Aware

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NATIONAL WEATHER SERVICE/*Warning Coordination and Hazard Awareness Report*

Refocusing

As we move through the modernization and associated restructuring (MAR) of the National Weather Service (NWS), we must periodically step back, assess where we are, and refocus our energies so that we can meet our objectives. We are doing that now on a number of fronts.

The Office of Meteorology (OM) is assessing what it must do to take a more prominent role in the whole modernization effort. Louis Uccellini, the new director of OM, has charged the office with reviewing and refining its mission and arriving at a new structure to place us in a position of leadership. Succinctly, OM must ensure that the promise of new and better science is applied to the solution of real world forecast problems. The reorganization of OM will not occur in a vacuum. Input will be solicited from the regions and other offices in Headquarters so that what is created will benefit all of us.

The National Meteorological Center (NMC) is also undergoing a restructuring to meet the needs of users and NWS field offices in the modernized and restructured NWS. The March issue of the Bulletin of the American Meteorological Society (BAMS) outlines how NMC will evolve into the National Centers of Environmental Prediction (NCEP). The task now is to crystalize the relationships between the NCEP and the Weather Forecast Offices (WFO) and River Forecast Centers (RFC) in the end-to-end forecast process.

The changing of county warning areas with the introduction of the Weather Surveillance Radar-88 Doppler (WSR-88D) and the spinning down of non-warning offices has brought its own list of concerns. Critical in this transfer of responsibility is the involvement of local station management and particularly the Warning Coordination Meteorologists (WCM). As this issue of the *Aware Report* goes to press, the 2-week WCM course is undergoing review while a WCM training program is being laid out. The final result should be a program that provides the WCMs with the skills they need to assist our offices in meeting user expectations.

As other articles in this issue will attest, change is everywhere. The *Aware Report* provides a snapshot of how the modernization and development of services is evolving. Because things are so fluid, these snapshots should not be expected to be the definitive final answer. Rather, it is our intent to communicate the present thinking on a multitude of service-related issues. If something that you read strikes a chord, either positively or negatively, let us know. As the modernization proceeds, we are all looking for ideas to keep us focused and on track.

Donald R. Wernly

Donald R. Wernly
Chief, Warning and Forecast Branch

U.S. DEPARTMENT OF COMMERCE • National Oceanic and Atmospheric Administration

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Modernization

Relationship of the National Centers in the Forecast Process

The NMC, which includes the National Severe Storms Forecast Center (NSSFC) in Kansas City, Missouri, and the National Hurricane Center (NHC) in Coral Gables, Florida, is being restructured into the NCEP. A definitive paper on the restructuring is contained in the March 1994 issue of the BAMS.

In essence, the NCEP will be made up of the Hydrometeorological Prediction Center in metropolitan Washington, DC; the Storm Prediction Center in Norman, Oklahoma; the Aviation Weather Center in Kansas City, Missouri; the Tropical Meteorological Center which includes the NHC in metropolitan Miami; the Marine Prediction Center in Monterey, California; the Climate Prediction Center in metropolitan Washington, DC; and the Environmental Modelling Center in metropolitan Washington, DC.

The modernization and associated restructuring of the NWS is grounded on the concept that warning and forecast responsibility should reside with the office that has the most data and information for that area. Because of the large amounts of data available from the WSR-88D, the local WFO will have more information than any other organization for the area covered by their WSR-88D. Outside of WSR-88D coverage patterns, such as over the oceans, responsibility for warnings and forecasts can be centralized.

Once the Advanced Weather Information Processing System (AWIPS) is available, WFOs will be able to integrate data sets much as the National Centers can today. Accordingly, warnings, watches, and forecasts for most hazards will originate from the WFOs. One exception will be warnings and watches for hurricanes since response actions must be initiated well before a hurricane is within range of the coastal WSR-88Ds. A significant change both for our WFOs and our users will be the issuance of severe local storm watches from WFOs.

The major role of the NCEP will be to provide forecast guidance to the WFOs and RFCs and to serve as centers of expertise for particular hydrometeorological problems. Accordingly, the Hydrometeorological Prediction Center will be a center of expertise for essentially synoptic-scale situations while the Storm Prediction Center will be a center of expertise for mesoscale events.

Gridded forecasts from the numerical models will be available to WFO forecasters and external users as well as gridded forecasts that have been value-added by the NCEP meteorologists. WFO forecasters will use their expertise about the local situation in combination with unique local data sets to modify the forecast grids and to make critical warning decisions. Product formatters in the local WFO AWIPS will then create and disseminate the appropriate products.

A concern for forecasters is the ability to deal with the entire forecast process especially during short-fused warning situations. This has spawned the concept of the availability of guidance information of such quality that it can be used by local offices with minimum modification. This **does not mean** that user-ready loca forecast products will be generated by the NCEP. Rather, it mean that gridded guidance from the NCEP can be used by the WFO AWIP to format products that can be issued following review by fiel forecasters.

For example, during a fast-paced severe local storm warnin situation, it might be necessary to modify an existing severe loca storm watch or it might be advisable to issue a flash flood watch. Gridded guidance arriving from the NCEP could trigger the formattin of a flash flood watch or the modification to the severe local storm watch. Given the hydrometeorological situation, the local forecasters could set adaptable parameters in the local AWIPS to format particular watch products given a certain probability of occurrence. Before any of these products were issued, they would be reviewed, modified as appropriate, and coordinated with adjacent offices.

The NCEP exists to provide support to the front lines of the forecast process which resides at the local WFO. Working groups are now being formed to flesh out the end-to-end forecast process and to better define the relationship between the NCEP, RFCs, WFOs, and the end users.

—Don Wernly, Chief, Warning and Forecast Branch

Weather Forecast Office (WFO) Backup Plan

There have been minor revisions to the plan to back up WFOs in the MAR of the NWS. Such changes allow greater flexibility for NWS Regions to determine the sites which will perform the back-up duties. (Regional Directors, in consultation with local Meteorologists in Charge [MIC], shall identify the site[s] providing service backup to WFOs.) The changes allow greater discretion for the Regions to determine what constitutes a situation requiring backup.

Here are the principal WFO functions to be backed up.

- Local data acquisition (WSR-88D, Automated Surface Observing System [ASOS], mesonet [if any], hydrometeorological).
- Local warning generation.
- Local warning dissemination.
- Local forecast generation.
- Local forecast dissemination.
- Local support to RFCs.

Generally, the back-up WFOs should assume responsibility for **all programs** essential to the "protection of life and property;" i.e., public, severe weather, hydrologic, aviation, marine, agriculture, and fire weather; in the geographic area for which they are providing back-up coverage. Backup for programs not essential to the "protection of life and property" will be provided by local arrangement with approval by Regional Directors.

Stage 2 service backup should be provided using the following guidelines.

I will again be asking the regions later this year to poll their field offices about operational experiences with the NOW—i.e., format, wording, issuance frequency, workload/staffing, problems, solutions, and most importantly user satisfaction—and bottom-line recommendations as to whether the NOW should continue to be issued. I will incorporate these lessons learned, along with those from the official risk reduction effort at the Next Generation Radar (NEXRAD) Weather Service Forecast Office (NWSFO) Norman, Oklahoma, into a final report for the NWS Directors next spring. The report will recommend whether the short-term forecast (the Area Weather Update in the future) should be issued by all NEXRAD offices as part of their operational suite of products. This would mean, in some cases, adjusting work schedules to ensure timely delivery of the NOW, like NWSFOs Norman, Oklahoma, and Denver, Colorado, have done. An updated OML or separate chapter on the NOW will then be issued.

The concept of the NOW is simple: give people a forecast of what's going to happen or how they'll be affected in the short term. It's the execution that's difficult—to synthesize, sometimes in a matter of minutes in fast-breaking weather, an increasingly diverse and complex set of observational data, using new mesoscale analysis techniques and other methods into a concise, plain-language forecast (presenting a forecast of the most significant weather first, of course) that the average user can easily and quickly understand.

In emphasizing the forecast, the NOW should not be in traditional statement format. Understandable misconception of the short-term concept has occurred because the NOW has been seen as a replacement for other statements (including the special weather statement [SPS] and radar narrative summary). This appeared to encourage the use of statement-like characteristics, e.g., the inclusion of meteorological reasoning, which had the tendency of burying the forecast, and calls to action statements. In changing the culture of statement writing to forecast writing, a good way to view the NOW would be as a "zone" forecast for the short term; zones don't provide statement-type information.

SPSs still have their place as a vehicle for describing longer term weather, technical reasoning, and action statements. In severe weather, the relationship between the NOW and convective warning-type products is trickier and may depend on workload and user requirements. Ideally, use severe weather statements to provide very concise, ground-truth information as follow-ups to individual warnings and the NOW to continue to provide a short-term forecast of significant weather (including the latest on severe events) for county warning areas.

From an NWS workload standpoint, it would be desirable to include statement-type information in the NOW as a way of reducing or eliminating some other statement-type products and to provide users with a "one stop shopping" product. But, ironically, this bucks up against another real-world user constraint: **many media outlets simply will not use, or cannot handle, products that are long and complicated**, and they are savvy about their users' (the public's) ability to easily comprehend such products. **On the other hand, sophisticated emergency managers increasingly appear to need comprehensive, technical, and probabilistic information.** Until such time as we can provide appropriate text/graphical formats to users with differing needs, we should continue to gear the NOW for the general public, while knowing that sophisticated users will be able to get importar short-term information that hasn't been available before.

A vexing problem that, if not eventually changed, coul undermine the short-term forecast program is the option to chang from the NOW product to the SPS when the weather reaches tha increased level of significance. This is being done in some areas t get the information to those users, including resource-poo emergency managers, who currently do not receive, or do not want the NOW, but do get the SPS. (Old habits die hard, and it's incumben on the NWS to explain to users the advantages of a more continuous flow of update weather information.) This option has the effect of providing NOWs only during benign or insignificant weather, thereby sending the inadvertent message that the NOW product isn't important. So, what to do?

First, we must inform emergency managers about the availability of the NOW on the NWWS. Also, we must work with state officials to have the NOW transmitted on the law enforcement telecommunications systems in a timely manner.

This brings us to The Weather Channel's (TWC) desire, by late this year, to display NOWs as written by NWS forecasters to their customers (a potential audience of over 50 million people), and, as luck would have it, to users who currently have no other means of receiving weather information. NWS offices will have at least 2 months of preparation of the modified NOW format (see next two paragraphs) before implementation. This should enable us to continue issuing NOWs through significant weather conditions and not switch to SPSs.

Naturally (as seems the case with all worthwhile endeavors), there's a catch. TWC will only be able to display (as of this writing, the following are **NOT YET FIRM**) about 80 words (or 6-7 AFOS/PC lines) on two "screens" that would be shown, typically, several times during its valid period, rather than be scrolled once, thereby blocking out ongoing programming as is done with SPSs. New NOW issuances would replace old versions using the Universal Generic Code (UGC). If no new NOWs were issued, say in benign weather, TWC would replace the expired NOW with other information.

It should be clearly understood that forecasters always have the option (depending on regional discretion) of including more information after the 80 words, but a delimiter (double ampersand, "&&") would have to be inserted to separate that part for TWC display from the rest of the product. If done manually, it could impact workload and lead to coding errors. Happily, regional/field office ingenuity is already at work to create a software applications program that would automatically provide the correct format and coding (including the UGC).

Given the importance of the short-term forecast as a key service enhancement in the early stage of NWS modernization, using such new tools as advanced Doppler radars, Profiler sounding systems, and ASOS—and now the ability to reach a vast audience—we should opt to format the NOW, as requested, even while beginning the process of automation. It's my understanding that senior-level NWS management has already signaled their desire for this outcome. More to come...stay tuned!

—Rod Becker, Warning and Forecast Branch

Joint National Weather Service/ Federal Emergency Management Agency (FEMA) Training for Emergency Managers—Update

We are progressing rapidly on developing courses to teach emergency managers about preparedness and support for NWS warning mission. These will be part of the FEMA field courses taught in each state.

The course on "Creating and Maintaining Spotter Groups" has been pilot tested in Virginia and Utah. It will be offered in Minnesota, November 8-9, for the final test before it is finalized. We are planning to go to press in early December and mail out the course materials in January 1995, in time for offering as part of spring awareness activities.

Our next course will be on basic meteorology and hydrology for emergency managers. On August 15-17, a course development meeting was held at FEMA's National Emergency Training Center. Jim Henderson, NSSFC; Rich Douglas, Western Region Headquarters; Beverly Poole, Weather Service Office (WSO) Paducah, Kentucky; and Ira Bartfeld of Sacramento, California, RFC met with emergency management subject matter experts Marc Breckenridge of Washtenaw County, Michigan; Bob Koneval of Port Charlotte, Florida; and Randy Duncan of Ponca City, Oklahoma, to begin outlining the course. This course will focus on:

- basic science of weather and water hazards;
- how to assess community vulnerability and ranges of impacts;
- available forecast information and data products;
- analysis and application of forecast information and data products;
- range of proactive community preparedness and response actions;
- application into local emergency management program.

The course will start at the global and climatological level, move to hemispheric forces, and then focus most of the course on local weather, ocean, and flood hazards.

We will be using a number of NWS experts to provide detailed information and guidance on specific components in the course. Our target for testing the draft version is spring 1995.

—Chris Adams, Warning and Forecast Branch

National Emergency Managers Forum

The NWS, in conjunction with FEMA, is sponsoring a National Emergency Managers Forum on Warning Coordination and Communication, March 2-4, 1995, in Crystal City, Virginia. This will be an opportunity for Federal, state, and local users of NWS warning services to meet and identify their warning information and coordination needs.

We are planning brief presentations by D. James Baker, James Lee Witt, and Dr. Friday. These will be followed by a roundtable discussion of Federal/state/local warning partnerships. This will be followed by presentations of local and state disaster case studies warning coordination and information needs. The rest of t conference will be devoted to discussion working groups to devel lists of key issues and needs in each of four areas: (1) Warni Coordination and Decision Making, (2) Critical Informati Communications Technologies and Formats, (3) Critic Information Needs, and (4) Warning Dissemination to Communiti and the Public. The Forum will end with a summary of findings and formal action plan for future coordination as part of the MAR.

Representatives of national associations of emergenc management, law enforcement, transportation, public works, fi service, public safety are being invited. Also, key representatives related Federal programs are being asked to attend. We are expectin about 125 participants at the forum.

Each Region will be asked to send representatives to attend an learn about user's warning information needs.

—Chris Adams, Warning and Forecast Branch

Warning Coordination Meteorologist Training, July 1994, NWS Training Center (NWSTC) Course Overview

The July 1994 WCM Course at the NWSTC in Kansas City, Missouri, successfully taught the WCM students the concepts and disciplines which are critical to the role of the WCM. The WCM's position requires a diverse base of knowledge, from meteorology to sociology, and from emergency management to public relations and working with the private sector. The course was a blend of theory and real-world problem-solving issues that encouraged the students to work together, share ideas, and propose solutions.

As the NWS continues down the road of MAR, there is an increasing need to effectively communicate critical information to a diverse public service sector and the public. To meet this need, Dr. Chris Adams presented warning information from a sociological perspective and also examined the role of partnerships with external groups and agencies in the warning and coordination program. The 2-week course also offered sessions for the students to explore both established and new ways to organize and maintain successful spotter programs, conduct post-disaster and field damage surveys, and to conduct on-station drills and exercises.

Experts in agriculture, aviation, fire weather program, hydrology, marine weather service, emergency management, and the broadcast media were brought to the course to present their perspective on the concept of an all hazards warning program. A relatively new topic, "Operational Warning Philosophy," focused on the role of the WCM in developing a comprehensive on-station understanding of issues related to severe convective weather. Interactive case studies on severe weather, hydrology, and HAZMAT explored NWS's mission to protect life and property. An overview of the Weather Service Evaluation Officer responsibilities was presented as well as sustainable redevelopment technical support to communities rebuilding after a natural disaster.

The students in the July 1994 WCM course found the course to be challenging and fruitful. The course coordinators, David Runyan and Bill Bunting, will be working closely with Rainer Dombrowsky,

The FFGS is designed to be independent of rainfall runoff models. New and enhanced rainfall runoff models will be added to NWSRFS where current soil moisture conditions are made available for flash flood guidance computations in FFGS.

Application of Guidance at the WFO

Flash flood guidance, observed precipitation, forecast precipitation, and radar estimated rainfall are key components in the decision process at the WFOs for the issuance of flood/flash flood watches/warnings. Two hydrologic application programs, planned to reside on AWIPS, are being developed specifically for WFOs: the Area-Wide Hydrologic Predictor System (AWHPS) and the Site-Specific Hydrologic Predictor System (SSHPS).

First, the AWHPS is designed to assist the WFO forecasters in assessing flood threat from small streams in the WFO's area of responsibility. The AWHPS consists of a flash flood potential and monitoring components. In the flash flood potential component, observed gridded precipitation from the WSR-88D radar is used to compute projected, gridded precipitation for up to 1 hour into the future. By applying a statistical algorithm to these observed and projected gridded precipitation accumulation amounts, critical rain probability (CRP) values are computed by comparing the grid accumulation amounts to gridded flash flood guidance provided by the RFCs. Because the CRP values represent accumulation of precipitation over time, the values are most useful during periods of multiple precipitation events.

In the monitoring component, summed amounts of observed and forecast precipitation are compared (monitored) with gridded flash flood guidance. Based on the comparison, the monitor progra initiates an audible alarm with a computer-generated message to ale WFO forecasters of a potential flash flood-producing rain event. difference grid, representing the difference between gridded flas flood guidance and observed gridded precipitation, provides a instantaneous "snapshot" of flash flood potential from individu precipitation events.

CRP values and difference grids will be displayed in color o background maps of streams, roads, and political boundaries.

Second, the SSHPS is designed to assist the WFO forecaster i assessing the flood threat from headwaters or specific stream gage locations in the WFO's area of responsibility. The SSHPS monitor observed stream gage levels, executes a forecast model using RFC provided soil moisture conditions, generates a stream forecast, an alerts the forecaster when the stream gage level rises to predefined critical levels.

Application of Guidance by External Users

Some local and state agencies operate Local Flood Warning Systems which use flash flood guidance to set initial soil moisture conditions in flash flood forecast models and procedures.

Flash flood guidance is provided by the WFOs and RFCs to those Local Flood Warning System cooperators who use certain flash flood models and procedures.

—Timothy Sweeney, Research Hydrologist, Hydrologic Research Laboratory

NOAA Weather Radio (NWR) Initiatives

Update on the Vice Presidential Initiative

Following the May 27, 1994, Palm Sunday tornado disaster in Alabama, Vice President Gore announced his intention to provide NWR coverage to 95 percent of the people of our Nation. His vision is to have NOAA weather radios as common in homes as smoke detectors. To achieve this goal, the Vice President has assembled a task force from the NWS, FEMA, and the U.S. Department of Agriculture (USDA) to develop a plan to upgrade NWR coverage nationwide. The task force is focusing its initial efforts on a pilot project in the State of Alabama.

The first phase of the Alabama upgrade and enhancement plan includes a new transmitter in northeast Alabama located at Fort Payne. The broadcast signal from this transmitter will cover areas in northeast Alabama that were devastated by the Palm Sunday tornadoes. The Alabama Cooperative Extension Service and the NWS are finalizing a Memorandum of Understanding (MOU) between the two organizations. This MOU will help to ensure that the new transmitters are installed and operating in Alabama. The first new transmitter should be operating in the early fall.

The Birmingham WSFO has played a primary role in tower site selection and in fostering the private/public partnerships to obtain and install the transmitters. The next concerted effort in Alabama is the public awareness campaign for NWR. This endeavor is supported by USDA, FEMA, and NOAA. The campaign will emphasize the usefulness of NWRs and encourage private corporations and organizations to proliferate the use of the radios.

The experience gained from the Alabama pilot project will be used in other states as the tri-agency effort expands to realize the Vice President's goal of 95 percent coverage of the population.

—John Sokich, NWR Task Team Leader

Operations and Services

NOAA and the Environmental Protection Agency (EPA) Launch Experimental Ultraviolet (UV) Exposure Index

An experimental program designed to provide the public with an important new addition to the daily weather forecast—prediction of solar ultraviolet radiation levels—premiered this summer in 58 cities throughout the United States.

The program, announced jointly by NOAA and EPA, offers citizens a look at the next day's level of ultraviolet radiation and helps them guard against overexposure. Prolonged exposure to ultraviolet radiation has been associated with an increased incidence of skin cancer and cataracts, and inhibits the immune system.

NWS continues to refine the science behind the daily UV forecasts. EPA is working with the Centers for Disease Control and a coalition of health, medical, and environmental groups to provide information to the public about the UV Index and risks of overexposure to UV radiation.

NWS meteorologists began issuing the experimental forecasts for the 58 cities on June 28, 1994. Forecasts are centrally issued by the NMC in Camp Springs, Maryland, and sent to forecast offices around the country. Meteorologists at local forecast offices will voice the daily index over the NWR network; forecasts also are distributed to public and private meteorologists over the NWWS and other Weather Service information dissemination channels.

The daily forecast value in the ultraviolet index is for approximately 12:30 to 1:30 p.m., Daylight Savings Time, in each United States time zone. The index value is on a scale from 0 to 10, or higher in some areas, with corresponding exposure levels categorized by EPA extending from minimal to very high.

The daily index, along with educational materials provided by EPA, will help people make informed personal decisions about the effects of UV rays on their eyes and skin.

NWS scientists will continue to issue the experimental UV Index levels throughout the fall and winter for the selected cities. NWS plans to review the project in cooperation with the meteorological community by the spring of 1995, and plans will be made then concerning the future of the UV Index forecast program.

—Barry Reichenbaugh, Public Affairs Office, NWS

Update on the Emergency Broadcast System (EBS)

The FCC has completed its field tests of several alerting techniques. There was tremendous cooperation among the NWS, manufacturers of alerting equipment, EBS officials, and the broadcast and cable industries. The results of these field tests will go a long way in determining the technical characteristics and automatio capabilities of the new EBS.

The FCC's announcement of the upgrade of the EBS followed by news event, including the NWS, FEMA, and industry participatior is expected to occur this fall. Once the FCC grants approval, it' expected that the FCC, NWS, FEMA, and industry will work closel together to implement an integrated warning system for the Unite States.

On a complementary track, the Vice Presidential initiative t expand NWR into an "all-hazard" warning system (see NWR sectior on page 9) that reaches 95 percent of the population is proceeding. As part of this initiative, the Office of Systems Operations (OSO) will be hosting an NWR Conference on September 27-28, here at Headquarters. The purpose is to exchange information on the initiative and other relevant telecommunications matters with NWR manufacturers and others in industry. FEMA and the FCC will be presenting information on the EBS upgrade and their roles in the initiative.

NWR and NWWS have always been a part of the NWS alerting mechanism for the EBS, while the National Warning System has been FEMA's. The new EBS will now allow the communications industry full participation in the all-hazard warning system.

—Rod Becker, Warning and Forecast Branch

Exercise Response 95

On March 8, 1994, at the National Hurricane Conference in New Orleans, Louisiana, the FEMA Director, James Lee Witt, announced that "Response 95," a FEMA full-scale exercise with Mississippi and Louisiana, was being formulated. The initial concept was discussed at the Conference, and shortly after the Conference, general invitations were issued to Federal and state agencies to participate.

Exercise Response 95 will provide an opportunity for members of national, regional, state, and local response and support organizations to exercise their roles and responsibilities to a major hurricane. FEMA Headquarters will lead the exercise planning effort. Exercise Response 95 will be conducted as a "NO FAULT" exercise in order to encourage participants to identify policy, procedure, and system shortfalls, and to recommend appropriate actions for correcting shortfalls identified through the evaluation process.

Exercise Response 95 will be designed primarily to provide a realistic environment for demonstrating and evaluating Federal and state emergency response coordination mechanisms. The exercise will be conducted May 8-12, 1995, and will depict a hurricane affecting the coastal states in the Gulf of Mexico.

Exercise Response 95 will include the active participation by those agencies supporting the Federal Response Plan.

The scenario for Exercise Response 95 is oriented in the south-central United States in coastal areas of Mississippi and Louisiana. The scenario is intended to depict a major hurricane that requires