



# Environmental Impact Statements, Air Permitting, and Air Compliance

Patrick Foley  
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# Environmental Impact Statements

- Required by the National Environmental Protection Act of 1970
- Consider environmental impacts when a Federal Agency evaluated options in making a decision in how to implement a project
- Required for any project involving a Federal Agency decision
  - Projects involving federal funding may also be required to do an EIS
- Federal Agency making the decision is responsible for developing EIS
  - Department of Energy for a Nuclear Power Plant
  - Department of Agriculture for opening up federal lands to cattle grazing
  - Department of Transportation for building a highway

# Environmental Impact Statements

- Other Federal Agencies can be stakeholders who comment on the EIS if it involves an issue overseen by the Federal Agencies
  - Fish and Wildlife might comment on an EIS for a highway that was developed by the Department of Transportation
  - Memorandums of Understanding are developed between agencies to guide acceptable approaches to minimize disagreements between agencies

# Environmental Impact Statements

- Council for Environmental Quality oversees the interaction of federal agencies
- CEQ mediates disagreements between federal agencies
- CEQ reports to the White House
- Decisions on significant EIS decisions can be made at the Presidential level
  - Disposal of nuclear waste from many states in one state
  - Trans-continental oil pipelines

# Air Permitting

- New Source Review
  - Minor New Source Review
  - Major New Source Review
    - PSD in Attainment Areas
    - Major Non-attainment NSR in Non-attainment Areas
- Title V Operating Permits
- Nearly all permitting is implemented at the state level

# Minor New Source Review

- Minor NSR is required for any physical change that can affect emissions (with many exemptions for small projects)
- Minor NSR programs are for small (i.e. not major) new sources or for small changes at major sources
- EPA requirement is for a state to have a minor NSR program but the elements of the minor permit program are not dictated by the EPA
- Some states will require a control technology review even for minor NSR permits
- Minor NSR acts as a screening mechanism to ensure that a project is truly minor

# Major New Source Review

- Applies to Major Sources of criteria pollutants (SO<sub>2</sub>, NO<sub>x</sub>, CO, VOC, PM, PM-10, PM-2.5 etc.)
  - Any sources that emit more than 250 tons per year of any criteria pollutant
  - Sources on a list of specific industrial categories (petroleum refinery, pulp mill, electric generating units, etc.) that emit more than 100 tons per year

# Major New Source Review

- Construction of a new major source can trigger Major New Source Review
- Modification of an existing major source can trigger Major New Source Review if significant
  - For SO<sub>2</sub>, NO<sub>x</sub>, and VOC, greater than 40 tons per year increase in emissions is significant
  - For PM, greater than 25 tons per year increase in emissions is significant
  - Lower significance thresholds is area is non-attainment



# Major New Source Review

- Permit Requirements
  - Control Technology Review
    - Best Available Control Technology review for attainment pollutants (considers costs of control)
    - Lowest Achievable Emission Rate for non-attainment pollutants (does not consider costs of control)
  - Air quality impact analysis to ensure continued attainment
  - Emission offsets for non-attainment pollutant increases

# Title V Operating Permits

- Required for all existing and new Major Sources
- Intended to indentify and list all federally enforceable requirements from regulations and minor and major permits
- Not intended to be used to create new requirements (except gap-filling of some missing monitoring and record-keeping requirements)

- Questions?

# Obtaining Information to Assess Compliance with Permits and Permit Rules

- File Review
- Facility Inspection
- Information Requests

# File Review at EPA and State Offices

- Permit Applications and Correspondence
- Engineering Evaluations
- BACT Analyses
- Minor and Major NSR Permits
- Emission Inventories
- Inspection Reports
- With the internet, much of this can be now be done remotely

# Facility Inspection

- Interviews
- Physical evidence
- Records



# Different Levels of Inspections

- States are primarily responsible for inspections
- Many state inspector inspections last a few hours at a major stationary source
- USEPA inspections at a major stationary source will typically take one day sometimes two weeks
- What is described below is an inspection method utilized by USEPA inspectors to identify violations of major NSR permitting rules

# Facility Inspection: Interviews

- Talk to Engineer responsible for process
  - detailed description of process
    - reference process flow diagrams
  - changes in operations or equipment
    - reference Authorizations For Expenditure and engineering studies
- Talk to Operators during plant walkthrough



# Facility Inspection: Physical Evidence

- Physical signs of new construction
- Changes in control equipment or technology
- Photographs (Google Maps)
- Samples and monitoring

# Facility Inspection: Facility Records

- Records that indicate modifications
  - Authorizations for Expenditure
  - Engineering Studies
  - Turnaround Reports
  - Capital Forecasts and other planning documents

# Facility Inspection: Facility Records

- Production records
- Records of raw materials usage/supplier
- Records of process parameters
- Calculation of actual emissions
- Results of stack tests and test methods
- Continuous Emissions Monitoring System Data

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# Information Requests: Capacity Increase Evidence

- Documents
  - Authorizations for Expenditure
  - Engineering Studies
  - Turnaround Reports
- Data over time
  - Feed/Production – plot it
  - Fuel Usage – plot it

# Information Requests: Emissions Calculations

- Feed/Production/Fuel usage over time
- CEMS data over time
- All Stack Tests for Unit in Question
- Annual Emission Statements
- Calculations of projected actual emissions

# Information Requests: Permit History

- All permit applications and supporting correspondence
- Engineering or permit review memoranda
- All permits
  - Minor NSR
  - Major NSR
  - Title V

- Questions?



# Case Study:

## Flare Efficiency Investigations

- Using too much steam to aerate a flare flame will degrade the combustion efficiency of the flare resulting in large emissions of VOCs
- EPA jointly investigated the issue with Marathon Petroleum Refining
- Currently EPA is engaged in a significant enforcement initiative to correct the problem

# The Issues

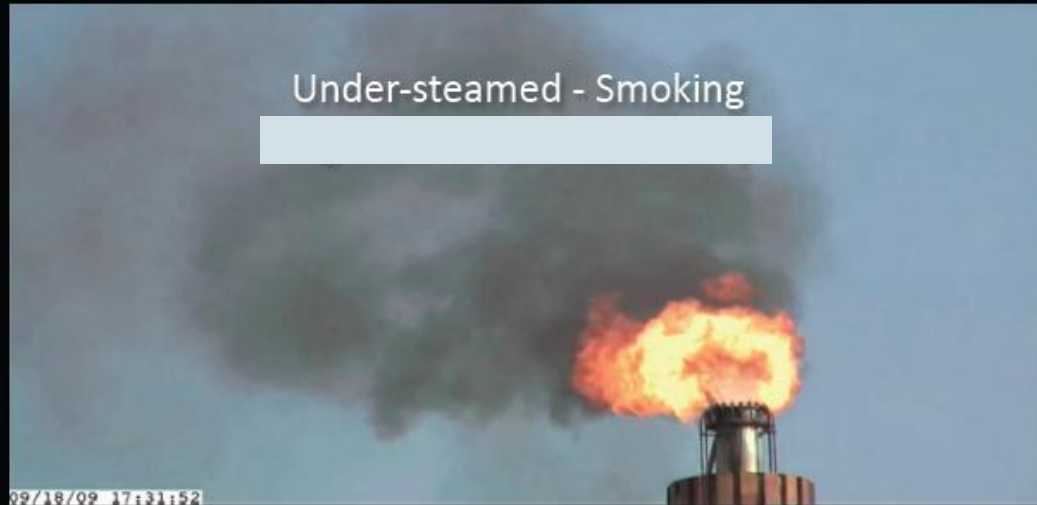
Over-steamed  
Low combustion efficiency



Incipient Smoke Point  
High combustion efficiency



Under-steamed - Smoking



# History of EPA's Concerns with Flare Efficiency

## Inspections of Refineries and Chemical Plants

– Problems Exist

- Too much steam
- Too much air
- Low BTU value in combustion zone

– Hundreds and thousands of tons excess emissions per flare per year



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

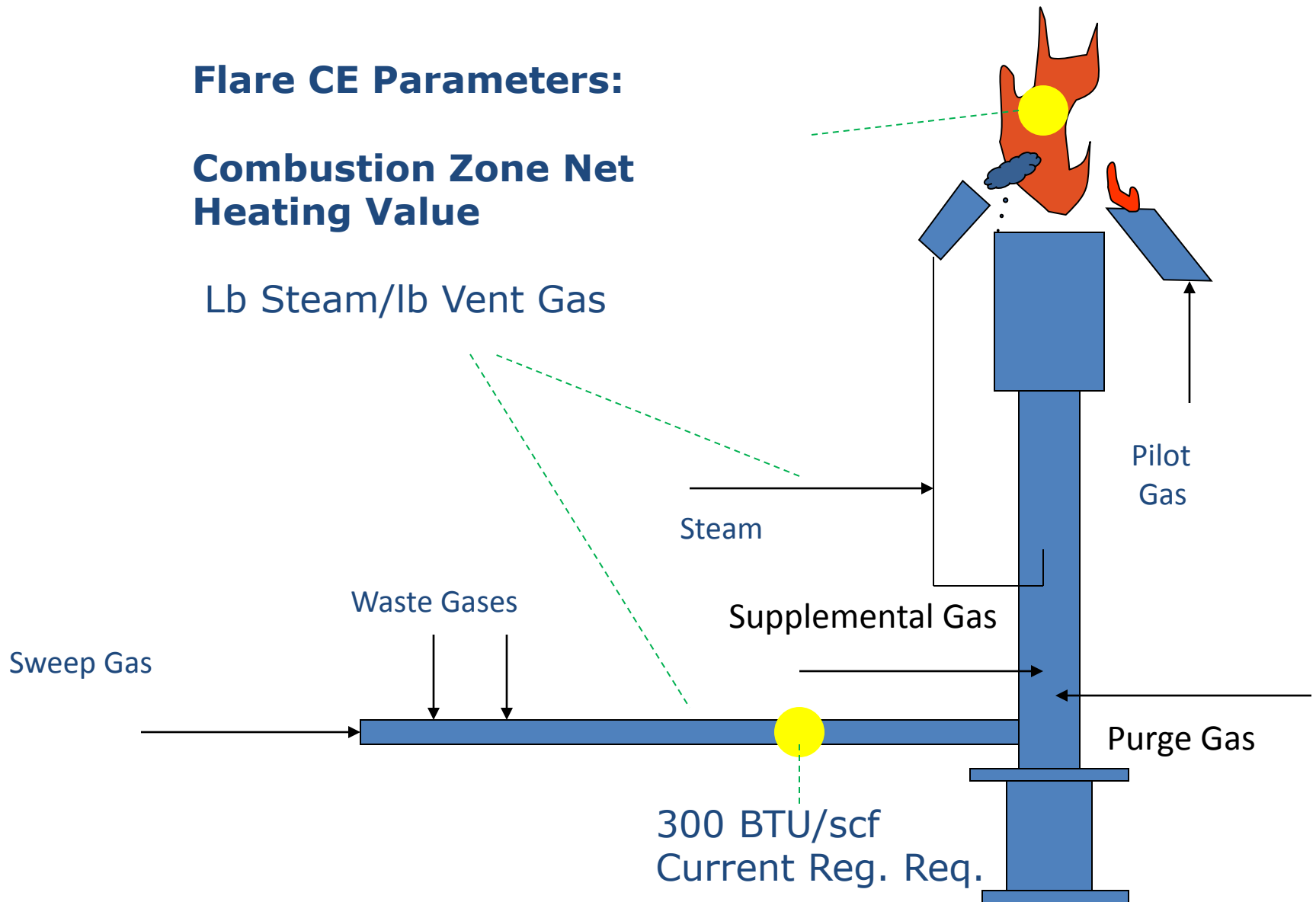
Good Combustion:  
Turbulent, Hot Flame

→ Excess Steam/Air:  
Dilution and  
Cooling of Flame

# Flare CE Parameters:

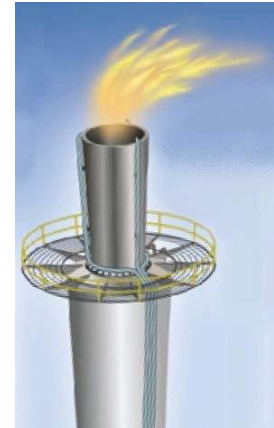
## Combustion Zone Net Heating Value

Lb Steam/lb Vent Gas

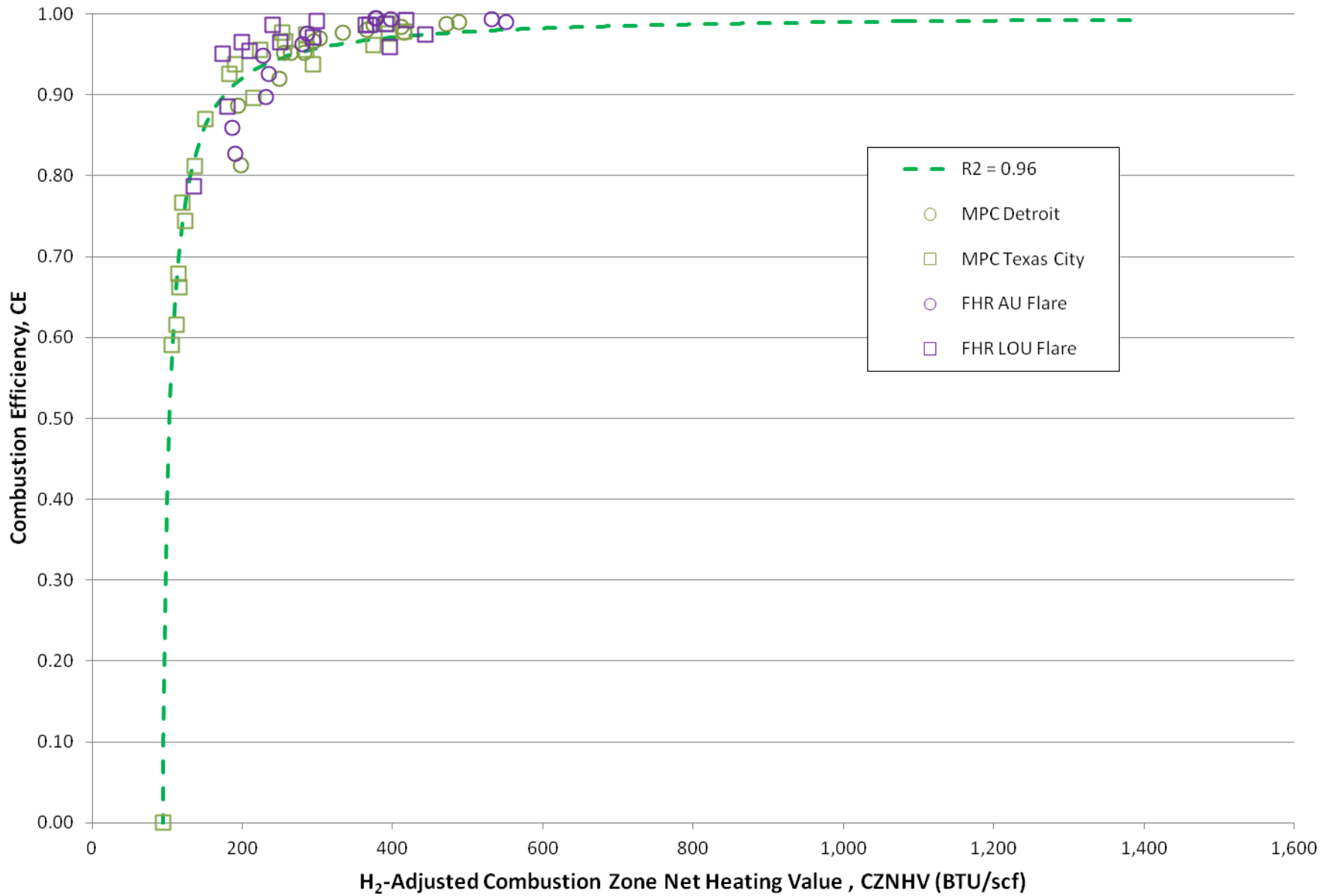


# Remote Quantification of Combustion Efficiency - Passive Fourier Transform Infrared (PFTIR) Spectroscopy

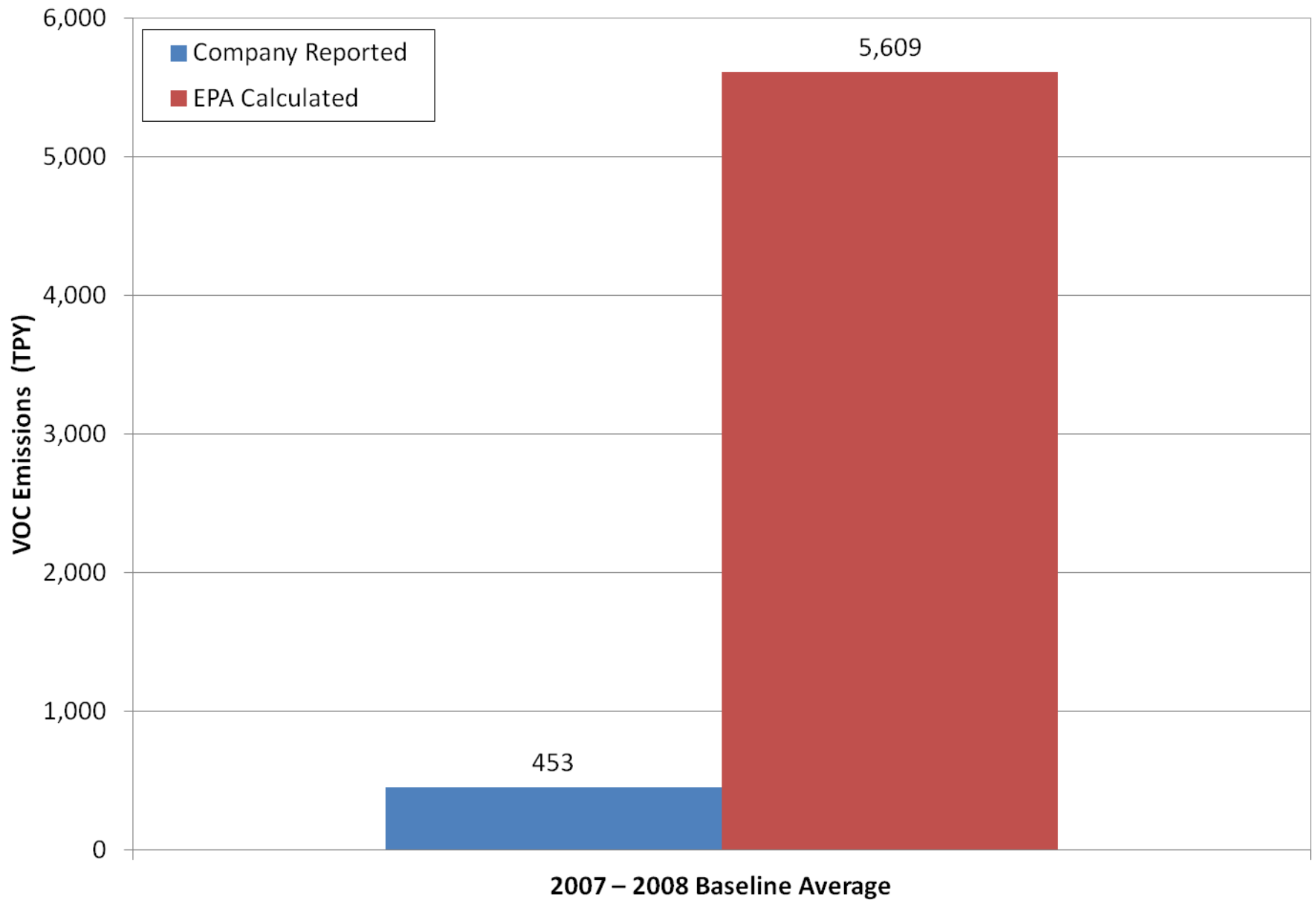
- Hot gases from flares radiate spectra that are unique to each compound
- A PFTIR is a spectrometer that can “see” the gas spectra from the ground
- Can estimate flare combustion efficiency remotely from ground level with a high degree of accuracy



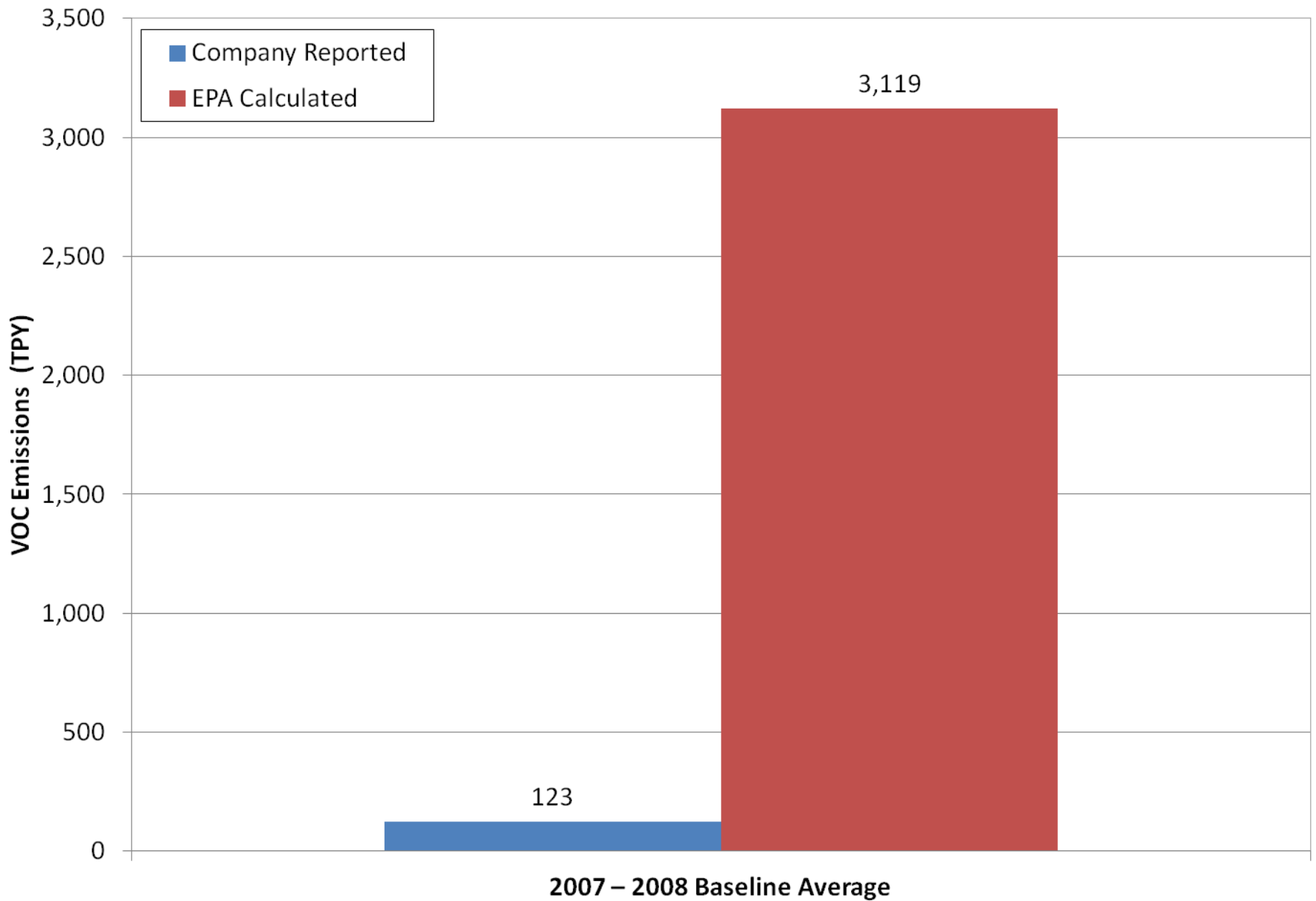
# Equation 3: MPC Baseload Runs; FHR Baseload Runs



# Marathon Petroleum Company Baseline VOC Emissions from Flares



# BP Whiting Refinery Baseline VOC Emissions from Flares





# Marathon and BP Injunctive Relief – Emissions Reductions

- For Marathon, flare efficiency and caps will result in:
  - **VOC** emission reductions greater than 5,000 TPY\*;  
and
  - **HAP** emission reductions greater than 135 TPY\*.
- For BP, flare efficiency, flare gas recovery and caps will result in:
  - **VOC** emission reductions greater than 3090 TPY\*;
  - **HAP** emission reductions greater than 83 TPY\*.

\* All values estimated. Volume and composition of waste gas not monitored previously.

## Potential U.S. Refinery Flare VOC Emissions if Marathon and BP Flare Gas Volume, Composition and CE are Typical

<b>Sensitivity Analysis</b>	<b>Crude Capacity (bpd)</b>	<b>Total VOC Emissions from Flares (ton/year)</b>
U.S. Full Capacity With CE Problems	17,787,714	98,000
50% U.S. Capacity With CE Problems	8,893,857	49,000
25% U.S. Capacity With CE Problems	4,446,929	24,000
10% U.S. Capacity With CE Problems	1,778,771	10,000

1. U.S. crude capacity as of January 1, 2012, per Oil & Gas Journal.

99% of these emissions can be controlled through a flare efficiency program. HAP content of flare gas is highly variable, but can typically range from 0.5 to 3.0 %.

- Questions?

# Contact

Patrick Foley, Senior Environmental Engineer

USEPA - Air Enforcement Division

Email: [foley.patrick@epa.gov](mailto:foley.patrick@epa.gov)

Phone: 202-564-7978

