AAFEX Status Report #5 – 24 January 2009

Primary Activities: Rake and inlet plumbing; 30-m box installation; 200-m trailer instrumentation; 200-m inlet tests; instrument setup/test/calibration

Weather: The temperature was 47 F at 7 am with mostly clear skies and a light WSW wind. The winds increased throughout the day and were gusting to 20 mph by sunset. Conditions were somewhat chilly, but dry throughout the work day.

Summary: Work began at 7 am and extended until almost 7 pm; as usual, Rick (Figure 1) and the hardworking, highly-motivated ARI team was the last to leave. A great deal of progress was made in the following areas:

200-m sampling station (Figure 2)—Aerodyne's creative HONO inlet was completed and bets were made regarding its durability. The inlet drops sample pressure to reduce HONO loss/creation on tubing walls and includes a torturous flow path intended to eliminate particles that might contaminate the Herriot-Cell mirrors within the HONO spectrometer. Automobile emissions were sampled though the inlet late Saturday; measurement results suggested that the innovative design was functioning as intended. Most of the aerosol instruments provided by MST, UTRC and NASA were installed in the Toy Hauler trailer and checked for functionality.

Near-field sampling system (Figure 3)—Work continued to install plumbing and electrical connections to the 1-m inlet rakes and 30-m sample probes. AFRL completed their connections to the #2 and #3 rakes and were able to leak and functionally check their heated lines and valve boxes. AEDC finished plumbing the #2 rake and was almost done with #3. LaRC/UTRC connected the 30-m sample lines to the MST trailer, plumbed the 30 pitot tube and dilution line, and dressed all the tubes/wires with cable ties. Sample and dilution air lines connecting the sample selection box in the MST trailer and the valve boxes and were completed. LaRC began assembling the sample distribution manifold in the MST trailer (Figure 4).

Work to ready the AAFEX instrument suite for Monday's first engine test continued, with progress being made in several areas. LaRC finished plumbing and testing their two particle into liquid samplers (PILS) instruments, which will be used for soluble aerosol composition measurements, and a bank of quartz-fiber filter collectors (Figure 5), which will provide samples for EC/OC analysis. Kathy (GRC) assembled TEM grid filter/quartz-fiber filter collectors; using electron microscopy and other techniques, Randy Vander Wal (PSU) will analyze these to determine soot morphology and particle elemental composition. Terry (UCSD) began loading filter media for her sample collectors and completed plumbing the 30-m collector to the outflow from the EPA's inlet pump. MST continued calibration work, MSU searched for a remedy to its GC valving problem, and GRC worked to calibrate its MGA sensor. AFRL and EPA performed calibrations while waiting for the engine test runs to begin.

Figure 1. Rick's vivacious daughter, Isomi, drove up from LA and got the AAFEX red-carpet tour including this stop in the executive conference room.

Figure 2. The 200-m aerosol (2” tube) and HONO inlets.

Figure 3. AFRL heated valve box wired, plumed, and ready in its position off the aircraft’s right wing.

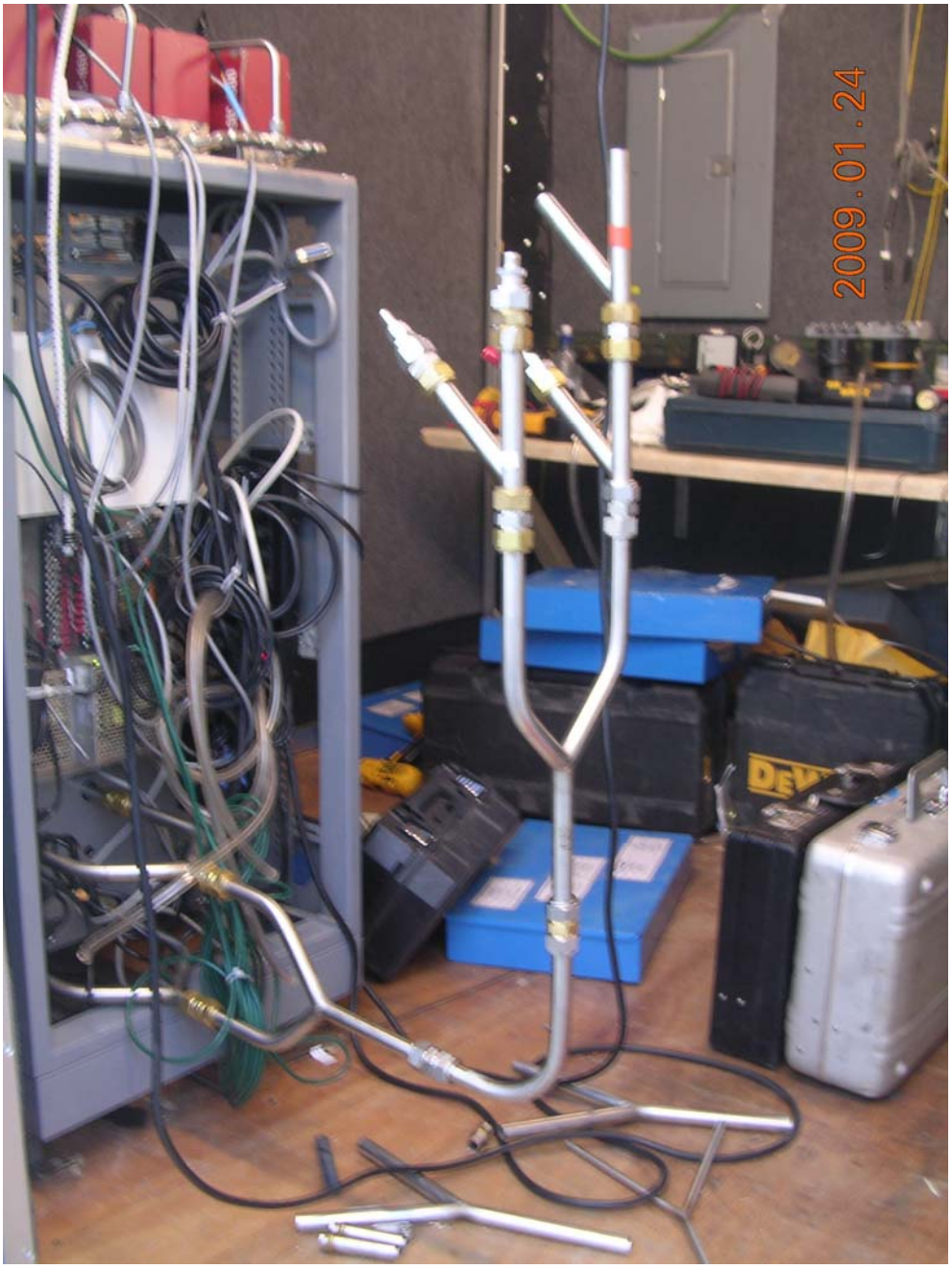

Figure 4. Aerosol sample distribution manifold taking shape in the MST trailer.

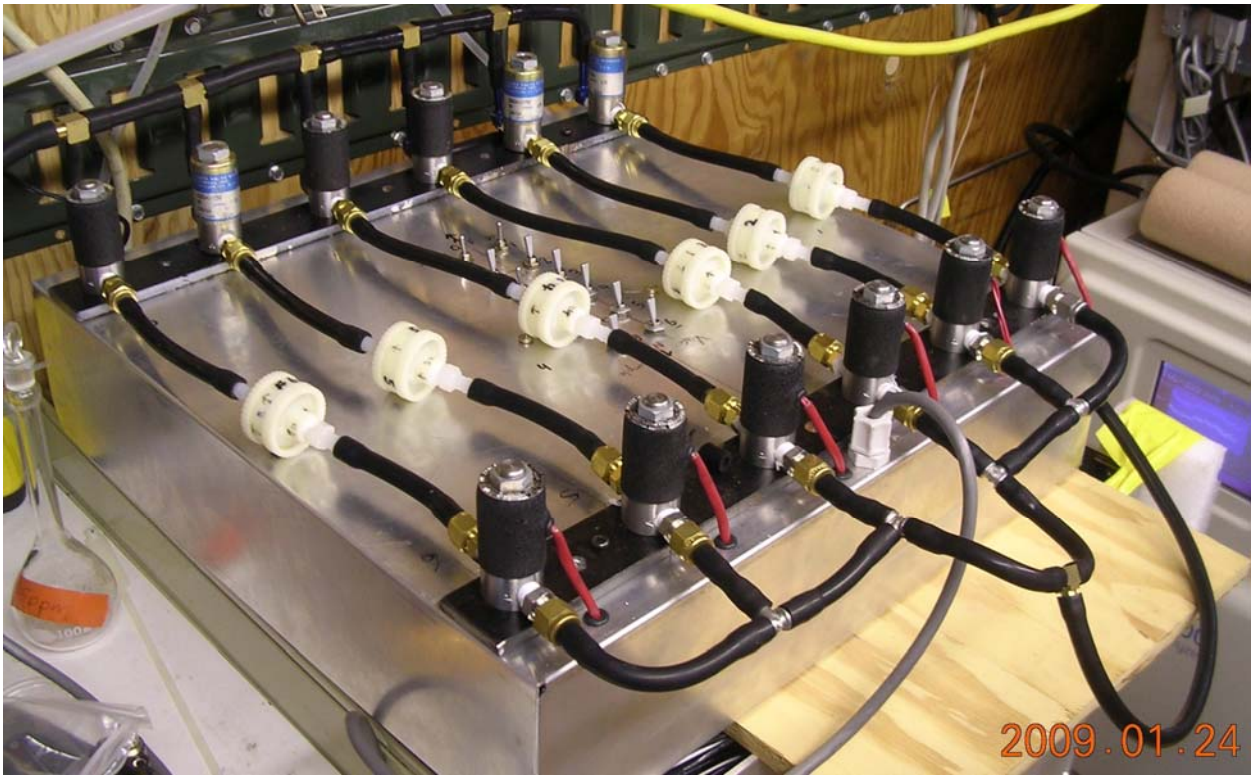

Figure 5. Six-pack EC/OC filter collector system installed in the LaRC truck.