APPENDIX A

FEDERAL COORDINATION AND PLANNING

BASIS FOR FEDERAL COORDINATION PROCESS

In 1963, Congress and the Executive Office of the President expressed concern about the adequacy of coordination of federal meteorological activities. In response, Congress directed in Section 304 of Public Law 87-843--the Appropriations Act for State, Justice, Commerce, and Related Agencies--that the Bureau of the Budget prepare an annual horizontal budget for all meteorological programs in the federal agencies.

The Bureau of the Budget (now the Office of Management and Budget) issued a report entitled "Survey of Federal Meteorological Activities" (1963). The report described each agency's program in some detail, particularly its operational services, and detailed the relationship between the programs of the various agencies. The report revealed close cooperation but little evidence of systematic coordination. Based on this study, the Bureau of the Budget issued a set of ground rules to be followed in the coordination process. It established a permanent general philosophy for assignment and assessment of agency roles in the field of meteorology and set certain goals to be achieved by the coordination process. The Bureau of the Budget tasked the Department of Commerce (DOC) to establish the coordinating mechanism in concert with the other federal agencies. It also reaffirmed the concept of having a central agency--the DOC--responsible for providing common meteorological facilities and services and clarified the responsibilities of other agencies for providing meteorological services specific to their own needs.

The implementation of these directives by DOC led to the creation of the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) which operates with policy guidance from the Federal Committee for Meteorological Services and Supporting Research. The principal work in the coordination of meteorological activities and in the preparation and maintenance of federal plans is accomplished by the OFCM staff with the advice and assistance of the Interdepartmental Committee for Meteorological Services and Supporting Research, and over 30 program councils, committees, working groups, and joint action groups.

MISSION AND STAFFING OF THE OFFICE OF THE FEDERAL COORDINATOR FOR METEOROLOGY

The mission of the OFCM is to ensure the effective use of federal meteorological resources by leading the systematic coordination of operational weather requirements and services, and supporting research, among the federal agencies. To discharge its mission, OFCM has meshed its objectives with the objectives of the agencies that provide the services and perform the research.

These objectives include:

- Documenting agency programs and activities in a series of national plans and reports that enable agencies to revise/adjust their individual ongoing programs and provide a means for communicating new ideas and approaches to fulfill requirements.
- Providing structure and programs to promote continuity in the development and coordination of interagency plans and procedures for meteorological services and supporting research activities.
- Preparing analyses, summaries, or evaluations of agency meteorological programs and plans that provide a factual basis for the Executive and Legislative branches to make appropriate decisions related to the allocation of funds.
- Reviewing federal weather programs and federal requirements for meteorological services and supporting research. This review may suggest additions or revisions to current or proposed programs, or identify opportunities for improved efficiency, reliability, or cost avoidance through coordinated actions or integrated programs.

DOC currently has ten positions assigned to OFCM. DOC also provides administrative support to OFCM and approximately one-half of OFCM's annual operating budget. The Department of Defense (DOD) currently provides two senior staff officers--one Air Force and one Navy--and contributes approximately one-fourth of the annual operating budget. The Department of Transportation (DOT) Federal Aviation Administration (FAA) provides one professional staff member and also provides approximately one-fourth of the annual operating budget. These three agency representatives are designated Assistant Federal Coordinators for liaison to their respective agencies. In all, 13 meteorologists, oceanographers, physical scientists, and administrative and computer-support personnel are assigned to the OFCM staff.

FEDERAL COMMITTEE FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

The Federal Committee for Meteorological Services and Supporting Research (FCMSSR), established in 1964, provides policy-level agency representation and guidance to the Federal Coordinator to address agency priorities, requirements, and issues related to services, operations, and supporting research, and also resolves agency differences that arise during the coordination of meteorological activities and the preparation of federal plans. The Under Secretary of Commerce for Oceans and Atmosphere, who is also the Administrator of the National Oceanic and Atmospheric Administration (NOAA), serves as the FCMSSR Chair.

The 15 federal agencies that engage in meteorological activities or have a need for meteorological services are represented on FCMSSR. The FCMSSR membership includes: DOC, DOD, DOT, the Departments of Agriculture (USDA), Energy (DOE), Homeland Security (DHS), Interior (DOI), and State (DOS), and the Environmental Protection Agency (EPA), National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), National Transportation Safety Board (NTSB), Nuclear Regulatory Commission (NRC), the Office of Science and Technology Policy (OSTP), and the Office of Management and Budget (OMB).

HIGHLIGHTS FOR FISCAL YEAR 2002 AND PLANS FOR FISCAL YEAR 2003

NATURAL DISASTER REDUCTION

Interdepartmental Hurricane Conference. OFCM annually hosts the Interdepartmental Hurricane Conference (IHC) to provide a forum for the responsible Federal agencies, together with representatives of the user communities such as emergency management, to review the Nation's hurricane forecast and warning program and to make recommendations on how to improve the program in the future. The 57th IHC was held in Miami, Florida, March 10-14, 2003. The theme for the conference was *The Nation's Hurricane Warning Program-Streamlining the Roadmap for the Future*. Dr. James R. Mahoney, Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy NOAA Administrator, provided the keynote address. The conference began with a review of the 2002 tropical cyclone season in the Atlantic Ocean, Gulf of Mexico, Caribbean Sea, and the Pacific Ocean, followed by sessions on: (1) Observing and Reconnaissance Technologies; (2) Hurricane Modeling and Prediction; (3) Tropical Cyclone Hazards, Impacts, and Products; (4) The National Hurricane Program-Where the Rubber Meets the Road; and (5) Transitioning Research to Operations including H*Wind-Making the Transition to Operations and Joint Hurricane Testbed. Workshops and a forecaster/operations forum were conducted to reinforce and build upon the topics addressed during the sessions and action items from recent conferences. The Working Group for Hurricane and Winter Storms Operations and Research met to work on IHC action items and changes to the *National Hurricane Operations Plan* (NHOP). The 41st edition of the NHOP provides the basis for hurricane reconnaissance for the 2003 season and details responsibilities of Federal agencies; operations and procedures; products; aircraft, satellite, radar, and buoy data collection; and marine weather broadcasts. A tour of the National Hurricane Center/Joint Hurricane Testbed was also conducted.

Several major accomplishments that have resulted from specific action items that were brought to the IHC or have been achieved through the partnership arrangements facilitated by the IHC include: implementation of the 5-day hurricane forecast; development of the Stepped Frequency Microwave Radiometer; improved capability because of use of Global Positioning System dropwindsondes; improved hurricane modeling and prediction; increased focus on inland flooding; the successful partnering with the Federal Emergency Management Agency through the Hurricane Liaison Team; improved preparedness, response and outreach to the public through Hurricane Awareness Week; support to the Joint Hurricane Testbed; partnership between IHC and The Weather Channel; and increased outreach to other Federal agencies.

National Hurricane Conference. OFCM participated in the 25th Annual National Hurricane Conference (NHC) in New Orleans, Louisiana, April 14-18, 2003. The theme of the NHC was *Where We Have Been and Where We Are Going in Forecasting and Emergency Preparedness and Response*. The NHC is the Nation's forum for education and professional training in hurricane preparedness. There were approximately 1,300 attendees representing a large cross section of the hurricane emergency planning, response, and recovery communities, including emergency managers; fire and law enforcement officials; engineers; meteorologists and geographers; volunteer agency representatives; and city and county commissioners, man-

agers, and planners. OFCM and the Federal Emergency Management Agency conducted a Training Workshop on April 14th. The workshop theme was *Risk Assessment-Characterizing the Impact of Hurricanes and Inland Flooding to Help Emergency Managers and the Public Deal with the Risks They Face*. The training workshop was divided into two panels: (1) the role of Federal statutes, policies, and procedures in dealing with environmental threats and risks, and (2) operational and emerging decision-making programs, tools, and techniques for risk management and assessment. Panelists included the Staff Director for Senator John B. Breaux of Louisiana and the Chief of Operations for Congressman W.J. "Billy" Tauzin of Louisiana's 3rd District, who both had special interest in storm surge and coastal erosion issues.

Post-Storm Data Acquisition. The OFCM-sponsored Working Group for Natural Disaster Reduction/Post-Storm Data Acquisition coordinated efforts to:

- Examine the devastation following the landfall of Hurricane Lili along the coast of Louisiana in October 2002;
- Survey tornado damage in the Fort Wayne, Indiana, and the Knoxville, Tennessee, areas in November 2002;
- Survey tornado damage in southwest Georgia (Mitchell and Worth Counties) in March 2003;
- Survey tornado damage in northern, central, and southern Arkansas in April 2003;
- Survey tornado damage in western Tennessee, Wyandotte County in Kansas, Platte and Clay Counties in Missouri, the Springfield area in Missouri, the Paducah area in Kentucky, the Madison, Heard, Coweta, Troup, and Meriwether Counties in Georgia, areas in southeast Missouri, southern Illinois, and western Kentucky, and Lewis County, Kentucky in May 2003;
- Survey tornado damage in the Sioux Falls area in South Dakota in June 2003; and
- Survey the tornado/flood event which occurred across southwest and central Minnesota in June 2003.

Aerial photography support was provided by the Air Force's Civil Air Patrol. The support provided by the Civil Air Patrol, which was negotiated by the working group and documented in a memorandum of understanding, has proven to be both timely and very cost effective. OFCM also served as a conduit between agencies for information and contacts for post-storm data gathering for Hurricane Isabel in September 2003. These post-storm efforts contribute to the determination of the intensity and magnitude of storms, and in many cases help to determine the extent of damage for use in Presidential disaster declarations. The additional data collected after hurricane landfall is also used in validating modeling efforts with both emergency management models (e.g., FEMA's HAZUS) and hurricane storm surge models (e.g., NOAA's SLOSH). These models are used in real-time to assist decision makers in evacuation decisions and procedures. Post-storm data are also used to update FEMA Flood Insurance Rate Maps. OFCM also published the *National Post-Storm Data Acquisition Plan* in March 2003.

FEDERAL COMMITTEE FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH. The Federal Committee for Meteorological Services and Supporting Research (FCMSSR) met on October 18, 2002, at the White House Conference Center in Washington, D.C. The meeting was chaired by VADM Conrad C. Lautenbacher, Jr., USN (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator. Items considered include Environmental Support to Homeland Security, Climate Change Research Initiative, Phased Array Weather Radar Project, Weather Information for Surface Transportation, and Integrated Global Observing System. Actions resulting from the meeting include conducting an interagency forum on Environmental Support to Homeland Security, and agency support for the development and expansion of the Washington, D.C., Dispersion Testbed; support to the Climate Change Research Initiative and the *U.S. Climate Change Science Program-Planning Workshop for Scientists and Stakeholders*; expansion of agency participation in the Phased Array Weather Radar Project; and publication of the report *Weather Information for Surface Transportation-National Needs Assessment Report*.

ENVIRONMENTAL SUPPORT TO HOMELAND SECURITY

George Mason University Transport and Dispersion Modeling Conference/ OFCM Special Session. George Mason University (GMU), Fairfax, Virginia, conducted its 7th Annual Conference on Transport and Dispersion Modeling, June 17-18, 2003. The conference was cosponsored by the Defense Threat Reduction Agency (DTRA). It included presentations addressing recent advances and ongoing research and development with regard to urban scale modeling and dispersion, urban scale experiments, boundary layer modeling and dispersion, model evaluation, mesoscale modeling and dispersion, and advanced modeling techniques.

In connection with this conference, OFCM partnered with DTRA and GMU as a first step in addressing the recommendations that came out of the Joint Action Group for Selection and

Evaluation of Atmospheric Transport and Diffusion Models (JAG/SEATD) report, *Atmospheric Modeling of Releases from Weapons of Mass Destruction-Response by Federal Agencies in Support of Homeland Security*. These recommendations were supported by the Federal Committee for Meteorological Services and Supporting Research and are currently being implemented under the purview of the Interdepartmental Committee for Meteorological Services and Supporting Research. On June 19, 2003, OFCM hosted an all-day special session to begin addressing three specific objectives to:

- Identify and refine the requirements for atmospheric transport and diffusion (ATD) modeling support/plume forecasts and develop a concept of operations to support those requirements;
- Refine, prioritize (if possible), and document the community's research and development needs; and
- Develop a common model evaluation framework that supports customers' needs and requirements.

The special session was attended by representatives from Federal (DHS/FEMA, DOC/NOAA, DOD, DOE, NRC, and EPA), state and local agencies, the national laboratories, academia, and the private sector. It was determined that OFCM, through its Working Group for Environmental Support to Homeland Security (WG/ESHS), would: complete the development of an environmental support concept of operations in support of homeland security that is consistent with the new National Response Plan, and will form the basis for the *Homeland Security Environmental Support Plan*; develop a research and development plan and pursue interagency support, including DHS; complete the development and implementation of a common framework for model evaluation among the Federal agencies; and plan a follow-on forum to rollout the *Homeland Security Environmental Support Plan* and the research and development plan.

Homeland Security Environmental Support Plan. OFCM made great strides in working with agencies in developing the *Homeland Security Environmental Support Plan*. The plan defines the mission, roles, and responsibilities of individual Federal agencies as they relate to homeland security and documents each agency's environmental support capabilities and/or requirements. The plan will specify a coordinated, interagency concept of operations to meet the environmental support needs and requirements of the Nation's homeland security and emergency response efforts, and is being developed and coordinated with the Department of Homeland Security. The Principal Federal Official, Primary Federal Agencies, and environmental support assignments for chemical, biological, radiological, nuclear, and other hazardous material release incidents are in accordance with established plans and directives. The plan also addresses the unmet needs and requirements for environmental support during crisis and consequence management and details research and development efforts, both ongoing and planned, that are designed to fulfill those needs and requirements. The intended audience for this document includes the Federal agencies involved in crisis and consequence management, including the newly established Department of Homeland Security; and state and local (e.g., city, county, and parish) governments and their first responder organizations.

Additional Environmental Support to Homeland Security. OFCM coordinated the Navy/NOAA tabletop exercise in Norfolk, Virginia, on March 26, 2003, and participation in additional tabletop exercises is being planned. The results will be integrated into the concept of operations section of the *Homeland Security Environmental Support Plan*. OFCM is working with the Department of Homeland Security (DHS) to identify a policy-level focal point for participation in the Federal coordinating infrastructure, and has continued to coordinate with the U.S. Coast Guard (USCG) and the DHS Directorate of Emergency Preparedness and Response (FEMA). OFCM worked to increase agency support for the development and future expansion of the Washington, D.C., Dispersion Testbed (DCNet). DCNet will couple the best available forecasts with real-time measurements of key dispersion properties, develop GIS systems to display current and forecast dispersion plumes, explore existing network data, and develop systems to extract data to improve dispersion forecasts from them. Having developed a refined dispersion system for Washington, D.C., the goal is to expand the operation to cover the entire National Capital area and other major cities. OFCM introduced the agencies to the DTRA/DOE-sponsored Oklahoma City Field Exercise, officially titled "Joint Urban 2003." The objectives of this atmospheric dispersion study, which occurred in Oklahoma City from June 28 - July 31, 2003, are to collect meteorological and tracer data resolving atmospheric dispersion at scales of motion ranging from flows in and around a single city block, in and around several blocks in the downtown central business district, and into the suburban Oklahoma City area several kilometers from the central business district; and to use tracer and meteorological data collected in Oklahoma City to evaluate and improve existing indoor and outdoor dispersion models.

ANNUAL FEDERAL PLAN

OFCM prepared *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2003*. The Federal Plan is Congressionally mandated and is a one-of-a-kind document which articulates the meteorolog-

ical services provided and supporting research conducted by agencies of the Federal government. The Federal Plan helps to reduce duplication among the agencies. It is a comprehensive publication that documents proposed programs for Fiscal Year 2003 and reviews agency programs in Fiscal Year 2002. The Plan demonstrates to the Congress and to the Executive Branch how the Federal agencies work together to accomplish their missions in an effective and efficient manner. The special interest article of the Annual Federal Plan is *The Need for Weather Information for Surface Transportation-Keeping the Country Safe and on the Move*. The article describes interagency activities underway within the Federal transportation and meteorology communities.

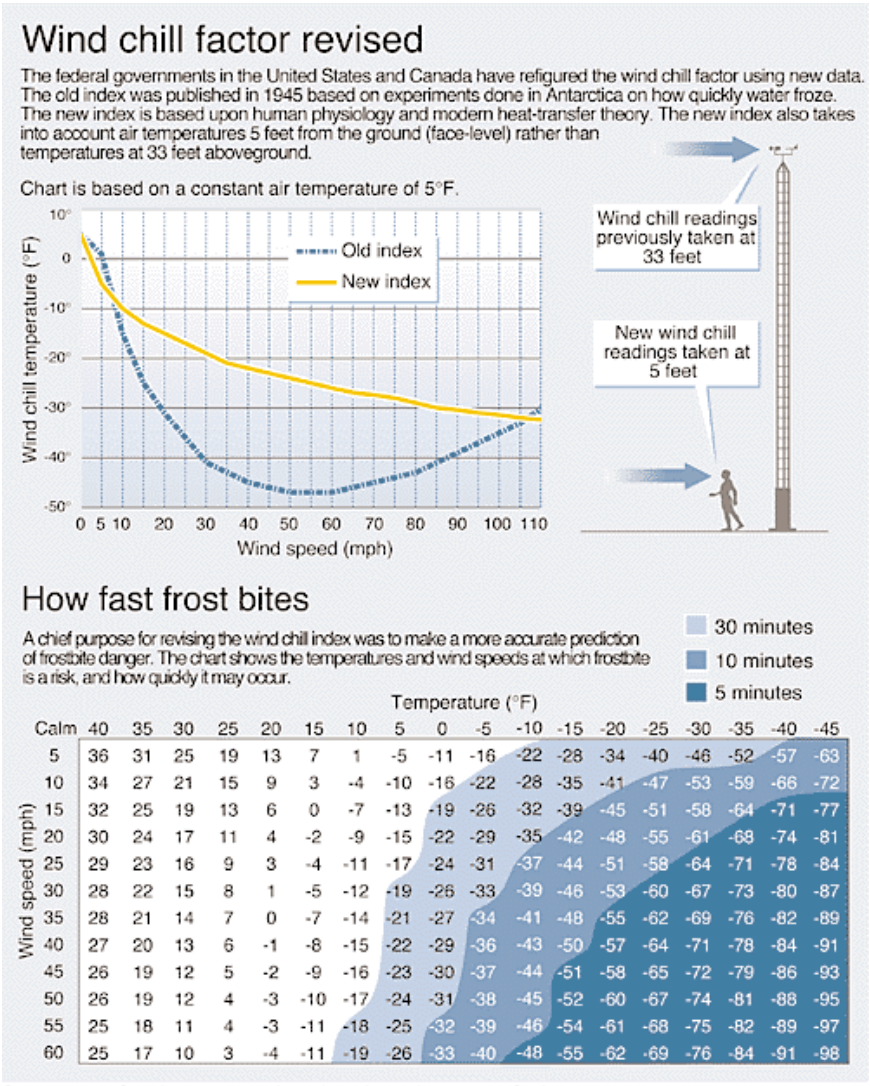
WEATHER INFORMATION FOR SURFACE TRANSPORTATION

In September 1998, the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) was briefed on the Office of the Federal Coordinator for Meteorology "Look to the Future." The briefing identified priority areas, issues, problems, and ideas to improve the effectiveness of interagency coordination and cooperation. Surface transportation needs (including ground and marine transportation modes) were emphasized. FCMSSR agreed on the importance of addressing users' needs for Weather Information for Surface Transportation (WIST) through a coordinated effort. Subsequently, the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) directed that a joint action group be formed to address mission needs and meteorological requirements for surface transportation. Two WIST symposia followed; the first (November - December 1999) helped to identify WIST user needs, and the second (December 2000) reviewed the progress of compiling and analyzing the data collected over the previous year. FCMSSR endorsed the continuation of this OFCM led process in November 2000.

This led to OFCM publishing the *Weather Information for Surface Transportation-National Needs Assessment Report* in December 2002. The WIST Report sets the stage for revolutionary improvement in the way weather information is applied to surface transportation across the Nation. It establishes a process that involves decision makers throughout the public and private sectors, academia, and industry in a collaborative effort to define weather information needs and recommends next steps to incorporate current and future results from science and technology innovations into surface transportation activities that bear on the safety and economic welfare of all citizens. The WIST Report is the product of an extensive 3-year interagency effort and is a historic achievement from the standpoint that it is the first-ever compilation of weather support needs across the six surface transportation sectors: roadway, railway, transit, marine transportation, pipeline systems, and airport ground operations. This activity included the formation of a joint action group to address meteorological requirements for surface transportation; questionnaires; surveys; WIST symposia conducted jointly by the Office of the Federal Coordinator for Meteorology and the Federal Highway Administration; meetings with railroad, pipeline, and emergency managers; and participation on panels concerning public-private partnerships in transportation and Intelligent Transportation Systems. The report makes clear that by meeting the requirements for provision of weather information for surface transportation to users, we can often increase safety and realize economic benefits at the same time. Costs of roadway weather serve as a good example of this. It is estimated that vehicle accidents caused by adverse weather result, either directly or indirectly, in 800,000 injuries and 7,000 fatalities annually. This represents approximately 28 percent of all highway crashes and 19 percent of all fatalities. The estimated annual economic cost from weather-related crashes (deaths, injuries, and property), amounts to nearly $42 billion. A study of the effects of snow, ice, and fog estimated that these weather conditions caused 544 million vehicle-hours of delay on highways in 1999. The report also makes clear the importance of environmental support to homeland security; we need better weather information to support the emergency response to disasters inflicted on our communities by those who would do us harm. More detailed weather information must be used in operational decision-making processes. We must also improve cooperative efforts and working partnerships among Federal, state, and "private-public" entities, and between the governmental and commercial sectors. OFCM also arranged a March 21, 2003, press briefing on the rollout of the *Weather Information for Surface Transportation-National Needs Assessment Report*, which was led by VADM Conrad C. Lautenbacher, Jr., USN (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and Chairman of the Federal Committee for Meteorological Services and Supporting Research, and very well received.

WIND CHILL TEMPERATURE INDEX

The result of this coordinated effort led to the implementation of a more rigorous, scientific-based Wind Chill Temperature Index for the protection of lives during winter weather. This index was implemented by the United States NOAA's National Weather



Service, the Meteorological Service of Canada/Environment Canada, the U.S. Army, and the U.S. Air Force. This index has also been made available for use by the public and private sector. In a 2003 National Weather Service survey of broadcast meteorologists, it was reported that over 70 percent found the index very useful at communicating the impact of wind chill in adverse weather conditions to the public and their other constituents. The index will also be used as a basis for the development of an internationally-based Universal Thermal Temperature Index which will be implemented worldwide in the next several years.

AVIATION WEATHER

In April 1997, the National Aviation Weather Program Council (NAWPC) approved and published a National Aviation Weather Program Strategic Plan, which had been developed by the Program Council's Joint Action Group for Aviation Weather. This Strategic Plan was the first step in a Federal agency response to the challenge for improved aviation weather safety set forth in a National Research Council report, *Aviation Weather Services--A Call for Federal Leadership and Action* (1995). The Federal Coordinator, who serves as Chair of the NAWPC, has coordinated the activities to support and implement the Strategic Plan. In the 1997 Strategic Plan, the NAWPC took responsibility for overseeing periodic reviews of the program to provide mid-course corrections as needed, as well as to maintain momentum as the plan progressed. OFCM was assigned a supporting role in providing analyses, summaries, and evaluations as a "factual basis for the Executive and Legislative Branches to make appropriate decisions related to the allocation of funds." The plan is now halfway to the Fiscal Year 2007 marker set for achieving an 80 percent reduction in fatal accidents, an appropriate time to review progress and consider any needed mid-course corrections.

OFCM published the *National Aviation Weather Program Mid-Course Assessment* in August 2003. The report presents a mid-course assessment of progress toward the goal of reducing weather-related fatal accident rates by 80 percent over 10 years. In February 1997, the White House Commission on Aviation Safety and Security recommended an 80 percent reduction in fatal aviation accidents from all causes as a ten-year national goal. In its 1999 report on *National Aviation Weather Initiatives*, the National Aviation Weather Program Council identified initiatives being pursued by federal agencies in collaboration with their industry and university partners. The Initiatives report also discussed an 80 percent reduction in weather-related accidents as an overall measure of success. To assess progress toward this goal, the *National Aviation Weather Program Mid-Course Assessment* examines trends in weather-related accidents for clearly defined categories of aircraft and weather hazards. In each category, an 80 percent reduction from the average accident rate just before and during 1997 is used as a benchmark for assessing success in reducing accident risk. The analyses confirm much anecdotal evidence that the coordinated efforts and diverse partnerships that constitute the National Aviation Weather Program initiatives are making a real difference in accident rates. The investments in research and development and implementation of products, services, and

systems are paying off. The Assessment tells us where trouble spots remain and points to ways we can overcome them, while furthering the work that has started us toward success.

In September 2003, OFCM published an update to the 2001 *Aviation Weather Program Baseline Report*. The update is an inventory of over 150 programs/projects in aviation weather and represents nearly a doubling of the number of programs/projects in the 2001 report; it was included as the framework for the Mid-Course Assessment. The update is a snapshot of work underway in the agencies and also in the private sector and includes a mapping of the programs/projects against the National Aviation Weather Initiatives. The update shows that most of the initiatives are being worked by one or more agency programs, but the update also cautions that the agencies must remain vigilant for possible duplication.

SPACE WEATHER

Space weather refers to conditions on the Sun and in the solar wind, magnetosphere, ionosphere, and thermosphere that can influence the performance and reliability of space-borne and ground-based technological systems, and can endanger human life or health. Space weather storms can cause disruption of satellites, communications, navigation, and electric power distribution grids. The overarching goal of the National Space Weather Program (NSWP), which is administered by an OFCM program council, is to achieve an active, synergistic, interagency system to provide timely, accurate, and reliable space weather warnings, observations, specifications, and forecasts by 2007. The NSWP Strategic and Implementation Plans provide, respectively, broad guidance and a detailed roadmap for the NSWP.

Within the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) and National Space Weather Program Council (NSWPC), OFCM examined the National Space Weather Program (NSWP) in light of potential funding reductions at the NOAA Space Environment Center (NOAA/SEC). The assessment report outlined the many key benefits provided by NOAA/SEC to the multi-agency NSWP, and detailed the negative impacts that would result from insufficient funding at NOAA/SEC on the Nation's ability to observe, predict, and warn of impending solar activity, and the resultant impacts on the Nation's technical systems and human life or health. In the OFCM-led examination, OFCM reached out to the major stakeholders and asked them to identify: (1) significant impacts on their agency's mission or operations as a result of current/proposed reductions in the SEC budget, (2) significant benefits the NSWP brings to their overall mission, and (3) success stories that could be shared that clearly identify the service and ongoing research that SEC is providing. The resultant report was provided to the FCMSSR Chairperson who subsequently provided it to the Office of Science and Technology urging their "full support of the NSWP and that the NOAA Space Environment Center be supported, in the spirit of the October 2002 President's Council of Advisors on Science and Technology (PCAST) recommendations about U.S. research and development funding, to ensure that the multi-agency NSWP effort would continue to succeed from an operational and research perspective." The FCMSSR Chairperson further stated that, "A successful NSWP will form the basis for improved space weather forecasting and warning capabilities and we will reap the associated socioeconomic benefits for the nation."

Another key part of the NSWP, the Community Coordinated Modeling Center (CCMC) has the mission to prepare the next generation of space weather models for transition to operations through the NOAA and Air Force operational centers' Rapid Prototyping Centers (RPC). During FY 2003, the CCMC has greatly expanded the number of resident models. At the present time, models accepted and implemented at the CCMC include: two magnetospheric global MHD models; one ring current/radiation belt model, which has been successfully coupled to the MHD models; two physics-based ionospheric models; one empirical ionospheric electric field and current model; a solar coronal MHD model; and an interplanetary structure model, which is based on interplanetary scintillation measurements. Of these, all but the last two are available for researchers to use remotely upon request. This feature is being heavily used, with in excess of 140 requests executed. CCMC is performing the first comprehensive and repeatable metric-based analyses of space science models. CCMC successfully transferred an update of the University of Michigan MHD model to the Air Force RPC. In addition, the Weimer Polar Cap model has been sent to both the Air Force and NOAA RPCs, after completion of metrics-based evaluations. Current CCMC evaluation action involves an inner magnetospheric model, which was transferred to the Air Force RPC in August 2003.

The National Science Foundation (NSF) named Boston University to lead the Center for Integrated Space Weather Modeling (CISM), a new $20 million, multi-institutional NSF Science and Technology Center. The center will create computer models able to provide advance warning of potentially harmful space weather events that could put astronauts at risk, disable satellites, disrupt communications, or cause costly damage on earth. In addition to BU, the center consists of research groups at seven other universities and several government and

non-profit research organizations and commercial firms. The CISM will focus on the central and most ambitious research goal of the U.S. government's National Space Weather Program: building a comprehensive, physics-based computer model that can accurately simulate the complex, closely interconnected variables-from explosions on the sun to aurora on the earth and almost everything in-between-that give rise to the specific manifestations of space weather. The Boston University-led center is one of six new Science and Technology Centers the NSF funds. NSF established the Science and Technology Center program in 1987 to fund important fundamental research efforts that also create educational opportunities, encourage technology transfer, and provide innovative approaches to interdisciplinary research challenges. NSF's support for the Center for Integrated Space Weather Modeling at Boston University is $20 million over the next five years, renewable for another five years. In addition, the highly successful competition for space weather research grants, sponsored and administered by the National Science Foundation (NSF), will continue in FY 2004 with a modest increase in funding.

LIGHTNING DATA USER REQUIREMENTS

The OFCM Joint Action Group for Lightning Detection Systems met on several occasions to complete the requirements definition and to complete drafting the Statement of Work for the new Lightning Data Contract. The Statement of Work was finalized in July 2003 and was subsequently made available for industry comment. The Request for Proposals is scheduled for release during fall 2003, and the contract award is expected in the spring/summer 2004 timeframe. The new contract will be in effect for FY 2005.

PHASED ARRAY WEATHER RADAR PROJECT

A meeting on expanded agency participation in the Phased Array Weather Radar Project was hosted by the Federal Coordinator for Meteorology on July 22, 2003. The meeting responded to actions of the last meeting of the Federal Committee for Meteorological Services and Supporting Research (FCMSSR; October 18, 2002) and the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR; April 30, 2003) which directed the Federal Coordinator to determine specific needs of the agencies, show benefits of the Phased Array Radar (PAR) capability for their respective agencies, and explore opportunities for expanded agency participation in the Phased Array Weather Radar Project. Agencies which were represented include the National Oceanic and Atmospheric Administration (National Weather Service and Office of Oceanic and Atmospheric Research), Department of Transportation (Federal Aviation Administration and Federal Highway Administration), Department of Defense (U.S. Air Force and U.S. Army), Department of Interior, and National Science Foundation. Actions resulting from the meeting include forming a Joint Action Group within the Office of the Federal Coordinator for Meteorology that would identify the potential needs and benefits of the agencies that PAR and Networked Radars (NETRAD) would address; and arranging for interested agencies to visit the NOAA National Severe Storms Laboratory in Norman, Oklahoma, to see and learn more about the Phased Array Radar and possible applications and benefits to their agencies from the system. The interested agencies would include those represented at this meeting, the Department of Homeland Security, and others including the National Aeronautics and Space Administration and the Department of Energy.

U.S. CLIMATE CHANGE SCIENCE PROGRAM

The *U.S. Climate Change Science Program-Planning Workshop for Scientists and Stakeholders* was held December 3-5, 2002, in Washington, D.C. The principal focus of the workshop was to develop short-term products to support climate change policy and resource management decision-making. Approximately 1,300 attendees were invited because of the pivotal role they play as climate stakeholders, and the impact that their views would have in shaping the application of scientific, economic, and energy system information to policy-making and resource management decisions. In support of this effort OFCM participated in the workshop, and an OFCM Senior Staff Meteorologist served as a rapporteur for the Emerging Science Issues session. OFCM also used its infrastructure to reach out and invite many government, private, and academic participants, which resulted in approximately one-third of the participation for the workshop.

INTERAGENCY TASK FORCE ON RISK MANAGEMENT

The purpose of the Interagency Task Force on Risk Management is to examine and report on the role of precaution in risk management decisions by managers or decision makers in both the public and private sectors, especially regarding risks to human welfare, quality of life, and environmental protection. The Federal Coordinator continued to represent NOAA at meetings of the Interagency Task Force on Risk Management. At these meetings, agencies provided the following information: precautionary/regulatory risk management standards and guidelines; risk assessment and management requirements/practices; decision crite-

ria regarding different risks; and historical examples where risk management decisions incorporated too much, too little, or the appropriate amount of precaution. In September 2003, the Office of Management and Budget released a report to Congress on progress in regulatory reforms, including precautionary approaches for different management objectives.

COLLABORATION WITH NAS/NRC BOARD ON ATMOSPHERIC SCIENCES AND CLIMATE

OFCM continued its mutually beneficial interactions with the National Academy of Sciences/National Research Council (NAS/NRC). The NAS/NRC Board on Atmospheric Sciences and Climate (BASC) recently formed a "Committee on Weather Research for Surface Transportation: The Roadway Environment." The Committee is conducting a study to examine the research opportunities and required services needed to support improved weather forecasting for the Nation's roadways. It will investigate the current state of knowledge regarding forecasting of road weather conditions, recommend key areas of research to enhance operational weather forecasts for roads, and identify possible agency and infrastructure requirements to best provide this information to users. The study will stress not just research opportunities but, also, how to make this information useful for improved operations and implementation. The study will provide a framework and recommendations to engage the transportation and weather communities (and other stakeholders) in the development of a strategic plan to guide road weather research. At its first meeting held February 20-21, 2003, in Washington, D.C., the Federal Coordinator addressed the Committee regarding the roadway transportation aspects of OFCM's *Weather Information for Surface Transportation-National Needs Assessment Report* and, more generally, about the Federal context for meteorological research relevant to surface transportation. Copies of the WIST Report were also provided to the Committee members to assist the BASC study. The Federal Coordinator also addressed BASC at its planning retreat June 30 - July 2, 2003, in Woods Hole, Massachusetts, in the portion of the retreat dealing with how BASC could be more effective; lessons from past BASC studies; and how BASC could improve, expand, and address new audiences.

COLLABORATION WITH THE U.S. WEATHER RESEARCH PROGRAM

The mission of the U.S. Weather Research Program (USWRP) is to accelerate forecast improvements of high impact weather and facilitate full use of advanced weather information. The program's vision is to mitigate the effects of weather-induced disasters; reduce the costs associated with routinely disruptive weather; create opportunities for increased productivity through better weather information; and assist the military in the accomplishment of its mission. The current USWRP team includes NOAA as the lead agency, National Science Foundation, National Aeronautics and Space Administration, and the U. S. Navy. The Federal Coordinator has contacted additional agencies to broaden Federal participation in the USWRP in accordance with an action from the Interdepartmental Committee for Meteorological Services and Supporting Research, direction from the Chairman of the Federal Committee for Meteorological Services and Supporting Research, and a recommendation from the National Academy of Sciences/National Research Council Board on Atmospheric Sciences and Climate (BASC). The additional agencies included Federal Aviation Administration (FAA), Federal Highway Administration (FHWA), U.S. Air Force, Department of Energy (DOE), United States Department of Agriculture (USDA), Environmental Protection Agency (EPA), and Federal Emergency Management Agency (FEMA). This has led to more interaction directly between the leadership of the USWRP and interested agencies to discuss in more detail agency-specific needs which may be benefited by the Program. It is expected that several additional Federal participants will join the U.S. Weather Research Program and that the USWRP priorities will be expanded to address their needs. In fact, at the September 18-19, 2002, USWRP Science Steering Committee meeting, FAA, FHWA, DOE, and the Air Force made presentations on their research needs and follow-on breakout sessions discussed how those needs could be addressed within the USWRP's ongoing program. An OFCM representative also attends all meetings of the Interagency Working Group of the U.S. Weather Research Program.

COLLABORATION WITH CENR/ SUBCOMMITTEE ON DISASTER REDUCTION

The Federal Coordinator continues to be a participant on the Committee on Environment and Natural Resources (CENR). OFCM has been an active participant in the work of the CENR Subcommittee on Disaster Reduction. Recognizing that disasters can be the result of a technological and/or natural hazard, the subcommittee changed its name from the Subcommittee on Natural Disaster Reduction to the Subcommittee on Disaster Reduction (SDR). Recently, the focus of this group has been to define its strategic vision in coordination with the White House Office of Science and Technology Policy and the Office of Homeland Security. Through

OFCM representation on the SDR, OFCM has helped craft the subcommittee's charter and annual operation plan. The major thrusts of these documents are to (1) promote effective strategies for reducing national vulnerability to disaster risks and losses by leveraging expertise and information across the federal government, and (2) establish focused outreach to the academic and private communities. OFCM is committed to working with SDR to provide a forum for information sharing, development of collaborative opportunities, and interactive dialogue with the U.S. policy community to advance informed strategies for managing risks associated with natural and technological disasters. To achieve these goals and to support communication of high priority, national programs for disaster reduction and recovery, OFCM representation on SDR helped draft an annual report that presents an overview of current, national disaster programs, and an identification of high priority needs and opportunities. The report will contribute to U.S. government planning activities on a number of levels and is intended as a supplement to the President's FY 2004 budget.

AMERICAN METEOROLOGICAL SOCIETY

During FY 2003, OFCM joined leading environmental science and service corporations in supporting undergraduate scholarships in the atmospheric and related oceanic and hydrologic sciences. The scholarships, awarded for the junior and senior years, are designed to encourage outstanding undergraduates to pursue careers in the fields covered by the awards. OFCM plans to continue this support. OFCM also supports American Meteorological Society (AMS) endeavors by participating in AMS conferences and workshops and other environmental science education and outreach programs.

PUBLICATIONS AND OFCM'S WEB SITE. The following publications were prepared in hardcopy form and have been placed on OFCM's Web site (*www.ofcm.gov*):

- *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2003*
- *Federal Plan for Cooperative Support and Backup Among Operational Processing Centers*
- *Weather Information for Surface Transportation-National Needs Assessment Report*
- *Wind Chill Temperature and Extreme Heat Indices-Evaluation and Improvement Projects*
- *National Post-Storm Data Acquisition Plan*
- *National Hurricane Operations Plan*
- *Federal Meteorological Handbook No. 11-Doppler Radar Meteorological Observations; Part A-System Concepts, Responsibilities and Procedures*
- *National Aviation Weather Program-Mid-Course Assessment*

The following documents are planned for publication during FY 2004:

- *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2004*
- *Homeland Security Environmental Support Plan*
- *Research and Development Plan for Environmental Support to Homeland Security*
- A *National Framework for Volcanic Ash Hazards to Aviation*
- *National Hurricane Operations Plan*
- *Proceedings of the Workshop on Weather Support for the U.S.*
- *Proceedings of the Forum on Information Dissemination Technologies*
- *Proceedings of the Forum on Urban Meteorology*

During FY 2003, OFCM continued to make substantial progress on its use of the Internet. In addition to information about the office, OFCM has placed its current publications on its Web site, and keeps the Web site current with information regarding workshops and forums being conducted by the office. OFCM will continue to make information available on the Internet during FY 2004.

Table A.1 Current OFCM Publications

Publication Title	Date	Number
Federal Plan for Meteorological Services and Supporting Research, Fiscal Year 2003	June 2002	FCM-P1-2002
National Plan for Space Environment Services and Supporting Research: 1993-1997	August 1993	FCM-P10-1993
National Severe Local Storms Operations Plan	May 2001	FCM-P11-2001
National Hurricane Operations Plan *WSR-88D Tropical Cyclone Operations Plan*	May 2003	FCM-P12-2003
National Winter Storms Operations Plan	November 2000	FCM-P13-2000
Federal Plan for Cooperative Support and Backup Among Operational Processing Centers	Nov 2002	FCM-P14-2002
National Plan for Stratospheric Monitoring, 1988-1997	July 1989	FCM-P17-1989
National Aircraft Icing Technology Plan	April 1986	FCM-P20-1986
National Plan to Improve Aircraft Icing Forecasts	July 1986	FCM-P21-1986
Federal Plan for the Coordination of Automated Weather Information System Programs	May 1988	FCM-P23-1988
Federal Plan for Meteorological Information Management	July 1991	FCM-P24-1991
National Plan for Tropical Cyclone Research and Reconnaissance (1997-2002)	January 1997	FCM-P25-1997
National Aviation Weather Program Plan	September 1992	FCM-P27-1992
National Geostationary Operational Environmental Satellite (GOES) Data Collection System (DCS) Operations Plan	August 1997	FCM-P28-1997
Federal Plan for Marine Environmental Data, Services, and Supporting Research	June 1996	FCM-P29-1996
The National Space Weather Program: Strategic Plan	August 1995	FCM-P30-1995
The National Space Weather Program: Implementation Plan - 2nd Edition	July 2000	FCM-P31-2000
National Aviation Weather Strategic Plan	April 1997	FCM-P32-1997
National Post-Storm Data Acquisition Plan	March 2003	FCM-P33-2003
National Aviation Weather Initiatives	February 1999	FCM-P34-1999
National Aviation Weather Initiatives, Final Baseline Tier 3 and 4 Report	April 2000	
Federal Meteorological Handbook No. 1 - Surface Weather Observations and Reports	December 1995	FCM-H1-1995
Federal Meteorological Handbook No. 2 - Surface Synoptic Codes Surface Synoptic Code Tables (Update)	December 1988 July 1990	FCM-H2-1988 FCM-T1-1990
Federal Meteorological Handbook No. 3 - Rawinsonde and Pibal Observations	May 1997	FCM-H3-1997
Federal Meteorological Handbook No. 10 - Meteorological Rocket Observations	December 1988	FCM-H10-1988
Federal Meteorological Handbook No. 11 - Doppler Radar Meteorological Observations		
Part A - System Concepts, Responsibilities and Procedures	June 2003	FCM-H11A-2003
Part B - Doppler Radar Theory and Meteorology	June 1990	FCM-H11B-1990
Part C - WSR-88D Products and Algorithms	February 1991	FCM-H11C-1991
Part D - WSR-88D Unit Description and Operational Analysis	April 1992	FCM-H11D-1992

Table A.1 Current OFCM Publications (cont.)

Publication Title	Date	Number
Federal Meteorological Handbook No. 12 - United States Meteorological Codes and Coding Practices	*December 1998*	*FCM-H12-1998*
Directory of Atmospheric Transport and Diffusion Consequence Assessment Models	*March 1999*	*FCM-I3-1999*
Federal Directory of Mobile Meteorological Equipment and Capabilities	*December 1995*	*FCM-I5-1995*
A Guide to WMO Code Form FM 94 BUFR	*March 1995*	*FCM-I6-1995*
Tropical Cyclone Studies	December 1988	FCM-R11-1988
Tropical Cyclone Studies Supplement	August 1989	FCM-R11-1988S
Interdepartmental Meteorological Data Exchange System Report, IMDES	*August 1998*	*FCM-R12-1998*
Federal Meteorological Requirements 2000	October 1990	FCM-R13-1990
U.S. Wind Profiler: A Review	*March 1998*	*FCM-R14-1998*
Aviation Weather Training Report	*April 2002*	*FCM-R16-2002*
Atmospheric Modeling of Releases from Weapons of Mass Destruction	August 2002	FCM-R17-2002
Weather Information for Surface Transportation--National Needs Assessment Report	*December 2002*	*FCM-R18-2002*
Report on Wind Chill Temperature and Extreme Heat Indices: Evaluation and Improvement Projects	*January 2003*	*FCM-R19-2003*
National Aviation Weather Program Mid-Course Assessment	*August 2003*	*FCN-R20-2003*
Standard Formats for Weather Data Exchange Among Automated Weather Information Systems	November 1994	FCM-S2-1994
Standard Telecommunication Procedures for Weather Data Exchange (under revision)	October 1991	FCM-S3-1991
Federal Standard for Siting Meteorological Sensors at Airports	*August 1994*	*FCM-S4-1994*
Proceedings of the Workshop on Multiscale Atmospheric Dispersion Modeling within the Federal Community	*June 2000*	
Proceedings of the Aviation Weather User Forum--Aviation Weather: Opportunities for Implementation	*July 2000*	
Proceedings for the Symposium on Weather Information for Surface Transportation: Delivering Improved Safety and Efficiency for Tomorrow	*February 2000*	
Proceedings of the Symposium on Weather Information for Surface Transportation -- Preparing for the Future: Improved Weather Information for Decision Makers	*March 2001*	
Proceedings of the Forum on Risk Management and Assessment of Natural Hazards	*July 2001*	
Proceedings of the Workshop on Strategy for Providing Atmospheric Information	*March 2002*	
Aviation Weather Training: A Report on Training for Emerging and Recently Implemented Aviation Weather Programs	*April 2002*	*FCM-R16-2002*
Proceedings of the Workshop on Effective Emergency Response	*May 2002*	

Italics = publication available online at *www.ofcm.gov*