NOAA ARL Monthly Activity Report

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Bruce B. Hicks, Director
Air Resources Laboratory

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Highlights

1. Air Quality Forecasting. The Eta-Community Multiscale Air Quality (CMAQ) air quality forecasting (AQF) system, developed by NOAA/NWS, NOAA/OAR, and EPA/ASMD, is now running daily in test mode at NOAA/NWS National Centers for Environmental Prediction (NCEP). Responsibility for model runs has now transferred to NCEP Central Operations as part of the daily routine. A 48-hour forecast run is available each day by 1:30 pm EDT and an updated 30-hr run is available by 7:30 am EDT the next morning. Forecasts are made for ozone concentrations across the northeast United States. Initial results show the model to be overestimating ozone downwind of the major source areas and underestimating directly over the source areas. Causes for the apparent bias are being investigated. Thus far, the summer 2003 ozone season has shown unusually low observed ozone values across the area. (Kenneth Schere, 919 541 3795)

Quality assurance and analysis of the emission input files used in the real time Air Quality Forecasting project continued. Preliminary analyses indicate that biogenic emissions in the southeastern United States during August

2003 may have been overestimated due to a warm and sunny bias in the ETA model. Recommendations were made for updating emission estimates for the 2004 version of the air quality forecast modeling system. Expected improvements include revisions to mobile sources and the use of a larger modeling domain. (George Pouliot, 919 541 5475)

Air Quality Forecasting outputs are being routinely moved to ASMD machines from NCEP machines and stored in an ASMD air quality forecasting database. (Alfreida Torian, 919 541 4803)

Silver Spring

2. Homeland Security – Hysplit Linkages with ETA. It was previously reported that the 12 km ETA forecast and archive files were now available on our web server. However, these files still too large to be downloaded to offsite locations for real-time dispersion support. A CONUS ETA-12 sub-grid is now being created with each forecast, reducing the file size to 1/8 of the original forecast file. In addition, to support local scale Hysplit calculations in urban areas, a meteorological pre-processor program was developed that adjusts the turbulent fluxes in the meteorological data file based upon the ratio of the urban area roughness length to the ETA grid roughness length. This results in enhanced horizontal and vertical mixing over urban areas. roland.draxler@noaa.gov

3. Revised Hysplit Interface for Chemistry Applications. In the July activity report it was noted that the Hysplit code was revised to simplify the interface with the IER chemistry module. This new interface has been expanded to include the GRS ozone and de Pena sulfate modules. The new interface includes an option to define the concentration grid on the same projection as the meteorological data grid, further simplifying the interface of the chemistry and meteorological modules. roland.draxler@noaa.gov

4. READY Limitations on Automated Access. Automated scripts that access hundreds of READY meteorological products in a short period of time have always been a problem for us. Recently, the problem has accelerated to the point that users are not able to get to the meteorological products they request because the system is too busy processing many products from a single user simultaneously. Effective October 1, a new procedure will be implemented on READY which will hopefully prevent all automated scripts from succeeding. Users will be presented with a graphic showing a ramdomly generated access code that must be entered into the form before a product can be produced, thereby preventing a computer program or script from accessing the product directly. This will be one more step a user will need to do to get a meteorological product, however it should reduce and possibly eliminate the backlog of products and speed up the time it takes to request a product from READY. This change will not effect the HYSPLIT access on the web. glenn.rolph@noaa.gov

Boulder

5. SURFRAD/ISIS. A general algorithm to automatically compute the optical depth owing to molecular scattering, based on the station pressure measured at the SURFRAD station, for all spectral bands measured by the Multi-Filter Rotating Shadowband Radiometer was developed and tested for the automated aerosol optical depth program currently being developed for the SURFRAD network.

Oak Ridge

6. Terrestrial Carbon Program. Upgrades to the Walker Branch Watershed (WBW) Tower's grounding system have been scheduled for September. In August, lightning from a series of strong frontal thunderstorms caused data interruptions and damage to sonic wind sensors and IRGA's on multiple occasions. At the CHESS site, concrete for the tower base has been poured. This site will take over many functions of WBW when industrial activities near WBW get underway. The next phase for CHESS is installation of the grounding electrodes for lightning protection. The bidding process for the support building has been re-opened for all general contractors. (Meyer)

7. Bay Regional Atmospheric Chemistry Experiment. Preliminary analysis of the BRACE data produced results promising enough to submit for presentation at the AGU Meeting this December. The Twin Otter made 21 flights over the Tampa Bay area. Coordinating these data with the ground-based wind profiler/RASS systems and the rawinsondes released by the NWS, we examine the regional structure of the late-spring boundary layer in the Tampa Bay area. (Gunter)

8. CASES-99. The CASES-99 tower data are being used to study wave-turbulence interactions. The matter is of importance because of the current neglect of nocturnal intermittent turbulence in forecast models. The issue is likely to be of special importance in air quality models, with intermittent vertical diffusion accelerating the mixing of long-range transported pollutants from aloft to the surface at rather regular intervals. (Nappo)

9. Urban dispersion. Hardware for three more HYSPLIT dispersion model systems was acquired during August and is being prepared for deployment in the field. Access to DCNet and RAMAN (East TN) mesometeological data will be facilitated by an ArcIMS-based web site to be developed for ATDD by Mark Bramer from ESRI, Washington DC. Each tower site will be identified as a point on a multi-resolution map of the United States. The points will provide hyperlinks to their respective tower's real-time data. New hyperlinks can be readily added as future tower sites anywhere in the US join the network. (Dumas, Pendergrass)

ATDD's participation in the Joint Urban Study of 2003 in Oklahoma City included operation of two 30-m crank-up towers, three surface energy balance stations, and mean wind and turbulence measurements aloft from NOAA's Twin Otter airplane. A summary of these activities and the data collected was reported to DTRA in August, along with a preliminary assessment of data quality. (Hosker, Gunter, White, Meyers, Heuer)

10. U.S. Climate Reference Network. Three new USCRN sites were installed, in Shabbona, IL; Goodridge, MN; and Harrison, NE. Annual maintenance was performed on the Sioux Falls, SD site, and on the two GA sites; the Lafayette, LA site; the Monroe, LA site; the Newton, MS site, and the Asheville, NC site. (Brewer, Randolph, Bryant, Dunn, Rutherford)

Development of the ATDD USCRN database began. Preparation for the database included tracking all equipment, deciding what information was needed for each piece of equipment, etc. The database should be operational by September. (Satterfield)

Research Triangle Park

11. Community Multiscale Air Quality Modeling System. Work continued this month on revising and testing the Community Multiscale Air Quality Modeling System (CMAQ) for the September release. Specific activities included: 1) finalizing the new dry deposition algorithm for secondary organic aerosols (SOA); 2) finalizing emission adjustment factors for determining the portion of alkanes and aromatics that form SOA; 3) updating all chemical mechanism files to add dry deposition of key species (*e.g.*, PAN, N_2O_5, HONO, *etc*); 3) updating all chemical mechanisms to subject several new species to cloud water scavenging; 4) changing the CB-IV and RADM2 rate constants for reactions of monoterpenes with OH, NO_3, and HNO_3 to be consistent with those used in SAPRC99; 7) zeroing out the rate constant for the reaction of N_2O_5 with H_2O in all mechanisms whenever aerosols is on; and 8) modifying process analysis to account for changes to the units used for aerosols in the vertical diffusion routine. All of the revisions have been checked into the CMAQ source code repository. In addition, numerous test runs have been conducted with the new code, and all problems that were found have been corrected. Finally, CMAQ model change logs have been prepared for the aforementioned changes, and work has been initiated on preparing the model release notes for the new SOA treatment. This release note and the one for the new CB-IV Euler Backward Iterative (EBI) solver will be completed before the release. (Gerald Gipson, 919 541-4181)

The September 2003 release of CMAQ incorporates a number of enhancements including dry deposition of secondary organic aerosols, an optimized gas chemistry solver, and a layer-dependent scheme that allows for better representation of the Courant- condition-limited horizontal advection in the lower boundary layer. In addition, the treatment for aerosols in vertical diffusion was corrected to deal with molar mixing ratio rather than mass density units. There were also a number of other reported bugs that were fixed. (Jeffrey O. Young, 919 541 3929; Shawn Roselle, 919 541 7699; Jonathan Pleim, 919 541 1336)

Emissions were processed for the September 2003 release of Community Multiscale Air Quality model(CMAQ). Emissions were generated for the SAPRC99 and the CB-IV chemical mechanisms for the June—August 1999 and January—February 2002 evaluation test periods. Changes to the emissions inventory (since the previous release) included an update to residential heating emissions, a revision to fugitive dust emissions, a revision to the MCIP input files, and the incorporation of BEIS 3.11. (George Pouliot, 919 541 5475)

12. Multimedia Mercury Model. In coordination with collaborators, a multimedia mercury problem statement was drafted that provides a consistent foundation for the development of future tasks. Further collaboration will continue in September. The atmospheric dispersion and transport of mercury (Hg) is an environmental concern on global, regional, and local scales. Between 50-75% of global mercury emissions are derived directly from anthropogenic sources (>50% particulate and divalent forms) with the remainder attributed to natural sources. More than 90% of natural emissions are in the form of elemental mercury. Natural emissions occur from direct release via geologic processes and re-volatilization (*i.e.*, recycling) of previously deposited anthropogenic-source Hg from soil, water and vegetation surfaces. On regional to global scales, the majority of Hg measured in ambient air is in the elemental form, but estimates of direct and re-cycled elemental fractions are highly uncertain. This uncertainty prevents accurate descriptions of the Hg biogeochemical cycle, thereby, hindering the development of effective management and control strategies. The goal of the Division's regional multimedia modeling research program is to develop the capability to link the chemical conversion and re-cycling of Hg across media to help identify and address key uncertainties impacting effective management. The current state-of-the-science regarding Hg does not support the development of a fully predictive multimedia model for Hg. However, the Division is working towards a coupled system that will significantly expand the ability to identify, trace, and test the sensitivity of environmental pathways critical to biogeochemical cycling and re-cycling of Hg. This should facilitate the development of more efficient management strategies and control recommendations.

Work has begun to couple a multimedia mercury module to CMAQ. In phase 1 of this effort, the latest version of CMAQ with airborne mercury is being installed on the IBM-SP. The first phase is scheduled to be completed by December 2003. (Ellen Cooter, 919 541 1334)

13. Field Study of Sub-Canopy Deposition. A field study to measure sub-canopy deposition of ozone in a herbaceous perennial stand was completed in mid-August. The field study took place at Purchase Knob in the Great Smoky Mountains National Park. Measurements of ozone profiles and atmospheric turbulence were made over a three-week period. The data will be used to evaluate higher-order closure model, which predicts sub-canopy deposition. The model will be used to calculate ecosystem exposure over a full growing season, which will help to understand the response of ecosystems to pollutant damage. This will be a major advance over the present state of the art, which seeks only to relate damage to atmospheric concentrations. This study was done in cooperation with the Air Resources Laboratory's Atmospheric Turbulence and Diffusion Division. It is part of a larger collaboration of scientists from several universities and government agencies looking at ozone damage to sensitive plants. (Peter Finkelstein, 919 541 4553)

14. Atmospheric Nitrogen Deposition for TMDL Calculations. A major insight into how to help water quality managers deal with atmospheric deposition of nitrogen came out of a meeting about TMDL (Total Maximum Daily Load) issues. It was made clear the states did not know how to effectively use our multi-media work on airsheds, in part because they were never going to run an air quality model. As a result, states consider atmospheric deposition uncontrollable and take no credit for future reductions in NO_x that are mandated by the Clean Air Act. We proposed a solution that was enthusiastically accepted. Under our multi-media program, we will build a tool to allow the states to estimate for their watersheds what reduction in air deposition to use, taking continental CMAQ aggregated deposition estimates, for current and future emissions, as data. Likely futures of oxidized-nitrogen deposition based on Office of Air Quality Planning Standards regulatory projections are developed and regularly updated for Chesapeake Bay''s Program. These climatological estimates of anticipated atmospheric deposition reduction can be used with the tool we will develop, to allow a state to take some TMDL credit for anticipated atmospheric deposition reductions. (Robin Dennis, 919 541 2870)

15. Using the Air Resources Laboratory/EDAS Data. ARL EDAS archives have been successfully accessed, and code has been tested to extract and compute those variables needed for employing Eder's cluster analysis procedure. We are working to develop a data archive and storage plan for these large files. This effort is being coordinated with the Office of Air Quality Planning and Standards, which is engaged in a similar effort. The EDAS data will be used as 'observations' against which RCM meteorological 'clusters' will be compared. This analysis will contribute to an evaluation of RCM regional representation and bias. (Ellen Cooter, 919 541 1334).

16. CFD Developments and Applications. Computational Fluid Dynamics simulations of air flow and pollution dispersion near buildings are being developed. The challenges for isolated buildings and neighborhoods of buildings are different. Application in support of the New York World Trade Center (WTC) studies for 200-300 buildings in Lower Manhattan has been set up and initial solutions are being examined. Additional refinements are needed to support proper turbulence modeling. Once this is done, comparisons with measurements from the Fluid Modeling facility's wind tunnel model will be made. Computational Fluid Dynamics simulations have the potential of simulating flow around buildings under a range of the atmospheric boundary layers both for ranging surface roughness and thermal conditions. Development for the thermally neutral condition for a range of surface roughness is nearly complete. Thermally stable and unstable boundary layers will soon be addressed. The effects of atmospheric boundary conditions on air flow and pollution dispersion near buildings will be examined and applied in support of the WTC case studies. (Alan Huber, 919 541 1338).

17. Review of 3MRA. A review has been conducted of the Multimedia, Multipathway, Multireceptor Risk Assessment (3MRA) modeling system. The 3MRA team delivered at least eight hours of presentations and software demonstrations during the two-day meeting. A Division scientist participated on the atmospheric modeling portion of the team. The review panel's comments overall were very favorable. Of particular interest to the Division was the recommendation that AERMOD replace ISCST3 for the atmospheric modeling component. A version of AERMOD was recently released that contains algorithms for modeling particulate and gaseous deposition. Resources permitting, the Division will participate in additional conference calls and meetings during the fall of 2003. (Donna Schwede, 541-3255)

18. Emergency Response Modeling. On July 10, 2003, an all-day meeting was held with staff from the Atmospheric Turbulence and Diffusion Division, who had installed a version of the HYSPLIT transport and diffusion modeling system onto a computer for use by EPA for emergency response modeling. This meeting is the first of a series of meetings that will be held as the HYSPLIT model and its associated graphical analysis software are tested and customized for use. The installed version of the HYSPLIT modeling system was tailored for regional-scale applications. The discussions on July 10 were to explore options for enhancing the system to address more local-scale applications (say on the order of 1 to 2 km and beyond transport). To address near-field impacts in urban situations (say the first 2 km of transport) is anticipated to require special modeling that can process building and street canyon information. (William B. Petersen, and John S. Irwin, 919 541 1376)

19. Meteorological Model Evaluation Tool. More work was completed on the meteorological model evaluation tool. One of the biggest accomplishments was the implementation of a new method of storing the evaluation data. We have set-up a database server on the internal unix network and modified the model evaluation program to populate the database with the matched observation-model records rather than generating text files. The database can be used by most all analysis software including SAS, the R statistical package, Excel, and others. It can also be easily queried using web languages such as perl and php. This approach will provide a consolidated, organized location to store the evaluation data. An early test of WRF (Weather, Research and Forecast) model 2 meter temperatures for Atlanta, GA, indicate a definite trend, with the model too warm at night and too cool during the day. It is also apparent that the errors are on average larger during the middle part of the day as compared to at night. In this example, the most likely reasoning is that the model does not correctly account for urban heating. (Robert Gilliam, 919 553 4593)

20. Source Apportionment of Primary Carbonaceous Aerosols. Gridded emission inventories of source-segregated carbonaceous particulate matter from five major source categories (diesel exhaust, gasoline exhaust, biomass combustion, natural gas combustion, and road dust) were compared with receptor-based model calculations obtained from a 1999 sampling campaign in the southeastern United States. Several differences between the emission inventories and the source apportionment calculations were revealed. Calculated source contributions from diesel exhaust exceed the inventory estimates by 20% or more during all four seasons. Summertime emissions from gasoline-powered engines in the inventory exceed source apportionment results by a factor of two to five. Springtime emissions from biomass combustion in the inventory exceed the source apportionment results by a factor of two to four. The root causes of these differences are being sought. (Prakash Bhave, 919 541 2194; George Pouliot, 919 541 5475)

21. Plume Model Uncertainties. During June and July a series of discussions were held with various investigators on how to conduct an assessment of the uncertainties associated with Gaussian plume modeling. Data from past tracer experiments were analyzed to characterize the uncertainties associated with the dispersion parameters, plume rise, and wet and dry deposition velocities. Observed winds were compared with winds developed from MM5 analyses to possibly characterize uncertainties in wind speed and direction. One of the findings of these efforts is that while there are random uncertainties at a particular site that to a first order are similar from one site to the next, there are also random biases that vary from one site to the next. It is anticipated that hourly concentration estimates will feel the effects of both kinds of uncertainty (within-site random uncertainties and random site-to-site biases), whereas annual concentration estimates will feel only the effects of random site-to-site biases. This ongoing research activity contributes to several independent research investigations. (Jawad Touma, and John S. Irwin, 919-541-5381)

22. Model Evaluation. An ongoing research effort is exploring differences in sulfate, nitrate, and ammonium monitoring data as reported by three networks: IMPROVE, CASTnet, and STN. The goal of the effort is to uncover similarities and differences among the reported observations, and by so doing, it is hoped to inform people about the difficulties ahead when blending data from multiple networks. It is not a goal of this effort to provide a universal recipe for performing this task. Current findings suggest that the sulfate and ammonium data reported by the three networks may be similar, with possibly minor biases, yet to be defined. The nitrate observations are perplexing, with large differences in magnitude and in the variations in time, making it difficult to believe that all three networks are reporting identical species. This is preliminary work being conducted in preparation for developing and testing methods for characterizing regional-scale air quality model performance in simulating these species. (S.T. Rao, and John S. Irwin, 919-541-5682)

A centralized database is being prepared for these data. The data will be maintained from as far back as available and will be routinely updated to add new data. Tools are also being updated or developed to extract these data for specific analysis purposes and to merge model simulation outputs with these data on the correct time scale and collocated grid(s). The database for observations will be managed by Alfreida Torian. She is currently working with division scientists to retrieve Air Quality Data Retrieval (AIRS) data from the AIRS database and using Fortran and R programming to read and manipulate the data sets for the different project purposes. (Alice Gilliland, 919 541 0347; Alfreida Torian, 919 541 4803)

Tools are currently being developed also to extract and process CMAQ model output for evaluation as part of this effort. Steve Howard has developed some IOAPI data extraction programs. These tools include capabilities to extract model output, average model output on the correct time scale for specific observations, and create merged outputs that include model results and observations for analysis. (Steve Howard, 919 541 3660)

23. Emission Data Uncertainty Workshop. A workshop on uncertainty in emission inventories was recently held in Houston, Texas. The workshop, sponsored by the American Petroleum Institute, focused on the example of uncertainty in benzene and 1,3-butadiene emissions in Houston, Texas, area. The intent of the workshop was to apply the expertise of the attendees (about 25 people) and define ranges of error of the inventory components as part of a Monte Carlo analysis of emissions. However, the workshop attendees were unable to agree on error bounds for the various emission components. A ""strawman"" proposal will be circulated to the workshop attendees for comment. (William Benjey, 919 541 0821)

Idaho Falls

24. CBLAST-High. Preparations continued in August to use the BAT Probe on NOAA P-3 for the upcoming hurricane season. Two flights were conducted with the BAT Probe installed on the NOAA P-3 over the Gulf of Mexico. The first flight (Aug 19) focused on calibration maneuvers for the BAT probe system, including pitch up/downs, yaws, wind circles, a wind box, and speed runs (acceleration/deceleration). Comparison between the data from the BAT probe and data collected by the nose radome on NOAA P-3, to this point, are favorable. Work continues on calculating flight level winds and temperature from these data.

The second flight (Aug 21) focused on practicing patterns and working through aircraft coordination that will be necessary for research flights. The basic flux pattern for the hurricane research flights consists of a series of stepped descents, both in the along and crosswind direction. One of the aircraft (N42RF) will fly at an altitude of 7000 ft. The lower aircraft (N43RF), instrumented with the BAT probe, will fly an initial leg of 2500 ft. During this initial leg, N42 will drop a series of 5 GPS sondes and 3 AXBT in order to retrieve a temperature and wind profile through and just above the boundary layer. Upon completion of the roughly 20 nmi. leg, N43 will complete a 180 degree turn and descend to 1200 ft, nominally the top of the hurricane boundary layer. Each leg will take between 5 and 11 minutes to complete, depending whether it is flown with or against the wind. After each leg is complete the plane will turn and descend, with legs in addition to the 2500 ft. and 1200 ft., at 900, 600, 400 and finally 200 ft. Completion of the entire stepped descent pattern will take roughly one hour of flight time. During this time, it is crucial we remain in relatively rain-free air. This will, of course, require carefully picking a location between rain-bands, near enough to the eye of the hurricane for 60-80 kts surface winds, and a region that remains reasonably steady-state. (Jeff.French@noaa.gov)

25. Extreme Turbulence Probe. As reported last month, some effort has gone into the use of Bayesian Monte Carlo Markov Chain (MCMC) modeling to come up with more realistic confidence intervals for the turbulence statistics generated by both the ET probe and the INEEL sonic anemometer that is being used for comparisons. The attraction of this technique is that it has the potential to account for both autocorrelations and cross correlations in the data. Originally, attempts were made to use autoregressive (AR) models for the time series, but this did not lead to satisfactory results. The main problem is that a high-order AR model is necessary to provide a reasonable representation of Eulerian velocity time series, and these are too unwieldy for practical use. An alternate MCMC approach was developed based on the concept of an effective sample size. With 10 Hz sonic data, for example, there are 18,000 samples within a half-hour period. If all these samples are assumed to be independent, the resulting confidence intervals for the statistics will be very narrow. However, autocorrelation in the data reduces the effective sample size to something much less than 18,000. In one typical instance, the effective sample sizes for the horizontal velocity components and the temperature were down near 600, whereas for the vertical velocity it was in the 3,000-4,000 range. The MCMC approach based on effective sample size appears to provide reasonable results, and it runs quickly on even a modest desktop computer. (Richard.Eckman@noaa.gov)

26. JOINT URBAN 2003 (JUT). Field operations for the Joint URBAN 2003 project were completed on Aug. 2, 2003, when laboratory analysis of the Programmable Integrating Gas Samplers (PIGS) for the final IOP was completed. Equipment was packed up and transported to Idaho Falls, arriving on the evening of August 5. An initial report was prepared to summarize FRD's efforts while in the field. Some of the more important points of that report follow below.

During the field deployment of JUT, sulfur hexafluoride (SF_6) tracer was disseminated a total of 69 times in 10 intensive studies. Twenty-nine of these releases were continuous releases lasting 30 minutes, while 40 were instantaneous or puff releases. The SF_6 continuous release rates ranged from 1.9 to 5.0 g s^{-1}. The total amount of material released in continuous releases was 155,650 g. The SF_6 puff releases ranged in size from 298 to 1,041 g. The total amount of material released as puffs was 24,490 g. Thus, the total amount of SF_6 released for all 10 IOPs was 180,140 g excluding amounts used for testing and troubleshooting. (Kirk.Clawson@noaa.gov).

FRD operated 10 continuous SF_6 analyzers during each intensive observation period, more than FRD has ever operated in the past. Nine of the analyzers were stationary during the releases and one was mobile. Because of the short-range nature of the urban experiment, the analyzers were tuned for their maximum dynamic range of 0 to 20,000 ppt SF_6. This made it difficult for some of the analyzers to make reliable measurements at very low concentrations (0 to 100 ppt). However, most of the plume observations peaked at several thousand ppt so lack of sensitivity at the low concentrations should not be a problem. Data analysis for the continuous SF_6 analyzers was begun in the field and has been continuing at our Idaho Falls office. Each data set from the continuous analyzers must be examined carefully to ensure that a good set of calibrations that meet QC criteria is available, all SF_6 peaks have been identified and no peaks caused by interfering chemicals or other sources are included. The identified peaks must then be extracted and instrument baseline subtracted. With 100 data sets to process, this represents a significant effort. We estimate that this process is currently about 50 percent complete. (Roger.Carter@noaa.gov)

Although automation of the data process has been greatly streamlined, the final data set will not be released until every data point has been closely reviewed, which is an extremely labor-intensive process. All problems noted during the project will be reviewed and fixed. The data will need to be graphed to visualize possible issues that may not be apparent during data reviews. This review process will continue for several more weeks.(debbie@noaa.inel.gov)

We have also been conducting tests on the new "Super PIGS" samplers. The QC data from the field blanks and field controls show a number of problems which don't seem entirely consistent with what was observed on the regular samplers. We are investigating the effects of air temperature and handling procedures on the samplers to determine the cause of the problems. (Roger.Carter@noaa.gov, Debbie Lacroix, Randy Johnson)

27. INEEL Support. A report produced by FRD on worst-case dispersion scenarios at INEEL is continuing to have ramifications on emergency preparedness at the site. The report used the MDIFF model together with nine years of Mesonet data to create probability density functions for the total integrated concentration (TIC) at various INEEL facilities. An estimate of "worst-case" dispersion events was taken as the 95th percentiles from these pdfs. However, the report demonstrated that it is possible to generate more than one pdf from the same model output. For example, one pdf is created by including all the null TICs that occur when the plume totally misses a receptor, whereas another pdf is created by excluding these nulls. There is currently some debate on which pdf is the most appropriate for emergency planning. (Richard.Eckman@noaa.gov)

28. Airborne Environmental Research. A preliminary agenda has been set for the second workshop of the Network of Airborne Environmental Research Scientists. The meeting will take place in Trento, IT, October 20-22. The workshop will focus on new and emerging technologies and how they may be applied to airborne research as well as updates to existing instrumentation. The workshop provides an opportunity for scientists from around the world to gather and discuss issues unique to the operations of research programs utilizing small aircraft. The NAERS group is truly one-of-a-kind in the realm of small aircraft research programs. For more information on NAERS and the upcoming workshop, visit the group's discussion page at http://groups.yahoo.com/group/naers (Jeff.French@noaa.gov)

Las Vegas

29. DOE Meteorological Coordinating Council (DMCC). An "assist visits" to Sandia National Laboratories (SNL) Environment, Safety, and Health (ES&H) Division, was made. By definition, an Assist Visit is a no-fault evaluation that does not require compliance by the organization that receives the review. Noteworthy practices are indicated, and a series of observations and recommendations are provided for consideration by the SNL ES&H management. Each of the recommendations is designed to serve to improve some aspect of the meteorological program. However, the implementation of these recommendations is purely at the discretion of SNL ES&H management. External drivers, such as available funding, program priorities, and availability of human and physical resources, usually determine the extent and timing of the organizational response.

The SNL Assist Visit and meteorological program review was conducted in four parts:

1. The meteorological program was compared to the 24 performance criteria within a recently developed Voluntary Consensus Standard (VCS), ANSI/ANS-3.11 (2000);

2. The custodians of the meteorological monitoring program were interviewed to establish the program structure and its implementation. In addition, surveillances of the instrumentation were performed and evaluated to determine how it met the applicable performance objectives of ANSI/ANS-3.11 (2000);

3. Meteorological data customers were interviewed to determine the level of their satisfaction with the data and to identify any improvements to meteorologically-based products and services; and,

4. A programmatic evaluation was performed relative to the present and future program needs at SNL.

The Assist Visit was concluded on August 20. A final report is being prepared and will be provided to SNL in mid-September. (Walt Schalk, 702 295 1262, and Darryl Randerson, 702 295 1231)

30. Cloud-to-Ground (CG) Lightning Study. A research project was initiated to determine the CG flash density as a function of altitude. The NTS lightning detection system detects CG lightning in an area that includes terrain that ranges from approximately 1000 ft to nearly 12,000 ft above mean sea level (MSL). In addition, this system is one with short base lines, thereby, yielding a high detection capability. Moreover, the area of detection includes two large mountain ranges, namely, the Spring Mountains and the Sheep Range. To attempt to define flash density as a function of terrain elevation, the SORD, 1993 through 2000, CG lightning data base was melded with a high-resolution, U.S. Geological Survey (USGS), topographic data base for the Western United States. The data were analyzed to yield flash density versus terrain elevation, flash density versus terrain elevation versus time of day (PDT), flash density versus elevation for the two primary mountain ranges, and a data listing of flash count by year, month, hour, and terrain elevation. Preliminary analysis of the data point to a maximum flash density per unit area between 8,000 and 9,000 ft MSL with a secondary maximum between 4,000 and 5,000 ft MSL. (Darryl Randerson, 702 295 1231, Doug Soule', 702 295 1266, and Jim Sanders, 702 295 2348)

31. NOAA CIASTA --Mesoscale Modeling. NV-RAMS ran to completion on the University of Nevada-Las Vegas computer system 29 of 31 days (a 94% completion factor). Data are continuing to be renamed and saved daily, and backed up to CD monthly (3 CDs).

The 12z model run is continuing to work well with a 94% completion factor.

As was seen last month, the 00z model run becomes unstable after the 21st hour. Details of what is causing this are sketchy. We have some thoughts that it is due to the moisture parameterization scheme selected. The scheme for the 32km and 8km grid spaced grids were changed, but no improvement was seen. (Walt Schalk, 702 295 1262)

32. MEDA Maximum Temperature Predictions. The August maximum and minimum temperature predictions for selected MEDA station locations showed good results overall. The average bias error for all stations was 0.2°F. The absolute average error for all stations was 3.2°F. The maximum temperatures during August on the NTS were fairly close to the long term averages, and not many extremes occurred during the month. (Doug Soule', 702 295 1266)