EPA Air Enforcement Initiatives Toxics/O&G

Ed Messina

NACAA Joint Permitting and Enforcement Workshop

Chicago, Illinois

FY 2011-2013 National Enforcement Initiatives

- **Assuring Energy Extraction Sector Compliance with Environmental Laws**
- **Cutting Toxic Air Pollution that Affects Communities' Health**
- **Reducing Widespread Air Pollution from the Largest Sources, especially the Coal-Fired Utility, Cement, Glass, and Acid Sectors**
- **Keeping Raw Sewage and Contaminated Stormwater Out of our Nation's Waters**
- **Preventing Animal Waste from Contaminating Surface and Ground Waters**
- **Reducing Pollution from Mineral Processing Operations**

Land-Based Natural Gas Extraction and Production

- Environmental Concern
  - Natural gas is cleaner burning “bridge fuel” in search for new forms and sources of energy
    - Unprecedented acceleration of natural gas development
    - Responsible development of natural gas as energy source offers important economic, energy security, and environmental benefits
  - However, some techniques for natural gas extraction pose significant risk of pollution
  - Need to ensure development of “clean energy” sources in environmentally protective manner
    - EPA plays an important role in addressing public concerns, ensuring environmental protection, and in working with federal and state partners to manage the benefits and risks

Land-Based Natural Gas Extraction and Production

- Existing Compliance Concerns
  - High non-compliance with air and water requirements and/or adverse environmental impacts have been documented in compliance evaluations and resulted in issuance of several Administrative Orders and initiation of multiple enforcement actions
  - Significant rise in air pollution adversely affecting CAA National Ambient Air Quality Standards in parts of country
  - Inability of CTWs and POTWs to properly treat produced water and flowback

National Enforcement Initiative

- Enforcement Goals
  - Address natural gas extraction and production activities that may be causing or contributing to air and/or water impacts
  - Address corporate-wide noncompliance by initiating evaluations of companies with significant potential for harm to public health and the environment
- National Environmental Policy Act (NEPA) Goal
  - Use NEPA and CAA Section 309 review responsibilities to help prevent potentially adverse impacts of land-based natural gas extraction and production operations on Federal lands and Indian country by working with lead agencies to improve environmental performance of these operations

National Enforcement Initiative

- Strategy
  - Focus primarily on compliance monitoring and enforcement activities directed at known facility-specific problems and evolving to national corporate-wide efforts to maximize deterrence
    - Take action where violations cause air and water impacts that threaten human health
  - Utilize full breadth of available enforcement authorities to hold responsible companies accountable
  - Work with industry to develop best management practices (BMPs) to raise level of environmental performance across industry

National Enforcement Initiative

- Strategy (Cont.)
  - Pursuant to NEPA and CAA Section 309, EPA will use its authorities to review and comment on Federal Environmental Impact Statements to improve protection of air and water resources that could be affected by any Federal decision related to natural gas extraction and production activities
  - Enhance transparency of agency efforts by making information available through the EPA website, responding to inquiries, developing materials (e.g., press releases and enforcement alerts), engaging external organizations, and making use of emerging communication tools (e.g., Twitter, blogs)
  - While Initiative focuses on EPA activities, state/local/tribal governments are important partners in regulating the sector: Critical to work together to leverage limited resources and ensure efforts are complementary

Potential Air Compliance/Enforcement

- Noncompliance with CAA statutory and regulatory requirements may be associated with multiple emission sources such as compressor stations, glycol dehydrators, storage tanks, fugitives, truck loading
  - Pollutants of most concern are volatile organic compounds such as benzene, toluene, ethylbenzene, xylene, hexane, and methane
  - Since methane is a potent greenhouse gas and a primary component of natural gas, natural gas production is significant contributor to global greenhouse gases

Potential Air Compliance/Enforcement

- Natural gas extraction and production activities potentially subject to:
  - Several NSPS and NESHAP standards applicable to industry (NSPS Subparts KKK, LLL, IIII; NESHAP Subparts HH, HHH, JJJJ, ZZZZ)
    - In keeping with court ordered review of air emission standards by OAQPS, evaluating emissions from gas production and processing operations which may result in regulatory revision
  - Parts 70 and 71 Title V Operating Permits Program
  - NSR/PSD
  - Section112(r) general duty clause
  - Federally enforceable State/Tribal Implementation Plans that may be applicable to facilities
  - Mandatory Reporting of Greenhouse Gases: Petroleum and Natural Gas Systems (Part 98, Subpart W)
  - Section 303 authority to address imminent and substantial endangerment

FY 2011-2013 Air Toxics National Enforcement Initiative

Goal

- EPA will target and reduce illegal emissions of toxic air pollutants from leaks and flares, as well as target and reduce excess emissions, **at facilities that have a significant impact on air quality and health in communities.**
  - Emphasis on fence-line monitoring technologies (i.e., UV-DOAS, PIDs, and FLIR cameras) to identify, and address high risk, noncompliant facilities, and achieve significant reductions of HAP emissions affecting vulnerable communities.

Air Toxics National Enforcement Initiative

Three Focus Areas

- LDAR: improperly leaking valves, connectors, and pipes can be a significant, otherwise unknown, source of a facility's emissions.
- Flares: improper operation of flares from over-steaming and combustion of gases with low Btu content can be a significant, otherwise unknown, source of a facility’s emissions.
- Excess Emissions: improper operation of a facility, including during start-up, shut-down, and malfunction events can be a significant, otherwise unknown, source of a facility's emissions.

Why Focus on LDAR?

- The Agency is focusing enforcement efforts on LDAR emissions due to widespread noncompliance and the potential for significant emission reductions

- Leaking equipment is the largest source of HAP emissions from petroleum refineries and chemical manufacturing facilities

- EPA compliance evaluations have shown significantly higher numbers (e.g., often 3 to 5 times greater) of leaking components than regulated entities' report

LDAR Regulatory Requirements

19 different standards have equipment leak requirements which include:

- Periodic monitoring and timely leak repair
- Leak definitions varying from 500 ppmv to 10,000 ppmv
- Requirement that leaks are repaired within a certain amount of time (5 to 15 days)

LDAR Sources

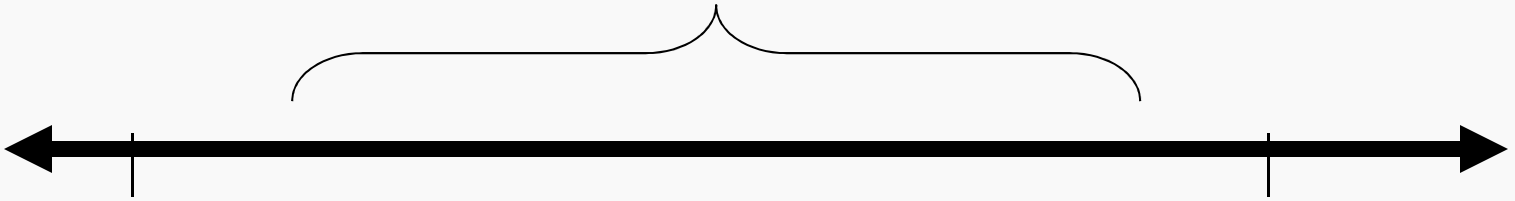
- Petroleum refineries
- Chemical manufacturers
- Petrochemical manufacturers
- Specialty chemical manufacturers
- Polymer manufacturers

Why Focus on Flares?

- Two major problems:
  - Combustion of gases with low Btu content, and/or
  - Over-steaming
- Potentially Causing:
  - Incomplete combustion
  - Significant HAP emissions

Steam Use

Good Combustion:
Turbulent, Hot Flame



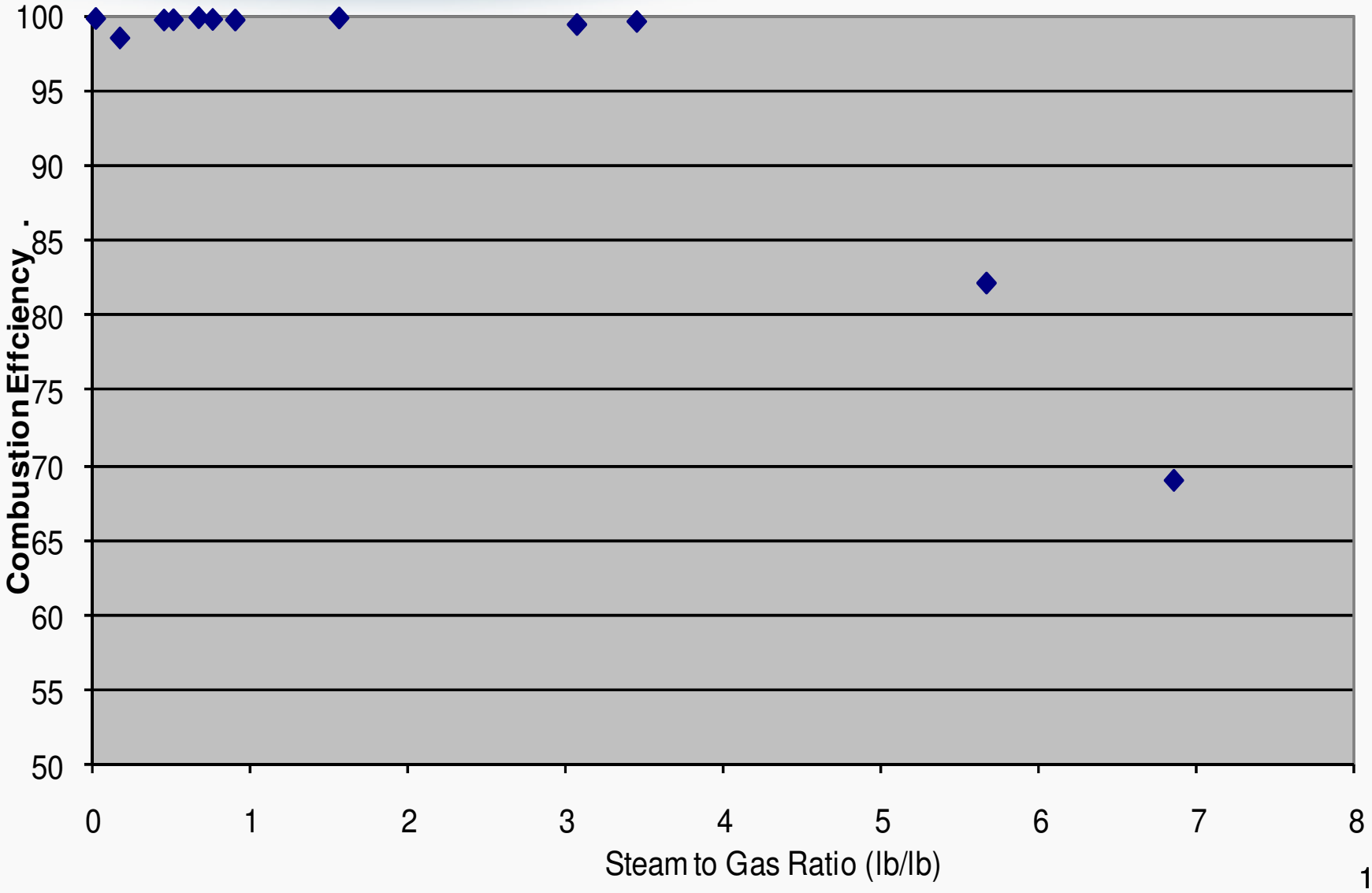
Insufficient Steam:
Smoke due to poor mixing-
Not enough oxygen

Excess Steam:
Dilution and
Cooling of Flame

Flare Regulatory Requirements

- Parts 60 and 63 ("General Provisions")
  - Flares that are control devices must combust gases with heat content of $\leq$ 300 Btu; and
  - Meet flare design specifications
  - Good Air Pollution Control Practices

1983 EPA/CMA Report



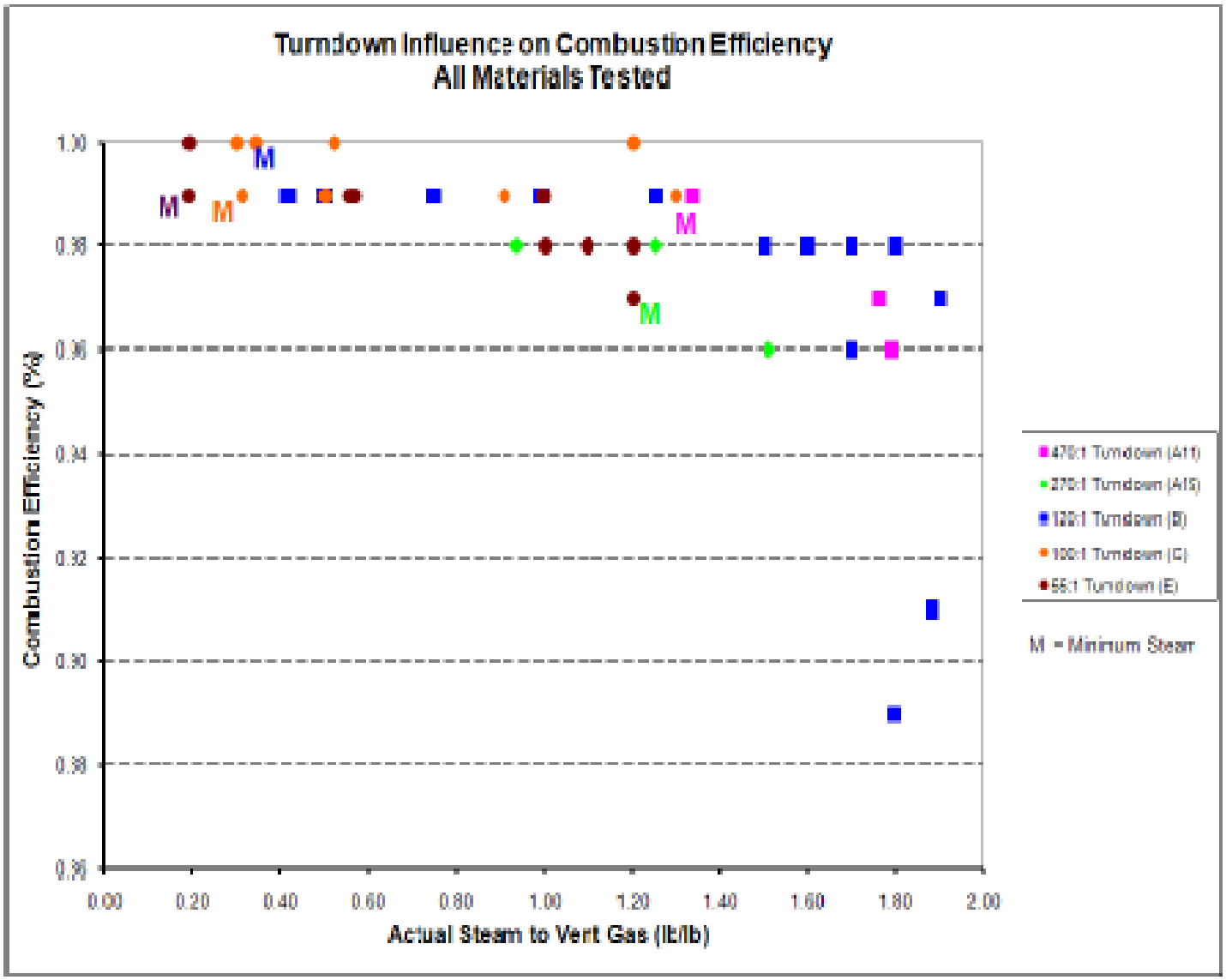
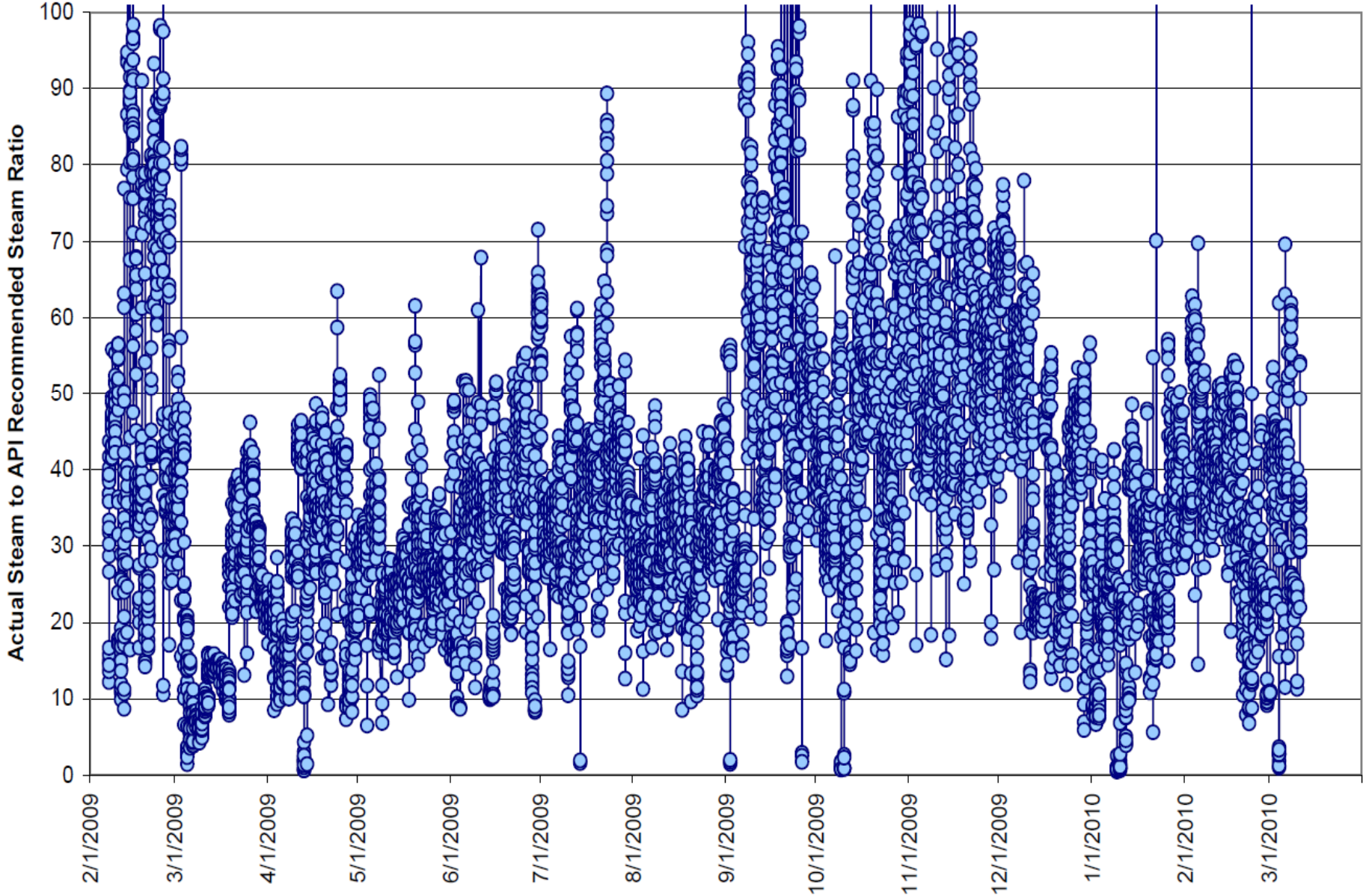


Figure 1-2. Combustion Efficiency vs. S/VG: Composite of All Materials Tested

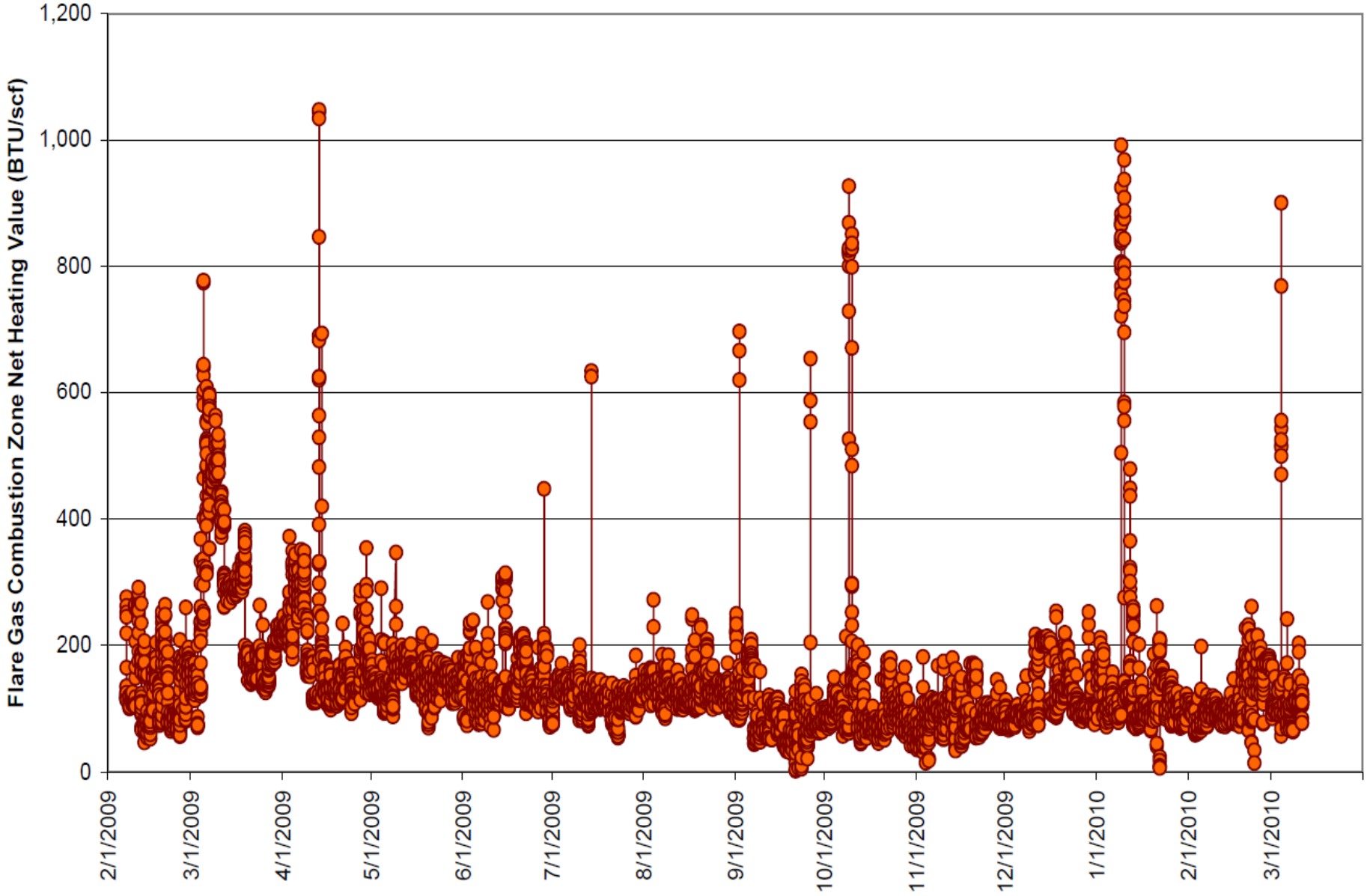
Flare Actual Steam to API Recommended Steam Ratio

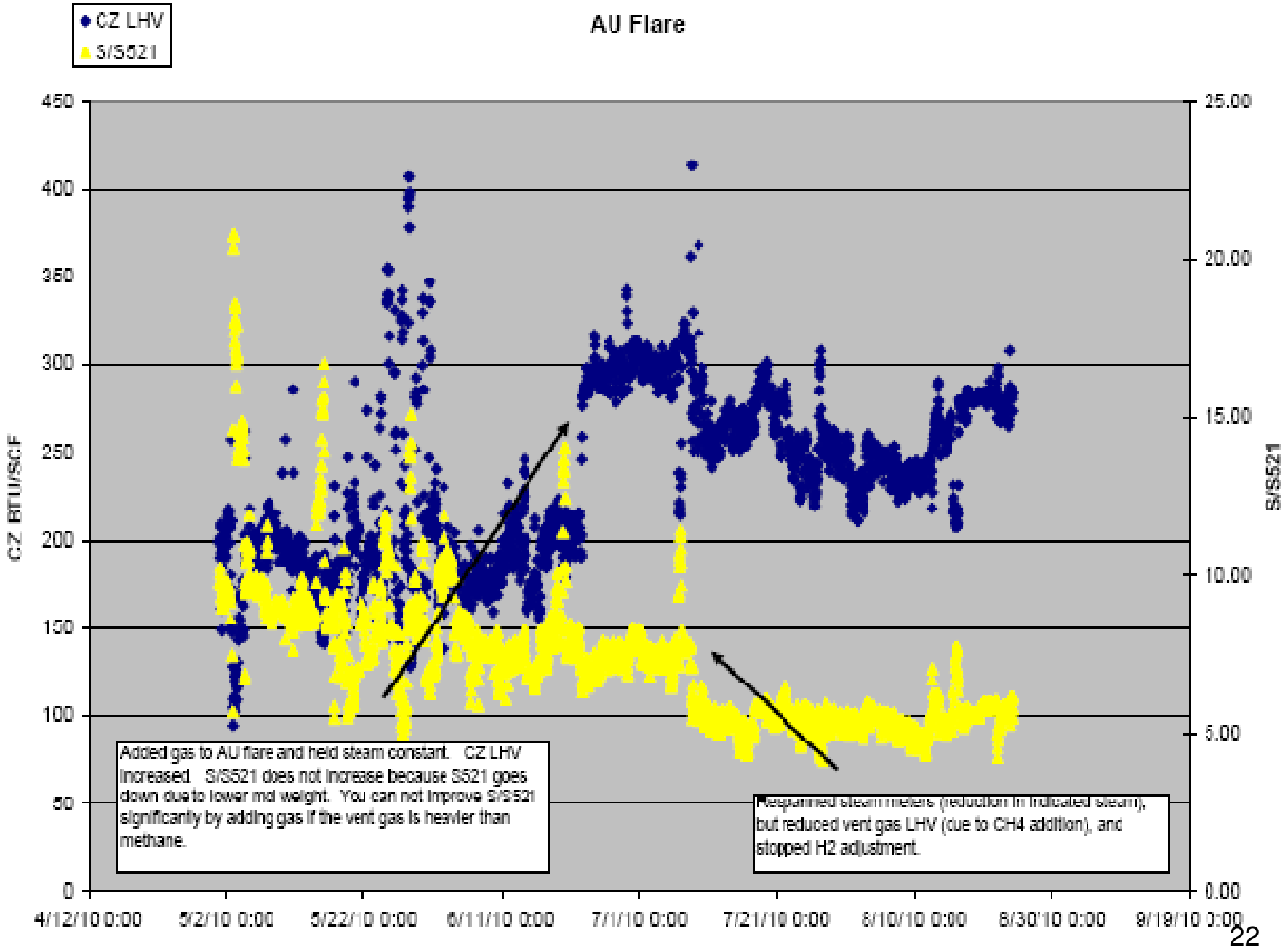
Company X



Flare Gas Combustion Zone Net Heating Value

Company X





Why Focus on Excess Emissions?

- Recent monitoring shows that facilities typically emit more HAP emissions than they actually report.
- Result from poor O&M practices, leaky storage tanks, wastewater systems, coker steam vents and quench systems, cooling towers, and other components.
- Also result of a failure to minimize emissions during periods of startup, shutdown, and malfunction (SSM).

Why Focus on Excess Emissions?

- Emissions may be in violation of specific numerical limitations set out in the regulations or applicable permits.
- If SSM emissions specifically exempt in the regulations, sources still under general duty clause to minimize excess emissions during all SSM events.
- EPA currently in process of removing malfunction exemptions from all 112 standards and promulgating revised limits for startup and shutdown emissions.

Compliance Evaluation Totals for FY 2008-2010

Focus Area	**Number of Compliance Evaluations**
LDAR	80
Flares	54
Surface Coating	83
Total	**217**

Emissions Reductions for FY 2008-2010

- For FY 2008-2010, EPA achieved over **1.8 million pounds** of HAP emissions reductions as a result of the Air Toxics Initiative.

FY 2008-2010 Case Highlights
INEOS/Lanxess

- Reductions
  - 360 TPY of BD reductions from the flare controls
  - ~1.1 TPY of AN reductions from the Biofilter Project
  - ~ 59.6 TPY of HAP reductions from the enhanced LDAR relief
- Penalty: $3.1 million dollars

INEOS/Lanxess Facility

FY 2008-2010 Case Highlights (continued)

Vertellus

- Reductions
  - 31 tons of HAPs (Benzene , Hydrogen Cyanide and Formaldehyde)
- Penalty
  - $425,000
  - SEP: $705,000

Tonowanda Coke (ongoing)

- Reductions to date
  - 333 tons of HAPS (Ammonia, Benzene, Napthalene, Toluene)

FY 2008-2010 Case Highlights (continued)

Formosa Plastic

- Comprehensive Enhanced LDAR Program corrective actions, including
  - Employee training
  - 3rd party LDAR audits
  - Lower leak definition for initiating repair
  - Reduced “delay of repair” listing
  - Replace leaking equipment with newer technology
  - Include 160,000 connectors in LDAR program
- Annual emissions reduced: 6,570,000 lbs of VOCs, including HAPs such as vinyl chloride
- Civil Penalty $2,800,000

Reduction in Cancer Risk

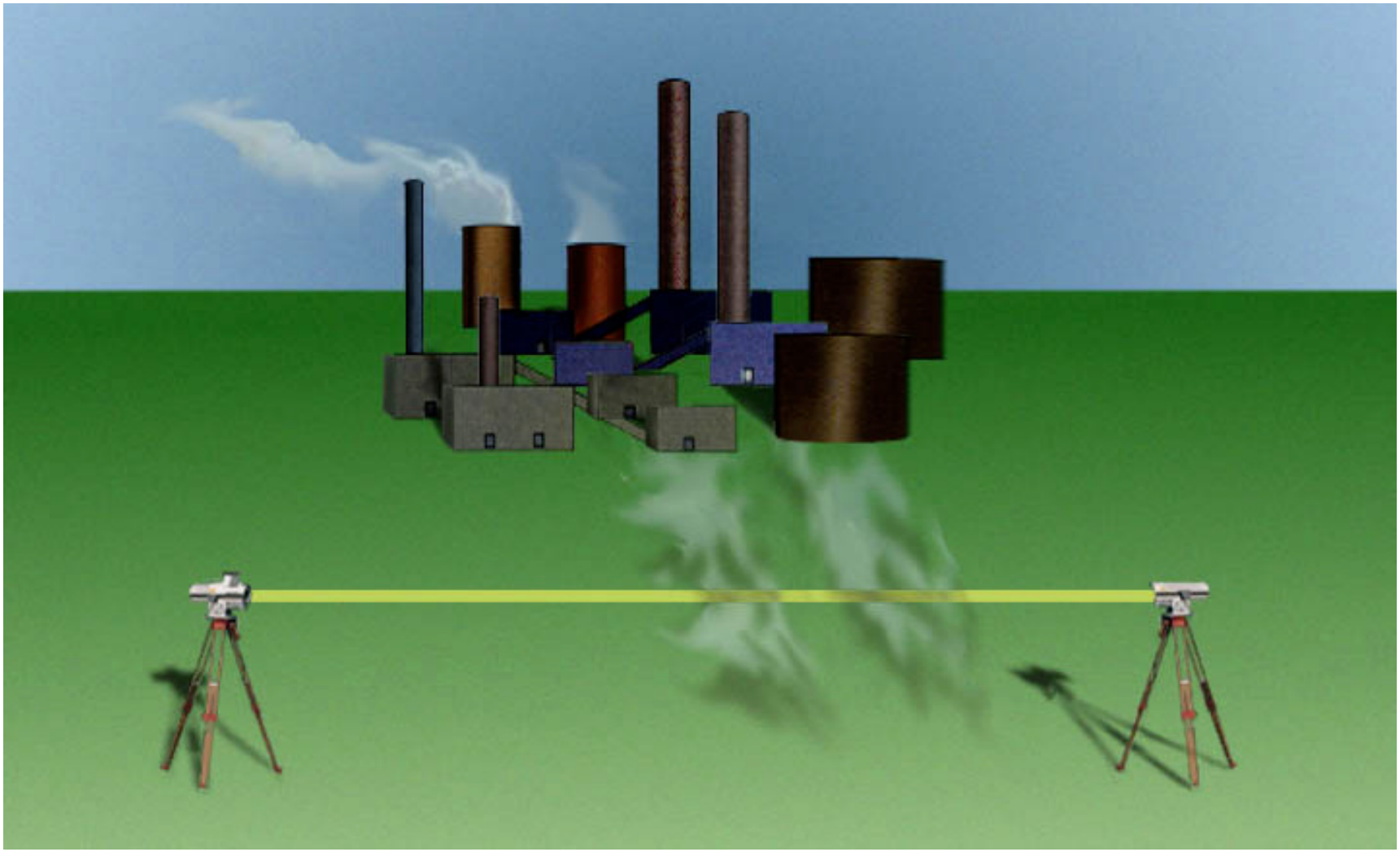
Using EPA's Human Exposure Model (HEM-3), OC working with OAQPS has calculated that:

- The Tonowanda Coke actions, INEOS/Lanxess, and Essroc cases resulted in reduction of the lifetime air toxics cancer risk to less than 1 in a million for over 900,000 people.
  - EPA's HEM-3 model does not take into account cancer risk from sources other than the modeled facility.

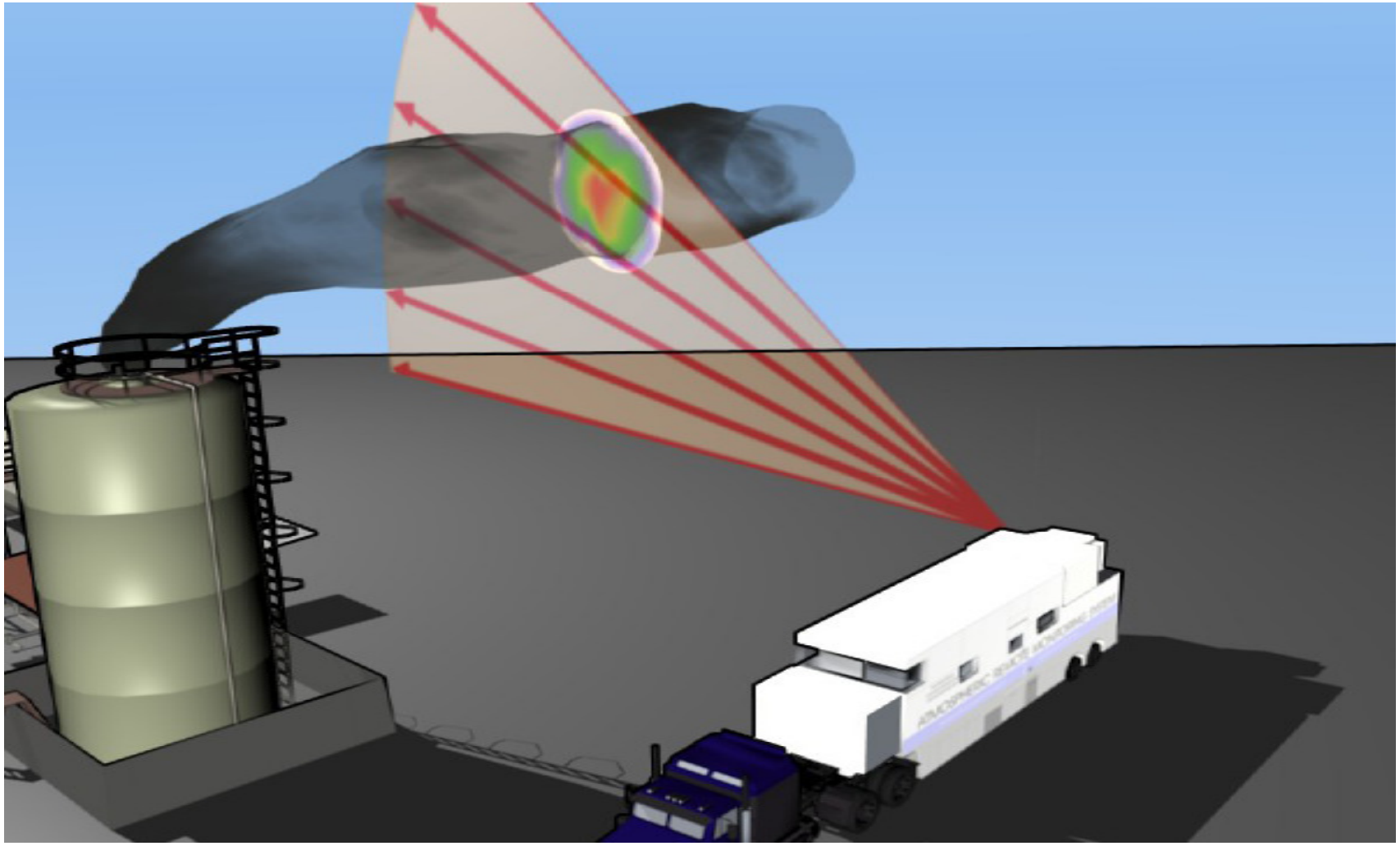
Greater Use of Monitoring

- When we can “see” air pollutants through measurement, our efforts to target and reduce emissions are more effective.

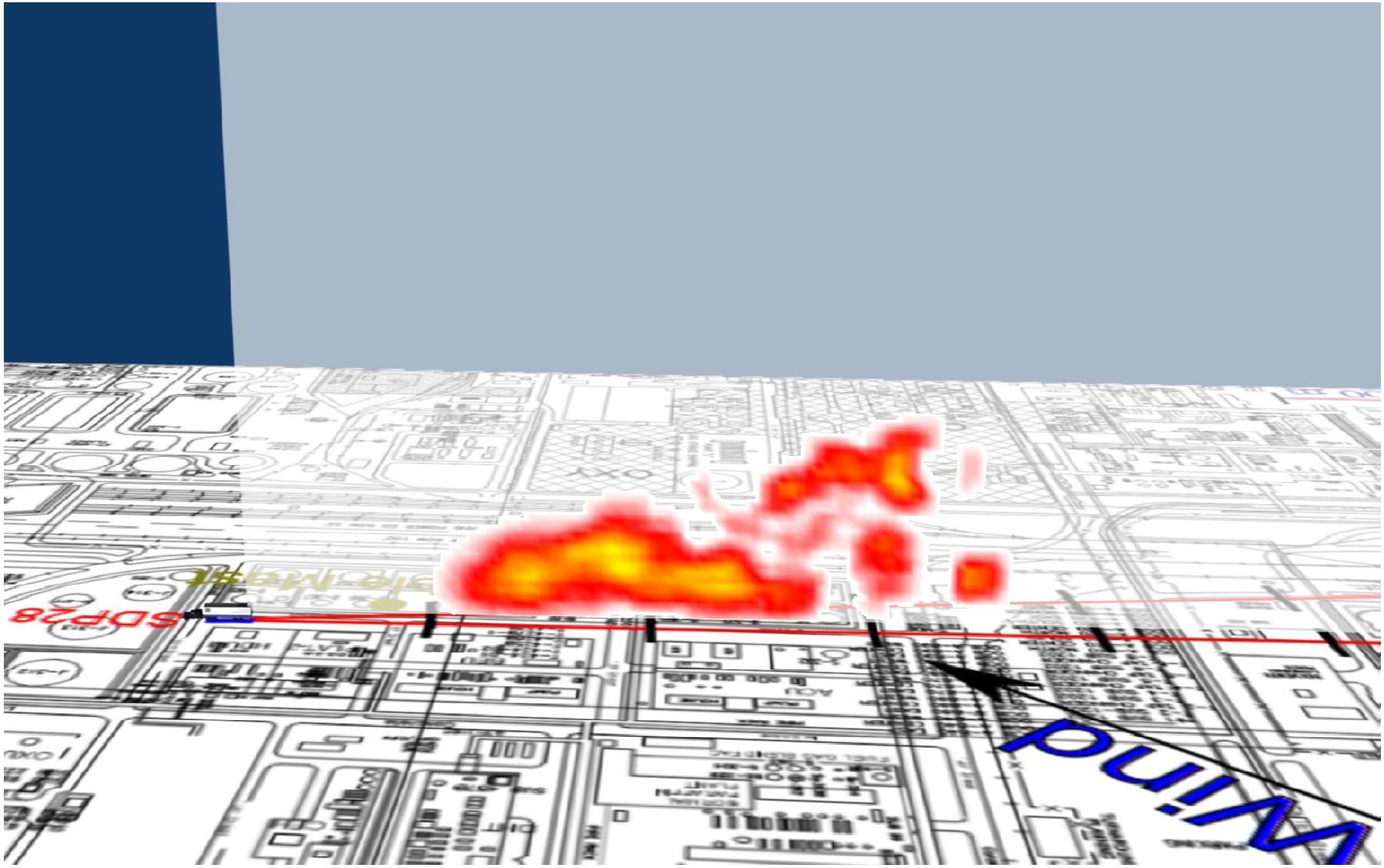
UV DOAS



Differential Absorption Light Detection and Ranging (DIAL)

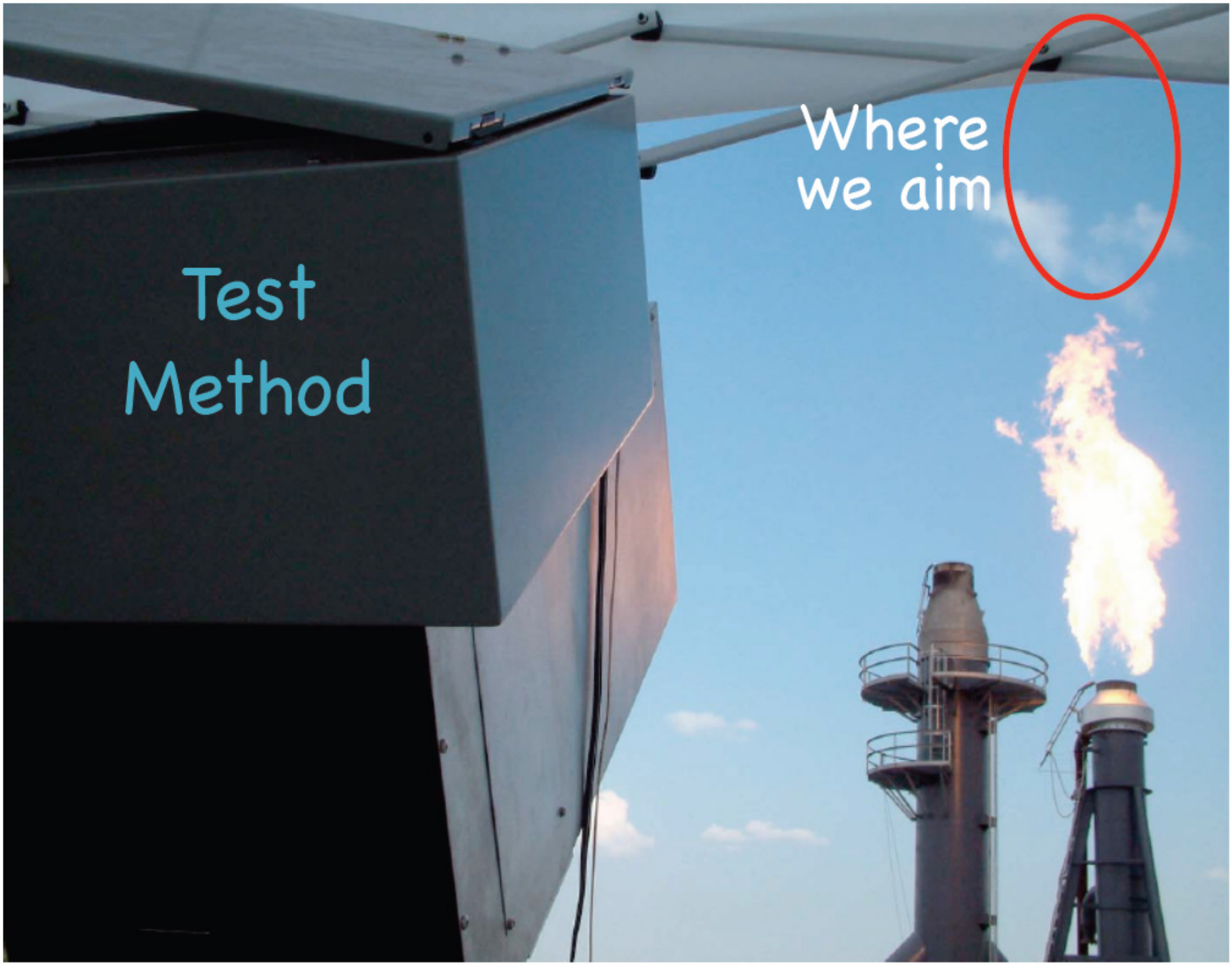


DIAL Benzene Scan Plane



PFTIR Flare Testing

- Flare radiance is the spectral signal
- IR camera used to point the PFTIR just outside the flare combustion zone.
- IR spectrometer measures compounds.
- Recently used at refineries and a chemical plant to optimize flares


Where
we aim
Test
Method

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 and TVAs


FISHER

Infrared Cameras

- Enables inspectors, citizens, and judges to see the pollution
- Advantages for finding leaks in difficult to monitor sources or unexpected areas.