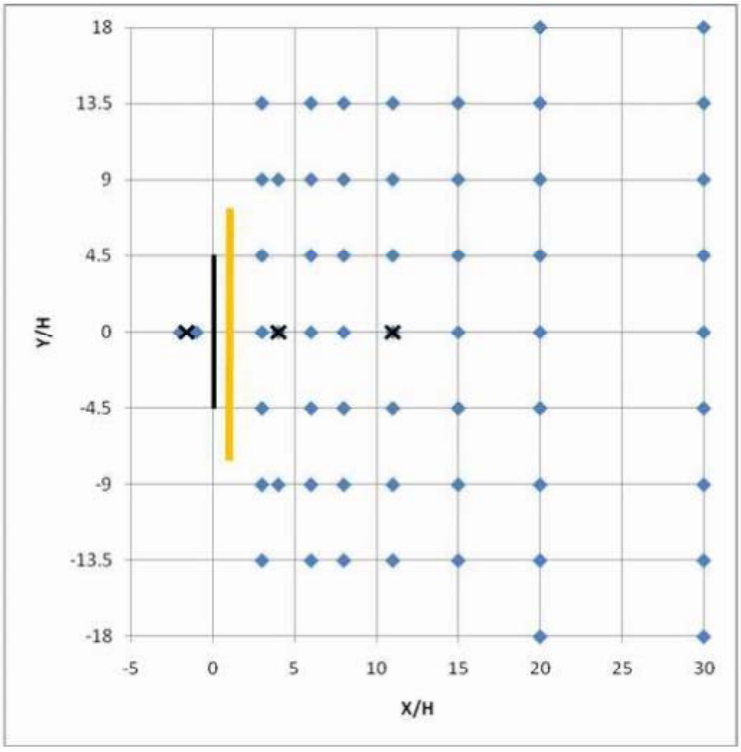
RLINE Evaluation Database:

Idaho Falls Tracer Experiment



Schematic representation of the experimental plan showing the locations of the line source release on the left (bold), the barrier (orange), bag samplers (blue diamonds), and sonic anemometers (x). H is the height of the barrier which was 6 m.

Reference

Finn, D., K. L. Clawson, R. G. Carter, J.D. Rich, R.M. Eckman, S.G. Perry, V. Isakov, D.K. Heist 2010: Tracer studies to characterize the effects of roadside noise barriers on near-road pollutant dispersion under varying atmospheric stability conditions. *Atmospheric Environment*, **44,** 204-214.

Files included

- Sources: “IF2009_Source_INF.txt”
- Receptors: “IF2009_Receptors_INF.txt”
- Meteorology: “IF2009_Case1235.sfc”
- RLINE input: “Line_Source_Inputs.txt”
- Data: “IdahoFalls_crosswindintegrated_data.xlsx”

Notes

- As part of this study two simultaneous experiments were conducted, one had a barrier downwind of the line source to represent a roadside sound wall, the other had no barrier. In this analysis we only use the data from the no-barrier experiment to test the RLINE model concentrations for a flat roadway case.
- Although the line source in the experiment was 54 m long, the field results have been processed to represent what would have been measured had the source been infinitely long (See Heist et al., 2009, Atmos. Env., 43, 5101-5111, for an example of this procedure). Therefore the input source is very long (1 km) and only one receptor is only modeled at each perpendicular downwind distance.
- The source is modeled with a unit emission rate, because the measured emission rates are slightly different for each day. The emission rates are as follows:
    - day1 - 0.05 g/s
    - day2 – 0.04 g/s
    - day3 – 0.03 g/s
    - day5 – 0.03 g/s
- The surface meteorology file contains only the 15min periods where the wind direction was within 25 degrees of perpendicular to the line source. Also day 4 is omitted completely, because the winds where rather erratic and the receptor grid was not always downwind of the line source.

Run RLINE

Run RLINE using the provided "Line_Source_inputs.txt" file.

Interpreting Results

Starting from the outputs computing using unit emissions rates, apply the actual emission rate of SF_6 by multiplying the unit-rate concentrations by the emission rate per unit length (the emission rate (g/s) for each test day divided by the line source length (54 m)). Finally divide by the density of SF_6 at the field site altitude and temperature (estimated to be 5.34 kg/m^3). The results will be in ppb and can be compared to the measured concentrations provided.