



# FRD ACTIVITIES REPORT

## July - September 2008



### RESEARCH PROGRAMS

#### *Roadside Barrier Tracer Study*

The Field Research Division is preparing to conduct a roadside barrier tracer study sponsored by the U.S. Environmental Protection Agency (EPA). The purpose of this project is to quantify the effects of roadside barriers on the downwind dispersion of atmospheric pollutants emitted by roadway sources, e.g., vehicular transport.

The current AMS/EPA Regulatory Model AERMOD performs well for modeling vehicle pollutants but does not

take into account sound barriers near roadways that may increase pollutant concentrations and pose increased health problems to surrounding neighborhoods. To test this theory, a mock sound barrier 6m in height and 90m in length, constructed of 300 1-ton straw bales, has been built at the Grid 3 facility on the INL (Fig. 1). Pollutant transport and dispersion will be measured in field tests using the atmospheric tracer sulfur hexafluoride ( $SF_6$ ) tracer as a pollutant surrogate. The turbulence field driving the dispersion will also be measured with fast-response high-fidelity sonic anemometers. The experiments will be conducted in October over a range of atmospheric conditions.



Figure 1. The mock sound barrier is constructed of 300 1-ton straw bales, 6m in height and 90m in length.

A tracer release line 56m in length will disseminate the  $SF_6$  tracer upwind of the mock sound barrier. The line will be constructed from polyurethane and latex tubing. Flow metering orifices will regulate the flow from the tubing to the atmosphere and will act as the actual tracer dissemination devices. The metering orifices will be made from 64 small hypodermic needles (31 gage). To deliver equal pressure to each metering orifice, a 6-level binary tree network (Fig. 2) will be used to divide the flow to each of the 64 hypodermic needles. Creating a binary tree for the release system makes the line resistance, distance, and pressure drop equal at each of the 64 release points.

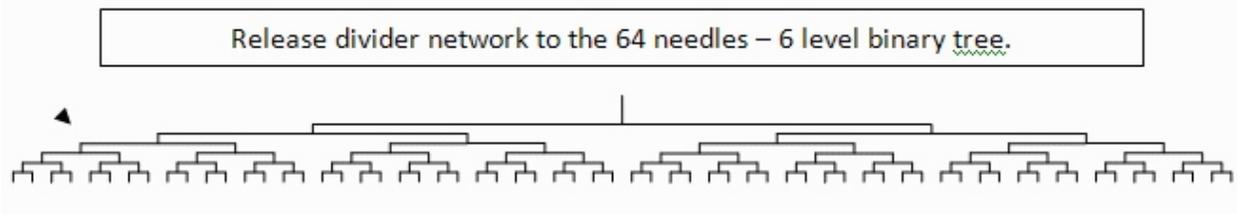


Figure 2. Diagram of 6-level binary tree line source release configuration.

A downwind sampling grid of 58 bag samplers and a mobile real-time analyzer will measure the dispersion characteristics of the mock sound barrier up to 180m downwind. A nearby grid, identical to the grid described above will be set up to monitor unmodified dispersion characteristics. Comparison of data from the two grids will show the effects of the roadside barrier.

A Quality Assurance Project Plan for the project was completed and accepted by the EPA in September. The real-time analyzers, gas chromatographs, samplers, cartridges, and sonic anemometers have all undergone pre-study conditioning and quality control testing and should be ready for the first practice test on October 1<sup>st</sup>. ([Kirk.Clawson@noaa.gov](mailto:Kirk.Clawson@noaa.gov) and staff).

### ***Fast Response Analyzer Data System Upgrade***

The upgraded data system is complete, installed, tested, and will be used on the Roadside Barrier Tracer Study.

### ***Low Cost Tracer Detector***

The semipermeable membrane was received on July 25 during the preparations for the Roadside Barrier Tracer Study. This allowed very little time for working with the membrane. A few days of testing was conducted on the membrane to determine its water and oxygen separation capabilities, but it has not yet been used with the new detector. ([Roger.Carter@noaa.gov](mailto:Roger.Carter@noaa.gov), Shane Beard)

### ***ET Probe***

The ET probe program remains in quasi hibernation due to funding limitations. There are periodic attempts to find external sources of funding, but none has yet been successful. The probes also are still integrated into PPBES, so there is a slight chance of NOAA funding in follow-on fiscal years. ARL has also discussed using internal funds at ATDD and FRD to maintain limited forward progress on the instruments. ([Richard.Eckman@noaa.gov](mailto:Richard.Eckman@noaa.gov))

## **NOAA/IDAHO NATIONAL LABORATORY METEOROLOGICAL RESEARCH PARTNERSHIP**

### ***Emergency Operations Center (EOC)***

Team A attended a drill that was conducted at the EOC on 9 July. This drill was conducted to help prepare for the annual exercise to be conducted on 13 August. Nowcasts, short-term forecasts, and plume plots for the Assessment Specialists and Emergency Director were produced throughout the drill. ([Jason.Rich@noaa.gov](mailto:Jason.Rich@noaa.gov) and Roger Carter.)

The annual INL exercise was conducted at the EOC on 13 August. The drill consisted of a major radiological release at the Reactor Technology Complex, which houses the only active reactor on the INL. The drill lasted most of the day and involved jumping forward 24 hours halfway through the drill to work on different aspects of the radiological release. FRD, as a member of the EOC team, produced nowcasts and short-term forecasts and ran the MDIFF dispersion model to produce plume plots for the Assessment Specialist and Emergency Director throughout the drill. ([Jason.Rich@noaa.gov](mailto:Jason.Rich@noaa.gov) and Brad Reese)

On 9 September Team D participated in a drill at the EOC. This one was different from most other EOC drills in that the simulated event took place at an INL office facility in Idaho Falls rather than at INL proper. Because the city is on the edge of the INL tower network, it was more difficult to use the standard forecast and dispersion tools available at the EOC. ([Richard.Eckman@noaa.gov](mailto:Richard.Eckman@noaa.gov) and Randy Johnson)

FRD also participated in the Quarterly Assessment Drill on 4 September. A table top exercise was conducted that simulated a radiological release from TRA. Several different types of plume plots were produced to show the path of the plume and indicate dangerous levels of radiation on dairy and produce sources of food. ([Jason.Rich@noaa.gov](mailto:Jason.Rich@noaa.gov))

### ***New INL Hazardous Weather Alert System***

FRD began issuing weather statements and alerts for the INL on Tuesday, September 2. These statements and alerts for hazardous weather affecting the INL will be issued on our web site and through an email distribution list that consists of over 200 managers, security officers, and transportation and emergency personnel located on the INL. Currently, the National Weather Service (NWS) in Pocatello is responsible for issuing public weather watches, warnings and advisories for SE Idaho including the INL. Our intent is to explain and amplify their watches and warnings with statements and alerts of our own, or to issue our own statements and alerts when conditions warrant, even if the NWS has not issued a watch or a warning for the INL. A document describing the new NOAA INL weather hazards statement and alert issuing criteria can be found on our NOAA/INL Weather Center (NIWC) home page. ([Kirk.Clawson@noaa.gov](mailto:Kirk.Clawson@noaa.gov), Jason Rich, and Neil Hukari)

### ***NOAA/INL Weather Page***

Updates and additions to the NIWC home pages are on-going. Recent additions to the main page include a radar wind profiler graph that displays the upper level wind field from 160 meters up to 3,200 meters. Progress has also been made on a PDA version of the INL Weather Products Page. Field workers on the INL will be able to use their PDA's to view weather alerts, forecasts, current weather observations, wind trends, and weather radar data on their PDA's. This is another tool that has the potential to help keep INL field workers safe. We are currently testing this page and hope that it will be ready for INL personnel later in the fall.

([Jason.Rich@noaa.gov](mailto:Jason.Rich@noaa.gov) and Neil Hukari)

### ***Transport and Dispersion Modeling***

Some additional progress was made on implementing the AERMOD dispersion model for the INL site using data generated by the NOAA/INL Mesonet. Specifically, this calls for using onsite tower, sodar, and radar profiler meteorological measurements in lieu of NWS measurements made at considerable distances from the site. Some variance and covariance measurements made at an onsite flux station will also be included. Three programs have been written that together will QC the flux station data; calculate the necessary variances, covariances, fluxes, and surface layer parameters; and merge elements of that data stream with the Mesonet measurements into the AERMOD meteorological preprocessor AERMET. Initial testing of these programs has begun in preparation for the final implementation. ([dennis.finn@noaa.gov](mailto:dennis.finn@noaa.gov))

FRD has taken a lead role in developing new data assimilation tools that can produce realistic wind fields for use with the HYSPLIT dispersion model. The main local application would be to create HYSPLIT wind fields from the INL Mesonet data. Recent focus has turned to tools under development in other parts of NOAA that may be adaptable for dispersion applications. In September, Dr. Yuanfu Xie from ESRL gave an online presentation to ARL staff and others on a system called STMAS. It starts with a background wind field from a forecast model and then uses sophisticated procedures to assimilate field observations from a variety of sources. NCEP is working on similar types of systems and has been invited to give a presentation in the future.

([Richard.Eckman@noaa.gov](mailto:Richard.Eckman@noaa.gov))

The pieces are starting to fall into place in making HYSPLIT the primary dispersion model for INL applications, replacing the current MDIFF model. The data-assimilation issue discussed above is still a holdup, but many other issues have been largely resolved, including radiological dose calculations and more flexibility in the graphical output products. Current plans are to have a working prototype HYSPLIT system for INL applications available in FY 2009.

([Richard.Eckman@noaa.gov](mailto:Richard.Eckman@noaa.gov))

## **OTHER ACTIVITIES**

### ***Outreach***

Preparations were being made for an early October visit to FRD by highschool teachers from the Idaho Teacher's Science Conference. The teachers will be given a short presentation and then a tour of the facility. A visit to one of the Mesonet towers is also planned.

([Richard.Eckman@noaa.gov](mailto:Richard.Eckman@noaa.gov))

### ***Papers***

**Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, K.J. Allwine, and J.E. Flaherty, 2008:** Analysis of Plume Dispersion in a Nocturnal Urban Boundary Layer in Complex Terrain, Salt Lake City, URBAN 2000. *Journal of Applied Meteorology and Climatology*. (Accepted)

### ***Safety***

At the July staff meeting, FRD employees watched a video on Heat Stress.

A video from the DOE library on tire safety was viewed at the August staff meeting.

FRD employees viewed an informational pamphlet labeled "The Guide to Protecting Yourself and Your Family from Radon" at the September staff meeting. A radon detector from the NWS was provided to the employees at FRD to test the radon levels at home. All homes tested were below the EPA recommended 4 pCi/L level.

### ***IT***

The NOAA contractor hired to conduct the Certification and Accreditation audit inspected the FRD facility on 9 July. For the most part, the auditor found FRD to be in compliance with Dept. of Commerce and NOAA standards. A recommendation was made to coordinate the vulnerability scans with DOE for DOE-owned computers so that all machines under NOAA control can be verified as being in compliance.

### ***Travel***

Richard Eckman to Warrenton, VA, July 28-31, to attend the NOAA Leadership Seminar.

### ***Training***

Donna Harris completed an on-line training course on "NOAA Personal Property".

Rick Eckman attended the 2008 NOAA Leadership Seminar at the end of July. It took place at Airlie Center near Warrenton, VA.