Public Comments on Risk and Exposure Assessment to Support the Review of the SO_2 Primary NAAQS - Second Draft

Oral Supplement of Written Comments to CASAC: April 16, 2009

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on behalf of the National Association of Manufacturers

Summary of Comments on Second Draft REA for SO_2

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- **Steep downward trends in SO_2 emissions makes the analysis of ambient exposure obsolete.**
- **Inaccurate methods are used to extrapolate historical SO_2 air quality to just attaining current NAAQS levels.**
- **Exposure assessment applies an incorrect interpretation of diurnal air measurements to specify diurnal emissions profile for area sources.**
- **Probabilistic short-term NAAQS will require probabilistic modeling approaches.**

Issue – Emissions Trends

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- **Continuing downward trends of SO_2 emissions will continue to reduce ground-level concentrations**
  - Reincarnation of Clean Air Interstate Rule (CAIR) will reduce utility emissions in East, e.g. the existing rule calls for:
    - 57% reduction by 2010
    - 73% reduction by 2015
  - Ultra Low Sulfur Diesel (ULSD, 15 ppm sulfur) fuel program
    - June 2010: all highway ULSD
    - 2012: locomotive and marine distillate fuel
  - Best Available Retrofit Technology (BART) rule
  - National Petroleum Refinery Priority: reductions > 250,000 tons

Downward SO_2 Emission Trends

http://acwi.gov/monitoring/conference/2008/presentations/sessionE/E1B_Hameedi.pdf

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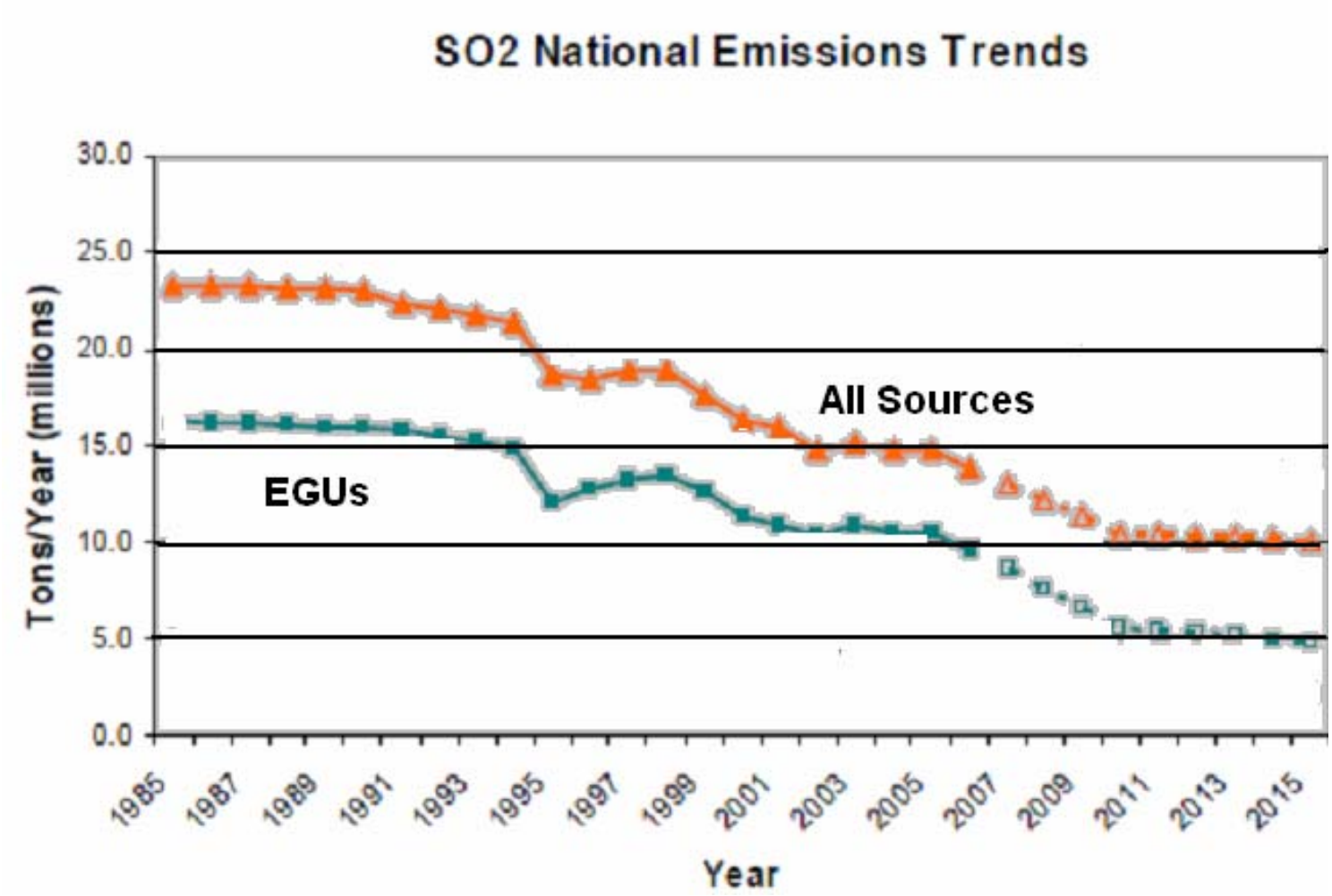

Downward Trend in Ambient SO_2

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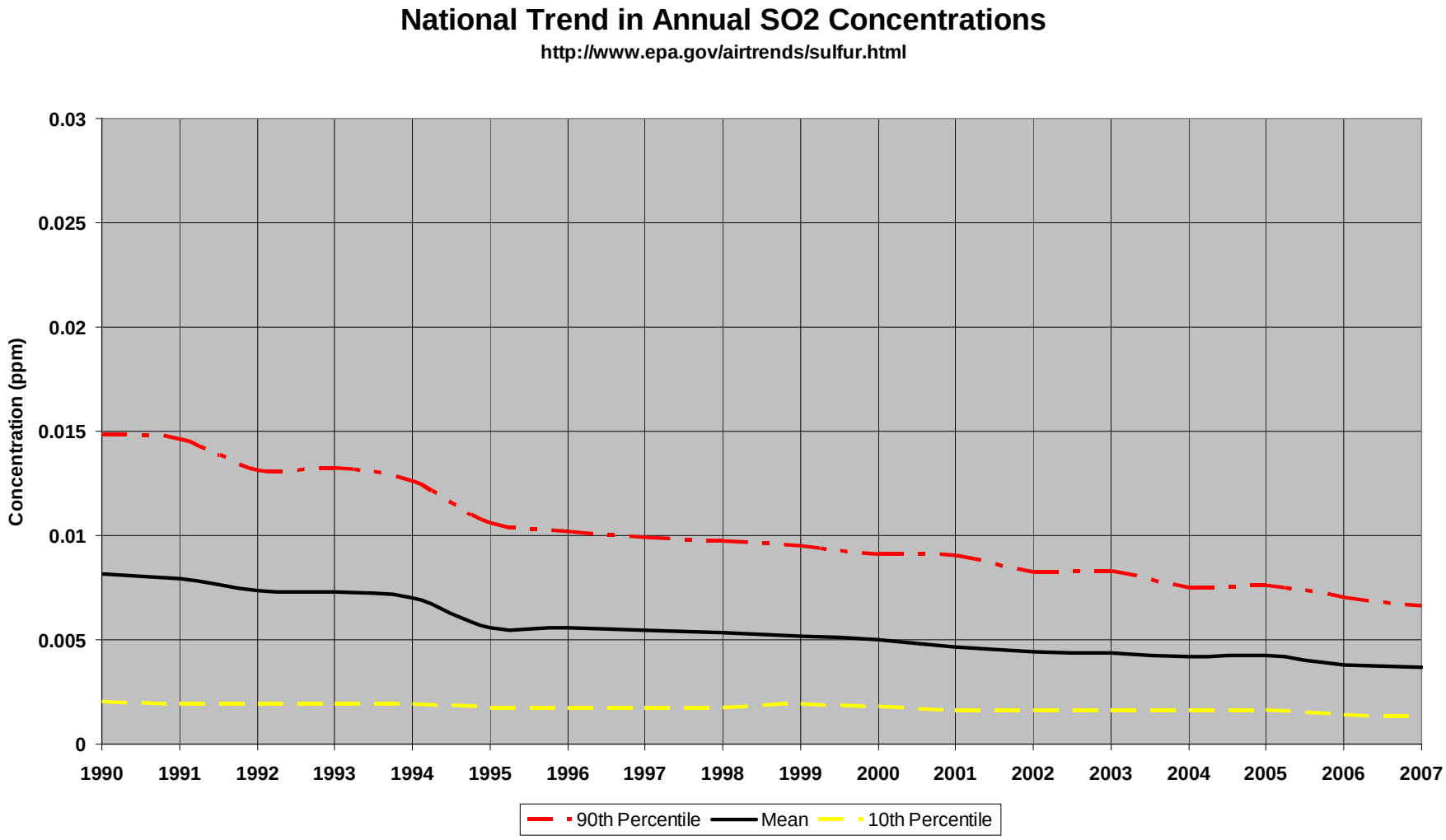

Issue – Just Meeting NAAQS Analysis

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- **Flawed logic used to extrapolate historical SO_2 air quality to just attaining current NAAQS**
  - Analysis unnecessary since concentrations are well below standards and rapidly decreasing
  - Unrealistically assumes no change in the mix of ambient sources and their temporal emission patterns
- **Improper extrapolation of 24-hour second high concentration**
  - Impact likely due to a single source or a group of sources
  - Likely to be the result of episodic or upset emissions
  - Could be due to unique meteorological conditions that occur only two days out of a year
  - Unreasonably unrealistic and overly conservative to assume that all 1-hour concentrations increase proportionately to meet 24-hour NAAQS
- **Result: Misleading conclusions regarding adequacy of present standards in protecting short-term concentrations.**

National and Regional SO_2 Source Contribution
Percent of Emissions by Region

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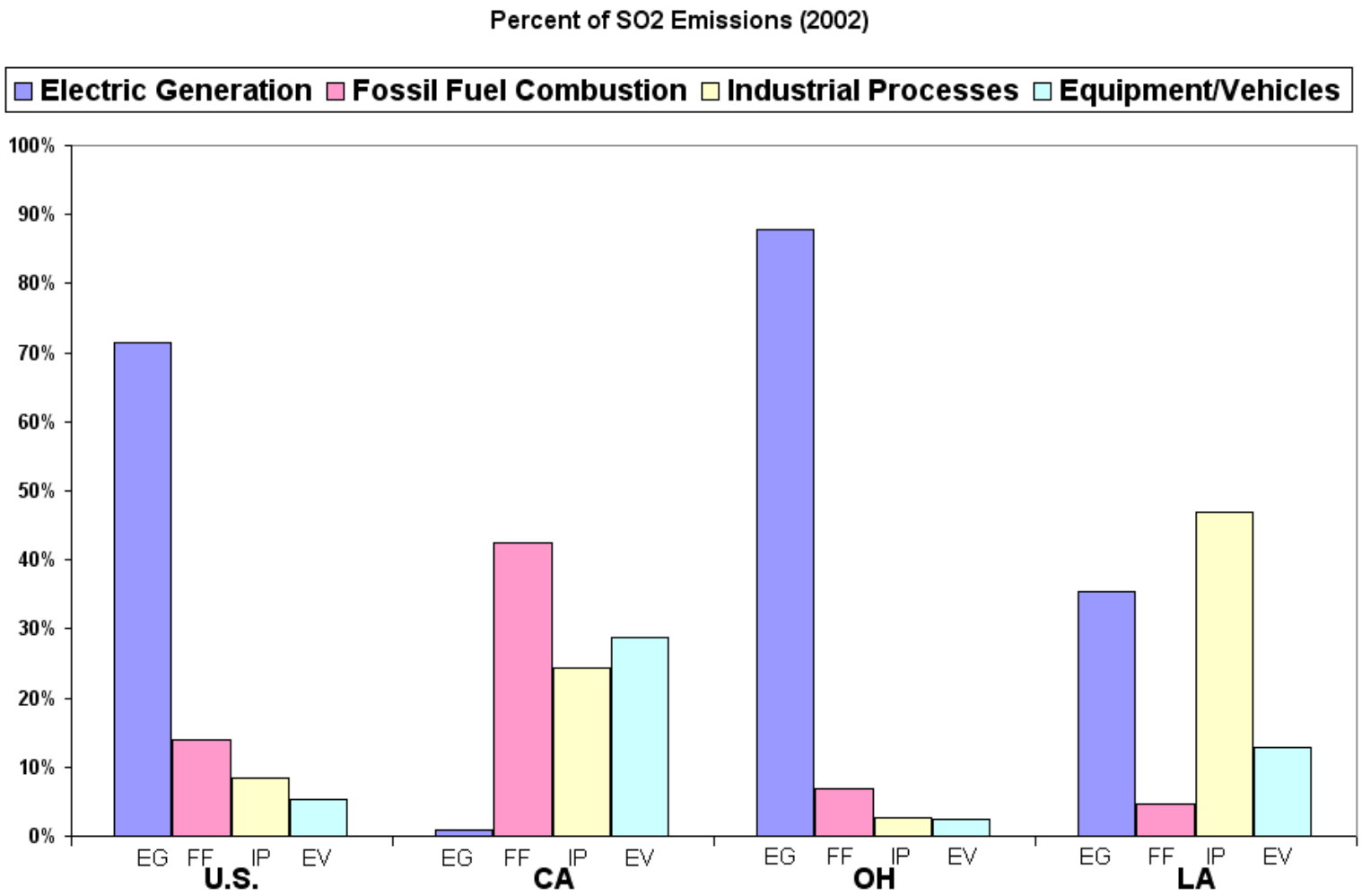

Issue – Area Source Emissions in Exposure Assessment

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- **Exposure assessment incorrectly estimates diurnal patterns of area source emissions**

  - Uses a “perfect model assumption” assuming residuals are real
  - Attributes residual between model and monitor results to area source emissions alone
  - Ignores the effect of diurnal variations in dispersion
  - Diurnal pattern is well-explained by vertical dispersion of elevated plumes during the day

Derived Diurnal SO_2 Area Source Emissions Pattern Used in REA

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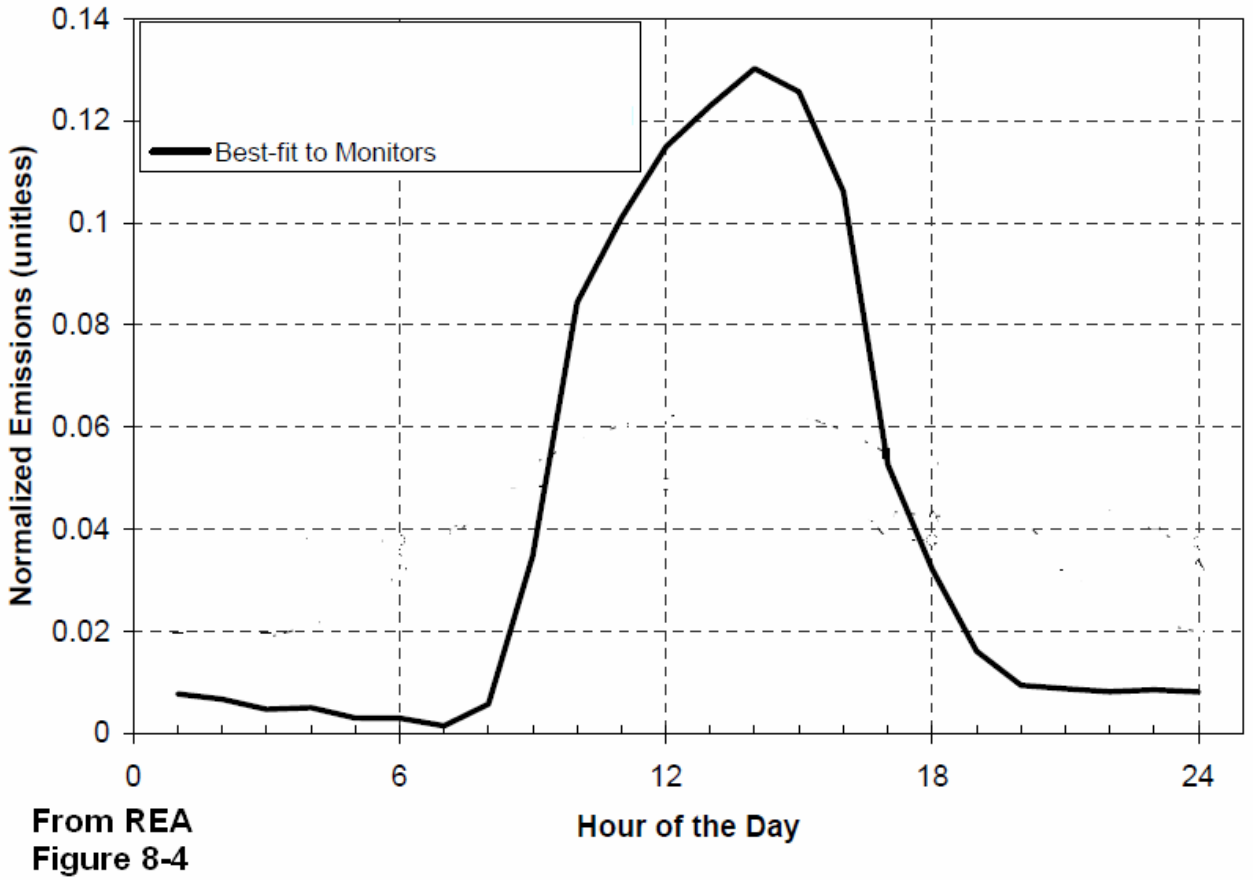
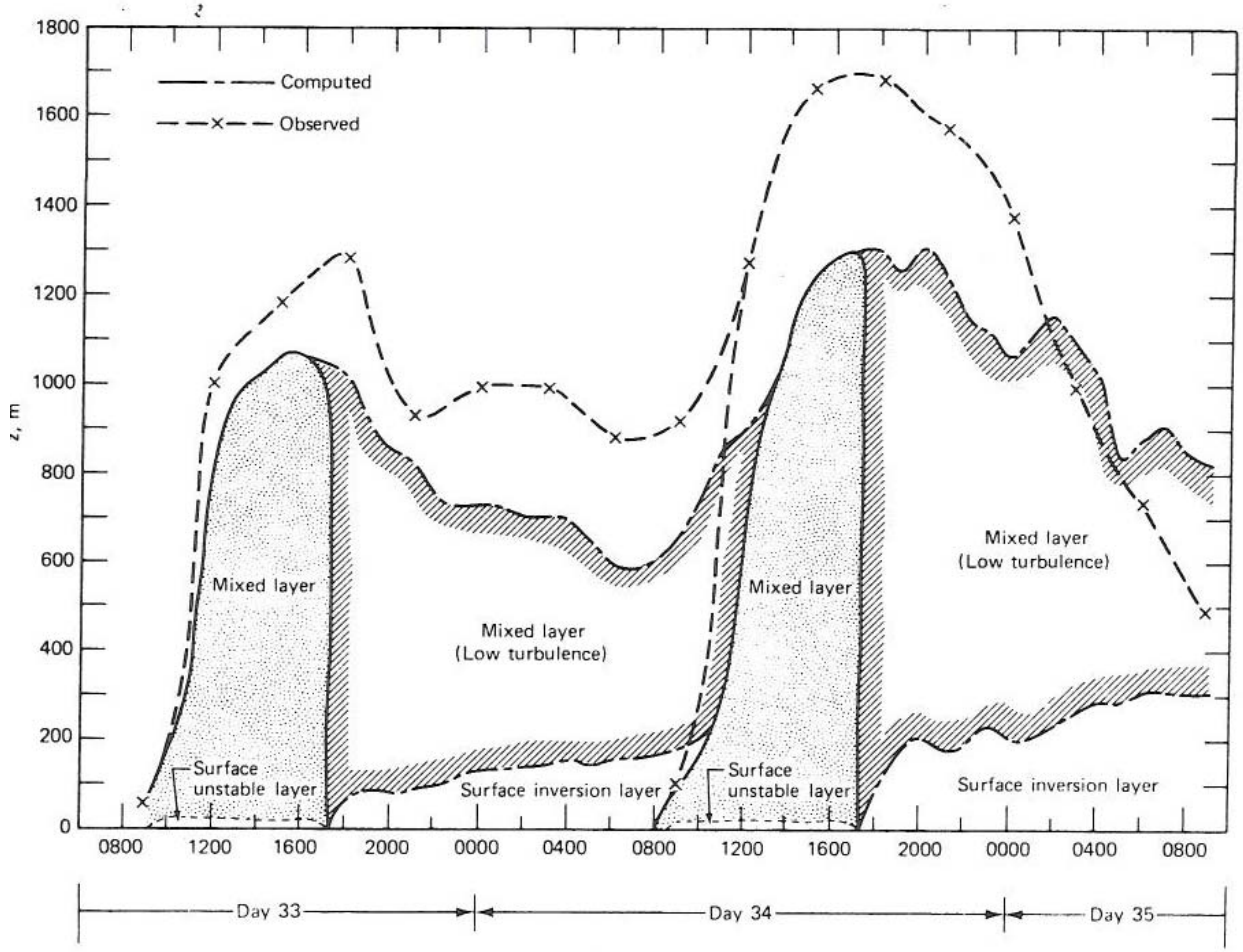


From REA
Figure 8-4

Derived best-fit non-point area source diurnal emission profile for the St. Louis domain, compared to other possible profiles.

Diurnal Boundary Layer Variation



Temporal evolution of the atmospheric boundary layer based on output from a model developed by Yamada and Mellor (1975

Monitored Diurnal SO_2 Concentration Near Power Plants

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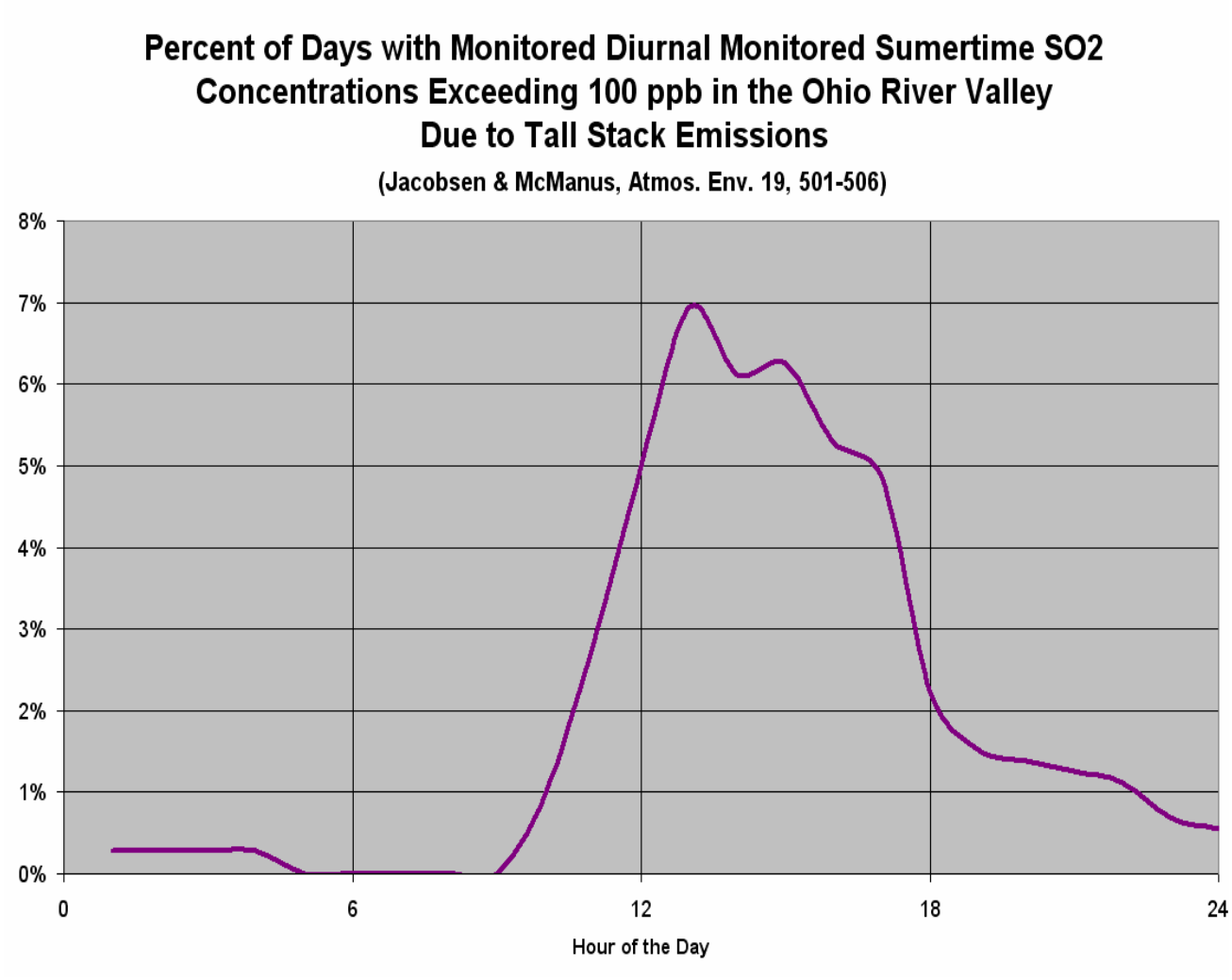

Issue – New Compliance Modeling Approaches

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- **Probabilistic Short-term NAAQS Will Require Probabilistic Modeling Approaches**
  - Implementation of a 1-hour standard will require that modeling procedures be refined to realistically address frequency of peak short-term impacts.
  - Assuming continuous peak emissions continuous will lead to overestimates of the frequency of peak total impacts.
  - Modeling procedures used in the exposure assessment should consider the use of a frequency distribution of emissions for the sources being considered in order to characterize the probabilistic nature of the intended result more accurately.
  - Procedure should also be adopted for air quality modeling used to demonstrate compliance with revised short term NAAQS.