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Changes to Federal Ambient Air Quality Standards and the Affect on Industry in BC

EMA of BC - 2017 Workshop
February 16, 2017

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Outline

- Background
- New SO2 CAAQS
- CAAQS Implementation in British Columbia
- State of the Air
- Implications for Industry

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Background

- What are the CAAQS?
  Canadian Ambient Air Quality Standards
  - Health-based air quality objectives for pollutant concentrations in outdoor air
  - *Voluntary* objectives
- What is their purpose?
  - Drive action on air quality
  - Protect human health and environment
- How are they developed?
  - Collaborative process
  - Considers health and environmental studies, existing air quality, etc.

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CAAQS Overview

- Authority
  - Established by the federal government using the authority of the *Canadian Environmental Protection Act, 1999*
  - Provinces and territories implement
- Pollutants
  - Existing CAAQS - Ozone and PM2.5 (2013)
  - New CAAQS – SO2 (2016)
  - Upcoming CAAQS – NO2 (2017?)

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New CAAQS - SO2

- Announced by CCME October 3, 2016
  - 1-hour standard is health based
  - Annual is environmental based
  - No guidance documents posted yet

Averaging Period	Effective 2020	Effective 2025	Form
1-hour	70	65	3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations
Annual	5.0	4.0	Arithmetic average over a single calendar year off all 1-hour average concentrations

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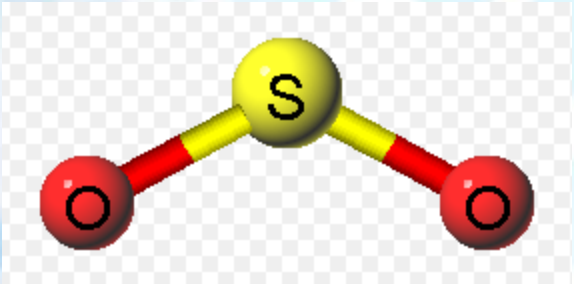
About SO2
Sulphur Dioxide



- Colorless gas
- Primarily from industry (coal and fuel oil combustion, smelting, oil and gas)
- Health effects - respiratory
- Environmental Effects
  - Direct effects on sensitive species (lichen) or other vegetation at high levels
  - Indirect effects (acid rain)

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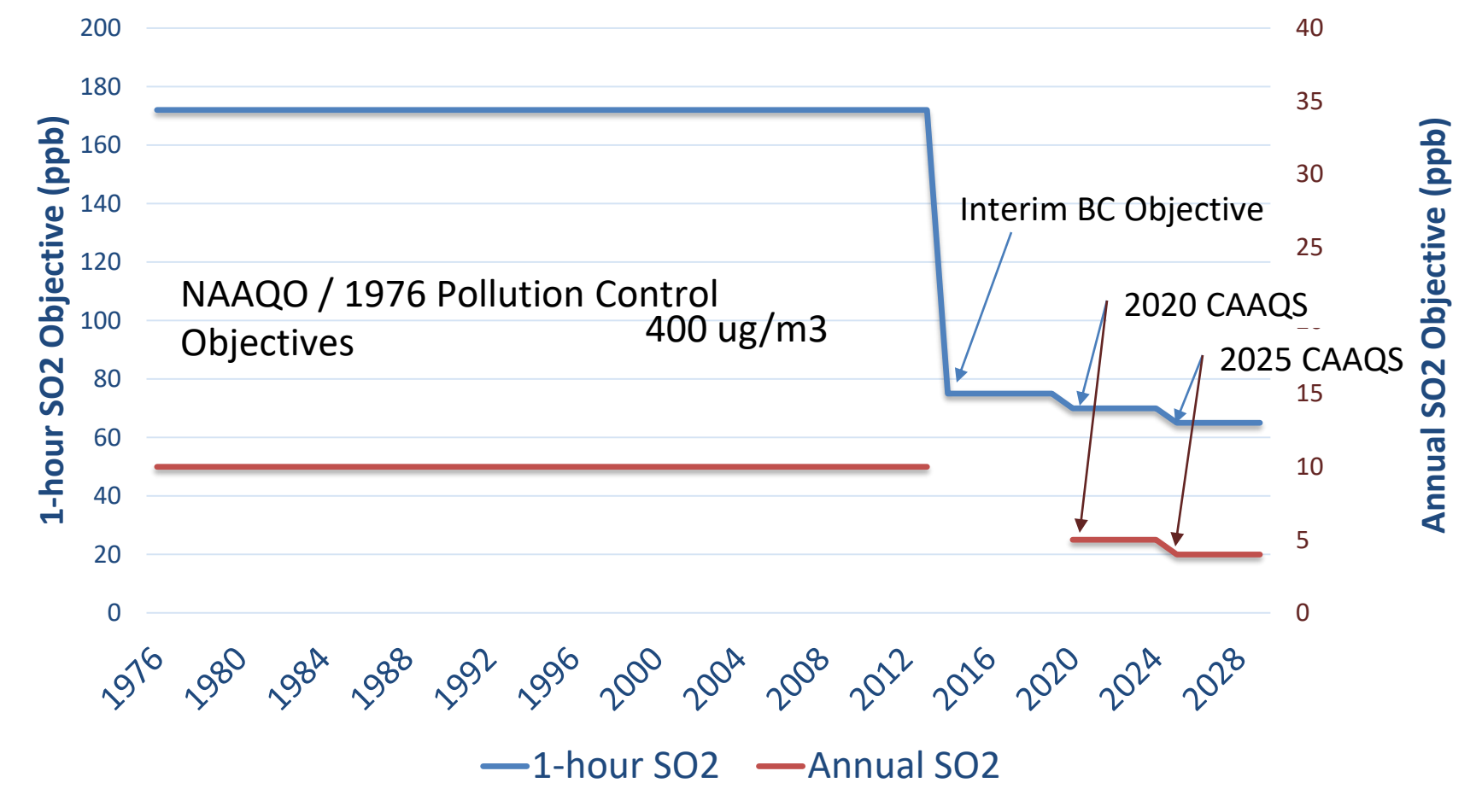
SO2 Historic Perspective



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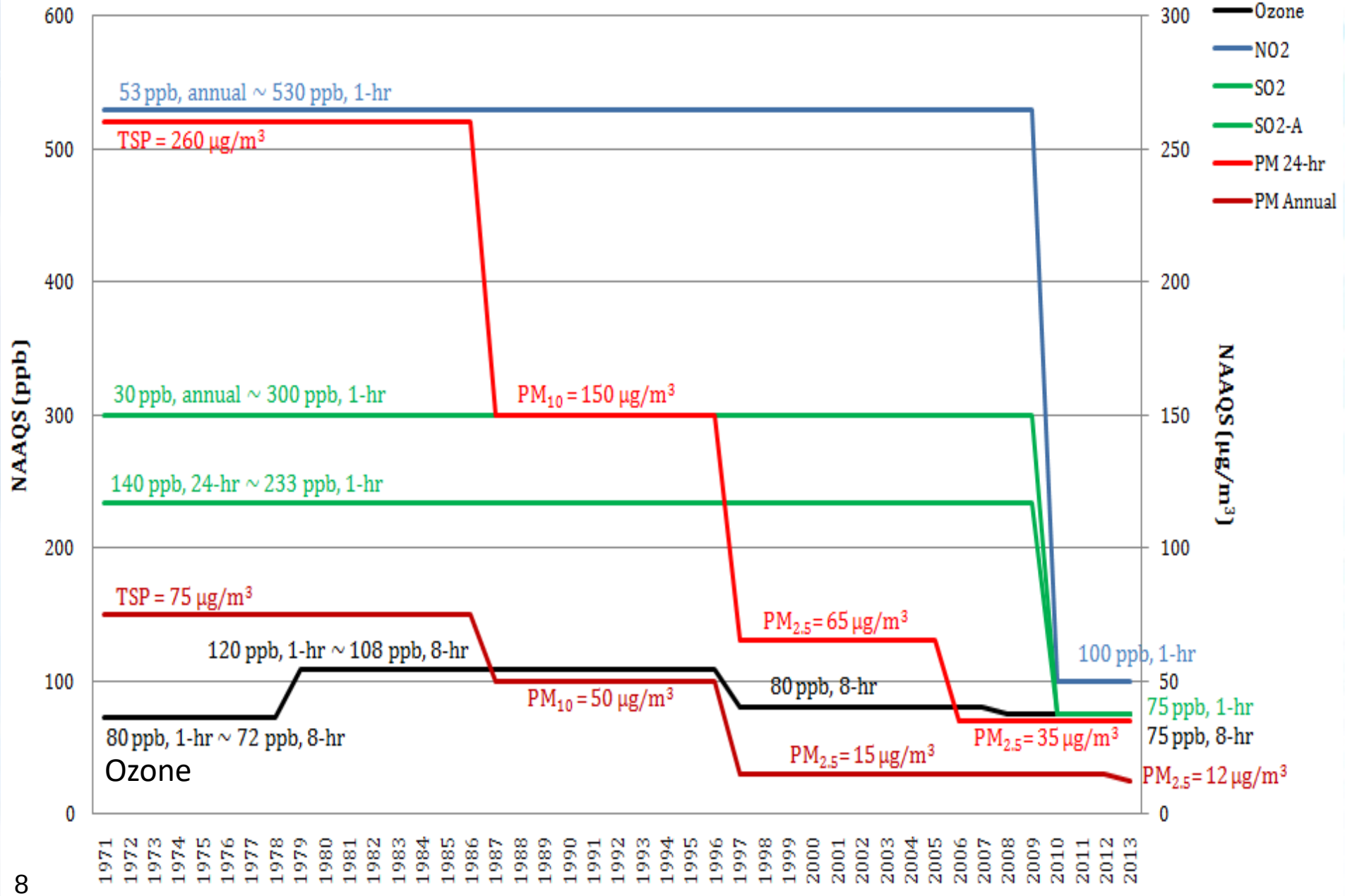
Primary US EPA NAAQS, 1971-2014



CAAQS Air Quality Management System

- Provinces and territories take actions depending on monitoring values in range
  - Proactive management to keep clean areas clean
  - Advanced actions to achieve CAAQS when exceeded

Air Management Threshold Values				
	Substance:	Ozone	$PM_{2.5}$	
	Averaging time:	8 Hours	Annual	24 Hours
Management Level	Red	Actions for Achieving Air Zone CAAQS		
	Threshold:	63 ppb	10.0 µg/m³	28 µg/m³
	Orange	Actions for Preventing CAAQS Exceedance		
	Threshold:	56 ppb	6.4 µg/m³	19 µg/m³
	Yellow	Actions for Preventing Air Quality Deterioration		
	Threshold:	50 ppb	4.0 µg/m³	10 µg/m³
	Green	Actions for Keeping Clean Areas Clean		

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CAAQS Air Quality Management System – SO2

Management level and action	Management levels for the 1-hour CAAQS for SO_2 (ppb)		Management levels for the annual CAAQS for SO_2 (ppb)	
	Effective 2020	Effective 2025	Effective 2020	Effective 2025
Red To ensure that CAAQS are not exceeded through advanced air management actions	> 70 ppb (CAAQS)	> 65 ppb (CAAQS)	> 5.0 ppb (CAAQS)	> 4.0 ppb (CAAQS)
Orange To improve air quality through active air management and prevent exceedance of the CAAQS	>50 to ≤70 ppb	> 50 to ≤ 65 ppb	>3.0 to ≤ 5.0 ppb	> 3.0 to ≤ 4.0 ppb
Yellow To improve air quality using early and ongoing actions for continuous improvement	> 30 to ≤ 50 ppb		> 2.0 to ≤ 3.0 ppb	
Green To maintain good air quality through proactive air management measures to keep clean areas clean	≤ 30 ppb		≤ 2.0 ppb	

Implementation in BC

- Incorporated into provincial Air Quality Objectives in November 2016

Contaminant	Avg. Period	Air Quality Objective		Source	Date Adopted by Source
		µg/m³	ppb		
Formaldehyde (HCHO)	1 hour	**60**[6]	50	Provincial AQO	1995
Nitrogen Dioxide (NO_2)	1-hour	188	**100**[7]	Interim Provincial AQO	2014
	Annual	**60**	32		
Ozone (O_3)	1-hour	**160**	82	NAAQO[8]	1989
	8 hour	123	**63**[9]	CAAQS	2013
Particulate Matter <2.5 microns ($PM_{2.5}$)	24 hour	**25**[10]	-	Provincial AQO	2009
		28[11]	-	CAAQS	2013
	Annual	**8**[12]	-	Provincial AQO	2009
		10[13]	-	CAAQS	2013
Particulate Matter <10 microns (PM_{10})	24 hour	**50**	-	Provincial AQO	1995
Sulphur Dioxide (SO_2)	1-hour	196	**75**[14]	Interim Provincial AQO	Dec. 2016
	1-hour	183	**70**[15]	CAAQS	2016
	Annual	13	**5**[16]	CAAQS	2016
Total Suspended Particulate (TSP)	24-hour	**120**		NAAQO	1974
	Annual	**60**[17]	-	NAAQO	1974

http://www.bcairquality.ca/reports/pdfs/aqotable.pdf

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Implementation in BC

- BCMOE issued an information sheet in November
  - Existing Sources - Possible management actions
    - *Used as a **tool to help inform air management decisions in B.C**.*
    - *Where necessary, actions to reduce SO_2 emissions will be developed in cooperation with facility operators.*
  - CAAQS Exceedance – MOE will:
    1. Clarify the cause of the exceedances
    2. Work with key stakeholders and affected communities take appropriate action to reduce SO2 emissions over time

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Implementation in BC

- Projects - new or expanding emission sources
  - Air quality assessments should compare predicted concentrations against CAAQS
    - Ignore interim objectives if operating past 2020
  - Assess all locations – not limited to sensitive locations or populated areas
    - Use of objectives this way differs from info sheet

    While the CAAQS are not intended to be used for fenceline reporting, these standards will be used to characterize air quality and potential air quality impacts in areas where people live or where other sensitive receptors are likely to be found.

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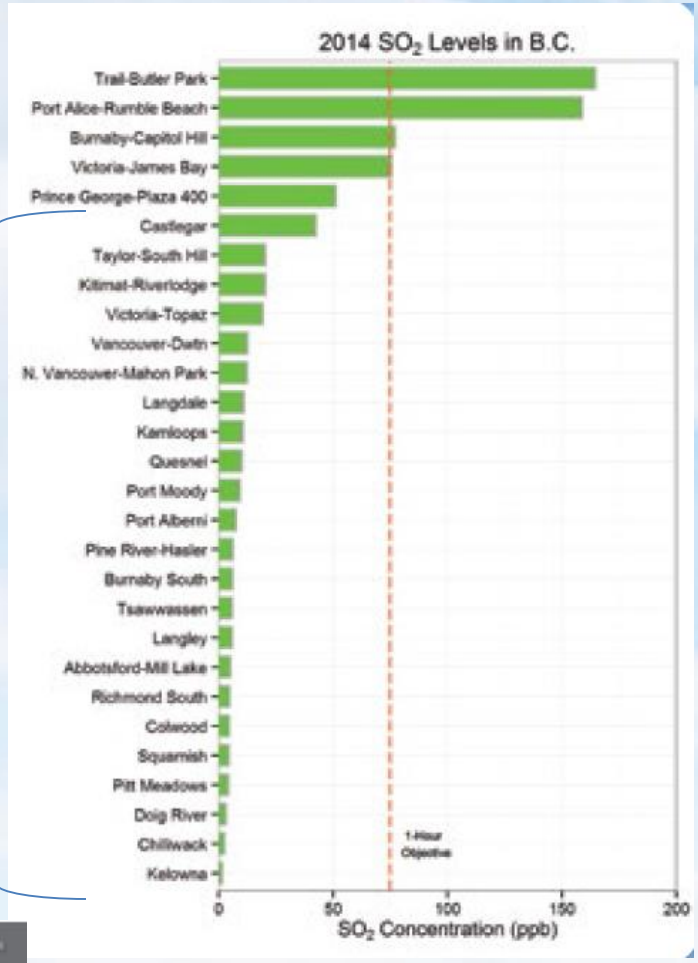
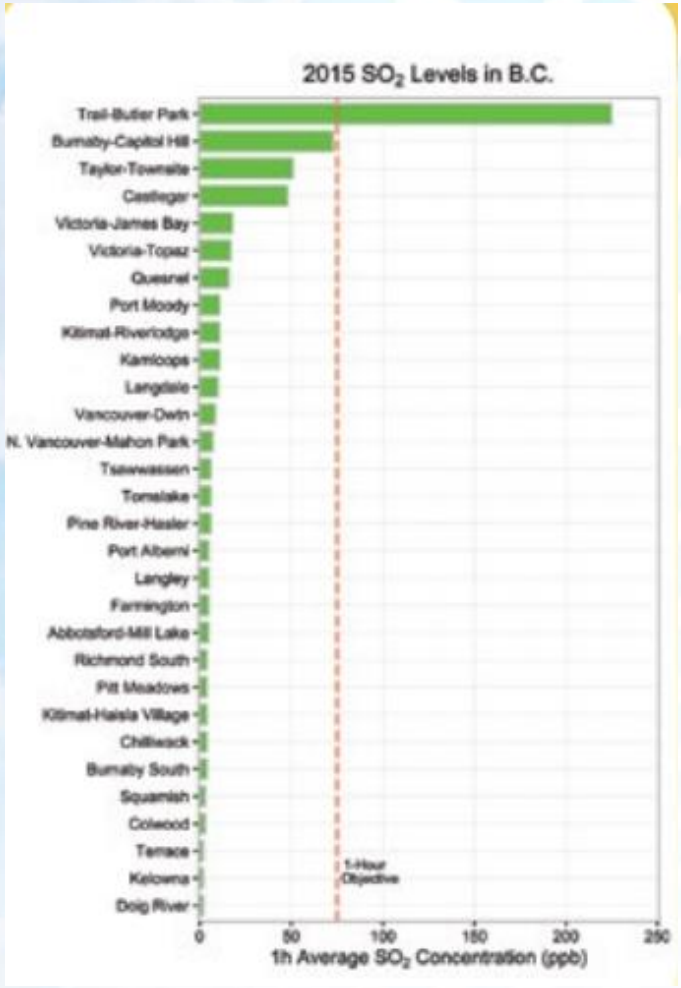
State of the air

Large group well below objective





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Implications for Industry

- Restrict expansion in areas with high SO2
- Likely cause challenges for AQ assessments
  - Delay timeline
  - Drive down emission limits
- Can look to U.S. from 2010 1-hour NO2 and SO2 standards for example
  - SO2 implementation has resulted in permit limits and shutdowns, many costly studies
  - Driver for permit timelines and limits now usually AQ Standards (PM2.5, NO2, SO2)

Overcoming Challenges

Measures to address the 1-hr Standards

1. Investigate the effects
   - Human health vs Environment
   - Frequency
2. Refine Emission Schedule
3. Source parameter changes
4. Building changes
5. Evaluate meteorology
6. Evaluate ambient monitoring data
7. Stratify impacts
8. Pollutant specific strategies

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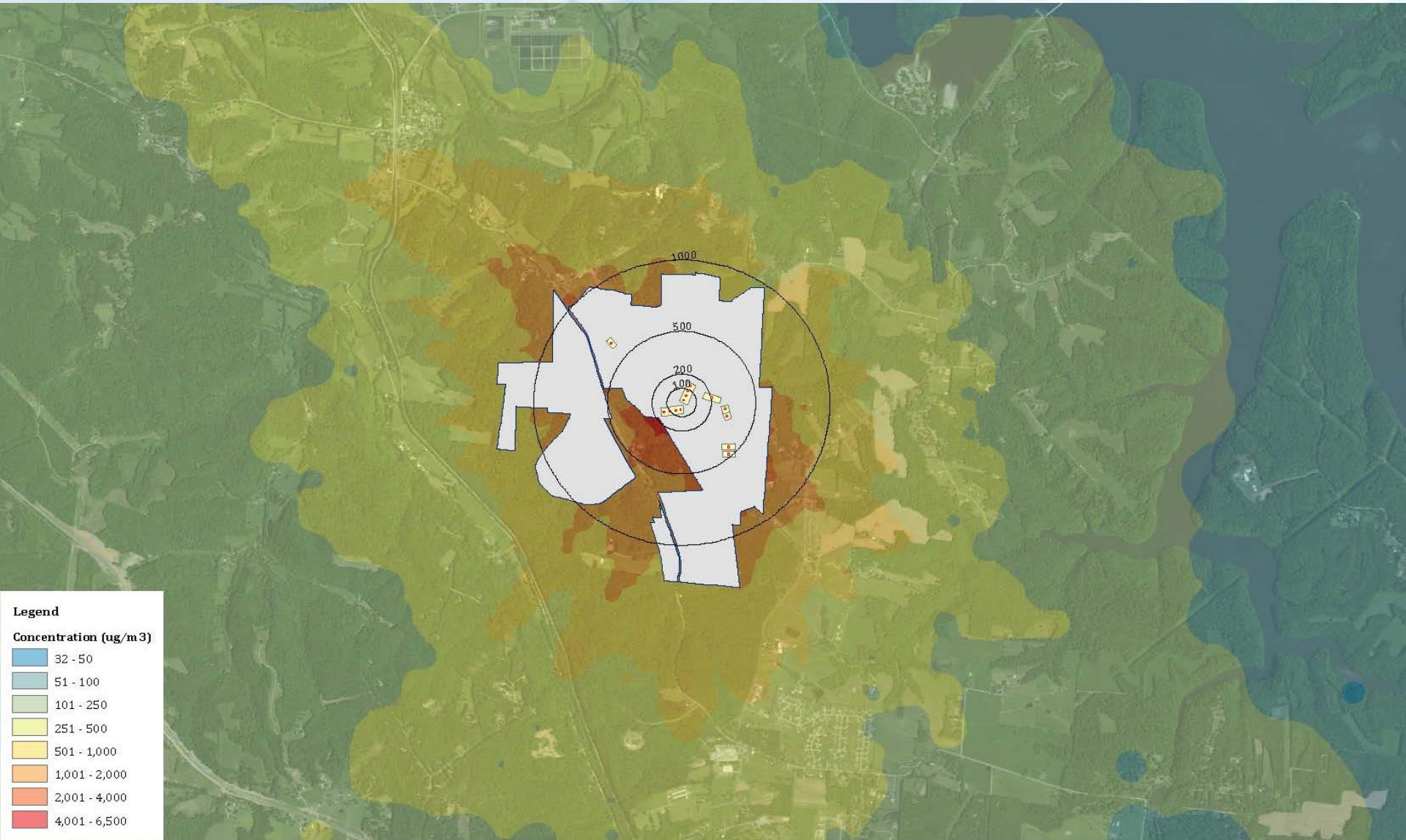
1. Investigate the effects

Example Air Quality Assessment Results Map



8. Pollutant specific strategies

- For NO_2 apply
  Ambient ratio method (ARM)
  PVMRM or OLM
  1. Consider testing to get stack-specific in-stack NO_2/NOx ratios
  2. Pair by season, month, hour with ozone data
- For SO2, defend the use of, and apply a decay coefficient (e.g., turned on for urban for SO_2 but must be demonstrated for rural areas)

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Questions?

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