Significant concentration gradient memo

JAMES THURMAN

US EPA/OAQPS/AQAD/AQMG

2014 REGIONAL/STATE/LOCAL MODELERS WORKSHOP

SALT LAKE CITY, UT

Disclaimer!

All recommendations are not final and are subject to change prior to release of the memo

Purpose of memorandum

- Offer recommendations on determining nearby sources to explicitly model in regulatory applications using the significant concentration gradient criterion (Section 8.2.3.b of Appendix W)

Nearby Sources: All sources expected to cause a significant concentration gradient in the vicinity of the source or sources under consideration for emission limit(s) should be explicitly modeled. The number of such sources is expected to be small except in unusual situations. Owing to both the uniqueness of each modeling situation and the large number of variables involved in identifying nearby sources, no attempt is made here to comprehensively define this term. Rather, identification of nearby sources call for the exercise of professional judgment by the appropriate reviewing authority...This guidance is not intended to alter the exercise of that judgment or to comprehensively define which sources are nearby sources.

Key terms/questions to consider

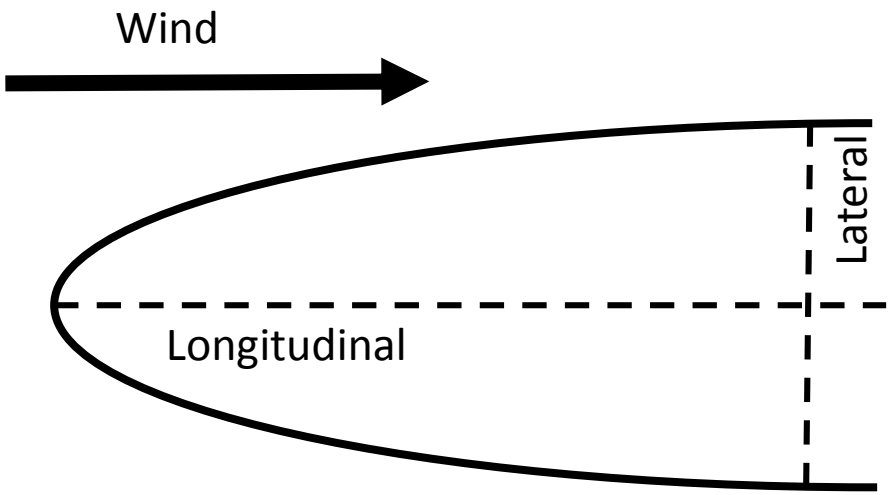
- Significant: Is significant relative to all directions or just a subset of receptors between the potential nearby source and the source(s) under consideration for limits
  - Qualitative or quantitative?
    - Visual inspection of concentration maps
    - Statistical definition, i.e. 98th percentile of gradients, upper 10%, etc.
- Concentration: Is this the concentration of a potential nearby source or total concentration (all sources)?
- Vicinity: Is vicinity within the area of SIL exceedances of the source under consideration for emission limits?

Nearby source impacts

- For nearby sources what concentrations should be considered as part of the gradient analyses?
  - Maximum impacts, independent of the SIL exceedances of the project source(s)?
  - Concentrations paired in time and space with the project source(s) SIL exceedances?
  - Nearby source's design values?

Past Guidance

- Initial guidance offered in March 1, 2011 “Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard”
  - Concepts of lateral (cross-wind) and longitudinal (along-wind) gradients



Gradient

$$\nabla X = \frac{\partial X}{\partial x}\mathbf{i} + \frac{\partial X}{\partial y}\mathbf{j}$$

Longitudinal gradient

Lateral gradient

x=direction of flow in Gaussian space

Status of memo

- Performing technical analyses to inform memo recommendations
- Drafting of memo