for clarity, we recommend the term “regulated components” be changed to “equipment leak components regulated by the referencing subpart or permit.”**

C. In the petroleum operations that Appendix K would apply to under the current proposal<sup>4</sup> and in other operations it may apply to under other rules or permits, a “site” can be anything from a single piece of equipment involving a few potential leak interfaces to a refinery complex involving millions of potential leak interfaces. Thus, monitoring a “site” can take a brief time for one OGI operator (minutes or hours) or require many fulltime OGI operators and take months to complete. Because of this extreme diversity, **API recommends “site” not be the basis for any Appendix K requirements, except where the size of the site is not significant** (e.g., the requirement in Section 9.0 that each “site” have a monitoring plan). Specific suggestions for alternatives to each use of “site” in the draft Appendix K where we believe a change is needed are included below and in the redline version of the proposed Appendix K we have included with these comments.

Additionally, there are requirements assigned to the “site” that could be the responsibility of a contract monitoring organization and could apply at multiple sites. For instance, development of procedures that describe how components will be viewed with the OGI camera (paragraph 9.4) and the requirement to have a plan for avoiding camera operator fatigue (paragraph 9.5). **In these cases, we are recommending that Appendix K provide that the various requirements assigned to the site be either**

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<sup>4</sup> Ibid.

**reassigned or flexibility be provided to allow a more appropriate assignment of responsibility and to reduce unnecessary or duplicative recordkeeping requirements.**

D. “Number of surveys” performed is a proposed criterion for an operator to be a senior OGI operator, for establishing training requirements and is a criterion for other proposed requirements. Given that an individual site survey can take hours or months depending on the size and complexity of the site, basing any requirement or criterion on the “number of surveys” creates confusion and inequities. In our specific comments below, **we recommend use of hours of monitoring or, in some cases, the “number of 20-minute monitoring periods” as a more precise and easily managed substitute for “number of surveys.”**

E. In setting requirements based on “sites” or “number of surveys” there is a lack of clarity as to whether the requirements require each site to be a different site or each survey to be of a separate set of equipment. This concern would carry over if, as we recommend, the criterion is changed to a monitoring time basis. It would be burdensome and wasteful to interpret these requirements as requiring monitoring of different equipment and, in some cases, it would be infeasible to meet such an interpretation. **We recommend EPA clarify that such requirements do not require monitoring of different equipment for every survey, and we have recommended clarifying language in some of our specific comments and in our redline version of the proposed Appendix K.**

F. Initial training requirements for OGI operators is referred to as “classroom” training throughout proposed Appendix K. Most training today is done through electronic media, often through web-based on-line modules. Use of the word “classroom” could be interpreted to disallow such common training approaches and instead mandate in person classroom attendance. Such a strict limitation creates inefficiencies, is inconsistent with modern training approaches and potentially limits the rate at which new operators can be trained. **API requests the word “classroom” be deleted or revised everywhere it is used.** In some uses we believe the meaning is unchanged by this deletion, but where necessary we suggest the term “classroom, computer or on-line” be used instead.

## 2. Paragraph 1.3 Applicability Belongs in a Referencing Subpart, Not in A Test Protocol

A. Paragraph 1.3 starts “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.” Consistent with the application of Appendix K to other source categories in the near term, the precedent of leaving applicability decisions to referencing subparts and permits, and API’s belief that Appendix K is inappropriate for many of the upstream operations listed, we see no purpose for including this sentence in Appendix K. Nor does it reflect that the protocol addresses equipment leaks, as would be normal for an EPA method. **API, therefore, recommends this sentence be revised to the following: “This protocol is applicable to equipment leak components at facilities when referenced by an applicable subpart.”**

B. Paragraph 1.3 states “This protocol is not applicable to chemical plants or other facility types outside of the oil and gas upstream and downstream sectors.” **We recommend this sentence be deleted.**

Appendix K is appropriate for use for some processes in other source categories and there is no reason to preclude that here since Appendix K only becomes applicable when a referencing subpart, permit or the Administrator allows and since adequate camera capability is assured by the requirements in proposed Paragraphs 6.1.1 and 6.1.2.<sup>5</sup> and the other Appendix K requirements.

For instance, there are many Hazardous Organic NESHAP (HON) processes, including within some refineries (e.g., benzene, toluene, xylene (BTX) units), where Appendix K would be immediately useable, with appropriate approvals. There is no reason to preclude the use of OGI and Appendix K, and to forgo any potential emission reductions or efficiencies, for those HON processes where the camera has adequate capability by having this sentence present in Appendix K. Similarly, Appendix K could, with appropriate approvals, be used for Ethylene Production source category units, another type of unit often found within or adjoining a refinery. Deleting this sentence now, would save having to amend Appendix K in the near future, when the first non-oil and gas rule is proposed to allow OGI, or a regulatory authority wishes to require its use for other source categories.

While there will be processes in a chemical or other source category where OGI and Appendix K would not fit, there are many places where it does and the use of OGI in those cases should be encouraged. Assurance that Appendix K is not being misapplied can be further achieved by being specific in the referencing subpart or permit as to process chemistry that must be present to use OGI and Appendix K, or through the permit or Administrator review where it is requested to be used for sources not covered by a referencing subpart. The purpose of part 60 appendices is to provide generic methodologies that do not have to be amended each time they are referenced, and we encourage the Agency to align the Appendix K applicability section with that purpose.

### 3. Definition of “Fugitive Emission or Leak”

The proposed definition of fugitive emission or leak is “any emissions observed using OGI.” **API believes that the definition can only address emissions from equipment components identified in the referencing subpart or permit as being subject to OGI.** Those are the only emission sources that were considered in the referencing subpart rulemaking or permitting process and are the only components that the referencing subpart or permit monitoring and repair provisions address. We agree that other OGI findings must be addressed if the monitoring identifies excess emissions or unauthorized emissions, but such findings are subject to other repair and reporting requirements than those a referencing subpart or permit imposes for equipment leaks.

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<sup>5</sup> 6.1.1 The spectral range of infrared radiation measured by the OGI camera must overlap with a major absorption peak for the chemical target of interest, meaning the OGI camera must be sensitive with a response factor of at least 0.25 when compared to the response factor of propane for the majority of constituents (>75 percent) of the expected gaseous emissions composition

6.1.2 The OGI camera must be capable of detecting (or producing a detectable image of) methane emissions of 17 grams per hour (g/hr.) and butane emissions of 18.5 g/hr. at a viewing distance of 2 meters and a delta-T of 5 °Celsius (C) in an environment of calm wind conditions around 1 meter per second (m/s) or less.



We recommend the following revised definition.

***Fugitive emission or leak* means any emissions observed using optical gas imaging from any equipment component identified in the referencing subpart or permit as being subject to monitoring using this Appendix (Appendix K).**

#### 4. Definition of “Repair”

Appendix K appropriately requires that when a leak is identified by OGI monitoring, that the leaking component be clearly identified. However, Appendix K does not address repair. Repair requirements are addressed in the referencing subpart or permit, and the referencing subpart or permit may provide alternatives to adjusting or altering the leaking component, the only approach mentioned in the proposed Appendix K definition of repair. For instance, it may be possible and allowed to route the leak to a compliant control device. Additionally, the referencing subpart will have its own definition of repair and will address how it is to be demonstrated that the repair was successful. For instance, it could require remonitoring by OGI or it could require remonitoring by OGI or Method 21. **Because repair is addressed in each referencing subpart or permit and not in Appendix K, and the definition in that subpart or permit may be different from the definition proposed here, this proposed definition should be deleted.**

#### 5. Definition of “Response Factor”

The proposed definition of “response factor” is:

*Response factor* means the OGI camera’s response to a compound of interest relative to a reference compound at a concentration path-length of 10,000 part per million-meter.

Response factors can be obtained from peer reviewed articles or may be developed according to procedures approved by the Administrator.

The second sentence of this proposed response factor definition limits response factors to those obtained from peer reviewed articles or developed according to procedures approved by the Administrator. However, there are serious issues with that limitation as discussed below. We believe that the criteria in the first sentence of the proposed definition and in paragraph 6.1.1 of the proposed Appendix K are adequate to assure valid response factors. Therefore, **API recommends that the second sentence of the proposed definition be deleted.**

The first issue is that there may be different response factors for different OGI cameras as technology changes and new response factors will be needed as additional applications of OGI are made. Such commercial information is not amenable to publication in peer reviewed articles, nor could such response factors be published in a timely manner. Thus, if anything is to be peer reviewed it must be the methodology used to develop the response factors. Given the specifics in the first sentence (a path-length of 10,000 ppm-meters) and the specification in proposed paragraph 6.1.1 of propane as the reference compound, it hardly seems necessary to require any review of the response factors themselves.

Secondly, hundreds of response factors have been developed by camera manufacturers for current cameras. We are concerned that those response factors, which are currently in widespread use, might not meet the criteria in the proposed definition. While these factors may have been peer reviewed, they were not necessarily “obtained from peer reviewed articles.” Furthermore, we have no idea what procedures the Administrator might require and whether currently used factors will be found to be consistent with that yet undefined procedure.

**If the Agency believes such a limitation is needed, it should focus the limitation on the methodology for developing response factors, propose the methodology they plan to require when the final Appendix K language is proposed, provide for automatic approval after 90 days of any response factor or response factor methodology submitted to the Administrator if no action is taken within that time and grandfather response factors developed prior to the proposal of the Administrator’s methodology.**

## 6. Definition of “Senior OGI Camera Operator”

A. Some OGI camera operators are certified thermographers. The thermographic certification requirements for a Level 2 thermograph operator parallel the initial and refresher OGI training requirements that would apply under Appendix K. Thus, **we recommend that certified thermographers be considered as senior OGI camera operators and that they be exempted from the initial training requirements in proposed Paragraphs 10.1 through 10.3.**

To this end, we also recommend adding a definition of a certified thermographer as follows:

***Certified Thermographer* for the purposes of this Appendix, means a thermographer who has successfully completed the requirements for a Level 2 or higher thermography certificate compliant with ASNT-TC-1A or ISO 18436-7.**

B. Our members report confusion over the 12-month time (i.e., whether it is a calendar 12-months or a rolling 12-months) in the proposed senior OGI camera operator definition. **We recommend, as included in our recommended revised definition below, a sentence be added to the definition of senior OGI camera operator to clarify this point as follows “Previous 12-months means the 365-calendar days prior to the day of the activity requiring a senior OGI camera operator.”**

C. Per the discussion in Comment I.4.B, we recommend the proposed definition of senior OGI camera operator be replaced. We suggest the following definition:

**A senior OGI camera operator is an OGI camera operator who has performed at least 100 hours of OGI monitoring (excluding their own initial and refresher training time) in the previous 12-months and has either 1) successfully completed the initial and field training specified in Section 10 of this Appendix and has completed any required refresher training or**

**2) is a certified thermographer. Previous 12-months means the 365-calender days prior to the day of the activity requiring a senior OGI camera operator.**

As discussed in comment II.1.C, “site” is an extremely unclear and imprecise term and we are suggesting that 100 hours of recent monitoring experience (i.e., in the previous 12 months) be specified instead. More critically, we are recommending removal of any “career” experience requirement. We do not believe career experience adds significantly to an operator’s ability to train or audit others. It is recent experience with current equipment and requirements at locations of the type currently being monitored that is critical to quality training and auditing, and we believe a 12-month criterion provides that expertise. Removing the proposed career criterion will increase the availability of senior OGI camera operators as OGI programs are being instituted and the demand for senior operators is at a maximum for training purposes and will make some senior operators available for actual monitoring duty.

One hundred hours of monitoring experience is consistent with the results of the operator experience testing reported in the Appendix K Technical Support Document (TSD)<sup>6</sup>. As shown in Table 4-35 (Overall Blind Survey Results for Leaks Released at 2% Concentration) and Appendix C-3 of the TSD, there was little difference among camera operators above the novice level (<10 hours of monitoring experience). In fact, the two most experienced operators (with >300 hours of field experience and >400 hours of laboratory experience) had the worst and the best results at finding leaks, respectively. The other operators did about equally well and had experience levels at or under 100 hours and some had no field monitoring experience at all. This conclusion is supported by others. In Appendix 1 to the Optical Gas Imaging Feasibility Study Summary Report included in the Appendix K TSD<sup>7</sup>, it is reported that a Sage Environmental expert interviewed by EPA’s contractor stated, “that a trusted operator (one who has sufficient imaging experience to generate highly reliable results) has about 1 month or 100 hours of in-the-field use and experience.” Similarly, Texas has concluded that refresher training is not needed for an OGI camera operator with 100 hours in 12-months experience<sup>8</sup>, an indication that that level of experience identifies a well-qualified individual.

The work of Zimmerle, et. al.<sup>9</sup> referenced in the TSD evaluated operator experience levels using test facilities typical of upstream equipment. They concluded that “Surveyors from operators/contractors who had surveyed more than 551 sites prior to testing detected 1.7 (1.5 – 1.8) times more leaks than surveyors who had completed fewer surveys” but they also point out their “data also indicate that all surveyors have a high probability of detecting large leaks” and thus “it is unclear if total emissions (which are generally dominated by large emitters) would be highly impacted.” While there is some variability, the data reported by Zimmerle, et. al. appears to show that their 551-site finding is equivalent to 200-250 hours of monitoring. We believe any operator meeting the >100 hour/12-month criterion we recommend would already have or quickly pass the 200-250 hours of experience and that

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<sup>6</sup> Docket Document EPA-HQ-OAR-2021-0317-0079, Eastern Research Group, Technical Support Document: Optical Gas Imaging Protocol, August 2, 2021, Pages 113 and 114

<sup>7</sup> Ibid.

<sup>8</sup> See 30 TAC 115.358(h)(2).

<sup>9</sup> Zimmerle, D., Vaughn, T., Bell, C., Bennett, K., Deshmukh, P., & Thoma, E. (2020). Detection Limits of Optical Gas Imaging for Natural Gas Leak Detection in Realistic Controlled Conditions. *Environmental Science & Technology*, 54(18), 11506-11514. DOI: 10.1021/acs.est.0c01285

emission reduction effectiveness would not be seriously impacted in the interim because large leaks will be readily found by any camera operator.

Our recommended level of experience will assure the senior OGI camera operator duties are well performed and that their knowledge is current while expanding the pool of senior operators to assure an adequate supply and the availability of senior operators to perform monitoring as well as training and quality assurance functions.

**It also should be clarified that monitoring hours performed by a senior operator as a quality check of another operator or as part of operator training counts toward the 12-month senior OGI operator monitoring criterion.**

D. The proposed definition would seem to require that a senior OGI camera operator must have conducted OGI surveys at 500 different sites in their career and 20 different sites in the past 12 months. We recommend below this criterion be changed to a “hours in the previous 12-months” basis. None-the-less, many OGI camera operators, particularly those associated with a single company or facility, will not have access to many different sites or be able to monitor 100 hours at separate locations. Thus, as recommended in general in Comment II.1.E, **EPA should clarify that any field monitoring counts towards the senior operator’s site or hour’s criterion, whether at the same or separate locations, except for the senior operators own initial and refresher training hours.**

## 7. Paragraph 5.1 Site Hazards

The final sentence of this paragraph states, “It is the responsibility of the user of this protocol to establish appropriate health and safety practices and determine the applicability of regulatory limitations prior to implementing this protocol.” **This sentence is inappropriate and unnecessary and should be deleted.** Imposing health and safety requirements, even general ones such as this, is the responsibility of other Agencies.

Furthermore, it is the responsibility of all involved, not just the user of this Appendix to assure a safe and healthy operation. It is EPA’s responsibility not to incorporate unsafe requirements into this method. It is the responsibility of the site owner or operator to meet requirements applicable to the site and to establish other requirements it feels are needed. It is the responsibility of the OGI camera operator and his or her organization to meet regulatory and other requirements applicable to workers.

## 8. Section 6 Equipment and Supplies

A. **API supports the spectral range requirements in paragraph 6.1.1.** In refineries and other complex processes likely to eventually become subject to Appendix K, monitored components can contain many hydrocarbons with a range of individual response factors. It is important to making the OGI methodology feasible for these processes to balance the camera’s ability versus the range of components that may be in an emission and our limited ability to precisely characterize stream compositions. We believe the proposed paragraph accomplishes that balance and cameras meeting this specification will be widely applicable and will be able to identify emissions of these materials and thus

assure equipment leak emissions are controlled. For upstream operations there is usually a dominant hydrocarbon in the streams being monitored and, therefore, the simpler, less burdensome requirement in §60.5397a(c)(7)(i)(A) is appropriate for those operations.

B. Paragraph 6.1.2 and its subparagraphs specify a minimum camera detection limit for methane and butane and various equipment to be used in demonstrating that those minimum limits are met. Requiring this test for every individual OGI camera is unnecessary since all cameras of a particular model are the same. Some camera configuration changes, as exemplified in the definition of camera configuration can impact detectability (e.g., changes sensitivity setting or camera lens) while other will not (e.g., whether camera is hand-held or mounted on a tripod). Thus, the detection limit demonstration is only needed for each configuration that could impact the detection limit. **We recommend that paragraph 6.1.2 be clarified to indicate that this testing may be performed by the equipment manufacturer for each model camera and for each configuration where a camera configuration parameter could impact the camera detection limit and that this demonstration does not have to be performed for every individual OGI camera.**

C. It is proposed in paragraph 6.1.2 to establish the minimum camera detection limit as detection of 17g/hr. methane and 18.5 g/hr. butane at specific distance, delta T and wind conditions. This is a change from the 60g/hr. (10,000 ppm methane/propane mix) minimum detection limit established in part 60 subpart OOOOa and that is in general use today. EPA explains in the proposal that 17g/hr. is what their current modelling shows is needed from bimonthly OGI to get the same emission reduction for methane as is achieved by subpart OOOOa Method 21 requirements<sup>10</sup>. It was shown previously that the subpart OOOOa OGI requirement is also equivalent to Method 21<sup>11</sup>. Thus, there does not seem to be any reason for changing the minimum detection limit demonstration (and possibly having to replace some cameras), requiring new operating envelope determinations, and potentially requiring changing procedures and permits that already use the OOOOa requirements. **API, therefore, recommends the minimum detection limit requirement from §60.5397a(c)(7)(i)(B)<sup>12</sup> be allowed as an alternative to the proposed paragraph 6.1.2 minimum detection limit and that the operating envelope determination procedure in paragraph 8.5 be revised accordingly.**

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<sup>10</sup> Op. Cit., page 63232

<sup>11</sup> Environ. (2004). Development of Emissions Factors and/or Correlation Equations for Gas Leak Detection, and the Development of an EPA Protocol for the Use of a Gas-imaging Device as an Alternative or Supplement to Current Leak Detection and Evaluation Methods. Final Report to the Texas Council on Environmental Technology and the Texas Commission on Environmental Quality.

<sup>12</sup> Your optical gas imaging equipment 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 ≤60g/hr. from a quarter inch diameter orifice.

D. To clarify the recordkeeping requirements associated with paragraphs 6.1.1 and 6.1.2 and to eliminate what could be viewed as a requirement for large volumes of unnecessary records, **we recommend that proposed second sentence of paragraph 8.1 be relocated to section 6 as 6.1.3 and that it require paragraph 6.1.2 records to be maintained by the organization doing the demonstration (usually the camera manufacturer) and not by every site where that camera is being used. We propose:**

**6.1.3 Documents demonstrating compliance with paragraphs 6.1.1 and 6.1.2 must be retained with other OGI records by the owner or operator or testing organization, as applicable.**

E. Paragraph 6.2 specifies equipment needed to perform the minimum detection limit testing required by paragraph 6.1.2 and the operating envelopes required in Section 8. For clarity we recommend paragraph 6.2 be modified to be clear on where these requirements apply. **We recommend the following revised paragraph 6.2:**

**6.2 The following items are needed for the initial performance verification of each OGI camera model configuration, as required by paragraph 6.1.2 and Section 8:**

F. Paragraph 6.2.4 calls for use of a mass flow controller or rotameter capable of controlling the methane and butane rates within a National Institute of Standards and Technology (NIST) traceable accuracy of 5% when testing a camera's detection limit or operating envelope. NIST traceability is not specified for any other instrumentation used in these demonstrations and seems unnecessary for this use. **We recommend the requirement for NIST traceability be removed.**

G. The paragraph 6.2.6 subparagraphs specify requirements for weather stations from which data will be used for the minimum detection limit testing required by paragraph 6.1.2 and the operating envelope testing in Section 8. It specifies the weather information be obtained from a weather station within 1 mile of test location and that the weather station instrumentation meets various listed specifications. In many cases, National Weather Service stations will be the basis for this data, and the testing facility will not have ready access to the instrumentation specifications at that weather station or the ability to influence that equipment. **We therefore recommend that weather data obtained from a National Weather Service Station located within 1 mile of the test location be allowed without requiring the information specified in paragraphs 6.2.6.1 through 6.2.6.5 to be collected.**

H. Paragraph 6.2.6.4 contains a typographical error. Wind direction is measures in degrees, not degrees Celsius as indicated in the draft.

## 9. Section 7 Camera Calibration and Maintenance

Our members report their experience with OGI cameras confirms that these cameras do not require any on-going calibration or routine maintenance. Thus, **we support Section 7 as proposed.**

## 10. Section 8 Initial Performance Verification and Development of the Operating Envelope

A. Paragraph 8.1 requires a record be maintained with other OGI records that each OGI camera meets the minimum detection limit requirements in paragraph 6.1.2. As indicated in Comment II.8.B, we anticipate it will be primarily the camera manufacturer's responsibility to assure the camera meets those specifications. Furthermore, many of these cameras will be used at multiple, separate facilities owned by different entities and it would be difficult and lead to a lack of cohesion for every entity that uses the camera and must maintain OGI monitoring records to have to maintain a copy of that documentation. **API therefore recommends this requirement be revised to require that the manufacturer of the OGI camera or other entity that performs the paragraph 6.1.2 evaluations be required to maintain the records showing compliance with the minimum detection limits and that such a record not be required to be kept by the camera owner or at each location where the camera is used. Further, we recommend this recordkeeping requirement be moved to paragraph 6.1, where it better fits (See Comment II.8.D).**

### B. Operating Envelopes

a. As we discuss in Comment II.8.C, EPA's data shows equivalent performance is obtained by using the same methane/propane mix as used in part 60 subpart OOOOa for establishing camera minimum detection limits and operating windows as is obtained using methane and butane as proposed. Therefore, it is unnecessarily burdensome to require sources to change from a methane/propane mixture to methane and butane. **We therefore request that Appendix K allow use of either approach for setting operating envelope parameters (i.e., use methane/propane mix or use methane and butane).**

b. As with the requirements in paragraph 6.1.2, in most cases establishing operating envelopes per the requirements of proposed paragraphs 8.2 through 8.6 can most efficiently, and with minimum methane and butane emissions, be developed by the manufacturer for each camera model configuration that could impact the camera's capabilities. Some camera configuration variations will not impact the camera capabilities and thus will not need a separate operating envelope. For instance, it usually makes no difference if a camera is hand-held, mounted on a tripod or mounted on a drone. If the mount is appropriately located to meet the maximum monitoring distance parameter of its operating window and is stationary (e.g., drone is hovering if a drone mount is in use) the same operating envelope is applicable. While there may be cases where a different operating envelope is needed for a unique monitoring situation, that will be the exception rather than the rule. In most cases, a single or a few operating envelopes will suffice for most monitoring. The key, which is addressed in Section 9 of the proposal, is assuring all equipment components being monitored are within an established operating

envelope when they are monitored. **We, therefore, recommend that it be made clear in paragraph 8.3 that operating envelopes may be developed by the manufacturer or by others for each camera model and that separate operating envelopes are only required for camera configurations that impact the camera's ability to reliably locate leaks.**

c. **API also recommends paragraph 8.6 be revised to require that the entity that develops an operating envelope for an OGI camera model or configuration be required to maintain the records supporting that operating envelope and that not everyone that has to maintain OGI monitoring results must have those records, as the proposed paragraph 8.6 language would seem to require.** Since the users of an OGI camera need to know what operating envelopes are applicable, and the parameters for those operating envelopes, **we also recommend that the OGI camera owner or user maintain a record of the operating envelope parameters that apply for each configuration of their camera that they use.** Again, this needs to be the camera users or owners' responsibility, since many of these cameras will be used at multiple locations owned or operated by many different entities and the camera owner may not even be a facility owner or operator (e.g., a monitoring contractor).

d. Finally, it would be a clarification if the wording of paragraphs 8.3 through 8.6 be revised to indicate there may be multiple operating envelopes for a particular camera configuration. **We suggest a few specific wording revisions in the Appendix K redline included in this submission.**

## 11. Section 9 Conducting the Monitoring Survey

### A. General

a. Throughout Section 9 of the proposal the monitoring plan requirements are stated as requirements for each site. However, much of the information is not site specific (e.g., procedure for assuring operating envelope conditions are met, procedures for documenting monitoring surveys). Most of those procedures are generic for a particular camera and monitoring approach and apply to many sites, often sites with different owners. Many of the procedures in a monitoring plan will be the responsibility of the camera owner or contract monitoring firm. There is no justification for forcing every site to develop those procedures or even to have a record of the generic ones. Rather than trying to list who should be responsible for each procedure **we recommend these requirements (except for paragraph 9.7) be reworded to simply identify monitoring plan content requirements without specifying who is responsible for them.** We make specific recommendations as to maintenance of the monitoring plan records in the next comment and in our recordkeeping comments in Section 17 of these comments.

b. Section 9 of the proposal requires that each site have a monitoring plan that describes the procedures for conducting a monitoring survey. Proposed paragraph 12.2 requires the facility must maintain a record of the site monitoring plan. We comment on the specifics of recordkeeping paragraph 12.2 in Comment II.17.B, however, we believe that both the section 9 and paragraph 12.2 need to be clarified that it is not required that a copy of the plan be maintained at every site. Typically, such a plan would be developed centrally and would be available electronically as needed by the camera operators when they are monitoring that site. **We suggest the introductory sentence to section 9.0 be revised to the following.** We recommend an equivalent change in our recommended changes to paragraph 12.2.

**9.0 A monitoring plan that describes the procedures for conducting a monitoring survey at each site must be readily available to the camera operator.**



**B. API generally supports the proposed daily initial verification checks in paragraph 9.1.** In our experience these checks assure the OGI camera is functioning properly. However, we see no value in the burden imposed by paragraph 9.1.4 that requires a video record of the camera imaging a butane lighter or other validation source. It is more than adequate to simply have confirmed that the camera sees the butane lighter image as part of confirming the entire 9.1 set of requirements were met. It is overly burdensome and unnecessary to require daily video records of that determination. Storing thousands of videos, no matter how short, is difficult and there needs to be a significant justification for any such a requirement. **API recommends paragraph 9.1.4 be deleted.**

**C. Paragraph 9.3 requires a monitoring plan for each site to identify monitoring survey methodologies that ensure all regulated components are monitored.** It provides only three approaches that may be used. All three approaches are extremely complex, and the burdens imposed are often not justified versus other alternatives. We comment on some of the specifics of the three approaches next (in Comment II.11.D.b), though we believe paragraph 9.3 should be replaced in its entirety.

As was found for Part 60 Subpart OOOOa sources (as described below), we believe other approaches to those proposed for assuring all components are included are available or will be identified as thousands of monitoring programs are developed and executed and as technology improves. Use of such alternatives should be encouraged where they prove more efficient.

Limiting survey monitoring methodologies to only three is also inconsistent with the stated intent of the current proposal<sup>13</sup>. On page 63165 of the current proposal, EPA states:

The 2016 NSPS OOOOa, as originally promulgated, required that each fugitive emissions monitoring plan include a site map and a defined observation path to ensure that the OGI operator visualizes all of the components that must be monitored during each survey. The 2020 Technical Rule amended this requirement to allow the company to specify procedures that would meet this same goal of ensuring every component is monitored during each survey. While the site map and observation path are one way to achieve this, other options can also ensure monitoring, such as an inventory or narrative of the location of each fugitive emissions component. The EPA stated in the 2020 Technical Rule that “these company-defined procedures are consistent with other requirements for procedures in the monitoring plan, such as the requirement for procedures for determining the maximum viewing distance and maintaining this viewing distance during a survey.” 85 FR 57416 (September 15, 2020). Because the same monitoring device is used to monitor both methane and VOC emissions, the same company-defined procedures for ensuring each component is monitored are appropriate. Therefore, the EPA is proposing to similarly amend the monitoring plan requirements for methane and for compressor stations to allow company procedures in lieu of a sitemap and an observation path. [Underline emphasis added.]

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<sup>13</sup> Ibid.

For these reasons, **we request language based on Part 60 Subpart OOOOa §60.5397a(d)(1)<sup>14</sup> be substituted for the proposed paragraph 9.3. That language we recommend is as follows:**

**Your plan must include procedures to ensure that all equipment leak components are monitored. Example procedures include, but are not limited to, a sitemap with an observation path or GPS coordinates, a written narrative of where the fugitive emissions components are located and how they will be monitored, or an inventory of fugitive emissions components.**

D. Should the proposed paragraph 9.3 not be replaced with the language from Part 60 Subpart OOOOa or an equivalent, we have the following comments on the proposed paragraph 9.3 language.

a. The proposed three approaches are clearly intended for use at larger operations where many monitoring locations are needed and there is a large infrastructure and significant resources to allow marking monitoring locations, mapping routes and maintaining this information. Many locations subject to the current rulemaking are smaller facilities or portions of a facility (e.g., a flow meter station or a tankfield pump station) where monitoring will require one pair of observations (two views of the components) or at the most a few observations. It is unnecessary and overly burdensome to have to manage repetitive route maps, to place and maintain monitoring location markers or even identify GPS coordinates in such situations. Thus, if section 9.3 is not replaced, **we recommend an additional option be added that would apply to facilities where less than 25 monitoring observations are needed to monitor all components regulated by a referencing subpart or permit.** The term “monitoring observation” refers to each pair of camera locations<sup>15</sup> used to visualize a particular collection of equipment leak components (e.g., a piping manifold, a meter station). Under that option, the monitoring plan would allow for a description of the approach that will be used (e.g., monitor all components from two views at least 90 degrees apart) and a list of the facilities or facility locations to which this option applies.

b. For the reasons discussed in Comment II.1.C, **we recommend the word “site” in paragraph 9.3 (if maintained) be removed. We suggest the paragraph start with “Conduct monitoring using ...”**

c. **We also recommend the wording of paragraph 9.3 sentence two, if maintained, be clarified to indicate that a mix of the options is allowed if all components subject to OGI monitoring under the referencing subpart or permit are monitored.** As proposed, that sentence requires the use of the same option for an entire facility. For larger facilities and facilities with a mix of densely located components and remote collections of components, use of a mix of the options may be most efficient.

d. **In paragraph 9.3 (if maintained), we also recommend the last sentence be clarified to indicate that a component database is not required.**

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<sup>14</sup> §60.5397a(d)(1) states, “(1) If you are using optical gas imaging, your plan must include procedures to ensure that all fugitive emissions components are monitored during each survey. Example procedures include, but are not limited to, a sitemap with an observation path, a written narrative of where the fugitive emissions components are located and how they will be monitored, or an inventory of fugitive emissions components.”

<sup>15</sup> Typically, at least two different views of potential leak sources are used for OGI monitoring.

e. Given the massive number of route maps, GPS coordinates and site lists that must be recorded and maintained if this provision is not replaced, **it is critical that it be clarified that this information may be in electronic form (e.g., databases, spreadsheets) and not “included as part of the monitoring plan” as apparently required by the draft language.**

E. Paragraph 9.4 and Table 14-1 specify minimum dwell times for observations.

a. **API requests EPA explain the basis for the dwell time requirements in the formal proposal of Appendix K (i.e., the Table 14-1 entries),** so we can provide scientifically valid comments.

b. API believes that setting prescriptive dwell times is unnecessary and introduces inefficiencies and wasteful burdens. An experienced camera operator will determine dwell time based on the circumstances – some views may require an extended dwell time and other views may need shorter dwell time. **Dwell time should be an element of operator training and auditing, but not specified in Appendix K.** Dwell time is already included in paragraph 10.2.1.5 training requirements, in monitoring plan requirements and dwell time issues would become readily apparent in the final field training test and during performance audits and other quality control activities as required by paragraph 11.1. In the work of Zimmerle<sup>16</sup>, et. al. dwell times were not identified on a per component basis. However, they did report the range of times operators took to complete surveys of three different typical upstream installations, where leaks were artificially introduced. They reported the range of monitoring times as follows.

Test Site	Monitoring Time (min)
1	3-52 (mean 19)
2	1-89 (mean 18)
3	9-108 (mean 39)

With that wide range of monitoring times, it is impossible to identify minimum dwell times that do not introduce inefficiency. Unnecessarily long dwell times result in inefficient emission reductions and take time and resources away from other compliance activities with greater environmental benefits. Zimmerle’s work clearly identifies that experienced operators adjust the dwell time of an individual observation to account for environmental considerations (e.g., background) and for the type of equipment and process conditions and the likelihood of leaks. It is the ability to make these adjustments that makes the monitoring process efficient. If dwell times are not flexible, efficiency is lost, since extended time is spent looking at the many components that are not leaking or even likely to leak. Zimmerle also reported that while the number of smaller leaks identified increased with increased monitoring times, identification of larger leaks was not significantly impacted, so the mass of emissions identified was not overly sensitive to the monitoring time.

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<sup>16</sup> Ibid.

Specifying a dwell time discourages a camera operator from adjusting for prevailing conditions. Once the specified dwell time is reached there is no reason for an operator to spend additional time, even if the situation requires it.

F. Paragraph 9.5 requires that the monitoring plan address camera operator fatigue. It includes specific requirements to address this concern. Imposing specific ergonomic requirements such as proposed in this paragraph is outside the scope of an EPA method. Furthermore, the approach must be tailored to the situation. For instance, under this rulemaking most monitoring will be in short bursts with travel time between monitoring locations. Nothing specific is needed in these situations to prevent operator fatigue. In more densely populated situations relief may be needed, but the times for breaks need to be matched to the situation. For instance, arbitrarily requiring a break 5 minutes before lunch or quitting time makes no sense. Similarly, stopping a monitoring round that takes 23 minutes to complete for a break at twenty minutes (as specified in the proposal) is equally nonsensical. Additionally, 20 minutes may be too long between breaks in some situations. For instance, if the camera operator had to climb a hundred-foot tower to perform monitoring or monitor in particularly hot situations.

We do not believe there is a generic approach that would not significantly interfere with the efficient execution of this program and **we, therefore, recommend that all but the first sentence of proposed paragraph 9.5 be deleted.**

G. Paragraph 9.6 requirements apply to a “monitoring survey,” but that is an undefined and ambiguous term and the requirements do not really fit since, depending on the situation, single site or even a single process unit can take anywhere from less than an hour to many days to complete. Furthermore, we see no value for requiring weather data when monitoring moves from one process unit to another at the same location or at the end of the day. Even where there are large process units, weather does not change significantly because of location changes within a facility and end of day weather information is of no use in assuring operating envelope requirements are being met, since monitoring has concluded for the day.

**We suggest paragraphs 9.6.1 and 9.6.2 be replaced with the following to address this variability**

**9.6.1 For each monitoring day or change in facility, record the date, approximate start and stop times and the name of facility where the monitoring is performed.**

**9.6.2 At the start of each monitoring day or a change in facility, record the weather conditions, including ambient temperature, wind speed, relative humidity, and sky conditions.**

## H. Leaks

a. Paragraph 9.7 specifies documentation requirements for leaks found (video clip) and clarifies that no video record is required unless a leak is found. **API strongly supports the important clarification that individual records are not required unless a leak is identified.** Obtaining and maintaining video records is a major burden and is only justified where there is a reason, such as where a leak has been identified and a video clip or digital picture will aid in identifying the location of the leak for repair personnel.

b. Paragraph 9.7.1 requires that if a leak is identified, a video clip be taken, and the leak tagged for repair. The final sentence of the paragraph suggests the video clip is needed to allow the operator to find the leak. Since it is required that the leak be tagged, it does not seem there would be a need for a video or even a still picture to help find the leak. As indicated in the subpart OOOOa quote below, that subpart only requires tagging or an image, not both. No justification for requiring both is provided in the record.

Furthermore, there are situations where immediate repair or tagging of a leak can impose a potential safety problem and thus the absolute requirement to tag all leaks is infeasible. Safety issues occur, for instance, if the leak is in an extremely hot piece of equipment (e.g., in a furnace process outlet line), where there is no immediate safe access available (e.g., in a pipe rack, on the side of a tower), or where toxics such as hydrogen sulfide is or may be present. In these cases, a video or a digital picture could be helpful in identifying the leak location and the burdens associated with requiring such a record are justified. As we have previously discussed, any video record requirement adds burden and can be difficult to reliably meet. A digital picture, as opposed to a video, has the advantage of being much easier to store and can better show reference points that help identify the leak location when compared to video. Paragraph 60.5397a(h)(4)(ii) of part 60 subpart OOOOa requires a digital picture of leaks that are not immediately repaired or tagged, and that approach has been in successful use since September of 2015. Paragraph 60.5397a(h)(4)(ii) states:

For each repair that cannot be made during the monitoring survey when the fugitive emissions are initially found, a digital photograph must be taken of that component, or the component must be tagged during the monitoring survey when the fugitives were initially found for identification purposes and subsequent repair. The digital photograph must include the date that the photograph was taken and must clearly identify the component by location within the site (e.g., the latitude and longitude of the component or by other descriptive landmarks visible in the picture).

Thus, **we request that paragraph 9.7.1 be revised to parallel the part 60 subpart OOOOa approach, allowing either a video or a digital picture and only imposing that requirement where a leak is not immediately repaired or tagged and that only a written record of the leak information be required otherwise.**

I. Paragraph 9.7.3 requires a 5-minute per day quality assurance video for each camera operator. The paragraph specifies that the video must document the procedures the operator uses to survey (e.g., dwell times, angles, distances, backgrounds) and the camera configuration. It is unclear how such a video clip would show compliance with that list of items. For instance, dwell times, angles, distances,

backgrounds will vary for every monitoring occurrence, since they depend on the equipment being monitored, the location of the camera relative to the component locations, the background and the weather. A video does not show whether those parameters are being met. A video does not show whether all operating envelope criteria are being met, even for the situation being viewed. Furthermore, video of camera operators who know they are being videoed is unlikely to be representative. The required quarterly (or as we recommend annual) performance audits, proper training, the daily equipment startup checks and the quality assurance requirements in paragraph 11.1 provide all the appropriate quality assurance much more effectively and efficiently than this proposed video requirement. Furthermore, creating extensive video records that are difficult to reliably store, provide no useful information, and are unlikely to ever be reviewed, imposes a large and overly burdensome mandate.

We are also concerned that EPA underestimates the burden of storing video files, specifically storing the 5-minute per camera operator per day videos required in paragraph 9.7.3. There are actual examples of data storage issues associated with the requirement in MACT CC (63.670(h)(2)), which requires recordkeeping of photos taken of a flare every 15 seconds (or 2,102,400 images per year per flare). For at least one of our member companies operating several refineries, the flare images are *not* stored on the Cloud. Rather, they are saved locally on a server for several reasons, primarily for security. Refineries often have very tight Information Technology (IT) security systems because of the nature of the industry. Additionally, some member companies have experienced a loss of some of the photos because of power outages or other technical issues associated with handling the sheer volume of images. The flare images add up quickly, and the videos required by paragraph 9.7.3 will as well. For comparison, a high-definition video is 60 frames per second. Assuming 5 such videos per day for 250 days per year for a refinery then represents 22,000,000 images. The burden of saving these videos on the slight chance someone may want to review one is not justified, since, as discussed above, we do not see them providing any compliance assurance value.

**Paragraph 9.7.3 and the corresponding entry in the table in paragraph 11.3 should be deleted.**

## 12. Paragraph 10.2 Initial OGI Camera Operator Training

Paragraph 10.2.1 addresses initial “classroom” training of OGI camera operator trainees. As discussed in Comment II.1.F, it needs to be clarified throughout Appendix K that this can be computer-based training and does not have to be in-person classroom training.

Paragraph 10.2.2 addresses the required field training. It calls for a minimum of 1) 10 site surveys where the trainee is observing a senior OGI operator, 2) 40 site surveys where monitoring is performed side-by-side with a senior OGI operator, 3) 50 site surveys where a senior OGI operator observes the trainee performing monitoring and 4) a final survey where a senior OGI operator performs a follow-up survey that demonstrates the trainee did not miss any persistent leaks. There are many issues with these requirements as follows.

A. Paragraph 10.1 calls for a training plan. It includes a sentence saying, “If the facility does not perform its own OGI monitoring, the facility must ensure that the training plan for the company performing the OGI surveys adheres to this requirement.” **API recommends this sentence be deleted.** Any company contracting for OGI monitoring services has a responsibility to assure that those services meet any

applicable requirements. There is no reason a training plan is any more critical than any of the other requirements of Appendix K. Nor is it clear how individual facilities would “ensure” compliance with the training plan requirements or why each facility would have that responsibility if the monitoring contract involved many facilities. Imposing an unclear burden on every facility that does OGI monitoring using Appendix K aggregates to a large and unnecessary burden.

B. As discussed in Comment II.1.C, site is an imprecise term and could require monitoring for minutes at a location with only a few potential leak components or could require monitoring for months at a location with hundreds of thousands of potential leak components. Thus, **we recommend the word “site” be deleted from these paragraphs and these training requirements should be based on monitoring hours as discussed below.**

C. If we assume a reasonable training OGI survey as roughly 20 minutes of monitoring (EPA’s suggested monitoring duration without a break in proposed paragraph 9.5), the proposal will require over 34 hours of actual field monitoring training for the trainee and over 17 hours of one-on-one senior OGI operator monitoring time, assuming as discussed below the required observational items can be done in groups. Obviously, much more time would be required if “survey” is left undefined and thus involved more than 20 minutes of monitoring. Considering set-up, breaks, lunch, equipment relocation, etc. this will require well over a week of trainee time and half a week of senior operator time (per trainee).

In our experience, 34 hours of field monitoring training is unnecessary to assure well-trained operators. In fact, Texas has concluded only 24 hours of total initial training is necessary<sup>17</sup>. Based on that experience, the need to train large numbers of OGI camera operators initially and the likely shortage of senior OGI camera operators, **we recommend 1) field monitoring training be limited as discussed below, 2) field monitoring training require monitoring surveys of approximately 20-minutes each and 3) that it be clarified that the observational portions of the training do not have to be one-on-one.** We amplify on these recommendations in the following comments (II.12.D and E). In combination with the initial classroom or computer-based training, these recommendations would provide more than the 24-hour minimum required by Texas.

D. Paragraph 10.2.2 requires 10 surveys where the trainee observes a senior operator, 40 surveys side-by-side with a senior OGI operator and 50 surveys with a senior operator overseeing the trainee. In our experience, this is excessive, particularly the amount of side-by-side surveying. Nor as discussed below and elsewhere, will there be enough senior OGI operators to perform these functions if the requirements for reaching senior operator status are unchanged. We believe side-by-side monitoring can be done with operators meeting our suggested revised senior OGI camera operator definition with no loss in quality versus senior operators meeting the proposed definition. It is also important that the

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<sup>17</sup> §115.358(h)(1) of Title 30 of the Texas Administrative Code requires “Operator training. Any person that performs the alternative work practice in this section shall comply with the following minimum training requirements.

(1) The operator of the optical gas imaging instrument shall receive a minimum of 24 hours of initial training on the specific make and model of optical gas imaging instrument before using the instrument for the purposes of the alternative work practice.

revised language be clear that the observational training does not have to be one-to-one (see our suggestions in the Appendix K redline attached to these comments). Thus, **we recommend these requirements be revised to 10 20-minute monitoring surveys where a group of trainees observes a senior OGI camera operator, 50 20-minute monitoring surveys where a senior operator oversees a group of trainees and 5 20-minute monitoring surveys side-by-side with a qualified operator.** The proposed final survey test in proposed paragraph 10.2.2.4 (modified as discussed below) would complete the training. This would provide a total of approximately 23 hours of field experience for each trainee prior to their starting to perform monitoring surveys.

#### E. Final Field Training Test

a. Paragraph 10.2.2.4 requires a final monitoring test where the trainee conducts an OGI survey, and a senior OGI camera operator follows behind with a second camera to confirm the trainee's survey results. Consistent with our recommendation for performance audits below, **we recommend this final test be of 1-hour duration (e.g., 3 20-minute periods) to assure a sizable number of components are monitored.**

b. The criterion for passing this final test is "The trainee must achieve zero missed persistent leaks relative to the senior OGI camera operator ..." We believe the criterion of zero missed persistent leaks is unreasonable and should be revised. First, even if the follow-up survey is performed immediately after the trainee's survey, there can be changes in leak rates, interferences, etc. that occur and can cause a marginal leak to be observed in one survey and not the other. Second, a leak may occur continually through a dwell period and still not occur at another time. Thus, it is quite possible in the real world that a leak can be observed in one survey and not occur in another survey even if the other survey is just a few minutes earlier or later. These differences can occur for either survey. In the real world, it is just as likely the trainee will observe "persistent" leaks that the qualified operator does not. EPA has acknowledged this potential issue for marginal leaks even in carefully controlled situations by establishing a 75% criterion (3 out of 4) when establishing operating envelopes for an OGI camera.<sup>18</sup> As proposed, paragraph 10.2.2.4 also presumes the senior operator monitoring always observes more leaks than the trainee observes. That is unreasonable and the passing criteria must allow for either situation. For these reasons, **we recommend that the criterion for passing the final test be changed to at least 90% agreement or a difference of no more than 1 persistent leak if less than 10 persistent leaks are identified.**

c. Paragraph 10.2 is silent as to what is required if an OGI operator trainee fails the final test required by paragraph 10.2.2.4. **API recommends that if 90% agreement is not achieved, the senior operator should work with the trainee on the reasons for the failure and then the test should be repeated.** In the case of a second failure, the trainee should be required to go through the refresher level of training prescribed in paragraph 10.3 before retaking the final test. A one and done failure construct creates arbitrary barriers to developing a qualified workforce.

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<sup>18</sup> See paragraph 8.5.3 of the proposal.



### 13. Paragraph 10.3 Refresher training

A. Paragraph 10.3 requires annual refresher training for OGI operators. In our experience annual refresher training is unnecessary considering the ongoing quality assurance requirements, and the typical amount of oversight that occurs. Even in the TSD, it is recognized that refresher training is not always needed. For instance, it is stated on page 115 that “If OGI technicians are regularly sent out to the field to perform surveys, then re-validating their performance may not be necessary, but could also be as simple as having a superior repeat a survey and report on the established technician’s performance.” **We recommend the refresher training be on a three-year interval.**

B. There are many OGI monitoring programs already underway and thus there are some experienced camera operators already in place. It would be unnecessarily burdensome for them to have to go through the entire initial training program when they first must meet Appendix K requirements. They would only need to understand the specific requirements of this Appendix. Thus, **we recommend that an OGI camera operator with at least 24 hours of OGI monitoring experience in the previous 12 months, but no previous Appendix K experience, only be required to go through the refresher level of training rather than the full initial training and then pass the field training final test in paragraph 10.2.2.4.**

### 14. Paragraph 10.4 Performance Audits

A. Paragraph 10.4 requires quarterly performance audits. Our experience suggests that formal quarterly audits of camera operators are excessive. We note that other similar work practice programs, such as the Method 21 LDAR monitoring program has been successfully in service for more than 40 years without a similar audit requirement. Considering the requirements for an on-going quality control program in proposed paragraph 11.1, annual performance audits are certainly adequate. **We recommend changing this requirement to annual audits.**

Besides reducing burdens and freeing camera operators for actual monitoring activities, this change in audit frequency has the added benefit of reducing the demand on senior OGI camera operator time, thereby allowing more time for senior operators to do monitoring and training.

B. Since senior OGI camera operators will carry out any required performance audits, they will automatically frequently review monitoring requirements and have an opportunity to identify and correct any issues of their own. Such issues would be apparent as they compare results if a comparative monitoring option is used and when reviewing, either in person or via video the auditee. Thus, **API recommends senior OGI camera operators not be required to undergo performance audits.**

C. Paragraph 10.4.1 outlines a performance audit option using comparative monitoring and paragraph 10.4.2 outlines a performance audit option using video review. We comment on the specifics of those approaches in our next comment (Comment II.14.D). We support providing alternative audit

approaches, since there will be many variants in monitoring organizations, monitoring schedules, senior OGI camera operator availability, and facilities, but believe there are more than two alternatives to evaluating the performance of a camera operator. Therefore, **we recommend that the performance audit methodologies that will be used be required to be included in the monitoring plan as already implied in proposed paragraph 11.1 and that the approaches in paragraphs 10.4.1 and 10.4.2 only be cited as examples.**

Alternative approaches include visual observation by a senior OGI camera operator (as opposed to their reviewing a video) or observation by a monitoring supervisor or review of results from monitoring at a test facility, among others.

#### D. Performance Audit Procedures

a. Paragraphs 10.4.1.1 and 10.4.2.1 require audits of at least 4-hours with no persistent leaks identified by the auditor that were missed by the auditee. Four hours is an excessively lengthy period and is not needed to assess if an auditee is monitoring correctly. One-hour is more than adequate to determine if the auditee is following procedures and can identify leaks. Nor is a 4-hour requirement it a reasonable use of resources, tying up an OGI camera operator and an auditor for more than a day per audit (4-hours for the trainee monitoring and 4 hours for the follow-up senior OGI operator survey) and for video audits a third person (taking the video) for half a day. **We recommend the 4-hour requirement be changed to require audits of 1-hour total duration (i.e., 3 20-minute periods) and, as discussed in Comment II.14.A, these audits only be required annually.**

b. Paragraph 10.4.2 provides a performance audit procedure wherein a senior OGI camera operator observes the auditee by reviewing a video of that auditee performing monitoring. While that approach is useful where senior operators are not readily available, in many cases it would be easier for the senior operator to simply observe the auditee by following them around. This also eliminates the issues associated with needing an additional (i.e., third) person to take the video and of storing the video. **Thus, if this requirement is maintained, we recommend it also allow for a senior operator to simply observe the auditee and not have to record a video.**

c. For all the reasons presented in Comment II.12.E.b, **we also recommend that the criterion for passing the audit be changed to at least 90% agreement of the number of persistent leaks found or a difference of no more than 1 persistent leak if less than 10 persistent leaks are identified.**

d. **We also request EPA make clear that these audits may be performed by the OGI camera operator employer or a site owner or operator and there is no requirement for additional audits as the camera operator moves from one site to another or from employer to employer.**

e. There is a typographical error in that paragraph 10.4.2.2 is labelled as 10.4.2.3 in the draft Appendix K.

f. Paragraphs 10.4.1.2 and 10.4.2.2 specify retraining requirements for an operator that fails the audit criterion. The retraining requires a minimum of 1) 10 site surveys where the trainee is observing a senior OGI operator, 2) 5 site surveys where monitoring is performed side-by-side with a senior OGI operator, 3) 10 site surveys where a senior OGI observes the monitoring and 4) a final survey where a senior OGI operator performs a follow-up survey that demonstrates the operator in training did not miss any persistent leaks. First, as discussed in Comment II.1.C **we recommend the word “site” be deleted**

**from these paragraphs and the monitoring requirements be expressed on a time basis.** Second, we believe the retraining proposed is excessive and overly burdensome. Failures to observe a leak or to follow some aspects of the monitoring procedure are situation specific. General retraining dilutes the focus on the real problem(s) and uses up precious monitoring time and senior resources on issues that are not a problem. Therefore, we believe it is impossible to specify a retraining paradigm that is generic and resource efficient. Rather, **we believe the requirement should be to specify that retraining is required to address monitoring aspects observed to be an issue during the audit and that the auditee must then pass a new comparative audit by achieving at least 90% agreement on the number of persistent leaks or a difference of no more than 1 persistent leak if less than 10 persistent leaks are identified.**

### 15. Paragraph 10.5 Returning Operators

A. This paragraph states, “If an OGI camera operator has not conducted a monitoring survey in over 12 months, then they must repeat the initial training requirements in Section 10.2.” This is excessive for an experienced operator who has, for example, been temporarily in another job or out due to an extended sickness. Rather, **we recommend the returning operator be only required to take refresher training and to pass a performance audit. Furthermore, for clarity, we recommend this requirement be integrated into paragraph 10.3 on refresher training.**

### 16. Section 11 Quality Assurance and Quality Control

A. Consistent with our recommendation in Comment II.11.J to delete Paragraph 9.7.3, **the second sentence of paragraph 11.2 should be deleted.**

B. We have commented individually on the QA/QC requirements proposed throughout. **Paragraph 11.3 summarizes those requirements and will need to be updated to match the final version of the Appendix.** We have included recommended revisions in the redline version of Appendix K that we are submitting with these comments.

Additionally, some of the wording in the frequency column of that table is unclear as to who is responsible and how often and on what basis the QA/QC activity is required. We have suggested improved wording and addition of specific references to the paragraph containing the requirement in the redline version of Appendix K that we are submitting with these comments.

### 17. Section 12 Recordkeeping

A. As indicated in the following specific comments, “facility” is the wrong basis for requiring most records. Many of the required records will be developed by the camera manufacturer. Others should be housed in owning or operating company central repositories because it is more efficient and because some sites potentially subject to these requirements are not continuously staffed and have no onsite recordkeeping facilities. Training and other operator records should be handled by the camera operator’s employer, often not the owner/operator of any facility being monitored. Nor would it be

manageable or sensible to require copies of these various records to be made for each of the facilities that will be subject to monitoring. **Thus, as suggested more specifically below, we recommend the word “facility” be deleted from this section and the appropriate entity (e.g., camera owner, facility owner or operator, camera operator employer) be substituted or no specific entity be identified as having to maintain the record.** Consistent with this change, **the general recordkeeping requirement in paragraph 12.1 should be generalized to “Records required by this Appendix must be kept for a period of five years, unless otherwise specified in an applicable subpart.”**

B. Paragraph 12.2 says, “The facility must maintain the following records in a manner that is easily accessible to all OGI camera operators:” However, except for paragraph 12.2.1 (the site monitoring plan) and 12.2.4 (operating envelope limits) the other listed records are associated with the camera, and many cameras will be used at multiple facilities and may not be owned by the facility or even the facility owner. In fact, it can be anticipated that many cameras will be owned by a monitoring company. Even in the case of the site monitoring plan, as we discussed in Comment II.11.A, much of the content of that plan will be the responsibility of the camera owner. While a facility owner or operator will have significant input relative to monitoring routes and safety issues, the camera owner or monitoring contractor is the appropriate owner of this plan it would be their responsibility to see that their camera operators have ready access to the plan, not the responsibility of the facility owner unless the monitoring personnel are in-house. **Thus, “facility” should be deleted from the paragraph 12.2 wording, and it should be rephrased to say, “The following records must be maintained, as applicable” and a sentence added to require that operating envelope limits and applicable site monitoring plans be readily accessible to camera operator.**

C. Paragraphs 12.3 requires records of data supporting development of the operating envelope. We anticipate most, though not all, operating envelope development will be done by the camera manufacturer and thus **paragraph 12.3 should require operating envelope supporting data to be maintained by the developer of the operating envelope.**

D. Paragraph 12.4 contains requirements applicable to camera operators. These records are the purview of the operator’s employer and not , in most cases, individual facilities or even operating companies. **Paragraph 12.4 should be clarified to require these records to be maintained by the camera operator’s employer or facility owner or operator as applicable.**

E. Paragraph 12.4.3 appears to require records of operator training activities, but starts by requiring “The number and date of all surveys performed ...” Records of actual monitoring surveys need to be maintained by the owner or operator of the site monitored and are covered by paragraph 12.5. Thus, this introductory phrase in paragraph 12.4.3 needs to be limited to surveys associated with training. If some of those training surveys are performed to locate leaks, records will need to be maintained with the training records required by paragraph 12.4.3 and, also, with monitoring records as required by paragraph 12.5. **We therefore recommend the introductory phrase in paragraph 12.4.3 be revised to “The number and date of all training surveys performed ...”**

F. Paragraph 12.5 deals with monitoring records and requires that the listed records be available to the technicians' executing repairs. Yet, most items are not associated with repairs or locating the leak and it is overly burdensome to require that they be made available, particularly if the monitoring is not being performed by an employee of the site being monitored. **Therefore, we recommend only proposed paragraph 12.5.6 be required to be available to the repair technicians.**