NACT 325
ENFORCEMENT OF NSR/PSD REQUIREMENTS

NACT 325

Introduction - Who, What, Why, and When?

2

Online Housekeeping

Instructor & Student Introductions

Online Agenda / Length of course

Breaks

Caveats

3

Introductions - Students

- Name
- Agency
- Title / Responsibility
- Years of Experience

Lessons

Lesson 1 – Introduction
Lesson 2 – Stationary Sources
Lesson 3 – Case Development
Lesson 4 – Utility Case Study
Lesson 5 – Potential to Emit
Lesson 6 – BACT
Lesson 7 – Air Quality Review
Lesson 8 – PSD Applicability
Lesson 9 – NSR (Non-attainment)
Lesson 10 – Effective Permit Conditions
Lesson 11 – Enforcement Techniques
Lesson 12 – Refinery FCCU Case Study
Lesson 13 – NSR Settlements
Lesson 14 – Compliance & Enforcement Considerations
Lesson 15 – Avoidance Permits
Lesson 16 – Case Studies

Lesson 1
INTRODUCTION

Objective

- What is a Stationary source?
- What are NSR and PSD?
- What sources are subject to these regulations?
- How does EPA choose enforcement targets
- Power Plant and Refinery Case Studies
- How do these requirements fit into permits?
- Overview of how to enforce permits
- More Case Studies

What are the *components* of the NSR program?

New Source Review (NSR) Program

- **Major NSR in attainment areas (PSD)**
- **Major NSR in nonattainment areas (NA NSR)**
- **Minor NSR in all areas**

What is NSR and PSD

- NA NSR – New source review
  - Federal program for major sources located in areas that do not attain ambient air quality standards
- PSD – Prevention of Significant Deterioration
  - Federal program for major sources located in areas that do attain ambient air Standards

Why Are These permits of Special Interest

- NSR/PSD Sources are big and important
- Most Complicated and Complex Permit rules
- Sources subject to these permit requirements tend to be the most controversial and/or important sources

Permits Needed

- Purpose of this session:
  - Identify what sources are subject to these requirements
  - What elements are needed in permits
  - Understand what makes a permit “good”
  - Understand how permits conditions can complicate enforcement or enhance enforcement

Sequence

- First, what is a new source
- Second, what are modified sources
- Third, what affected sources have to do to get their permit
- Fourth, how to avoid NSR/PSD
- Fifth, what makes a good permit condition
- Sixth how to enforce the permit conditions
- Finally how does EPA decide on what sources to enforce

What is the *purpose* of the PSD/NSR program?

- To ensure *environmental protection while allowing economic growth!*

What Pollutants are covered

- All Criteria Pollutants (NAAQS)
- All Hazardous Air Pollutants (Sect. 111)
- Any other Pollutants except hazardous air pollutants regulated under the CAA
- Greenhouse Gases (assumed)

Greenhouse Gases

- Supreme Court issued decision on EPA GHG PSD Rules on 23 June 2014
- Ruled that EPA could not set a trigger level higher than that in the CAA i.e. 100 or 250 tpy
- However EPA can include GHG for sources otherwise covered by PSD (Anyway Sources)

Greenhouse Gases (con't)

- Currently EPA has a Significant Emission Rate (SER) of 75,000 tpy for GHG.
- According to the Decision "EPA must justify its selection on proper grounds."
- Probable new regulations needed

GHG and CO2 Equivalent

- Gases covered include Carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride
- Nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are more powerful climate change compounds than CO2
- Table A-1 to 40 CFR 98 gives equivalents

LESSON 2

Stationary Source

Objectives

- Understand the different types of sources
- Understand what are the elements of a major source
- Understand what constitutes a modification
- Understand activities which are not modifications

Which Sources

- We are looking at PSD/NSR and
- Both regulations affect only major sources
- Spend some time looking at the elements of a source

“Major Source” Thresholds for NSR for Ozone, PM, and CO Depending on Non Attainment

Area Classification		Major Source PTE (tpy)
Ozone	Marginal	100 (precursors i.e. NOx and VOC)
Ozone	Moderate	100
Ozone	Serious	50
Ozone	Severe	25
Ozone	Extreme	10
CO	Moderate	100
CO	Serious	50
PM10	Moderate	100
PM10	Serious	70
PM 2.5		

PSD Major Source Thresholds

- 1. Coal cleaning plants (with thermal dryers)
- 2. Kraft pulp mills
- 3. Portland cement plants
- 4. Primary zinc smelters
- 5. Iron and steel mills
- 6. Primary aluminum ore reduction plants
- 7. Primary copper smelters
- 8. Municipal incinerators capable of charging more than 250 tons of refuse per day
- 9. Hydrofluoric acid plants
- 10. Sulfuric acid plants
- 11. Nitric acid plants 2
- 12. Petroleum refineries
- 13. Lime plants
- 14. Phosphate rock processing plants
- 15. Coke oven batteries
- 16. Sulfur recovery plants
- 17. Carbon black plants (furnace process)
- 18. Primary lead smelters
- 19. Fuel conversion plants
- 20. Sintering plants
- 21. Secondary metal production plants
- 22. Chemical process plants
- 23. Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels
- 24. Taconite ore processing plants
- 25. Glass fiber processing plants
- 26. Charcoal production plants
- 27. Fossil fuel-fired steam electric plants of more than 250 million British thermal units (BTU) per hour heat input
- 28. Fossil-fuel boilers (or combination thereof) totaling more than 250 million BTU/ hour heat input

Potential To Emit

- Both NSR and PSD thresholds based on Potential to Emit (PTE) for new sources
- PTE is defined in both NSR and PSD rules as: the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of fuel combusted, stored or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable.

Potential To Emit

- In simple terms PTE is the maximum emissions that the source can produce or is allowed to produce
- For many sources PTE is very hard to calculate

PTE Examples

- Fuel Burning sources like boilers and process heaters are frequently assumed to run at nameplate capacity for up to 8760 per year
- Non-emergency generators are generally assumed to run 100% of the time or 8760 hours
- Emergency generators are limited (by EPA) to 100 hours per year.
- Batch operations like auto refinishing take into account startup clean up and actual paint time

What is a Source

Stationary source is defined in two ways:

- "Building, Structure, or Facility" = "the Plant"
  - Includes all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more adjacent properties, and are under the control of the same owner or operator.
- "Installation" = "the emissions unit"
  - An identifiable piece of process equipment.

Same Industrial Classification

- Means part of the same two digit NAISCs or SIC

- Support facilities are also included regardless of SIC

Common Control

- First Assumption = common ownership
- On the same property = common control
- Contractual exclusivity also implies common control

Adjacent or Contiguous

- According to Merriam Webster:
  - Contiguous means being in actual contact: touching along a boundary or at a point, and
  - Adjacent means close or near : sharing a border, wall, or point
- EPA considers the functional interrelationships between activities to determine if they adjacent

Adjacent or Contiguous (con't)

- August 2012 decision in Sixth Circuit overturned EPA position
- December 2012 EPA memo – outside of 6^{th} Circuit no change in position
    - (MI, OH, TN, KY)
- May 2014 US Court of Appeals for the D.C. Circuit overturned 2012 EPA Memo

Major Source

- Talked about “Source”
- What is a major Source

What is a Major Source?

- Depends on location and source type
- NSR PTE of 100 tpy or less
- PSD PTE of 250 tpy unless listed
  - *Major for One, Major for All*" — If a source emits even one pollutant (attainment or non attainment) in major amounts, the source will be considered major. Then all attainment pollutants, even those emitted in non-major amounts, will be reviewed for PSD applicability by using their respective *Significant Emissions Rate (SER).* Emissions equal to or higher than the SER make the pollutant subject to PSD

Major HAP Source

A source with Potential to Emit of:

- 10 tpy of a Single Hazardous Air Pollutant, or
- 25 tpy of a Combination of Hazardous Air Pollutants

Significant Emission Rates (tpy) PSD

Carbon monoxide	100
Nitrogen oxides	40
Sulfur dioxide	40
Particulate matter (PM/PM-10/PM-2.5)	25/15 /10
Ozone (VOC)	40 (of VOCs)
Lead	.6
Fluorides	3
Sulfuric acid mist	7
Hydrogen sulfide (H2S)	10
Total Reduced sulfur compounds (including H2S)	10

Significant Emission Rates (SERs)

Significant Emission Rate – a rate of emissions that would equal or exceed any of the following rates:

Pollutant	SER (tpy)	Pollutant	SER (tpy)
Carbon Monoxide	100	Hydrogen sulfide(H_2S)	10
Nitrogen Oxide	40	Total reduced sulfur (including H_2S)	10
Sulfur Dioxide	40	Reduced sulfur compounds (includes H_2S)	10
Particulate Matter	25 PM, 15 PM_{10}, 10 $PM_{2.5}$	Municipal waste combustor organics	3.5×10^{-6}
Ozone	40 of VOCs	Municipal waster combustor metals	15
Lead	0.6	Municipal waste combustor acid gases	40
Fluorides	3	Municipal solid waste landfills emissions	50
Sulfuric acid mist	7		

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Example

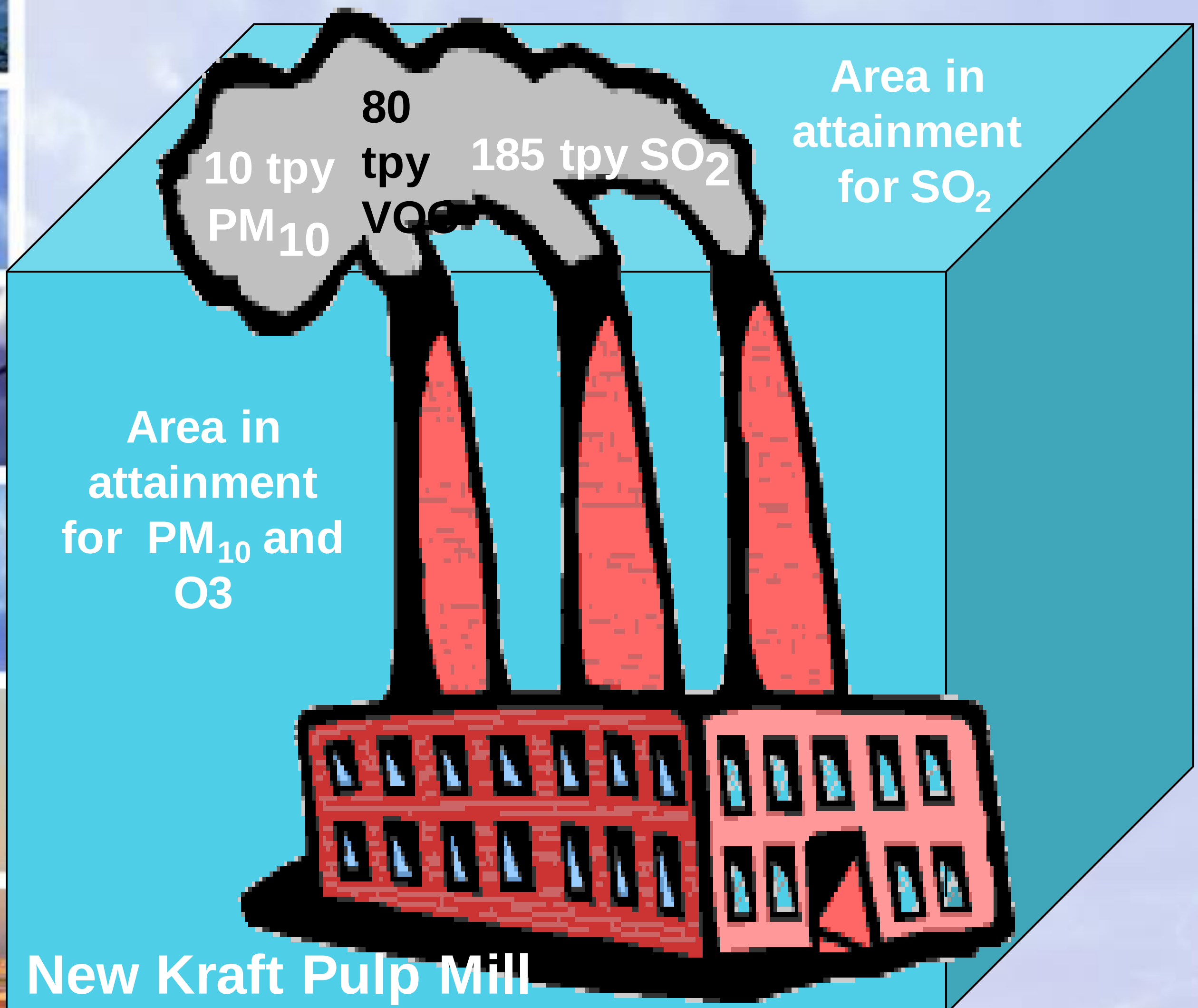
Let's try an

Applicability example

<u>Taken from an EPA power point presentation</u>

First a simple example

Example: Which pollutants are subject to PSD, NA NSR, and minor NSR permitting?



- **Facts:**
- Kraft pulp mills produce the dark-colored wood pulp used in the manufacture of a variety of paper products
- The tons per year (tpy) in the plume are the mill's potential to emit these pollutants

Example Solution

- **Mill's PTE:**
- SO2=185 tpy
- VOC=80 tpy
- PM10=10 tpy
- **Area is in:**
- Attainment for SO2
- Attainment for O3 and PM10

1. Evaluate for PSD
   - Determine what the applicable threshold is
     - ✓ Since kraft pulp mills are one of the 28 listed source categories, the **major source threshold is 100 tpy, not 250 tpy**
   - Determine if the source is major based on the threshold
     - ✓ In this case, the SO_2 emissions are 185 tpy, which is greater than 100 tpy. This makes the mill **a major source for PSD. Now we have to review all attainment pollutants for PSD applicability.**

Example solution (Cont'd)

- **Mill's PTE:**
- SO2=185 tpy
- VOC=80 tpy
- PM10=10 tpy
- **Area is in:**
- Attainment for SO2
- Attainment for O3 and PM10

- Review the two attainment pollutants based on their SER to see if they fall into PSD
  - ✓ The mill's VOC PTE is 80tpy, but VOC is not on the SER list. However, it is a precursor for ozone, and ozone is on the list with a SER of 40 tpy. **VOC is subject to PSD because PTE is higher than 40 tpy.**
  - ✓ PM_{10} is on the SER list with a SER of 15tpy. The mill's PM_{10} PTE is 10tpy, which is less than the SER. **PM_{10}, not subject to PSD.**

MODIFICATIONS

- In addition to major sources we must be concerned with modified sources also

Modified Sources

- Modification (for both PSD and NSR) defined as means any physical change in or change in the method of operation of a major stationary source that would result in: a significant emissions increase of a regulated NSR pollutant and a significant net emissions increase of that pollutant from the major stationary source.

Significant Emission Rates (tpy) PSD

- Carbon monoxide 100
- Nitrogen oxides 40
- Sulfur dioxide 40
- Particulate matter (PM/PM-10, PM 2.5) 25/15 /10
- Ozone (VOC) 40 (of VOCs)
- Lead .6
- Fluorides 3
- Sulfuric acid mist 7
- Hydrogen sulfide (H2S) 10
- Total Reduced sulfur compounds (including H2S) 10

"Significant Net Emission Increase" for NSR

Area Designation		Modification Trigger (tpy)
Ozone	Attainment	40 (NOx and VOC precursors)
Ozone	Marginal	40
Ozone	Moderate	40
Ozone	Serious	25 (count all increases in 5 years)
Ozone	Severe	25 (count all increases in 5 years)
Ozone	Extreme	0
CO	Attainment	100
CO	Moderate	100
CO	Serious	100 (if mobile sources significant)
CO	Serious	50
PM2.5	All	10
PM10	All	15
PM	All	25
NO2	All	40
SO2	All	40
Any other pollutant subject to regulation	All	any amount for those not listed in the rule*

*More pollutants are listed in the rule than are in this table.

Is It a Modification>

- *Physical changes or changes in the Method of Operation Include:*
- New Production Lines
- Increased capacity of existing equipment
- Process reconfiguration
- Change in fuels not otherwise exempt
- Non-routine replacement

Exemptions

- *The following are <u>not,</u> by themselves, physical changes or a changes in method of operation:*

- Routine maintenance, repair, or replacement
- Alternative fuel or raw material that the **source** was capable of accommodating before 1975
- Increase in operating rate or hours of operation that does not exceed a permit limit
- Change in ownership, with no other changes
- Certain 1970’s energy crisis driven conversions
- [Additional state exemptions]

Routine Maintenance, Repair and Replacement (RMRR) Exemption

- WEPCO Multi-factor Test
  - **Nature and Extent**
  - Frequency
  - Purpose
  - Cost

Routine Maintenance, Repair and Replacement Exemption -- WEPCO

- Nature and Extent
  - Indications of Non-Routine Changes (from <u>Cinergy</u>)
    - Use of "several outside contractors"
    - "Several multi-volume planning studies"
    - Time to complete the project: 13 weeks; 15 weeks
    - "A majority of the parts of the unit, and in some cases every part of the unit, was modified or replaced, redesigned or upgraded"
    - "Permanent improvements"
    - Not like-kind replacements

Routine Maintenance, Repair and Replacement (RMRR) Exemption

- WEPCO Multi-factor Test
  - Nature and Extent
  - **Frequency**
  - Purpose
  - Cost

Routine Maintenance, Repair and Replacement Exemption -- WEPCO

- Frequency
  - Indications of Non-Routine Changes
    - Occurs once or twice in the life of a unit
    - Replacement of original components that have never been replaced
    - Projects of this type occur infrequently in the industry
  - Courts tend to scrutinize this factor more than the others

Routine Maintenance, Repair and Replacement Exemption - WEPCO

- Frequency Cases
  - United States v. Southern Indiana Gas and Electric Company, (S.D. Ind. February 13, 2003).
  - United States v. Ohio Edison, (S.D. Ohio 2003).
  - United States, et al., v. Duke Energy Corporation, (M.D.N.C. 2003).
  - United States, et al., v. Cinergy Corp., (S.D. Ind. 2007).

Routine Maintenance, Repair and Replacement Exemption -- WEPCO

<u>United States v. SIGECO</u> , (S.D. Ind. 2003)

- Court applied WEPCO multi-factor test
- Affirmed EPA's then held view "only to activities that are routine for a generating unit"
- Court upheld EPA's interpretation as reasonable and persuasive
- However, the frequency of similar projects within an industry may inform the analysis so long as the exemption does not "swallow the modification rule"

Routine Maintenance, Repair and Replacement Exemption -- WEPCO

<u>Ohio Edison</u> (S.D. Ohio 2003)

> "It is the frequency of an activity at a particular unit that is most instructive . . . ."

> "Types of activities undertaken within the industry as a whole have little bearing on the issue if an activity is performed at a unit only once or twice in the lifetime of that unit."

Routine Maintenance, Repair and Replacement Exemption -- WEPCO

Duke (M.D.N.C. 2003)

- Evaluated what was routine within the industry
- "Determination of RMRR cannot turn exclusively on whether a particular replacement project has ever occurred in the industry. If this were dispositive, it would render the PSD program a nullity."
- Followed by:
  - Ala. Power (N.D. Ala 2005); EKPC (C.D. Ky 2007)
- Court's decision is currently under review

Routine Maintenance, Repair and Replacement Exemption -- WEPCO

Cinergy (S.D. Ind. 2007)

- Pre-trial decision court
  - Applied the WEPCO test
  - Deferred to EPA's three hallmarks argued in SIGECO
- At trial, the Court also applied WEPCO --
  - Jury rejected Cinergy's "RMRR" for all 14 counts
- Jury question:
  - "Did Defendants prove by a preponderance of the evidence that the project qualified as a RMRR activity? __ YES X NO"

Routine Maintenance, Repair and Replacement Exemption -- WEPCO

- Purpose
  - Indications of Non-Routine Changes
    - Restoring the unit to an original capacity or efficiency
    - Less outages or downtime
    - Extending the life of a unit beyond its expected retirement date
      - E.g., unit is expected to last 35 years, but project designed to add additional 30 years of service for a total of 65 years - almost 2 times the expected life

Routine Maintenance, Repair and Replacement (RMRR) Exemption

- WEPCO Multi-factor Test
  - Nature and Extent
  - Frequency
  - Purpose
  - **Cost**

Routine Maintenance, Repair and Replacement Exemption -- WEPCO

- Cost
  - Indications of Non-Routine Changes
    - Capitalization of costs
    - Expenditures approved by high level management approval - e.g., company president
    - Comparison of project costs to average annual maintenance costs at the facility - not across the company

Routine Maintenance, Repair and Replacement Exemption

New York II (D.C. Cir. 2006)

- A challenge to the 2003 Equipment Replacement Provision (ERP) rule
- ERP provided a “bright line rule” for determining if a replacement was exempt as a physical change
- Court vacated ERP:
  - Exemptions to be narrowly construed
  - Unlawfully allowed other than *de minimis* emission increases

Is it a “Major” Modification?

A physical change or change in the method of operation of a *major source* that will result in a *significant net emissions increase.*

Significant Emission Rates (tpy) PSD

Carbon monoxide	100
Nitrogen oxides	40
Sulfur dioxide	40
Particulate matter (PM/PM-10/PM 2.5)	25/15 /10
Ozone (VOC)	40 (of VOCs)
Lead	.6
Fluorides	3
Sulfuric acid mist	7
Hydrogen sulfide (H2S)	10
Total Reduced sulfur compounds (including H2S)	10

Major Modification
PSD

- <u>Significant Emissions Increase – *New Units*</u>
  - Actual to Potential
    - – Emissions Increase = PTE – BAE
  - Calculating Baseline Actual Emissions (BAE)
    - – Equals zero for initial construction and operation purposes
    - – Thereafter, and for all other purposes, equals PTE
  - Calculating PTE
    - – Can be limited by enforceable restrictions

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Major Modification (cont'd)
PSD

- <u>Significant Emissions Increase – *Existing Units*</u>

    – Actual to Projected Actual

  – Emissions Increase = PAE – BAE

    BAE = Baseline Actual Emissions

    PAE = Projected Actual Emissions

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Major Modification (cont'd)
PSD

– <u>Significant Emissions Increase – *Existing Units*</u>

- Calculating Baseline Actual Emissions (BAE)
  - Highest of two years in past five

– **With approval non electric utility may use 10 years**

- Calculating Projected Actual Emissions (PAE)
  - Consider all relevant information, including but not limited to, historical operational data, the company's own representations, the company's expected business activity and the company's highest projections of business activity, the company's filings with the State or Federal regulatory authorities.

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PSD

- Major Modification (cont):
  - Significant Emissions Increase (cont)
    - Actual to Potential
    - Emissions Increase = PTE – BAE
    - Hybrid
      - Calculate Actual to Projected Actual or Actual to Potential, depending on whether an emissions unit is new or existing
      - Sum the ***increases*** only

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Modification
PSD

EXERCISE

<u>Major Modification</u>

Let's do some calculations

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EXERCISE

- Scenario 1:
  - New Chemical Process Plant
  - Non-fugitive NOx emissions – 75 T/yr PTE
  - Non-fugitive VOC emissions – 30 T/yr PTE
  - Fugitive VOC emissions – 75 T/yr PTE
- PSD review required?
- Scenario 2:
  - New Source which is not a listed source
  - Non-fugitive NOx emissions – 75 T/yr PTE
  - Non-fugitive VOC emissions – 210 T/yr PTE
  - Fugitive VOC emissions – 75 T/yr PTE
- PSD review required?

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EXERCISE

- Scenario 3:
  - Adding a new < 250 MMBtu/hr boiler at a hospital
  - Hospital existing maximum PTE: 240 T/yr NOx (assume any existing boilers total < 250 Mmbtu/hr)
  - Boiler PTE: 200 T/yr NOx
- PSD review required?
- Scenario 4:
  - Same scenario except the boiler > 250 MMBtu/hr
- Scenario 5:
  - Same as 3, except Boiler PTE is 270 T/yr
- Scenario 6:
  - Same scenario as 3, except the source is a refinery rather than a hospital

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Example

- Lets Look at a couple of examples

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Baseline Actual Emissions

EUSGU (for each emissions unit)

Actual TPY		
900	2002	
870	2003	
970	2004	
850	2005	
900	2006	Date actual construction begins

870 + 970 = 1840/2 = 920

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Baseline Actual Emissions

Non- EUSGU (for each emissions unit)

Actual TPY		
840	1997	
910	1998	
870	1999	
970	2000	
850	2001	
830	2002	
170	2003	0.85 emission reduction limit commences
130	2004	
120	2005	
150	2006	Date actual construction begins

870 + 970 = 1840/2 = 920 * (1 - 0.85) = 138

170 + 130 = 300/2 = 150

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Projected Actual Emissions
(for each emissions unit)

Actual TPY		
960	2009	Unit resumes normal operation
960	2010	
960	2011	
1020	2012	
950	2013	Year 5 (no increase in design cap. or PTE)
1020	2014	
1300	2015	
1300	2016	
1300	2017	
1100	2018	Year 10 (inc. design cap. or PTE)

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Debottlenecking

Significant Net Emissions Increase Must

- Include emissions increases from all emissions units affected by the change, both upstream and downstream
- Removal of any limitation (physical or permitted) in a process line that enables the source to increase throughput can potentially increase emissions at other emissions units upstream or downstream in the process line

Example of Debottlenecking

- Example from July 28, 1983 PSD Determination in Region 10
  - A digester system in a kraft pulp mill produces black liquor which is sent through a multiple effect evaporator system where it is concentrated and is then burned in a recovery boiler
  - When the digester is expanded, in a way that additional black liquor will be produced, emissions from the recovery boiler must be counted in determining the net emissions increase
  - Since the recovery boiler itself will not be undergoing a physical change or change in the method of operation, it will not have to apply BACT

Example of Debottlenecking

- Utility Example
  - A coal prep plant is expanded to provide more coal to a coal fired utility boiler. The boiler is not modified but operates at a higher rate because of the additional coal provided by the coal prep plant.
  - The increase in emissions from the boiler must be counted in determining the net emissions increase caused by the expansion of the coal prep plant.
  - Since the boiler itself will not be undergoing a physical change or change in the method of operation, it will not have to apply BACT, but BACT must be applied at the coal prep plant for each pollutant for which NSR is triggered.

NETTING

- A major modification occurs if there is a significant net increase

Netting

- Netting analysis uses projected new emissions rather than potential
- *Projected actual emissions* means the maximum annual rate, in tons per year, at which an existing emissions unit is projected to emit a regulated NSR pollutant in any one of the 5 years (12-month period) following the date the unit resumes regular operation after the project, or in any one of the 10 years following that date, if the project involves increasing the emissions unit's design capacity or its potential to emit that regulated NSR pollutant and full utilization of the unit would result in a significant emissions increase or a significant net emissions increase at the major stationary source.

"Significant Net Impact"

The process of considering contemporaneous and creditable changes at an existing **major source** to determine if a "significant net emissions increase" of a pollutant will result from a modification.

A two step process – a significant emission increase and a significant net emission increase.

Calculate the emissions increases

- Calculate emissions increases by unit and pollutant
  - New units
    - Baseline Actual-to-potential test [52.21(a)(2)(d)]
    - Baseline emissions equal 0 ∴ increase = PTE
  - Modified and Debottlenecked units
    - Baseline Actual-to-projected-actual test; or
    - Baseline Actual-to-potential test

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Netting Equation

Net Emissions Change =

Emissions <u>increases</u> associated with the proposed modification

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(netting is optional)

MINUS

All source-wide creditable contemporaneous emissions <u>decreases</u>

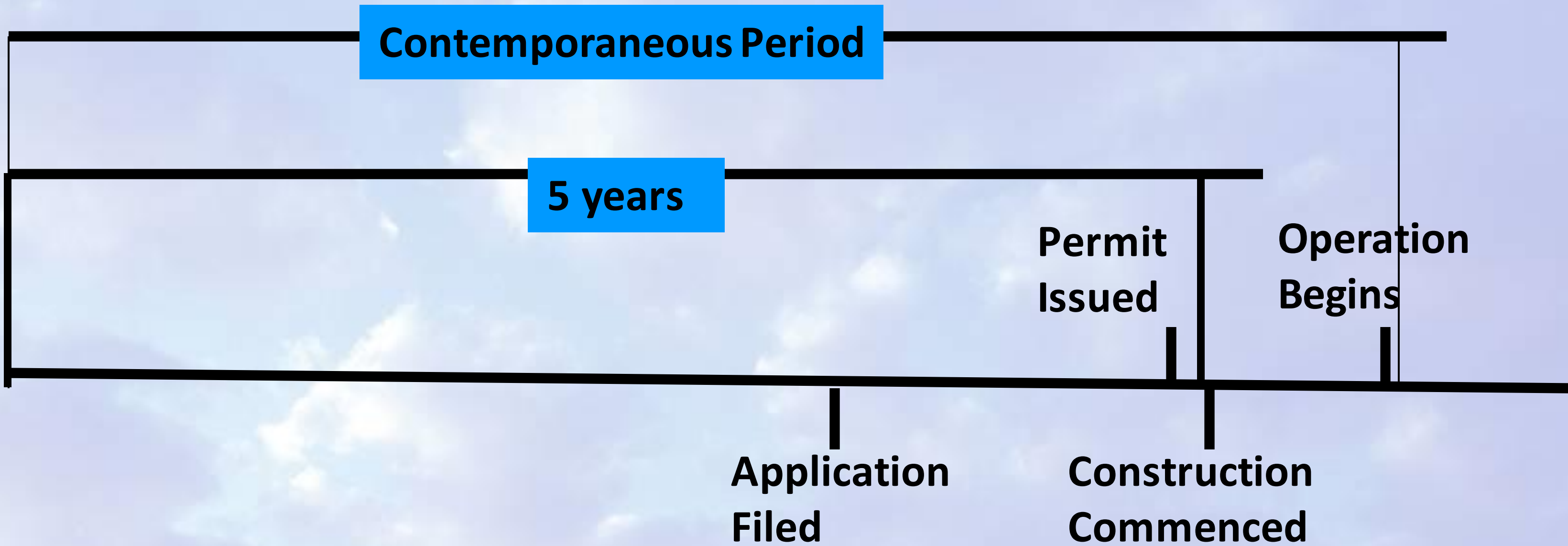
PLUS

All source-wide creditable contemporaneous emissions <u>increases</u>

Creditable Contemporaneous Emissions

- Emission increases and decreases are credible if:
  - They have occurred within 5 years of modification
  - Have not been relied upon for permits

Contemporaneous Emissions Increases and Decreases



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Summary of Applicability Process for Modifications

Determine if the source is an existing major source

- Based on PTE
- 100/250 tpy thresholds
- Count fugitives if in one of the 28 listed source categories

Identify all units with a physical change or change in the method of operation

- Increase in permitted emissions may indicate a physical change or change in the method of operation
- Does not include RMRR
- Does not include increases in hours of operation or production unless prohibited by permit, or the units with increased production are being debottlenecked

Determine if there is a significant emissions increase

- Only count increases from the current project
- Use actual-to-potential or actual-to-projected-actual tests as appropriate
- Properly calculate baseline
- If no significant increase, PSD does not apply

Determine if there is a significant net emissions increase

- Sum all increases and decreases from the current project along with all other creditable increases and decreases at the source during the contemporaneous period

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Major Modification

NSR Applicability to a Proposed Modification

To determine whether or not a proposed modification at an existing major stationary source is a Major Modification, we use a two-step test:

1. Step one is to determine if there is a "significant emission increase" of a regulated NSR pollutant from the proposed modification "project"
2. Step two is to determine whether or not the "project" results in a "significant net emissions increase" of that pollutant

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PSD & NNSR
Project Emissions Accounting

<u>EPA Revises the NSR Applicability for Modifications</u>

On 10/22/2020 EPA finalized a rule to clarify the process for evaluating whether NSR applies to a proposed modification at a major stationary source.

- The final rule clarifies that both emission increases and decreases from a major modification are to be considered during “Step One” of the two-step NSR applicability test.
- This process is called “Project Emissions Accounting” and applies to projects that include a combination of new and existing units

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Project Emissions Accounting (Cont'd)

<u>EPA Revises the NSR Applicability for Modifications</u>

- This final rule applies to EPA and permitting authorities that have been delegated federal authority from EPA to issue NSR permits on behalf of EPA
- State and Local Agencies that implement NSR program through an EPA-approved SIP, are <u>not</u> required to modify their program to account for this final rule and may continue to implement their current program without change.

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Netting Exercise

Calculating Baseline Emissions for a Non-EUSGU (Example 1)

Year	VOC Emissions
1998	75 tpy
1999	85 tpy
2000	95 tpy
2001	80 tpy
2002	60 tpy
2003	80 tpy
2004	75 tpy
2005	40 tpy
2006	55 tpy
2007	75 tpy

90 tpy

The look-back period for a unit other than an electric utility steam generating unit is any consecutive 24-month period within the 10-year period immediately preceding the date a complete application was submitted.

All else being equal, in this case the source would likely elect to use the emissions from 1999 and 2000 to calculate the baseline actual emissions

Permit application submitted in at the beginning of 2008

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Calculating Baseline Emissions for a Non-EUSGU (Example 2)

Year	VOC Emissions
1998	750 tpy
1999	1,000 tpy
2000	1,000 tpy
2001	800 tpy
2002	70 tpy
2003	60 tpy
2004	65 tpy
2005	60 tpy
2006	70 tpy
2007	60 tpy

← Requirement for thermal oxidizer to reduce emissions by 90%

← Permit application submitted in at the beginning of 2008

Exercise
Netting

- Example 1:
  - 7/1/06: Complete permit application submitted
  - 10/1/07: Permit issued (Estimated)
  - 10/30/07: Construction commenced (Estimated)
  - 12/1/08: New unit commences operation (Estimated)
  - PTE related to new construction is 28 T/yr
  - 5/1/02: 50 T/yr reduction
  - 6/1/04: 10 T/yr increase
  - 8/1/06: 45 T/yr increase
  - 3/1/07: 65 T/yr decrease
  - 1/1/09: 25 T/yr increase
- Example 2: Same as Example 1 except new construction PTE is 55 T/yr
- Example 3: Same as Example 2 except pre 8/1/06 were used to net out 8/1/06 increase

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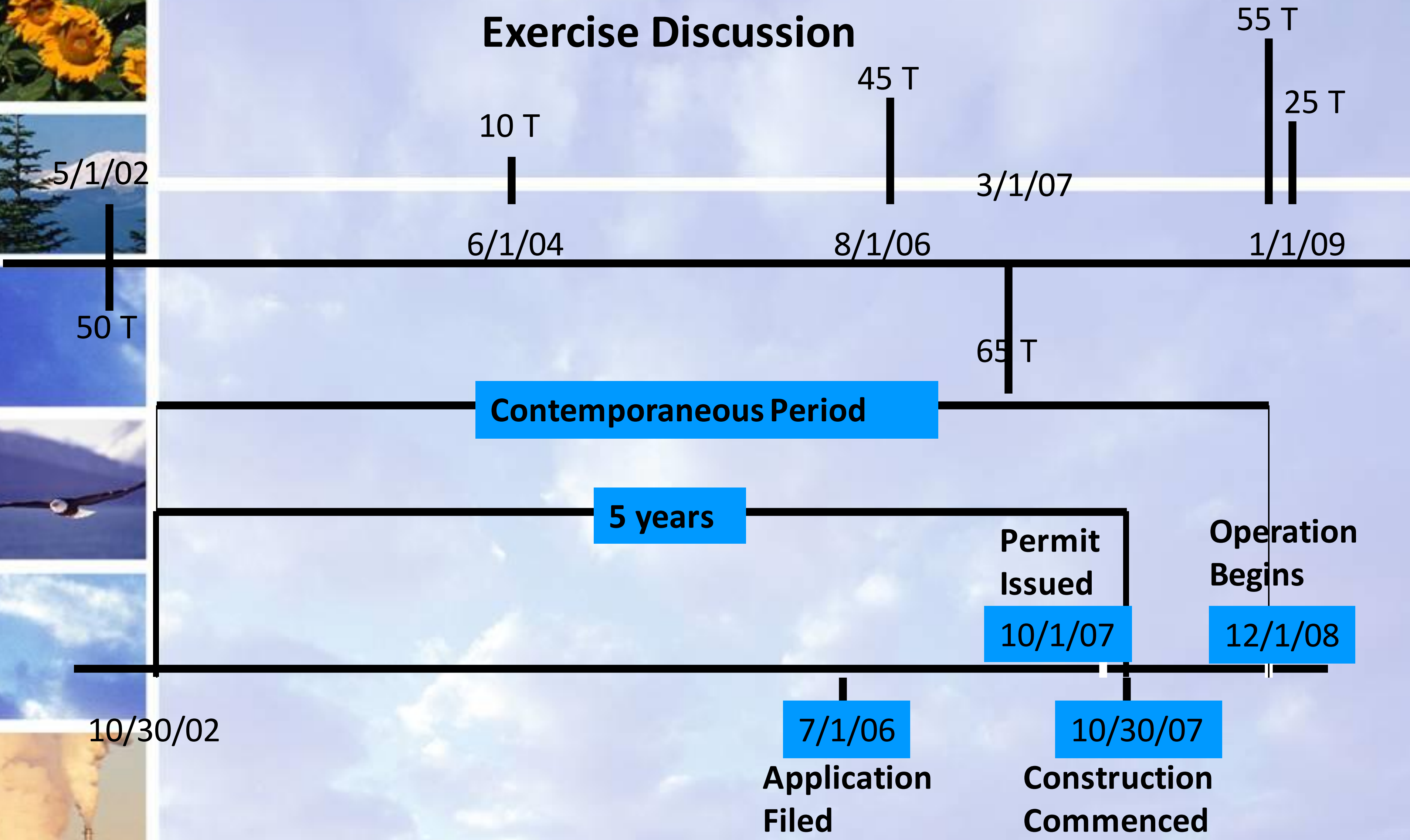
Exercise Discussion



PRACTICAL EXERCISES – NETTING

- **<u>EXERCISE 1</u>**
- An existing minor source (subject to the 100 ton per year threshold for the list of 28) proposes a modification. The modification involves the shutdown and removal of an old emissions unit (providing an actual contemporaneous reduction in NOx emissions of 75 tpy) and the construction of two new units with a total projected actual NOx emissions of 110 tpy.
- **Does PSD apply to the new units?**
- **Why or Why not?**

PRACTICAL EXERCISES – NETTING

- **<u>EXERCISE 2</u>**
- An existing major source is located in an area which is attainment for all criteria pollutants. The source had less-than-significant increases of NOx (30 tpy) and SO2 (15tpy) two years ago, and a 50 tpy decrease of SO2 three years ago. The source now proposes to add a new process unit with an associated projected increase in emissions of NOx (35tpy) and SO2 (80 tpy). The 80 tpy increase in SO2 is significant before netting. The 35 tpy increase in NOx is not significant.
- **Would either the NOx or SO2 emission increase trigger PSD after netting?**
- **Why or why no**

PRACTICAL EXERCISES – NETTING

- **EXERCISE 3**
- A plant which manufactures automobile and truck tires – an existing major source – proposes to increase its production of both types of tires. For its automobile tire line, the source applies for – and is granted – a minor modification permit for a new extruder that will increase projected VOC emissions by 39 tons per year. A few months later, the source applies for another minor modification permit to construct a new tread end cementer on the same line. This will increase projected actual VOC emissions by 12 tons per year.
- **Should the extruder modification have been subject to PSD?**
- **Why or why not?**
- **Should the tread-end cementer modification cause the plant to be subject to PSD?**
- **Why or why not?**

PSD Applicability

"Reasonable Possibility"

Recordkeeping and Reporting Requirements of the

2002 NSR Reform Rules

When the "Reasonable Possibility" Requirements are Applicable

- When a source uses the actual-to-projected actual emissions test in an applicability determination and there is a "reasonable possibility" that the changes may result in a significant emissions increase, the source must comply with certain recordkeeping and notification requirements

- A reasonable possibility occurs when the projected emissions are at least 50% of the significant emissions rate (including emissions originally excluded from the calculations due to demand growth or that the unit could have otherwise accommodated)

If there is a reasonable possibility…

- Before beginning actual construction, the owner must document and maintain records of:
  - The project description
  - The emission units that could be affected by the project
  - A description of the applicability test used to determine that the project is not a major modification, including the baseline actual emissions, projected actual emissions, any netting calculations
- Owner must monitor emissions of any regulated NSR pollutant that could increase as a result of the project and keep records of annual emissions (tpy) for
  - 10 years if the project increases design capacity or PTE,
  - 5 years in all other cases

Notification Requirements when there is a Reasonable Possibility

- If facility is an electric utility steam generating unit (EUSGU):
  - Source must provide permitting authority with the information on the previous slide before beginning actual construction
  - Source must report its actual emissions within 60 days after the end of each year during which records must be kept
- If facility is not an EUSGU:
  - Source must submit a report if annual emissions exceed the baseline by a significant amount and differ from the preconstruction projections
  - Report is due within 60 days after the end of a year in which the excess emissions occur

Summary

- Modification is physical change or change in operation which results in a significant change in emissions
- Significant net change varies by pollutant and location and program

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Lesson 3
Case Development: Tools and Techniques

Case Development

- Targeting
- Information Gathering
- Emissions Calculations

Purpose

- Identify tools and techniques that can be used in NSR Case development and permitting:
  - Targeting: Understanding trends in the industry and specific processes more completely
  - Information Gathering: Identifying the full scope, effect and purpose of the project being permitted
  - Emissions Calculations: Questioning and checking baseline actual and projected actual emissions

Targeting Importance

- For EPA targeting is important for enforcement because focusing on a sector and conducting in-depth investigations are time consuming commitments

- Limited resources within EPA require that they use their time most effectively and target inspections and investigations where violations are more likely

Premise

- Industries that have grown are more likely to have triggered CAA requirements than those industries that have not grown
  - NSR
  - NSPS
  - MACT
- NSR permitting is sometimes scant in industries where there has been significant growth

Emissions are often related to production

- Increased production often causes increased emissions from existing facilities and sources
  – Unless contemporaneous or concurrent emissions reductions are accomplished
- Increased production is normally achieved by construction of new facilities and sources or modification of existing facilities and sources

Increased production capacity indicates physical construction

- Increased production of existing lines
- New production lines

Link between CAA Requirements and Physical Construction

- Physical construction generally involves "a physical change" that may trigger new requirements of NSR or NSPS

Systematic Targeting of Industry Sectors

- Choose a high emitting sector
  - National Emission Inventories and TRI to identify can indicate a sector that is a high emitter nationally, regionally, or for State
  - Utilities, Petroleum Refineries, Pulp & Paper, Cement and Glass are all significant emitters of SO2 and NOx in the NEI

Systematic Targeting of Industry Sectors

- Identify a Sector with increases in capacity without corresponding permitting
  - Information on industry production capacity is publicly available
  - Research permit activity for the industry

Systematic Targeting of Industry Sectors

- Have a Case Theory and Test it
  - FCCU capacity expansion through increases in air blower capacity results in increased emissions of SO2, NOx and PM
  - Reclaiming lost capacity on a utility boiler results in increased emissions of SO2, NOx, and PM
  - Increase in pulping capacity results in increase SO2 from NCG incineration
  - Physical changes necessary to burn petroleum coke in cement kilns have resulted in increased emissions of SO2
  - Installing electric boost on glass furnaces can increase PM emissions

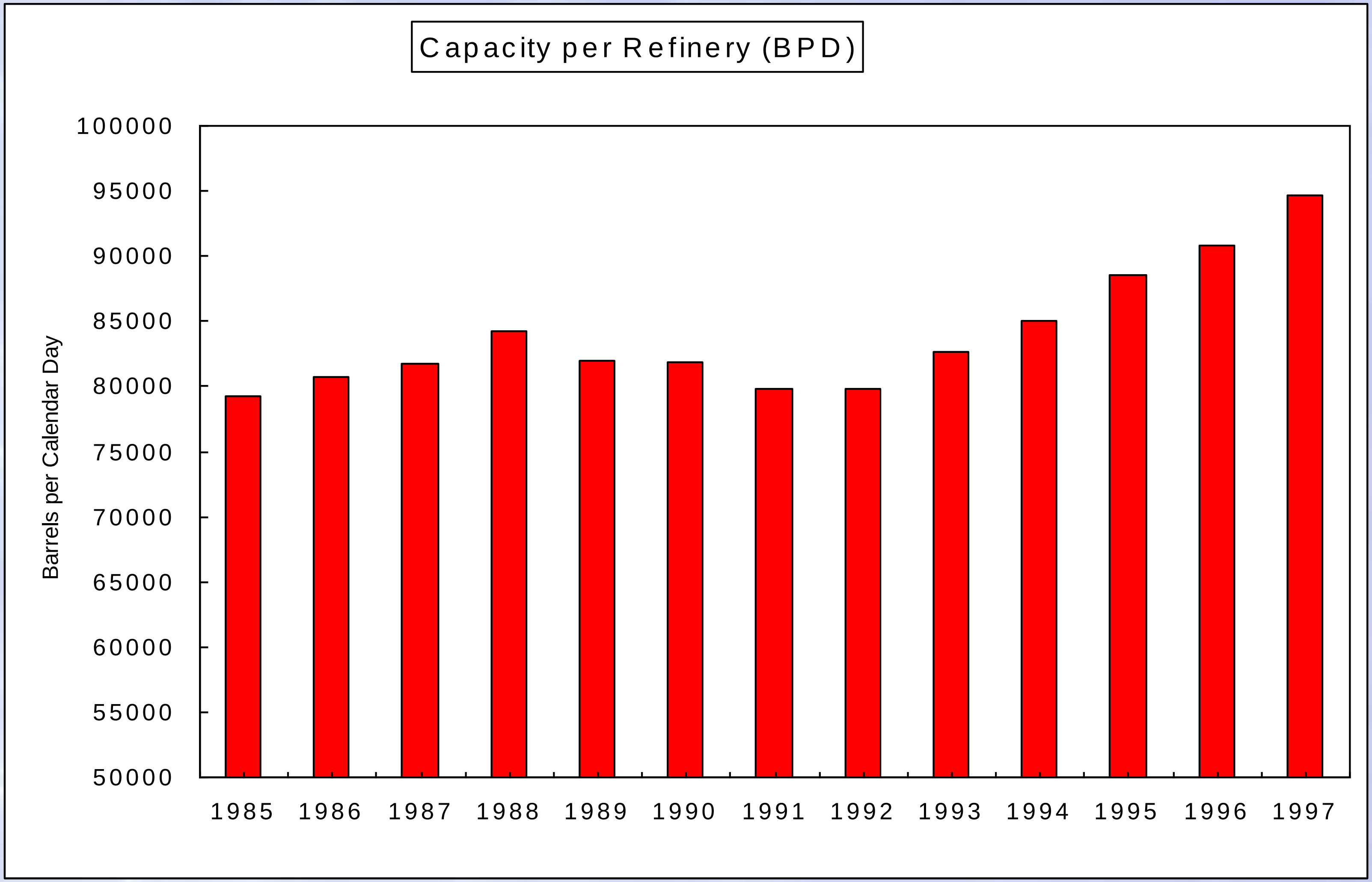
Systematic Targeting of Industry Sectors

- Keep the End Game in Mind
  - What benefits will result from application of injunctive relief?
  - Common existing controls in industry vs. availability of more effective controls
    - Do most sources avoid application of BACT/LAER by netting out or by questionable BACT/LAER determinations?
    - Is NSPS widely avoided in industry?

Examine Data over Time

- Identify an industry that has expanded significantly
- Gather data on capacity or production changes over time
- Plot data to highlight trends visually
- Read supporting information on forecasts of trends for the industry

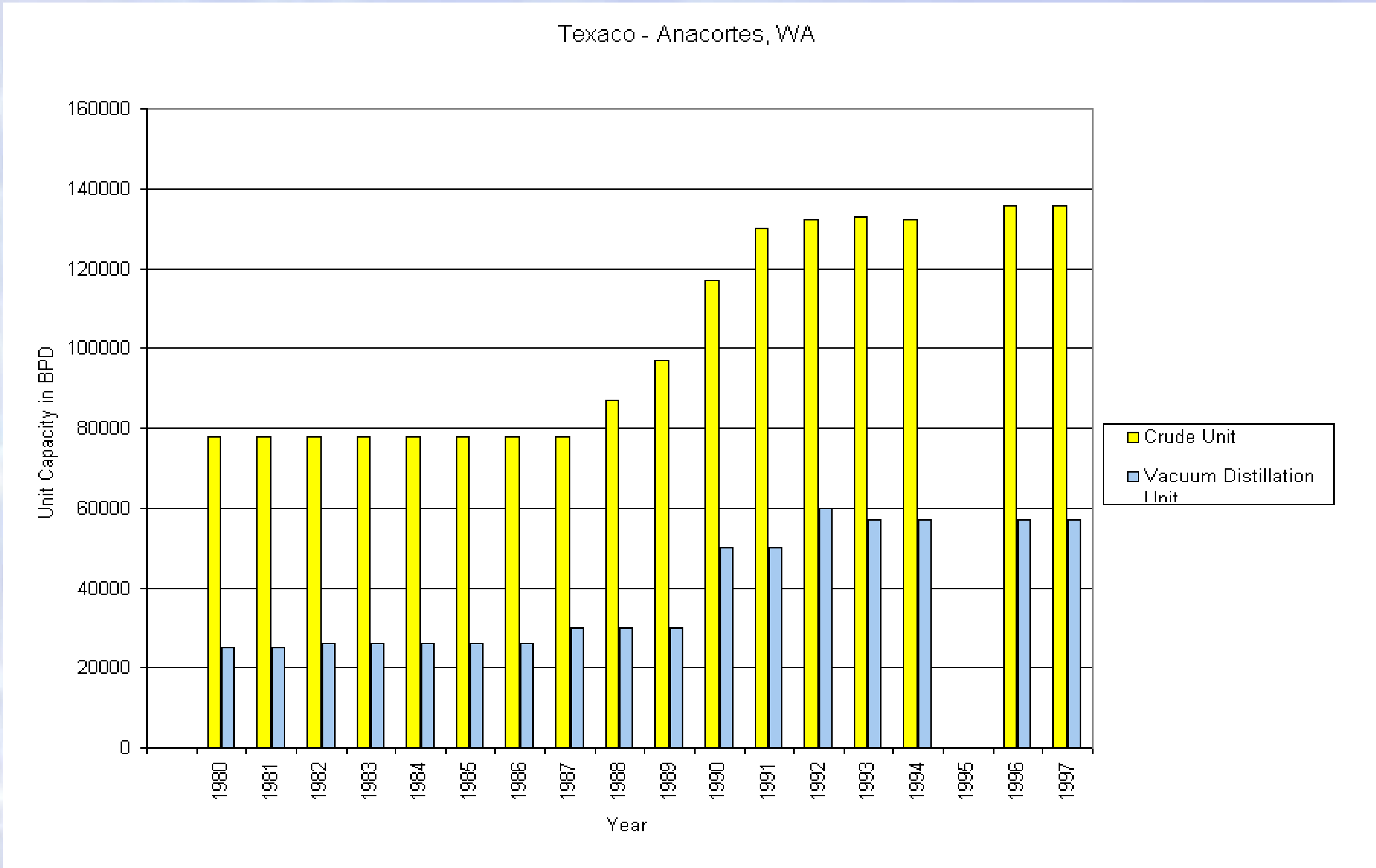
U.S. Refining Capacity per Refinery



Systematic Targeting of Specific Facilities

- Use research to identify facilities that have expanded production capacity significantly without obtaining PSD or NSR permits
- Look for facility capacity data over time, summaries of construction projects at particular facilities, and compare

Crude Unit Capacity



Other Clues for Targeting

- Look for companies that have had similar problems/violations in several facilities
- Look for companies that have had similar problems/violations in different parts of the country
- Look for similar changes among several companies in an industry sector
  - Process improvements that spread through industry that increase emissions (e.g., Ladle Metallurgy Station on an Electric Arc Furnace)
  - Cost savings measures that are adopted by the industry as a whole that increase emissions

Research Resources

- Industry journals
- Industry directories

Research Resources (cont'd)

- EPA databases showing changes over time in pollutant emissions, discharges, releases
  - AFS - Airs Facility Subsystem
  - NEI - National Emission Inventory
  - TRIS - Toxic Release Inventory System
  - PCS - Permit Compliance System

Research Resources (cont'd)

- Internet
  - Facility and corporate home pages
    - www.*name*.com
    - annual reports
    - facility and corporate news
  - Industry publishers
    - www.*pulp-paper*.com
    - www.*chemicalweek*.com
    - use to identify other sources of information

Federal Government Seeking Company Wide Settlements

- Utility Company – address all of the coal fired generation for company
- Portland Cement Plants – Ownership has consolidated to less than 10 companies Govt. seeking company wide settlements
- Refineries – company wide settlements
- Glass Plants

Owens Brockway Glass Container Manufactoring

- Settlement covers the following 5 facilities owned by the company:
- Atlanta, Georgia
- Clarion, Pennsylvania
- Crenshaw, Pennsylvania
- Muskogee, Oklahoma
- Waco, Texas

Stationary Source NSR Strategy

- Found at:
  - http://www2.epa.gov/enforcement/air-enforcement#nsr

  Coal fired Power Plants

  Sulfuric and Nitric Acid Plants

  Glass Manufacturing Plants

  Cement Manufacturing Plants

  Petroleum Refineries

EPA Case Summaries

- Short summary of EPA Civil found at:
- http://cfpub.epa.gov/compliance/cases/

Coal Fired Power Plants

- Approximately 1,100 coal-fired electric utility units in the United States with an overall capacity of 340,000 megawatts. This sector emits approximately two-thirds of the nation's emissions inventory of SO_2 and approximately one-third of the NO_x. Investigations of this sector have identified a high rate of noncompliance with NSR/PSD when old plants are renovated or upgraded.
- 28 judicial settlement secured by DOJ and EPA as of 7-14-14

Petroleum Refinery National Cases

- Since March 2000, the Agency has entered into 32 settlements with U.S. companies that refine over 90 percent of the Nation's petroleum refining capacity.
- Settlements cover 109 refineries in 32 states and territories, and on full implementation will result in annual emissions reductions of more than 93 K tons of nitrogen oxides and more than 256 K tons of sulfur dioxide

Cement Manufacturing Plants

- Third largest industrial source of air pollution, emitting more than 500,000 tons per year of SO_2, NO_x and carbon monoxide. EPA determined that many cement manufacturers made changes to existing facilities without applying for and obtaining pre-construction permits.

Portland Cement Plant Settlements

- Cemex Inc. (Lyons) (4/19/13)
- Essroc Cement Company (12/29/11)
- California Portland Cement Company (12/15/11)
- CEMEX Fairborn Plant (2/10/11)
- Lafarge North America, Inc. (1/21/10)
- Cemex (California) (1/15/09)
- St. Mary's Cement (Illinois) (9/08/08)

Acid Plant Settlements

- Mosaic Fertilizer Clean Air Act (10/05/09)
- DuPont/Lucite Clean Air Act (CAA) (04/20/09)
- Chemtrade/Marsulex CAA (01/12/09)
- Rhodia Inc. CAA (04/26/07)
- Agrium/Royster-Clark CAA (02/26/07)
- E. I. du Pont de Nemours & Company CAA (12/14/05)

Glass Manufacturing Plants

- Approximately 125 large glass plants operating in the United States. These plants emit approximately 200,000 tons per year of NO_x, SO_2 and particulate matter (PM). Investigation of this sector has shown that there have been a significant number of plant expansions but few applications for the installation of pollution controls required under NSR/PSD.

Lesson 4
Utility Case Study

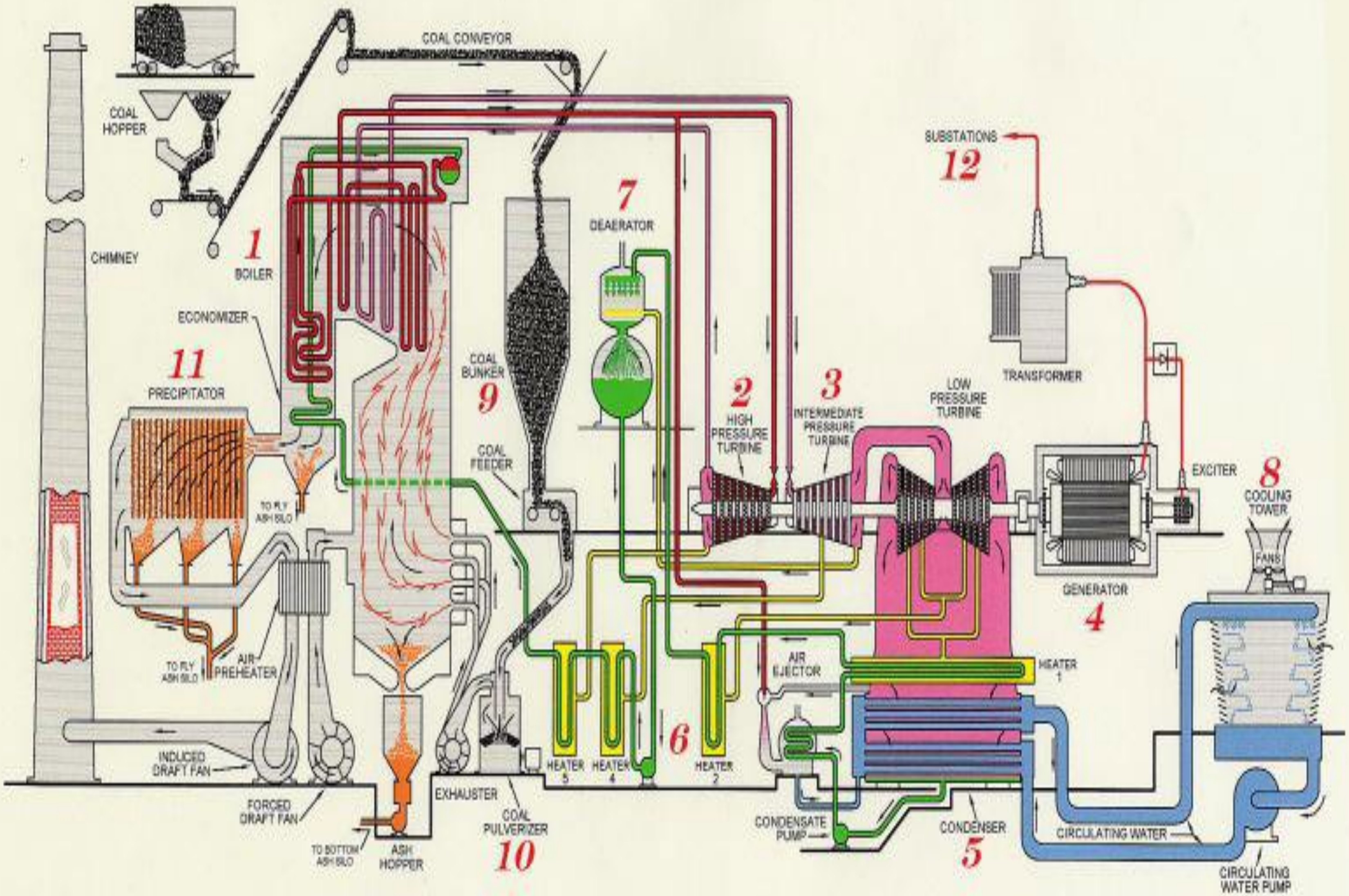
Purpose

- Provide examples of coal-fired power plant NSR investigations
- Identify the data sources, tools, and techniques that could be used; these also could be used by permitters

General Types of Power Plant Projects

- Projects to extend unit life
- Projects to increase the availability and reliability of the unit and recover lost capacity
- Projects to increase unit capacity

PLATTE GENERATING STATION
UNIT NO. 1



Data Sources - Emissions Data

- Clean Air Markets Database (www.epa.gov/airmarkets/)
  - Monthly NO_X
  - Monthly SO_2
  - Monthly Heat Input
- Department of Energy, Energy Information Administration (EIA) Form 767
  - PM Emissions Factors
  - Monthly Coal Use
- Stack Tests
- Emission Inventory Reports

Data Sources - Generation Availability Data System (GADS): Outages

- **Unplanned Outages –** An outage exists whenever a unit is not synchronized to the grid system and not in a reserve shutdown state
  - U1: An outage that requires immediate removal of a unit from service
  - U2: An outage that does not require immediate removal of a unit from in-service state but requires removal within six hours
  - U3: An outage that can be postponed beyond six hours but requires that the unit be removed from service before the end of the next weekend
- **Planned Outages (PO) –** An outage that is scheduled in advance and is of a predetermined duration, lasts for several weeks, and occurs only once or twice per year

Data Sources - Generation Availability Data System (GADS): Other Outage Events

- **Maintenance Outages (MO)** - an outage that can be deferred beyond the end of the next weekend, but requires that the unit be removed from service, another outage state, or reserve shutdown state before the next planned outage
- **Service Extensions (SE)** - an extension of a planned outage or maintenance outage beyond its estimated completion date
- **Reserve Shutdown (RS)** - an event that exists whenever a unit is available for load but is not synchronized due to lack of demand
- **Non-curtailing Events –** an event that exists whenever equipment or a major component is removed from service for maintenance, testing, or other purpose that does not result in a unit outage or derating

Data Sources - Generation Availability Data System (GADS): Deratings

- **Deratings –** Deratings exist whenever a unit is limited to some power less than the unit's net maximum capacity
  - D1: Unplanned Derating, Immediate: a derating that requires an immediate reduction in capacity
  - D2: Unplanned Derating, Delayed: a derating that does not require an immediate reduction in capacity but requires a reduction within six hours
  - D3: Unplanned Derating, Postponed: a derating that can be postponed beyond six hours but requires a reduction in capacity before the end of the next weekend.
- **Planned Deratings –** A derating that is scheduled well in advance and is of a predetermined duration

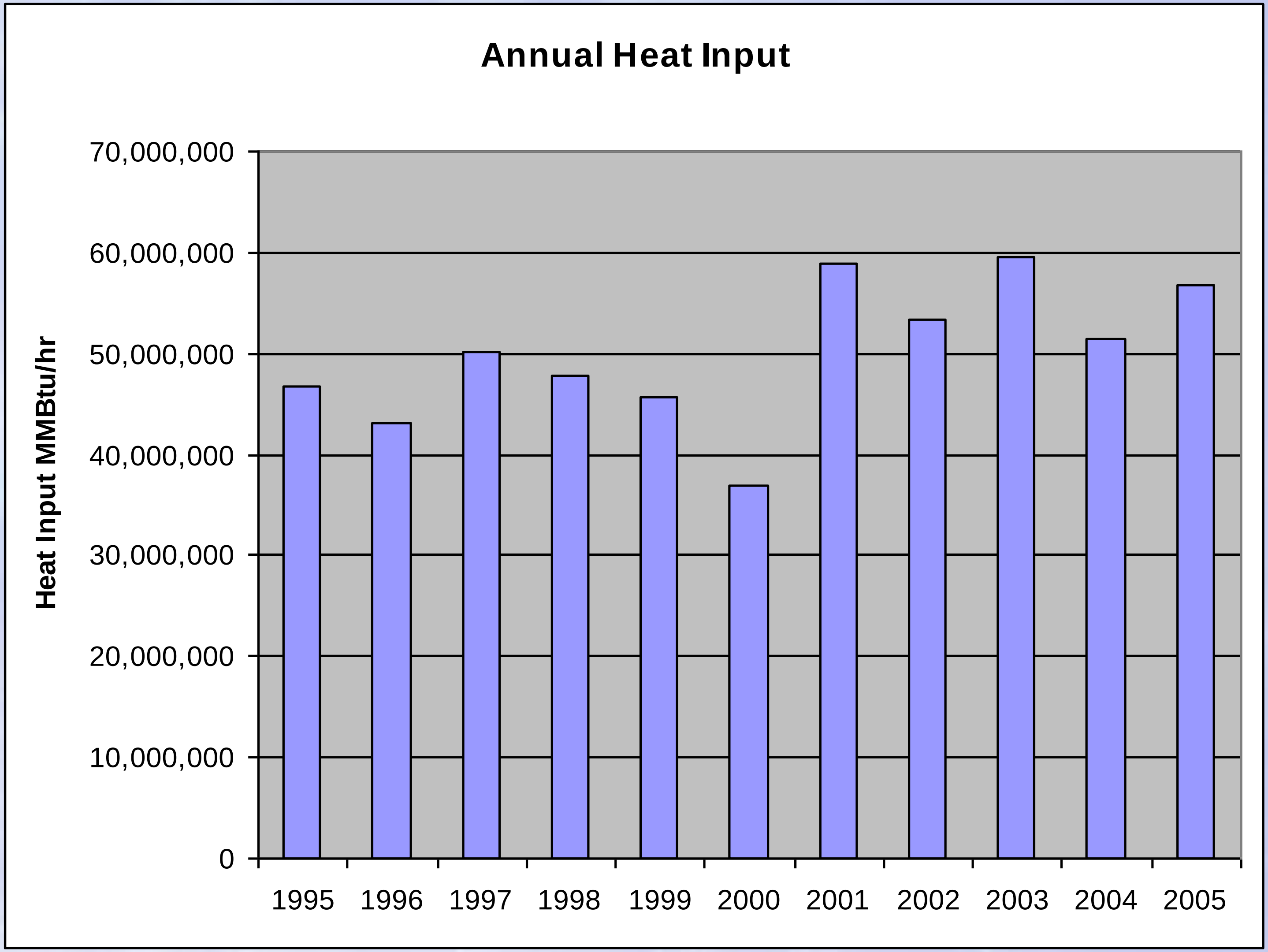
Data Sources - GADS Performance Data

- GADS also provides monthly and yearly performance data:
  - Net and Gross Maximum Capacity
  - Net and Gross Dependable Capacity
  - Net and Gross Actual Generation
  - Available, Planned Outage, Forced Outage, and Maintenance Hours
  - Type, amount and quality of the fuel burned
  - Statistical information including Capacity Factor, Availability Factor and Net Heat Rate

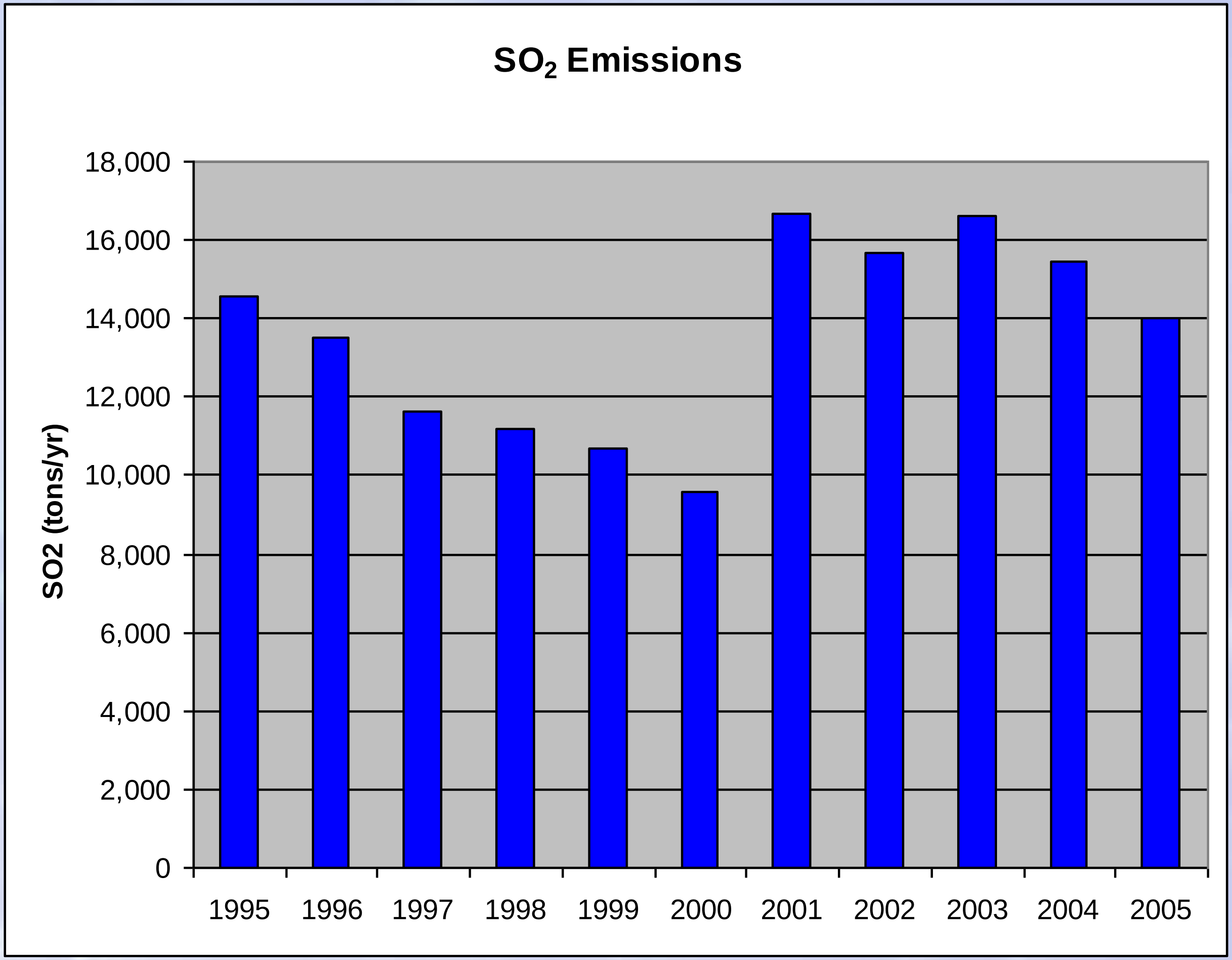
Example Project 1: Unit 1 Secondary Superheater Outlet Header Replacement Life Extension Project

Unit:	1
Project Title:	Unit #1 Superheater Outlet Header and Tube Replacement – 2000
Description:	Remove existing and replace with redesigned secondary superheater outlet headers and tubing
Upgrades:	New tubing for the headers would use a different material and the design would eliminate some saddle welds
Budget:	$1,000,000 authorized; $600,000 actual
Frequency:	Original (1964), approximately 36 years old

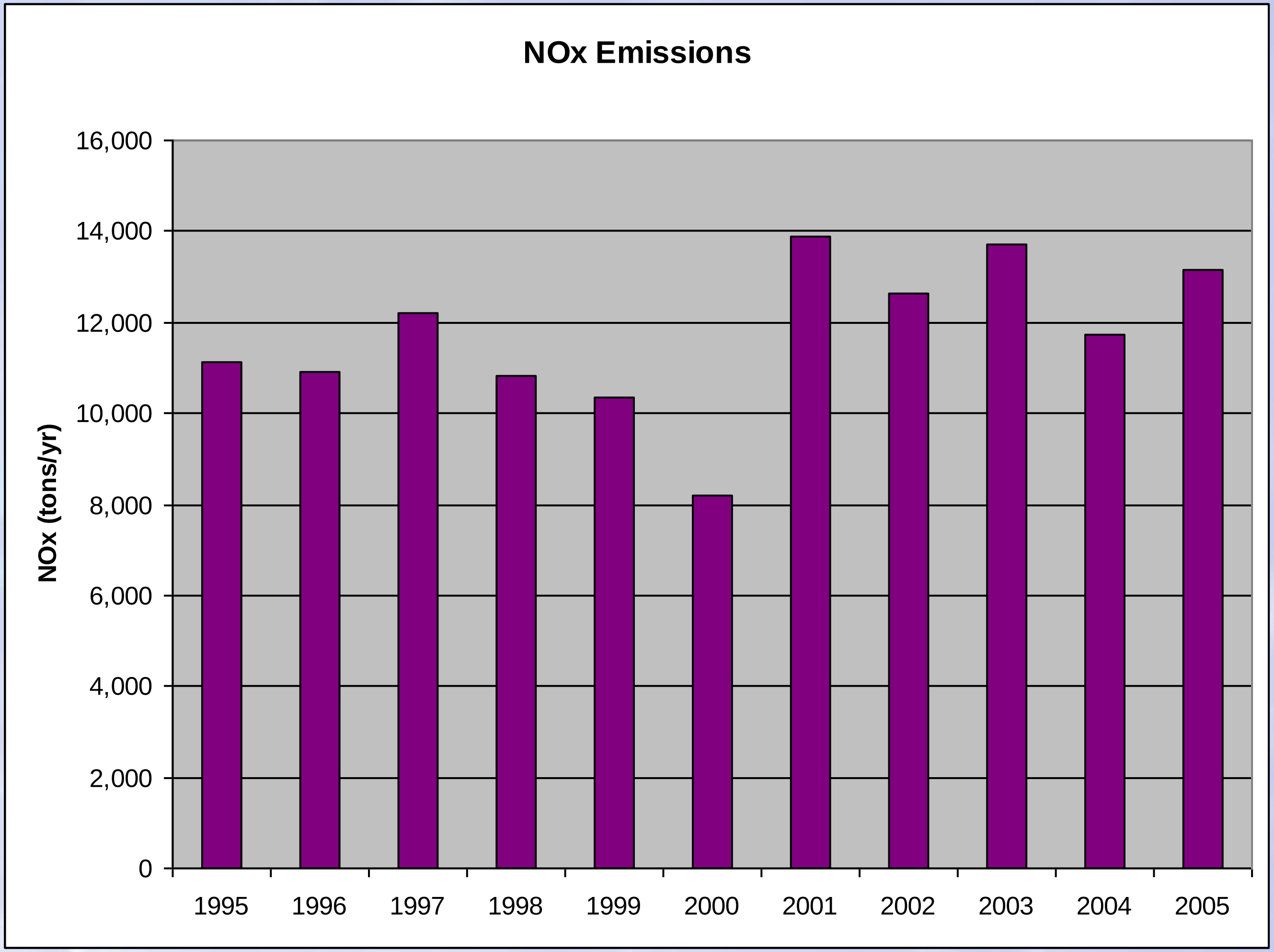
Annual Heat Input



Annual Emissions of SO_2 and NOx



Annual Emissions of SO_2 and NOx



Lesson 5
POTENTIAL TO EMIT

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POTENTIAL TO EMIT

- ***<u>Why discuss Potential to Emit (PTE)</u>?***
  - Applicability is often based on PTE
    - Permit (PSD/NSR, Title V, etc.)
    - Regulatory (MACT standards)
  - *[Applicability can also be based on the date of construction, modification or reconstruction of specified source categories (e.g., NSPS)]*
- ***<u>PTE is pollutant specific</u>***
    - The exception is Total HAPs

Objective

- Determine how PTE affects permit needs
- Learn how to calculate PTE
- How to limit PTE

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Potential To Emit (PTE)

<u>So what is "Potential to emit" ?</u>

- **The maximum capacity of a stationary source to emit a pollutant under its physical and operational design**.
- **Any physical or operational limitation on the capacity of the source to emit a pollutant**, *including air pollution control equipment and restrictions on hours of operation or on the type or amount of fuel combusted, stored or processed,* **shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable.**

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PTE

- In simple terms PTE is the maximum emissions that the source can produce or is allowed to produce
- For many sources PTE is very hard to calculate

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PTE Example Calculations

- Fuel Burning sources like boilers and process heaters are frequently assumed to run at nameplate capacity for up to 8760 per year

- Non-emergency generators are generally assumed to run 100% of the time or 8760 hours

- Emergency generators are limited (by EPA) to 500 hours per year.

- Batch operations like auto refinishing take into account startup clean up and actual paint time

PTE

- *Where does the data to calculate PTE come from?*

First we have to calculate emissions, then ramp them up to annual rates

- Emission Factors
  - Stack test data
  - AP-42
  - WebFIRE
- Material Balance
- EPA software
  - Tanks
  - LandGEM
  - WATER9
  - SPECIATE
- Engineering Judgment
- EPA's TTN Website is a good source
  - http://www.epa.gov/ttn

PTE

- ***Emission Factor method***

$$E = A \times EF \times (1-ER/100)$$

- E = Emissions
- A = Activity Rate
- EF = Emission factor for worst case operating alternatives
- ER = Overall Emissions Reduction Efficiency
  - Collection efficiency
  - Control efficiency

- [A and EF are often stated in pounds and at hourly rates, so E must be converted to tons annually to determine the PTE]
- Activity rate is the maximum capacity of the source

PTE

- ***Material balance method***

  Emissions = Input – consumed – recovered – destroyed

  - Input is the total amount of the pollutant that can enter the process
  - Consumed is the total amount that becomes an integral part of the product or process
  - Recovered for recycling or reuse
  - Destroyed using a control device

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PTE EXERCISE

- Evaluate the following:
  - A facility can use a maximum 100 lbs/hr of ink that has a VOC content of 35% by volume.
  - 20% of the ink is retained on the substrate.
  - The incinerator has a 95% control efficiency.

What are the lbs/hr of VOC emitted?

VOC Mass Emissions = (100 lbs/hr * .35) (1 - .20) (1 - .95) = 1.4 lbs/hr

PTE EXERCISE

- A 300 MMBtu/hr. boiler that can burn either natural gas or distillate oil, is limited to NOx emissions of 0.10 lbs/MMBtu b an NSPS.
- NOx EF for natural gas is 190 lb/10^6 scf
- NOx EF for distillate oil is 20 lb/10^3 gal
- Convert to MMBtu
  - Natural Gas: divide by 1,020 MMBtu/10^6 scf
  - Distillate Oil: divide by 140 MMBtu/10^3 gal
- The NSPS limit is met with low-NOx burners and FGR realizing 50% NOx reduction for fuel oil and 85% NOx reduction for natural gas
- 2011 fuel useage
  - Natural Gas - 1,200 x 10^6 scf
  - Distillate Oil – 100,000 gals

PTE EXERCISE

- What is the PTE of the boiler for NOx?

- What are the actual annual NOx emissions from the boiler for 2011?

PTE EXERCISE CALCULATIONS

- Boiler PTE for NOx:
  - EF * Max Hourly Capacity * 8760 hr/yr /2000 lbs/T
  - 0.10 lbs/MMBtu * 300 MMBtu/hr * 8760 hrs/yr / 2000 lbs/T
  - 262,800 lbs/yr of NOx ***or*** 131.4 T/yr of NOx

- Actual NOx emissions:
  - EF * annual usage * (1-control efficiency)
  - Nat Gas = 190 lb/10^6 scf * 1,200 x 10^6 scf * (1 - .85) = 34,200 lbs
  - Dist. Oil = 20 lb/1000 gal * 100,000 gal * (1 - .5) = 1,000 lbs
  - Total = 34,200 lbs + 1,000 lbs = 35,200 lbs = 17.6 T/yr

Quick Review

- Potential to Emit
  - Why it is important
  - How it is calculated
    - Methods
    - Reference material
  - Why limit PTE

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Lesson 6

BACT

Best Available Control Technology

Best Available Control Technology (BACT) means an emission limitation (including opacity limits) based on the maximum degree of reduction which is achievable for each pollutant, taking into account energy, environmental, and economic impacts, and other costs.

PSD Top Down BACT

- Step 1 – Identify all control technologies
- Step 2 – Eliminate technically infeasible options
- Step 3 – Rank remaining control technologies by control effectiveness
- Step 4 – Evaluate most effective controls and document results
- Step 5 – Select BACT

BACT Limitations

- BACT Determination is site specific
- BACT does not redefine project
  - BACT does not mandate changes in process or fuel i.e. a coal fired power plant does not have to be gas fired
- BACT for GHG will be addressed separately

PSD (cont'd)

- ***Inherently Lower-Emitting Processes/Practices***, including the use of materials and production processes and work practices that prevent emissions and result in lower "production-specific" emissions; and
- ***Add-on Controls***, such as scrubbers, fabric filters, thermal oxidizers and other devices that control and reduce emissions after they are produced.
- ***Combinations of Inherently Lower Emitting Processes and Add-on Controls***. For example, the application of combustion and post-combustion controls to reduce NOx emissions at a gas-fired CC turbine

Top Down BACT (cont'd)

- Data sources for Determining Feasible control technology include:

  - EPA's BACT/LAER Clearinghouse and Control Technology Center;
  - Best Available Control Technology Guideline - South Coast Air Quality Management District;
  - control technology vendors;
  - Federal/State/Local new source review permits and associated inspection/performance test reports;
  - environmental consultants;
  - technical journals, reports and newsletters air pollution control seminars

BACT/LAER Clearinghouse (cont’d)

- Data on:
  - Source Type (i.e. boiler, turbine etc)
  - Type of Permit (NSR or PSD)
  - Allowed Emission Rate in various units
  - Basis for emission rate

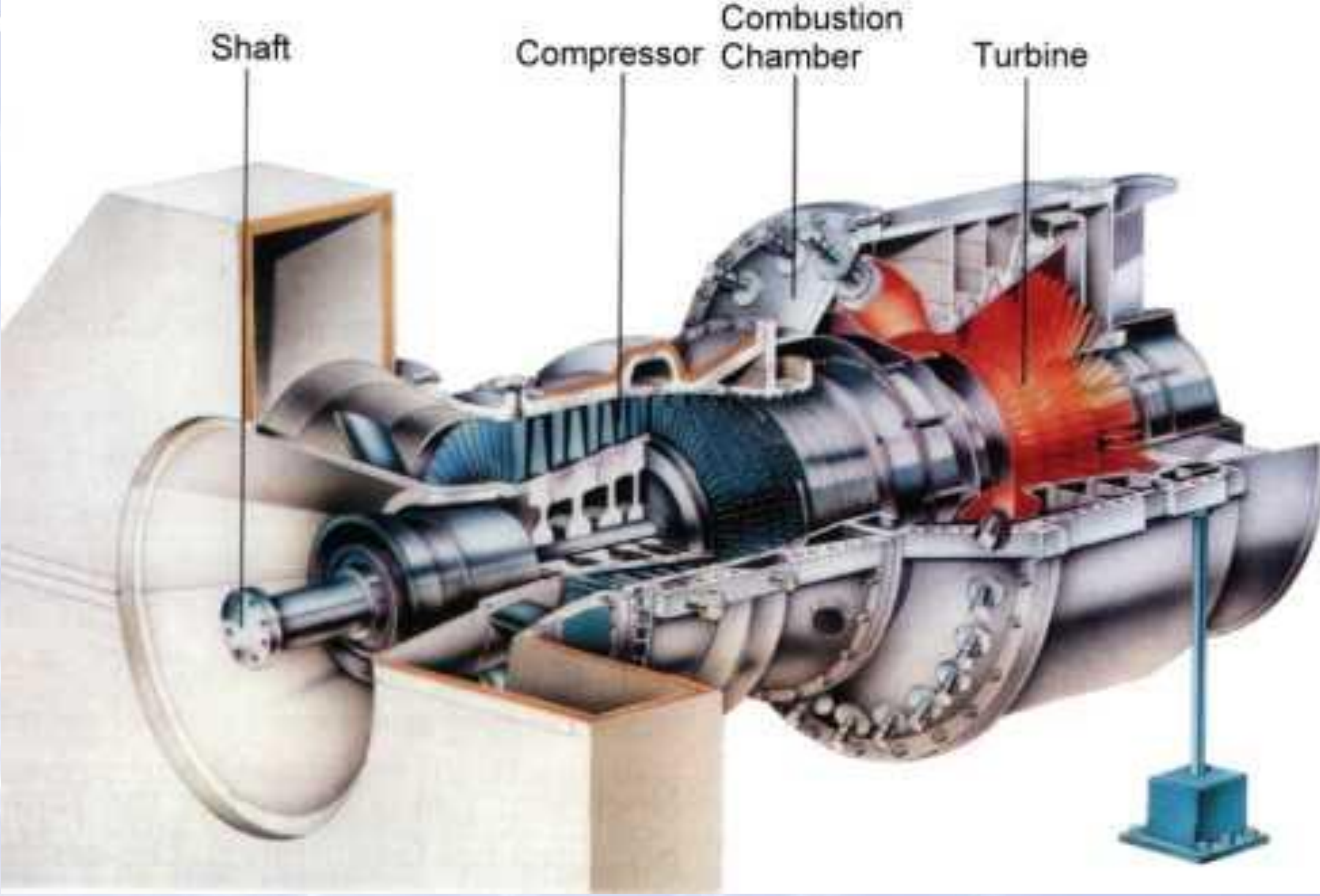
BACT/LAER Clearing House (cont'd)

- Control Levels will vary by Locality
- Control Levels will vary by process and manufacturer

BACT Determination

- Example:
  - Simple cycle gas turbine for peaking power Added to existing major source
  - Existing plant has potential to emit more than 250 tpy of NOx
  - New peaking gas turbine has PTE > 40 tpy, but < 100 tpy CO
  - New turbine is subject to PSD BACT for NOx

Gas Turbines



BACT Determination For Simple Cycle Gas Turbine

- Identify All control technologies
  - Water Injection
  - Combustion control i.e. low Nox Burner
  - Combination of above
  - Add on controls like Selective Catalytic Reduction
- Eliminate Infeasible technologies
  - Steam Injection not feasible

BACT Determination For Simple Cycle Gas Turbine (cont'd)

- SCR add on controls most effective
- Combustion Controls are most cost effective but higher emissions than SCR
- Next most cost effective Water Injection

BACT Determination For Simple Cycle Gas Turbine (cont'd)

- According to RACT/BACT Clearing house;
  - 7 Installations build simple cycle turbines between 2001 and 2014
  - BACT determinations ranged from 9ppm (3 cases) to 42 ppm (1 case)
  - 42 ppm was special case where limited water was available
  - Range in BACT results shows that BACT is case by case

BACT Determination For Simple Cycle Gas Turbine (cont'd)

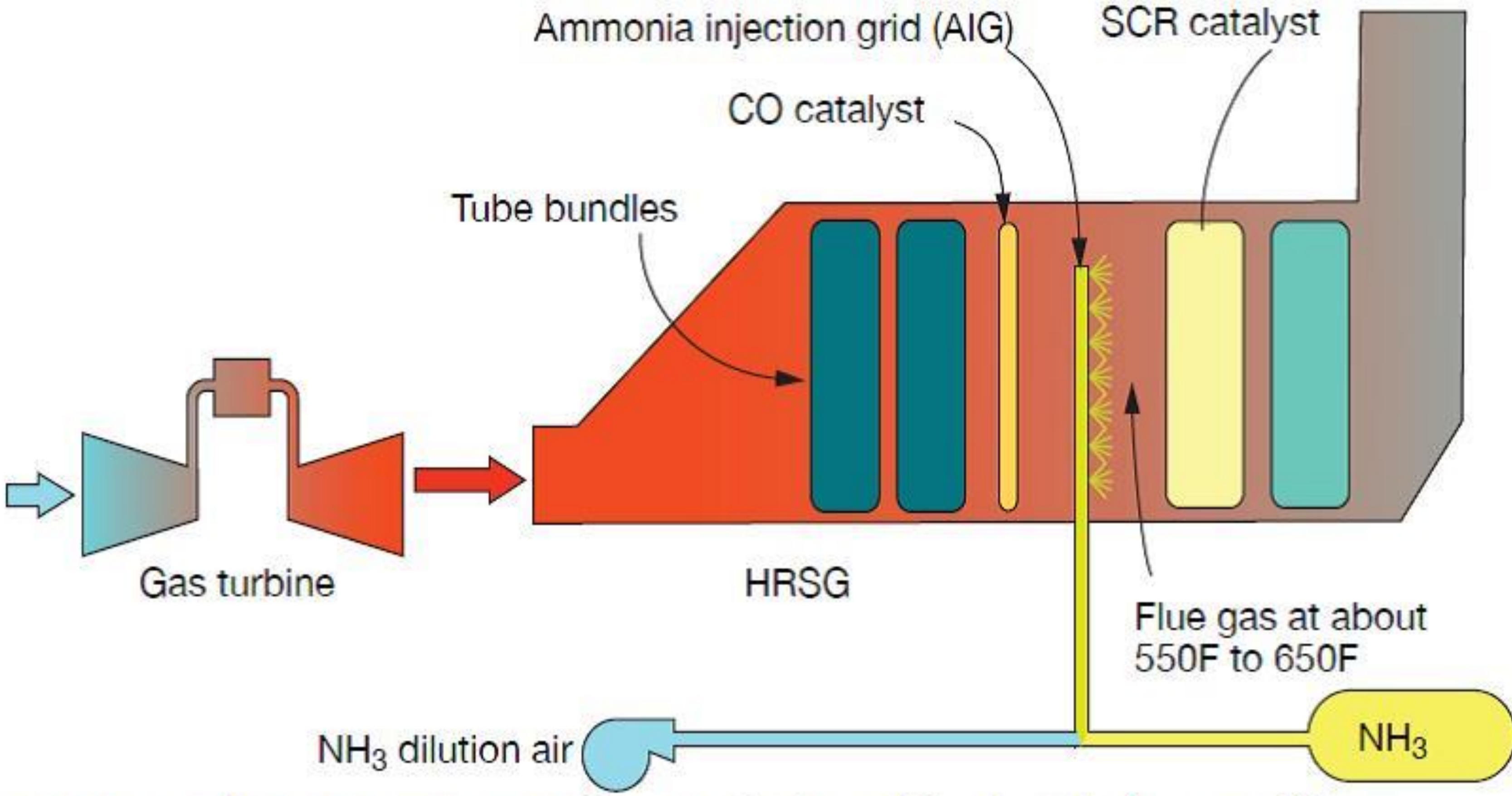
- Best Available Control Technology Guideline - South Coast Air Quality Management District
- **Gas Turbines, Simple Cycle**
- Gas Turbine, A/N 406065, EI Colton, LLC 2/17/04
- Gas Turbine, A/N 383044, ndigo 9/18/01
- Gas Turbine, A/N 374502, LADWP Valley 9/18/01

BACT Determination For Simple Cycle Gas Turbine (cont'd)

- Cost of SCR for Peaking Turbine ~$18 K/t of NOx
- Cost of Combustion modification ~ $1K/t
- Cost of water injection ~ $1.5K/t of NOx
- BACT ???
  - Water injection and combustion control

Another Example

- Combined Cycle Power Plant with heat recovery steam generator



1. SCR catalyst arrangement for a typical combined cycle has no diffuser vanes, perforated plates, or tempering air downstream of the gas turbine. A uniform NH_3/NO_x profile at the catalyst inlet is critical to achieving desired SCR performance in terms of NO_x reduction and ammonia slip

BACT Options

- Options Similar to Simple Cycle turbine
  - Add on control i.e. SCR and NSCR
  - Water injection
  - Steam Injection
  - Dry NOx Control
- Eliminate Infeasible Options
  - All options are technically feasible

BACT

- Dry Nox Control the Most Cost effective
- Water Injection the Next
- Steam injection next
- Add on control higher cost
- Combined (dry + Add on) highest cost

BACT Determination

- According to BACT/LAER Clearing House
  - 36 sources since 2000
  - Since 2010 all less than 5 ppm with add on control (SCR)
  - 2000-2010 most = dry control from 15-25 ppm

BACT Determination (cont'd)

- Differences based on:
  - technology demonstration – use of technology leads to more use
  - Definitions of cost effectiveness vary from state to state

Examples of Cost effectiveness

Summary of BACT Cost Effectiveness Thresholds ($/ton)					
	SCAQMD	BAAQMD	SJVAQMD	YSAQMD	SDAPCD
NOx	19,100	17,500	24,500	24,500	18,00
CO	400			300	
VOC	20,000	17,500	17,500	3,900	
SOx	10,100	18,300	18,300	3,900	
PM10	4,500	5,300	11,400	5,700	

PSD Top Down BACT Review

- Step 1 – Identify all control technologies
- Step 2 – Eliminate technically infeasible options
- Step 3 – Rank remaining control technologies by control effectiveness
- Step 4 – Evaluate most effective controls and document results
- Step 5 – Select BACT

GHG Considerations for Step 1

Energy Efficiency

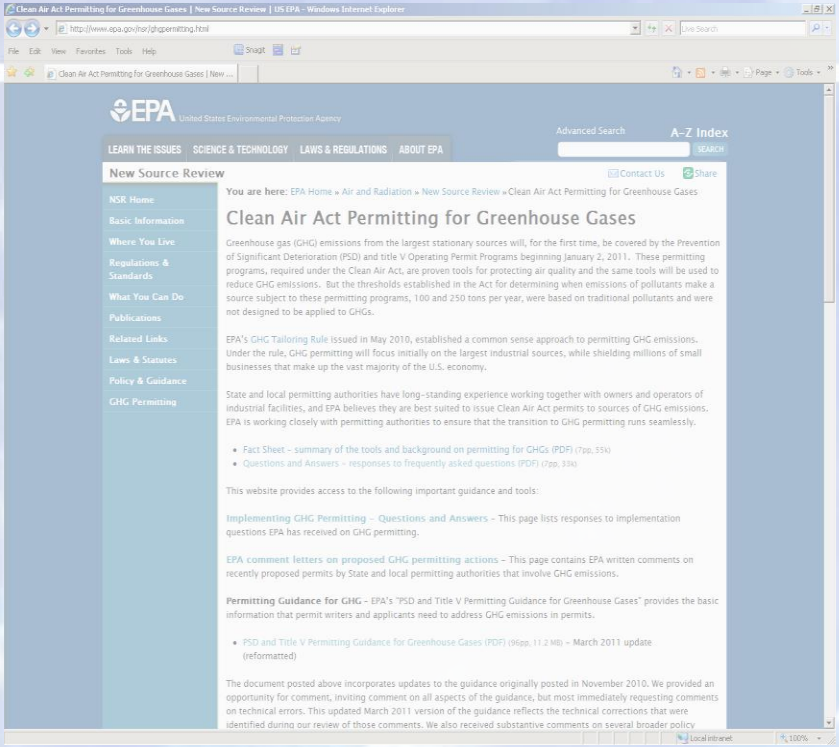
- In the near term, options to improve energy efficiency will be the key control technologies for combustion-related GHGs
- Two categories:
    1. Energy efficiency of the individual emissions unit
    2. Efficiency of non-emitting units that use energy generated onsite
        - Appropriate for new facilities
- Often energy efficiency is improved through many actions with small impacts. In that context, it may be impractical to evaluate them individually

GHG Considerations for Step 1

When and how to consider CCS

- Consider CCS in Step 1 for larger sources of CO_2
  - Power plants
- Cement plants
  - Hydrogen plants
  - Ammonia plants
  - Ethanol plants
  - Ethylene oxide production
  - Iron & steel manufacturing

GHG Technology Resources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EPA United States Environmental Protection Agency

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New Source Review

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GHG Permitting

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Clean Air Act Permitting for Greenhouse Gases

Greenhouse gas (GHG) emissions from the largest stationary sources will, for the first time, be covered by the Prevention of Significant Deterioration (PSD) and title V Operating Permit Programs beginning January 2, 2011. These permitting programs, required under the Clean Air Act, are proven tools for protecting air quality and the same tools will be used to reduce GHG emissions. But the thresholds established in the Act for determining when emissions of pollutants make a source subject to these permitting programs, 100 and 250 tons per year, were based on traditional pollutants and were not designed to be applied to GHGs.

EPA's GHG Tailoring Rule issued in May 2010, established a common sense approach to permitting GHG emissions. Under the rule, GHG permitting will focus initially on the largest industrial sources, while shielding millions of small businesses that make up the vast majority of the U.S. economy.

State and local permitting authorities have long-standing experience working together with owners and operators of industrial facilities, and EPA believes they are best suited to issue Clean Air Act permits to sources of GHG emissions. EPA is working closely with permitting authorities to ensure that the transition to GHG permitting runs seamlessly.

- Fact Sheet – summary of the tools and background on permitting for GHGs (PDF) (7pp, 55k)
- Questions and Answers – responses to frequently asked questions (PDF) (7pp, 30k)

This website provides access to the following important guidance and tools:

Implementing GHG Permitting – Questions and Answers – This page lists responses to implementation questions EPA has received on GHG permitting.

EPA comment letters on proposed GHG permitting actions – This page contains EPA written comments on recently proposed permits by State and local permitting authorities that involve GHG emissions.

Permitting Guidance for GHG – EPA's "PSD and Title V Permitting Guidance for Greenhouse Gases" provides the basic information that permit writers and applicants need to address GHG emissions in permits.

- PSD and Title V Permitting Guidance for Greenhouse Gases (PDF) (96pp, 11.2 MB) – March 2011 update (reformatted)

The document posted above incorporates updates to the guidance originally posted in November 2010. We provided an opportunity for comment, inviting comment on all aspects of the guidance, but most immediately requesting comments on technical errors. This updated March 2011 version of the guidance reflects the technical corrections that were identified during our review of those comments. We also received substantive comments on several broader policy

EPA GHG Technology White Papers

Electric generating units	Refineries
Nitric acid plants	Boilers
Iron and steel	Cement
Pulp and paper	Landfills

http://www.epa.gov/nsr/ghgpermitting.html

EPA GHG Mitigation Strategies Database

Link to RBLC

GHG Technology Resources

- EPA's Lean and Energy Toolkit
  http://www.epa.gov/lean/environment/toolkits/energy/index.htm
- ENERGY STAR Guidelines for Energy Management
  www.energystar.gov/guidelines
- EPA's Climate Leaders Protocols
  http://www.epa.gov/stateply/index.html
- ENERGY STAR Industrial Sector Energy Guides
  www.energystar.gov/epis
- SF Emission Reduction Partnership for the Magnesium Industry
  http://www.epa.gov/highgwp/magnesium-sf6/index.html
- Report of the Interagency Task Force on Carbon Capture and Storage
  http://www.epa.gov/climatechange/policy/ccs_task_force.html
- PFC Reduction/Climate Partnership for the Semiconductor Industry
  http://www.epa.gov/highgwp/semiconductor-pfc/index.html
- RACT/BACT/LAER Clearinghouse

BACT in More Detail - Step 2

Criteria for Eliminating Technically Infeasible Options

Not technically feasible/not demonstrated in practice successfully

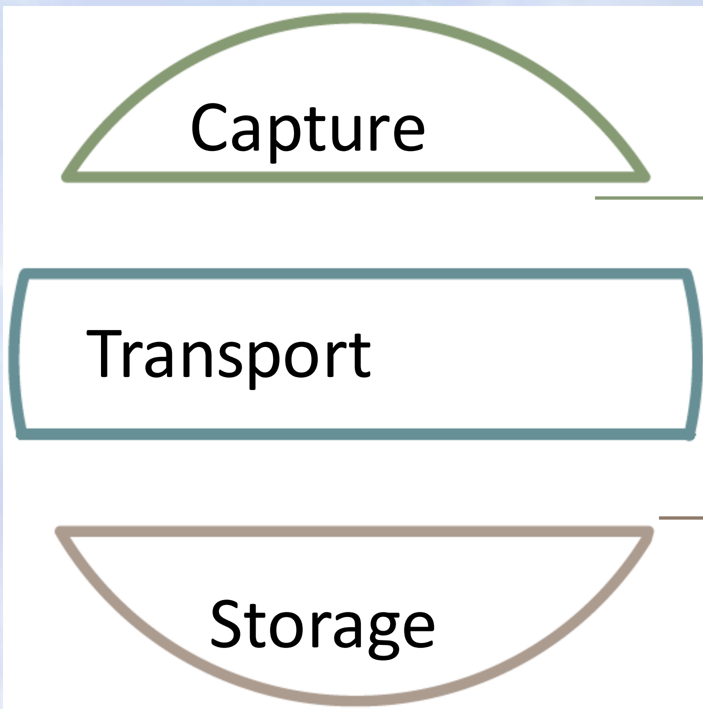
Technology is infeasible if it cannot be reasonably installed and operated on the source

Relates to the same type and size of facility, or one that has similar processes or emissions streams (for an add-on control)

- Control options should not be eliminated simply because a vendor will not guarantee a particular emission rate

GHG Considerations for Step 2

Feasibility of CO_2 Sequestration



Site-specific considerations

- Space for equipment
- Rights of ways for pipelines
- Presence of existing pipelines
- Access to an appropriate geological reservoir or another storage option

BACT in More Detail - Step 3

Ranking of Controls

- Remaining available, feasible control technologies (and combinations of technologies) are ranked in order of overall control effectiveness for the pollutant under review.
- Ranking options include:
  - Percent pollutant removed
  - Emissions rate (input- or output-based)
  - Emissions reduction over time

GHG Considerations for Step 3

- GHG measures of performance
  - If plant-wide measures to reduce GHGs are considered, alternative measures of overall net emissions impact may be more useful:
    - Expected emission rate in units such as tons/year, lbs/hour, lbs/unit of input or output, etc
    - Expected emissions reduction could be expressed in same units
- Must consider combinations of controls but not every possible permutation

GHG Considerations for Step 1

Is the use of biofuels a GHG control strategy?

- In General:
  - There is no consideration of offsite impacts in Step 1
  - Regarding on-site impacts, consider things such as:
    - Whether the CO_2 emission rates of potential biofuels are similar to the fossil fuel alternative
    - Whether the use of an alternative fuel would redefine the source

BACT
GHG Example

Natural Gas Fired Boiler

Project Scope

- Existing major source
- New 250 MMBtu/hour natural gas-fired boile

Step 1 – Identify All Available Controls

Permit application lists the following four controls:

- **Oxygen Trim Control:**
  - Inlet air flow adjusted for optimal thermal efficiency
- **Economizer:**
  - Increases thermal efficiency by preheating feedwater
- **Blowdown Heat Recovery:**
  - A heat exchanger transfers some of the heat in the blowdown
  - water to feedwater for deaeration or preheating
  - Increases the boiler’s thermal efficiency

Permitting Authority asks for inclusion of air preheater

Issues Associated with Redefining the Source

- Public comment asks for consideration of a combine cycle natural gas-fired turbine
- Applicant explains that a boiler is necessary for business purposes:
  - Providing process steam (and not electricity) and
  - Varying steam demand
- Permitting authority rejects a combined cycle natur gas-fired turbine for consideration on grounds it would "redefine the source."

Steps 2 & 3 – Eliminate Technically Infeasible Options, and Rank Controls

Step 2: Eliminate technically infeasible options

- Permitting authority determines that the six control are technically feasible; demonstrated or available and applicable to this type of source

Step 3: Evaluation and ranking of controls by their effectiveness

- Applicant ranked control measures for the boiler based on their impact on the thermal efficiency of the boiler (Could also be based on emissions per uni of steam produced)

Step 3 (cont'd)

- The permit applicant completed the control effectiveness analysis and found:
  - Most effective single measure is oxygen trim control
  - Air preheater is no more effective than an economizer in recovering exhaust heat

Step 4 - Cost Effectiveness Example

Boiler operating conditions

Emission factors

Assumptions		
Size of Nat Gas Boiler	250	MMBTU/hr
Annual Operating Hours	8760	Hours
CO2 emission factor	53.02	kg/MMBTU
CH4 emission factor	0.001	kg/MMBTU
N2O emission factor	0.0001	kg/MMBTU
GWP CH4	21	
CWP N2O	310	

Mass emissions

Annual Fuel Use	2,190,000	MMBTU
CO2 emissions	116,113,800	KG
CH4 emissions	2,190	KG
N2O emissions	219	KG

CO2 emissions	128,015.46	Tons
CH4 emissions	2.41	Tons
N2O emissions	0.24	Tons

CO_2e emissions

CO2 emissions	128,015.46	tons CO2e
CH4 emissions	50.70	tons CO2e
N2O emissions	74.85	tons CO2e
TOTAL	**128,141.02**	**tons CO2e**

Cost Effectiveness Continued

Positive = cost
Negative = savings

Measure	Efficiency Benefit (Fuel Savings)	Capital Cost	Annualized Capital Cost	Operating Fuel Savings and Maint. Costs	Annual Cost or Savings	CO_2e Emissions Reduction	C/E $/ton
Oxygen Trim	1%	$100K	$16.3K	-78.8K +$25K	-$37.5K	1,281	NA
Economizer	5%	$1,000K	$163K	-$395K +$75K	-$157K	6,405	NA
Blowdown Heat Recovery	0.3%	$400K	$67.2K	-$23.6K +$50K	+$93.6K	384.3	$243 /ton

Based on a capital recovery factor of 16.3%

Based on calculated baseline emissions and estimated fuel savings

Additional Energy & Environmental Impacts

Step 5 – Select BACT

- Permitting authority determined, and the record showed, that BACT was the combination of:
  - Oxygen trim control,
  - An economizer

Step 5 – Establish Enforceable BACT Limits

- Emission limit: lbs of CO_2e per pound of steam produced, 30-day rolling monthly average
- CO_2e emissions determined from natural gas use
- Steam production determined from a gauge
- Installation of boiler as described in the application, as a design standard
- Preventive maintenance program for the air to fuel ratio controller
- Periodic calibration of gas meter and steam flow analyzer

Lesson 7

AIR QUALITY REVIEW

Components of AQ Assessment

- Emission Estimates, Equipment, Operations
- Model Selection
- Meteorological Data Selection
- Receptor Grid Selection
- Significant Impact Modeling
- Ambient Monitoring
- NAAQS and PSD Emission Inventories
  - Allowable or Actual emissions
- Cumulative Impact/Nearby Sources Modeling
- Additional Impact Assessments, Class I, Class II

Increment

- Increment is the extent by which the ambient concentration of a pollutant is allowed to exceed a specified baseline
- Limits increases in ambient concentrations of PM 2.5, PM10, SOx and NOx from new or modified emission sources
- Increment consumption includes emissions from major, minor, area
- 3 area classifications
  - Class I – primarily nat'l parks, preserves, etc. and international parks
  - Class II – most other areas
  - Class III – must be specifically designated

Increment Compliance

- Dispersion Modeling used to demonstrate
  - Compliance with ambient standards
  - Amount of increment consumed
- All models must be EPA approved
- Review best done by modeling specialists

Sources impacting Federal Class I areas

PSD

- FLM must be notified if emissions impact a Class I area
- FLM may conduct a visibility analysis
- Permit can be denied based upon FLM analysis, even if increment requirements satisfied
- FLM role
  - Can be a point of contention
- Other special provisions relating to Class I areas
- Regional Haze requirements
  - Improve worst days
  - No degradation on best days

Lesson 8
PSD Applicability

Plantwide Applicability Limits (PALs)

Plantwide Applicability Limits (PALs)

A limit for a particular pollutant based on a facility's baseline actual emissions of all emissions units at the source that emit or have the potential to emit the PAL pollutant

Purpose of PALs

Any physical change or change in the method of operation of a major stationary source that maintains its total source-wide emissions below the PAL level, meets all of the requirements for PALs, and complies with the PAL permit:

- is not a major modification for the PAL pollutant;
- does not have to be approved through the PSD program; and
- is not subject to certain restrictions on relaxing enforceable emission limits that the source used to avoid PSD review

Although a PAL is voluntary, once in place, an owner **must** comply with **all** requirements.

Components of a PAL

- Pollutant-specific, facility-wide emission limit in units of tons per year
  - PAL level = sum of the baseline actual emissions for all covered units and the significant emission rate for that pollutant
- Effective for 10 years
  - PAL must specify the effective date and expiration date
- Annual limit, based on a 12-month rolling total
  - For the first year:
    - Source needs to show that the sum of the monthly emissions from all units under the PAL is less than the PAL
  - In all subsequent years:
    - For each month during the effective period of the PAL, source needs to show that the sum of the monthly emissions from all unit for the previous 12 consecutive months is less than the PAL

How is a PAL Established?

- Source owner must submit a complete application to the reviewing authority, that includes:
  - A list of all emissions units (existing and new) and their size classifications (major, significant, or small)
  - A list of all applicable requirements for each emission unit
  - Calculations of the baseline actual emissions for each emissions unit
    - Calculations should include emissions from SSM
    - Application should include documentation to support calculations
- A PAL may be established in a major NSR permit, minor NSR permit, operating permit issued under a SIP-approved program, or a title V permi
- A separate PAL is required for each pollutant

PSD Summary

- Applies to major sources or major modifications
  - Identification of the "source" may be complex
  - Routine Maintenance is exempt but is hard to define
- Requires:
  - Application of BACT
  - Source may not violate ambient standard
  - Source may not violate increment

PSD vs NSR

- Data needed to obtain permit varies between PSD and NSR
- PSD requirements focus on
  - Not violating air quality standards
  - Not violating increments
  - Applying BACT
- NSR requirements focus on
  - Apply LAER level of control
  - Offsetting emission increase with emission decreases

Lesson 9

New Source Review (Non attainment)

Lesson Objectives

- Explain legal basis for NA- NSR
- Review applicability
- Discuss state and local permits for nonattainment areas
- Define technology requirements
- Examine procedures for air quality protection

NA-NSR

- <u>Purpose:</u>
  - Allow economic expansion in Nonattainment areas without air quality degradation
  - Assure emissions from new and modified major sources are reduced to the maximum extent feasible
  - Implemented through a preconstruction permit requirement

NSR vs PSD

- Similarities
  - Same Definition of Source
  - Pre Construction Review
  - Netting Allowed

NSR vs PSD

- Significant differences:
  - Major source thresholds
  - Pollutants evaluated
  - VOC & NOx significance levels
  - Control technology requirement is LAER rather than BACT
  - Offsets
  - Certification that other facilities under the same ownership within the state are in compliance

Clean Air Act – Title I

- Part A: Air Quality and Emissions Limitations
- Part B: Ozone Protection (replaced by Title VI)
- Part C: Prevention of Significant Deterioration
  - **Part D: Plan Requirements for Nonattainment Areas**

"Major Source" Thresholds for NSR for Ozone, PM, and CO Depending on Non Attainment

Area Classification		Major Source PTE (tpy)
Ozone	Marginal	100 (precursors i.e. NOx and VOC)
Ozone	Moderate	100
Ozone	Serious	50
Ozone	Severe	25
Ozone	Extreme	10
CO	Moderate	100
CO	Serious	50
PM10	Moderate	100
PM10	Serious	70

NA-NSR

- <u>Pollutants evaluated:</u>
  - Criteria pollutant(s), precursors or constituents, for which the area is nonattainment
  - VOC &/or NOx for Ozone NA, depending on attainment plan
    - Nox, SOx and NH3 are PM2.5 precursors
    - Remember, PSD evaluation includes all NSR pollutants

LAER

- **Rate that has been achieved or is achievable for defined source**
- **Rate may be in a permit or regulation**
- **Rate does not consider the following factors:**
  - **Economic**
  - **Energy**
  - **Environmental**
  - **Other factors**

BACT vs. LAER

- Primary difference
  - BACT review considers economic and other factors
  - LAER does not

NA-NSR

- Certification that other major facilities owned or operated within the state are in compliance or on a schedule of compliance

NA-NSR

- Offsets:
  - Emission reductions that:
    - Offset the emissions increases resulting from the new source or modification, and
    - Provide a net air quality benefit
  - Offset ratio can be from 1:1 up to 1.5:1, depending on:
    - the criteria pollutant of concern; and
    - the nonattainment classification

Exercise
Offsets

- Maximum emission rate of new source is 100 pounds per hour
- LAER reduces emissions 80%
- Offset required is 1.2:1
- Permit limits operation to 8,000 hr/yr

- What is the uncontrolled PTE of the source in tons per year?
- What are the offsets required in pounds per hour?
- From what geographical area are the offsets required?
- How is the source going to obtain the offsets?

NA-NSR

– <u>Offsets (cont):</u>

- Calculating offsets is more involved than the example
  - The example looked only at offsetting direct emissions from the project
  - In practice, offsets must assure “reasonable further progress”

– Reasonable further progress is a planning term

NA-NSR

- Offsets:
  - How are offsets obtained?
    - Enforceable emission reductions in the non-attainment area
    - Banking
    - Other?

NA-NSR

Emissions trading

versus

Emissions banking

NA-NSR

- <u>Emissions Trading (Market Based program):</u>
  - Also called a “cap and trade” program
  - Emissions are limited on a geographic basis
  - Emissions are tracked through allowances
  - Sources must hold enough allowances to cover actual emissions (usually on an annual basis)
- Sources can buy or sell allowances
  - Sources that can economically reduce emissions can sell excess allowances to sources that cannot economically reduce emissions
  - Title IV Acid rain SOx trading program is an example of a emissions trading program
  - Requires comprehensive and transparent method of tracking emissions

NA-NSR

- Emissions Banking:
  - Primarily a nonattainment area program
  - Allows sources who have gone out of business or reduced nonattainment pollutants to below regulatory requirements to “bank” those emission
  - New or modified sources may purchase banked emissions when needed for offsets
  - Requires comprehensive and transparent method of tracking emissions

NA-NSR

Emissions Banking (cont):

– For purposes of banking, trading, or immediate use, emissions reductions must be:

1. Real
2. Surplus
3. Permanent
4. Quantifiable
5. Enforceable

NA-NSR

Emissions Banking (cont):

- A state or local agency operating a registration program must insure that the banked emissions meet these five criteria

NA-NSR

Emissions Banking (cont):

- Offsets must generally be of same pollutant
  - Some consideration of inter-pollutant offsetting between ozone precursors (VOC/NOx)
- The use of emission reduction credits to offset other criteria pollutants may be restricted geographically

Quick Review

NA-NSR Construction Permits

- Nonattainment NSR
  - Major source thresholds
  - Pollutants evaluated
  - VOC & NOx significance levels
  - Control technology requirement is LAER rather than BACT
  - Offsets
    - Distinguish between Emissions Banking and Emissions Trading
  - Certification that other facilities within the state are in compliance

Questions ???

Lesson 10

EFFECTIVE PERMIT CONDITIONS

Overview

- Analysis
- Permit Conditions
- Permit Expiration and Extensions
- Commence Construction vs. Begin Actual Construction

Analysis

- Key portions to document
  - Project description
  - PSD applicability (especially for major modifications – these can be tricky and should be included in your analysis even when PSD is determined not to apply)
  - BACT analysis
  - Air impacts/modeling
  - Additional impacts analysis
  - Response to comments

Permit Conditions

- Crucial component of permit
- Define terms of permit “contract”
- Tell permittee:
  - What is allowed
  - What is prohibited
  - What is required
  - When it is required

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Permit Conditions (cont'd)

- Identify permit terms and conditions necessary to assure that compliance obligations are met
- Understand how permits can complicate enforcement

Basic Permit Elements

- legal authority;
- technical specifications;
- emissions compliance demonstration;
- definition of excess emissions;
- administrative procedures;
- other specific conditions.

Interpretation of Permit Terms

- Permit requirements must "stand-alone“
- Courts will look first to “four corners of the permit” to understand legal obligations
    - Courts evaluate extra-permit information only if permit terms and conditions are ambiguous
- Permit language is strictly construed
- Permittees are strictly liable for compliance with all permit “terms and conditions”

Emissions Units

- Permit term should identify the emission unit:
  - Number and description
  - Size rating or design capacity
  - Control technology requirement

Legal Authority

- Basis--statute, regulation, etc.
- Conditional Provisions
- Effective and expiration dates

Technical Specifications

- Unit operations covered
- Identification of emission units
- Control equipment efficiency
- Design/operation parameters
- Equipment design
- Process specifications
- Operating/maintenance procedures
- Emission limits – including start-up

Definition of Excess Emissions

- Emission limit and averaging time
- Compliance Method – CEM or Stack Test
  - CEMs should be required where technically feasible
  - Stack Test will require CAM like monitoring
- Surrogate measures
- Malfunctions and upsets
- Follow-up requirements

Compliance Demonstration

- Permit must specify how compliance will be determined:
  - when and what tests should be performed
  - under what conditions tests should be performed
  - the frequency of testing
  - the responsibility for performing the test
  - that the source be constructed to accommodate such testing procedures for establishing exact testing protocol
  - requirements for regulatory personnel to witness the testing.

Administrative

- Recordkeeping and reporting procedures
- Commence/delay construction
- Entry and inspections
- Transfer and severability

Emission Limitations and Standards

- Is the emission limitation enforceable?
  - Federally-enforceable emission limitations must be short-term and specific to determine compliance at any time
  - Annual emissions limitations alone (e.g., emission of SO2 shall not exceed 249 tons per year) are inadequate

Emission Limitations and Standards (cont’d)

- Averaging times must be appropriate to control technology i.e. continuous compliance for continuous control
- Averaging Time must be compatible with compliance demonstration method
- No Averaging time should exceed one month

Examples of Unenforceable Permit Conditions

Emission Limitations and Standards -- Unenforceable

- Public Citizen et al v. American Electric Power, 2006 U.S. Dist. LEXIS 93336:
  - Pollutant limits expressed as lbs/mmBtu "while firing at full load (5156 mmBtu/hr, Nameplate Capacity: 558 MW)"
  - Court: Heat input limit not enforceable
  - Court: Only those terms preceded by "shall not exceed" were enforceable

Emission Limitations and Standards (cont'd) -- Unenforceable

- Cement Plant Permit Condition:
  - 1998 PSD permit
    - Compliance with BACT limits "will be determined by testing in accordance with condition 10"
      - Condition 10a: "within 180 days of reaching the maximum production rate . . . emissions and opacity of the kiln shall be measured by an approved testing service."
  - As of 12/07 facility had not reached the maximum production rate

Lesson 11
Enforcement Techniques

- From state perspective enforcement of NA NSR/PSD permits is the same as minor NSR

Information Gathering

- File Review
- Facility Inspection
- Information Requests

File Review

- Permit Applications and Correspondence
- Engineering Evaluations
- BACT Analyses
- Minor and Major NSR Permits
- Emission Inventories
- Inspection Reports

Information Gathering (cont'd)

- Site Visit begins with in plant meeting to discuss
  - All permit applications and supporting correspondence
  - Engineering or permit review memoranda
  - All permits
    - Minor NSR
    - Major NSR
    - Title V
  - Source Emission Data

Information Gathering (con't)

Data Hierarchy

1. CEMs data from emission point(s) in question
2. Representative source test data from emission point(s) in question
3. AP-42 emission factors
4. Industry-derived and vendor guaranteed manufacturer emission factors

CEMs Data

- Best data
- If data available from before and after change, data can be used to see what actually happened
- Statistical tests can be used to determine significance of the change

Source Tests

- Operating parameters can affect results
- Source can change parameters during tests
- Results can be used to create production-based emission factor
- If data from before and after change available; results can be used to look at actual-to-actual emissions
- Know why test was done: worst case vs. representative

AP-42 Emission Factors

- Is an estimated average and range
- Factors have a range of reliability
- If emission factor used prior to change involving new equipment, should consider requiring source test

Facility Inspection

- Interviews
- Physical evidence
- Records

Facility Inspection

- Review permitted Units
- Look for new/modified units
- Review all required records
- Look for emission units not on permit

Facility Inspection: Interviews

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

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

- Production records
- Records of raw materials usage/supplier
- Records of process parameters
- Control equipment O&M logs
- Operator logs
- Calculation of actual emissions
- Results of stack tests and test methods
- CEMS Data

Facility Inspection

- Compare operations to permit levels
- Match emission units to permit application

Research Resources

- Lexis/Nexis™ for facility information
- Contacts in states
  - inspectors
  - permit writers
  - enforcement personnel

File Review (cont'd)

- Permit Applications and Correspondence
- Engineering Evaluations
- BACT Analyses
- Minor and Major NSR Permits
- Emission Inventories
- Inspection Reports

File Review (cont'd)

- Just as important for permitting to understand the facility history as it is when conducting an NSR investigation
  - Relationship between separate permit applications (are they one project permitted separately?)
  - Relaxation of synthetic minor permit limit might trigger 52.21(r) and will not be known unless origin of limit is known

Meeting in Lieu of Onsite Inspection

- Understanding the process is key to proper permitting
- In lieu of an onsite inspection (sometimes difficult due to travel budget limitations), the permitter may ask that the company come in and provide a presentation explaining how the processes work

Information Requests
(CAA Section 114)

Ask for:

- Generally, evidence for changes that may have increased production capacity
- Information needed to calculate emissions independently
- Permit history

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
- Require testing (if necessary)

Information Requests: Permit History

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

Emissions Calculations

- Explain the various sources of data available for use in emissions calculations
  - A Data Quality List

Data Quality Hierarchy

1. CEMs data from emission point(s) in question
2. Representative source test data from emission point(s) in question
3. AP-42 emission factors
4. Industry-derived and vendor guaranteed manufacturer emission factors

CEMs Data

- Best data
- If data available from before and after change, data can be used to see what actually happened
- Statistical tests can be used to determine significance of the change

Source Tests

- Operating parameters can affect results
- Source can change parameters during tests
- Results can be used to create production-based emission factor
- If data from before and after change available; results can be used to look at actual-to-actual emissions
- Know why test was done: worst case vs. representative

Predictive Emissions Monitoring Systems

- Predicts emissions by analysis of process parameters through a statistical or neural net model after training model with a CEMS
- Similar to an Emission Factor (AP-42) but more emission unit specific

AP-42 Emission Factors

- Is an estimated average and range
- Factors have a range of reliability
- If emission factor used prior to change involving new equipment, should consider requiring source test

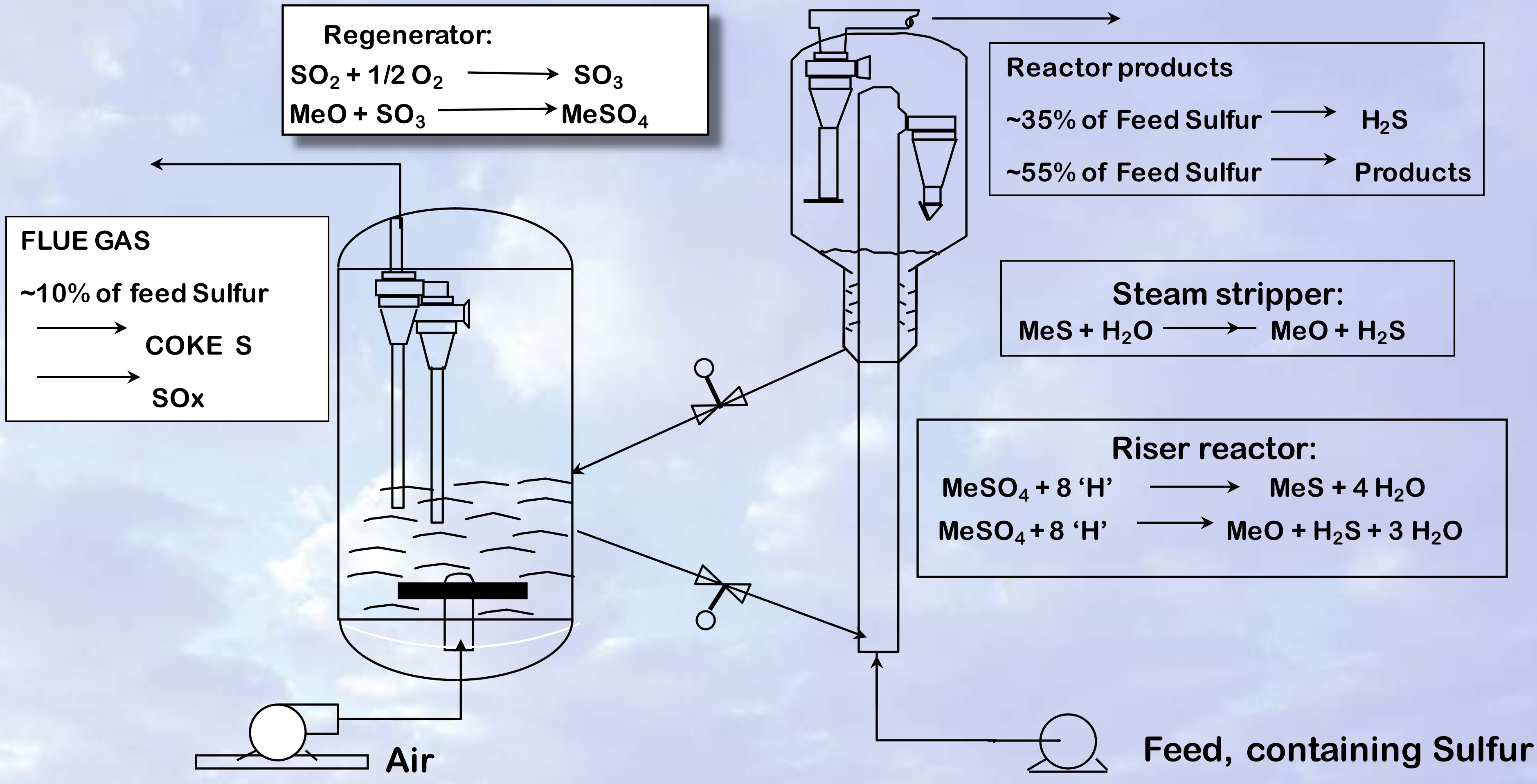
Lesson 12
Refinery FCCU
Case Study

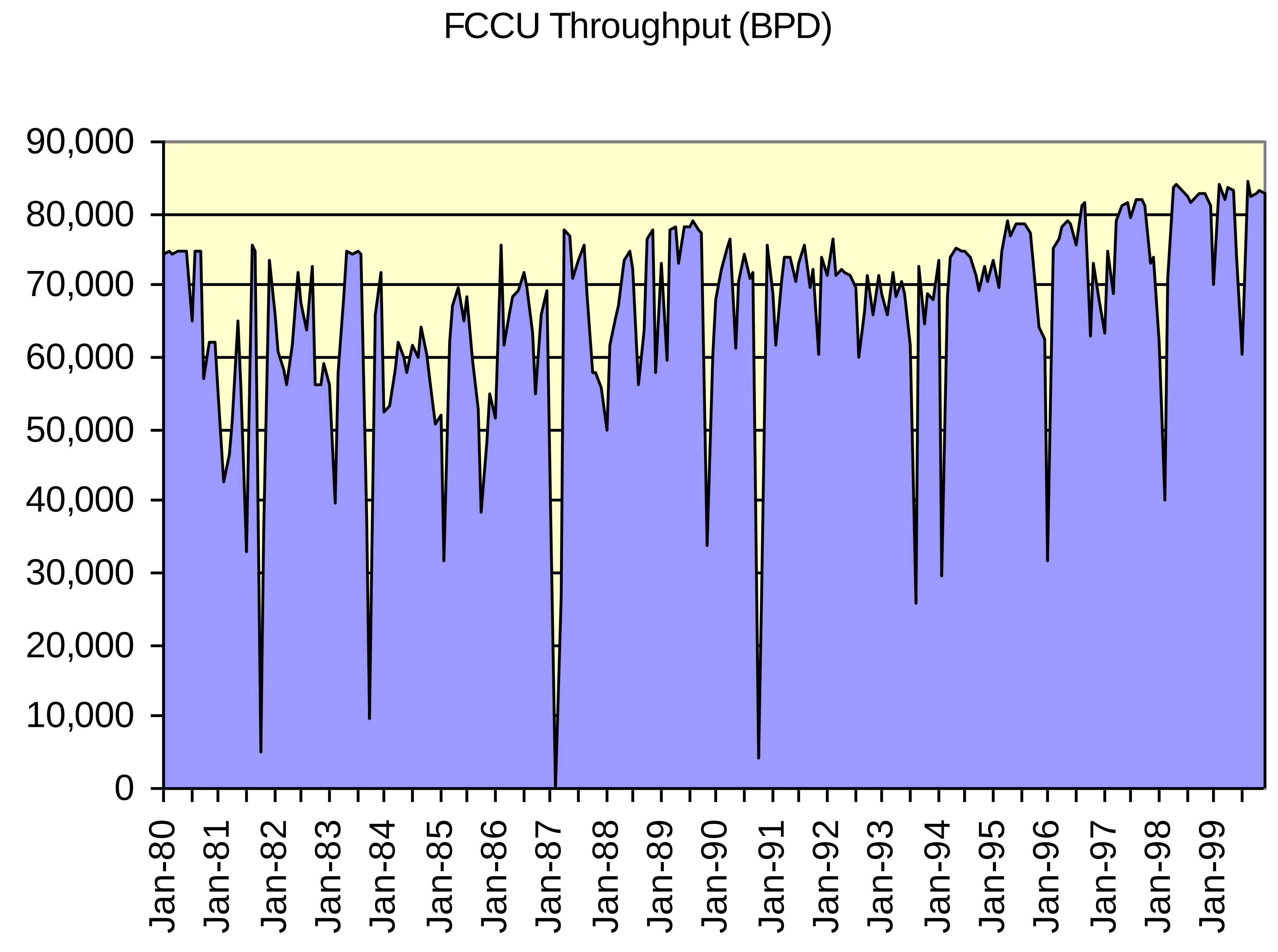
Purpose

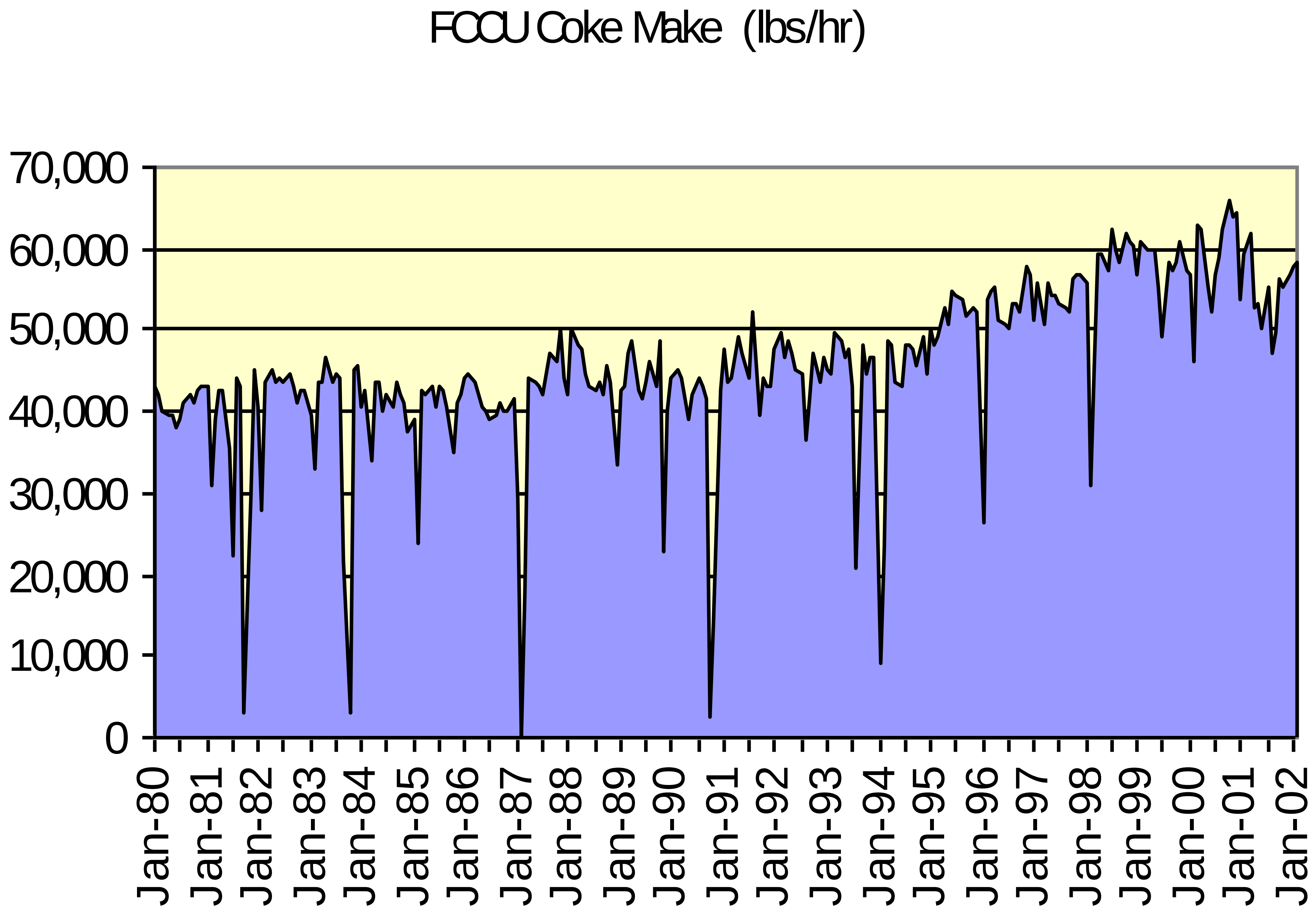
- Provide an example of an NSR investigation
- Tools and techniques used could be used when warranted by permitters

28
1

FCCU Configuration




FCCU Throughput (BPD)
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Jan-80
Jan-81
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99


FCCU Coke Make (lbs/hr)
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Jan-80
Jan-81
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02

1987 and 1990 TAs

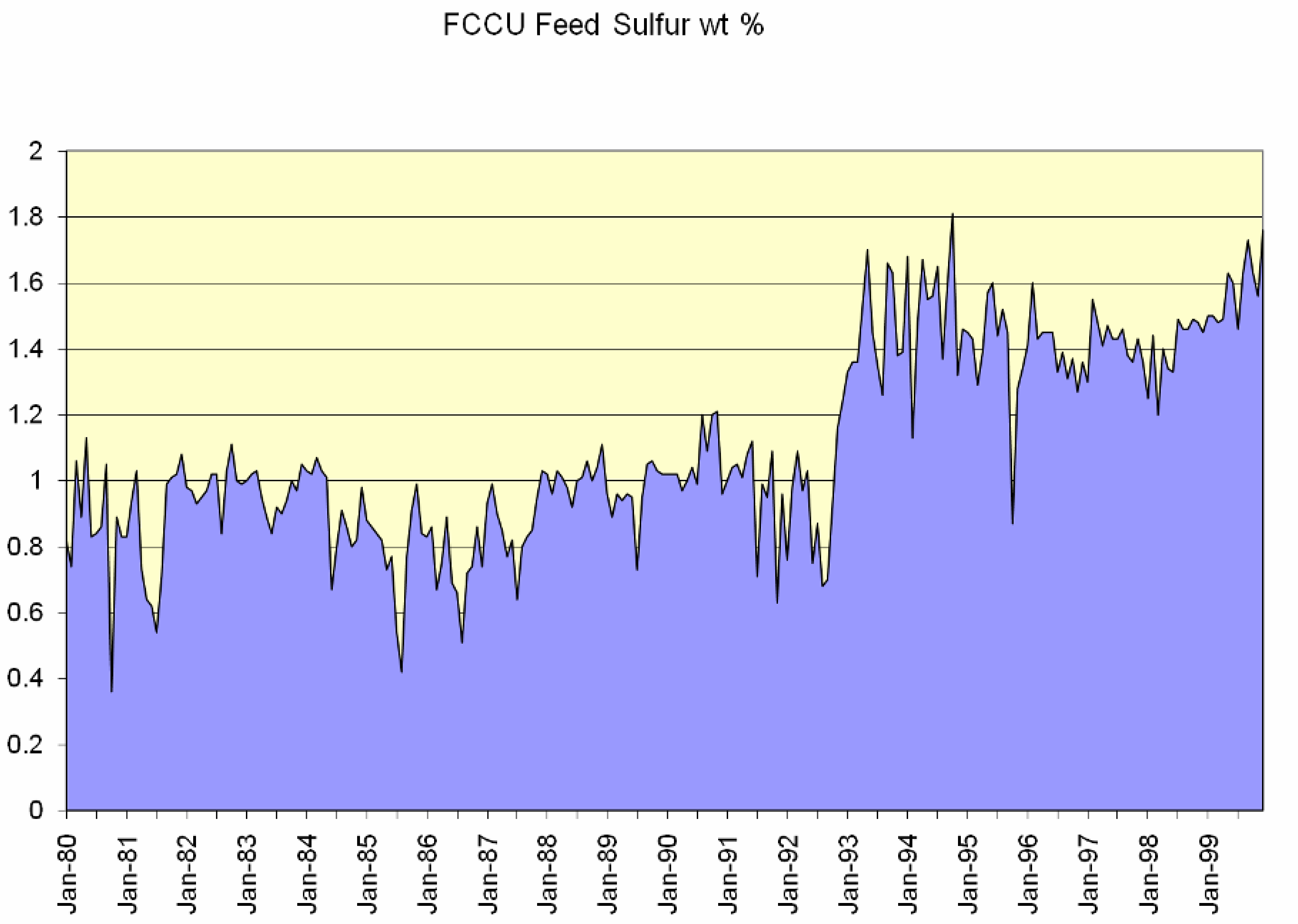
- 1987 TA
  - Installed 15 air grid arms, replaced 35 additional arms
  - All primary and secondary cyclones replaced in the reactor
- 1990 TA
  - Install tie-in for new CO boiler force draft fan
  - Install new CO boiler soot blowers
  - Install 3 additional main column overhead condenser air coolers, larger wet gas compressor lube oil cooler

28
5

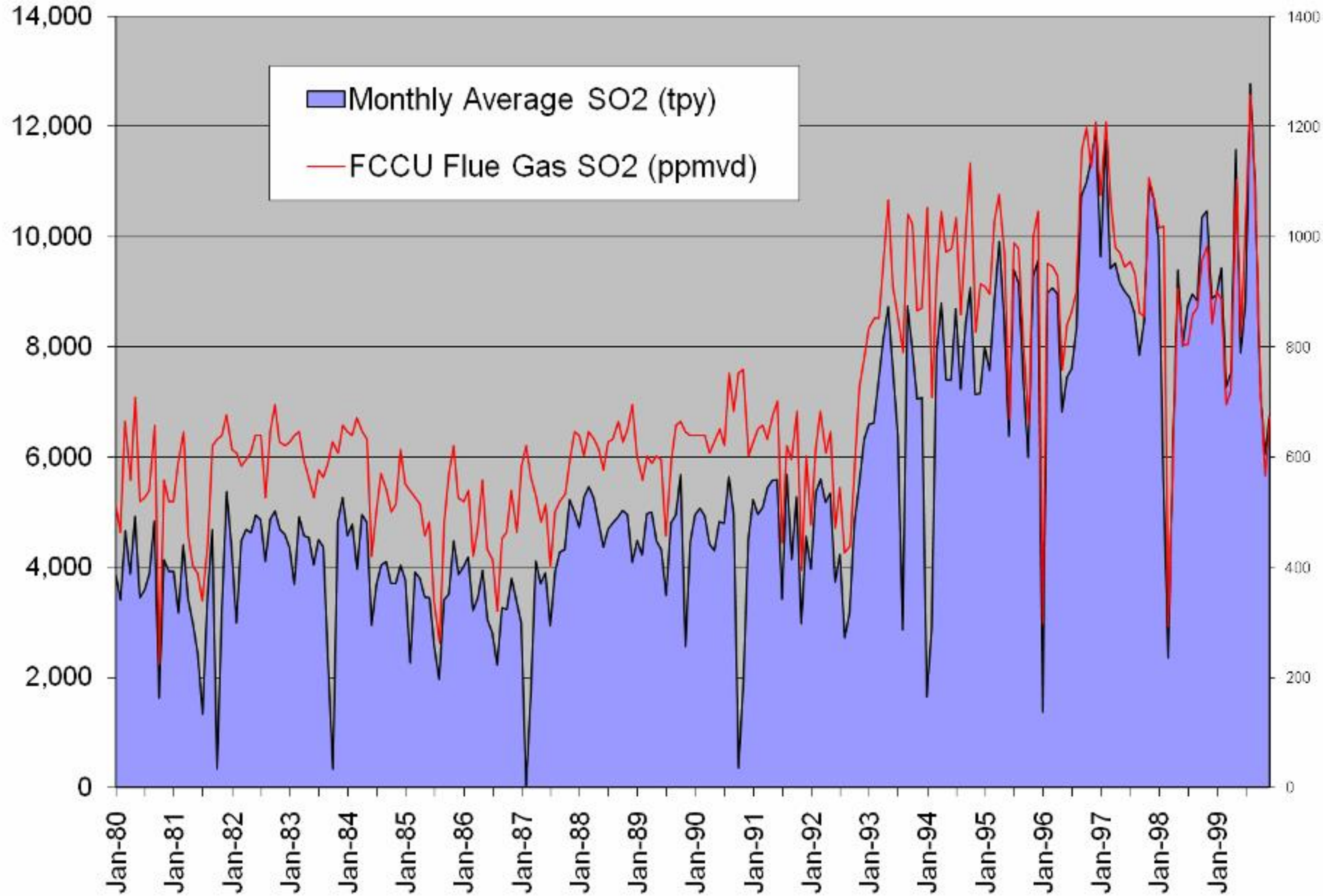
1994 and 1998 TAs

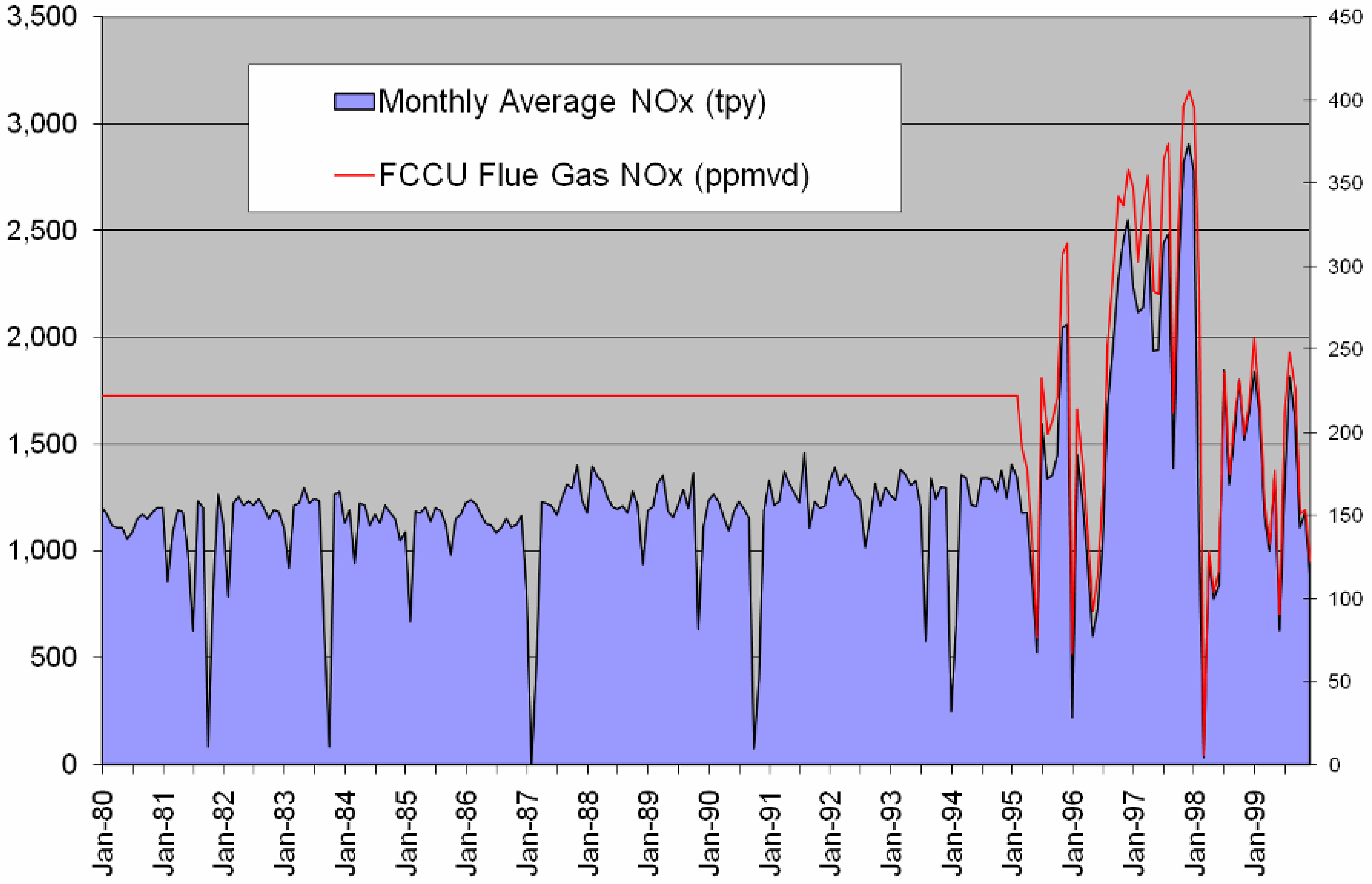
- 1994 TA
  - Stripper modification to strip hydrocarbons that allowed burning of more coke
  - Plan to handle heavier more sour feed that produced more coke per barrel of feed
- 1998 TA
  - Flue gas constraint on volume of flue gas
  - Modified CO boiler to lift the constraint
  - Coke burn would logically increase when constraint is lifted

28
6



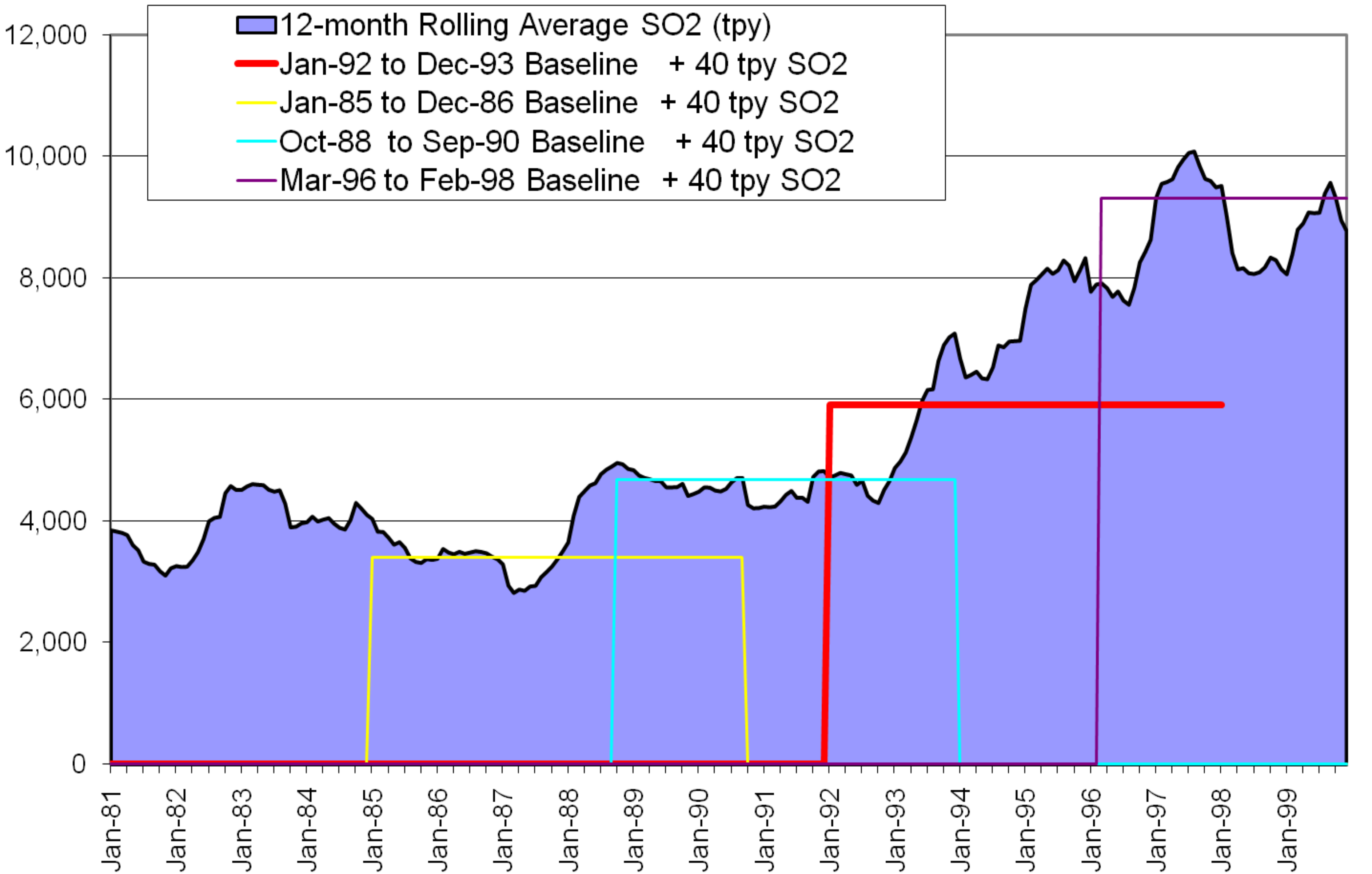
FCCU Feed Sulfur wt %
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Jan-80
Jan-81
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99


Monthly Average SO2 (tpy)
FCCU Flue Gas SO2 (ppmvd)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1400
1200
1000
800
600
400
200
0
Jan-80
Jan-81
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99



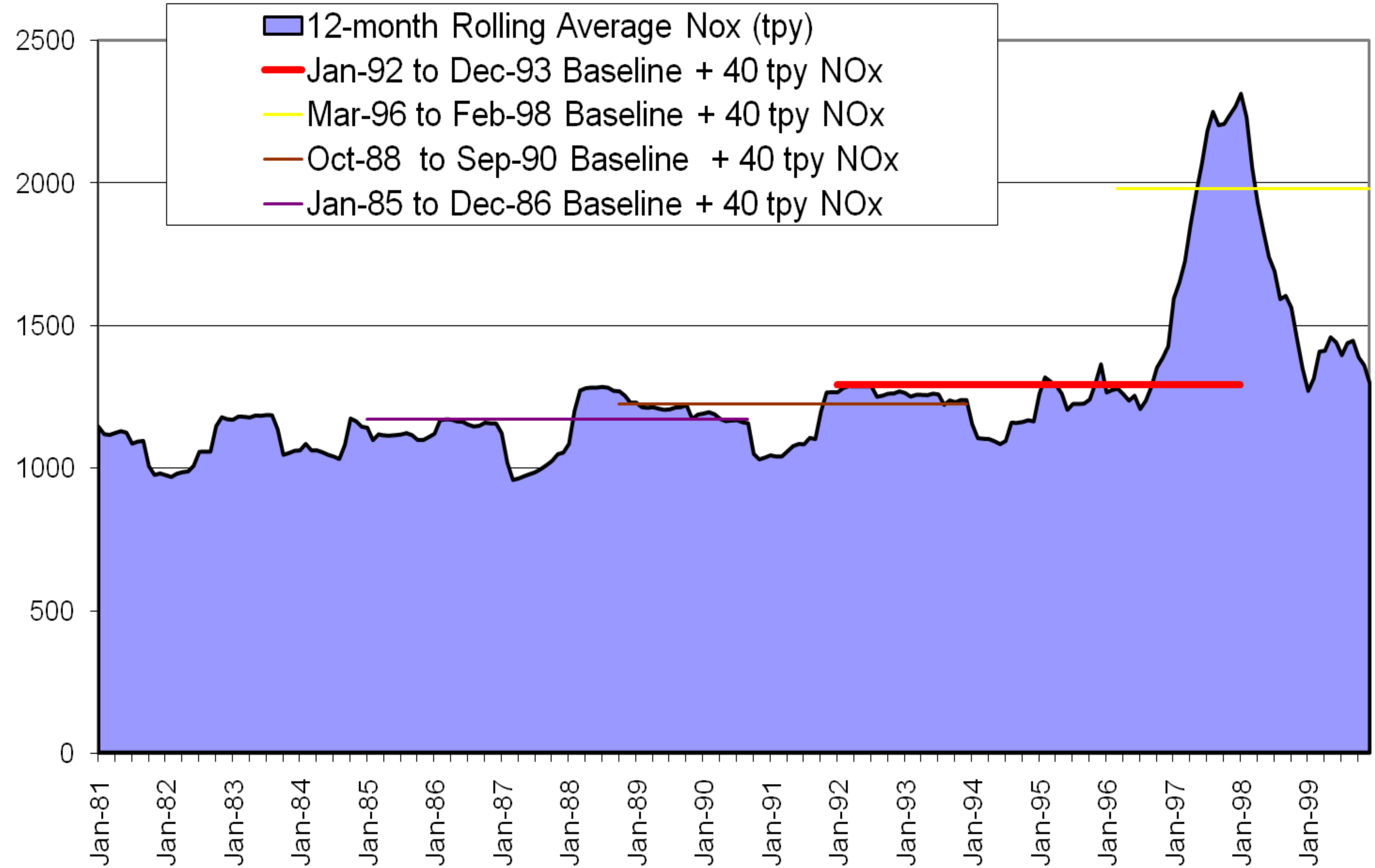
Monthly Average NOx (tpy)
FCCU Flue Gas NOx (ppmvd)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
450
400
350
300
250
200
150
100
50
0
Jan-80
Jan-81
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99

FCCU SO2 TAs



12-month Rolling Average SO2 (tpy)
Jan-92 to Dec-93 Baseline + 40 tpy SO2
Jan-85 to Dec-86 Baseline + 40 tpy SO2
Oct-88 to Sep-90 Baseline + 40 tpy SO2
Mar-96 to Feb-98 Baseline + 40 tpy SO2
12,000
10,000
8,000
6,000
4,000
2,000
0
Jan-81
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99

FCCU NOx TAs



12-month Rolling Average Nox (tpy)
Jan-92 to Dec-93 Baseline + 40 tpy NOx
Mar-96 to Feb-98 Baseline + 40 tpy NOx
Oct-88 to Sep-90 Baseline + 40 tpy NOx
Jan-85 to Dec-86 Baseline + 40 tpy NOx
2500
2000
1500
1000
500
0
Jan-81
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99

1987 and 1990 TA SO2 Emissions

SO2		1987 TA	Average tpy		1990 TA	Average tpy
2-year to highest 12-month		Jan-85 to Dec-86	3,370		Oct-88 to Sep-90	4,637
		Nov-87 to Oct-88	4,961		Jan-93 to Dec-93	7,091
		delta	**1,590**		delta	**108**
2-year to highest month		Jan-85 to Dec-86	3,370		Oct-88 to Sep-90	4,637
		Oct-89	5,679		Sep-93	8,742
		delta	**2,308**		delta	**4,105**

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2

1994 and 1998 TA SO2 Emissions

SO2		1994 TA	Average tpy		1998 TA	Average tpy
2-year to highest 12-month		Jan-92 to Dec-93	5,897		Feb-96 to Jan-98	9,422
		Sep-96 to Aug-97	10,085		Oct-98 to Sep-99	9,571
		delta	**4,211**		delta	**149**
2-year to highest month		Jan-92 to Dec-93	5,875		Feb-96 to Jan-98	9,422
		Dec-96	11,960		Jul-98	12,774
		delta	**6,085**		delta	**3,352**

29
3

1987 and 1990 TA NOx Emissions

NO_x		1987 TA	Average tpy		1990 TA	Average tpy
2-year to highest 12-month		Jan-85 to Dec-86	1,131		Oct-88 to Sep-90	1,184
		Aug-87 to Jul-88	1,283		Apr-91 to Mar-92	1,286
		delta	**152**		delta	**102**
2-year to highest month		Jan-85 to Dec-86	1,131		Oct-88 to Sep-90	1,184
		Nov-87	1,400		Aug-91	1,461
		delta	**269**		delta	**277**

1994 and 1998 TA NOx Emissions

NO_x		1994 TA	Average tpy		1998 TA	Average tpy
2-year to highest 12-month		Jan-92 to Dec-93	1,252		Feb-96 to Jan-98	1,952
		Feb-97 to Jan-98	2,311		Oct-98 to Sep-99	1,926
		delta	**1,059**		delta	**-26**
2-year to highest month		Jan-92 to Dec-93	1,252		Feb-96 to Jan-98	1,952
		Dec-97	2,905		Jul-98	1,847
		delta	**1,654**		delta	**-105**

Lesson 13
NSR - Settlements

NSR - Settlements

- This session will:
  - Discuss the purpose and meaning of settlement agreements and the types of settlement agreements
  - The relationship between Consent Decrees and Title V applicable requirements
  - The roles of EPA and the State

NSR - Settlements

- Purpose and meaning of settlement agreements (i.e., consent decrees):
  - Deter illegal conduct
  - Mutually resolve alleged violations
  - Return facilities to compliance
- Two Models
  - Claim-specific settlements
  - “Global” settlements

NSR – Claim-specific Settlements

- Elements of the settlement:
  - Injunctive relief
    - Identifies technology to be installed
    - Program of compliance to be implemented
  - Schedules for injunctive relief
    - Complete construction
    - Compliance dates
    - Note: All violating units must install, maintain and operate pollution control technology

NSR – Claim-specific Settlements

- Unit-specific emission limitations
  - All violating units must achieve BACT/LAER-equivalent emission rates
    - Short term limits:
      - » e.g., 3-hour and 7-day average
      - » May exclude startup, shutdown and malfunctions, provided that there is a long-term rate
      - » Note: All emissions from the unit must be counted against an emission limitation
    - Long term limits:
      - » 30-day rolling average, including startup and shutdown
      - » Malfunction excluded only if meets force majeure requirements

NSR – Claim-specific Settlements

- Offsets/Credits
  - Always prohibit the use of emission reductions from settlement to be used as offsets
  - Generally prohibit the use of emission reductions from settlement to be used as credits
    - Note: Exception – complying unit to complying unit

- Allowances
  - Utilities required to surrender all SO2 and/or NOx allowances not needed for plant/system

NSR – Claim-specific Settlements

- Monitoring to ensure benefits
  - Continuous Emission Monitoring (e.g., NOx, SO2, PM, Hg CEMS, COMS)
  - A core requirement of all NSR settlements
- Recordkeeping and Periodic Reporting
  - Actual annual emissions
  - Compliance with CD terms and emission limits

NSR – Claim-specific Settlements

- Compliance requirements continue post-CD
  - Apply non-Title V federally-enforceable permit or SIP revision to incorporate CD requirements (i.e., establish applicable requirements)
  - Apply for a new (or amended) Title V operating permit to include applicable requirements
- Civil penalties, including stipulated penalties
- SEPs and/or Environmentally Beneficial Projects
  - Environmental neutrality policy, especially with regard to CD modifications
- Covenants
  - Past release for violating unit(s) only

NSR – Claim-specific Settlements

- CD does not terminate until all applicable permits issued:
  - *Conditional termination of enforcement through this Consent Decree, after [the company]. . . has obtained all the final permits required by Section XVI ([Title V] Permits) of this Consent Decree covering both Unit 1 and Unit 2 that include as federally enforceable permit terms, all of the Unit performance and other requirements specified in this Consent Decree.*

NSR – Claim-specific Settlements

- Apply *Guidance on the Appropriate Relief for Violations of Major New Source Review Requirements, Eric V. Schaeffer, Director, Office of Regulatory Enforcement, November 17, 1998:*
  - Require installation and operation of BACT/LAER-equivalent controls, AND
  - For failure to obtain a NSR permit prior to construction:
    - First Scenario: actual emissions exceed major source threshold – must fully comply with all applicable NSR requirements (permitting, controls, AQ impact analysis/offsets); or
    - Second Scenario: actual emissions have never exceeded major source threshold – if below MST after install BACT/LAER –equivalent controls, Regions have discretion to allow source to obtain synthetic minor permit.

NSR – Claim-specific Settlements

- For failure to comply with an existing synthetic minor limit:
  - When a source knowingly and regularly violates their synthetic limit, then EPA should treat the source as a major and require full compliance with all applicable NSR requirements (U.S. v. Louisiana-Pacific, D. Colo. 1988) and 40 CFR 52.21(r)(4).
  - Circumstances where the appropriate response it enforcement of the synthetic minor permit:
    - Violations are (a) infrequent, (b) minor in nature, and (c) the synthetic minor limit is significantly lower than the major source threshold.

NSR – Claim-specific Settlements

- Miscellaneous
  - **GENERAL PROVISIONS**

    This Consent Decree is not a permit. Compliance with the terms of this Consent Decree does not guarantee compliance with all applicable federal, state, or local laws or regulations. The emission rates and removal efficiencies set forth herein do not relieve [the company] *from any obligation to comply with other state and federal requirements under the Clean Air Act, including* [the company's] *obligation to satisfy any State modeling requirements set forth in the SIP.*

NSR – Global Settlements

- Elements of a global settlement
  - In addition to the foregoing elements of a claim-specific settlement:
    - All units must be controlled to BACT-equivalent levels
    - The percentage of units to BACT-levels and the units to be controlled are determined, *inter alia*, in reference to:
      - The strength of the case
      - The emissions profile of the units

NSR – Global Settlements (cont’d)

- Elements of a global settlement (con’t)
  - Must achieve system-wide reductions (e.g., unit-specific emission rate and tonnage cap)
  - Establish system-wide cap or annual limits (e.g., 12-month or 365-day rolling average emission rate, annual tonnage cap)
  - Relief must match release

NSR – Settlements

- State role
  - States are encouraged to participate in all federal enforcement actions
  - Benefits to state to act on application from Defendant(s):
    - Secures emission benefits
    - Limits can go into BACT/RACT/LAER Clearinghouse as part of an enforceable permit

Lesson 14

COMPLIANCE & ENFORCEMENT CONSIDERATIONS

311

Lesson Objectives

- Answer question “What is compliance?”
- Explain how to define compliance in permit
- Examine what is required to demonstrate compliance
- Examine the importance of enforcement
- What should the permittee do?
- What can the agency do?

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Basis for Compliance

- Basic purpose of a permit term or condition is to tell permit holder
  - What is allowed
  - What is prohibited
  - What is required,
  - When it is required
  - How to comply

Compliance vs. Enforcement

- Compliance: The full implementation of requirements
- Enforcement: The set of actions taken by the government to achieve compliance
  - Inspections
  - Formal (or informal) Notice of Violation
  - Negotiations
  - Legal action
- NACT 335
  - Principles of Compliance and Enforcement

31
4

What Constitutes Compliance?

Examples:

- Emission limits being met
- Work practices being observed
- Maintenance being performed
- Hours of operation within limits
- Fuel meeting specifications
- Commencement of Construction

315

Compliance Defined in Permit

- Specify those actions in permit conditions
- Define time limits by which compliance must be attained
- Describe evidence required to prove a violation

316

Compliance Provisions

- Permittee shall not knowingly falsify or render inaccurate any monitoring device or method required by the permit
- The information obtained from the required monitoring can be used directly for enforcement.
- Any creditable evidence showing compliance or non-compliance

317

Compliance Demonstration

- Surrogate measurements may be useful in demonstrating compliance
  - Temperature
  - Pressure drop
- If relationship can be established, these may be easier, less costly
- Must be reflected in permit

Compliance Demonstration

- Permittee activities
  - Commencement of Construction
  - Source tests
  - Continuous emission monitors (CEMs)
  - Recordkeeping
    - Fuel/raw material usage
    - Parametric data (temp., pressure drop, V.E.)
    - Maintenance/repair
- Agency activities
  - Inspections

31
9

Compliance Demonstration

- Compliance demonstration hierarchy
  1. Reference method stack tests
  2. Calibrated (with reference method) CEM
  3. Calibrated tests on similar units
  4. Non-reference method tests on unit
  5. Non-reference method tests on similar units
  6. Literature data for similar units
  7. AP-42 factors
- Follow Agency Guidelines

320

Noncompliance

- Noncompliance with any permit condition constitutes a potential violation of the Clean Air Act and/or State rules and is grounds for:
  - Enforcement action
  - Permit termination, revocation and reissuance, or modification
  - Denial of a permit renewal application

32
1

Class Discussion - Compliance

- What is meant by the term "compliance"?
- Why must the term "compliance" be defined in a permit for each emission unit and for each emission limitation?
- Is the definition for the term "compliance" negotiable?

Enforcement

- After the permit is issued
  - Commencement of Construction
- Different than compliance schedule

323

Importance of Enforcement

- Permitting process meaningless if not appropriately enforced
- Levels "playing field"
- Provides disincentive
- Affords credibility to agency

324

Enforcement

- Agency must communicate
- Complex permits may warrant:
  - In house meeting with appropriate enforcement personnel before draft permit is issued
  - A meeting with permittee upon completion of the draft permit
  - A walk-through existing facility with permit writer, enforcement personnel, and facility representatives

32
5

Enforcement

- Permittee responsibilities:
  - Understand the permit
  - If questions, ask the agency
  - Request a meeting if necessary
- If permittee doesn't understand the permit, compliance will be difficult and enforcement action is likely

326

Enforcement

- Agency responsibilities
  - Diligence
  - Periodic inspections
  - Thorough review of records
  - Formal enforcement action if warranted
    - Depends on agency's enforcement policy
    - Warning
    - Notice of violation

Commencement of Construction

- Important in two different contexts in Pre-Construction PSD Permit
  - Before a Pre-Construction Permit is Issued
  - After a Pre-Construction Perm it is issued

328

Commencement of Construction Building a New Plant

- Application Preparation
- Agency Review
- Final Permit Issuance
- Land Will Be Laying Idle
- Plant Construction Period

32
9

Activities Allowed Before Permit Is Issued

12/18/1978 EPA Memo from Ed Reich interprets 40 CFR 52.21(i) as follows:

- Planning / Preparation
- Ordering of Equipment
- Clearing the Site
- Grading Activities
- On-Site Storage of Equipment and Material

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Activities Not Allowed Before Permit Is Issued

- Pouring Foundation
- Installing Building Support
- Paving
- Laying Underground Pipework and Utilities
- Avoiding “Equity In the Ground” argument

Activities Required After Permit Is Issued

- Source is required to “Commence Construction” within 18 months after Permit is issued (40 CFR 52.21(r)(2))
- Avoiding “Yesterday’s BACT”

332

Commencement of Construction?

What Qualifies as Commencement of Construction after permit is issued?

- Placement, assembly, installation of materials, equipment or facilities as part of ultimate structure of source
- Activities must take place at proposed site and be site-specific

333

Commencement of Construction Extensions

- Extension beyond 18 months is allowed "upon a satisfactory showing that an extension is justified"
- Jan. 31, 2014 EPA may no longer require a new application, if applicant shows extensive analysis is not needed, on a case-by-case basis
- 2014 EPA Policy in SIP or Agency Policy for state/local/tribal agency issued permit

334

Penalties

- Should result in behavior change
- Not just cost of doing business
- Should recognize certain factors

335

Penalty Factors

- Agency should formalize penalty factors
- Economic factors
  - Cost avoided
  - Cost postponed
- Deviation from standard
- Potential for harm
- Length of violation

336

Lesson 15
Avoidance Permits

- PSD/NA NSR are complex
- Permit process is time consuming
- Many sources limit emissions to avoid process

Emission Limitations and Standards

- <u>Synthetic Minor Permits</u>:
  - A source's potential to emit should include federally enforceable permit conditions which restrict hours of operation or amounts of material combusted or produced . . . but blanket restrictions on actual emissions are not"

Avoidance Permit Emission Limits

- Emission limits must meet all criteria discussed above including:
  - legal authority;
  - technical specifications;
  - emissions compliance demonstration;
  - definition of excess emissions;
  - administrative procedures;
  - other specific conditions.

LIMITING PTE

- ***Why place an operation or physical limitation on the capacity of a source?***
    - Actual emissions may be much lower than the potential to emit, or
    - To clearly demonstrate that only non-regulated materials are used.
  - Source can avoid some regulatory requirements
    - NSR/PSD, MACT, Title V
    - Still subject to NSPS, NESHAPS and SIP requirements not triggered by PTE or raw material usage
  - Sources with similar actual emissions will be regulated similarly
  - Regulators can concentrate resources on large sources

LIMITING PTE

- Where do you find physical or operational limitations?
  - Regulations
  - Permits
  - Consent decrees
  - Other enforceable documents

LIMITING PTE

- ***For the physical or operational limitation to be effective, it must be [federally] enforceable:***
  - Federal regulations (NSPS, NESHAPs, Acid Rain)
  - State Implementation Plan rules (SIP)
  - Legally enforceable documents (Consents decrees, binding agreements)
  - Permits
- **How do we write a permit that is federally enforceable?**

LIMITING PTE

- *<u>What does “enforceable” require?</u>*
  - The Limitation must be:
    - Permanent
    - Quantifiable
    - Practically Enforceable

LIMITING PTE

- *Limit must be Permanent*
  - In general, limit must not expire on its own accord

LIMITING PTE

- ***Limit must be Quantifiable***
  - The limit can be measured or determined reliably and replicably
  - Limits must be either
    - Physical limits or operational limits
    - Blanket emission limits (i.e., less than 249 T/yr, etc.) must be accompanied by
      - corresponding physical or operational limits or
      - some method to demonstrate calculation methodology
- PTE = A x EF x (1-ER/100) x (8760 hrs/yr) / (2000 lbs/T)

LIMITING PTE

- *Practical enforceability (cont)*
  - Method for determining compliance
    - Initial compliance
      - Reference Test Methods usually
    - Operational compliance
      - CEMs, Parametric Monitoring, PEMs, periodic testing
  - Record keeping
  - Reporting

LIMITING PTE

- *The limit must be properly issued*
  - Permit issued pursuant to an approved SIP, Title V program or sec. 112(l) submittal
    - Processed and issued in compliance with the approved SIP, Title V or sec. 112(l) procedure
  - Reflect an NSPS, NESHAP, SIP, Acid Rain or other federal regulation

LIMITING PTE

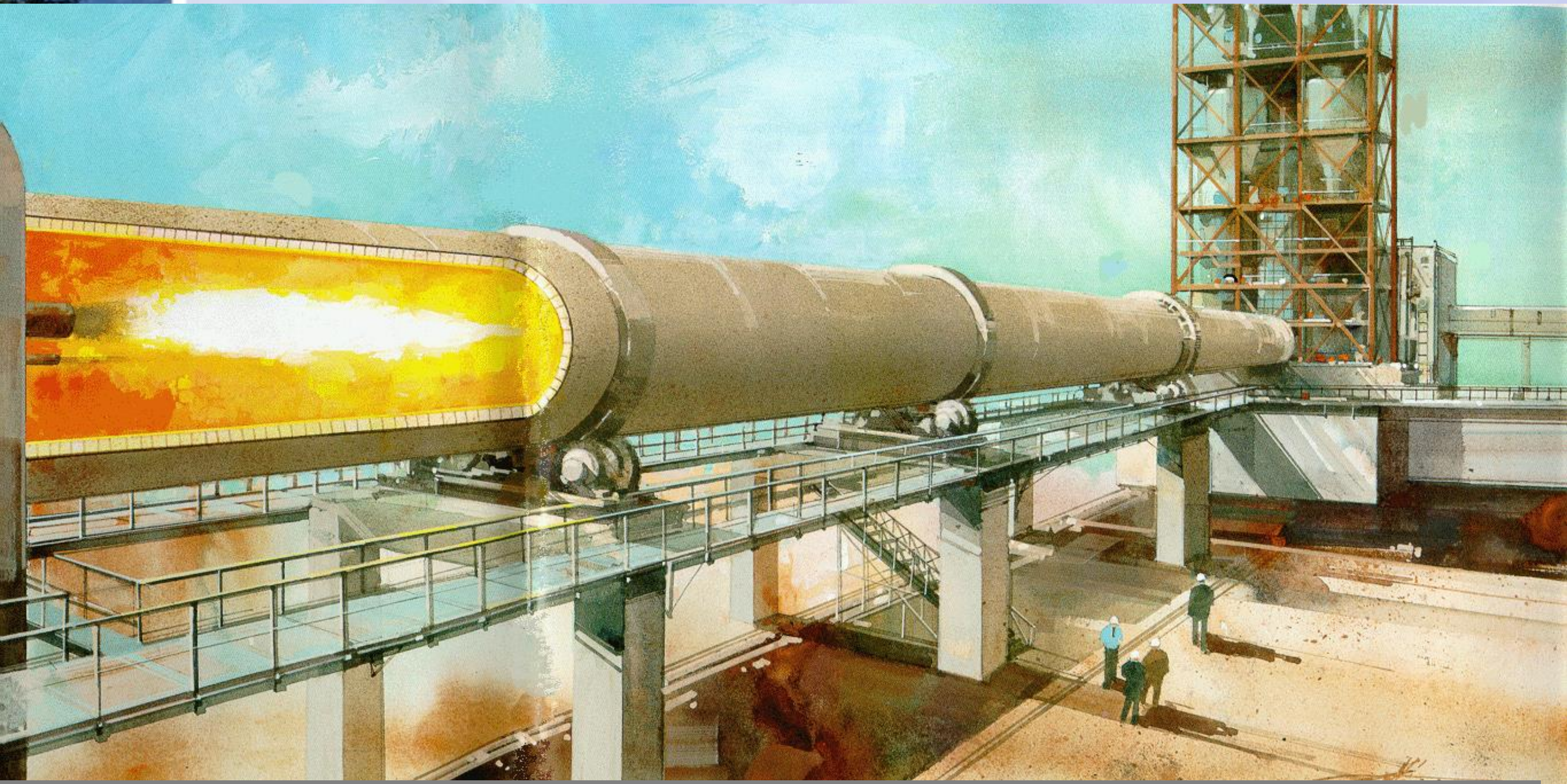
- ***Procedural requirements***
  - The procedural requirements set out in SIP or other approved permitting program must be followed

What's Next

- Review
- Questions

Lesson 16
CASE STUDIES

NACT 245 Cement Manufacturing



Types of Cement Kilns

- Long Dry Kilns
- Kilns with a Preheater
- Kilns with a Precalciner
  - Older
    - Wet
    - Semi dry

Raw Materials

- Calcium
- Silicon
- Aluminum
- Iron

Major Components of Portland Cement Clinker

90% of clinker contains these four products

- Tricalcium silicate
- Dicalcium silicate
- Tricalcium aluminate
- Tetracalcium aluminoferrite

Emissions

- Oxides of Nitrogen
- Oxides of Sulfur
- Carbon Monoxide
- PM, PM10 & PM2.5

Typical Emission Control

Electrostatic Precipitators

Baghouses

Generally no specific NOx or SO2 controls

Typical Fuel is Coal

- Recent Changes to fuels
  - Petroleum Coke
  - Tires
  - Waste VOCs

357

Case 1 – Addition of O2 Injection

- Allowed an increase in daily clinker production from 3,800 tpd to 4,200 tpd
- Pre Change Emissions
  - NOx - 2,350 tpy
  - SO2 - 550 tpy
  - CO - 473 tpy
- Significant Increase?

35
8

New District Permit

	NO_x	SO_2	CO
Emissions limit (tpy)	3,744.90	2,698.08	803.73

Case 2 – One Company 3 Facilities

- Change in Fuel
  - Resulted in Significant Increase in NOx and SO_2

- Complaint not specific on fuel changes

Possibilities???

Case 3 - $48 million for increased annual production

- NOx PTE went from 1640 tpy to > 2,000 tpy
- SO2 PTE went from 337 tpy to 420 tpy
- PM PTE went from 146 tpy to 240 tpy
- PM10 PTE went from 124 tpy to 187 tpy

Case 5 – Change in Fuel- Coal to Coke

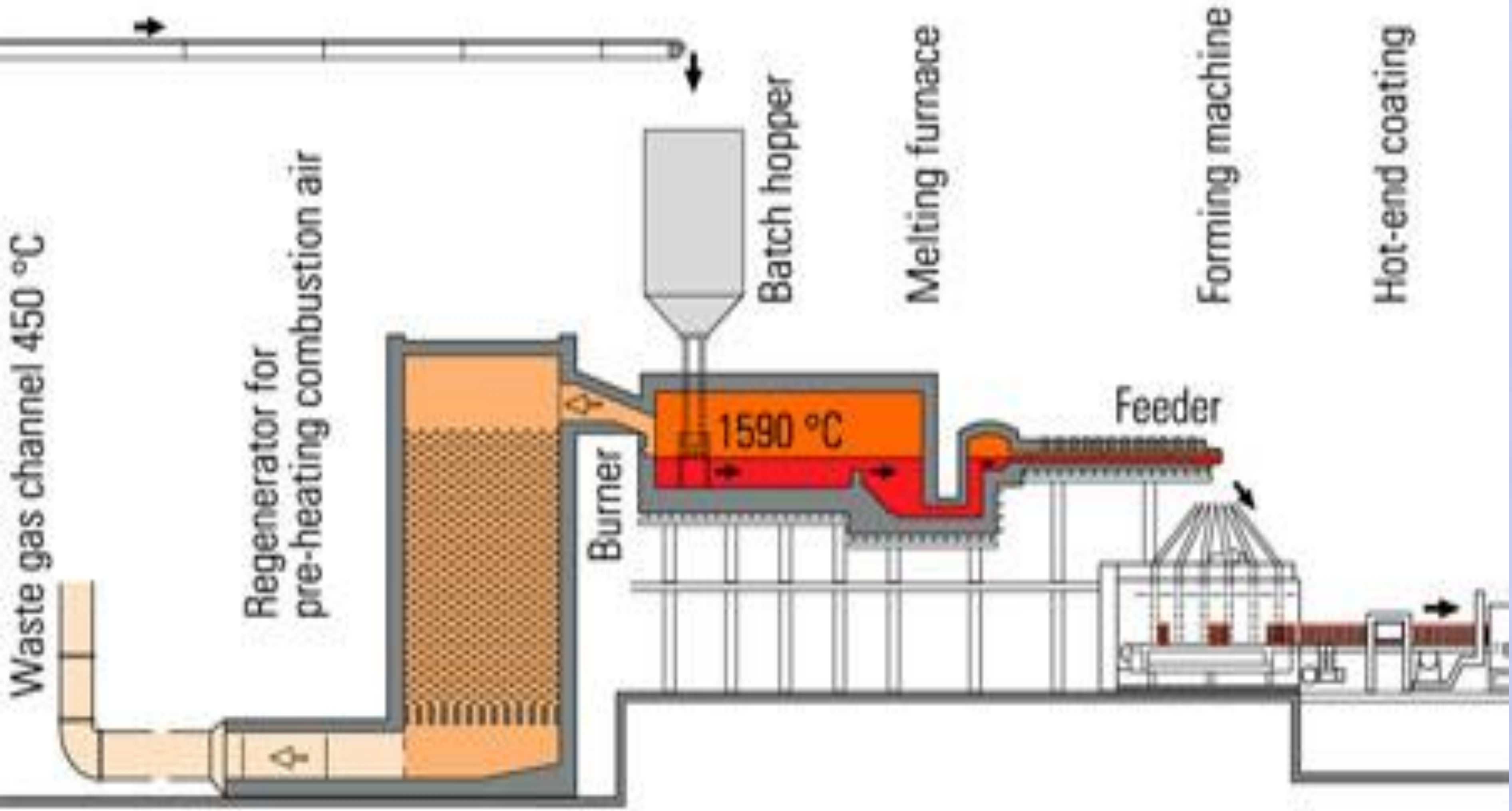
- 4 coal and Pet coke fired kilns
- Changed all kilns to combusting only Pet Coke
- Pet coke often will increase combustion Temps
- Pet coke often is higher in S content than coal

Inspection Information

- Most important to get updated production info
- If production increased inquire about expenditures for upgrades
- Addition of Oxygen enhanced combustion
  - Changes to fans to increase thruput
  - Debottlenecking changes to facility
- Changes in fuels (even going to gas typically > CO)

GLASS MANUFACTURING

Melting **Glass Forming**



Example Plants

- Owens Brockway
- Durand Glass
- St Gobain Containers

Owens Brockway

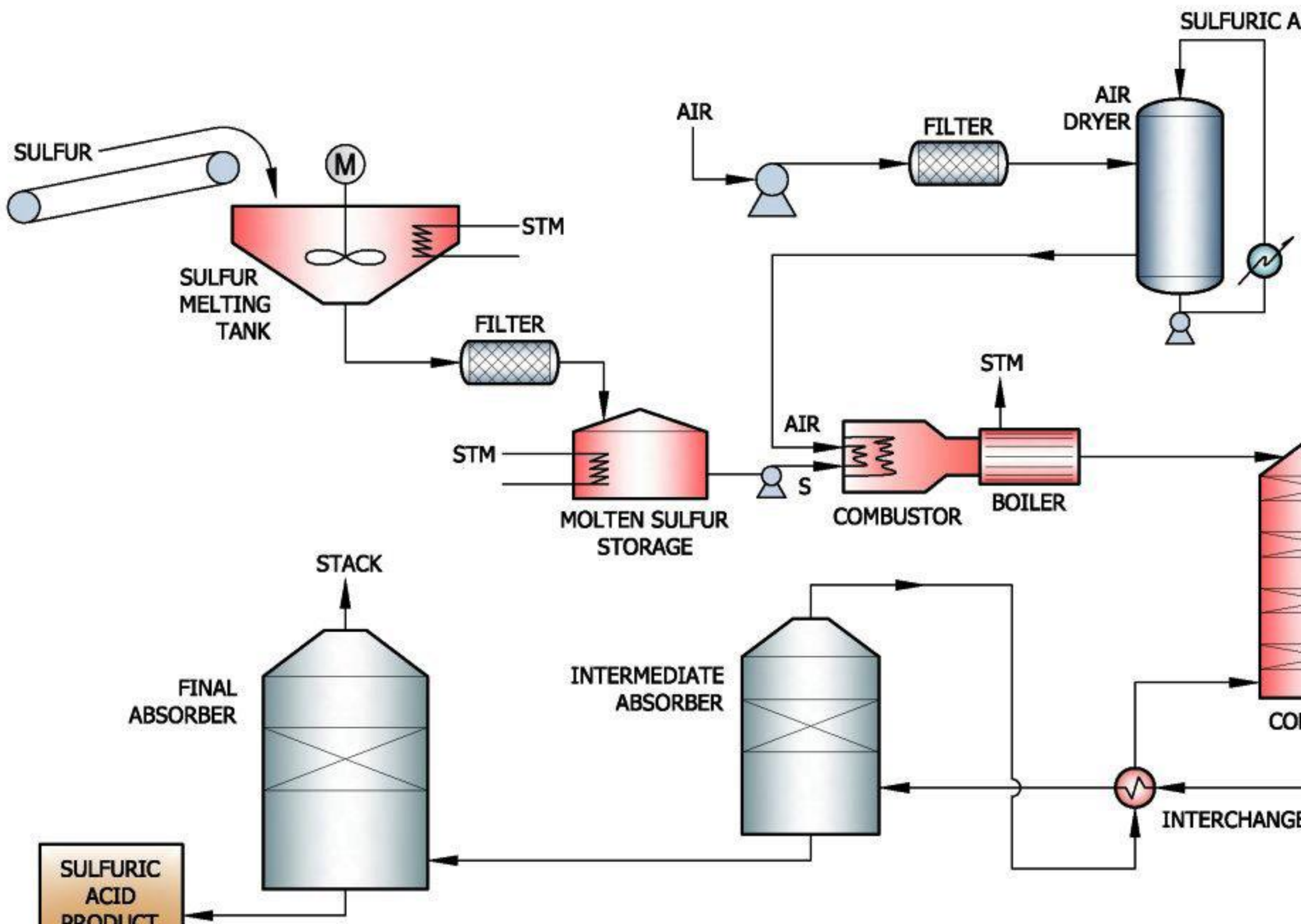
- Covers 5 Plants
- Only Oklahoma Joined EPA
- At all plants:
  - Added electric Boost
  - Increased Furnace Size
  - Modified Feeders

Durand

- One Plant Found
- Built New Furnance

Saint Gobain Containers

- Largest Container Manufacturer
- Compliant covers 15 Plants
- Complaint filed in 2010 for violations from 1992
- Complaint identifies issues at only one plant – alleges that furnace was rebuilt to increase production



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BOILER
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ABSORBER
INTERMEDIATE
ABSORBER
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INTERCHANGE
SULFURIC
ACID

Sulfuric Acid

- Produced via contact process
- Feedstock can be sulfur, H2S, or SO2
- Conversion can be as high as 97.5%
- Additional reduction via tail gas treatment

Example Plants

- DuPont
- Chemtrade
- PCS fertilizer

DuPont

- Intervention by Virginia in 2007
- DuPont:
  - Between 1982 -1985
    - Modified economizers
    - Modified converters
    - All part of one project
  - Between 1993 -1998
    - Series of nine modifications
    - Continuous construction project

Chemtrade

- Variety of changes
  - Retube boiler
  - Change catalyst beds
  - Change demister pads
  - Add booster fans
- EPA charged all changes were Non Routine

PCS Fertilizer

- Louisiana plant installed new larger converter and increased capacity
- Florida plant improved heat exchanged and decreased pressure drop and increased capacity

Summary

- Defining Source is Complex and Difficult
- PSD and NA NSR use same basic definition
- PSD
  - Applies in attainment areas
  - Requires:
    - Applicable to 100 tpy if Source is listed and 250 tpy if source is not
    - BACT

Summary

- Air Quality Analysis
- Modification based on Actual emissions
- BACT considers cost and economic and other impacts. It is site specific.
- Offsets not required

- NA NSR
  - Applies in Non Attainment
  - Applicable size varies by type of non attainment area

Summary

  - Requires LAER. LAER does not consider cost or other issues
  - Offsets are required. Offsets may be greater than source emissions
- Enforcement and Permit Conditions
  - Permit conditions must be precise
  - The best data should be used to develop permit. CEMS data is generally best.

Summary

- Averaging types should be as short as possible and no longer than one month.
- Inspections require review of all data before a site visit

- EPA enforcement can be based national trends.
  - Consent degrees frequently cover sources in multiple states
  - Data can be obtained from section 114 letters

The END