14th MEETING OF THE EMI SIG
DOE METEOROLOGICAL COORDINATING COUNCIL

U.S. Department of Energy
METEOROLOGICAL
COORDINATING COUNCIL

San Antonio, Texas
May 7, 2007

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0.0 EXECUTIVE SUMMARY

The Department of Energy (DOE) Meteorological Coordinating Council (DMCC) convened a meeting at the El Tropicano Hotel, San Antonio, TX on May 7, 2007. This meeting was held in conjunction with the Emergency Management Issues (EMI) Special Interest Group (SIG) annual meeting. DMCC is a program under the oversight of the EMI SIG (since 2004).

This year was the fourteenth (14th) DMCC meeting since its inception on December 2, 1994. A total of fifteen (15) individuals from the public and private sectors attended and actively participated in the meeting.

The purpose of this meeting was to:

- Provide a forum for DMCC members and DMCC associates to review accomplishments, products and projects
- Discuss the mission and implementation of organizational goals
- Resolve outstanding objectives during the meeting, including the following
  - DOE site meteorological program managers were provided an opportunity to discuss their programs and web sites and obtain feedback from the DMCC membership on various issues they were facing;
  - Several technical presentations on relevant operational and research topics were provided to the DMCC membership to enhance their knowledge of the atmospheric sciences and assist them in their program execution;
  - Two DOE Headquarter (HQ) elements (i.e., NA-41; HS-21) associated with the atmospheric sciences provided updates on their programs and how these offices programs are affecting the meteorological programs of the DMCC membership;
  - New DMCC products were discussed and the DMCC Assist Visit Program was reviewed;
  - New versions of consequence assessment software and mesoscale models were discussed; and,
  - A DMCC Roundtable was convened to discuss relevant National Nuclear Security Administration (NNSA)/DOE meteorological program issues, and where DMCC should be focusing its energies in FY08 and beyond.
  - There were also discussions on the FY06 accomplishments and FY07 planning of the DMCC.

Additionally, early planning for the 15th DMCC Meeting was briefly discussed. This meeting will be held in conjunction with the next EMI SIG meeting on May 5, 2008 in Washington, DC.

1.0 OVERVIEW

The DOE Meteorological Coordinating Council (DMCC) convened at the El Tropicano Hotel, San Antonio, Texas on May 7, 2007. This was the fourteenth (14th) meeting that DMCC sponsored since its inception on December 2, 1994. The meeting was called to order by the new DMCC Chairman, Walt Schalk, who is also the Deputy Director, National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory (ARL)/Special Operations & Research Division (SORD).

This meeting presented new DMCC initiatives to membership and associates, shared the many DMCC accomplishments over the past 12-1/2 years, and provided discussions on recent advancements in the atmospheric sciences to the DMCC membership.

The following activities were accomplished at the meeting:

- DOE site meteorological program managers were provided an opportunity to discuss their programs and web sites and obtain feedback from the DMCC membership on various issues they were facing;
- Several technical presentations on relevant operational and research topics were provided to the DMCC membership to enhance their knowledge of the atmospheric sciences and assist them in their program execution;
- Two DOE Headquarter (HQ) elements (i.e., NA-41; HS-21) associated with the atmospheric sciences provided updates on their programs and how these offices programs are affecting the meteorological programs of the DMCC membership;
- New DMCC products were discussed and the DMCC Assist Visit Program was reviewed;
- New versions of consequence assessment software and mesoscale models were discussed; and
- A DMCC Roundtable was convened to discuss relevant National Nuclear Security Administration (NNSA)/DOE meteorological program issues, and where DMCC should be focusing its energies in FY08 and beyond.

See Appendix A for the meeting agenda.

The 15 attending members and their respective affiliations are listed on the following page.

LIST OF ATTENDEES

Individual	Affiliation
Ken Burk	Pacific Northwest National Laboratory (PNNL)
Larry Campbell	Fluor-Hanford (F-H), Incorporated
John Ciolek	Alpha-TRAC, Incorporated
Kirk Clawson	NOAA ARL/FRD
Jeannie McBride	Oak Ridge Institute for Science and Education (ORISE) Jim
Fairobent	DOE/NA-41
Cliff Glantz	Pacific Northwest National Laboratory (PNNL)/Hanford
Chuck Hunter	Savannah River National Laboratory (SRNL)
Carl Mazzola	Shaw Environmental & Infrastructure (SE & I)
John Merrick	DOE/Savannah River Operations Office (SROO)
Mark Miller	NOAA/Hazmat
Will Pendergrass	NOAA ARL/ATDD
Darryl Randerson	NOAA ARL/SORD
Walt Schalk	NOAA ARL/SORD
Steve Vigeant	Shaw Environmental & Infrastructure (SE & I)

Introductions, functions within DMCC and affiliations were identified by each participant.

2.0 DMCC CHAIRMAN REPORT

Walt Schalk, Chairman of the DMCC, welcomed members and associates to San Antonio, Texas, and the Fourteenth (14th) DMCC Meeting convened. Walt thanked Jim Fairobent, NA-41, for sponsoring the program, and described the mission and the objectives of the DMCC. Walt presented a history of the many accomplishments of the Council over its twelve and one-half-year history.

Additionally, Walt reviewed the mission and objectives of the DMCC established in 1994, that are still applicable today. The list of participants includes eight (8) DOE/NNSA sites, nine (9) national laboratories, three (3) DOE/HQ elements, three (3) NOAA/ARL components, the Army Research Laboratory (ARL), Dugway Proving Grounds, the Nuclear Regulatory Commission (NRC), and other organizations.

Mr. Schalk shared an organizational update:

- Dr. Darryl Randerson, Chairman since the inception of the DMCC stepped down on July 31, 2006;
- Walt Schalk accepted the Chairmanship on August 1, 2006.

Walt specified that the 13th Meeting of the DMCC was held on May 2006 in Las Vegas, Nevada. Seventeen (17) attendees, representing eleven (11) organizations were present at the meeting. Since that meeting, DMCC has held teleconferences, the average attendance at the teleconferences has been between ten and twelve (10 &12) participants per call.

Walt led a discussion on the Assist Visit Program. An assist visit was performed at Los Alamos National Laboratory (LANL) in August, 2006. Potential assist visits in 2007 include Pantex, Hanford, Nevada Test Site (NTS), Brookhaven National Laboratory (BNL), Idaho National Laboratory (INL) and Y-12 in Oak Ridge, Tennessee.

Walt continued his presentation stating that DMCC provides support to other organizations. These include work on the following projects:

- DOE/EH-0173T: Revised Chapter 4, the summary and references
- DOE/HS-21 Project determined linkage between DOE O 231.1 environmental programs and meteorological data
- The Office of the Federal Coordinator for Meteorology (OFCM) developed a DOE appendix to the annual OFCM Federal Plan including a description of research and operations programs at fifteen (15) NNSA/DOE sites
- OFCM provided input to the Research & Development (R & D) priorities report

DMCC has continued to have outstanding relationships with its sister organization, the Nuclear Utility Meteorological Data User Group (NUMUG). DMCC Members attended and presented at the NUMUG meeting in St. Louis, Missouri in October 2006. During that meeting, Carl Mazzola was elected Chairman to the office of NUMUG for the next three years. Additionally, DMCC assisted NUMUG in its development of comments to NRC Regulatory Guide (RG) 1.23 Revision 1.

DMCC members also attended and presented at the American Nuclear Society (ANS) 9th Topical Meeting on Emergency Preparedness & Response in February 2006, and are presently assisting in the planning activities of the 10th Topical Meeting on Emergency Preparedness & Response, which will be held in March of 2008 in Albuquerque, New Mexico.

Walt continued his talk by stating that DMCC members are also involved in the Voluntary Consensus Standards (VCS) process. This includes work on the following standards:

- ANSI/ANS-3.11 (2005): Meteorological data;
- ANSI/ANS-2.3: Extreme winds and tornadoes;
- ANSI/ANS-2.15: Transport and dispersion modeling nuclear facility routine releases;
- ANSI/ANS-2.16: Transport and dispersion modeling nuclear facility accident releases;
- ANSI/ANS-2.21: Meteorological parameters for Ultimate Heat Sink (UHS) design and applications; and,
- ANSI/ANS-3.8.10: Transport and dispersion modeling real-time nuclear facility accident releases.

Other DMCC initiatives discussed were:

1. Monitoring meteorological data Software Quality Assurance (SQA) progress through the DOE Central Registry;
2. Facilitating the ingestion of DOE/NNSA data into National Weather Service (NWS) Meteorological Acquisition Data Ingest System (MADIS);
3. DOE/NNSA weather website linking program;
4. DMCC web page integration into the EMI SIG Subcommittee for Consequence Assessment and Protective Actions (SCAPA) section; and,
5. The development of a new product: "*Self-Assessment Guide for Meteorological Monitoring and Consequence Assessment Systems*"

Walt's presentation is located in Appendix B.

3.0 DOE/HQ REPORTS

3.1 NA-41 Initiatives - Jim Fairobent

Jim Fairobent spoke about the reasons DMCC is a subcommittee of the EMI SIG. Funding for DMCC had been through three (3) DOE/HQ entities. This arrangement was extremely complicated, so NA-41 took the lead through its already mature EMI SIG program. Jim indicated that until there is an opportunity for a better arrangement with NNSA/DOE, the DMCC will remain part of EMI SIG.

Jim encouraged the DMCC to increase its activities with the DOE/NNSA sites and to support solutions to issues common to the sites.

3.2 HS-21 National Environmental Standards for Hazardous Air Pollutants Report - Carl Mazzola

Gustavo Vazquez was unable to attend the meeting and Carl Mazzola delivered his presentation. Carl discussed the DOE Subpart H report that Gus will be delivering at the annual Health Physics Society (HPS) Meeting in June 2007. The report focused on the 40 CFR 61 NESHAP requirements for DOE/NNSA sites relative to routine releases of radionuclide air emissions.

The NESHAP requirements include:

- The Total Effective Dose Equivalent (TEDE) to a member of the public may not exceed 10 millirem per year, and must be estimated using the EPA CAP-88PC software, or other codified EPA-approved model or method;
- Continuous monitoring of emissions is required for facilities that may exceed 1% of the TEDE limit for a member of the public (i.e., 0.1 mrem/yr); and stack monitoring methods and quality assurance requirements specified in the regulation must be implemented at each DOE/NNSA site; and,
- DOE/NNSA facilities are required to report radionuclide air emissions annually to the EPA, who has interpreted the regulation to include unmonitored and diffuse sources as well as monitored stack sources.

Carl stated that the radionuclide emissions are reported by either point or diffuse source, and that DOE also reports emissions of Naturally Occurring Radioactive Materials (NORM), such as radon and unplanned radionuclide releases, although they are not specifically regulated under Subpart H.

The 2005 DOE air emissions by source type were discussed along with the trends in emissions from 1995-2005. These include:

- Tritium;
- Transuranics (TRUs);
- Noble gases (e.g., krypton, xenon); and,
- Radionuclides (e.g., cesium, strontium).

Carl discussed the current radionuclide NESHAP issues that DOE/NNSA sites are facing. These included the implementation of 2002 Subpart H amendment requirements, the usage of Subpart H dose models, and other Subpart H Program Issues.

Additionally, Carl alerted attendees to a new American National Standards Institute (ANSI) standard for sampling radionuclide emissions (i.e., ANSI/HPS-N13.1) which applies to newly-constructed and modified major stacks. The dose models were discussed which included CAP88-PC version 3.0, which was issued for use in 2006, COMPLY, and GENII; the latter soon to be issued.

Gus' presentation can be found in Appendix C.

4.0 BEST PRACTICES AND LESSONS LEARNED FROM DOE/NNSA SITES

4.1 Idaho National Laboratory - Kirk Clawson

Kirk Clawson discussed the activities of the Air Research Laboratory (ARL)/Field Research Division (FRD) since the last DMCC meeting and presented the partnerships that ARL/FRD had formed with other organizations with common interests over the years.

Kirk stated the major accomplishes of ARL/FRD to date included:

- Weather Research and Forecasting (WRF) mesoscale modeling
- Web access to WRF forecast products
- Improvements to the NOAA/INL Weather Center web page
- Revision of the INL climatology

Kirk indicated that based on the 2004 Assist Visit, DOE/ID has finally reversed ten years of flat funding. New funding was provided to develop HYSPLIT into a new emergency response consequence assessment model to replace the 25-year old MDIFF model which is the core of the INEELViz. ARL/FRD has received an almost 60% increase in funding and is formalizing its relationship with INL through a Memorandum of Agreement (MOA) rather than the earlier Interagency Agreement (IA) vehicle which was very limited. The NOAA/INL meteorological research partnership is targeted for being in place by September 2007.

ARL/FRD provides web access to a variety of Emergency Response Forecasting (ERF) products. Cliff Glantz questioned whether ARL/FRD has experimented with different grid spacing and Kirk replied that Rick Eckman of his staff has worked with running MM5 and WRF. However, the Rapid Update Cycle (RUC) code up-sizes data to 20-km resolution and 15-km resolution is needed. It was resolved for DMCC to write a letter to NOAA National Center for Environmental Programs (NCEP) requesting a resolution change in RUC. Walt Schalk and Kirk Clawson have taken this action.

Kirk discussed the WRF high wind forecast work performed by ARL/FRD and there is now a weather camera at INL which is functional from ARL/FRD. He also shared a study that was performed on INL winds where they were categorized into eight distinct clusters on a monthly and hourly basis. This cluster climatology has been developed into a forecast tool which can be used for a variety of emergency response applications, including wind forecasting for fire fighters when they are battling forest fires. Pocatello, ID National Weather Service (NWS) has a strong interest in this product; due to its forest fire forecasting. The technique will be published in a future edition of the Journal of Applied Meteorology (JAM).

ARL/FRD has recently enjoyed a strong profile in monthly meteorological publications with three programs being featured on the front cover of the Bulletin of the American Meteorological Society (BAMS) over the past five months.

See Appendix D for further information and details regarding Kirk's presentation.

4.2 Nevada Test Site (NTS) - Darryl Randerson

Darryl Randerson discussed activities at NTS since the last DMCC meeting. He provided information on the recently planned Divine Strike experiment at NTS that is planned as a 700-800 pound detonation of high explosives (HE) in a bunker. This will allow study of the potential impact and generated shock wave on underground facilities. Due to a number of events and public outcry, the project is delayed and has not been rescheduled.

Similar to the ARL/FRD situation, ARL/SORD has had flat funding and has difficulty accomplishing all of its activities since flat funding translates to a reduced number of Full-Time Equivalents (FTEs) when cost of living increases are factored in.

Darryl also discussed a lightning safety presentation that he made to NTS management, as the system is one of the more advanced in the NNSA/DOE complex. In addition to that briefing, Darryl also provided information to the new Nevada Site Office (NSO) Manager on fallout monitoring.

Darryl stated that ARL/SORD initiated a program of fire weather forecasting activities on May 11, 2007.

ARL/SORD has also developed a NTS climatology which has been prepared by the now-retired Doug Soule. Darryl will provide this climatology to EMI-SIG so it can be posted on the web page.

During the spring, ARL/SORD used the Richland xenon-sensitive detection technology, which detects in the 10^{-15} curie (Ci) range, in a backwards trajectory analysis that determined above ambient levels of a radioactive xenon isotope at NTS. The study revealed that the xenon was due to normal radioactive emissions from the Arizona Public Service (APS) three-unit Palo Verde nuclear plant.

ARL/SORD is also running the WRF model on a 00Z ETA database which yields a 33-hour forecast, generating 2-km, 8-km, and 32-km outputs. Kip Smith, a new ARL/SORD meteorologist, is quickly learning how to use this new technology in the daily NTS forecasting work.

Darryl continued by stating that the RAMS forecasting model does a reasonably good job, but it makes the boundary layer too moist. Kirk Clawson shared that RAMS does this on western sites, INL worked with this model and it showed the same tendency.

Walt Schalk added that ARL/SORD is improving its relationship with the emergency response organization as new individuals who have come in from NSTECH and appear to value the involvement of ARL/SORD. Ultimately, ARL/SORD will be replacing various NSTECH emergency response organization members as they retire.

Walt also shared that ARL/SORD is collaborating with ARL/FRD in its development of the HYSPLIT with Areal Locations of Hazardous Atmospheres (ALOHA) front-end code.

4.3 Hanford - Ken Burk

Ken Burk reported on the meteorological support of the Hanford Site which is provided by Pacific Northwest National Laboratory (PNNL). Ken has recently replaced Dana Hoitink who retired.

Ken presented the structure of the support organization and indicated in addition to providing meteorological support to the Hanford Site, it is part of the Public Safety and Resource Protection Project (PS&RPP), which include the following elements:

- Hanford environmental oversight;
- Surface environmental surveillance;
- Ecological monitoring and compliance; and,
- Cultural resources.

Ken elaborated on the Hanford meteorological station operations, which has six (6) specific functions:

- Provides weather forecasts in support of routine and special site operations;
- Detects adverse weather (i.e., heat stress and thunderstorms) that may affect the safety of site workers;
- Provides specialized support to the site environmental clean-up program (for example, building demolition);
- Provides meteorological data for annual potential radiological exposure assessment;
- Provides meteorological data for interactive atmospheric models in support of emergency response activities; and,
- Publishes the Hanford site climatological data monthly summaries.

Next Ken described the Hanford meteorological monitoring network. It consists of twenty-six (26) 9-meter towers, three (3) sixty-one (61)-meter towers; and one (1) 124-meter tower. Each tower monitors wind speed and direction, temperature, temperature difference, dew-point temperature and relative humidity, precipitation, and atmospheric pressure. Ken showed a graphical representation of the locations of each of the thirty (30) Hanford meteorological towers. Data from these towers show frequent drainage winds (i.e., katabatic) from the Cascade Mountains affecting the northwest portion of the Hanford site.

The following information provides a description of the forecasting services at Hanford:

- There is a Duty Forecaster available Monday through Friday, for 24 hours except from 8:00 p.m. to 11:00 p.m. and on weekends and holidays, from 6:00 a.m. to 2:00 p.m.
- Three full-time forecasters are available to provide general weather information like temperature, wind, and the current weather conditions, for example rain, snow, fog, high winds, or thunderstorms
  - The daily information is primarily used for work scheduling
  - Adverse weather advisories are also provided including high winds, thunderstorms, dense fog, and frozen precipitation; and,
- Heat stress readings used are a wet-bulb globe temperature technique.

The heat stress reading values are based on air temperature, radiant heat exchange, air movement and water vapor pressure. This information is used for work scheduling during the summer months. It provides data to take into account for work type and protective clothing type.

Additionally, Ken stated that the Hanford meteorological program has a good relationship with the NWS office at nearby Pendleton, Oregon.

Ken shared that the Hanford meteorological program also provides special forecasts, as requested, which uses the HMS telemetry data collection system. Ken shared that the program recently completed its conversion to Campbell Scientific, Inc. data loggers (i.e., CR10XTD, CR23XTD) in 2005 and is using the narrow band radio for transmission and receiving that ARL/FRD switched over to. The system software is LoggerNet 3.1, which calls the stations and runs processes.

Ken elaborated on the following data flow summary:

- Tower data logger;
- PC collection software;
- PC processing software;
- Intranet server;
- Processes and sends data to an FTP page; and,
- Internet.

Ken closed his presentation with a brief discussion of future issues that the Hanford Meteorological Program is facing. Environmental Monitoring (EM) may not continue as part of PNNL program and the assessment of support needs will change as the Hanford Site clean-up continues and eventually ends.

PNNL is bidding to retain the meteorological program responsibilities and is also bidding on the Hanford Mission Support Contract.

Ken's discussion can be found in Appendix E.

4.4 Savannah River National Laboratory - Chuck Hunter

Chuck Hunter discussed the Savannah River Site (SRS) Meteorological Program, operated by the Savannah River National Laboratory (SRNL).

He presented several recent upgrades to the SRS meteorological data polling system that have enhanced its capability. The previous system had a VMS-based system (i.e., RAQS) which was polling ten remote onsite data loggers and four data loggers at sites supporting a Mutual Aid Agreement (MAA) with Augusta-Richmond County in nearby Georgia. Dedicated telephone lines were used as the communication backbone. The ability to integrate new sensors to this system is no longer possible.

Additionally the system that included the VMS was no longer supported as an operating system at SRS; it was no longer supported by the vendor and had limited ability to integrate additional sensors. Additionally, there was a degrading reliability of telephone circuits.

Chuck shared that SRNL will be providing support to the SRS security force, Wackenhut Services Incorporated (WSI), flight operations by installing and operating a ceilometer and four visibility sensors to provide real-time data for SRS helicopter operations. The ceilometer and a visibility sensor will be at the helicopter pad and additional visibility sensors will be located at three existing SRS meteorological towers (i.e., L-Area tower, C-Area tower, H-Area tower). The measurements will be integrated into the existing meteorological monitoring system (i.e., data acquisition, database archival and web-based display). Chuck stated the reason for initiation of the service is that Bush Field in Augusta,

Georgia is twenty (20) miles away from the WSI helicopter pad and the data provided there is not representative of the data in B-Area at SRS.

Chuck said it was of great importance to the SRS meteorological program that SRNL has been partnered with the Office of Biological and Environmental Research (OBER) to establish a “Carbon Flux Super Site” at SRS. Partners to this enterprise include the University of Georgia (UGA), BNL, the Global Monitoring Division (GMD) of NOAA, and the U.S. Department of Agriculture (USDA) Forest Service at SRS. Chuck identified Matt Parker as the Principal Investigator (PI).

The research goals of this carbon flux project are to establish an AmeriFlux site at SRS, which is an important strategic location in the Southeastern United States. These goals are to assist NOAA-GMD with the use of a tall tower near SRS for continuous monitoring of trace gases. This information will support nocturnal forest canopy tracer studies, and will provide a better understanding of CO_2 exchange to support BNL passive tracer technologies.

Chuck closed his talk by discussing the advanced fine-scale modeling which is leveraging the SRNL RAMS-LPDM mesoscale modeling capabilities. Presently there is a transition from local to regional scales. In addition, SRNL will be coupling the RAMS-LPDM output with the CO_2 flux models.

SRNL has added two new meteorologists to their staff. They are Erik Kabela and David Werth.

Chuck’s presentation can be found in Appendix F.

5.0 TECHNICAL REPORTS

5.1 Atmospheric Flow Decoupling – Kirk Clawson

Kirk Clawson's report described an ARL/FRD project associated with atmospheric flow decoupling in an urban environment and its effects on plume dispersion.

Kirk explained the flow decoupling phenomenon and its probable cause. One way the atmospheric flow can be decoupled is within urban street canyons, especially under stable night time conditions.

Kirk briefed the DMCC on a Joint Urban 2003 project in Oklahoma City, Oklahoma. ARL/FRD studied the ability for field research through urban flow decoupling using sulfur hexafluoride (SF_6) as an atmospheric tracer.

This field study used the following equipment:

- More than 100 sonic anemometers
- Many continuous real-time analyzers
- Approximately 150 time-integrated bag samplers

Kirk then displayed a graph of the 2003 Joint Urban Field Study configuration. The results of the study were very interesting, the wind speed comparison depicted noticeable differences in the air flow between the top and the bottom of the buildings.

Kirk shared results of the plume concentration decay time, as well as the calculated plume speed to wind speed ratio for each of the field study cases. In addition, results were presented for decay time as a function of plume speed to wind speed ratio. A value of less than one (1) in this ratio means that the plume is actually moving slower than the wind.

Lastly, the vertically co-located rooftop comparison to street-level concentrations showed various levels of plume decoupling. In some cases, there was apparent "upwind" dispersion as a result of the effect of the street canyons on the atmospheric flow. Kirk demonstrated this using a Computational Fluid Dynamics (CFD) model (i.e., FEM3).

The following conclusions were made in the summary:

- Wind speeds were attenuated in the canopy;
- Inhibited mixing and plume dilution reduced the penetration of winds aloft into the urban canopy;
- Slower plume travel speeds and slower plume decay times;
- Weaker plume fluctuations;
- Possible divergence between the overall wind field and the direction of plume dispersion; and,
- Dense urban mesonet or empirical adaptation based on atmospheric tracers is needed for dispersion characterization.

Kirk's presentation can be found in Appendix G.

5.2 Urban Wind Study - Will Pendergrass

Will Pendergrass discussed the results of an urban wind study that he is actively working on. The objective of the study is to improve dispersion forecasting for Washington, District of Columbia, using the following:

- AWS ("WeatherBug") data available in MADIS for determining if value can be added in the short-term forecast process;
- MM5 code to assimilate mesonet observations in pre-forecast dynamic initialization period; and,
- MM5 forecast fields to the HYSPLIT code for trajectory analysis.

AWS is the largest meteorological company in the United States, with 7,000-8,000 weather stations. Drawbacks with this system include:

- Many towers are poorly sited (e.g., a 10-meter tower on top of a school building); and,
- Wind speed threshold is 2.2 mph to 3.8 mph.

The goal is to find the nuggets within a poorly representative data base.

Will indicated that the sensitivities for one case study suggested that the observation nudging toward surface observations only (i.e., wind) for dynamic initialization (DI) does not impact the forecast significantly and that small gains in skill are shown during DI in wind speed, but very little change in wind direction. In fact, using the dense surface mesonet observations for DI actually made no discernable difference compared with using standard NWS observations.

Although changes are seen in wind speed during DI, the following had virtually no impact on forecast:

- Using approximately all 325 active mesonet observations;
- Limiting mesonet observations to one per cell;
- Super-robbing mesonet within each cell;
- Super-robbing mesonet in 2x2-cell clusters;
- Using up to 16 NWS observations;
- Observation of nudging radius of influence (24, 48 km); and,
- Observation of nudging strength (0, $4x10^{-4}$, $8x10^{-4}$, $1.2x10^{-3}$ sec^{-1}).

Will provided some results of Model Output Statistics (MOS). The conclusions given were:

- Dynamic model uncertainties are implicitly included in the estimated error;
- There were generally higher forecast scores;
- MOS has a thirty-year history in weather forecasting and is tied to a specific dynamic-model version;
- There is a shorter history from which to form equations; and,
- Current experience favors MOS except for “rare” events.

Will closed his talk by indicating that these conclusions came as no surprise. In addition, there is a Las Vegas, Nevada test-bed that is being discussed that may be funded next fiscal year.

Will’s discussion can be found in Appendix H.

5.3 Optimizing Meteorological Observation Networks - John Ciolek

John Ciolek briefed attendees on techniques for assisting a three-dimensional dispersion modeler in placing sensors to generate the best data for building a wind field. This technique, called OSSE, also assists the modeler in determining the fewest number of sensors required.

John provided a report on a recent test he conducted to determine if the OSSE technique actually works. He provided the results of a field study conducted at Rocky Flats, Colorado. It focused on precision, how well the model runs and the data match of pattern of output. John stated the technique can also be used for conducting a cost-benefit analysis.

John ran the HPAC model for the demonstration showing the effect on the wind field by adding extra observations and comparing the wind field generated at one (1) station versus the wind field generated at ten (10) stations. The OSSE error curves may apply for local modeling and observation systems.
John closed his talk indicating that the study investigators are looking for

organizations to collaborate on the next phase.

John's discussion can be found in Appendix I.

5.4 Predicting Fire and Explosion Hazards Using ALOHA - Mark Miller

Mark presented the new and improved ALOHA Version 5.4.1 which has subsumed the EPA model, Automated Resource for Chemical Hazard Incident Evaluation (ARCHIE). ALOHA is now capable of modeling explosions, fires, and Boiling Liquid Expanding Vapor Explosions (BLEVEs).

Mark presented a background on the ALOHA code which was jointly developed by NOAA and the EPA. It contains both Gaussian and heavy gas dispersion algorithms, and is designed for short duration, short range incidents. It has multiple time-dependent source models to characterize phenomenology from tank releases, puddle evaporation, gas pipeline releases, and direct releases. It has been recently upgraded to include fires and explosions, and there is a seamless interaction with the CAMEO and MARPLOT modules.

Mark provided information on the ALOHA user community.

1. First responders (e.g., fire and police service) - 35%;
2. State/Local planners - 25%;
3. Industry - 10%; and,
4. Others - 30%.

ALOHA is also used extensively in academia and by environmental organizations, with approximately 60,000 international downloads to date.

Mark addressed some of the challenges that occurred with the design interface. The model had to address questions that responders would ask during emergency incidents in data sparse environments. In addition, these responders may have limited knowledge of uncertainties. To overcome these issues, it was necessary to minimize non-conservative results and guide the users to credible science.

Some of the user-driven design criteria in ALOHA includes it must run in the field, be quickly set up, provide cues for infrequent users, ask questions that can be reasonably answered, and to minimize inputs and provide reasonable defaults. In addition, the output must be easily interpreted.

Mark provided critical assumptions in ALOHA, including the following:

- Constant wind field;
- Maximum distance of 10 km;
- Max duration of 60 minutes;
- Flat earth;

- No explosive releases; and,
- Chemical only (not nuclear or biological).

Additionally, Mark went over the new ALOHA sources and scenarios output. These included a scenario text summary, source strength graphs, concentration graphs, threat zone footprints, NOAA and diagnostic menus. Some of the new features in ALOHA 5.4.1 follow:

- Five fire and explosions scenarios (i.e., jet fires, pool fires, flammable areas (i.e., flash fires), BLEVEs, and unconfined vapor cloud explosions; and,
- Users can now choose to use water as a ground type and as a ground roughness variable.

With respect to fires and explosions, for toxic releases, ALOHA uses a three (3) to five (5) minute average time. For a fire or explosion scenario, the average time is significantly shorter, ten (10) to twenty (20) seconds, to account for the instantaneous nature of the threat. One of the strengths of ALOHA is its ability to account for time-dependent releases. Mark stated that many of the fire and explosion algorithms used in ALOHA 5.4.1 had to be modified to work with the time-dependent source strength calculations.

Taking into account sensitivity analyses associated with fires and explosions, Mark opined that due to the nature of emergency response, sometimes users have to estimate their input values. The sensitivity analysis capability of ALOHA provides a way to assess where inaccurate input values would have the most significant effect on output values.

Mark also mentioned that there are algorithm checks in the fire and explosion modules which checked ALOHA's coded algorithms against the same algorithms programmed in MATHCAD, MATHEMATICA, or MATLAB. Mark indicated that the algorithm check verified the accuracy of the ALOHA code when the output values showed only nominal differences attributable to things such as round-off error.

Additionally, Mark continued, that ALOHA has an on-screen help system that is available anytime the program is on, and most dialog boxes have help buttons that take users directly to the help topic for that section. In addition, notes and warnings appear to guide users at critical points in the model and make sure the user is aware of what the model is doing.

Next Mark presented the model-to-model comparison study, the goal of which is to identify code errors and examine outliers. To do this, he uses fractional factorial design to prepare input values. He compared results with CHEMS-PLUS and ARCHIE using six scenarios, with the source and dispersion checked separately:

- Pure liquid release from a tank;
- Two-phase flow from a tank;
- Pure gas release from a tank;
- Cryogenic puddle evaporation;
- Non-cryogenic puddle evaporation; and,
- Release of gas from a gas pipeline.

Mark then presented additional model comparisons which included testing the SHELTER module for various air exchange rates using scenarios from the "*Workbook of Test Cases for Vapor Cloud Source Dispersion Models*" (i.e., CCPS, AIChE). The source strength and dispersion estimates of the DEGADIS heavy gas dispersion model were also tested.

Mark discussed the strengths of the ALOHA code. The first strength is that it links directly with CAMEO. In addition, it allows the use of 80,000 synonyms to help identify the chemical and has facility chemical inventory data. ALOHA automatically displays threat zones on MARPLOT and the output can also be exported to ESRI products.

Mark then discussed the weaknesses of the ALOHA code. Some of these are liquids in pipes as a source, and dual end ruptures, no multiple meteorological data input capability, no ability to model elevated dense gas releases, no time-dependent meteorology, and no ability to consider complex topography.

Mark closed his discussion by relating the continued developmental work on ALOHA including:

- Pool fires on water;
- Adding petroleum products to the chemical library;
- Water reactive calculations for byproduct source strengths; and,
- Enhancement of the network and web capabilities.

Mark's presentation can also be referenced in Appendix J.

6.0 DMCC PRODUCTS, PROJECTS AND ACTIVITIES

6.1 DMCC Assist Visit Program - Carl Mazzola

Carl Mazzola presented an update to the DMCC Assist Visit Program. He presented the DMCC objectives for assist visits, listed below:

- Evaluation of the meteorological monitoring and consequence assessment program adequacy to meet present and future mission requirements;
- Evaluation of the effectiveness of program links to EP & R, Environment Safety & Health (ES & H), environmental compliance, safety, licensing, and the National Environmental Policy Act (NEPA) organizations;
- Assessment of meteorological data representativeness and whether Data Quality Objectives (DQOs) are met relative to site applications;
- Identification of program benefits to DOE/NNSA management and other program stakeholders to demonstrate the value-added merits of the meteorological program;
- Encourage onsite meteorological research to further understand local atmospheric processes on atmospheric transport and dispersion; and,
- Identification of needs to upgrade and modernize the meteorological monitoring program to meet future mission applications, and to keep pace with state-of-the-art atmospheric sciences.

Carl also discussed the value-added components of an assist visit which is focused on improving meteorological program products and yielding a higher quality representative meteorological data base.

Program improvements from the 1996-2006 DMCC assist visits were discussed. They include:

- Improvements in instrumentation;
- Modeling-monitoring interfaces;
- Consequence assessment models; and,
- Need for an integrated program to support safety assessment and emergency response management.

Carl discussed the performance criteria used in a DMCC Assist Visit. These criteria are found in the following documents:

- ANSI/ANS-3.11 (2005);
- Chapter 4 of DOE EH-0173T for meteorological monitoring;
- DOE O 151.1C, DOE G 151.1-1; and,
- Chapter 4 of DOE EH-0173T for consequence assessment.

There are 24 performance criteria for meteorological monitoring in the following five categories:

- Meteorological monitoring system (5);
- Siting of meteorological observation instruments (3);
- Data acquisition (5);
- Data base management (7); and,
- System performance (4).

After all 24 performance criteria are reviewed, a determination is made whether the object has been *fully met*, *partially met* or *not met*. Observations and recommendations within the Assist Visit (AV) report are linked to performance criteria that are either *partially met* or *not met*.

Carl next discussed the consequence assessment system evaluation which consists of:

- Seven specific evaluation criteria from DOE O 151.1C and DOE G 151.1-1; and,
- Eight specific evaluation criteria from the summary of DOE/EH-0173T; items g, h, i, j, l, x, z, and cc.

Consequence assessment models are evaluated for accuracy, meteorological data linkage, how it supports environmental monitoring programs, links to meteorological data availability in real-time, how to address facility-specific and local meteorological factors that affect transport and dispersion, quality assurance, and providing of information to offsite agencies.

After all 15 performance criteria are reviewed, it is determined whether the object has been fully met, partially met and not met. Observations and recommendations within the Assist Visit report are linked to the performance criteria that are either partially met or not met.

The next stage of the Assist Visit involves the conduct of interviews with various customers, including the following six site organizational elements:

- Environmental Compliance: NESHAP and NPDES;
- Emergency Management: EPHA and CA;
- Integrated Safety Management: PDSA, DSA, LCO and BIO;
- Environmental Safety & Health: OSHA and PSM;
- Environmental Monitoring: ASER; and,
- NEPA: EA, EIS and PEIS.

Carl indicated that from the interviews, a program feature determination is conducted to identify the present compliance posture and evaluate if the existing program can support future missions.

The final assist visit information is communication of noteworthy practices, observations, and recommendations.

Carl closed the talk by stressing that an assist visit is *no-fault* in nature and that program improvements are at the site's discretion and within realistic budget constraints.

Carl's discussion can be found in Appendix K.

6.2 DMCC Meteorological Monitoring and Consequence Assessment Self-Assessment Guide - Steve Vigeant

Steve Vigeant presented the status for development of the *Meteorological Program and Consequence Assessment Self-assessment Guide*.

Steve first provided background and the need for this project. He indicated that DMCC has performed 11 assist visits since 1996 at most of the DOE/NNSA sites, these assist visits have lead to observations/recommendations that provide improvement to the programs at the sites. He stated that resources are not always available to fund assist visits even though their value is recognized. Accordingly, a decision was made by DMCC to develop a *Self-assessment Guide* that would be valuable to the DOE/NNSA community by facilitating self-assessments.

Next Steve reviewed the structure of the *Assist Visit Guide*, designed around the structure of previous assessments. The guide provides templates for pre-assessment, assessment, post-assessment activities, and instructions for using the templates.

In order to ensure that the self-assessment guide is an effective tool, DMCC has established a Working Group (WG) to oversee product development. The WG consists of:

1. Jim Fairobent, NA-41 Sponsor;
2. Walt Schalk, DMCC Chairman, NTS;
3. Cliff Glantz, SCAPA Chairman; Hanford;
4. Joel Siegel, WIPP;
5. Kirk Clawson, INL;
6. Tom Bellinger, Y-12;
7. Gina Deola, SNL; and,
8. Scot Johnson, LANL.

Steve reviewed the pre-assessment activities, which included the following:

- A sample plan of action;
- A sample assist visit schedule; and,
- A site line organization notification process.

See below for documents governing assessment performance criteria:

- ANSI/ANS-3.11 (2005);
- DOE/EH-0173T Chapter 4;
- DOE G 151.1-1, Consequence Assessment; and,
- DOE O 151.1C.

Steve then provided an example of applicable Lines of Inquiry (LOIs).

Lines of Inquiry are used to evaluate performance criterion using templates for conducting interviews with meteorological program custodians and customers. Additionally, there is guidance provided for analyzing information that enables the development of observations and recommendations.

Steve stated that post-assessment activities include checklists for the following uses:

- To track recommendations and observations;
- To organized by performance objective basis documents;
- To assist in determining follow-up assist visits; and,
- To ensure tracking of key program elements.

Steve concluded his presentation by reviewing the scheduled milestones:

1. Draft sent to DMCC WG – April 25, 2007 (COMPLETE)
2. DMCC WG comments due – May 11, 2007
3. Second draft to ORISE – May 18, 2007
4. NA-41 review comments due – June 15, 2007
5. Final draft to ORISE – June 29, 2007; and.
6. ORISE publishes as EMI-SIG document – July 13, 2007

The details of Steve's discussion are in Appendix L.

6.3 DMCC Web Page - Cliff Glantz

Cliff Glantz discussed the new entries on the DMCC Web Page. His presentation can be referenced in Appendix M.

7.0 DMCC ROUNDTABLE

Walt Schalk led the DMCC Roundtable discussion which occurs at each DMCC meeting. The purpose is to confer with other members regarding DMCC initiatives; and to provide a forum for all DMCC members to talk about specific issues being addressed at their sites.

The following points summarize the key points of the Roundtable discussion:

1. Carl Mazzola described the upcoming *DMCC Self-assessment Guide*. He challenged everyone present to come up with new ideas for additional DMCC products that would benefit all DOE/NNSA meteorological Program Managers.
2. Cliff Glantz extended Carl's concept and asked attendees to think consider projects that can be accomplished cooperatively. Additionally, he suggested developing a blog for sharing of information.
3. Walt Schalk recommended a White Paper on the state of Sonic Doppler Acoustic Ranging (SODAR) measurement. Additionally, applications will be developed to help Tom Bellinger at Y-12 and others with SODAR instrumentation.
4. Kirk Clawson indicated that lightning protection is getting more visibility and that DMCC should continue its involvement in this technical area.
5. John Merrick shared that there is a need for NARAC back-up guidance.
6. John Ciolek asked how DMCC involves modelers. He indicated that there should be an exchange of information with the modeling community, inclusive of mesoscale modeling. Additionally, performance issues and consequence assessment decisions should be discussed and final decisions supported.
7. Carl Mazzola suggested that the DMCC break into select sub-groups to address specific issues.
8. Darryl Randerson noted that Kip Smith runs into problems with mesoscale modeling and can use help from the DMCC community.
9. Cliff Glantz stated the following areas need attention., The:
   a. Scrutiny of Software Quality Assurance (SQA) regarding the fidelity of meteorological data
   b. Assurance that meteorological instrument vendors provide appropriate documentation

Cliff volunteered to develop a White Paper on SQA requirements.

10. Kirk Clawson closed the roundtable by stating that the interaction fostered by the DMCC is valuable and provides an intangible means for assisting all DOE/NNSA meteorological programs, and stressed that it should be continued.

The DMCC Roundtable was adjourned until the next DMCC meeting.

8.0 2007 DMCC MEETING

Walt Schalk presented his thoughts on the early planning for the next DMCC meeting. Since this meeting was successful and DMCC is more strongly affiliated with the EMI-SIG, scheduling the next DMCC meeting with next year's EMI-SIG meeting continues to make good sense.

Therefore, it was determined that the 15th DMCC Meeting will be a one-day meeting tentatively scheduled for May 5, 2008, in Reston, VA.

9.0 APPENDICES

Since the meeting presentations were not developed prior to the meeting, this section is reserved to document the presentations and other relevant documentation made at this meeting. Following is a list of the presentations.

Appendix	Description
A	DMCC Meeting Agenda
B	DMCC Chairman Report
C	HS-21 NESHAP Report
D	Idaho National Laboratory (INL)
E	Hanford
F	Savannah River National Laboratory
G	Atmospheric Flow Decoupling
H	Urban Wind Study
I	Optimizing Meteorological Observation Networks
J	Predicting Fire and Explosion Hazards Using ALOHA
K	DMCC Assist Visit Program
L	DMCC Meteorological Monitoring and Consequence Assessment Self-Assessment Guide
M	DMCC Web Page

Note: Space is provided in the back of this report for inserting 13 appendices.

10.0 ACRONYMS

A

AIChE	American Institute of Chemical Engineers
ALOHA	Areal Locations of Hazardous Atmospheres
ANS	American Nuclear Society
ANSI	American National Standards Institute
APS	Arizona Public Service
ARCHIE	Automated Resource for Chemical Hazard Incident Evaluation
ARL	Air Resources Laboratory, Army Research Laboratory
ASER	Annual Site Environmental Report
ATDD	Atmospheric Transport and Dispersion Division
AV	Assist Visit

B

BAMS	Bulletin of the American Meteorological Society
BIO	Basis for Interim Operation
BLEVE	Boiling Liquid Expanding Vapor Explosion
BNL	Brookhaven National Laboratory
BWXT	Y-12 M & O Contractor

C

CA	Consequence Assessment
CAA	Clean Air Act
CAMEO	Computer-Aided Management of Emergency Operation
CAP88-PC	An atmospheric transport and dispersion code
CCPS	Center for Chemical Process Safety
CFD	Computational Fluid Dynamics
CHEMS-PLUS	Name of a software package for Hazards Assessment
Ci	curie
COMPLY	An atmospheric transport and dispersion code

D

DEGADIS	Dense Gas Dispersion model
DI	Dynamic Initialization
DMCC	DOE Meteorological Coordinating Council
DOC	Department of Commerce
DoD	Department of Defense
DOE	Department of Energy
DQO	Data Quality Objective
DSA	Documented Safety Analysis

E

EA	Environmental Assessment
EIS	Environmental Impact Statement
EM	Environmental Monitoring
EMG	Emergency Management Guide
EMI	Emergency Management Issues
EOC	Emergency Operations Center
EP & R	Emergency Preparedness & Response
EPHA	Emergency Preparedness Hazard Assessment
EPA	Environmental Protection Agency
ERF	Emergency Response Forecasting
ES & H	Environment Safety & Health
ESRI	Environmental Systems Research Institute, Inc. develops GIS and Mapping Software
ETA	Mesoscale model

F

F-H	Fluor-Hanford
FEM3	A CFD model
FRD	Field Research Division
FTE	Full-Time Equivalent
FTP	File Transfer Protocol
FY	Fiscal Year

G

G	Guide
GENII	An atmospheric transport and dispersion code
GMD	Global Monitoring Division

H

HE	High Explosives
HMS	Hazard Mapping System
HPS	Health Physics Society
HPAC	An atmospheric transport and dispersion code
HQ	Headquarters
HS	Health, Safety & Security
HYSPLIT	An atmospheric transport and dispersion model

I

IA	Interagency Agreement
INL	Idaho National Laboratory

J

JAM	Journal of Applied Meteorology

K

Km	kilometer

L

LANL	Los Alamos National Laboratory
LCO	Limiting Condition for Operation
LIDAR	Light Detection and Ranging
LLNL	Lawrence Livermore National Laboratory
LOI	Lines of Inquiry

M

M & O	Management & Operations
MAA	Mutual Aid Agreement
MADIS	Meteorological Assimilation Data Ingest System
MARPLOT	Mapping Application for Response, Planning and Local Operational Tasks is a basic mapping application
MATHCAD	A software package for engineers that performs, documents and shares calculation and design work
MATLAB	A high level technical computing language and interactive environment developed by MathWorks
MATHEMATICA	High level mathematical software for research and development
MM5	Mesoscale model
MOA	Memorandum of Agreement
MOS	Model Output Statistics

N

NA-41	Office of Nuclear Non-proliferation
NCEP	National Center for Environmental Programs
NESHAP	National Environmental Standards for Hazardous Air Pollutants
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NORM	Naturally Occurring Radioactive Materials
NRC	Nuclear Regulatory Commission
NSO	Nevada Site Office
NSTECH	NTS M & O Contractor
NTS	Nevada Test Site
NUMUG	Nuclear Utility Meteorological data User Group
NWS	National Weather Service

O

O	Order
OBER	Office of Biological and Environmental Research
OFCM	Office of the Federal Coordinator for Meteorology
ORISE	Oak Ridge Institute for Science and Education
OSHA	Occupational Safety and Health Association

P

PC	Personal Computer
PDSA	Preliminary Documented Safety Analysis
PEIS	Programmatic Environmental Impact Statement
PI	Principal Investigator
PNNL	Pacific Northwest National Laboratory
PS&RPP	Public Safety & Resource Protection Project
PSM	Process Safety Management

Q

QA	Quality Assurance

R

R & D	Research & Development
RAMS-LPDM	An atmospheric transport and dispersion code
RAQS	Registry, Appraisal and Qualification System
RUC	Rapid Update Code

S

SCAPA	Subcommittee on Consequence Assessment and Protective Actions
SE & I	Shaw Environmental & Infrastructure
SIG	Special Interest Group
SME	Subject Matter Expert
SNL	Sandia National Laboratory
SODAR	Sonic Doppler Acoustic Ranging
SORD	Special Operations & Research Division
SQA	Software Quality Assurance
SRNL	Savannah River National Laboratory
SROO	Savannah River Operations Office
SRS	Savannah River Site

T

TEDE	Total Effective Dose Equivalent
TOC	Table of Contents
TRU	Transuranic

U

UDP	Urban Dispersion Program
UGA	University of Georgia
USDA	US Department of Agriculture

V

VCS	Voluntary Consensus Standard
VMS	Virtual Memory System

W

WG	Working Group
WIPP	Waste Isolation Pilot Plant
WRF	Weather Research and Forecasting
WSI	Wackenhut Services Incorporated

X

Y

Z