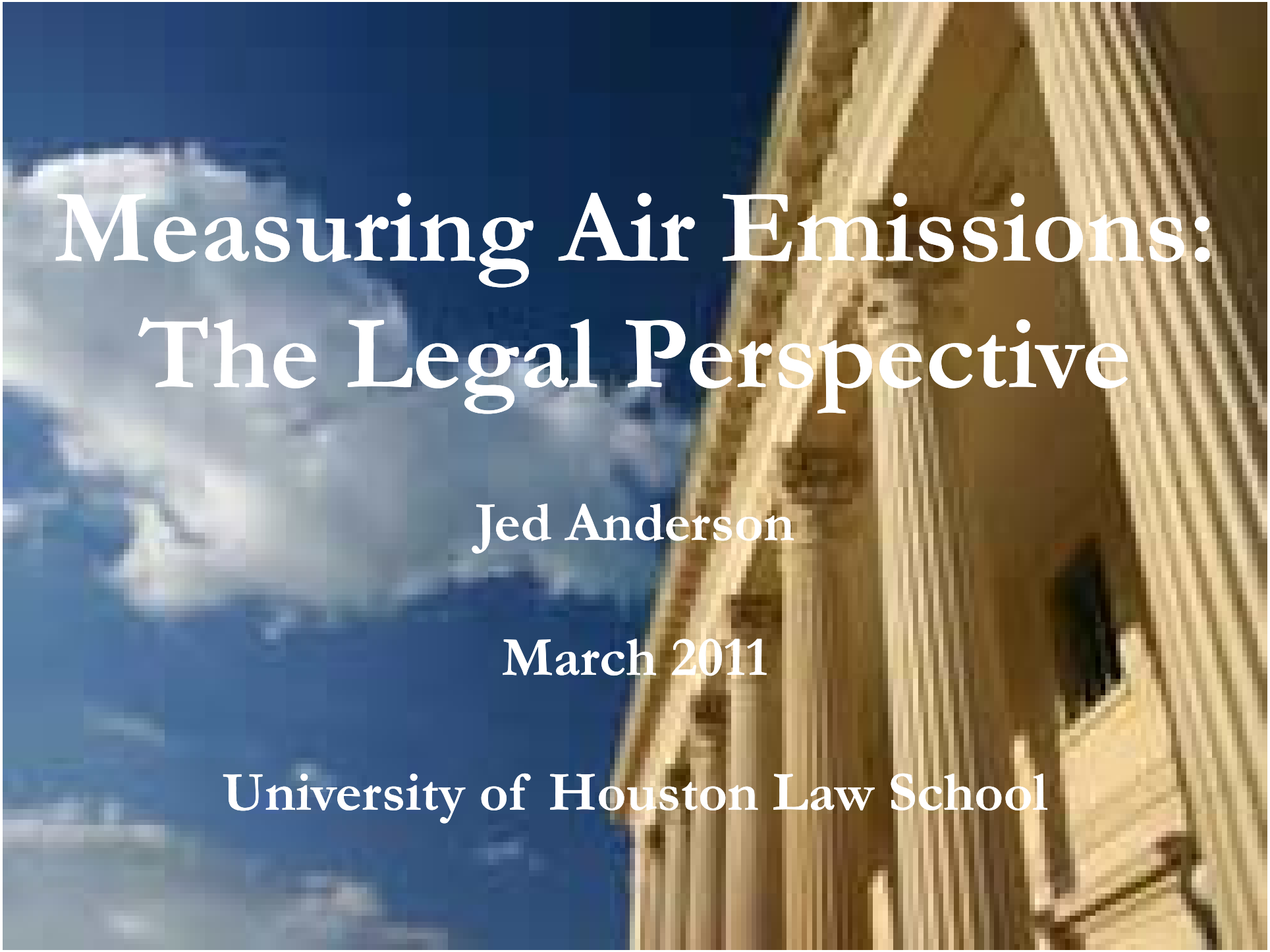


Measuring Air Emissions: The Legal Perspective

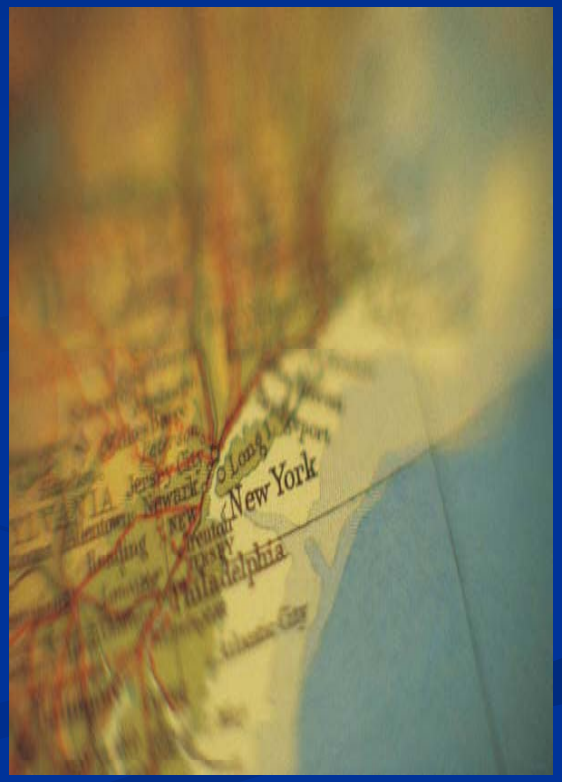
Jed Anderson

March 2011

University of Houston Law School

Roadmap

- Measuring emissions—the Big Picture of what we are trying to do
- Why do we measure emissions (e.g. what are the underlying legal drivers that require us to measure)?
  - Setting NAAQS and developing other air quality standards/programs
  - Determining applicability of certain air programs (e.g. NSR/PSD, Title V)
  - Determining compliance
  - Assessing Modeling/Health Effects impacts
  - Paying fees
- How do we measure emissions
  - Estimates using emission factors (i.e. AP-42)
  - CEMs, PEMs, and other current techniques
  - The future—more remote sensing techniques???



Measuring Emissions—the Big Picture of What We are Trying to Do

Certain Amount of Emissions

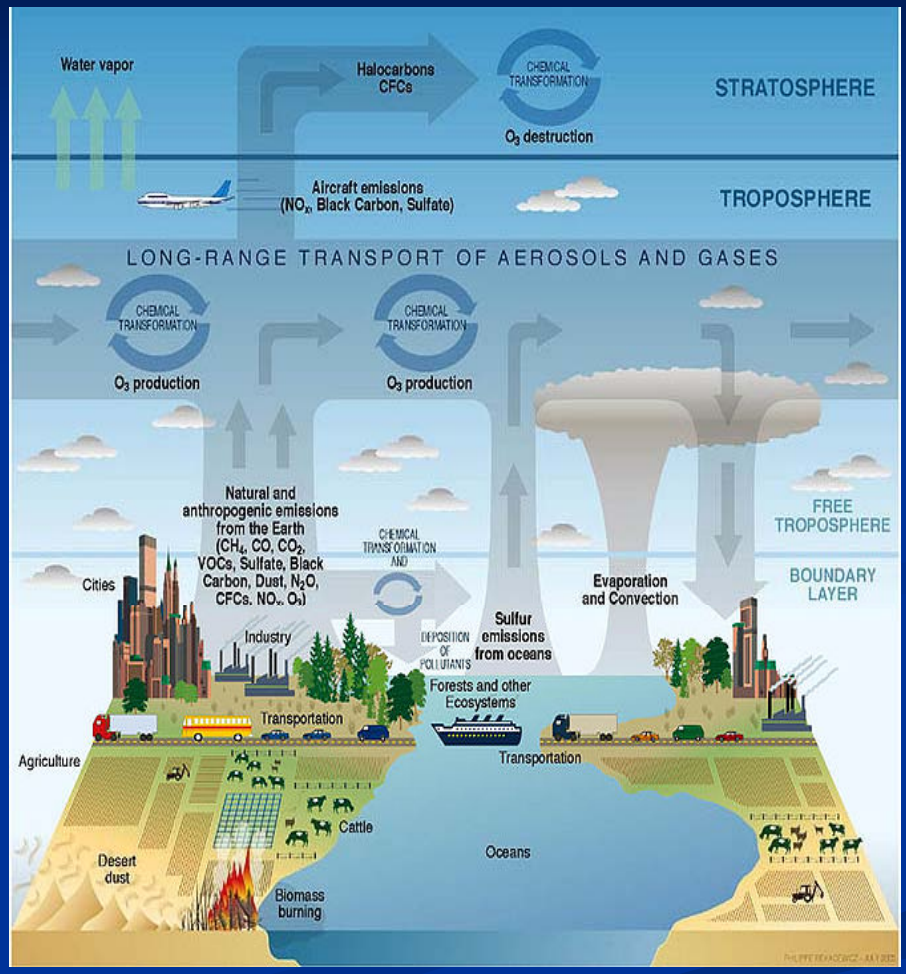
=

Certain Monitor Value

Not as easy as this equation looks, . . . why?

Why its not so easy to measure?

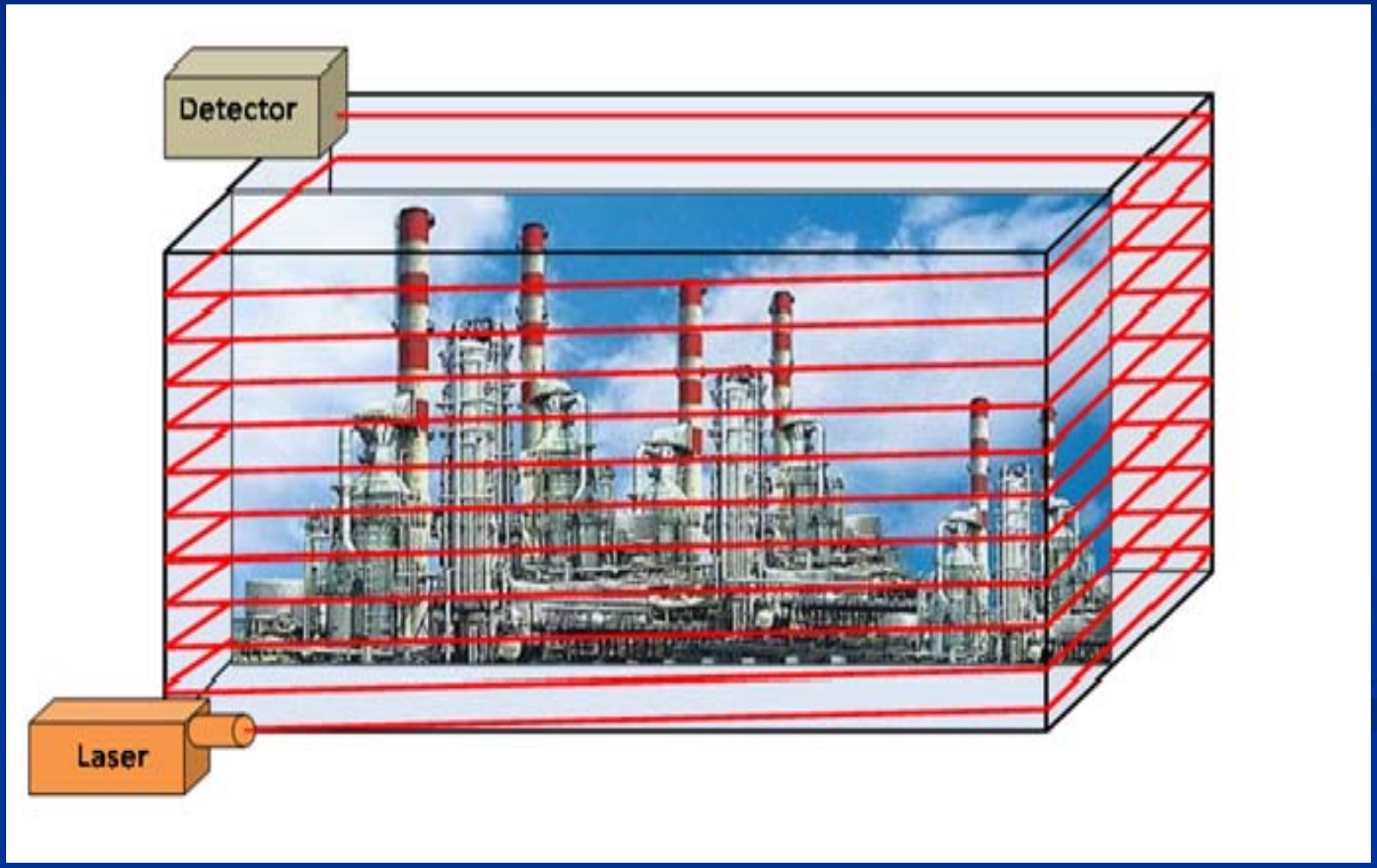
Sources sometimes numerous, complex, difficult to capture, non-routine emissions, operational factors change (ex./ people drive at different speeds)



Complex atmospheric chemical reactions and relationships; some pollutants are formed rather than emitted; complex meteorology

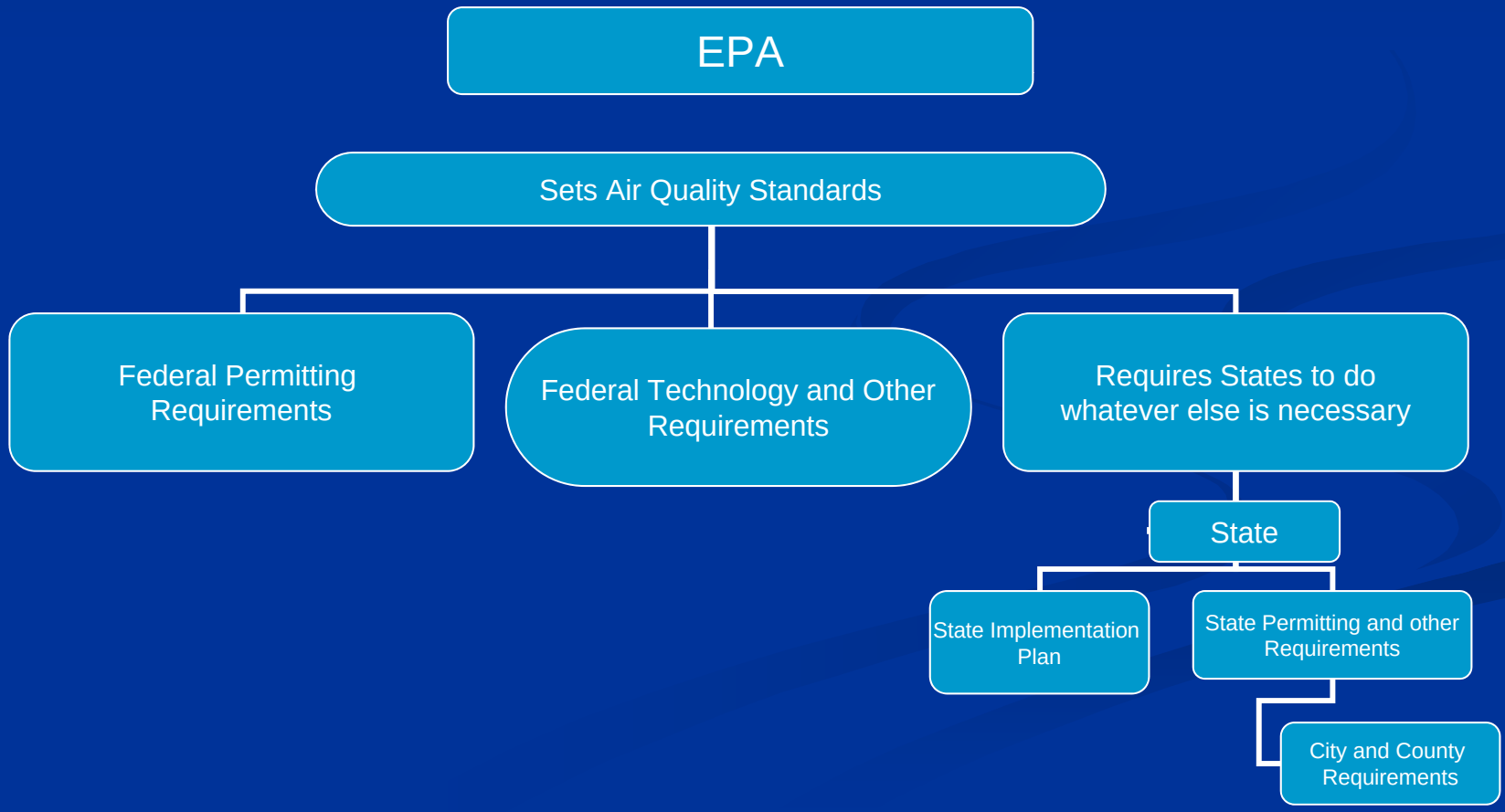
Example of Difficult Emissions Calculation Scenario

A Glimpse into the Potential Future that Might at Least Solve the Difficulty in Measuring Stationary Sources



Why do we measure emissions? Setting NAAQS and developing other air quality standards/programs

The Air Quality Regulatory Process

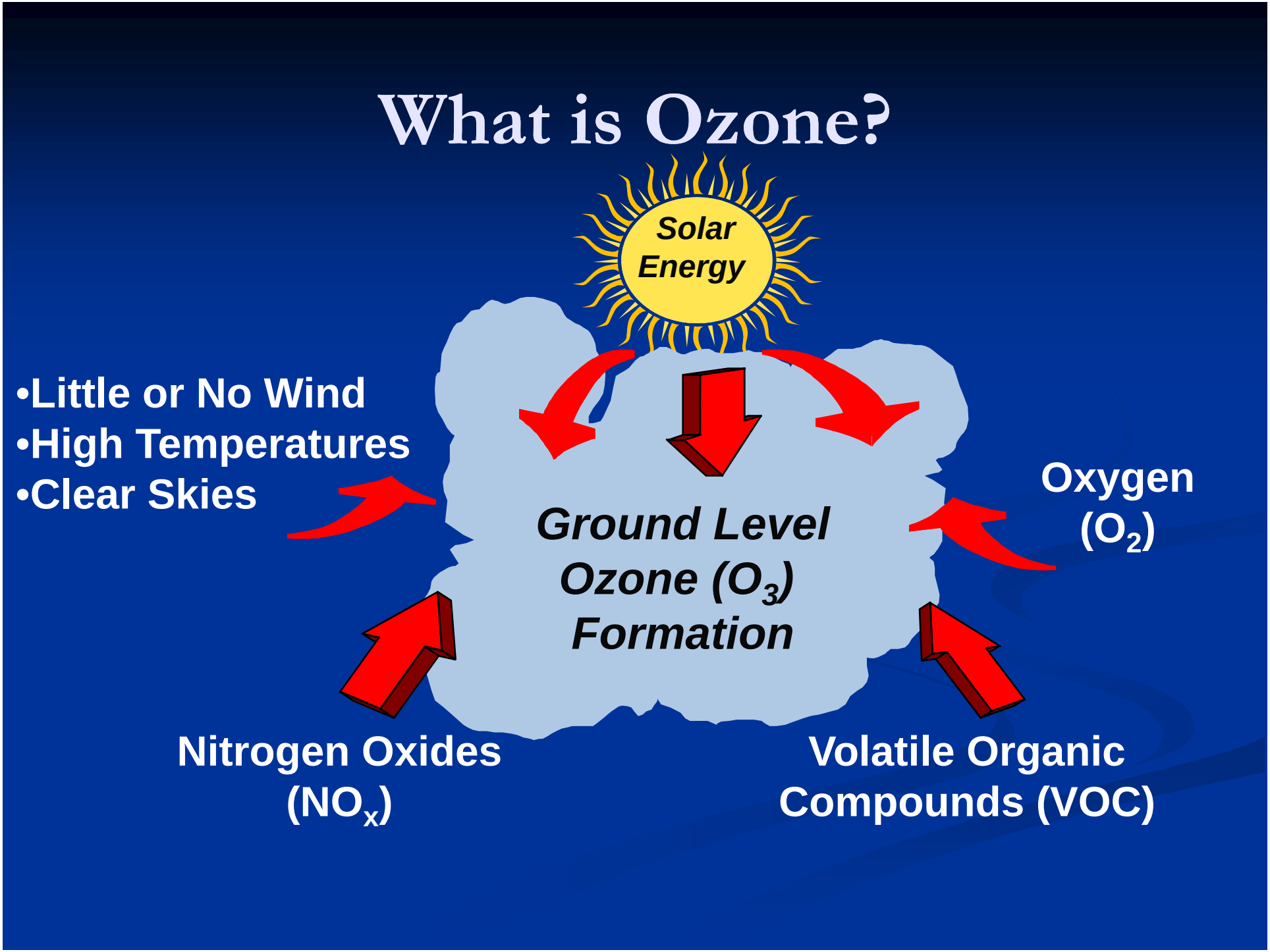


Air Quality Standards (CAA Section 107- 109)

- Ozone (1-hr and 8-hr)
- Particulate Matter (PM-10 and PM-2.5)
- Carbon Monoxide (CO)
- Nitrogen Oxides (NOx)
- Sulfur Dioxide
- Lead

**CO2 and toxics not NAAQS

What is Ozone?



Microscopic Airborne Particles

Particles fall into two size categories:

1. Coarse Particles

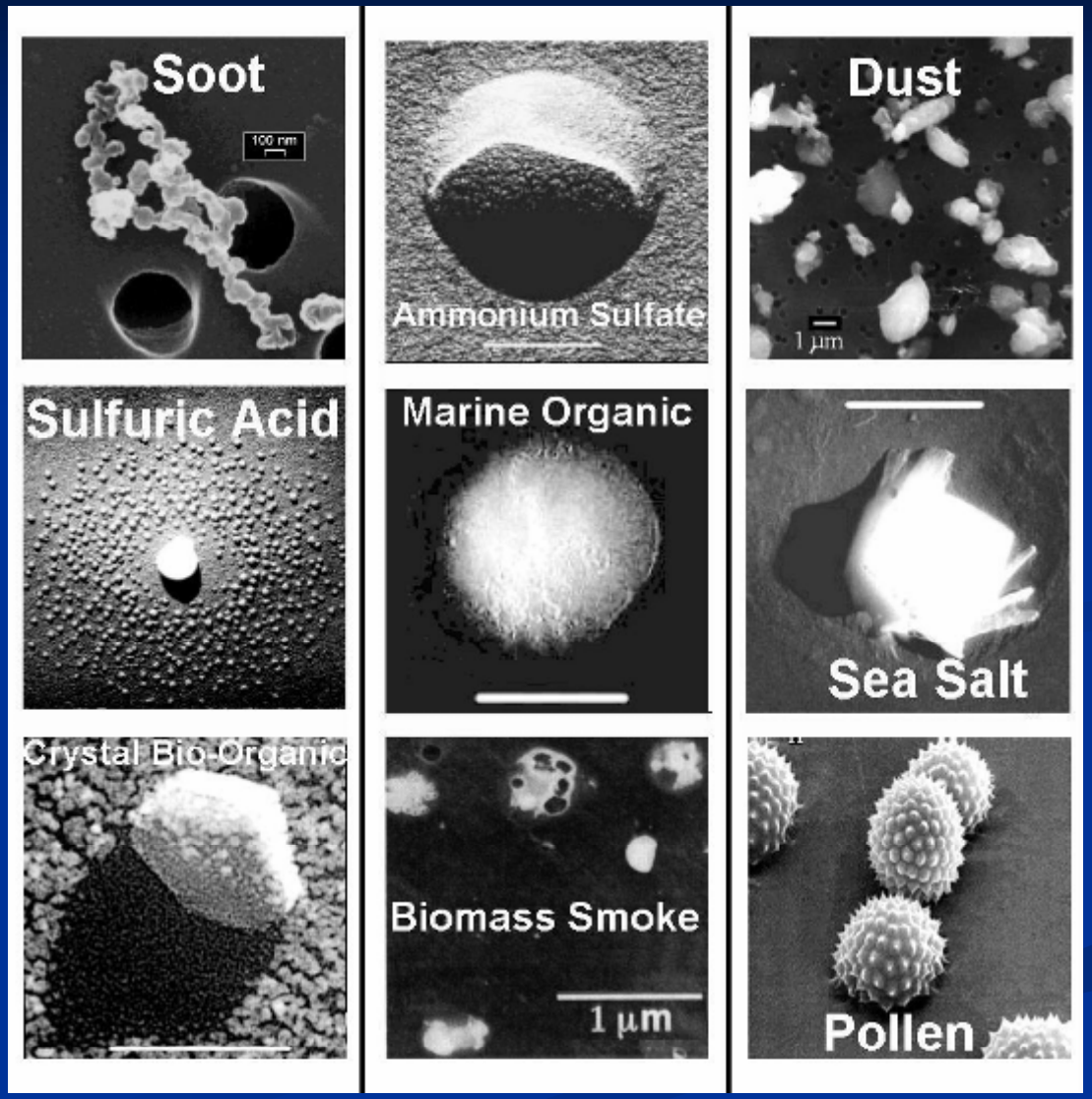
greater than 2 micrometers and less than 10 micrometers

(These particles usually deposit out of the air close to their source.)

2. Fine Particles

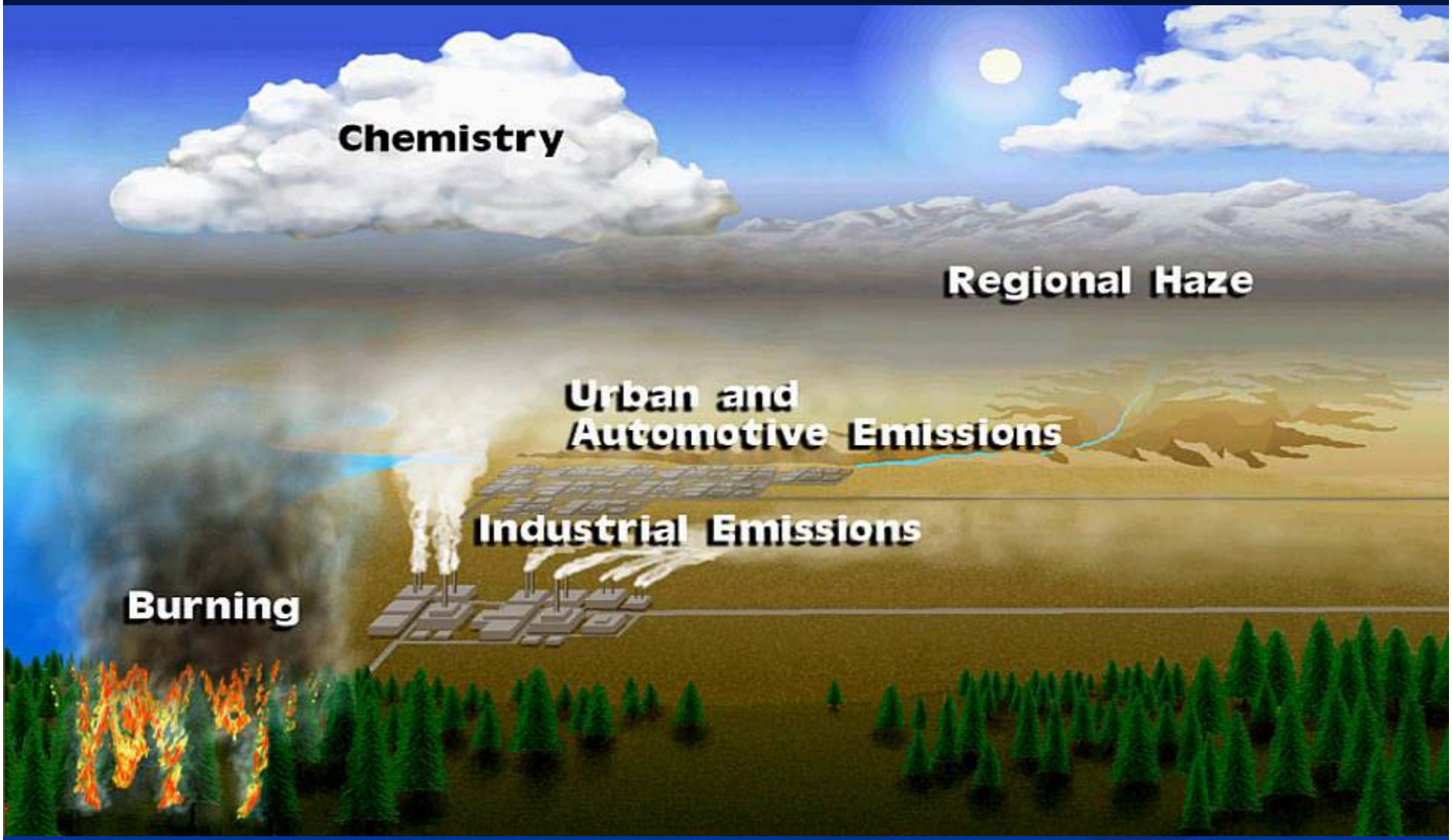
2.5 micrometers and smaller

(These particles can stay suspended for weeks and are transported far from their source.)

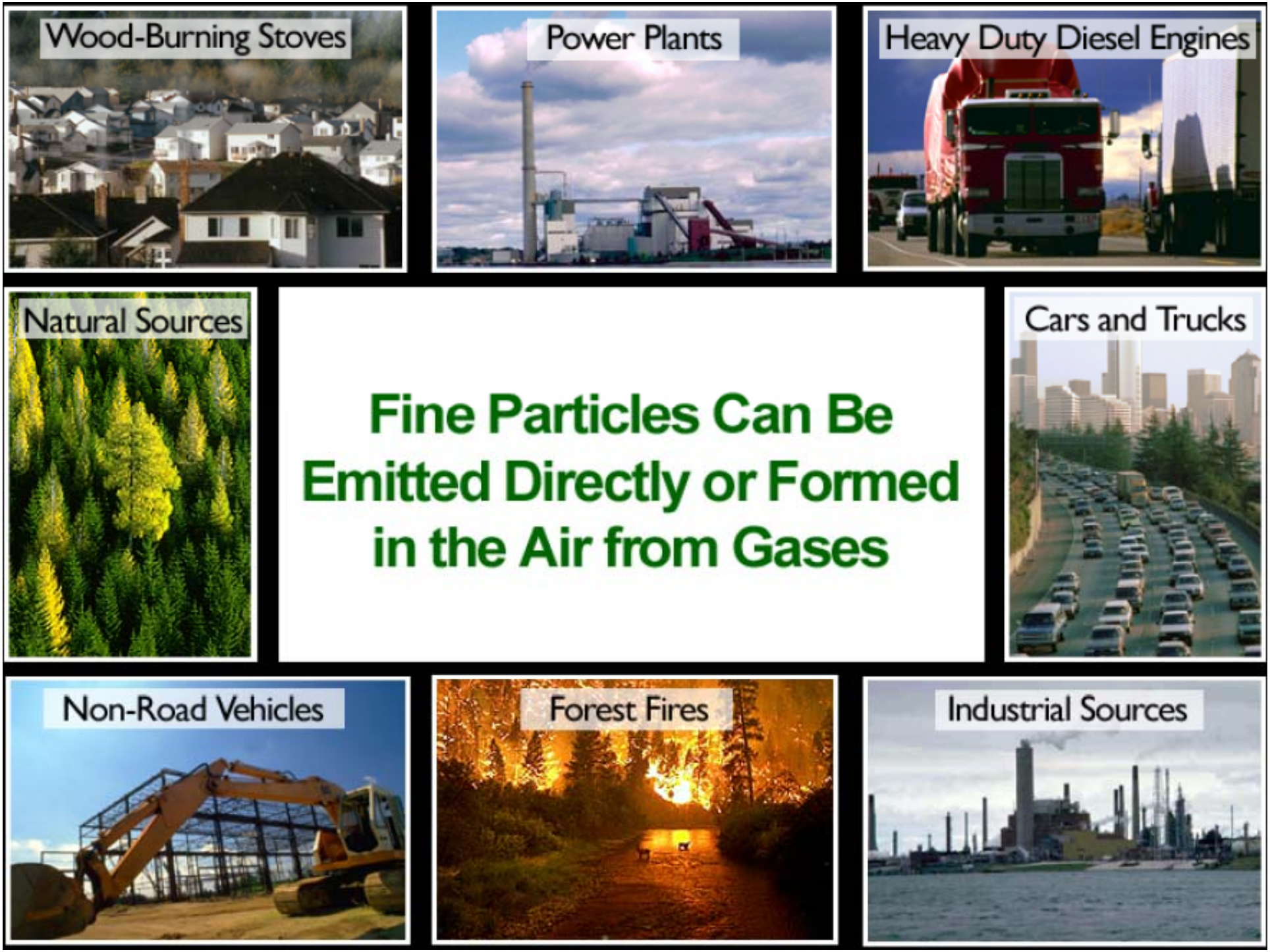


Examples of particles that affect visibility

Secondary Particle Formation

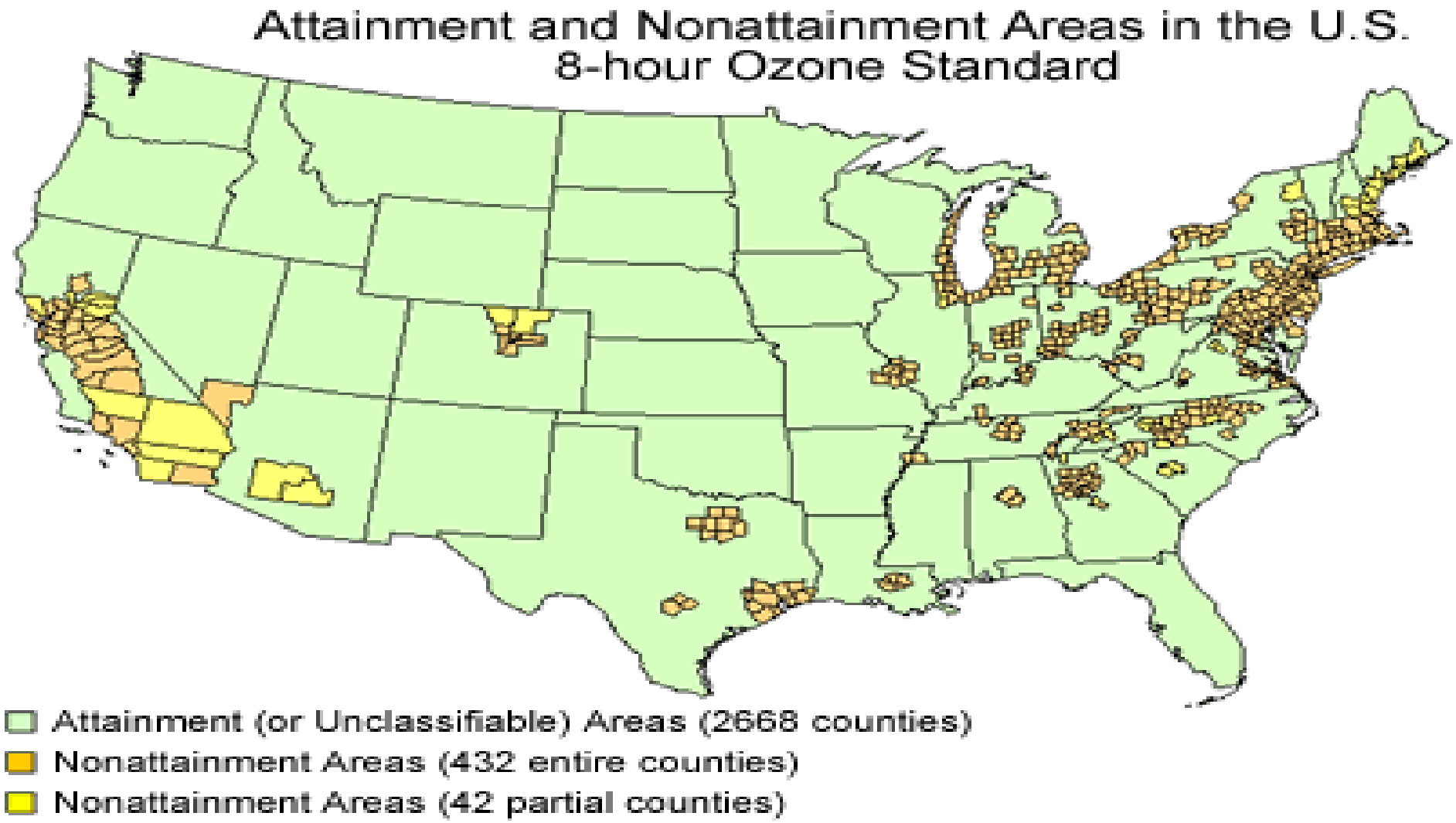


Precursor emissions disperse in the atmosphere, convert into secondary particles through complex atmospheric chemical reactions, then travel long distances to deposit in remote areas far from their source.


Wood-Burning Stoves
Power Plants
Heavy Duty Diesel Engines
Natural Sources
Fine Particles Can Be Emitted Directly or Formed in the Air from Gases
Cars and Trucks
Non-Road Vehicles
Forest Fires
Industrial Sources

Clinton Drive Monitor

8-Hour Ozone Nonattainment Areas



State Implementation Plan

- Plan demonstrating how state will attain standards
- Contains:
  - Emissions inventories
  - Photochemical modeling
  - Control strategies/regulations

Emissions Inventories

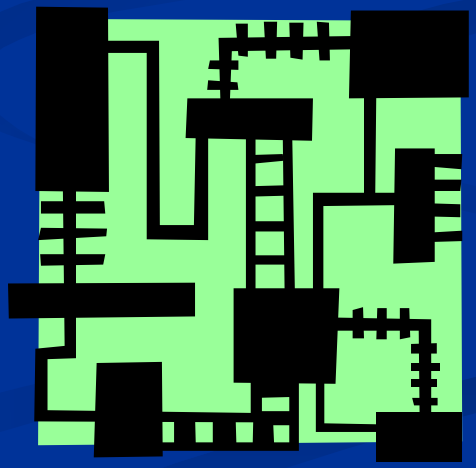
- Point Sources: refineries, factories, power plants

- On-Road Sources: cars, trucks, buses, motorcycles

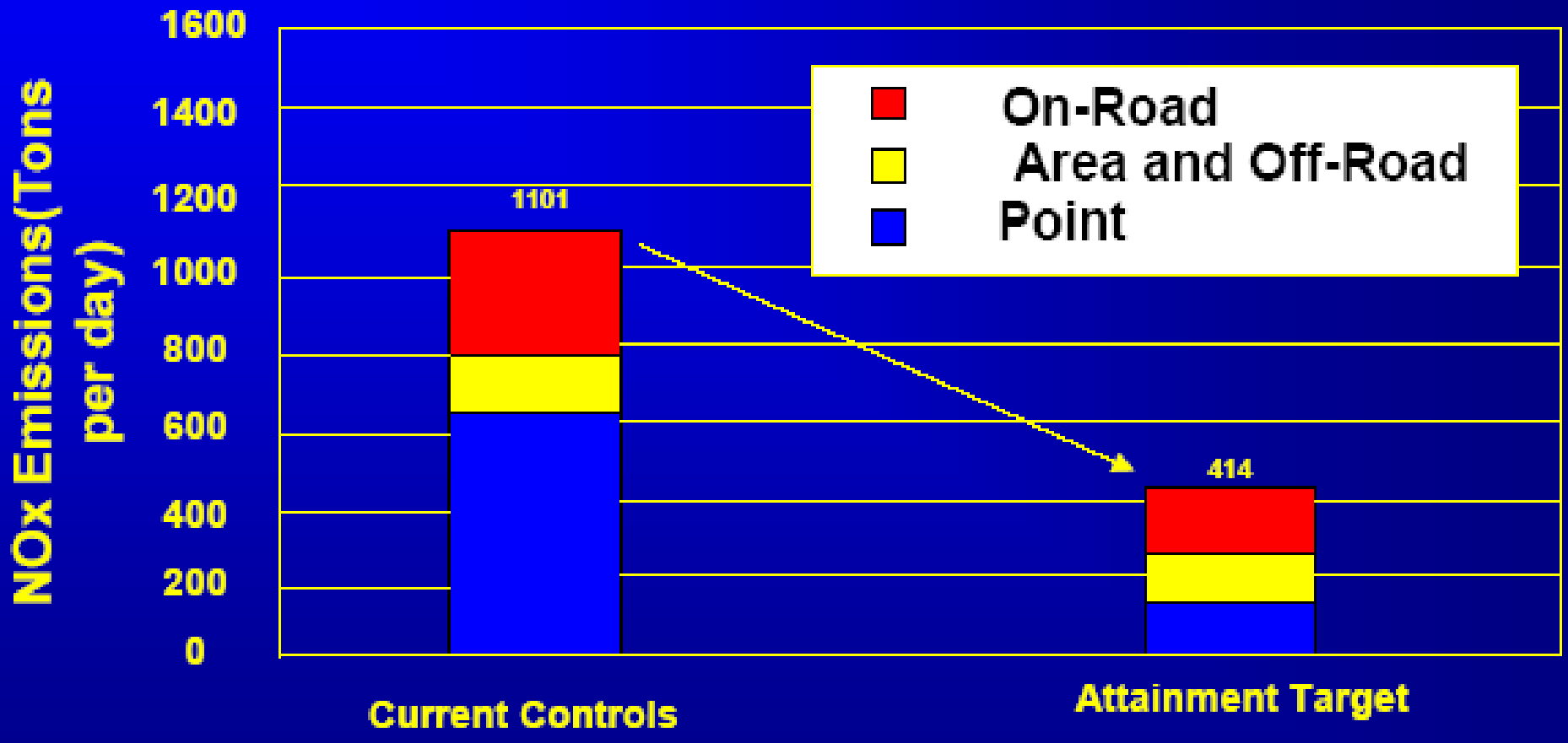
- Off-Road Sources: trains, ships, and construction equipment

Photochemical Modeling

- Attempts to replicate a past high ozone episode
- If model is performing correctly, then future scenarios are modeled to determine what control strategies are necessary



Houston's NOx Emissions



Source: TNRCC'S 2000 SIP DEMONSTRATION

Why do we measure emissions? Determining applicability of certain air programs (ex. New Source Review in Title I of the CAA)

- Purpose of NSR Program
  - Air quality does not worsen in nonattainment areas (NNSR)
  - Air quality is not significantly degraded where air is currently clean (PSD)
  - Major sources should install modern control equipment when built (for new sources) or when major modifications made that increase emissions significantly (for existing sources)
- Only applicable to **Major** new or modified sources if emissions in excess of certain thresholds
  - Ex/ Houston's NNSR threshold for NOx is 25 tons per year
  - Ex/ PSD threshold is generally 250 tons per year (depending on source category)

How do you determine if new source or modification is Major?

- Based on calculation of Potential to Emit
  - Potential to emit, or PTE, is the maximum amount of air pollution facility can emit if
    - each process unit is operated at 100 percent of its physical and operational design capacity;
    - materials that emit the most air pollution are used 100 percent of the time;
    - all of the equipment is operation 24 hours per day, 365 days per year (8,760 hours per year); and no pollution control equipment is used.
- How do I calculate PTE?

1) Identify your emissions units. An emission unit is an activity that emits or has the potential to emit pollution to the air.. Emissions units do not always connect to a vent or a stack.

2) List all possible pollutants from these units, including NOx, SOx, CO, VOCs, PM-10 and HAPs.

3) Calculate your emissions (typically by using AP-42 factors)

Sample of AP-42 Calculation - Tanks

7.1.3.1 Total Losses From Fixed Roof Tanks4,8-14 –
The following equations, provided to estimate standing storage and working loss emissions, apply to tanks with vertical cylindrical shells and fixed roofs. These tanks must be substantially liquid- and vapor-tight and must operate approximately at atmospheric pressure. The equations are not intended to be used in estimating losses from unstable or boiling stocks or from mixtures of hydrocarbons or petrochemicals for which the vapor pressure is not known or cannot be readily predicted. Total losses from fixed roof tanks are equal to the sum of the standing storage loss and working loss:
LT = LS + LW (1-1)
where:
LT = total losses, lb/yr
LS = standing storage losses, lb/yr, see Equation 1-2
LW = working losses, lb/yr, see Equation 1-29
7.1.3.1.1 Standing Storage Loss
The standing storage loss, LS, refers to the loss of stock vapors as a result of tank vapor space breathing. Fixed roof tank standing storage losses can be estimated from Equation 1-2, which comes from the previous edition of Chapter 7 of AP-42.
LS = 365 VV WV KE KS (1-2)
where:
LS = standing storage loss, lb/yr
VV = vapor space volume, ft3, see Equation 1-3
WV = stock vapor density, lb/ft3
KE = vapor space expansion factor, dimensionless
KS = vented vapor saturation factor, dimensionless
365 = constant, the number of daily events in a year, (year)-1
Tank Vapor Space Volume, VV - The tank vapor space volume is calculated using the following equation:
$V_V = (0.785)(D^2)(H_{VO})$

**Some problems with relying on emissions estimates using AP-42 factors:

- Problems with estimating non-routine emissions (e.g. upset, startup, shutdown, and maintenance emissions)
- Equipment can operate differently in the field than as designed

Why do we measure emissions? Determining Compliance

How do you determine if facility is actually meeting the AP-42 factors and other emission limits established by rules and permits?

- Direct measurements
  - Ex. CEMs, Method 21 for LDAR components, etc.
- Indirect measurements
  - PEMs or other indirect measurement (ex. measuring temperature, pressure, flow-rate, etc.)
- Sometimes you don't or can't

**Monitoring requirements established in various laws including MACT, NSPS, NSR/PSD permit conditions, Title V, state rules, emissions reporting rules such as the GHG reporting rule, and many others

Example of Monitoring Requirement – Equipment Leaks

Subpart bb - AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS

265.1062 - Alternative standards for valves in gas/vapor service or in light liquid service: skip period leak detection and repair.

(a)(1) An owner or operator subject to the requirements of 265.1057 may elect for all valves within a hazardous waste management unit to comply with one of the alternative work practices specified in paragraphs (b) (2) and (3) of this section.

(2) An owner or operator must notify the Regional Administrator before implementing one of the alternative work practices.

(b)(1) An owner or operator shall comply with the requirements for valves, as described in 265.1057, except as described in paragraphs (b)(2) and (b)(3) of this section.

(2) After two consecutive quarterly leak detection periods with the percentage of valves leaking equal to or less than 2 percent, an owner or operator may begin to skip one of the quarterly leak detection periods (i.e., monitor for leaks once every six months) for the valves subject to the requirements in 265.1057 of this subpart.

(3) After five consecutive quarterly leak detection periods with the percentage of valves leaking equal to or less than 2 percent, an owner or operator may begin to skip three of the quarterly leak detection periods (i.e., monitor for leaks once every year) for the valves subject to the requirements in 265.1057 of this subpart.

(4) If the percentage of valves leaking is greater than 2 percent, the owner or operators shall monitor monthly in compliance with the requirements in 265.1057, but may again elect to use this section after meeting the requirements of 265.1057(c)(1).

The Credible Evidence Rule

- Statutory and Historic Background
- Regulatory Changes
- Relation to Title V Monitoring
- Relation to Compliance Certification

Background

- 1970 Clean Air Act: Test Methods used to demonstrate compliance with regulations
- General provisions of parts 60 and 61:
  - Compliance determined in accordance with performance tests
  - Source owners required to operate and maintain facility consistent with good air pollution control practices at all times
  - Administrator may use monitoring results, opacity observations, procedure reviews, and inspections and other means to determine compliance
- Past court interpretations of CAAA:
  - Portland Cement Assoc. v. Ruckelshaus (1973)
    - Method used for compliance must be same as method used to set standard
  - *Donner Hanna Coke v. Costle (1979)*
    - The use of a non-reference method was "arbitrary and capricious" in conducting enforcement actions
  - *U.S. v. Kaiser Steel (1984)*
    - The use of the applicable test method was the exclusive method available to determine compliance with a regulation
- Other Court Cases related to use of CE for enforcement: National Lime Assoc. v. EPA (1980), PPG Industries v. Costle (1980), US v. Zimmer Paper products (1989), United States v. SDG&E, No. 3:06-CR-0065 (S.D. Cal. Mar. 9, 2007)

Changes by the 1990 Clean Air Act Amendments

- **Section 103(a)** An enforcement action may be based on "any information available"
- **Section 113(e)(1)** (Penalty calculation) the duration of a violation is established by "any credible evidence", including evidence other than that in the applicable test method.

Applications of CE in Enforcement

- **Sierra Club filed a CAAA citizen suit - 1995**
  - SC alleged: PSC's Hayden power plant violated the 20% opacity limit 19,000+ times in 5 years.
  - PSC argued: only Method 9 observations can establish ongoing violations, not COMS data.
  - Court finding: SIP does not limit citizens to a specific method in proving a violation, and that COMS data/reports were undisputed evidence of ongoing opacity violations

Other CE Applications

- Unitek used a broad range of data to prove that Hawaiian Cement violated the state PM standard, including;
  - EPA NOVs
  - HDOH non-compliance letters
  - Independent analysis of PM emissions data
  - Permit application indicated noncompliance and identified corrective action
- Court found that the entirety of the evidence showed Hawaiian Cement in violation

EPA Regulatory Action

- Changes to Regulations (62 FR 8314-8328):
  - 51.12 (Content of SIP)
  - 52.12 (Federal Enforcement of SIP)
  - 52.30 (Compliance Certification)
  - 60.11 (Compliance with NSPS)
  - 61.12 (Compliance with NESHAP)
- Regulatory Language Additions:

  "…nothing in this part shall preclude the use... of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed."
- Note that CE can be used to demonstrate either compliance or non-compliance.

Court Challenges to Regulations

- Challenges were heard by U.S. Court of Appeals (*Clean Air Project v. EPA, 1997*)
  - The Court delayed a decision on the CE rule: Challenges must be based on a specific case.
- Effect on Citizen Suits
  - Private citizens may use Credible Evidence to enforce the CAA;
  - The CE Rule creates no new rights or powers for citizen enforcers.

Effects on Monitoring Design or Operations?

- CE of a violation is NOT a test or gauge against which to judge effectiveness of monitoring design;
- For example, Part 64 procedures require justification of monitoring design and indicator ranges that provide reasonable assurance of compliance.

Effect on Compliance Certifications?

- EPA presumption re: part 64 – A device that operates within indicator ranges is presumed to be in compliance with emissions standards;
- Excursion(s) from indicator ranges does not prove noncompliance, source owner may use other information to augment certification (for any certification elements, not just for part 64 data).

Effects on Enforcement?

- Compliance with monitoring plan does not shield against enforcement action if credible evidence shows otherwise;
  - Prompt corrective action of excursions or exceedances does not establish a shield against enforcement.
  - The permittee is liable for CAM excursions specified as enforceable permit terms.
- *However: SDG&E court held, the rule does not supplant the Federal Rules of* Evidence or undercut the fundamental importance of promulgated test methods that define, as a threshold matter, what constitutes regulated material.

  -----"Of course, in judicial enforcement proceedings, what evidence is credible and admissible will be determined by the court taking into account how the evidence was gathered and the specifics of the emission standard and any associated reference method"

Current Status of the Credible Evidence Rule

- Has been reined back a bit since 1997, but still fairly broad
- In addition to *SDG&E, BP Amoco* case:
  - credible evidence rule was held unavailable to private litigants in a contract dispute
  - court rejected the use of evidence outside the specific testing authorized by the plant permit, reasoning that the EPA credible evidence rule is limited to "federal enforcement actions," and even suggested that the credible evidence rule is misplaced in citizen suits
  - "proof of noncompliance is limited to the means and methods specified in the Title V Permit."
- Current status appears to be that the rule allows the use of continuous monitoring data in substitution of infrequent reference testing to prove CAA violations.

Roadmap of Where We've Been

- Measuring emissions—the Big Picture of what we are trying to do
- Why do we measure emissions (e.g. what are the underlying legal drivers that require us to measure)?
  - Setting NAAQS and developing other air quality standards/programs
  - Determining applicability of certain air programs (e.g. NSR/PSD, Title V)
  - Determining compliance
  - Assessing Modeling/Health Effects impacts
  - Paying fees
- How do we measure emissions
  - Estimates using emission factors (i.e. AP-42)
  - CEMs, PEMs, and other current techniques
  - The future—more remote sensing techniques???