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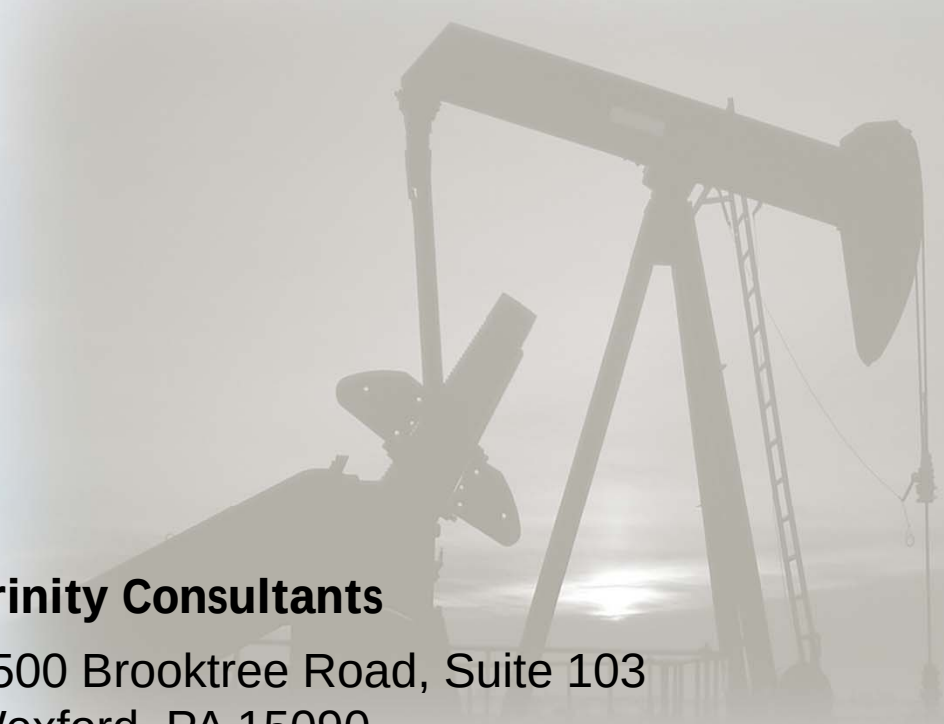
The 'Components' of Successful Optical Gas Imaging (OGI) Programs in PA



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PIOGA Technical Conference
Seven Springs Mountain Resort
Sunburst Meeting Room

Trinity Consultants

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Disclaimer

- Air quality regulations are a dynamic field – things we cover today may (will) change
- Our understanding of issues covered today may (will) evolve

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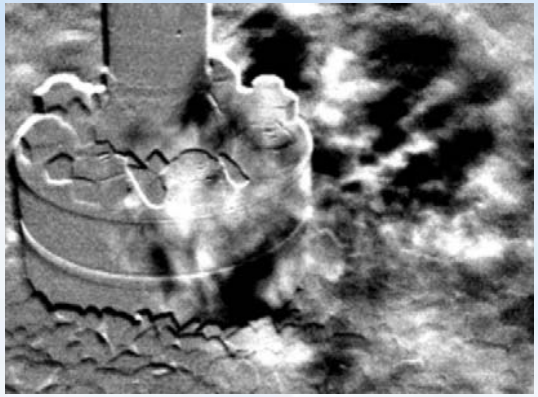
What is Optical Gas Imaging (OGI)?

- "Optical Gas Imaging (OGI) cameras use spectral wavelength filtering and sterling cooler cold filtering technology to visualize the infrared absorption of VOC/Hydrocarbon, SF6, refrigerants, Carbon Monoxide and other gases whose spectral absorption matches the response of the camera." (FLIR)

FLIR GF320 OGI camera:
http://www.flir.com/ogi/content/?id=66693



Opgal EyeCGas OGI camera:
http://www.opgal.com/INDUSTRIAL/IndustrialProducts/GasImagingCamera.aspx

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Implementation

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Building the Base

Questions to ask:

- What regulation(s) apply?
- What equipment is subject?
- What is the frequency of inspection?
- What is a leak?
- What is a repair and the timelines for completing the repair?
- What documentation is required?

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What Regulations Require OGI Cameras in PA?

- NSPS OOOOa
  - Federal-level regulation for oil & gas facilities
  - Requires OGI (or Method 21)
- PADEP Exemption 38
  - State-level conditional exemption for nat. gas production facilities
  - Requires OGI (or other as approved)
- PADEP GP-5
  - State-level permit for gas gathering/process. facilities
  - Requires OGI and AVO
- Plan Approvals (case-by-case)
  - State-level requirement for natural gas facilities
  - Typically requires OGI

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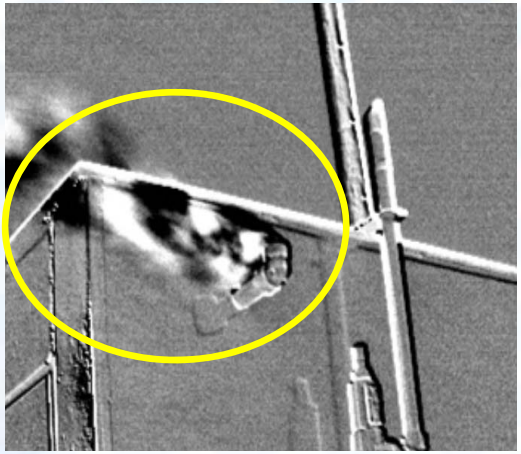
Subject Equipment – Exemption 38

- Wellpads where start of flowback of a well or equipment installation occurred after 8/10/2013
- Components: valves, flanges, connectors, storage vessels/storage tanks and compressor seals in natural gas or hydrocarbon liquids service
- Devices/equipment that vent as part of normal operations are not fugitive emissions components.



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Subject Equipment – GP-5

- Compressor Stations/Processing Plants permitted under GP-5 after 2/1/2013
- Components: all at facility
- Devices/equipment that vent as part of normal operations are not fugitive emissions components.

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Subject Equipment - NSPS OOOOa

- Wellpads* ('well sites')
  - New: construction comm. after 9/18/2015
  - Modified: new well is drilled or existing well is frac'd/refract'd after 9/18/2015.

*A Well Site with only wellheads is not affected.

*Off-pad tank batteries may be included.

- Gathering & Transmission Stations
  - New: construction comm. after 9/18/2015
  - Modified: additional compressor is installed at existing station, or replacement with gain in total station horsepower after 9/18/2015

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Subject Equipment - NSPS OOOOa

- ‘Fugitive emissions component’ is defined broadly in OOOOa with specific examples
  - The definition includes components beyond what is typically included in an LDAR program (ex. meters, instruments, etc.)
- Devices that vent as part of normal operations are not fugitive emissions components.

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Inspection Frequency – Exemption 38

- Annually
  - May change with wellpad GP…
- Initial within 60 days of start of production

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Inspection Frequency – GP-5

- OGI Inspections – quarterly
- Conduct initial OGI leak survey within 180 days of startup
- AVO Inspections – monthly
- Conduct initial AVO survey within 30 days of commencement of source operation

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Inspection Frequency - OOOOa

- Well Sites – semi-annually
- Compressor Stations – quarterly*
- **Conduct initial leak survey within 60 days of startup/modification, or by June 3, 2017 (whichever is later).**

*Allowed to skip one event per year based on extreme winter temperatures, but unlikely to be applicable in lower 48

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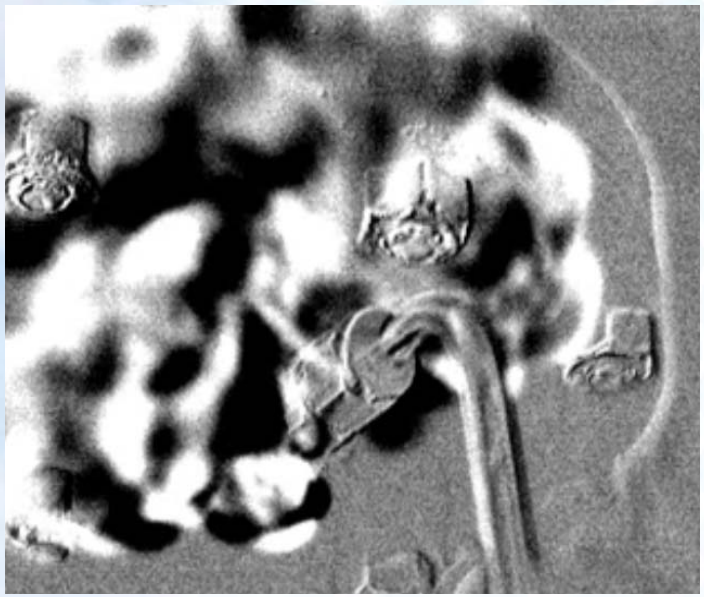
Leak definitions

- Exemption 38 & GP-5
  - Any release of gaseous hydrocarbons detected by a FLIR camera
  - Excludes releases for equipment protection or personnel safety
- OOOOa
  - Any visible emission from a component using OGI
  - Excludes vent stacks and permitted emissions sources



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Repairs – Exemption 38

- Repair within 15 days of detection
  - Unless facility shutdowns or ordering of replacement parts are necessary for repair of the leaks
  - DEP likely expects a request for delay of repair components
- No visible leak image when using an optical gas imaging camera
  - Bubble test may be used to confirm repairs

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Repairs – GP-5

- Repair within 15 days of detection
  - Unless invoking delay of repair under Subpart VV
  - DEP likely expects a request for delay of repair components
- Equipment is adjusted or otherwise altered to eliminate a leak so that the leak can no longer be detected.
  - Bubble test may be used to confirm repairs

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Repairs - OOOOa

- Repair leaks within 30 days
- Exceptions for repairs that would require blowdown/shutdown/shut-in and others
- EPA *seems* to indicate that you can re-survey within 30 days of repair using Method 21/OGI, but this does not line up with the 'repair' definition in 60.5397a(h)(3)(iv)(A):
  - "A fugitive emissions component is repaired when the optical gas imaging instrument shows no indication of visible emissions."
- EPA also seems to expect that if using bubble test, must re-survey immediately after attempt

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Documentation – Ex. 38 & GP-5

- Recordkeeping requirements:
  - Still image of leak from FLIR camera inspection with component name, ID and printed date.
  - Still image of repaired leak with printed date
  - Records of inspections
  - Retain for 5 years

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Documentation - OOOOa

- LDAR Monitoring Plan
  - Must cover well sites and compressor stations within each company-defined area (CDA)
  - At least two practical pieces:
    - Overall "Plan" (one per CDA)
    - Site "Plan" (part of overall plan)
  - **A well organized plan is intended to be a "how-to" book for those conducting surveys.**

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Documentation - OOOOa

- LDAR Monitoring Plan
  - Frequency/method of surveys/equipment details
  - Survey procedures
    - Including the 'big three'…
  - Procedures/timeframes for repairs
  - Training/experience requirements
  - 'Initial Verification' documentation

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Documentation - OOOOa

- LDAR Monitoring Plan
  - Sitemap
  - Defined 'observation path'
    - EPA indicates it can be simple, but does that cover the requirements? (must account for all fugitives and interferences)
  - Site's DTM & UTM components
    - Identification/location/explanation
    - Schedule for monitoring (requirements in rule)

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Documentation – OOOOa

Wellpad Observation Path – Good Enough?

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Compliance Considerations & Preparation

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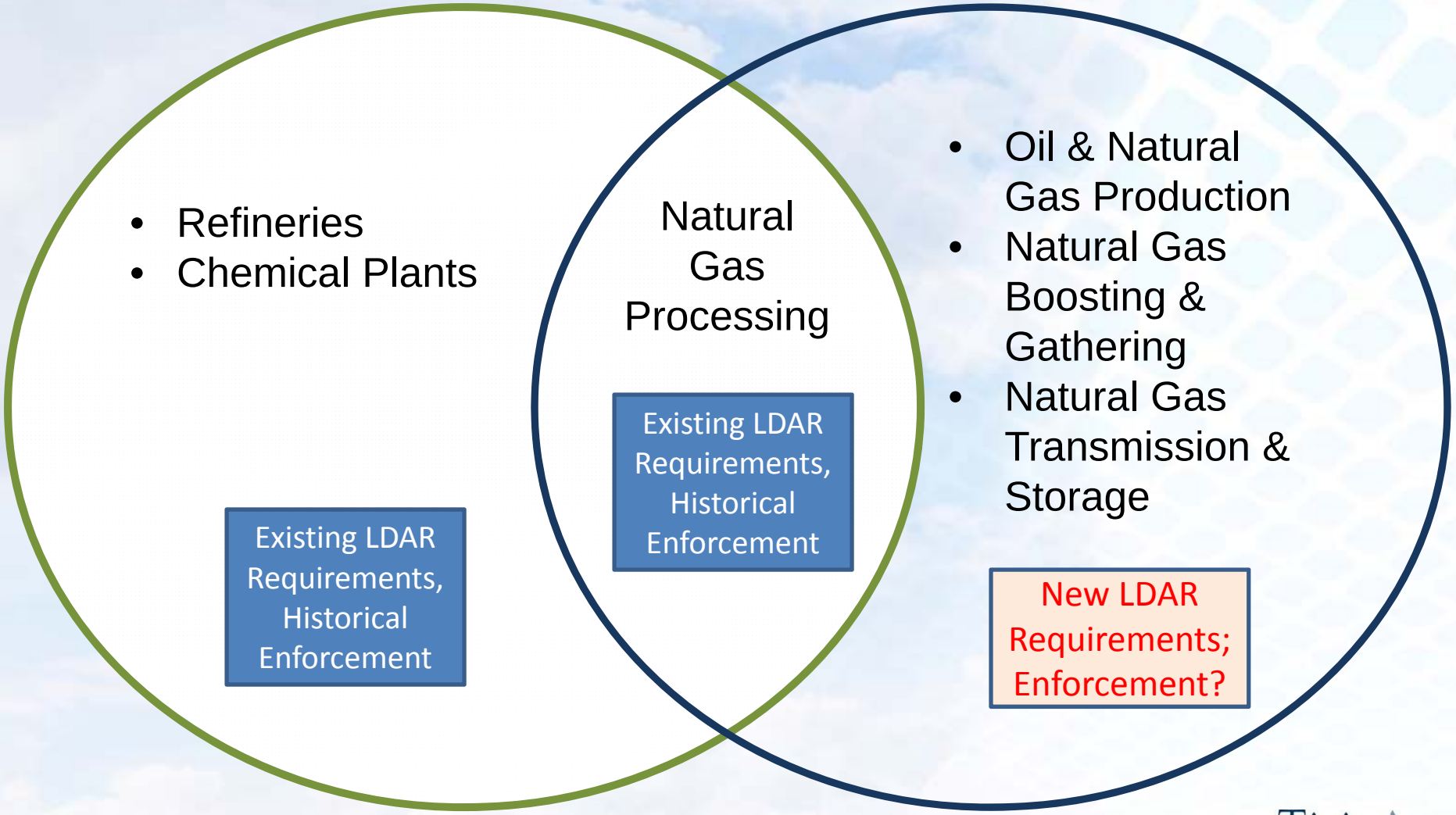
LDAR: New Requirements, Historical Enforcement



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Moving Forward

- A strong foundation of LDAR Program Development
  - Ensures that surveys are conducted in accordance with the rules
  - Saves on costs associated with unnecessary repairs, deviations, and enforcement.
  - Data management may be significant.

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Moving Forward

- Following the basic rule requirements may not be enough
- 100% compliance will be expected, but rule does not always specify how to document (i.e., demonstrate)
  - Photo of survey is required, but not of the component before or **after** repair
- "Plans do not need to be submitted, but provided upon request…"
  - In other words: years of potential issues for EPA to discover

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Moving Forward

- Overlap of federal and (ever-changing) state regulations*
  - Survey frequency
  - Monitored components
  - Varying repair timeframes
  - Delay of repair allowances are different
  - PA's Methane Reduction Strategy

*When developing OOOOa Monitoring Plan, consider ways to develop a program that meets **all state and federal requirements**

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Areas of Consideration

- Surveyors:
  - Internal vs. contractor?
  - Certification – will this be required (if available)?
  - Qualifications – do they know what to look at, and just as important, what NOT to look at?
  - Training procedures?
- How will surveys be performed?
  - Tagging?
  - Evidence of leaks?
  - Evidence of repair?

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Areas of Consideration

- How will you manage the recordkeeping?
  - If you outsource surveys, will the contractor handle all of this (what about reporting?)
- Who will be performing repairs?
  - Will they re-survey using the bubble test (and document correctly)?
- Safety procedures for surveys? Cameras have different safety features (i.e. is yours intrinsically safe?).
- How often will those surveys, procedures and documentation be reviewed?

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OOOOa - Six Things To Do Before the LDAR Deadline

1. Determine “company defined areas”
2. Document/develop survey procedures
    1. LDAR Plan
    2. Field documentation
    3. File storage procedures
3. Conduct ‘pilot’ program of surveys
4. Update documentation and survey procedures based on lessons learned

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OOOOa - Six Things To Do Before the LDAR Deadline

5. Train personnel or 3rd party on survey procedures (EPA expects certification for surveyors)
6. Complete first surveys at all affected sites no later than **June 3, 2017**

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Questions?

Additional Questions

- LDAR Program Development
- LDAR Program Audits
- Gap Analyses
- Training
- Impact Analyses
- Data Management

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