**Small scale plume dispersion study**

**Approach**

Use methane as a tracer to do small scale short term dispersion tests. Release methane from a point source at a steady rate, measure ambient levels downwind at one point using the LGR analyzer and also measure 3 d winds and turbulence with a sonic anemometer. If possible record all data at 10 Hz in a single file. Run tests for 10 min each, use different distances (10 m, 15 m, 20 m) and different test conditions (light to strong winds, sunny/cloudy). Initially do all tests during the daytime.

**Equipment**

Methane tank and regulator

Mass flow controller for methane (0.5 to 3 lpm approx., see attached spreadsheet)—release point a few cm above the surface, 1/4 in OD release tubing could be could be fixed near the base of the sonic tripod

LGR with sample pump and sample tubing (~ 30 m) arrange for rapid flush of sample tubing with tee to analyzer (could be downstream of pump if needed). Sample inlet can be moved to different locations (small tripod) to be downwind of the source. Could we use the old tracer profile sampling manifold tubing and pump?

3 d sonic on a tripod (1 m)

Datalogger and pc for display of data (what are the options for this?)

Power from AC on rooftop or from small generator (parking lot or field locations)

This should be set up for PACCAR rooftop and/or open ground-level (parking lot) test locations

Note safety limit for methane is approx. 5% combustion limit. The release rate is low enough that the atmospheric dilution reaches 5% within inches of the release point. We shouldn’t need to worry about the combustion issue, but should be careful with static sparks at the release.

We will need to measure the lag time between the sample inlet and the LGR response. This can be done by diluting methane (multiple dilutions) in a large syringe and then injecting past the sample inlet. Time it with a stopwatch to the first indication of response from the LGR.

Tests will be conducted during spring semester beginning as soon as possible.