I-710 Near Roadway Monitored to Modeled Comparison Methodology

Environmental Committee

September 28, 2011

This AQAP study is not part of the I-710 Corridor Project studies, but upon completion, it will be submitted to Caltrans for review and consideration for use in preparing the I-710 Corridor Project EIR/EIS.
Objective of the analysis

Methodology

Findings

Next Steps
Objective

Assess the representativeness of the I-710 EIR/EIS modeling near-roadway concentrations by:

• Comparing with the monitored data as used in air quality and exposure assessments
AERMOD – Air Dispersion Model (same as I-710 EIR/EIS)

- Key inputs: hourly emissions and local meteorology
- Model is only as good as inputs

Adjustments to I-710 EIR/EIS modeling:

- Hourly meteorological data for 2009 was obtained from SCAQMD and AERMOD input files were prepared
- Truck emissions were adjusted to 2009 levels based on monthly TEU activity relative to 2008
- Model receptors at SCAQMD at monitoring sites
I-710 EIR/EIS Near Roadway Modeling

- Three sets of receptor grids
  - 100m spacing within 500 m of I-710
  - 250 m spacing within 2,500 m of I-710
  - 500 m spacing within 5,000 m of I-710
- Considered appropriate scale for near-roadway modeling assessment for the I-710 EIR/EIS as requested by the CAC and the PC
Near-Roadway Concentrations Comparison Methodology

Separate comparison for two near-roadway monitoring sites (15m and 80m)
Separate comparison for both NO$_x$ and CO
  • Insights on inputs and model performance
  • Different source mix for NO$_x$ and CO
Graphical and statistical comparison
  • Scatter plots modeled vs. observed concentrations for: intra-day periods, winter/summer and two monitoring sites
  • Correlation coefficients – measure of scatter
Scatter Plots of Modeled versus Monitored CO (ppb) (paired in time and space)

- CO is generally under-predicted by the model.
- CO is primarily associated with gasoline vehicle emissions.

Under-predictions likely attributed to: hourly traffic volumes, fraction of HHDDT and cars
Scatter Plots of Modeled versus Monitored NO$_x$ (ppb) (paired in time and space)

NO$_x$ is generally over-predicted in the summer and underpredicted in winter.

Uncertainty in truck volumes and their speed profiles
Monitor to Model data is similar to other studies:

In an NCHRP study, two models HYROAD and CAL3QHC also had similar scatter for in comparison with monitored CO data.
Key Findings

- In general, model under-predicts CO and over-predicts NOx concentrations.

- Correlation is generally poor between data paired in time and space for predicted and observed concentrations.

- Discrepancies likely from uncertainties in traffic volumes and mix of vehicles and to a lesser degree meteorology.
Possible Next Steps

Present model comparison and discuss uncertainties in model

- On-site speed profile vs. average speed “driving cycle”
- Actual fleet mix (trucks/cars) vs. average weekday fleet
- Actual meteorology vs. N. Long Beach meteorology

Compare with similar type studies

Install permanent monitoring stations along the I-710 as an early action project (traffic volume, met and air quality)

Sensitivity studies on temporal traffic activity profile
Weight in Motion Hourly Profile versus Constant Volume with intra-day Periods