Emergency Management Issues Special Interest Group

DOE Meteorological Coordinating Council

16th Meeting of the DMCC

San Francisco, CA
May 4, 2009

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EXECUTIVE SUMMARY

The Department of Energy (DOE) Meteorological Coordinating Council (DMCC) convened a meeting at the Mark Hopkins Hotel, San Francisco, California, on May 4, 2009. This meeting was held in conjunction with the Emergency Management Issues (EMI) Special Interest Group (SIG) annual meeting. DMCC is a program which was created in 1994 and has been under the oversight of the EMI SIG since 2004.

This year was the 16th DMCC meeting since its inception on December 2, 1994. A total of twenty-two (22) individuals from the public and private sectors attended and actively participated in the meeting.

The purposes of this meeting were to:

- Provide a forum for DMCC members and DMCC associates to review accomplishments, products and projects.
- Discuss the mission and implementation of its organizational goals.
- Resolve outstanding objectives during the meeting, including the following:
    1. NNSA/DOE site meteorological program managers were provided an opportunity to discuss their programs to obtain feedback from the DMCC membership on various issues they were facing.
    2. NNSA/DOE site meteorological program managers made technical presentations on relevant operational and research topics to the DMCC membership to enhance their knowledge of the atmospheric sciences and assist them in their program execution.
    3. The results of recent DMCC Assist Visits were presented.
    4. New DMCC products were discussed and the DMCC Assist Visit program was reviewed.
    5. Eight (8) Action Items were opened.
    6. A DMCC Business Meeting was convened to discuss relevant NNSA/DOE meteorological program issues, and where DMCC should be focusing its energies in FY10 and beyond.
    7. Discussions on the FY09 accomplishments and FY10 planning of the DMCC took place.

Additionally, early planning for the 17th DMCC Meeting was briefly discussed. This meeting will be held in conjunction with the next EMI SIG meeting on May 3, 2010.

1.0 OVERVIEW

The DOE Meteorological Coordinating Council (DMCC) convened at the Mark Hopkins Hotel, San Francisco, California, on May 4, 2009. This was the sixteenth (16th) meeting that DMCC has sponsored since its inception on December 2, 1994. The meeting was called to order by the DMCC Chairman, Walt Schalk, who is also the Director, National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory (ARL)/Special Operations & Research Division (SORD). See Appendix A for the meeting agenda.

This meeting presented new DMCC initiatives to its membership and associates, shared its many accomplishments over the past 14½years, and provided discussions on recent advancements in the atmospheric sciences to the DMCC membership.

The following activities occurred at the meeting.

- Six (6) DOE/National Nuclear Security Administration (NNSA) site meteorological program managers were provided an opportunity to discuss their programs and obtained constructive 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.
- New DMCC products were discussed. The DMCC Assist Visit Program was reviewed.
- Eight (8) Action Items were opened.
- The status of the seven (7) ANS voluntary consensus standards was reviewed.
- A DMCC Business Meeting was convened to discuss relevant DOE /NNSA meteorological program issues, and where DMCC should be focusing its energies in FY10 and beyond.

Twenty (20) members were in attendance at the meeting and two (2) others attended remotely via Microsoft Live Meeting. The twenty-two (22) attending members and their respective affiliations are listed below.

Individual	Affiliation
Fernando Aluzzi	LLNL NARAC
Gary Arcemont	San Luis Obispo County Air Pollution Control District (APCD)
Tom Bellinger	B&W Y-12 (Live Meeting)
Kevin Birdwell	Oak Ridge National Laboratory (ORNL)
Becky Bullard	Oak Ridge Institute for Science and Education (ORISE)
John Ciolek	Alpha-TRAC, Incorporated
Kirk Clawson	NOAA ARL/FRD (Live Meeting)
Joel Craig	APCD
Dave Freshwater	NA-41
Cliff Glantz	Pacific Northwest National Laboratory (PNNL)/Hanford
Chuck Hunter	Savannah River National Laboratory (SRNL)
Erik Kabela	SRNL
Carl Mazzola	Shaw Environmental & Infrastructure (SE & I)
Jeanne McBride	ORISE
Ed McCarthy	Pacific Gas & Electric/NUMUG Chairman
John Merrick	Consultant (DOE/SR Retired)
John Nasstrom	LLNL NARAC
Brenda Pobanz	LLNL NARAC
Jeremy Rishel	PNNL/Hanford
Walt Schalk	NOAA ARL/SORD
Lori Thomas	NA-41
Steve Vigeant	SE & I

2.0 PROJECTS AND TOPICS FROM AROUND THE COMPLEX

2.1 Reformulating WRF Model for Graphics Processors – John Ciolek

John Ciolek, Alpha-TRAC, presented how graphics processing units (GPUs) from the video gaming industry are being used for prognostic meteorological applications [e.g., Weather Research Forecasting (WRF)]. The video gaming industry is enjoying rapid growth with revenues increasing from $31.3 billion in 2005 to $42.8 billion in 2007. The industry trend is moving toward more realistic images, which requires more powerful rendering hardware, thus creating an explosive growth in graphics processors.

John explained the mechanics of GPUs which are architecturally different than the conventional central processing units (CPUs) of computers. GPUs have distinct advantages which maximize the number of processors, minimize cache and control structures, and improve memory access. In addition, GPUs rely on localized memory and have slower access to the main system memory. John elaborated on how the GPU threads were organized to enable programmer accessibility. Due to these inherent advantages there has been explosive growth in GPU cores and their use in performing serious science and solving scientific problems requiring an enormous number of calculations. John gave examples of different scientific experiments being performed by using GPUs, inclusive of astrophysics, electrodynamics, life sciences, nanotechnology simulations, computational fluid dynamics (CFD), finance, chemistry, and molecular dynamics.

John then discussed the WRF Connection and the work of John Michalakes of the National Center for Atmospheric Research (NCAR) which is focused on formulating and optimizing WRF using GPUs, mostly using the Compute Unified Device Architecture (CUDA) on NVIDIA graphics cards. As in every breakthrough, there are residual issues which include the need to identify segments of the code that can be reformulated for stream processing and the recoding of those segments. In order to be successful in this endeavor, memory access must be optimally managed. In addition, the applications are machine-specific and there is a need to use a limited instruction set. However, CUDA does allow upward portability on NVIDIA devices. The WRF reformulation process begins with the identification of target WRF packages and quick improvement actions, with a FORTRAN to C language conversion. The most time-consuming tasks are the rethinking on how to implement algorithms and the revalidation of the new code.

Early successes using GPUs include work on the microphysics kernel with a 1.25 to 1.3 x overall improvement and improved compiler switch with the elimination of temporary array storage. Work is continuing on the WRF rewrite and the next WRF release will have a GPU switch.

Chuck Hunter indicated that the use of GPUs has come to the attention of the meteorologists at Savannah River National Laboratory (SRNL) with regards to optimization in data-sparse areas. Carl Mazzola stressed that this is a very

important breakthrough that can enhance the application of three-dimensional Lagrangian transport and diffusion models for consequence assessment, as well as CFD models for indoor air quality and field study applications and thus, its progress should be tracked.

GPU use will also allow models to run many times, as in ensemble systems; that can provide confidence estimates.

ACTION 09-01: Track progress of GPU usage in atmospheric modeling applications and keep DMCC membership current.

John's presentation is accessible in Appendix B.

2.2 Scalar versus Vector Winds – Chuck Hunter

Chuck Hunter, SRNL, presented some thoughts on an issue that Matt Parker of his staff raised at the September 2008 Hanford Assist Visit, associated with the use of scalar versus vector winds. The Hanford meteorological program is exclusively using vector winds which may not have appropriateness to all types of meteorological data applications.
Chuck referred to ANSI/ANS-3.11 (2005) which states that meteorological monitoring programs should archive both scalar wind speed and the resultant vector. This statement indicates that both scalar and vector winds should be collected by the meteorological program but stops short of identifying which meteorological applications should use scalar winds and which should use vector winds.

Chuck identified many analyses that favor the use of scalar speeds. These include analyses that look to average wind speeds and to account for gustiness. In addition, scalar winds are the required input for the Gaussian plume equation to determine the magnitudes of plume dilution, plume rise, release height and other scalar parameters, and it may be needed for certain types of stability classification. It also is required for quality assurance (QA) of instrument performance, for engineering studies (i.e., wind loading, etc.), for support of operational customers, for waste and contamination handling, fire weather applications, and heat and cold stress assessments to protect construction workers.

In contrast, Chuck's list for the application of vector speeds was much smaller. For example, consider the analyses seeking to determine net contaminant transport.

After much discussion it was determined that there would be a need for a White Paper to establish which analyses are linked to scalar winds and which ones are linked to vector winds. Chuck agreed to draft the White Paper and provide it to the DMCC for posting on its web page.

ACTION ITEM 09-02: Develop DMCC White Paper on vector and scalar wind speed usage consistent with ANSI/ANS-3.11.

Chuck's presentation is accessible in Appendix C.

2.3 Analytical Screening Technique to Estimate Effects of Cooling Ponds on Meteorological Measurements – Steve Vigeant

During the lunch period, Steve Vigeant, SE&I, presented a new screening technique to estimate the effect of cooling ponds on nearby meteorological measurements; in particular the impact on the temperature and moisture fields.

The analysis was conducted at an overseas nuclear power station that has a meteorological monitoring program which consists of two (2) towers; one instrumented at a height of 58 m and the other at a height of 10 m. The nearby cooling system includes two 12- by 12 m cooling ponds with elevated water temperatures located 62 m from 10-m tower. The Nuclear Regulatory Agency was concerned about possible effects of cooling ponds on the 10-m tower measurements. The utility representative contacted SE&I to see if it could develop a technique and subsequently defend the representativeness of the temperature and relative humidity data.

Accordingly, an analytical technique was devised to estimate the potential impact of the cooling ponds on the 10-m tower temperature and relative humidity measurements by estimating the heat and moisture fluxes from the cooling ponds and then determining the impacts of these fluxes on the 10-m tower measurements using atmospheric transport and dispersion modeling.

Steve mentioned that the first step was to use one-year of onsite measurements to estimate heat and moisture fluxes and transport and diffusion. With respect to the heat and moisture fluxes, bulk aerodynamic formulas of Friehe and Schmitt (1976) were chosen to estimate sensible heat and moisture fluxes from the cooling ponds. These fluxes were primarily due to differences in water and air temperatures. Steve presented the formulas used to calculate these and explained each of the parameters. Using these formulas, sensible heat and moisture fluxes were calculated using one year of hourly onsite measurements, with the sensible heat transfer coefficients based on seasonal values obtained from a site-specific study.

Steve indicated that the moisture transfer coefficient was also taken from Friehe and Schmitt and the seasonal intake water temperature measurements were used along with assumed pond temperature that was 7°C higher. A key assumption was that the temperature and moisture fluxes were homogeneous over the ponds, which is reasonable due to the relatively small size of the ponds. These fluxes were then multiplied by the pond surface area to obtain sensible heat and moisture “source terms.”

Dispersion of the sensible heat and moisture “source term” with ambient air was determined using the Nuclear Regulatory Commission (NRC) transport and diffusion model, Atmospheric Relative Concentrations (ARCON96), which is applicable to source-receptor distances as nearby as 10 m per Regulatory Guide

1.194. Hourly onsite data from the 10-m tower were used to calculate hourly Chi/Q values.

The results of the study showed a maximum temperature increase of 0.2°C and a maximum relative humidity increase of 0.7%. These maxima were both within the accuracy ranges of these parameters as identified in Table 1 of ANSI/ANS-3.11 (2005). Therefore it was concluded that the cooling ponds did not exert a meaningful effect on the 10-m tower meteorological data. It appears that the nuclear regulatory agency has found this approach and the results adequate for the intended application.

Steve's presentation is accessible in Appendix D.

3.0 ROUND ROBIN: BEST PRACTICES AND LESSONS LEARNED FROM DOE/NNSA SITES

3.1 SRNL: Nocturnal Field Study – Chuck Hunter

Chuck Hunter discussed some of the activities that his group is involved in at SRNL since the last DMCC meeting. He indicated that SRNL will soon be conducting a nocturnal field study for the DOE Office of Science (SC). The objective of the study is to establish a Carbon Flux Super Site at the Savannah River Site (SRS). Partners in this study include the University of Georgia (UGA), Brookhaven National Laboratory (BNL), NOAA Global Monitoring Division (GMD), and the United States Forest Service – Savannah River (USFS-SR). Chuck mentioned several research goals associated with this study which include the establishment of an Ameri-Flux site at SRS and an advanced monitoring system to quantify CO_2 exchanges in the forest-atmosphere ecosystem to provide representative data for the Southeastern United States.

He stated that the 100-foot flux tower is instrumented to examine the nocturnal behavior of CO_2 flux in a locally flat terrain area of well-maintained uniform loblolly pine trees. There are eight levels of instrumentation on the tower including 3-D sonic anemometers, a fast response CO_2/water vapor sensor (i.e., LICOR-7500), a local power source of solar panel arrays and data logging. The installation of the instrumentation on the tower should be completed by July 2009. Chuck then discussed the research goals which are to assist NOAA GMD in establishing monitoring on the SRNL tall tower as part of Carbon Tracker Program (CTP) and to provide a key data location in the Southeastern United States. The installation will be completed and incorporated in the NOAA CTP by August 2009. With respect to the tall tower, the existing SRNL tower will be equipped with research-grade instrumentation at three levels (i.e., 100 ft, 200 ft, 1000 ft). The instrumentation includes sonic anemometers (u', v', w' and T'), fast-response CO2/water vapor monitors, fast-response pressure transducers (P'), and slow-response temperature and humidity instrumentation. The data sample rate is 10 Hz and there is very reliable radio transmission to a Linux server at SRNL for data archival.

Chuck said that the research goals of this study include the use of advanced fine-scale modeling. To this end, SRNL will conduct regional atmospheric modeling using its Regional Atmospheric Modeling System (RAMS) code and will quantify CO_2 flux from local (i.e., forest ecosystem) to regional scales.

Chuck then discussed the particulars of the 2009 field experiment which proposes to conduct an intensive field data collection experiment leveraging the tall tower data set and investigating the meteorological phenomena significant to terrestrial carbon sequestration and flux at night (e.g., low-level jet, breaking gravity waves). The field experiment will be conducted by releasing fluorocarbon tracers upwind of the tower during a northeast wind regime. This wind regime was selected since it increases the probability of a low level jet which more commonly occurs under a clear sky with strong radiation cooling. This fetch also avoids the confounding

effects of potential contaminants from East Augusta industry and provides a good potential for well-exposed upwind tracer release locations. A dry run was conducted on May 2, 2009. The field study will begin as soon as there are NE winds. With respect to Augusta, Georgia climatology, time is quickly running out on such meteorology and the study may have to wait until late-September.

Kevin Birdwell asked how the radio system works in complex terrain and Chuck referred him to Matt Parker, who is the principal investigator of this field study.

Each of the research partners will provide various instruments. BNL will provide 15 sources of field deployable tracer gas and 30 portable CO_2 samplers and a mobile analyzer for near real-time plume detection. UGA will contribute a sodar, vertically pointing lidar, a microbarograph array, 20 Hz sampling, and a short flux tower with a sonic anemometer and a fast-response CO_2 monitor. SRNL will provide a tethersonde with a CO_2 sampling package, and a mobile CO_2 sampling device. SRNL will also run a transport and diffusion code (i.e., HYSPLIT) with RAMS-simulated meteorology.

The tracer study will release more than 100,000 particles over a 9-hour period from 10 sources and examine the evolution of plumes as it impacts a downwind TV tower with instrumentation to 300 meters at 50-meter increments. It is assumed that it is a continuous, unit release (i.e., 1 Ci/hr) at the surface from each source. Average 15-minute concentrations will be calculated over the 9-hour period for 6 different layers up to 300 m.

Chuck was requested to provide a copy of the report, or to post it on the DMCC web page, when it was completed.

ACTION ITEM 09-03: Provide report on SRNL field study.

Chuck's presentation is accessible in Appendix E.

3.2 INL: EPA Sound Barrier Study – Kirk Clawson

Via *Live Meeting*, Kirk Clawson discussed the meteorological support provided to Idaho National Laboratory (INL) which is provided by the Air Resources Laboratory Field Research Division. Kurt's special topic was a discussion of the roadside sound barrier tracer study that is being conducted for the Environmental Protection Agency (EPA). EPA is concerned about air toxics from automobile exhaust passing through roadside sound barriers and how the air toxics could adversely affect drivers on the road.

Kirk showed the experimental configuration of the field tracer study including a sampling grid schematic, an aerial view of the straw stack sound barrier, the SF_6 tracer release line and system, the bag sampler, the configuration of the barrier, samplers, and sonic anemometers, as well as the non-barrier reference, and the sonic release line and sample grid. Kirk also elaborated on the meteorological data being collected to support the field study objectives. Sampling arrays were set up for SW and NE wind fetches.

Kirk presented a summary of the study's conclusions. Most of the results confirmed that the maximum concentrations were behind the barrier. However, the barrier demonstrated a lot of dispersive capabilities. EPA intends to use the results of this field study to incorporate new algorithms into its AERMOD transport and diffusion model.

Kirk was requested to provide a copy of the report, or to post it on the DMCC web page, when it was completed.

ACTION ITEM 09-04: Provide report on INL field study.

Kirk's presentation is accessible in Appendix F.

3.3 Hanford: Assist Visit Findings – Cliff Glantz

Cliff Glantz presented an overview of the Hanford meteorological program and also discussed the recent DMCC AV that was conducted at Hanford by Carl Mazzola, Walt Schalk, and Matt Parker on September 25–26, 2008. The Hanford Meteorology Services (HMS) program provides weather forecasts in support of routine and special site operations, detects adverse weather events on the reservation (e.g., heat stress, thunderstorms) that may affect worker safety, supports emergency response, and provides specialized support to site cleanup operations (e.g., building demolition). The meteorological program is part of the PNNL Public Safety and Resource Protection Project which includes Hanford environmental oversight, surface surveillance, ecological monitoring, and cultural resources, and has been in continuous operation since 1944. It has 34 meteorological monitoring locations including one 400-foot tower and three 200-foot towers. An on-duty forecaster is available 21 hours/day (i.e., 8:00 p.m. to 11:00 p.m. are not covered) during the week and 8 hours per day on weekends and holidays (i.e., 6:00 a.m. to 2:00 p.m.).

Cliff discussed the particulars of the Hanford meteorological program website. Recent upgrades include a backup meteorological data polling station which is in testing mode and the purchase of new servers which should be faster, more reliable, and have more capabilities. These servers push out data to the various ftp sites [i.e., Emergency Operations Center (EOC), PNNL, external].

Cliff indicated that the homegrown MetView and APGEMS codes are the consequence assessment models of choice at the Hanford Unified Dose Assessment Center (UDAC). He also mentioned that a new home for the meteorological program is possible based on the recent M&O contractor change which is in the transition phase.

Cliff then discussed the details of the AV which evaluated the Hanford meteorological program against the Voluntary Consensus Standard (VCS) ANSI/ANS-3.11 (2005) and the meteorological aspects of the consequence assessment element against DOE G 151.1-1. Noteworthy practices included effective integration with other environmental programs at the Hanford site, a

large and diverse group of satisfied onsite customers, the MetView program rating as *excellent,* excellent calibration of the rain gauges, and a reliable radio link with 34 meteorological towers.

There were also 29 observations and recommendations which include the need to add staff, as the program is significantly understaffed. In addition, documented procedures are needed and there is a need for more connection with the ASGC division, and with senior meteorologist leadership, and a need to implement an ANSI/ANS-3.11-compliant quality assurance program. The AV team noted that there is no upper air data monitoring, which can be resolved by the purchase and strategic siting of a sodar, mini-sodar or wind profiler. There also is a need for capital upgrades and an improvement of guy wiring and anchor rod inspections, as well as a relational database for data storage. The AV team also observed that there is a need for better infrastructure for computer equipment and a means of providing direct measurement of turbulence. Lastly, the team encouraged information sharing among forecasters and stated that numerical modeling for forecasting purposes should become part of the consequence assessment program.

A draft AV report was provided to the Hanford stakeholders in December 2008 and 41 comments were provided to the team in March 2009. Resolution of the comments is currently occurring and a final report is targeted for sometime in June 2009. Cliff requested Carl Mazzola to meet with Dana Ward, DOE-Richland, to discuss the final report and its implementation the next time he is on the west coast.

Cliff was requested to make the APGEMS and MetView models available to the DMCC membership.

ACTION 09-05: Provide the APGEMS and MetView models to the DMCC membership.

Cliff's presentation is accessible in Appendix G.

3.4 NTS: News from the Desert – Walt Schalk

Walt Schalk discussed the Nevada Test Site (NTS) meteorological program which has been operated by ARL/SORD and its predecessors since 1958. Steve Mellington is the new Nevada Site Office (NSO) Manager.

NSO funding remains very tight and very little stimulus money is available to mitigate this situation. The M&O contractor had many layoffs in the last year, in part due to the budget shortfall. ARL/SORD staffing was reduced even further and Jim Sanders, a senior meteorologist at NTS for many decades, retired in December 2008. In addition, one of the two Electronics Techs left in the summer of 2008. To conserve limited funds, there is an ongoing effort towards facility space reduction.

Presently DOE is refocusing the site mission away from testing and test readiness with more emphasis on operations, safety (i.e., wind and lightning), climatology

and data collection. Moreover, there is more focus on developing better tools to support DOE.

A significant development for ARL/SORD was its new responsibility for the NTS consequence assessment function.

In the future, ARL/SORD will continue to work with WRF, which is run over the NTS, Las Vegas, and Southern Nevada for a 36-hour to 48-hour period. WRF is coupled with HYSPLIT, a NOAA consequence assessment code. ARL/SORD also supported a multi-national experiment in the fall of 2008 and provided forecasting and balloon launches. This year ARL/SORD replaced the five Vaisala lightning sensors at a capital equipment cost of $300,000. Walt is looking at additional capital improvements to purchase a sodar, fix the wind profiler and move forward into current technology. He would also like to leverage the recent NOAA partnership with Google.

Walt mentioned that there has been no forward movement on the new initiative to involve ARL/SORD in the emergency management group's deconfliction of Nellis Air Force Base air space.

Walt's presentation is accessible in Appendix H.

3.5 News Round-up from Other Sites – Various contributors

LLNL: Fernando Aluzzi mentioned that the two LLNL operational meteorology positions have not been back-filled. LLNL continues without an operational meteorologist.

Pantex: One of the prior LLNL meteorologists, Brent Bowen, has taken a part-time position at Pantex, which has been without an operational meteorologist for more than 3 years.

ORNL: Kevin Birdwell discussed his program at ORNL and the recent DMCC AV. He mentioned that the March 2009 AV was very helpful to him and the ORNL meteorological program, as it gained the proper management attention. Because of the AV observations and recommendations, a summer-fall intern will be hired to provide additional support to the program followed by the hiring of a full time individual during FY10. ORNL has recently upgraded its meteorological data communication systems from the old 1200 baud system to a modern radio transmission system, and it has also enhanced its CAPARS system capabilities.

Kevin indicated that he was encouraged that the radio transmission is not adversely affected by the nearby ridges and that issues with meteorological data transmission associated with new cybersecurity requirements are less than anticipated.

Y-12: Tom Bellinger discussed the Y-12 meteorological program. He continues to work on the May 2008 AV observations and recommendations. He reported resolution of the most important observations. Tom has installed a real-time wet-bulb globe temperature (WBGT) monitor on both the East tower and West tower

to provide direct input for heat stress calculations. Carl Mazzola requested that Tom provide information on the real-time wet-bulb globe temperature system to the DMCC as his site is the first to accomplish this.

ACTION 09-06: Provide real-time wet-bulb globe temperature monitoring information to the DMCC membership.

Tom also mentioned that field mills to assist with real-time lightning detection have not been installed. He also shared that the Y-12 web page is reconfigured and upgraded.

SRNL: Erik Kabela discussed the SRNL NOAA port satellite system feed. SRNL uses a Local Data Manager (LDM) feed through the University Corporation for Atmospheric Research (UCAR) as a back-up. The SRNL web page also is redesigned and upgraded.

A ceilometer was installed in the B-Area to provide 24-hour cloud height data which assists the security contractor with its flight operations. Lastly, SRNL worked with Shaw AREVA MOX Services to provide a link to its web page and assistance during severe weather events.

Cliff Glantz requested information on the ceilometers.

ACTION 09-07: Provide ceilometer information to the DMCC membership.

Hanford: Cliff Glantz is working a cybersecurity project with the NRC and mentioned that a new NRC regulation on that topic will soon be issued. It addresses critical infrastructure and will result in the augmentation of existing safety, security and emergency response systems.

Chuck Hunter mentioned that cybersecurity scans have had a minor effect on meteorological system operations. Cliff agreed to develop a White Paper on cybersecurity for the DMCC membership. Kevin Birdwell and John Ciolek mentioned that cybersecurity concerns prompted the current upgrades to the operational CAPARS systems and that they caused some problems that took a while to resolve.

ACTION 09-08: Provide cybersecurity White Paper to the DMCC membership.

4.0 DMCC BUSINESS, PRODUCTS, PROJECTS AND ACTIVITIES

4.1 Overview of 2009 DMCC Activities – Walt Schalk

Walt Schalk described the mission and the objectives of the DMCC and presented a history of the many accomplishments of the Council over its 14½-year history. Walt indicated that the 15th Meeting of the DMCC was held on May 2008 in Reston, Virginia. Since that meeting, DMCC has held five (5) teleconferences. The average attendance at the teleconferences has been between ten (10) and twelve (12) participants per call.

Walt shared highlights of the DMCC accomplishments during the May 2008–April 2009 period that he will be presenting to the EMI SIG Steering Committee later today.

Walt's presentation is accessible in Appendix I.

4.2 DMCC Assist Visit Program – Carl Mazzola

Carl Mazzola presented an update to the DMCC Assist Visit (AV) Program. This program became increasingly more active over the past year with AVs conducted at Y-12 and Hanford in 2008, and ORNL in 2009. An AV is scheduled for SRNL in June 2009.

Carl presented the DMCC objectives for AVs as follows:

- 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
- Encouragement for onsite meteorological research to further understand local atmospheric processes on atmospheric transport and dispersion
- Identification of needs to upgrade and modernize the meteorological monitoring program to meet future mission applications

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

Program improvements discussed from the 1996–2009 DMCC AVs include:

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

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

- ANSI/ANS-3.11 (2005)
- DOE G 151.1-1

There are 23 ANSI/ANS-3.11 (2005) performance criteria for meteorological monitoring in the following five categories:

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

Once 23 performance criteria are reviewed, a determination is made whether the objective is fully met, partially met or not met. Observations and recommendations within the 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 19 specific evaluation criteria from DOE G 151.1-1. Consequence assessment models are evaluated for accuracy; meteorological data linkage; support to environmental monitoring programs; links to meteorological data; availability in real-time; support for facility-specific and local meteorological factors that affect transport and dispersion, quality assurance, and provision of information to offsite agencies.

Once 19 performance criteria are reviewed, it is determined whether the objective has been fully met, partially met and not met. Observations and recommendations within the AV report are linked to the performance criteria that are either partially met or not met.

The next stage of the AV involves conducting interviews with various customers, including the following six site organizational elements:

- Environmental Compliance: NESHAPS and National Pollutant Discharge Elimination System (NPDES)

- Emergency Management: EPHA and CA
- Integrated Safety Management: PDSA, DSA, LCO and BIO
- Environmental Safety & Health: OSHA and PSM
- Environmental Monitoring: ASER
- 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 AV information is communication of noteworthy practices, observations, and recommendations.

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

Carl's discussion is accessible in Appendix J.

4.3 ANS Standards Update – John Ciolek, Carl Mazzola, Steve Vigeant

John Ciolek, Carl Mazzola, and Steve Vigeant reported on the progress of eight voluntary consensus standards (VCS) that are associated with meteorological data and its application.

John Ciolek, Chairman of the ANSI/ANS-2.15 Working Group, discussed the progress of this VCS which began its work in September 2004. This standard addresses the transport and diffusion modeling of routine releases of radionuclides. John reported good progress since the last DMCC meeting, and was confident that the goal of having a draft of the standard available for consensus review by the October 21–23, 2009 NUMUG meeting is achievable. After this standard is complete, work will begin on ANSI/ANS-2.16 and ANSI/ANS-3.8.10.

Carl Mazzola discussed the status of various standards that he is presently involved with. This includes ANS-2.3, which addresses extreme straight-line winds, hurricanes, and tornadoes, and ANS-58.25, which addresses a Level 3 Probabilistic Risk Assessment (PRA). His role in the latter standard is to develop the sections on meteorological data requirements and the appropriate atmospheric transport and diffusion models. Carl also indicated that Matt Parker is the Chairman of ANSI/ANS-3.11(2005). This standard is scheduled for reaffirmation in 2010. Carl stated that a new standard, ANSI/ANS-2.31, associated with extreme precipitation will be started shortly.

Steve Vigeant discussed ANSI/ANS-2.21, "Ultimate Heat Sink." This standard should be ready for consensus review by the end of May 2009.

4.4 Software Quality Assurance – Cliff Glantz

Cliff Glantz presented the status of the meteorological data Software Quality Assurance (SQA) effort.

Cliff discussed the background associated with this project. He indicated the DOE Central Registry Office has issued SQA guidance for safety-related meteorology software through DOE Order 414.1C and DOE Guide 414.1-4. In addition to the efforts of the Central Registry, there are parallel efforts on SQA by SCAPA and the Energy Facilities Contractor Group (EFCOG). He noted that in 2005, DOE issued an Order and Guide establishing SQA requirements for safety software. However, there was no guidance provided for safety-related or non-safety software.

Cliff discussed the meaning of safety software, which is defined to include software that "performs a safety function" as part of a structure, system, or component (SSC) at a nuclear facility. Thus, safety software is a code that is used to classify, design, or analyze nuclear facilities which helps to ensure the proper accident or hazards analysis of nuclear facilities or an SSC with a safety function. In addition, there is software that performs a hazard control function or a control function necessary to provide adequate protection from hazards. This software supports "eliminating, limiting, or mitigating nuclear hazards to workers, the public, or the environment. . .." Cliff discussed the application of the SQA Order and Guide indicating that safety software is used for hazards assessment and safety planning purposes, as well as emergency response purposes that provide a direct hazard control function. The latter are models used to make protective action recommendations (PARs), such as HOTSPOT, EPICODE and ALOHA.

Cliff then discussed the concerns involving DOE O 414.1C, which primarily are that the average cost to bring widely used simple codes (e.g., GENII, EPICODE) into full compliance with that order requirements is approximately $300,000 per model, and for more sophisticated software and models, these costs would be even greater. Therefore, there is a need to find a balance that allows the effective use of resources. Cliff then elaborated on how to find the right balance (e.g., graded approach) between safety software, which must comply with DOE O 414.1C and non-safety software. Cliff also indicated that SCAPA and EFCOG both want to adopt an appropriate SQA approach to safety-related or non-safety software. This can be based on the DOE SQA Order and Guide, but less burdensome while emphasizing key elements and compatible with site-specific or contractor-specific requirements.

Cliff then discussed his proposed SQA Guidance. The first step is to review each of the ten SQA work activities specified in the DOE Order for safety software and then determine which activity elements are pertinent for application to the software. After that is completed, the next steps are to develop SQA project management and quality planning documentation, describe needed SQA activities, establish SQA milestones, assign SQA responsibilities, and prepare design and implementation documentation to clearly detail how the software works.

Cliff emphasized the need for sufficient information to support continuity in software development and maintenance if there were an abrupt change in personnel, and that users would be provided with sufficient technical documentation to efficiently use the software and understand what it is doing. He iterated the need to develop a Configuration Management Plan (CMP) to ensure configuration control during software development and ensure secure storage of the source code, executables, software documentation verification and validation (V&V) test procedures and results, and other types of SQA documentation.

Finally, Cliff elaborated on the design, conduct, and documentation of V&V testing with a focus on the portions of the code that were modified, inclusive of baseline testing and independent testing by someone not on the software development team. He closed his talk by stating that there is a need to develop and implement a problem reporting and tracking program and to train the software development team and prepare user guides.

Cliff's presentation is accessible in Appendix K.

4.5 NUMUG/DOE/NNSA Facility Meteorological Program Mini-Surveys – John Ciolek

John Ciolek presented the series of surveys that NUMUG and DMCC are jointly conducting. The first mini-survey will be sent out the week of May 11, 2009.

The first survey that NUMUG conducted was in 1992 in which responses associated with 54 meteorological towers were received, followed by a 1997 survey that elicited responses from 82. This will be the first survey in almost 12 years.

John's presentation is accessible in Appendix L.

4.6 DMCC Web Forum – John Ciolek

John Ciolek discussed the DMCC web forum and encouraged all DMCC members to use this excellent networking tool. The web forum is being used as a blog and as a repository for information on ANSI/ANS-2.15, keeping a running commentary on the decision process associated with the development of this voluntary consensus standard.

4.7 DMCC Web Page Update – Cliff Glantz

Cliff Glantz discussed the new entries on the DMCC Web Page. DMCC Homepage, http://orise.orau.gov/emi/dmcc/default.htm.
The web page includes navigation options, meeting webpage, and current AIs.

It also includes 2009 meeting news, links to web sites of DOE/NNSA meteorological programs, previous DMCC meeting reports, technical products, technical links, DMCC contacts, DMCC membership list, publications, teleconference highlights and website credit.

5.0 DMCC BUSINESS MEETING

Walt Schalk led the Annual DMCC Business Meeting discussion. The purpose of the annual business meeting 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 discussions of the business meeting:

- Walt reviewed the AIs that resulted from the meeting, which are as follows:

ACTION 09-01: Track progress of GPU usage in atmospheric modeling applications and keep DMCC membership current.

ACTION ITEM 09-02: Develop DMCC White Paper on vector and scalar wind speed usage consistent with ANSI/ANS-3.11.

ACTION ITEM 09-03: Provide report on SRNL field study.

ACTION ITEM 09-04: Provide report on INL field study.

ACTION 09-05: Provide the APGEMS and MetView models to the DMCC membership.

ACTION 09-06: Provide real-time wet-bulb globe temperature monitoring information to the DMCC membership.

ACTION 09-07: Provide ceilometer information to the DMCC membership.

ACTION 09-08: Provide cybersecurity White Paper to the DMCC membership.

- John Ciolek encouraged continued information exchange with NUMUG and for DMCC members to attend the upcoming October 21–23, 2009 NUMUG meeting which will also be in San Francisco, California. Ed McCarthy, the NUMUG chairman, agreed that it was valuable to interact with DMCC, especially with respect to the work that is being accomplished with the meteorological VCS. John will send information on the DMCC Forum to Ed McCarthy to share with the NUMUG membership. In addition, information on real-time monitoring of wet bulb globe temperature at Y-12 and the ceilometer at SRS will also be shared with NUMUG.

- Walt Schalk presented his thoughts on the early planning for the next DMCC meeting. Since this meeting was very successful and DMCC is becoming more strongly affiliated with the EMI SIG each passing year, scheduling the next DMCC meeting with next year's EMI SIG meeting continues to make good sense. Therefore, it was determined that the 17th DMCC Meeting will be a one-day meeting tentatively scheduled for Monday, May 3, 2010, in an East Coast city that will be hosting the EMI SIG meeting.

- The DMCC Business Meeting was adjourned until May 2010. The next teleconference will be held in July 2009.

6.0 ACRONYMS

A

AERMOD	EPA Transport and Diffusion Model
AI	Action Item
ANS	American Nuclear Society
ANSI	American National Standards Institute
ARCON96	NRC Transport and Diffusion Model
ARL	Air Resources Laboratory
ATD	Atmospheric Transport and Diffusion
AV	Assist Visit

B

BAAQS	Bay Area Air Quality District
BNL	Brookhaven National Laboratory
BWXT	Y-12 M&O Contractor

C

CA	Consequence Assessment
CAPARS	Computer-Assisted Protective Action Recommendation System
CFD	Computational Fluid Dynamics
CMP	Configuration Management Plan
CPU	Central Processing Unit
CTP	Carbon Tracker Program
CUDA	Compute Unified Device Architecture

D

D	Dimension
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
EFCOG	Energy Facilities Contractor Group
EIS	Environmental Impact Statement
EMI	Emergency Management Issues
EOC	Emergency Operations Center
EP&R	Emergency Preparedness & Response
EPA	Environmental Protection Agency
EPHA	Emergency Preparedness Hazard Assessment
ER	Environmental Report
ERO	Emergency Response Organization
ES&H	Environment Safety & Health
ETTP	East Tennessee Technology Park

F

FAA	Federal Aviation Administration
FRD	Field Research Division
FTE	Full-Time Equivalent
FY	Fiscal Year

G

G	Guide
GA	Georgia
GENII	EPA dispersion code
GMD	Global Monitoring Division
GPU	Graphics Processing Unit

H

HQ	Headquarters
HMS	Hanford Meteorology Services
HS	Health, Safety & Security
HYSPLIT	An atmospheric transport and dispersion model
Hz	Hertz

I

ID	Idaho
INL	Idaho National Laboratory

J

K

km	kilometer

L

LANL	Los Alamos National Laboratory
LCO	Limiting Condition for Operation
LDM	Local Data Manager
LIDAR	Light Detection and Ranging
LLNL	Lawrence Livermore National Laboratory

M

M&O	Management & Operations
MADIS	Meteorological Assimilation Data Ingest System
MB	Megabyte
MM5	A prognostic Mesoscale model
MOX	Mixed Oxide

N

NA-41	Office of Nuclear Non-proliferation
NARAC	National Atmospheric Release Advisory Center
NCAR	National Center for Atmospheric Research
NCEP	National Center for Environmental Programs
NEPA	National Environmental Policy Act
NESHAPS	National Environmental Standards for Hazardous Air Pollutants
NM	New Mexico
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NORM	Naturally Occurring Radioactive Materials
NPDES	National Pollutant Discharge Elimination System

NRC	Nuclear Regulatory Commission; National Research Council
NSO	Nevada Site Office
NSTec	NTS M & O Contractor
NTS	Nevada Test Site
NUMUG	Nuclear Utility Meteorological data User Group
NWS	National Weather Service
	O
O	Order
ORISE	Oak Ridge Institute for Science and Education
OSHA	Occupational Safety and Health Association
	P
PA	Pennsylvania
PAR	Protective Action Recommendation
PC	Personal Computer
PDSA	Preliminary Documented Safety Analysis
PEIS	Programmatic Environmental Impact Statement
PNNL	Pacific Northwest National Laboratory
PS&RPP	Public Safety and Resource Protection Project
PSM	Process Safety Management
	Q
QA	Quality Assurance
	R
R&D	Research & Development
RAMS	Regional Atmospheric Modeling System
RUC	Rapid Update Code
	S
SC	Office of Science
SCAPA	Subcommittee on Consequence Assessment and Protective Actions
SE&I	Shaw Environmental & Infrastructure
SIG	Special Interest Group

SNL	Sandia National Laboratory
SODAR	Sonic Detection and Ranging
SORD	Special Operations & Research Division
SQA	Software Quality Assurance
SRNL	Savannah River National Laboratory
SRS	Savannah River Site
SSC	Structure System Component

T

TV	Television

U

UCAR	University Corporation for Atmospheric Research
UGA	University of Georgia
UHS	Ultimate Heat Sink
US	United States
USFS-SR	United States Forest Service – Savannah River

V

V&V	Verification & Validation
VCS	Voluntary Consensus Standard

W

WBGT	Wet Bulb Globe Temperature
WFO	Weather Forecast Office
WIPP	Waste Isolation Pilot Plant
WRF	Weather Research and Forecasting
WSI	Weather Services Incorporated

X

Y

Z

7.0 APPENDICES

Since the meeting presentations were not developed prior to the meeting, this section documents the presentations and other relevant documentation made at this meeting. Following is a list of the twelve (12) presentations.

A DMCC Meeting Agenda

B Reformulating WRF Model for Graphics Processors

C Scalar Versus Vector Winds

D Analytical Screening Technique to Estimate Effects of Cooling Ponds on Meteorological Measurements

E SRNL: Nocturnal Field Study

F INL: EPA Sound Barrier Study

G Hanford: Assist Visit Findings

H NTS: News from the Desert

I Overview of 2009 DMCC Activities

J Assist Visit Program Update

K Software Quality Assurance Update

L NUMUG/DOE/NNSA Facility Meteorological Program Mini-Surveys

APPENDIX A

16th Meeting of the DOE Meteorological Coordinating Council (DMCC)
May 4, 2009; Mark Hopkins Hotel, San Francisco, CA

AGENDA

I WELCOME, INTRODUCTIONS (*0800-0810*)

II PROJECTS AND TOPICS FROM AROUND THE COMPLEX

- ***A*** *Reformulating WRF Model for Graphics Processors (John Ciolek, Alpha-TRAC)*
- ***B*** *Scalar vs. Vector Winds (Chuck Hunter, SRNL)*

III ROUND ROBIN: BEST PRACTICES AND LESSONS LEARNED AT DOE/NNSA SITES

- ***A*** *SRNL: Nocturnal Field Study and other News (Chuck Hunter, SRNL)*
- ***B*** *INL: EPA Sound Barrier Study and other News (Kirk Clawson, ARL/FRD)*
- ***C*** *Hanford: Assist Visit Findings, Path Forward, and other News (Ken Burk. PNNL)*
- ***D*** *NTS: News from the Desert (Walt Schalk, ARL/SORD)*
- ***E*** *News Roundup for BNL, SNL, LLNL, LANL, Y-12, ORNL, Pantex, ANL, WIPP, etc*

FEATURED LUNCH-TIME PRESENTATION*: Analytical Screening Technique to Estimate Effects of Cooling Ponds on Meteorological Measurements: (Steve Vigeant, Shaw Environmental Incorporated)*

IV DMCC BUSINESS, PRODUCTS, PROJECTS AND ACTIVITIES (*1215-1345*)

- ***A*** *Overview of 2009 DMCC Activities (Walt Schalk)*
- ***B*** *Assist Visit Program Update (Carl Mazzola)*
- ***C*** *DOE NA-41 Report (Jim Fairobent, NA-41)*
- ***D*** *ANS Standards Updates (John Ciolek; Steve Vigeant; Carl Mazzola)*
- ***E*** *Software Quality Assurance Update (Cliff Glantz)*
- ***F*** *NUMUG/DOE/NNSA Facility Meteorological Program Mini-surveys (John Ciolek)*
- ***G*** *DMCC Web Forum Update (John Ciolek)*
- ***H*** *DMCC Web Page Update (Cliff Glantz; Dorothy Cohen)*
- ***I*** *New Business (All)*
- ***J*** *Review of New Action Items (All)*

1430 **ADJOURNMENT**

APPENDIX B –Reformulating WRF Model for Graphics Processors

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APPENDIX C –Scalar Versus Vector Winds

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APPENDIX D—Analytical Screening technique to Estimate Effects of Cooling Ponds on Meteorological Measurements

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APPENDIX E—SRNL: Nocturnal Field Study

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APPENDIX F—EPA Sound Barrier Study

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APPENDIX G—Hanford: Assist Visit Findings

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APPENDIX H—NTS: News from the Desert

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APPENDIX I—Overview of 2009 DMCC Activities

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APPENDIX J—Assist Visit Program Update

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APPENDIX K—Software Quality Assurance Update

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APPENDIX L—NUMUG/DOE/NNSA Facility Meteorological Program Mini-Surveys

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