AAFEX Status Report #6 – 25 January 2009

Primary Activities: Rake, inlet, and sample line leak checking; manifold construction; line loss measurement; black carbon instrument inter-comparison; 200-m trailer instrumentation;

Weather: 47 F at 7 am, dry with mostly clear skies and a strong WSW winds, with gusts to 40 mph. Wind chills were at or below freezing for much of the day. Difficult working conditions.

Summary: Despite having clocked 50 to 60 hours in the preceding five days, the entire AAFEX crew was on site and working by 7:30 am. Accomplishments and events of the day included the following.

- Tubing connections between the 1-m rakes, valve boxes and equipment trailers was completed; leak checking, insulation of gas lines, and ringing-out all lines to determine inlet-tip/sample valve correspondence began (Figures 1 and 2).
- Lines connecting MST, ARI, LaRC, GRC, and AFRL instruments to the aerosol sample distribution manifold within the MST trailer were installed.
- The 30-m lines passed vacuum leak check
- Max and Elizabeth set up the MST monodisperse aerosol generator behind the aircraft and evaluated size-dependent particle losses in the EPA, 2" diameter sample transport tubes as well as the ¾" diameter common 30-m inlet lines. They were real troopers to stick with the tests, given the cold, blustery conditions they encountered (Figure 3).
- A CAST (combustion aerosol standard) system was set up near the MST sample distribution manifold and used to challenge black carbon sensors located in the LaRC, AEDC, AFRL, EPA and ARI equipment trailers. These instruments included four Multi-Angle Aerosol Photometers (MAAPs), a Tapered Element Oscillating Microbalance (TEOM), a Laser-Induced Incandescence spectrometer (LII), and a photo-acoustic aerosol absorption photometer. Samples were also collected for EC/OC analysis by off-line, thermo-optic techniques. Soot aerosols ranging from 70 to 100 nm in mean diameter and from 0.1 to 2.5 mg/m3 in concentration were tested.
- CMU arrived and began setting up their PUF/filter collection system in the AEDC trailer.
- ARI reported that their "magic probe" was up and running in the AEDC trailer.

A readiness review meeting was held at 5 pm in the hanger, with each group being represented. Status was reviewed in the following areas:

Instruments—EPA, AFRL, ARI, LaRC and AEDC reported that 100% of their primary instruments were online and ready to collect data. GRC was continuing to calibrate its MGA,

CMU had just started installing their system and UCSD needed to connect a filter sampler at the 1-m position. These groups thought the work would be completed by mid-morning on Monday.

Sample lines—AEDC was still ringing out the 1 m lines and needed to install a cover plate on the #2 engine rake. Robert thought that all such work would be completed by 11 am Monday.

Aerosol sample distribution—MST was still checking out software and leak checking the valve box located in their trailer. Phil thought they would be done in a couple of hours.

Communications—Headset lines still need to be installed between the MST and participant trailers. A two-hour job, this work is scheduled to be completed by mid morning Monday. Two-way communications between the ARI van and the 200-m trailers was complete but need to be tested during aircraft runs to determine whether voices could be heard above engine noise.

Apparatus Installation—All rakes, probes, and transport lines that will be exposed to engine blast are securely attached to the concrete pad. The lid to the 30-m box still needs to be bolted in place, however.

Vehicle Safety—All equipment vehicles are equipped with fire extinguishers and all staff have been briefed on what to do in case of fire. Roy and Gary were assigned the role of pulling power breakers in case of emergency.

Consumable Supply—Robert assayed the amount of N2 remaining in the “six-packs” that had been delivered the previous week and thinks that we should order at least 4 more packs for delivery ASAP. All agreed that a sufficient supply was on hand to support the tests scheduled for Monday.

All present at the meeting believed that remaining preparations would be complete in time for a noon test run on Monday. This information was relayed to Frank Cutler of Aircraft Operations, who will schedule to have a run crew on hand to support the tests.

Figure 1. Dressed appropriately, Roy hunts for leaks in #3 engine rake before installing the remaining rear rake cover. Unfurled insulation tape illustrates the windy, uncomfortable conditions that prevailed throughout the day.

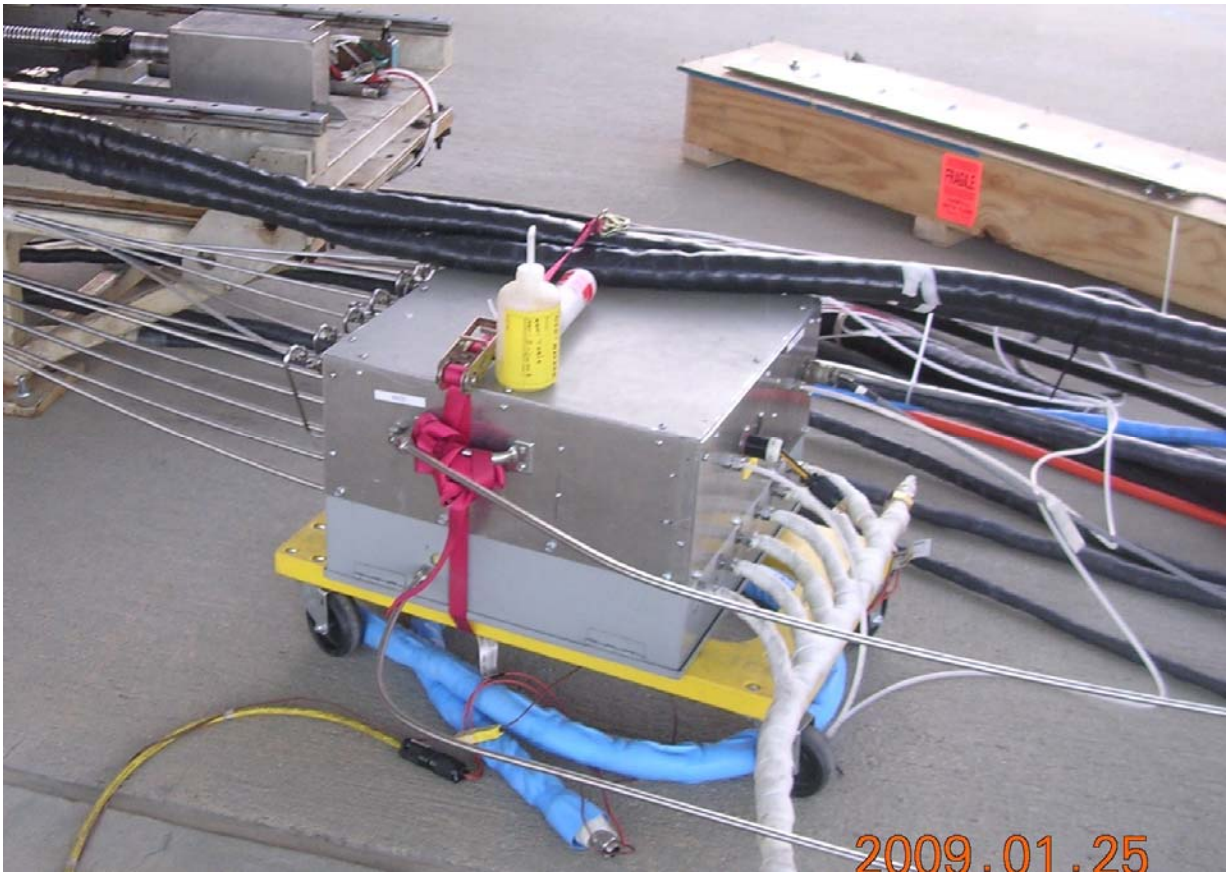

Figure 2. Six-port valve box on aerosol sample lines emanating from the #3 engine rake.

Figure 3. MST monodisperse particle generator used in the line-loss assessments.

Figure 4. Max and Elizabeth brave inclimate conditions to conduct line loss assessments.

Figure 5. Changlie sets up the combustion aerosol generation system (CAST) for black-carbon instrument inter-comparisons.