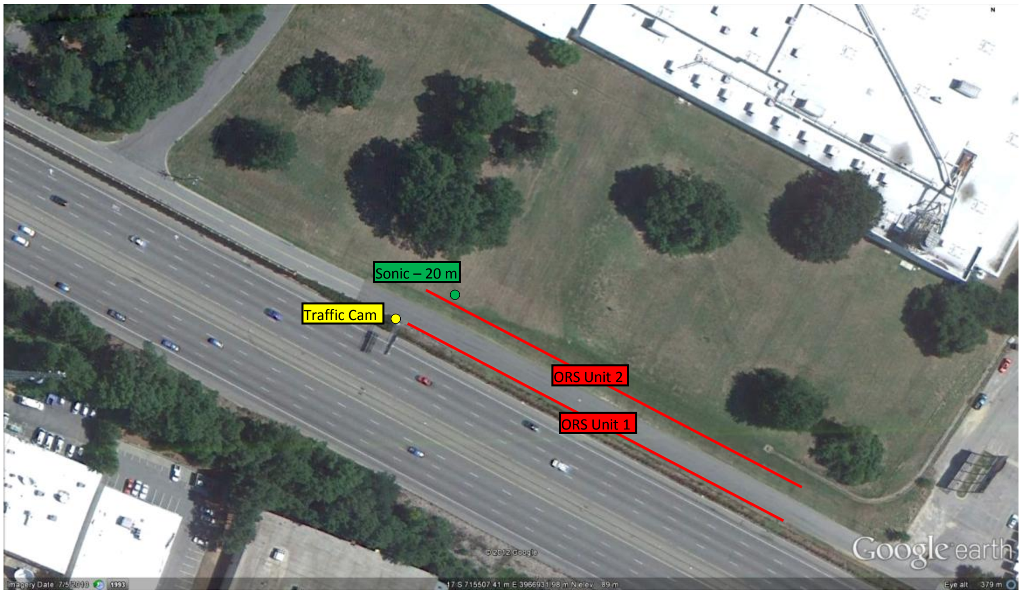
# RLINE Evaluation Database:

## Raleigh 2006 NO Experiment




*References*

Baldauf, R., E. Thoma, A. Khlystov, V. Isakov, G. Bowker, T. Long, and R. Snow 2008: Traffic and Meteorological Impacts on Near-Road Air Quality: Summary of Methods and Trends from the Raleigh Near-Road Study. *Journal of the Air & Waste Management Association*, **58,** 865-878.

Venkatram, A., V. Isakov, E. Thoma, and R. Baldauf, 2007: Analysis of air quality data near roadways using a dispersion model. *Atmospheric Environment*, **41,** 9481-9497.

*Files included*

- Sources: “Ral2006_Source.txt”
- Receptors: “Ral2006_Receptors.txt”
- Meteorology: “Ral_2006_NO.sfc”
- RLINE input: “Line_Source_Inputs.txt”
- Data: “Raleigh_NOdata.xlsx” (contains measured traffic and concentrations)

*Notes*

- The line sources are run with unit emission rates so they can be multiplied by the traffic and emission factor to determine the modeled concentration.
- The line source is 1 km long, and 8 lanes are used (4 on each side of median).
- The emission factor used is 0.5 g/ veh./ km from Venkatram 2007.

- Each line of the met file represents a 10 minute period.

*Run RLINE*

Run RLINE using the provided “Line_Source_inputs.txt” file.

*Interpreting Results*

1. To determine the emission in g/m/s for each time period: multiply the traffic volume (in vehicle-miles) by the emission factor, convert mi. to km, divide by the length of the sources, divided by the number of seconds in your measurement time, and convert km to m.

$$(unit\ emission\ rate) \cdot \frac{Traf.[veh.mi.] \cdot 0.5 \left[\frac{g}{veh.km}\right] \cdot 1.6 \left[\frac{km}{mi.}\right]}{(8\ lanes \cdot 1\ km) \cdot 600\ s \cdot 1000 \left[\frac{m}{km}\right]} = emission\ rate\ \left[\frac{g}{m \cdot s}\right]$$

2. Multiply the unit-emission concentrations by the emission rate,

$$(Output\ Conc.) \cdot \left(emission\ rate\ \left[\frac{g}{m \cdot s}\right]\right) = Conc. \left[\frac{\mu g}{m^3}\right]$$

3. Divide by the density of *NO* and convert to ppb for comparison with the field data.

$$\frac{Conc. \left[\frac{\mu g}{m^3}\right]}{1.34 \left[\frac{kg\ NO}{m^3}\right]} \left[\frac{kg}{10^9 \mu g}\right] \cdot 10^9 = Modeled\ Conc. [ppb\ NO]$$