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NAAQS Implementation Status and Dispersion Modeling Implications

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Overview

- NAAQS Statuses
- NAAQS Implementation Challenges
- Modeling Changes

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NAAQS Process & Statuses

- NAAQS are required to be reviewed every 5 years by statute
- The Administrator is required to ignore costs in setting the NAAQS at a level that is protective
- The Administrator has certain discretions in implementation of new NAAQS
- Significant recent activity in this area has become a compliance and permit risk issue for existing facilities and plant expansions

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Revised NAAQS Implications

- Poses potential risks to existing facilities when compliance is demonstrated via modeling:
  - By the source itself
  - Or State (as being required for SO_2 NAAQS designations)
  - Or nearby sources (when undergoing PSD permitting)
- Poses potential risks to plant modifications or new construction when modeling required
  - Air quality analyses for PSD permits require modeling

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Current NAAQS

[Recent New Additions in Green, Red Going Away]:

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Time
CO	9 ppm	8-Hour	None	
	35 ppm	1-Hour		
Pb	0.15 µg/m³	3-Month (2008 std.)	Same as Primary Standard	
	~~1.5 µg/m³~~	~~Quarterly (1978 std.)~~	Same as Primary Standard	
NO_2	0.053 ppm	Annual	0.053 ppm (Under Review)	Annual
	0.100 ppm	1-Hour (2010 std.)		
PM_{10}	~~50 µg/m³~~	~~Annual~~	Same as Primary Standard	
	150 µg/m³	24-Hour	Same as Primary Standard	
$PM_{2.5}$	15.0 µg/m³	Annual	Same as Primary Standard	
	35 µg/m³	24-Hour (2006 std.)	Same as Primary Standard	
Ozone	0.075 ppm	8-Hour (2008 std.)	Same as Primary Standard	
	0.08 ppm	8-Hour (1997 std.)	Same as Primary Standard	
SO_2	0.03 ppm	Annual (1971 std.)	0.5 ppm (Under Review)	3-hour
	0.14 ppm	24-Hour (1971 std.)		
	0.075 ppm	1-hr (2010 std)		

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NAAQS Summary - Comparison

	Existing NAAQS Standards		New NAAQS Standards
Nitrogen Dioxide			1-hr avg
			188 ug/m3
	Annual		
	100 ug/m3		
Sulfur Dioxide			1-hr avg
			196 ug/m3
	3-hr avg		
	1,300 ug/m3		
	24-hr avg		
	365 ug/m3		
	annual		
	80 ug/m3		
Particulate Matter	PM10 24-hr avg		PM2.5 24-hr avg
	150 ug/m3		35 ug/m3
	PM10 annual		PM2.5 annual
	50 ug/m3		15 ug/m3

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Form of the New SO_2 and NO_2 1-hour NAAQS

- SO_2 Standard
  - SO_2 standard is 3-year average of **99th percentile** of annual distribution of **daily maximum** 1-hour concentrations
  - Interim 1-hr SO_2 Significant Impact Level (SIL) issued in EPA Guidance August 2010 – 3 ppb (7.8 µg/m^3)
- NO_2 Standard
  - NO_2 standard is 3-year average of **98th percentile** of annual distribution of **daily maximum** 1-hour concentrations
  - Interim 1-hr NO_2 Significant Impact Level (SIL) issued in EPA Guidance June 2010 – 4 ppb (7.5 µg/m^3)

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$PM_{2.5}$ NAAQS

- 1997 Annual Standard = 15.0 µg/m^3
  - Attainment due date = 04/05/2010
- 2006 24-hour Standard = 35.0 µg/m^3
  - Attainment due date = 12/19/2014
- U.S. EPA currently reviewing adequacy of current standards
- Air permitting/compliance implications
  - Significant impact levels (SILs) are so low that many PSD projects trigger full impact modeling
  - Background concentrations are frequently close to the standard
  - Emission factors (especially condensable $PM_{2.5}$) not well understood.

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Ozone NAAQS

- 2008 8-hour Standard = 75 ppb
  - 01/2010 proposal = 60-70 ppb
  - 09/2011 – withdrew 01/2010 proposal & re-initiated implementation of 2008 standard
  - Expected attainment due date = 2015
- U.S. EPA currently reviewing adequacy of current standard
- Air permitting/compliance implications
  - Additional non-attainment areas (RACT and NA NSR)
  - Potentially lower MSTs, more major stationary sources

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1-hr SO_2 NAAQS Issues

- 1-hr SO_2 std. of 75 ppb - represents an 85% decrease from existing 3-hr std. and a 47% decrease from existing 24-hr std.
- State attainment demonstrations to be based on monitoring and dispersion modeling
  - Initial designations due 06/2012 (based mainly on monitoring)
  - "Infrastructure" SIPs due 06/2013 (must complete refined modeling)
  - Nonattainment SIPs due 02/2014
  - Attainment due date = 08/2017
- Air permitting impacts
  - Significant impact levels (SILs) are so low that nearly all PSD projects trigger full impact modeling
  - Background concentrations are frequently close to the standard
  - Intermittently operated sources (e.g., emergency generators)

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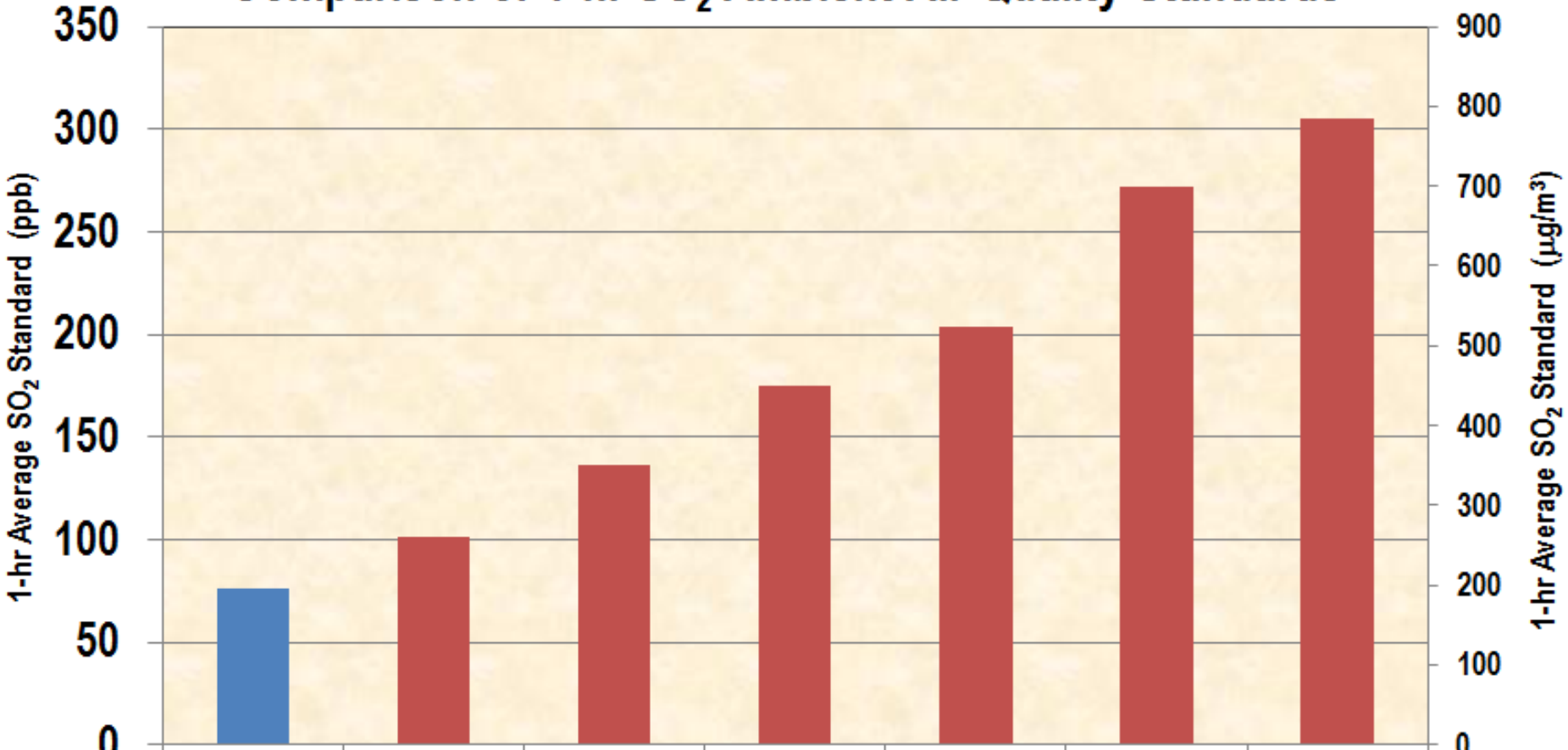
Comparison of 1-hr SO_2 Ambient Air Quality Standards



	US	Japan	Europe	Canada	Australia	China	South Africa
ppb	75	100	134	172	200	268	300
µg/m3	196	261	350	449	523	700	784

US: 3-year average of 99th percentile daily maximum
Europe: 24 exceedances allowed per year
Canada: National Ambient Air Quality Objectives- Maximum Desirable Levels

China: Group III standards for industrial areas
South Arica: Guideline values only; not standards

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Implications: SO_2 Attainment Demonstrations

- States required to define areas as attainment, nonattainment, or unclassifiable with respect to the new SO_2 NAAQS
- EPA recommends use of a combination of monitoring data and dispersion modeling analyses to demonstrate attainment
- Method is unique to SO_2
  - Attainment demonstrations for 1-hour NO_2 will not require modeling

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1-hr NO_2 NAAQS Issues

- 1-hr NO_2 std. of 100 ppb - is roughly equivalent to an annual std. of 8 ppb, which represents an 85% decrease from the existing annual std.
- State attainment demonstrations to be based on monitoring
  - Initial designations due 01/2012
  - Expanded monitoring network due 01/2013
  - Re-designations likely in 2016/2017
  - Attainment date is 2021/2022
- Air permitting impacts
  - Significant impact levels (SILs) are so low that nearly all PSD projects trigger full impact modeling
  - Background concentrations are frequently close to the standard
  - Intermittently operated sources (e.g., emergency generators)
  - May need to understand NO/NO2 ratios for refined modeling techniques

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Modeling Constraints

- Lower NAAQS, less compliance margin
- Statistically based standard, deterministic modeling tool
- Short (1-hour) averaging period
- Revisions to model
  - Downwash treatment
    - At GEP, downwash is no longer "on/off" in the model
  - AERMINUTE meteorological data
    - Less calms, less missing data, more low wind speed hours = more potential challenges

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Emerging Areas for Modeling

- Environmental Justice Reviews
  - Will proposed projects result in significant (adverse) impacts in socio-economically challenged areas?
- Health Risk Assessments
  - More risked-based modeling, air pathway, for air toxics from various projects

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Questions

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