AAFEX-II Status Report #1 – 21 March 2011

Primary Activities: Get badges, position trailers, download cargo, set up equipment and instruments.

Weather: 44 F at 7 am, partly cloudy with strong southwesterly winds. Intermittent light showers throughout the day. Cold and raw—miserable conditions for working outside.

Summary of Accomplishments

Participants from Air Force Research Lab (AFRL), Arnold Engineering Development Center (AEDC), Navy Aviation Environmental Support Office (AESO), Environmental Protection Agency (EPA), Missouri University for Science and Technology (MST), and NASA Langley Research Center (LaRC) met at the Dryden Aircraft Operations Facility (DAOF) badge office at 0700 to obtain badges. Unfortunately, the primate security office was on vacation and his fill-in lacked experience in badging visitors, so the process was painfully slow. However, Wendy and Karen from DAOF convinced security to give the team temporary "Escort" badges to that we could start work, then come back later in smaller groups to complete the finger-printing and photographic processes needed to get more permanent credentials.

Around 0830, we caravanned the laboratory and equipment vehicles from the parking lot over to the B1B test area north of the DAOF hanger (Figure 1). Donnie led the parade on a heavy duty fork lift, which he had just used to maneuver the MST supply trailer out an area where it had been parked-in by DAOF workers (Figure 2). Referring to photographs and notes, Robert and Bruce directed the drivers to park the vehicles in AAFEX-I configuration, which minimized the lengths of electrical cables and sample lines. By 1000, the vehicles were in place, and the DC-8 crew (Donnie and Joe) assisted participants in downloading heavy racks and equipment from their trailers, moving boxes from the hanger to the site, transporting gas cylinders and determining where excess equipment should be stored. Wendy also pitched in, assisting folks in locating shipments and missing equipment. She couldn't help Changlie however: his shipment was lost on a train somewhere in mid-America, four days after it was guaranteed to arrive at the hanger.

Participants worked steadily throughout the day on a variety of activities until about 1730, when inclimate conditions and the impending happy hour at the Embassy Suites forced us to abandon the site for the day. Some activities of note:

- AEDC and MST downloaded the EPA electrical distribution panel and positioned it near the ground-power source. After several calls from Frank, the DAOF electrician came by and scoped the work effort required to make the necessary connections, then promised to come back first thing Tuesday morning to complete the job.
- Donnie used the luggage loader to deliver the 25, 20-foot long pieces of ¾" stainless tubing that is to be used as sampling line. Soon after, Luke, Andreas and Eddie (LaRC) assembled

the new “Ream-A-Matic”, roto-rooter-type tube swabbing apparatus and cleaned all the new and used tubing brought to the site (Figure 3).

- Donnie also towed the DC-8 out from the hanger and parked it in a position that is 5 feet to the right and 2 inches forward of the AAFEX-I aircraft location. Since the trailers are parked in almost the same locations, our sampling lines will be a few feet shorter than during the previous mission.
- Triet and the hard-working AESO crew jumped on assembling Deathbox V2.0 (Figure 4) soon after we arrived. Larger, more strongly braced, and more aerodynamically shaped than the AAFEX-I version, the box will be placed 30 m behind the #3 engine and the instruments it houses will be used to test sampling line losses and examine new particle formation in the aging exhaust plume.
- The AEDC 28-foot trailer was positioned just off the DC-8 port wing, directly across from the primary experimenter encampment. It will accommodate the “E-31” team, which will use sampling equipment placed behind the #2 engine to validate the exhaust sampling system and aerosol mass and number measuring methods that are proposed to satisfy ICAO emission measurement requirements. E-31 team leaders, Dave (UTRC) and John (EPA), spent the afternoon cleaning the trailer and rounding up the equipment needed to flesh out their kit (Figure 5).
- After unloading their trailers and running power cables to all their vehicles and equipment, Robert and the AEDC team began assembling the 1-m rakes and inlet probes. This time, both rakes will be mounted on translation stages so that exhaust emissions can be mapped completely across the diameters of both inboard engines. Robert has also designed and attached additional probes on the left and right rakes to supply sample flow to the E-31 and AESO teams, respectively. Some of the inlet probe hardware is still being machined and will be delivered later in the week.
- The LaRC team took charge of assembling the 30-m probe stands and sampling lines. Luke manned the hammer drill and within minutes the stands were tightly anchored to the concrete pad and ready to withstand hours of vicious blast from the 24,000-lb thrust engines. Sample lines were laid in place, but time prevented the team from completing all the connections.
- A brief meeting was held around 3 pm, wherein project status and action items were discussed. The team agreed that despite various obstacles, good progress was being made and that no show stoppers had been identified.

Figure 1. The NASA EM-50 proudly leads off the parade of vehicles heading over to the AAFEX-II encampment.

Figure 2. After considering the consequences of forking the offending mini-van out of the way, Donnie maneuvers the MST cargo trailer into position to be hitched to a truck.

Figure 3. Luke gets plenty of help in deploying the Ream-O-matic to clean potential sampling lines.

Figure 4. Triet tries the new Deathbox (DB2.0) out for comfort.

Figure 5. Tastefully decorated interior of the E-31 trailer.