

# Addressing Regional Haze in the Midwest

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Map of 156 National Park and Wilderness Areas Protected by EPA's Regional Haze Rule

# Summary of Major Activities

- Technical summary of regional haze (completed)
- Analysis of five factors (completed)
- Identification and evaluation of control strategy options (on-going)
- Preparation of state implementation plans for regional haze

# Regional Haze Requirements

- Section 169A sets as a national goal “the prevention of any future and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution”
- States are required to “make reasonable progress toward meeting the national goal”
  - Improvement in visibility for most impaired days (20% worst)
  - No degradation in visibility for least impaired days (20% best)
- **In determining reasonable progress, states shall consider:**
  - costs of compliance,
  - time necessary for compliance,
  - energy and non-air quality environmental impacts of compliance,
  - remaining useful life of existing sources subject to such requirements
- **Also, states must consider (EPA’s 1999 visibility rule):**
  - uniform rate of visibility improvement (needed to attain natural visibility conditions by 2064) – i.e., “the line” or “the glide path”

# EC/R Contract: Project Objectives

- Prepare methodology for addressing the reasonable progress factors in the Clean Air Act (and EPA's visibility rule)
- Apply methodology for several possible control strategies which are intended to improve visibility in the northern Class I areas
  - “On the books” measures
  - Possible additional control measures

# Reasonable Progress for Class I Areas in the Northern Midwest – Factor Analysis

July 18, 2007

Draft Final Technical Memorandum

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## Statutory Factors

- Cost of compliance
- Time required for compliance
- Energy and non-air quality environmental impacts
- Remaining useful life
- Uniform rate of visibility improvement

## Strategies of Interest

- “On the books” measures
- Possible additional controls (sector-level)
- Possible additional controls (individual facilities)

## Geographic Areas of Interest

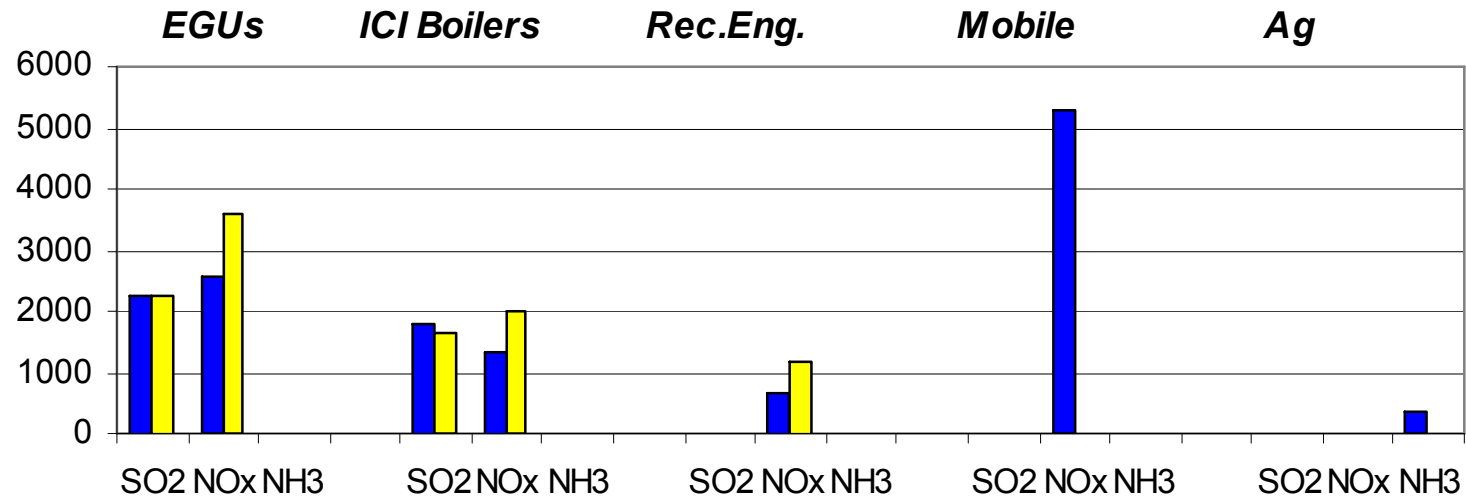
- 3-state region: MI, MN, WI
- 9-state region: MI, MN, WI, plus IA, IL, IN, MO, ND, SD

# Priority Pollutants and Sources

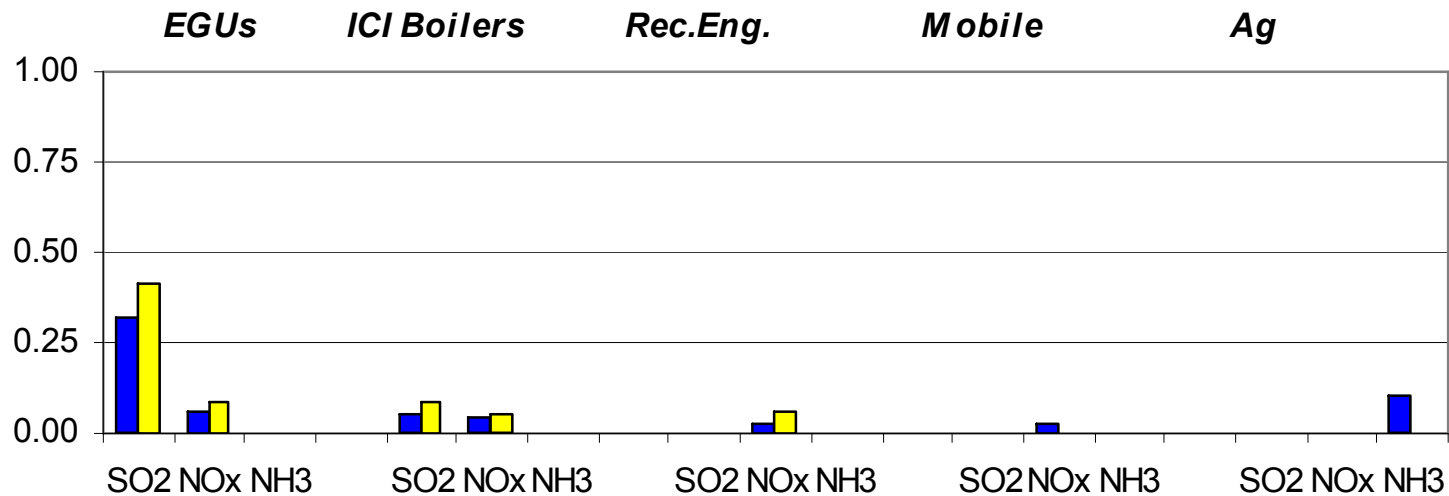
<b>Source Category</b>	<b>SO<sub>2</sub></b>	<b>NO<sub>x</sub></b>	<b>NH<sub>3</sub></b>
Point – EGUs	x	x	
Point – ICI Boilers	x	x	
Point – Recip. Engines/ Turbines		x	
Mobile (on-road, nonroad)		x	
Agricultural Operations			x

# Factor Analysis: Results

## Cost Effectiveness (\$M/dv)



## Visibility Improvement (dv)



■ Strategy 1 ■ Strategy 2

# Factor Analysis: Results (cont.)

- Time necessary for compliance
  - All candidate control measures can be achieved within about 5 – 7 years – i.e., by 2018
- Energy and other impacts
  - Increases in CO<sub>2</sub> emissions, energy demand (< 1% of total regional electricity production), solid waste disposal and wastewater treatment costs (< 5% of total operating costs of control equipment)
  - Decreases in acid deposition and nitrogen deposition
- Remaining equipment life
  - For market-based “caps”, controls not applied to units that will be retired before amortization period for control equipment

# Summary

- Cost-per-deciview values for most candidate measures are within range of values for “on the books” controls
- Although EGU and ICI boiler controls have somewhat higher cost-per-deciview values (compared to some of the other measures), visibility impacts are larger
- Examination of the other factors suggests that they are either manageable or will not affect selection of candidate control measures

# Comments

## Center for Energy & Economic Development (Aug 3)

- Visibility benefits outweighed by costs
- Health benefits overstated
- Consideration of health benefits inappropriate
- Time required for compliance not adequately assessed
- Regional EGU control program inconsistent with legal precedent
- Have not considered impact of international emissions

## Midwest Ozone Group and CEED (Sept 19)

- SO<sub>2</sub> and NO<sub>x</sub> retrofit control costs understated

## American Forest & Paper Assoc. and MOG (Sept 20)

- Use of linear scaling method to estimate visibility impacts of candidate control measures provides “meaningless” results
- Have not considered impact of international emissions



# Minnesota Class I Area Consultation Proposal



**Minnesota Pollution  
Control Agency**

# Minnesota RH SIP Elements

- NE Minnesota Plan
- Voluntary EGU reductions of ~50% SO<sub>2</sub> and NO<sub>x</sub> (aided by MnStat 216B.1692)
- Analysis and possible regulation of...
  - Large ICI Boilers
  - Large turbines and IC engines for NO<sub>x</sub>
- Work with RPOs for ammonia control and ozone, PM reduction

# NE Minnesota Plan

- 6-county area adjacent to Voyageurs and Boundary Waters
- Taconite/EGU sources dominate
- Few available BART controls for taconite
- Objectives:
  - Set and track emission target for area (**30% reduction in combined SO<sub>2</sub>/NO<sub>x</sub> emissions by 2018**)
  - Develop good emission data for taconite (AOs for CEMs in our SIP)
  - Encourage development of control technology (probably AOs, but after SIP)
  - Address new source growth

# Contributing State Expectations

- Contributing state  $\geq 5\%$  contribution based on MRPO trajectory, MRPO PSAT, or CENRAP PSAT
  - WI, ND, IA, IL, MO
- “Ask” contributing states to do at least what Minnesota will commit to in their RH SIP
- “Ask” EPA and states to use the 2013 SIP assessment as a benchmark for those regulatory actions that cannot be accomplished this year.

# Minnesota “ask”

- Based on Minnesota, MRPO, and CENRAP “four factor” analyses (ECR and Alpine Geophysics)
- Attain EGU emission rates of  $<.25$  lb/mmBTU SO<sub>2</sub> and NO<sub>x</sub>, or explain why not feasible
  - WI, ND, IA, and MO are expected to exceed in 2018
- Review and adopt limits if there are significant cost effective reductions
  - Large ICI boilers
  - Large turbines and IC engines (for NO<sub>x</sub> control)
- Report on progress in 2013 SIP assessment

# Reasonable Progress & Measures for MANE-VU Class I States

MANE-VU – Midwest RPO Consultation

August 6, 2007

Chris Salmi, New Jersey DEP

# Principles

- Establish Reasonable Progress Goals reflecting the 4-factor analysis to determine reasonable measures that can be implemented by 2018
- Goal is to achieve as much or more visibility improvement as the Uniform Rate of Progress

## 4- Factors

- Costs of compliance
- Time necessary for compliance
- Remaining useful life
- Energy and non-air quality environmental impacts

# MANE-VU Commitment

MANE-VU 2018 OTB/OTW

Inventory:

955,000 tons per year SO<sub>2</sub>

MANE-VU 2018 Commitment

Beyond OTB/OTW Inventory

EGU: 312,000 tpy →

“167 Stacks” = 68,000 tpy @ 21 units

Total EGU = 68,000 tpy (22%) *rearranged*

Non-EGU: 643,000 tpy →

S-1 and S-2 Oil Strategies = 209,000 tpy

BART = 35,000 tpy

Total non-EGU = 244,000 tpy (38%) *reduced*

MANE-VU Benchmark  
Early Analysis indicated a 28%  
Reduction

# Midwest RPO “Ask”

Midwest RPO 2018 OTB/OTW  
Inventory:  
1,793,000 tons per year SO<sub>2</sub>

MANE-VU 2018 Ask  
Beyond OTB/OTW Inventory

EGU: 1,252,000 tpy →

“167 Stacks” = 233,000 tpy @ 51 units

Total EGU = 233,000 tpy (19%) *rearranged*

Non-EGU: 541,000 tpy →

BART = ?? tpy

Other “28%” strategies = ?? tpy

Total non-EGU = 151,000 tpy (28%) *reduced*

# MANE-VU Commitment & Other Region “Ask”

## MANE-VU Commitment:

- BART
- Focused EGU Strategy within CAIR (90% reduction – list of 167 stacks)
- Low sulfur fuel oil strategy
- Continued evaluation of other measures (e.g., ICI boilers)
- Further reduction in power plant SO<sub>2</sub> and NO<sub>x</sub> beyond CAIR (federal “ask”)

## Other Regions:

- BART
- Focused EGU Strategy within CAIR (90% reduction – list of 167 stacks)
- 28% reduction in non-EGU SO<sub>2</sub> emissions
- Continued evaluation of other measures (e.g., ICI boilers)
- Further reduction in power plant SO<sub>2</sub> and NO<sub>x</sub> beyond CAIR (federal “ask”)