

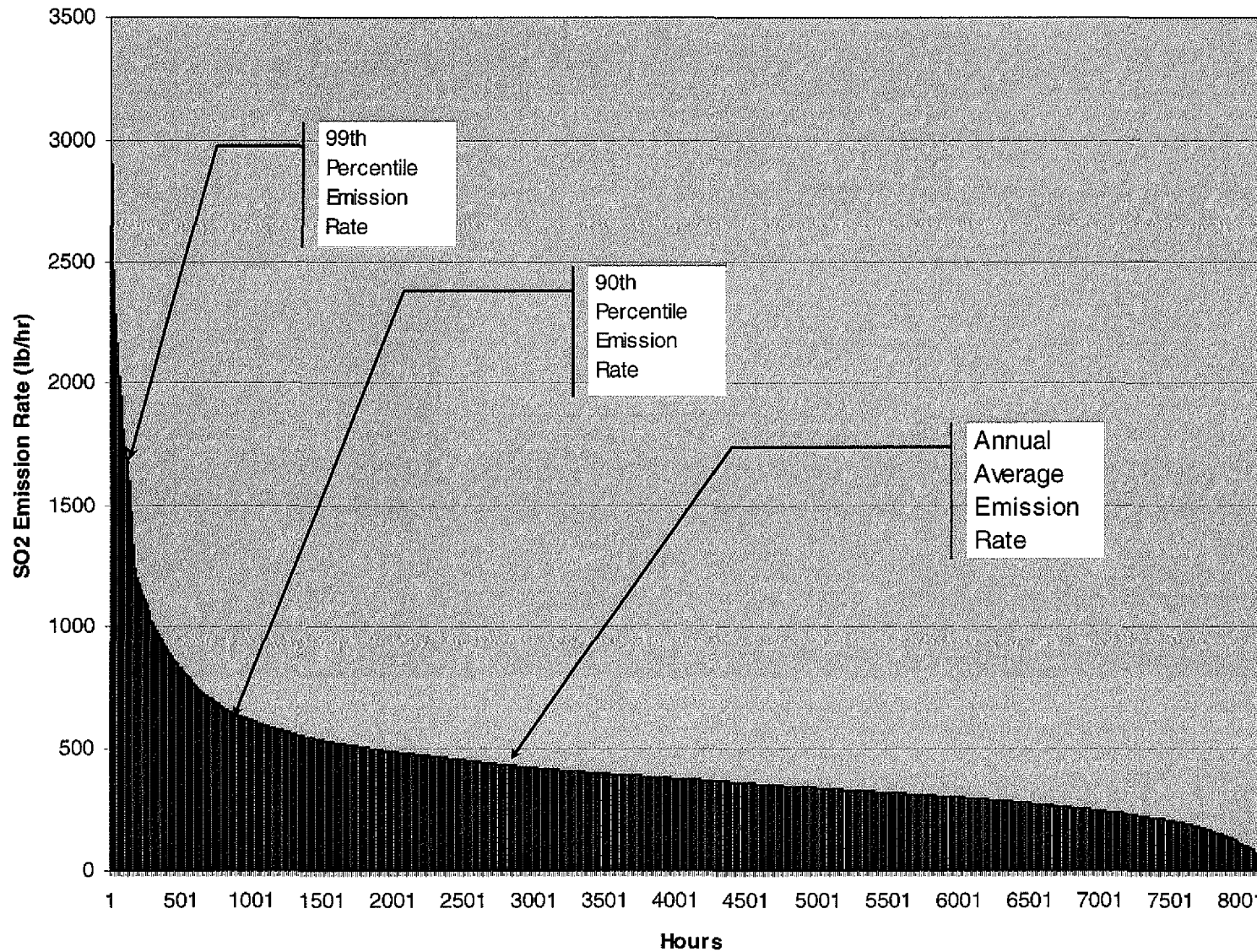
# Statistical Analysis of Short Term Increments

- For short term averaging periods where increments may only be exceeded no more than once per year, this translates to 99.5<sup>th</sup> percentile impact.
- Proposal would permit use of emission rates at 50<sup>th</sup> – 60<sup>th</sup> percentile to compare against a standard with a 99.5<sup>th</sup> percentile impact level.

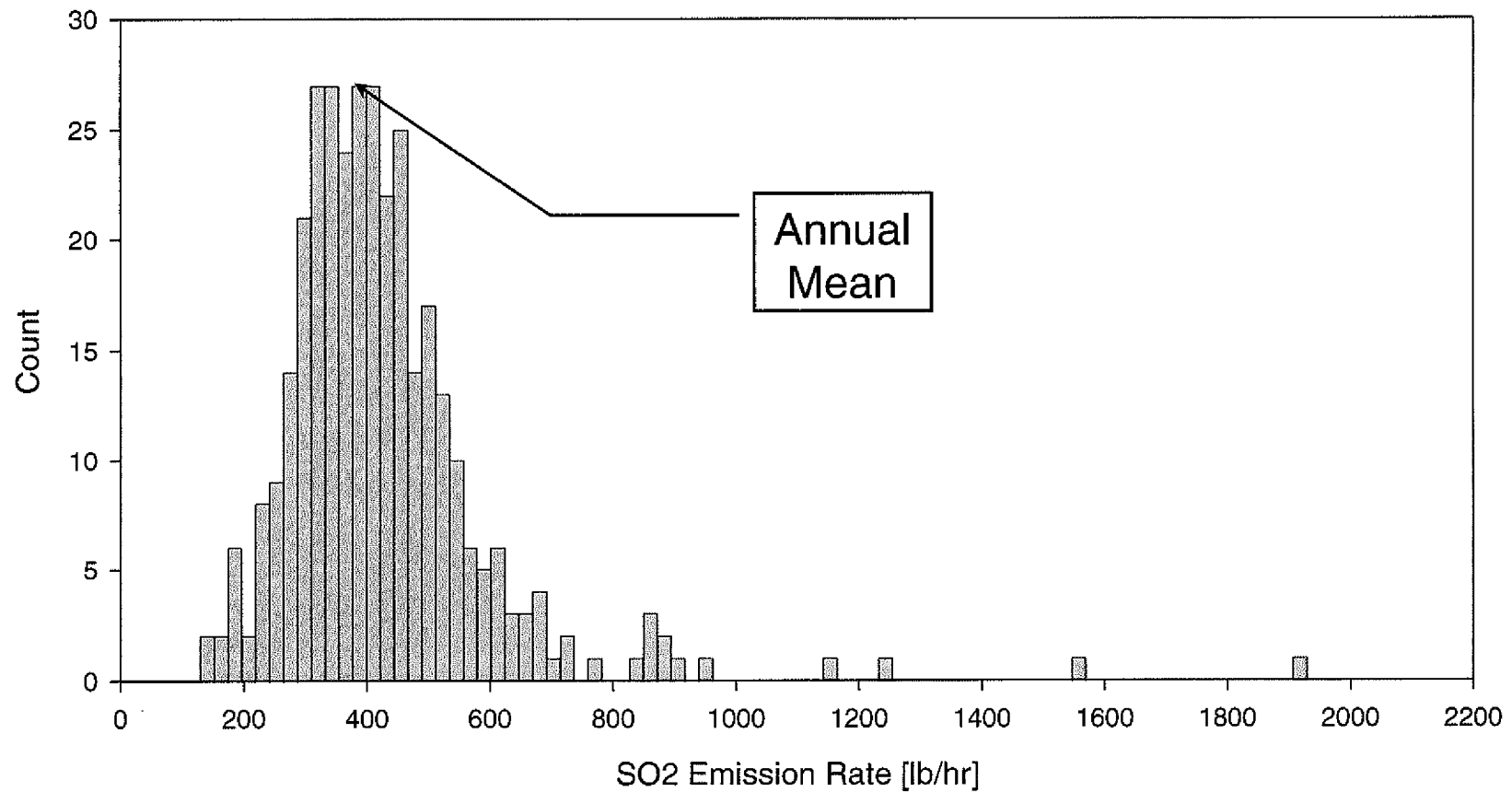
# Example Analysis of CEM Data

- 2005 CEM data from Sunflower Electric in Kansas.
- Baseload EGU facility – average heat input rate of 3,327 MMBTU/hr (SD 415 MMBTU)
- The annual average hourly emission rate is 430 lbs/hr for SO<sub>2</sub>.

# CEM Hourly Emission Rate Analysis



# CEM 24-Hour Emission Rates



# Comparison of 1-Hour Average Emission Rates

## *1-Hour Average Emissions (lb/hr)*

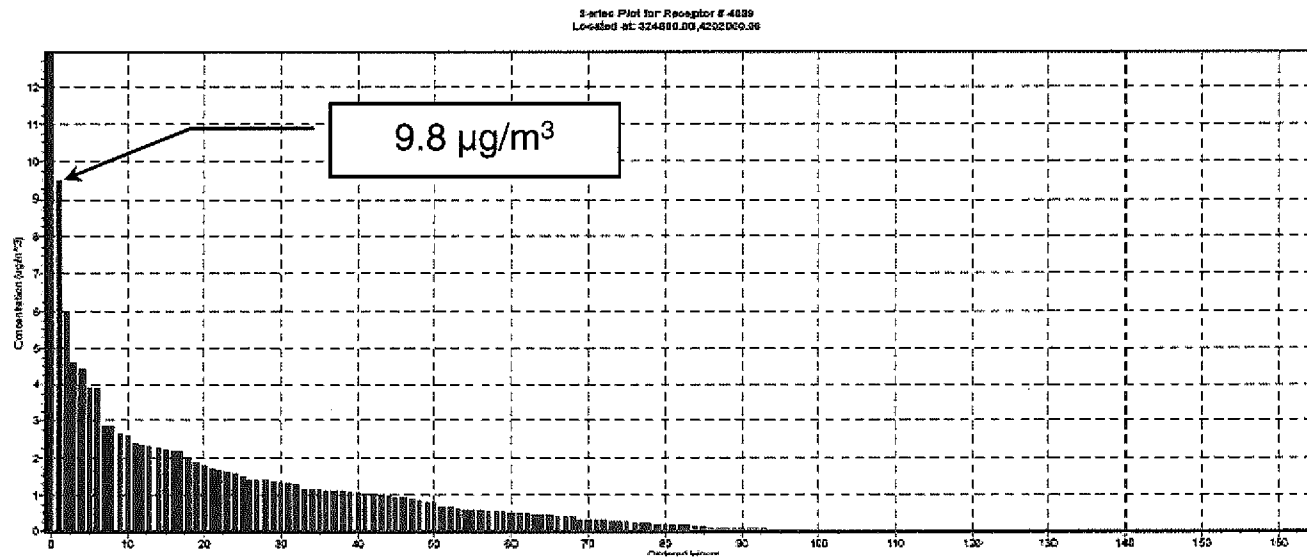
MAX	99th	90th	75th	50th	25th	10th	Mean	SD
3767.6	2107.6	1228.9	484.1	376.4	295	216.7	430.8	277.9
<b><i>Ratio of Percentile to Mean</i></b>								
MAX	99th	90th	75th	50th	25th	10th		
13.56	4.89	1.52	1.12	0.87	0.68	0.50		

# Comparison of 24-Hour Average Emission Rates

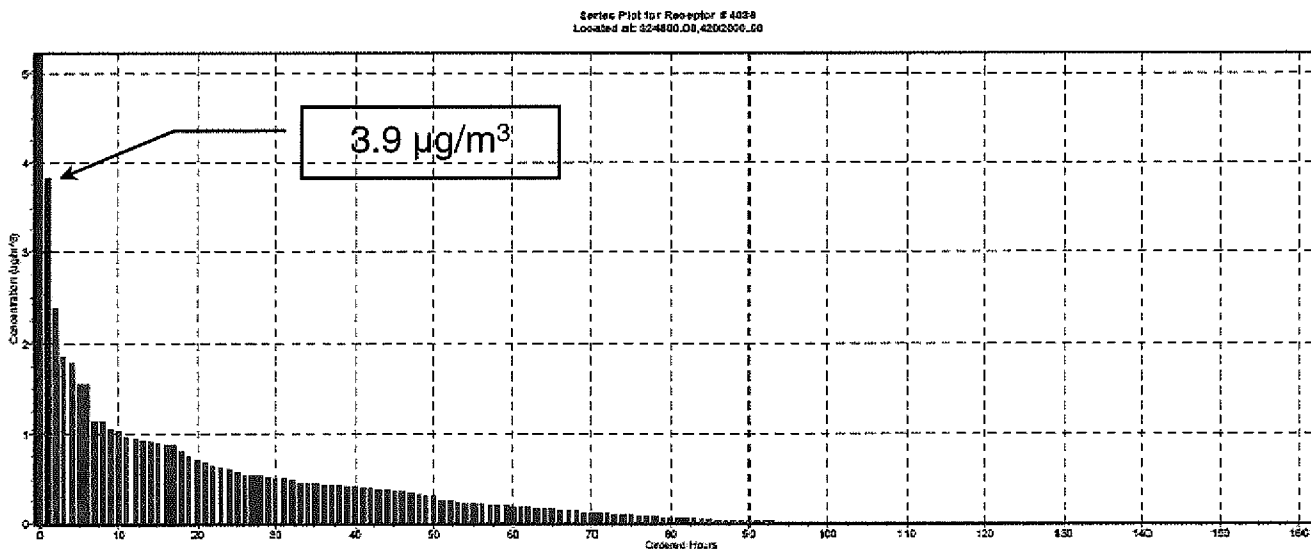
## *24-Hour Average Emissions (lb/hr)*

MAX	99th	90th	75th	50th	25th	10th	Mean	SD
1930.0	1068.30	585.98	485.25	400.69	321.78	270.40	427.22	179.9
<b><i>Ratio of Percentile to Mean</i></b>								
MAX	99th	90th	75th	50th	25th	10th		
4.52	2.50	1.37	1.13	0.94	0.75	0.63		

# Comparison of Model Response for Short Term Increments – 99<sup>th</sup> Percentile to Mean Emission Rates



**99<sup>th</sup> Percentile  
Emission Rate**



**Mean 24 Hour  
Emission Rate**

# Peak-to-Mean Emission Rate Ratios

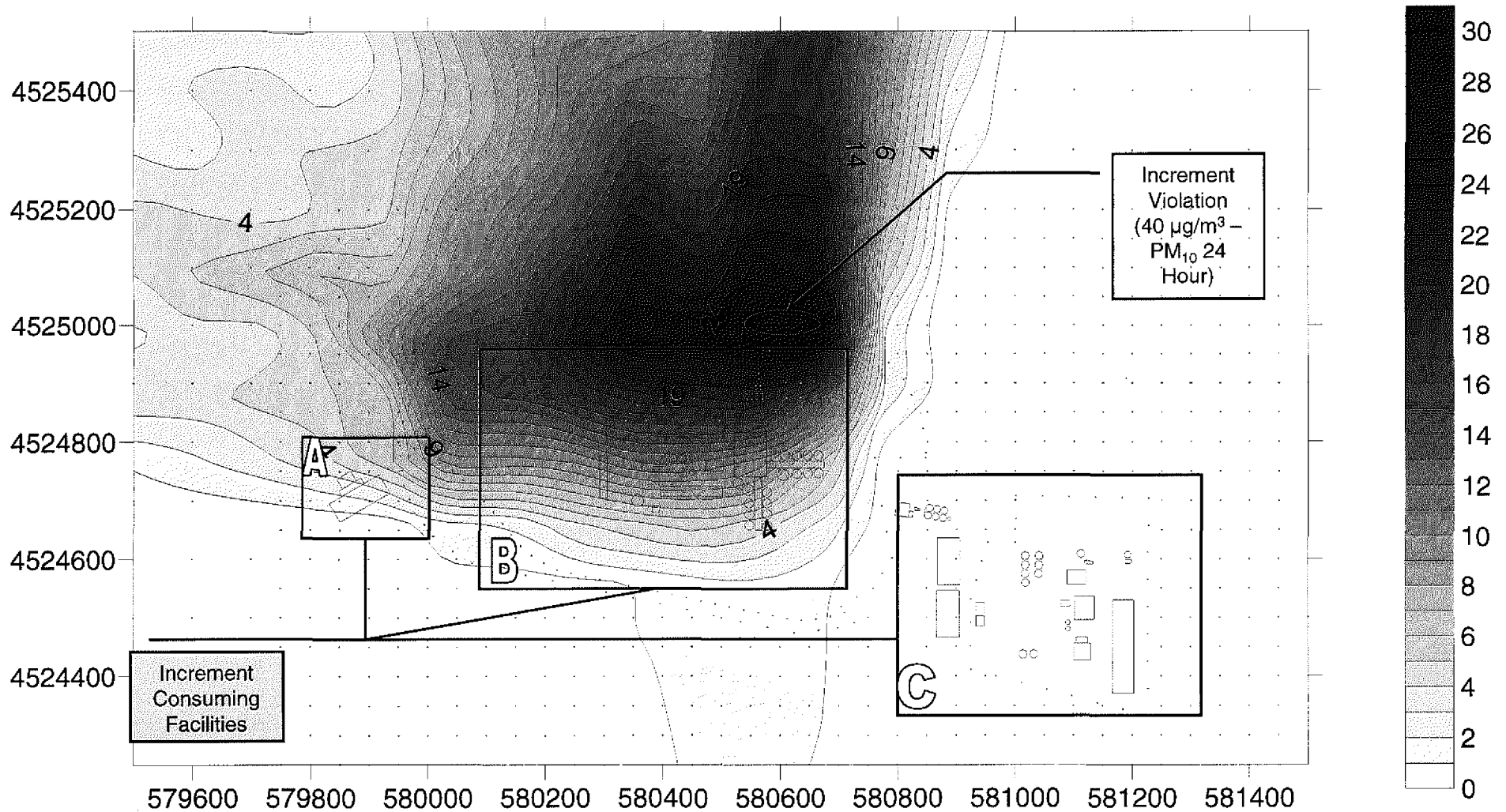
- 99<sup>th</sup> percentile 24-hour emission yields 2.45 times greater concentration than annual mean 24-hour emission rate.
- 99<sup>th</sup> percentile 1-hour emission yields 4.89 times greater concentration than annual mean 1-hour emission rate.
- Even at the 75<sup>th</sup> percentile emission rate, increment consumption would be underestimated by 12%.



# Effects of Current Proposal

- Under proposed modification to PSD rule, 2857 operating hours (121 days) are greater than the annual average hourly emission rate in the previous distributions if reviewing authority chooses to use annual average emission rate.
- This would mean that 2857 hours/121 days with higher hourly emissions than the annual mean would not be evaluated under current proposal and would be compared against a standard which allows only one exceedance per year.
- Depending upon which cut-point one chooses for actual short-term emission rate, short term increment consumption would be underestimated by 1.5 – 13 times when compared to the annual mean emission rate.

# 2007 Region 7 PSD Example



# 24-Hour Increment PM10 Increment Consumption

## *24-Hour Maximum Actual Emission Rate*

A	B	C	Totals
0.018	39.996	0.311	40.32

## *24-Hour Annual Mean Emission Rate (assuming 2.5 Peak to Mean Ratio)*

A	B	C	Totals
0.007	15.999	0.124	16.13

# Key Points

- In most short-term PSD increment situations, a majority of times there is little or insignificant collective impacts, even when sources are located next to each other.
- Concentrations on a receptor-by-receptor basis is typically dominated by single source impacts. Model concentrations are extremely sensitive to source-receptor geometry. Sources typically must be aligned along the same wind direction for collective impacts to occur at a given receptor.
- OAQPS made erroneous assumption that a more representative picture of actual conditions can be found by promoting annualizing emission rates. Little source interaction is observed in many cases based upon over 20 years of reviewing PSD modeling.
- When little source interaction is observed, increment consumption is literally a function of individual source release characteristics and emission rates.
- Annualized emission rates will relieve increment violations derived from maximum actual emission rates, contrary to OAQPS stated opinion that proposed rulemaking will still remain protective of increments.