Candidate Control Measures for Cement Plants

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Category Description: Cement Plants

- Cement kilns are the predominant source of gaseous pollutant emissions
- Kilns contribute 1% of NOx and 1% of SO2 in 5-state region
- Diverse Source Category
  - Fuels (coal, waste-derived fuels)
    - Sulfur and nitrogen content of fuels
  - Raw material moisture content (wet vs. dry)
    - Sulfur and nitrogen content of raw materials
  - Type of process:
    - wet process
    - the dry process (long dry process)
    - the semidry process
    - the dry process with a preheater
    - the dry process with a preheater/precalciner
  - Kiln age
  - Existing pollution control systems
- These factors result in substantial variability in emission rates and candidate control options

Cement Kilns in Illinois

Plant Name	Kiln Description	NOx SIP?	BART?	SO2 tpy	NOx tpy
ILLINOIS CEMENT CO Lasalle, IL	Dry Kiln	Yes	No	35	366
LONE STAR INDUSTRIES Oglesby, IL	Dry Kiln	Yes	No	957	1,281
LAFARGE MIDWEST INC Grand Chain, IL	Dry Kiln #2 Dry Kiln #1	Yes Yes	No No	283 285	1,938 1,776
DIXON-MARQUETTE Dixon, IL	Kilns #1-4	Yes	No	342	1,754

Cement Kilns in Indiana

Plant Name	Kiln Description	NOx SIP?	BART?	SO2 tpy	NOx tpy
ESSROC CEMENT CORP.	Wet Kiln #1	Yes	No	949	857
Logansport, IN	Wet Kiln #2	Yes	No	947	855
ESSROC CEMENT CORP.	Long Dry #1	Yes	Yes	1,727	911
Speed, IN	Preheat Kiln #2	Yes	Yes	1,349	614
LEHIGH CEMENT COMPANY	Dry Kiln #1	Yes	No	1,056	1,596
Mitchell, IN	Dry Kiln #2	Yes	No	1,154	1,745
	Preheat Kiln #3	Yes	Yes	1,758	838
LONE STAR INDUSTRIES	Wet Kiln	Yes	No	267	1,511
Greencastle, IN					

Cement Kilns in Michigan

Plant Name	Kiln Description	NOx SIP?	BART?	SO2 tpy	NOx tpy
LAFARGE NORTH AMERICA	Dry Kiln #19	Yes	Yes	778	1,202
Alpena, MI	Dry Kiln #20	Yes	Yes	948	1,239
	Dry Kiln #21	Yes	Yes	559	1,196
	Dry Kiln #22	Yes	Yes	6,418	3,070
	Dry Kiln #23	Yes	Yes	7,872	2,975
CEMEX, INC.	Precalciner	Yes	No	3,108	3,037
Charlevoix, MI					
HOLCIM (US) INC.	Wet Kiln	Yes	No	7,129	1,455
Dundee, MI					

Cement Kilns in Ohio

Plant Name	Kiln Description	NOx SIP?	BART?	SO2 tpy	NOx tpy
CEMEX, INC.	Dry Kiln	Yes	Yes	422	3,429
Xenia, OH					
LAFARGE/SYSTECH	Wet Kiln #1	Yes	No	112	184
Paulding, OH	Wet Kiln #2	Yes	No	248	203

Cement Kilns in Wisconsin

There were no cement kilns operating in Wisconsin in 2002

Regulatory History: Cement Plants

- New Source Performance Standards
  - Subpart F source constructed or modified after August 17, 1971
  - Emission standards for particulate matter only
- NSR (BACT or LAER)
- NOx SIP Call
  - providing operators of cement kilns several options for complying with emission limits,
    - use of low-NOx burners
    - mid-kiln-firing system
    - achieves 30 percent reduction during the 5-month ozone season
- Portland Cement MACT (Subpart LLL)
- Hazardous Waste Combustion MACT
- BART

Available Control Measures for NOx: Cement Kilns

- Process control systems
- Changing feed composition
- Low NOx burners
- Mid-kiln firing
- Selective Non-Catalytic Reduction
- Selective Catalytic Reduction

Available Control Measures for SO2: Cement Kilns

- Changing feed composition
- Changing fuel composition
- Absorbent addition
- Wet Flue Gas Desulfurization
- Advanced Flue Gas Desulfurization

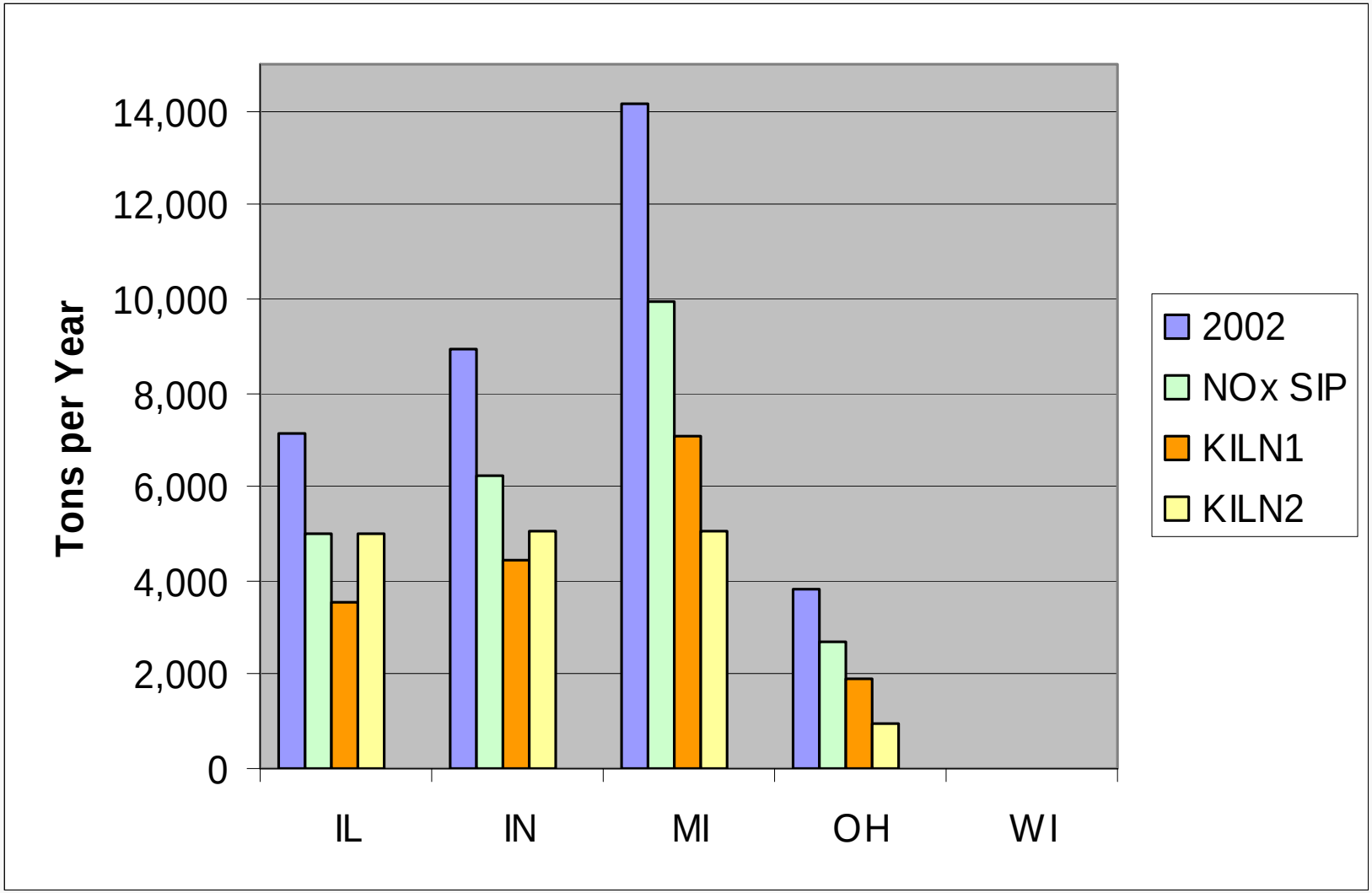
Candidate Control Measures: Cement Kilns

- *Measure KILN1 – Apply Reasonably Available Controls to All Kilns in Region*
  - Applicable to all cement kilns in the MRPO region
  - For NOx, we are assuming that sources could combine mid-kiln firing with low-NOx burners or apply SNCR technologies such as biosolids injection and NOXOUT®. These technologies showed average emission reductions about 50 percent from uncontrolled levels
  - For SO2, we are assuming that sources could reduce SO2 emissions by 90 percent using wet FGD systems

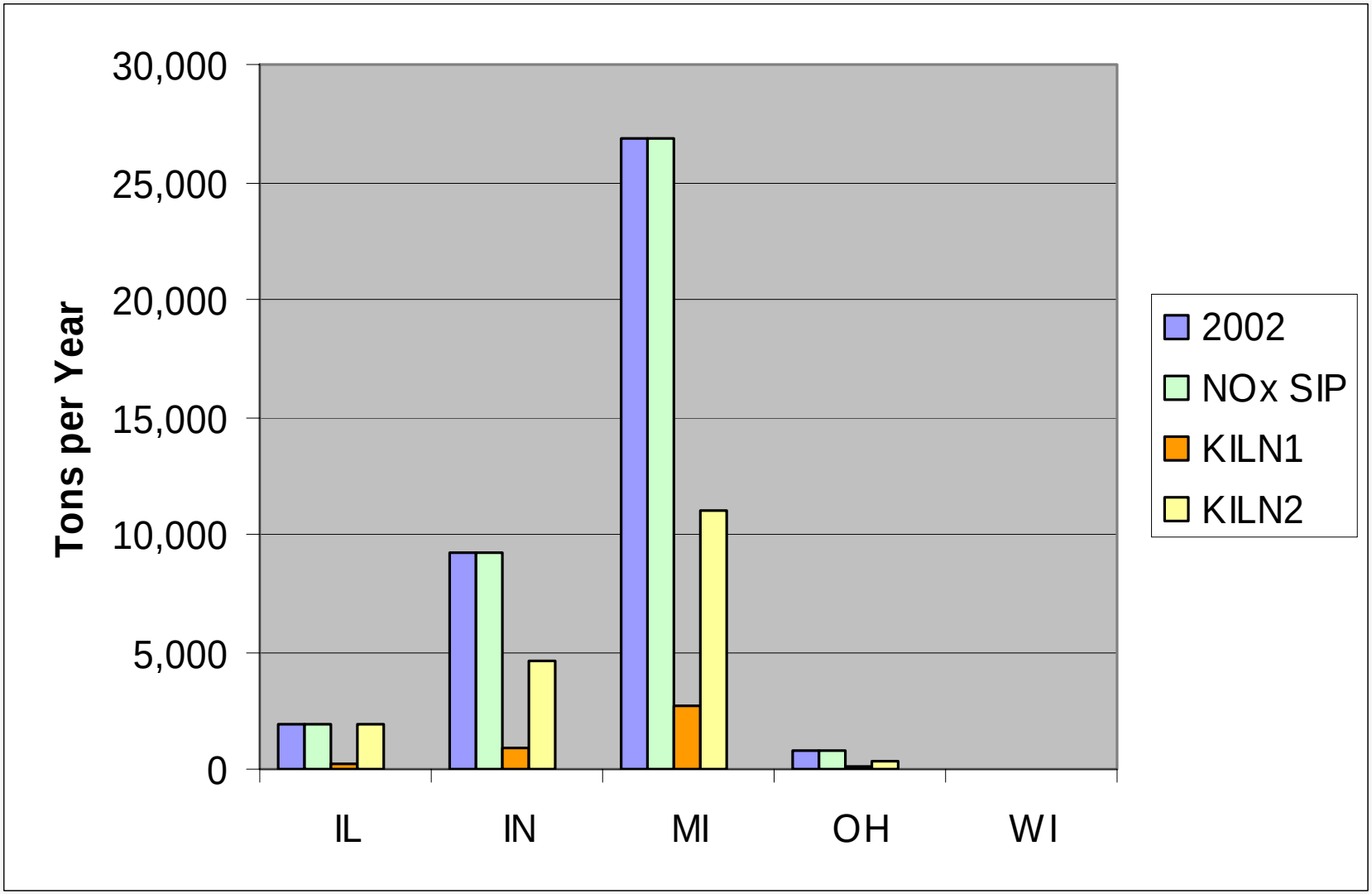
Candidate Control Measures: Cement Kilns

- *Measure KILN2 – Apply Likely Controls to Cement Kilns Subject to BART Requirements*
  - Applies case-by-case control requirements for those Cement kilns subject to BART
  - Only nine of the 26 kilns in the region appear to be subject to BART
  - NOx - 80 percent reduction for NOx (based on SCR technology)
  - SO2 - 95 percent reduction for SO2 (based on a wet FGD systems)

NOx Emissions for Cement Plants for Candidate Control Measures



SO2 Emissions for Cement Plants for Candidate Control Measures



Cost Effectiveness: Cement Kilns

Control Measure	Pollutant	% Reduction	Cost Effectiveness ($/ton)
KILN1 – Apply Reasonably Available Controls to All Kilns in Region.	NOx	50	-310 to 2,500
	SO2	90	2,211 to 6,917
KILN2 – Apply Likely Controls to Cement Kilns Subject to BART Requirements	NOx	80	1,500 to 2,000
	SO2	95	2,211 to 6,917

Other Issues: Cement Kilns

- Timing for reductions
  - Ozone SIPs in 2007, compliance by 2009
  - RH SIPs in 2008, BART controls not until 2013
- Geographic applicability
  - Entire LADCO/MRPO region
- Seasonal applicability
  - Ozone season only or year-round for NOx
- Rule Implementation Issues
  - Cap and trade opt-in?
  - State specific or source specific RACT
  - Case-by-case BART

Questions? Cement Kilns