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Presentation Organization

- Section 812 Study Context
- Refinery Settlements – What They Cover
- Modeling Approach
- Observations and Conclusions
Section 812 Study Context

- Periodic, comprehensive cost/benefit study
- 1990 Clean Air Act Amendments
- Retrospective (1970-1990)
- First Prospective (1990-2010) completed in 1999
- Second Prospective (1990-2020) underway
Second Prospective

- Projection year work focuses on 2010 and 2020 from a 2002 base year
- All criteria pollutants except lead
- Ammonia (NH₃) included
- With and without CAAA scenarios
Example Emissions Display

Non-EGU Point Source Emissions

- **NO\textsubscript{x}**
  - Without CAAA
  - With CAAA

Calendar Years

- 1990
- 2000
- 2010
- 2020
Refinery Settlements Analysis

- SO$_2$ and NO$_x$ focus
- Prioritization by refinery company expected emission reductions
- Largest expected emission reductions included
Refinery Companies Included

- BP Amoco
- CITGO
- Conoco Philips
- Equilon
- Marathon Ashland
Refinery Companies Included (cont’d)

- Montana Refining
- Motiva
- Navajo Refining
- Premcor
- Sunoco
Major Affected Refinery Sources

- FCCUs/fluid coking units
- Process heaters and boilers
- Flare gas recovery
- Leak detection and repair
- Benzene/wastewater
FCCU/FCU Control Requirements

- **SO₂**
  - Option 1 – Install wet gas scrubbers
  - Option 2 – Use catalyst additives
  - Option 3 – Use existing wet gas scrubber

- **NOₓ**
  - Option 1 – Install SCR or SNCR
  - Option 2 – Use catalyst additives
Heaters/Boilers

- **SO₂** – Eliminate burning of solid and liquid fuels
- **NOₓ** – Install ULNB or the equivalent to heaters and boilers ≥ 40 MMBtu per hour
Issues in Modeling Associated Emission Reductions

- FCCU/FCU records in the 2002 NEI easy to locate
- One refinery had associated emissions at CO boiler
FCCU SO₂ Control Requirements

- New wet gas scrubber – 90% SO₂ CE or the specified SO₂ CE
- Catalyst additives – 70% SO₂ CE based on the literature
- Existing wet gas scrubber – No additional CE applied or no requirement
Heater/Boiler Control Requirements

- $\text{SO}_2$ – None applied: few fuel oil burners in the NEI
- $\text{NO}_x$ – equivalent to meeting 0.04 lbs/MMBtu $\text{NO}_x$ rate average
  - 50 percent reduction to affected units
  - $> 40$ MMBtu/hour or
  - 10 tons/year $\text{NO}_x$
Other Sources (Flare Gas Recovery, LDAR, Benzene/Wastewater)

- Less significant criteria pollutant reductions
- 2002 NEI emission estimates uncertain
Observations/Conclusions

- Emission limit application
  - NO$_x$ constraint company-wide
  - Discretion in application to units

- Issue in areas considering further NO$_x$ controls
  - OTC example
  - Sensitivity tests suggested
Consider settlement-requirements in BART determinations
  » Effective BART?
  » BART floor?

Emission inventory improvements
  » Report boiler/heater design capacities
  » Track/report control device installations
  » Compare base year emissions inventory with refining reporting to OECA
Observations/Conclusions (cont’d)

- **Alternative ways to express emission changes**
  - Percentage reductions (preferred)
  - Emission totals by facility

- **Limitations**
  - Settlements that occurred by September 2005

- **National emission reductions**
  - 60 thousand tons NO$_x$
  - 210 thousand tons SO$_2$
For more information
www.epa.gov/oar/sect812