Advances in hydraulic fracturing and horizontal drilling have opened new areas for oil and gas development. Growth is regional, unevenly distributed across the U.S., and in close proximity to large populations in some areas. Natural gas is an important cleaner burning “bridge fuel” that must be extracted and produced in a manner that protects communities and the environment, and complies with applicable laws.
• In March 2010, EPA announced a new enforcement initiative for energy extraction.
• Initiative renewed for FY 14-16 cycle.
• Requested comment on whether to renew for the FY 17-19 cycle.
• Focus is onshore natural gas extraction and production.
• Target efforts based on potential non-compliance.
• Increased field presence.
• Utilize advanced air monitoring technologies to facilitate compliance evaluations.
• Encourage corporate-wide assessments and corrective actions where appropriate.
• Promote Best Management Practices.
Air emissions from shale gas exploration and production threaten ambient air quality.

– Air emissions can be released during all stages of production.
– Primary pollutants of concern are volatile organic compounds (VOCs, e.g., propane, butane, xylene, benzene, toluene).
– Ozone non-attainment areas – e.g., Denver, Western PA.
– Between 2000 and 2013 approx. 9.4 million people lived within one mile of a hydraulically fractured well.
– Approx. 487,000 active natural gas wells
Science First:
What is Actually Happening
Available Tools Influence

Enforcement Approach: IR Cameras

- Enables inspectors, citizens, judges and operators to see the emissions.
- Great for finding leaks in difficult to monitor sources or unexpected areas.
- Devices have been provided or made available to all EPA Regional Offices.
- Increasing numbers of states and operators also using IR cameras.
Photoionization Detectors

- Hand held detectors
  - Sensitive to 1 ppb
  - Measured concentrations are real-time
  - General VOCs, or benzene or butadiene-specific
- Alert inspectors to presence of...
  - Emissions from storage tanks, wastewater, etc
  - Equipment leaks
- For LDAR, PIDs can detect process equipment leaks tens of feet away for further identification using FLIR cameras
Off-site assessment with GMAP-REQ (EPA has it.)

(Geospatial Measurement of Air Pollution – Remote Emissions Quantification)

- Drive-by Mapping
- Position vehicle in the plume
- Acquire CH$_4$ and wind data for 20 minutes
- Pull a 30 second canister sample for VOC information

Spike in CH$_4$ indicates emission
GMAP REQ measurement equipment

In the truck:
High-precision CH$_4$ and BTEX instruments, batteries, control system, IR camera, rangefinder

Auto-north met station (all in one weather station)

(Open tubes) Quad Sampling Port

3D (measuring the wind in 3D – have to have the up and down for the emissions rate) sonic anemometer

High-res GPS

1.4 liter canister placement
Diffusion Tube
DUVAS

Diagram showing the components of a DUVAS system, including the receiver, monitoring path, light source/emitter, electronics, computer, monitoring data, grating, detector, and spectrometer.
Apply Law and Common Sense
CAA Legal Authorities

• NSPS, especially Subpart OOOO
• NESHAP/MACT
• NSR/PSD
• SIP
• FIP
• Permit Requirements
• Section 303 – Imminent and Substantial Endangerment
• Section 112(r) – General Duty Clause
A Recent Enforcement Settlement – Region 8

- Entered in June 2015.
- Resolved claims that the company failed to adequately design, size, operate, and maintain vapor control systems on its controlled condensate storage tanks -- emissions of VOCs.
- Covers all of the company’s *controlled* condensate storage tanks in the Denver 8-hour ozone marginal nonattainment area that have vapor control systems operating pursuant to the Colorado SIP.
  - More than 3,400 tank batteries, which are multiple storage tanks located together.
- The company will spend an estimated $60 million on system upgrades, monitoring, and inspections.
- $4.5 million to fund environmental mitigation projects.
- $4 million on Supplemental Environmental Projects.
- $4.95 million civil penalty.
Recent Enforcement Settlement – Region 8

**Injunctive Relief**

- Engineering evaluations to ensure vapor control systems are properly designed/controlled.
- Company must make necessary modifications to ensure systems are properly designed/controlled following the engineering evaluations.
- Infrared camera inspections to ensure the vapor control systems are controlling emissions as expected.
- Inspection/preventative maintenance program.
- Third-party auditor will review the engineering evaluations and will also perform infrared camera inspections.
- Evaluation of the pressure relief valves and thief hatches on each condensate storage tank and address any evidence of VOC emissions.
- Install pressure monitors with continuous data reporting on a cross-section of the tank systems.
It’s Not All About Enforcement

It’s Also About Communication
EPA and state investigations identified CAA compliance concerns regarding significant emissions from storage vessels, such as tanks or containers, at onshore oil and natural gas production facilities.

The Alert discusses certain engineering and maintenance practices that may address compliance concerns and reduce emissions.

To read the Alert, go to: [http://www2.epa.gov/enforcement/compliance-alert-epa-observes-emissions-controlled-storage-vessels-onshore-oil-and](http://www2.epa.gov/enforcement/compliance-alert-epa-observes-emissions-controlled-storage-vessels-onshore-oil-and).

Wide distribution:
- Interstate Oil and Gas Compact Commission (IOGCC); and
- Academics, NGOs, Vendors, and Researchers.

Positive feedback:
- ExxonMobil;
- TCEQ;
- ND Dept of Health;
- OSHA; and
- National Oil and Gas Emissions Committee.
Emerging Issues
Unconventional Oil & Gas Pigging/Venting Operations

Background: Shale Gas Gathering Pipelines

• In comparison to traditional or conventional rural natural gas gathering pipelines, unconventional shale gas gathering lines are generally:
  - Larger in diameter
  - Operating at higher pressure
  - Transporting “wet” gas

• Potential concern for safety of people near operations and the environment.

Greater potential for VOC emissions
Unconventional Oil & Gas Pigging/Venting Operations

• Numerous gas compressor and pig launcher/receiving stations.
• Venting of high and low pressure pipelines.
• We are investigating how best to fully estimate all emissions from these operations.
• Numerous citizen complaints raise level of concern.
Unconventional Oil & Gas Pigging/Venting Operations

- NSPS Subpart OOOO does not address pigging emissions from gathering or transmission lines.
- Magnitude and Frequency of these operations can be significant.
- Operations may trigger CAA permitting requirements.
- Some States (e.g., Texas) have specific regulatory requirements.
- Sharing information with PHMSA/DOT/OSHA/CDC.