

# Questions about SO<sub>2</sub> Forecasting and Messaging, a New Hampshire Case Study.

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# Revised SO<sub>2</sub> Standard

- On June 2, EPA strengthened the SO<sub>2</sub> standard from 140 ppb evaluated over 24-hours, and 30 ppb evaluated over an entire year to a 1-hour standard of 75 ppb.
- In the same ruling, EPA revised the Air Quality Index (AQI)

Category	AQI	1-Hour SO <sub>2</sub> Concentration
Good	0 - 50	0 – 35 ppb
Moderate	51 - 100	36 – 75 ppb
Unhealthy for Sensitive Groups	101 - 150	76 – 185 ppb
Unhealthy	151 - 200	186 – 304 ppb
Very Unhealthy	201 - 300	305 – 604 ppb

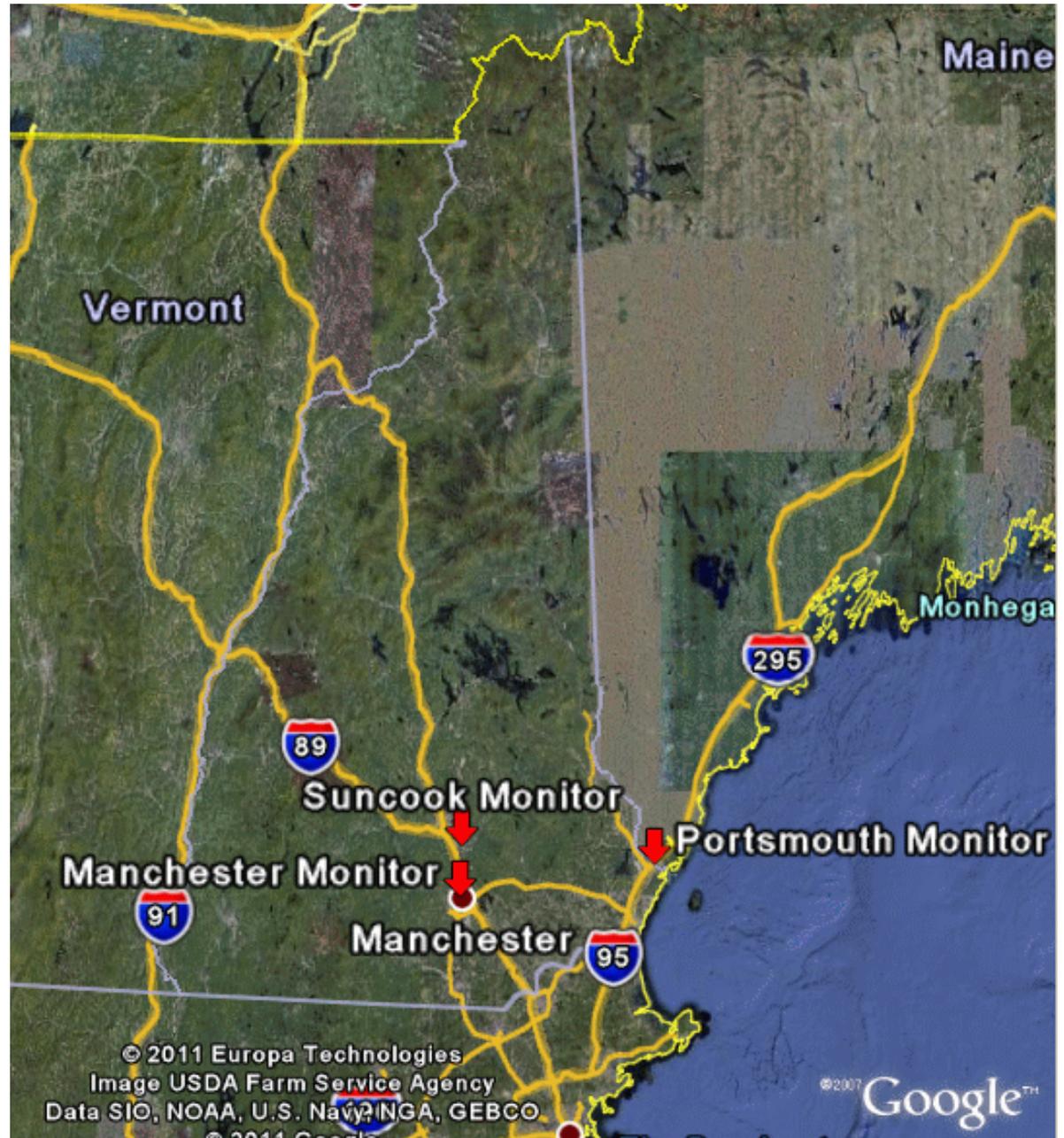
# Forecasting the AQI for SO<sub>2</sub>

“EPA recommends and encourages air quality forecasting but it is not required (64 FR 42548; August 4, 1999). We agree that there will be new challenges associated with creating and communicating an SO<sub>2</sub> forecast, and will work with State and local agencies that want to develop an SO<sub>2</sub> forecasting program on issues including, but not limited to, forecasting air quality for short time periods. We plan to work with State and local air agencies to figure out the best way to present this information to the public using the AQI.” (75 FR 35587; June 22, 2010)

# New Hampshire SO<sub>2</sub> Monitoring Locations

Suncook to Manchester –  
~10 miles

Suncook to Portsmouth –  
~40 miles



# Number of SO<sub>2</sub> Exceedance Days based on the 1-Hour Standard of 75 ppb

	2007	2008	2009	2010
Manchester, NH	1	1	1	1
Suncook, NH	54	35	80	95
Portsmouth, NH	0	1	0	0

# Suncook, NH Air Monitor

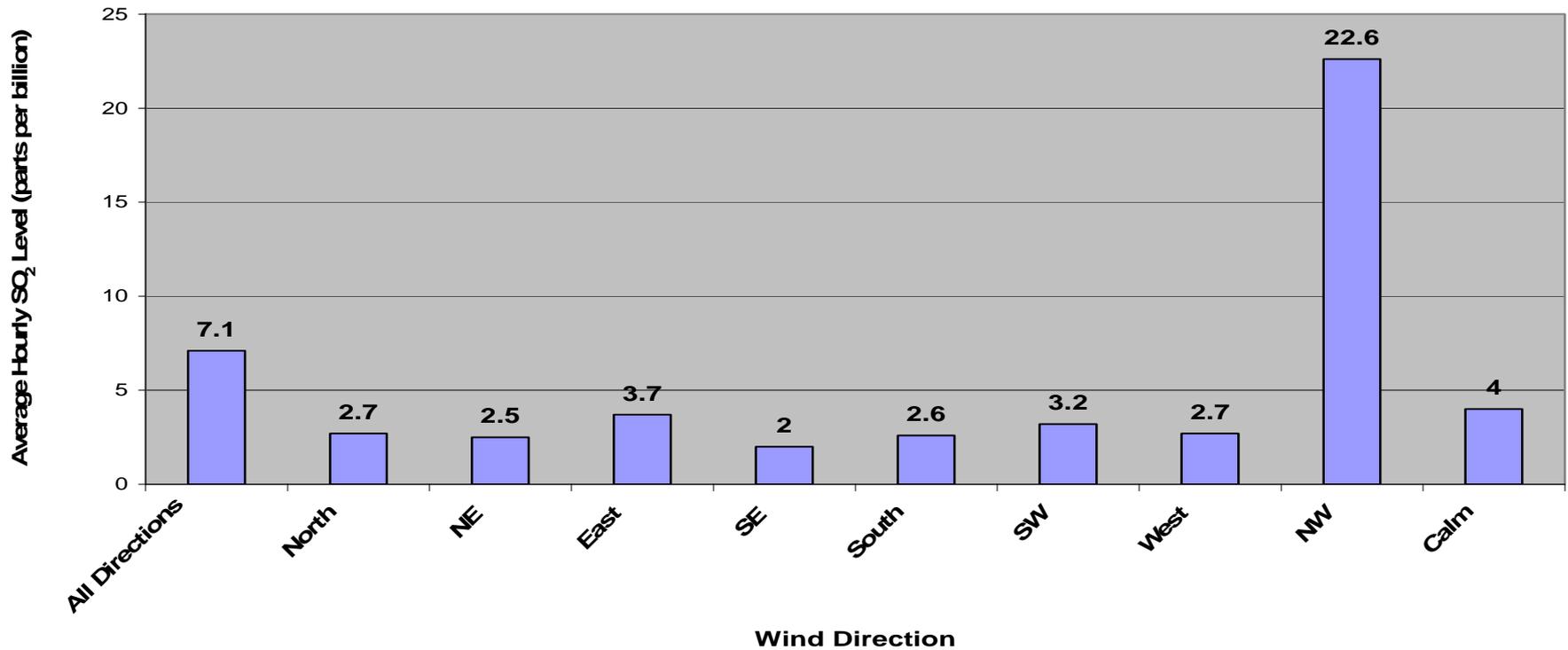


# Factors contributing to SO<sub>2</sub> concentrations at Suncook Village, NH

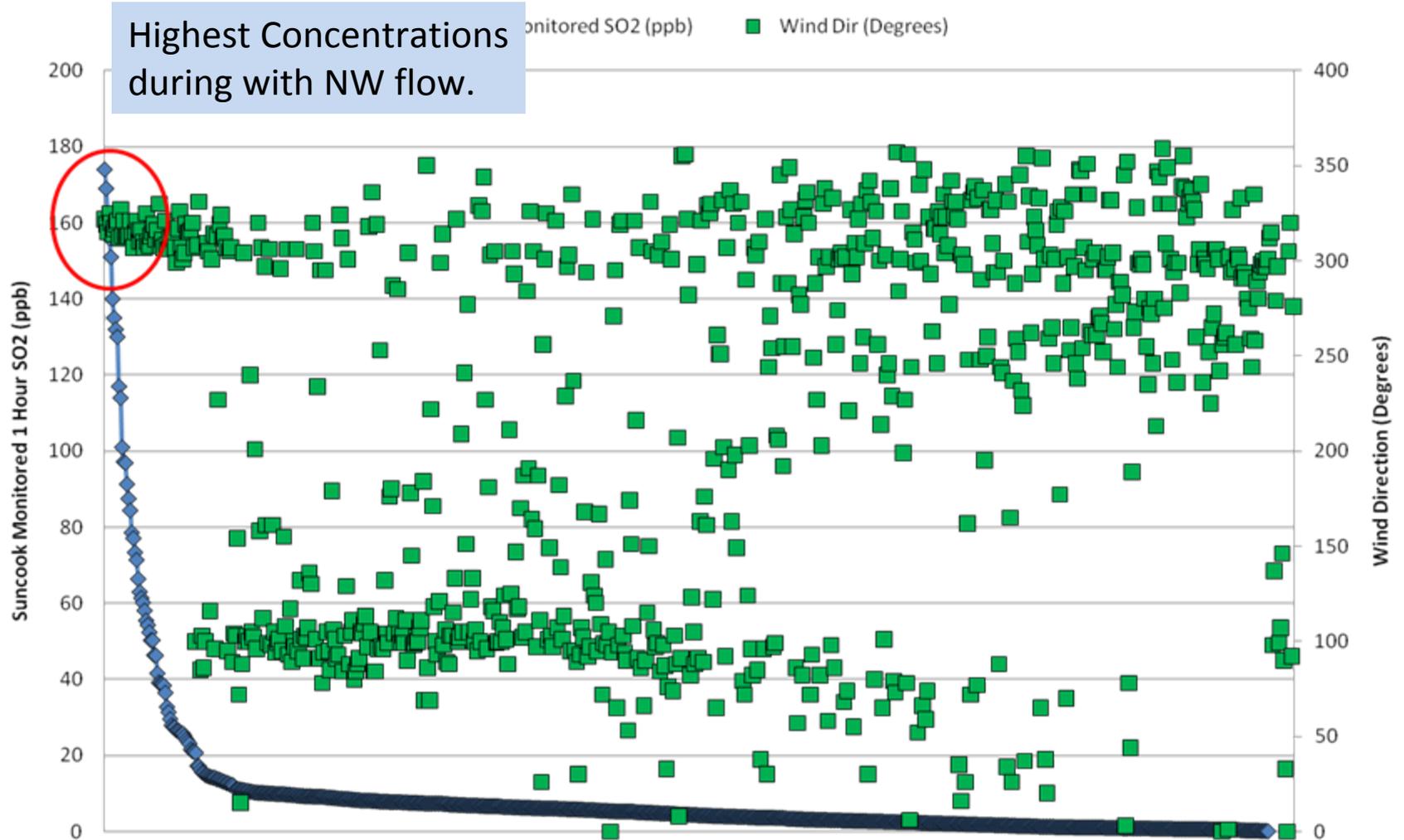
- Wind Direction
- Wind Speed
- Power Plant Emissions

# SO<sub>2</sub> concentrations are higher with Northwest flow.

Figure 5-6. Average hourly SO<sub>2</sub> Levels by Wind Direction:  
Exchange Street, Mar 2004-Feb 2006



# Monitored SO<sub>2</sub> at Suncook, NH vs monitored wind direction by decending SO<sub>2</sub> concentration January 2009



# For northwest winds, SO<sub>2</sub> concentrations are higher at wind speeds above 15 mph

**Figure 5-7. Average hourly SO<sub>2</sub> levels by wind speed: Northwest winds only, Exchange Street, Mar 2004-Feb 2006**

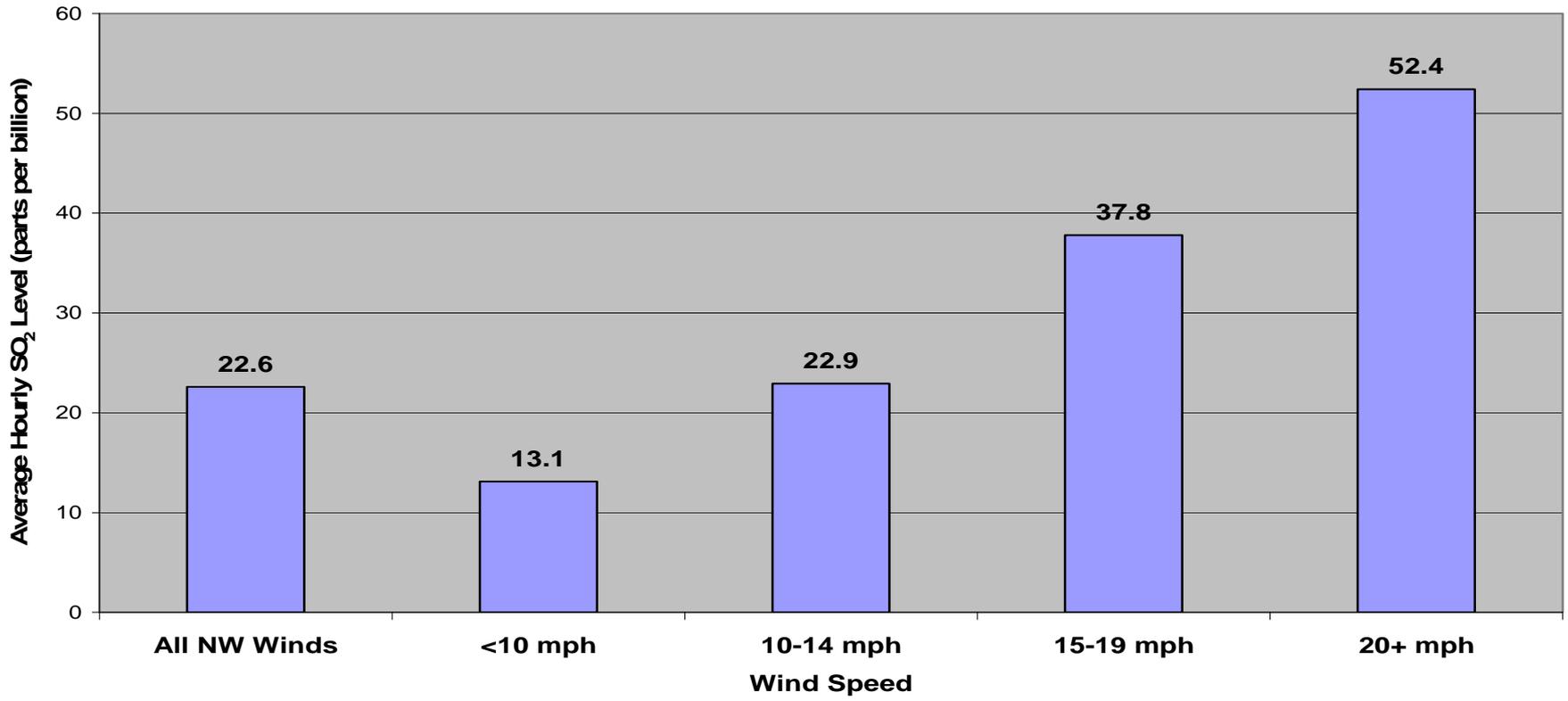
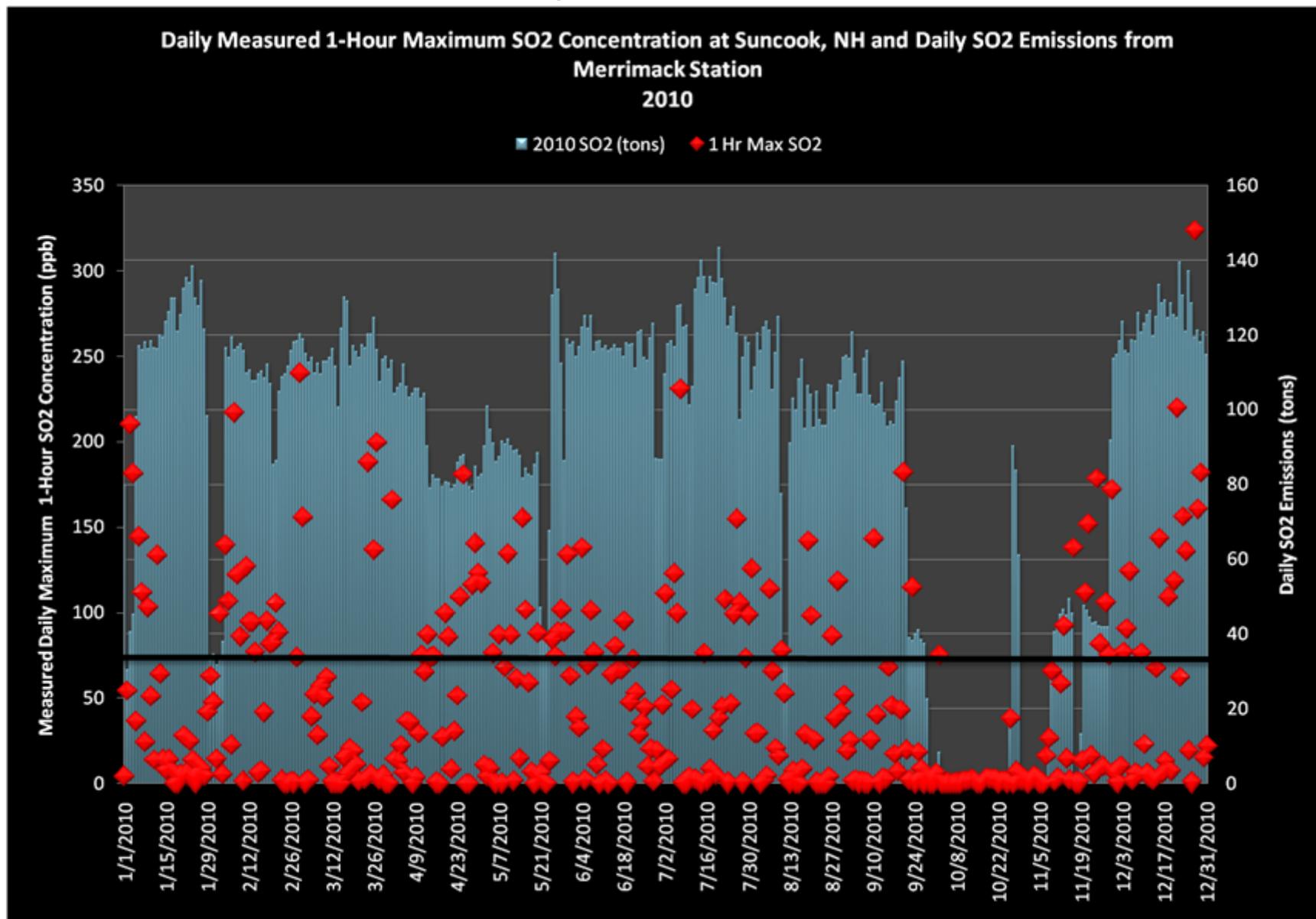


Figure Courtesy of New Hampshire Department of Environmental Services

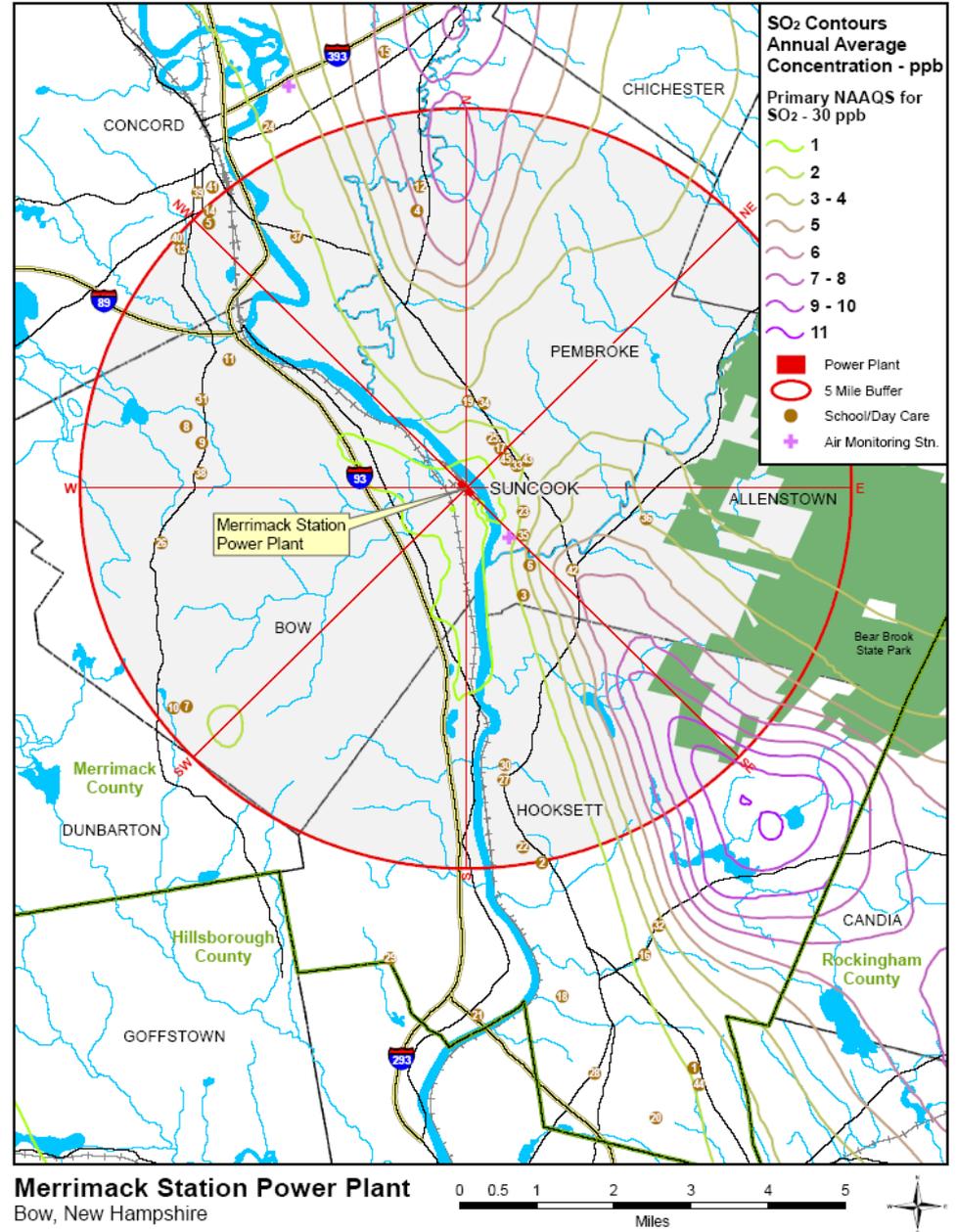
# SO<sub>2</sub> concentrations are dependant upon power plant operations



What happens to ambient concentrations in other directions and distances from the source?

What is the spatial extent of the unhealthy air quality?

Figure 3.2. Location of Schools & Day Care Facilities near Merrimack Station (7)



# What should we be forecasting?

- For the 1-hour ozone standard, an entire day was considered “unhealthy” if any hour was expected to “exceed” the standard.
- Ozone is well behaved in that, in absence of cloud cover , concentrations increase to a peak value, usually in the late afternoon.
- Will we use the same approach for SO<sub>2</sub> forecasting?
- High SO<sub>2</sub> concentrations can happen any time of the day for a variable length of time.

# Suncook, NH Monitor Data

## January 9, 2009 and April 12, 2009

<u>Date and Time</u>	<u>Measured SO2 (ppb)</u>	<u>Wind Direction (Degrees)</u>	<u>Wind Speed (mph)</u>
1/9/2009 0:00		279	1.6
1/9/2009 1:00		297	1
1/9/2009 2:00	6.1	301	1.6
1/9/2009 3:00	6.7	303	2.2
1/9/2009 4:00	5.9	297	1.6
1/9/2009 5:00	0.7	299	1.1
1/9/2009 6:00	1.1	307	1
1/9/2009 7:00	5.7	294	1.7
1/9/2009 8:00	1.3	301	3.5
1/9/2009 9:00	2.6	303	3.6
1/9/2009 10:00	1.4	293	3
1/9/2009 11:00	2.4	299	3.9
1/9/2009 12:00	101	313	4.3
1/9/2009 13:00	66.4	316	4.6
1/9/2009 14:00	84.4	321	4.5
1/9/2009 15:00	41.6	316	4.9
1/9/2009 16:00	97.2	321	4.3
1/9/2009 17:00	46.4	319	2.8
1/9/2009 18:00	21.6	316	2.3
1/9/2009 19:00	9.2	320	2.7
1/9/2009 20:00	27.5	313	4.3
1/9/2009 21:00	26.5	317	3.7
1/9/2009 22:00	5.3	319	3.2
1/9/2009 23:00	23.7	315	1.8

<u>Date and Time</u>	<u>Measured SO2 (ppb)</u>	<u>Wind Direction (Degrees)</u>	<u>Wind Speed (mph)</u>
4/12/2009 0:00	146	322	4.2
4/12/2009 1:00	132	331	4.9
4/12/2009 2:00	139	326	5.2
4/12/2009 3:00	16.6	327	4.9
4/12/2009 4:00	107	329	3.4
4/12/2009 5:00	57.4	328	4.9
4/12/2009 6:00	60.1	328	5.4
4/12/2009 7:00	72.3	326	6.2
4/12/2009 8:00	61.9	331	6.9
4/12/2009 9:00	33.4	326	6.1
4/12/2009 10:00	17.3	331	5.7
4/12/2009 11:00	56.3	326	5.8
4/12/2009 12:00	81	323	5.6
4/12/2009 13:00	125	315	5.8
4/12/2009 14:00	74.3	316	5.6
4/12/2009 15:00	94.2	318	5.7
4/12/2009 16:00	71.3	316	4.9
4/12/2009 17:00	24.4	308	4
4/12/2009 18:00	88.6	313	4.3
4/12/2009 19:00	58.7	314	4.2
4/12/2009 20:00	25.7	310	3.6
4/12/2009 21:00	12.3	306	3.3
4/12/2009 22:00	16.7	306	2.8
4/12/2009 23:00	2.7	302	2.9

# What is the message?

- Do we specify the source of the SO<sub>2</sub>?
  - The source is slated for control in 2012, but an advocacy group is calling for the complete shut-down of the source.
- What is the health messaging?
  - Do people just avoid strenuous outdoor activities?
- What actions can people take?
  - Do we advocate energy conservation?