

*U.S. DEPARTMENT OF COMMERCE*  
*Office of Inspector General*

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*NATIONAL OCEANIC AND  
ATMOSPHERIC ADMINISTRATION*

*Raleigh Weather Forecast Office Provides  
Valuable Services but Needs Improved  
Management and Internal Controls*

*Final Inspection Report No. IPE-12661/September 2000*

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RELEASE**

*Office of Inspections and Program Evaluations*

September 29, 2000

**MEMORANDUM FOR:** Dr. D. James Baker  
Administrator of the National Oceanic and Atmospheric  
Administration and Under Secretary for Oceans and Atmosphere

John J. Kelly, Jr.  
Assistant Administrator  
National Weather Service  
National Oceanic and Atmospheric Administration

**FROM:** Johnnie E. Frazier

**SUBJECT:** Final Inspection Report: *Raleigh Weather Forecast Office Provides Valuable Services but Needs Improved Management and Internal Controls* (IPE-12661)

As a follow-up to our August 22, 2000, draft report, this is our final report on our inspection of the Raleigh, North Carolina, Weather Forecast Office. The report includes comments from NOAA's written response. A copy of this response is included in its entirety as an attachment to the report.

On a positive note, the WFO staff in Raleigh is providing what its partners and service users described as valuable products and services. At the same time, we found management deficiencies and serious internal control weaknesses that warranted management's attention. Your response to our draft report indicates a series of impressive remedial measures that you have taken or plan to take to address the problems that we have identified.

Please provide your action plan addressing the recommendations in our report within 60 calendar days.

We thank the personnel in the National Weather Service and the Raleigh WFO for the assistance and courtesies extended to us during our review.

Attachment

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## **EXECUTIVE SUMMARY**

Pursuant to the authority of the Inspector General Act of 1978, as amended, the Office of Inspector General evaluated the National Weather Service's (NWS) Weather Forecast Office (WFO) in Raleigh, North Carolina. Our field work was conducted from February 7 through 11, 2000. The purpose of this inspection was to determine how effective the Raleigh WFO is in delivering forecasts and other information to its service users, how well it coordinates its activities with state and local emergency managers, and how well it manages its volunteer networks of spotters and observers. We also assessed the adequacy of the office's management practices, internal controls, and administrative procedures.

NWS, an agency within the Department of Commerce's National Oceanic and Atmospheric Administration, has 121 WFOs nationwide. Each office issues local forecasts and warnings of severe weather, such as tornadoes, severe thunderstorms, flash floods, hurricanes, and severe winter weather. The weather service has maintained a forecast office in Raleigh since January 1887. The current office is located on North Carolina State University's Centennial Campus. The Raleigh WFO's county warning area covers 31 counties in the state's northern Piedmont, its northern and central Coastal Plain, and the Sandhills.

In recent years, the Raleigh county warning area has experienced a number of severe weather events, including Hurricane Floyd in September 1999, which caused record flooding in several eastern North Carolina communities. More recently, on January 24 and 25, 2000, Raleigh had a record 20.3 inches of snowfall, forcing many facilities, including Raleigh International Airport, to close for several days.

As part of our review of the Raleigh WFO, we spoke with numerous public officials who work closely with the WFO. We met, for example, with the governor's emergency managers in Raleigh, as well as several county emergency managers, concerning the interaction they have with the Raleigh WFO and the quality of service the WFO provides. Without exception, the representatives had favorable comments about the quality of service received from the WFO (see page 5). Several representatives from North Carolina State University's meteorology department thought that the collaborative projects undertaken by the university and the WFO have been beneficial to both organizations' missions. Moreover, based on regional verification statistics, the Raleigh WFO ranked as one of the best offices in the eastern region in delivering accurate forecasts and warnings during the 1999 severe weather season (see page 6).

However, during our review, we also found a number of administrative and operational deficiencies that require prompt management attention.

**More support is needed for the Cooperative Observer program.** While the Raleigh WFO has tried to maintain the Cooperative Observer program, an important component of NWS's data collection and national observing capability, it has only two staff members dedicated part-time to this activity. The resources currently dedicated are insufficient to expand Raleigh's Cooperative Observer program to the level they deem appropriate. However, the office should be able to reallocate its resources to strengthen support for this program (see page 8).

**Skywarn network should be expanded.** Raleigh's Skywarn network, designed to have trained volunteer spotters provide the forecast office with timely and accurate severe weather reports, does not provide adequate coverage in certain remote parts of the WFO's county warning area. As a result, the office cannot obtain valuable forecast verification data for those parts of the county warning area (see page 10).

**Raleigh should implement NWS's policies on information technology security.** The WFO has not implemented NWS's information technology security policies that were issued to maintain appropriate levels of security over information technology (IT) and to foster greater IT security awareness among NWS employees. In addition, the office had not designated a systems security officer (see page 12).

**The electronic systems analyst (ESA) should manage the office's IT systems and equipment.** We found disjointed and inadequate oversight of the office's information systems. Different personnel have been managing various aspects of the WFO's IT systems and software, and the meteorologist-in-charge (MIC) has been overseeing systems repair. The ESA is the office's designated systems administrator. As such, he should manage the office's IT systems, including systems software and repair. However, the ESA has *not* been managing the office's IT systems because the MIC has not held the ESA accountable for that responsibility (see page 14).

**Greater use of the engineering management reporting system is needed.** Raleigh personnel did not understand how to use NWS's engineering management reporting system, which helps managers keep track of the operational reliability and maintenance of 35,000 pieces of NWS equipment at 3,000 sites. Raleigh personnel stated that they (1) have not been inputting repair information into the system in a timely manner, (2) are unaware of what system capabilities are available to them, and (3) have not managed the office's equipment on a proactive basis (see page 18).

**Quality control over WFO products needs to be more consistent.** While the Weather Service Operations Manual emphasizes quality control of forecasts, warnings, and other products, we found that the Raleigh office lacks a structured method to review products before and after they are issued to maintain accuracy and completeness. As a result, some Raleigh products have been issued with improper information. Although the overall quality of products issued by the Raleigh

office appears adequate, many Raleigh personnel strongly emphasized that the accuracy and completeness of all products can be improved (see page 20).

**The office needs a structured training program for its staff.** While some training has been provided, several Raleigh personnel stated that meteorological and hydrological training has been inconsistent and somewhat unresponsive to their needs. Some office personnel complained that training has been a low office priority, as evidenced by the lack of a structured training program for both experienced forecasters and interns. Operational demands should not unduly restrict training or preclude the WFO from having a structured training program (see page 22).

**Sound internal controls are needed in several key administrative areas.** The Raleigh WFO lacks adequate internal controls and procedures for maintaining official government vehicles, maintaining a complete and accurate inventory, and controlling and reporting credit card purchases (see page 26).

**Security of delivered packages should be improved.** We found a safety and security vulnerability during our review of the Raleigh WFO. Specifically, unidentified packages that are delivered to the office too often sit unopened for long periods of time at the front desk, which is at times unattended (see page 31).

**Management should track expenditures against the WFO's allotted budget.** The MIC does not effectively track WFO expenditures against its budget. Although the region provides the office with quarterly status of funds reports, the MIC was not aware of the office's current status of funds. The office does not maintain any type of spreadsheet to track its expenditures. Consequently, it is difficult for the MIC to effectively plan the use of and manage the office's fiscal resources (see page 32).

**Savings can be realized by eliminating some leased storage space.** In addition to its main office, where all the staff is housed, the WFO leases space on the university campus to primarily store surplus equipment and repair parts. The WFO also rents storage space at a public storage facility less than 10 minutes from the Raleigh office. The annual lease cost is \$2,640 for two 250-square-foot bins at the public storage facility and \$13,701 for 670 square feet on the university campus. We recommend that the office vacate the storage space on-campus, move the items stored there to the public storage facility, and dispose of or surplus items that are no longer needed, saving NWS \$13,701 if the lease is terminated by August 31, 2000 (see page 33).

**Local and regional management should be more attentive to office problems.** We found that inattentive management, personality conflicts, and resentment over staffing decisions have combined to lower office morale, especially among the office's electronics technicians. These factors have negatively impacted the WFO's equipment repairs, overall IT management, and

administrative operations. It is incumbent upon the MIC to implement a more effective system of management. For example, the MIC should hold staff accountable for performing their assigned responsibilities. In addition, the regional managers need to ensure that effective management and leadership practices are employed at the local level (see page 35).

On page 37, we offer a series of recommendations to the Assistant Administrator of the National Weather Service to address our concerns.



In its written response to our draft report, NWS generally agreed with most of our observations and outlined steps it was taking to address the intent of our recommendations. On each of the four recommendations with which the agency did not concur, it believed that what was being recommended was already in practice at the Raleigh WFO. We disagree in all but one instance. Where appropriate, we adjusted the language in our draft report in response to the NWS's comments. We also applaud NWS for its aggressive plan of remedial actions to address our concerns.

## INTRODUCTION

Pursuant to the authority of the Inspector General Act of 1978, as amended, the Office of Inspector General evaluated the National Weather Service's (NWS) Weather Forecast Office (WFO) in Raleigh, North Carolina.

Inspections are special reviews that the OIG undertakes to provide agency managers with timely information about operational issues. One of the main goals of an inspection is to eliminate waste in federal government programs by encouraging effective and efficient operations. By asking questions, identifying problems, and suggesting solutions, the OIG hopes to help managers move quickly to address problems identified during the inspection. Inspections may also highlight effective programs or operations, particularly if they may be useful or adaptable for agency managers or program operations elsewhere. This inspection was conducted in accordance with the *Quality Standards for Inspections* issued by the President's Council on Integrity and Efficiency. Our field work was conducted from February 7 through 11, 2000. During the review and at its conclusion, we discussed our findings with the Meteorologist-in-Charge (MIC) of the Raleigh WFO, the eastern regional Director in Bohemia, New York, and the Deputy Assistant Administrator of NWS.

## PURPOSE AND SCOPE

The purpose of this inspection was to determine how effective the Raleigh WFO is in delivering forecasts and other information to its service users, how well it coordinates its activities with state and local emergency managers, and how well it manages its networks of observers and volunteer spotters. We also assessed the adequacy of the office's management and its internal controls, its compliance with selected Department and NWS policies and procedures, and the effectiveness of regional oversight. This is the first in a series of OIG inspections of WFOs.

In performing our review, we examined pertinent records and documents and interviewed the majority of staff at the Raleigh WFO. We also spoke by telephone with the Regional Director in Bohemia, New York. In addition, we interviewed many representatives from the Department and other government agencies—federal, state, and local. We also interviewed private sector individuals involved in meteorological activities to obtain their assessment of the services provided by the Raleigh WFO, as well as to elicit their suggestions, if any, for improving the WFO's conveyance of critical weather information.

## BACKGROUND

The National Weather Service, an agency within the Department of Commerce's National Oceanic and Atmospheric Administration, has 121 Weather Forecast Offices nationwide. Each office issues local forecasts and warnings of severe weather—such as tornadoes, severe thunderstorms, floods, hurricanes, and extreme winter weather—for their assigned counties. The offices, where applicable, also support NWS's marine, aviation, and climatic data collection programs and prepare guidance for the fire weather program, supporting federal lands management and wildfire control. All U.S. counties are assigned to specific forecast offices for warning purposes. The offices are responsible for the effective use of advanced meteorological technology to issue weather predictions and continue to improve the timeliness and accuracy of severe weather and flood warnings to the general public.

NWS has maintained an office in Raleigh since January 1887. The WFO has been located on the North Carolina State University's Centennial Campus since 1994. It currently has a staff of 25, including a management team consisting of a meteorologist-in-charge, a warning coordination meteorologist, a science operations officer, a data acquisition program manager, an electronics system analyst, and an administrative assistant. There are also five lead forecasters, six journeyman forecasters, three electronics technicians, two hydrometeorological technicians, and three meteorologist interns. The office's fiscal year 2000 operating budget is \$442,126.

The Raleigh WFO's county warning area includes 31 counties and covers the northern Piedmont, northern and central Coastal Plain, and the Sandhills of North Carolina. The warning area includes the four metropolitan areas of Winston-Salem/Greensboro/High Point (Piedmont Triad), Raleigh/Durham/Chapel Hill (Triangle), Rocky Mount/Wilson, and Fayetteville/Fort Bragg.

The WFO uses various technology and programs to help protect the citizens in its warning area. Radar, satellite, and automated surface observation systems are used to prepare forecasts and issue warnings for all types of severe weather. NWS is currently implementing its Advanced Weather Interactive Processing System (AWIPS). AWIPS is an interactive computer system that integrates NWS meteorological and hydrological data, and NWS satellite and radar data. It is designed to enable forecasters to prepare and issue more accurate and timely forecasts and warnings.

To effectively provide early warnings and collect important climatological data, the WFO must rely on its many partners. State and local emergency managers are vital components of the WFOs efforts to disseminate critical weather information to the public. Conversely, the WFO plays an important role in the state and local officials' efforts to keep abreast of severe weather events. Other partners include Skywarn and Cooperative Observer volunteers.

The office's Skywarn program, part of a nationwide effort, trains volunteer spotters to provide the office and the Raleigh community with timely and accurate eyewitness severe weather reports. The Cooperative Observer program uses volunteers to provide daily weather measurements, including rain and snowfall amounts. Both the Skywarn and Cooperative Observer programs are considered critical by the meteorological community to verifying and collecting data to improve forecast models, and recording accurate climatic data. After developing weather forecasts and obtaining critical information from its partners, the office disseminates that information to the general public via its partners, NOAA weather radio, the Internet, and other means.

**Figure 1: Raleigh Weather Forecast Office**



Source: NWS Raleigh Homepage (<http://www.nws.noaa.gov/er/rah>)

In recent years, the Raleigh county warning area has experienced a number of extreme weather events. In August 1998, Hurricane Bonnie, a category 3 hurricane<sup>1</sup>, devastated North Carolina with overall damages estimated near \$1 billion. In September 1999, Hurricane Floyd, a category 1 hurricane, brushed the Raleigh area, causing record flooding in several eastern North Carolina communities. Finally, on January 24 and 25, 2000, Raleigh was hit with a record 20.3 inches of snow, part of a storm that surprised and crippled a sizable portion of the Raleigh WFO's county warning area. The storm forced many facilities, including Raleigh International Airport, to close for several days.

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<sup>1</sup>The Saffir-Simpson Hurricane Scale is a 1-5 rating based on a hurricane's intensity. This is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale. Category 1: Winds 74 - 95 mph; Category 2: Winds 96 - 110 mph; Category 3: Winds 111 - 130 mph; Category 4: Winds 131 - 155; and Category 5: Winds 156 and higher.

## OBSERVATIONS AND CONCLUSIONS

### I. WFO Operations Are Well Respected in North Carolina's Meteorological Community

As part of our review of the Raleigh WFO, we spoke with numerous public officials who work closely with the office's staff. For example, we met with emergency managers in the governor's office, as well as several county emergency managers concerning the type and quality of their interaction with the Raleigh WFO and their opinion of the quality of service the WFO provides. Without exception, each representative had favorable remarks regarding the quality of service received from the WFO. In addition, several representatives from North Carolina State University's meteorology department told us that collaborative projects undertaken by the university and the WFO have been beneficial to both organizations' missions.

#### WFO has an effective outreach program

State and local emergency managers in North Carolina help citizens in their community prepare for natural disasters, such as floods, hurricanes or tornadoes, and other emergencies, such as hazardous materials spills and nuclear power plant accidents, all of which may affect the public. The WFO is responsible for helping to (1) increase public responsiveness to warnings and critical weather, (2) better prepare customers and partners for extreme weather events, (3) develop and strengthen existing partnerships, and (4) increase customer feedback to enhance NWS services.

According to state and local emergency managers we interviewed, Raleigh WFO officials make themselves available to discuss severe weather forecasts. For example, during the severe snowstorm in January, the WFO conducted periodic conference call briefings with state and local representatives. Emergency managers stated that although the severity of the storm was not predicted in earlier forecasts, primarily because of the storm's unusual characteristics, the WFO staff kept them well informed about the storm's status.

The partners also expressed their confidence in the reliability of the forecasts issued by the WFO. This confidence is consistent with the WFO's regional verification statistics, which indicated that the Raleigh office is among the best in the eastern region in delivering accurate forecasts and warnings during the 1999 severe weather season.

In an example of the WFO's cooperative working relationship with state and local emergency managers, the state of North Carolina is providing \$2.8 million to address the problem of limited reception of NOAA weather radio, which provides immediate emergency broadcasts of severe weather forecasts. Because of the limited number and power of radio transmitters, some remote

areas in North Carolina do not receive the NOAA weather radio signal. Consequently, residents, schools, hospitals, and others in those areas must rely on other sources for early severe weather warnings. Some have had to subscribe to a paging service that alerts them to impending severe weather. To address this problem, the state is funding an effort to erect more transmitters and to also place additional NOAA weather radios in schools, daycare centers, hospitals, and other public institutions. NWS will be responsible for maintaining the additional transmitters.

In November 1999, the NWS published its *Fiscal Year 2000 Outreach Action Plan*. The plan outlines steps various NWS components, including the WFOs, should consider in accomplishing these outreach goals. The Raleigh WFO and its partners work well together in pursuing these goals. As part of the state's role in protecting North Carolinians, it is involved in several public awareness and information programs throughout the year. For example, a Severe Weather Awareness Week campaign is annually sponsored by the State's Division of Emergency Management in cooperation with NWS and the North Carolina Department of Public Instruction. As part of Severe Weather Awareness Week, schools, government agencies, and businesses throughout North Carolina have been encouraged to be alert to and prepared for severe weather events and have been invited to take part in an annual tornado drill. The WFO staff contributed to the event by providing information about NWS programs.

At the local level, most emergency managers' web sites have links to the WFO web sites and encourage citizens to monitor severe weather events on the NOAA weather radio or the local WFO web site.

#### Collocation of the Raleigh WFO on a university campus offers unique opportunities

In January 1994, the Raleigh WFO began moving its operations from Raleigh/Durham International Airport to North Carolina State University's Centennial Campus. Operations at the airport facility ceased completely in June 1996. The move has allowed closer collaboration with the university's Marine, Earth and Atmospheric Sciences Department<sup>2</sup> on various meteorological research projects. According to both university and WFO officials, these collaborative efforts have resulted in a better understanding of forecast problems found in the Southeast and the Carolinas, such as cold air damming, mixed precipitation, and coastal flooding along the sounds. In many cases, the research has resulted in real applications that have helped NWS meteorologists better forecast various meteorological phenomena.

Unfortunately, university and WFO officials informed us that certain valuable research conducted by the university is not being implemented into the WFO's operations. For example,

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<sup>2</sup>The department offers an undergraduate degree in meteorology.

the university-initiated research on the detection and prediction of “cold fronts aloft”<sup>3</sup> and “gravity waves”<sup>4</sup> has not yet reached operational implementation.

Staff in Raleigh stated that the WFO does not have sufficient resources to properly test and evaluate the results of some research projects. Because NWS-wide resource allocation was not within the scope of our work, we are not making recommendations concerning Raleigh staffing levels. However, the office may be able to adjust work assignments, as discussed throughout the report, to free staff for some of their important research projects.



In its written response, NWS noted that the problem of research not being implemented into operations is not unique to the Raleigh WFO. NWS pointed out that goal number two of the *NWS Strategic Plan*, “Capitalize on Science and Technological Advances,” recognizes the critical need to infuse science and technology into operations. NWS also created its Office of Science and Technology, in part, to help facilitate that infusion.

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<sup>3</sup>According to NWS, a pronounced band of rain is usually associated with cold fronts aloft. In some instances, they are capable of producing severe weather hundreds of miles ahead of the surface front, creating unanticipated weather consequences.

<sup>4</sup>According to NWS and other research sources, severe weather is often associated with gravity waves, which are defined as waves created by the action of gravity on variations in the density of the atmosphere.

## II. Improvements Are Needed in the Cooperative Observer and Skywarn Programs

### A. *More support is needed for the Cooperative Observer program*

Raleigh WFO personnel have worked hard to maintain the office's Cooperative Observer program. This program is a vital component of NWS's data collection and observing capability for monitoring temperature, rain, snowfall, and other weather events across the United States. For this program, the Raleigh WFO maintains 76 observer stations that measure various weather events.<sup>5</sup> The office has two people who work only part-time on Cooperative Observer activities,<sup>6</sup> including visiting Cooperative Observer sites, maintaining equipment, and preparing required paperwork. However, key Raleigh office personnel stated that this is insufficient to properly maintain or strengthen its Cooperative Observer program.

The Cooperative Observer program is a nationwide weather and climate monitoring network of almost 12,000 volunteer citizens and institutions. Each observer regularly reports temperature and rainfall amounts to their forecast office so that forecasts and warnings can be issued and the climate of the United States can be recorded. Cooperative data is used to verify forecasts and warnings and as data for various public service programs. Experts in the meteorological community emphasize that there is an increased need for greater "near-real-time" data as NWS attempts to move into an era of improved small scale analysis and forecasting. According to a 1998 study by the National Research Council,<sup>7</sup> data acquired through this program "represent a historical gold mine." The study states that such data is used in many ways, ranging from the management of water resources and the design and maintenance of infrastructure to predictions of crop yield and local weather forecasting. The study emphasizes that the growing recognition of the far-reaching economic and societal impact of climate variability and potential climate change reinforces the argument for maintaining this program.

Unfortunately, the study also suggests that the nationwide Cooperative Observer program has been struggling because of insufficient funding, aging equipment, insufficient resources, and poor management oversight. The council found that the national program had been hampered by technological, organizational, and budgetary factors, and that modernization would require

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<sup>5</sup>Cooperative observers use various weather gages to record and transmit their daily weather observations and come from all walks of life, including farmers, ranchers, and teachers. Organizations such as radio and television stations, schools, and public utility companies can also be cooperative observers.

<sup>6</sup>Both individuals involved in the program also work weather shifts and perform other assigned office administrative duties.

<sup>7</sup>*Future of the National Weather Service Cooperative Observer Network*, National Research Council, 1998.

substantial funding for equipment, ongoing operations, and maintenance. The council also found that other federal agencies that use the data have been concerned that NWS has apparently given relatively low priority to the program.

The Raleigh Cooperative Observer program has a resource problem consistent with the national program. Raleigh personnel stated that its Cooperative Observer stations provide valuable data but that because of the limited resources allocated to the program, they have been unable to adequately maintain and enlarge the program. Before NWS restructured its forecast offices several years ago, most states had a dedicated manager for their Cooperative Observer activities. At the Raleigh office, the Cooperative Observer program is currently maintained by the data acquisition program manager and one hydrometeorological technician. However, in addition to overseeing the Cooperative Observer program, the program manager works meteorological shifts, manages the office's equipment inventory, and participates on one of the office's program teams.<sup>8</sup> She may go from working a shift, to visiting Cooperative Observer sites, to performing administrative duties, to receiving training, and back to working a meteorological shift. The hydrometeorological technician also works rotating meteorological shifts.

The MIC, the program manager, and the hydrometeorological technician believe the office's Cooperative Observer network should be expanded to about 100 sites to provide more complete, accurate, and reliable meteorological data. However, such a level would require a larger and more consistent resource commitment. Both the data acquisition program manager and the hydrometeorological technician stated that adequately managing the current network on a part-time basis is possible, but takes a lot of time and hard work. The program manager emphasized, however, that expanding the Cooperative Observer network would be difficult at the current resource level, because both she and the hydrometeorological technician sometimes fall behind schedule on day-to-day program activities with only 70 observer sites. The MIC also emphasized that just maintaining the existing number of sites is difficult because the office loses one to two people a year as observers, and new observers must be found and trained.

Several office personnel suggested that changes in Raleigh's Cooperative Observer program were needed. They recommended additional shifts for Cooperative Observer activities and participation by more office personnel. The program manager has not used the office's meteorological interns and the other hydrometeorological technician for two reasons. In her opinion, cooperative observers need to see the same people for each visit, and she does not want multiple people entering data into the Cooperative Observer database.

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<sup>8</sup>The Raleigh office has 22 program teams working on various issues, including aviation, diversity, fire weather, safety, and verification.

However, we do not believe that involving one or two additional WFO personnel on a part-time basis would disrupt Cooperative Observer operations or other office activities. We believe that the Raleigh office should evaluate the feasibility of using other office personnel for its Cooperative Observer program. (We discuss on page 25 alternative resource allocation strategies that should allow the WFO to accomplish these priorities without disrupting others.) Cooperative Observer program managers in other WFOs have told us that although having additional staff members work on the program is a resource allocation challenge, it has generally helped, not hindered, their efforts to collect important meteorological data. The meteorological interns and the other hydrometeorological technician expressed some interest in the program. They stated that their involvement could help expand the program and allow them to meet individuals they would be interacting with when performing their regular meteorological duties. The MIC stated that even student interns can be used to perform some Cooperative Observer tasks and said that he will consider using additional staff, as appropriate, to maintain and expand the program.

**B. Skywarn network should be expanded**

Raleigh WFO personnel are also working hard to maintain the office's Skywarn program. Skywarn is an NWS program that trains private citizens to be severe weather spotters and provide forecast offices with timely and accurate severe weather reports. According to NWS, these reports, when integrated with modern NWS technology, are used to inform communities of the proper actions to take as severe weather threatens. The key focus of the Skywarn program is to save lives and property through the use of the observations and reports of trained volunteers. Regular training of spotters is designed to improve the quality of information they convey. The Raleigh office has been revitalizing its Skywarn program over the last year by adding regional managers to oversee and recruit Skywarn volunteers. The office has trained about 1,500 Skywarn volunteers over the last six years. With 31 counties in its county warning area, the Raleigh office has to oversee a large and varied area of North Carolina. Some Raleigh forecasters complained that there were not enough spotters in certain areas.

The *Weather Service Operations Manual* states that forecast offices must emphasize the development and maintenance of severe local storm spotter networks.<sup>9</sup> The manual also states that timely and reliable observations from trained volunteers are a key element in office forecasts and warnings.<sup>10</sup> The warning coordination meteorologist at each forecast office, in cooperation with local authorities, is primarily responsible for organizing, developing, recruiting, training, and maintaining well-managed spotter networks. He relies on volunteer managers to help him

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<sup>9</sup>“Severe Storm Reporting Networks,” *WSOM Chapter B-21*, March 9, 1982.

<sup>10</sup>“Warning Coordination and Hazard Awareness Program,” *WSOM Chapter C-49*, August 7, 1991.

with these duties, because the warning coordination meteorologist, like the office's Cooperative Observer manager, has other duties, including interacting with emergency managers and working occasional meteorological shifts.

Raleigh's warning coordination meteorologist agreed that the office does not have sufficient volunteers in some of its counties. He stated that the office has some rural and sparsely populated counties where it is difficult for forecasters to verify WFO weather warnings. Even the Weather Service manual states that in sparsely populated regions or areas where damaging severe local storms occur infrequently, finding emergency or volunteer groups to serve as spotters is difficult.<sup>11</sup>

The warning coordination meteorologist emphasized that he is always working to recruit more volunteers in those areas. For example, one of the three volunteer Skywarn managers for the Raleigh county warning area stated that his part of Raleigh's Skywarn network was not very active about a year ago, but that over the last year, he has made aggressive efforts to organize and enlarge his part of the network.

While the Raleigh warning coordination meteorologist has been expanding the office's spotter network, more needs to be done. The meteorologist has had very limited help with spotter activities. He recommended that two additional staff members be hired to assist him with spotter activities, such as recruiting at schools and colleges, arranging for promotions on television and radio stations, and issuing public service announcements on the importance of being spotters. However, the Raleigh office is fully staffed, and hiring two individuals for spotter activities is not likely. To address this resource shortage, the Raleigh office should evaluate the feasibility of using other office personnel for its Skywarn program. The MIC stated that he is willing to consider using other office personnel to maintain the program.



In their written response, agency officials stated that NWS has proposed a modernization initiative to Congress for the Cooperative Observer Program. It calls for "improving timeliness and quantity of data, replacing antiquated equipment, and improving maintenance activities." NWS also agreed that Raleigh needs additional spotters for its Skywarn network in rural areas. Since our visit, the WFO reports that it has recruited a new Skywarn coordinator and conducted additional spotter training classes in rural areas. In addition, the Raleigh MIC has commissioned a team to study and, if appropriate, recommend a more efficient and effective method to accomplish office tasks within existing resource limits.

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<sup>11</sup>"Severe Storm Reporting Networks," *WSOM Chapter B-21*, March 9, 1982.

### III. Controls over Information Systems Should Be Strengthened

NWS has made major advancements in the 1990s with new technology and modernized operations. Improved radars, new computer systems, and other technological advances associated with NWS's modernization efforts have substantially improved its access to critical weather data and its ability to forecast. Currently, all forecast offices are implementing AWIPS,<sup>12</sup> which enables forecasters to display and analyze satellite imagery, radar data, meteorological and hydrological data, automated weather observations, and computer-generated forecasts from various sources on a single workstation for weather and flood warnings and other forecast operations.

During our review, we found that office personnel had successfully deployed new hardware and software and transferred weather applications to AWIPS. However, we also found that office personnel had not followed NWS policy on information technology (IT) security, no one is being held accountable for managing the office's IT systems and equipment, and office personnel are not effectively using the engineering management reporting system.

#### A. *Raleigh should implement NWS's policies on IT security*

The Raleigh office has implemented neither NWS's longstanding IT security policies nor two more recent policies. To provide IT security at all forecast offices, NWS has issued policies for maintaining the security of each site's hardware and software systems.<sup>13</sup> These policies emphasize that the manager of each NWS site will be the IT system owner and, as such, should conduct periodic reviews of personal computers and workstations and office software applications. In August and December 1999, NWS issued a new AWIPS security policy and an overall NWS IT security plan.<sup>14</sup> Both documents, like prior NWS security policies, require the MIC to perform various security actions, such as ensuring that the prescribed level of security is maintained and designating an office IT security officer. However, we found that a systems security officer had not been designated for the Raleigh WFO, nor had the prescribed level of security been maintained.

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<sup>12</sup>AWIPS replaces NWS's existing 1970s-era weather communications system, known as Automation of Field Operations and Services.

<sup>13</sup>(1) *IT Security Management*, NOAA Administrative Order, August 1990, (2) *National Weather Service Office Automation Policy and Guidelines*, WSOM Chapter A-50, May 1991, (3) *Final Advanced Weather Interactive Processing System Security Policy*, December 1996.

<sup>14</sup>*Advanced Weather Interactive Processing System (AWIPS) Information Technology Security Policy*, August 1999, and *National Weather Service Information Technology (IT) Security Plan*, December 1999.

NWS has made systems security policies more stringent to increase the protection of its IT resources. With the new AWIPS security policy<sup>15</sup> and new IT security plan, each NWS IT systems owner has specific guidance for operating all systems and ongoing security tasks. For the Raleigh WFO, the MIC must (1) maintain the appropriate level of security for IT resources, (2) periodically reevaluate security levels, (3) ensure that only approved hardware and software are installed, and (4) designate an office IT security officer. The new policies reaffirm the importance of periodically reevaluating IT security and designating an IT security officer. In addition, the new NWS systems security plan greatly expands system security requirements for each NWS office, including requiring an office-level security plan,<sup>16</sup> risk analysis,<sup>17</sup> and disaster recovery plan.<sup>18</sup> While preparing plans and performing an analysis will improve system security at each forecast office, NWS just recently mandated these requirements, so we considered it too soon to evaluate the Raleigh WFO's compliance with them.

Our concerns focused on systems security requirements that the Raleigh WFO should have implemented some time ago. For example, the office should have implemented the existing AWIPS policy (December 1996) and at least begun to implement the new AWIPS policy (August 1999) by designating an office IT security officer. The officer's responsibilities should include overseeing office-developed AWIPS applications and user passwords and controlling system access. The 1996 AWIPS policy stated that the overall responsibility for local IT security rests with the MIC and the office's AWIPS system administrator. Although not a requirement, the policy stated that oversight of AWIPS is assumed by the electronics systems analyst (ESA).

However, during our inspection, we asked the ESA whether he had been designated the office's IT security officer or AWIPS system administrator. He replied that he has been the office's de facto systems security officer. However, he stated that he did not know what security guidelines had been issued and what security tasks needed to be implemented. We found that office personnel believed that the ESA was the systems security officer because he was responsible for hardware and software maintenance.

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<sup>15</sup>The new policy provides guidance to all personnel operating or servicing AWIPS hardware, software, or networks and specifying services and access controls for all AWIPS equipment.

<sup>16</sup>Security plans will contain detailed technical information about the office's systems, its security requirements, and the controls implemented to provide protection against vulnerabilities.

<sup>17</sup>Risk analyses measure the relative vulnerabilities and threats to an office's information technology systems in order that resources can be used to strengthen security and minimize potential losses.

<sup>18</sup>Disaster recovery plans provide continuity in data processing services should catastrophic events occur causing interference with normal system operations.

The ESA emphasized that the office's MIC never officially designated anyone in the office as the IT security officer. However, he stated that the MIC had designated team leaders for office issues such as forecasts, outreach science, science, systems,<sup>19</sup> and warnings. Each team leader coordinates office activities on these specific issues. The office's systems team leader, a forecaster, has successfully coordinated the office's commissioning of AWIPS and customization of AWIPS software. As a lead forecaster, the systems team leader has been very concerned with office systems security. However, he too has not been the office's designated or de facto system security officer. The MIC agreed that the ESA had not been designated the official IT security officer. He emphasized that the office's preparation for its AWIPS commissioning, operational constraints, and other factors have delayed his implementation of the new NWS IT security policies, including preparation of a security plan and designation of a security officer.

The office has experienced some security problems. [REDACTED]

[REDACTED] Without adequate IT security measures in place, the WFO is at greater risk of a number of other vulnerabilities, including employees downloading unapproved software, having unlicensed software installed, and not having adequate protection against computer viruses.

[REDACTED] After our inspection, the MIC designated a lead forecaster as the IT security officer. This individual needs to implement the new AWIPS policy and NWS security plan and correct the above deficiencies as soon as possible.

***B. The systems administrator should better manage the WFO's IT systems and equipment***

Although the ESA is the WFO's designated systems administrator, he has not managed the office's IT systems and systems software or overseen systems repair. We found disjointed and inadequate oversight of the office's hardware and software. In addition to the above security oversight issue, we found that different office personnel have been managing various aspects of the operation of the office's IT systems and software, and the MIC has been overseeing systems repair.

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<sup>19</sup>The systems include AWIPS, Automation of Field Operations and Services, and LINUX operating systems for the office's personal computers.

The ESA's position description states that he is the primary manager of the office's information systems. As such, the ESA should maintain the WFO's electronics systems, systems software, and telecommunications equipment. He should also provide technical and administrative supervision for the electronics technician staff. One of his major prescribed duties is to support the office's AWIPS hardware and local AWIPS applications. The ESA is also tasked with overseeing the maintenance of the radar, upper-air, telecommunications, automated surface, and hydrologic systems.

[REDACTED] As mentioned above, the office's team leader for systems, a forecaster, has overseen the office's customization of AWIPS software and the official commissioning of AWIPS. However, this forecaster has not been the office's designated or de facto systems administrator. Such a role would unduly interfere with his full-time forecaster duties. In fact, not until after our review was the responsibility for effectively managing the office's overall systems given to one individual. We believe that the person who is the most qualified, and has sufficient time to adequately perform the functions, should be the designated systems administrator.

[REDACTED]

[REDACTED]

[REDACTED] While the systems team leader has been overseeing the installation of AWIPS, the office has other critical systems that the team leader has not had time to oversee. The office's lack of centralized systems administration has allowed different individuals to work independently on various hardware and software systems. We identified several problems resulting from this lack of IT leadership.

First, several office personnel stated that communication about systems activities could be improved. For example, the office lacks a systems maintenance schedule. To a large degree, office personnel did not know what daily or weekly changes and modifications had been scheduled or completed, or to whom systems maintenance issues should be communicated. The MIC needs to inform all office personnel that the ESA is the systems administrator and that the ESA will plan and schedule all systems work. The ESA needs to coordinate an office-wide schedule of systems changes and modifications.

Second, the WFO's electronics technicians have not performed regular maintenance on some office equipment or have not recorded their work in the repair system. During our inspection, some office personnel stated that office equipment was not properly maintained. Preventive maintenance on some equipment was either not being performed or not properly recorded in the engineering management reporting system (EMRS). For example, quarterly maintenance should be performed on each of the office's nine surface observation systems. In 1999, EMRS information showed that the technicians only performed one of the four quarterly maintenance checkups. The WFO has various types of equipment to maintain and monitor, including (1) AWIPS, (2) radar equipment, (3) surface observation systems,<sup>20</sup> (4) upper air equipment, and (5) river gages. NWS guidelines require routine maintenance of all of this equipment.

Required maintenance is vital to reduce equipment degradation. However, the WFO lacks a log documenting what the required maintenance is for each piece of equipment, when it was performed or should be performed, and who performed it. The office also lacks an inventory of system hardware and software, including software license information. The MIC believed that his staff performed the scheduled maintenance on the equipment but failed to enter their work into EMRS (see page 25).

Several NWS headquarters personnel told us that they also believed that Raleigh WFO technicians had performed at least some preventive maintenance on surface observation systems. They based their conclusion on Raleigh's systems having acceptable operational working periods. While their premise is plausible, acceptable operational working periods are not necessarily a good indicator that maintenance is being performed. Without documentation, the Raleigh MIC and regional and NWS headquarters' personnel cannot determine what maintenance work has been performed.

While the MIC agreed that scheduled preventive maintenance needs to improve, he noted that office personnel have been busy installing and learning new systems. After our inspection, the MIC established a scheduled maintenance log for all office equipment. We believe that this step will help improve office operations.

Third, some office equipment, such as the surface observation equipment, has not been repaired promptly. When a piece of equipment needs repair, office managers or personnel fill out an

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<sup>20</sup>The Raleigh office has nine such systems to maintain.

equipment repair form and assign a priority to the repair.<sup>21</sup> NWS has different priority levels and acceptable time periods for completion of equipment repairs at each level. For example, for surface observation equipment, NWS has a priority level 1, 2, and 3, requiring that equipment be fixed within 24, 36, and 120 hours, respectively. While most priority 1 repairs were completed within 24 hours, we found six instances where surface observation priority 1 repairs in January and February 2000 were not completed within the prescribed 24 hours.<sup>22</sup>

Although various reasons, such as employees on sick leave, may have kept office personnel from repairing the equipment on a timely basis, the ESA stated that consistent oversight of equipment repairs, either by the MIC or himself, is needed. Considering the full-time nature of such a responsibility, we believe that the MIC should have the ESA oversee equipment repairs rather than doing it himself.

Lastly, two automation efforts had not been completed at the time of our visit in February. One system, the console replacement system, has been available for installation for over a year, but had not been installed. This new system is designed to improve the timely issuance of severe weather information and reduce the need for office staff to record periodic forecast messages. Both the ESA and the systems team leader do not know why this system had not been installed. The MIC stated that the system had not been installed because office personnel have been preparing for the office's AWIPS commissioning. Raleigh personnel reportedly installed the new system in April 2000, two months after our inspection.

In another case, the office has needed an automated system to track Cooperative Observer activities. While not an NWS requirement or a direct responsibility of the ESA, the ESA could help develop or acquire and install such a system. The office had maintained a manual log to track the program manager's and hydrometeorological technician's visits to Cooperative Observer sites, maintenance work performed at the sites, and other pertinent information. During our inspection, the Cooperative Observer manager stated that the previous log had been

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<sup>21</sup>Information on the repair form, WS Form A-26, is inputted into the engineering management reporting system after a repair has been completed. The four repair priorities are: (1) immediate, (2) routine, (3) low, and (4) not applicable.

<sup>22</sup>The six instances were related to surface observation equipment that had dew point, temperature, or wind sensor errors. Some of the instances occurred during winter storms.

misplaced, and, as a result, months of data was lost. While the program manager has started another log book, we recommend that an automated log be developed and implemented. Both the MIC and NWS headquarters personnel said that they were unaware of such a log being available at other forecast offices. However, they emphasized that forecast offices within the regions maintain their own programs. The Cooperative Observer manager and the ESA both agreed that an automated log would benefit the office.

**C. Greater use of the EMRS is needed**

We found that Raleigh WFO personnel did not understand how to use NWS's engineering management reporting system. NWS personnel use the reporting system to assess the operational reliability and maintainability of 35,000 pieces of equipment at 3,000 sites. NWS electronics personnel update the system with information on equipment repairs and preventive maintenance. After inputting information, NWS headquarters, the regional offices, and each forecast office can review and manage equipment maintenance. Because Raleigh personnel have not been inputting repair information into the system in a timely manner and are unaware of what system capabilities are available, they have not managed the office's equipment repairs on a proactive basis.

Raleigh personnel told us that they were not consistently using and updating EMRS, in part, because they did not find it to be an effective management tool. They also found that it was not user-friendly. We discussed the concerns of Raleigh personnel with NWS headquarters personnel who are responsible for maintaining EMRS. They stated that all forecast offices (1) should input system information in a timely manner to allow the region to adequately monitor system repairs, (2) can get various reports to manage their office's equipment, (3) have received adequate training on the system, and (4) can get updated system information from the EMRS web site. Eastern region personnel stated that they now monitor the input of system information on a weekly basis and that they periodically ask eastern region MICs if their employees need new or updated EMRS training. They emphasized that weekly monitoring should ensure the timely input of maintenance information in the future.

We also questioned why the Raleigh staff was unaware of the EMRS system capabilities. We found that NWS headquarters personnel have provided the WFO with significant information regarding EMRS. The system's web site allows users to enter data and receive such information as system bulletins, performance measures, training, and individual office performance reports.

Forecast office personnel can contact NWS headquarters if they have any questions or system problems. Headquarters personnel also stated that they are constantly trying to improve the system. For example, they are upgrading the system to include a graphics-based data entry system<sup>23</sup> and a web-based report generation, guidance communication, and documentation retrieval tool.

Raleigh WFO personnel need to improve their understanding of EMRS. Although we did not evaluate the training they received, additional training at NWS's national training center is available and information on the reporting system's capabilities appears to be adequate. Headquarters and regional personnel stated that Raleigh office personnel have not complained about inadequate training or insufficient information about the system's capabilities. Raleigh personnel should communicate their concerns to headquarters and regional personnel and read the information available on the system's web site for further information about EMRS. In addition, Raleigh personnel need to input information into the system in a more timely manner.



In the agency's written response, officials agreed with all but one of our recommendations in this area.

[Redacted text block]

[Redacted text block]

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<sup>23</sup>NWS personnel will access the system via the Web, on-line, and off-line.

#### IV. Quality Control over WFO Products Needs to Be More Consistent

We found that Raleigh WFO personnel do not consistently review weather products for correct information before and after they are issued. While the Weather Service Operations Manual emphasizes quality control of forecasts, warnings, and other products, we found that the Raleigh office lacks a structured method to review products before and after they are issued to maintain accuracy and completeness. As a result, some Raleigh products have been issued with improper information. Although we have no reason to question the overall quality of products issued, a number of Raleigh personnel strongly emphasized that the accuracy and completeness of some products can be improved.

The *Weather Service Operations Manual* provides WFO with general requirements for the quality control of all products.<sup>24</sup> The manual states that each office should establish quality control, consisting of training on the operational use of update criteria, proper coding, and clear wording of products. Specifically, quality control of products is a two-part process. WFOs must review products before issuance for correct information, format, and spelling. After products are issued, WFOs provide quality control through verification procedures<sup>25</sup> and the review of their products for adherence to NWS policies.

The Raleigh WFO needs to improve its review of products. Although the Raleigh staff verifies specific event forecasts, such as those for tornadoes, winter storms, and severe thunderstorms, it does not systematically and consistently review weather products to determine that each one has the correct spelling, coding, and weather terminology. The Raleigh warning coordination meteorologist emphasized that lead forecasters are responsible for the quality of all products and services during their shift. He stated that Raleigh managers occasionally check products after they have been issued for spelling, coding, and proper wording.

Raleigh personnel assume that because the WFO has experienced forecasters, the office will produce quality products. Six of the 10 Raleigh forecasters have many years of experience. However, we found two examples of product errors that were not identified by the lead forecaster. The expiration time for one warning was before the event's estimated start time, and the Universal Generic Code for another warning was incorrectly coded for the county to be

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<sup>24</sup>*Severe Local Storm Watches, Warnings, and Statements*, Weather Service Operations Manual Chapter C-40. *National Watch/Warning Verification Program*, Weather Service Operations Manual Chapter C-72.

<sup>25</sup>NWS determines how well it handles its forecasting and severe storms warnings through its verification process—a quality control process that essentially matches warnings to actual weather observations and compiles statistical results of forecasting performance.

warned. Office personnel did not remember whether the errors in either warning were corrected and subsequent warnings issued. During our inspection, we saw a forecast that was erroneously issued with P.M. instead of A.M. One forecaster believed that because of time constraints, some forecasts are just briefly reviewed before they are issued. Additionally, a few short-term forecasts, or NOWCASTS, were issued by one of the office's two hydrometeorological technicians without being reviewed by the lead forecaster. While both technicians are experienced personnel, all forecasters and the two hydrometeorological technicians agreed that all products should be reviewed by the lead forecaster before being issued.<sup>26</sup>

NWS's eastern region personnel stated that NWS management has been aware of inconsistent quality control of WFO products nationwide and is developing new software to address this problem. NWS is currently pilot testing software at one WFO to provide on-line editing and quality control of all aviation products. Regional office personnel emphasized, however, that it could be a year or longer before software is available for all WFO products. In the meantime, the Raleigh MIC needs to emphasize to all forecasters that products must be reviewed, and an ongoing quality control system should be implemented.



In response to our recommendation, the Raleigh WFO is reportedly developing an enhanced quality control plan that will evaluate products and services. The plan will be designed to require office program area focal points to regularly review products and services and provide feedback to staff and management. Customer and partner critiques of its products are also part of the WFO's plan to identify products and services where improvements are needed.

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<sup>26</sup>Weather Service Operations Manual, Chapter C-40, states that all weather products must be reviewed before they are issued.

## V. The WFO Needs a Structured Training Program for Its Staff

NWS has emphasized the importance of employee training for many years. NWS policies require training programs, including a forecaster development program, to maximize employee proficiency and potential.<sup>27</sup> While some training has been provided to Raleigh WFO personnel, meteorological and hydrological training has been inconsistent and somewhat unresponsive to staff needs. Office personnel said that training has been a low office priority, as evidenced by the lack of a structured training program for both experienced forecasters and interns. In addition, operational demands make it difficult to focus on training needs. To increase the priority of training, operational changes and a higher commitment by office management are needed. We understand that issuing forecasts, warnings, and other products around the clock is the office's highest priority. However, we agree that operational demands should not unduly restrict training or prevent the development of a structured training program.

Working operational shifts and serving on office "teams" leave staff little time to participate in planned training sessions. Office personnel reportedly work up to four non-operational shifts a month, which can be used for training, research, and other purposes. Occasionally, however, they do not work any non-operational shifts. For example, an individual may be asked to work the shift of an absent employee, thereby losing his or her training opportunity. We reviewed the biweekly pay sheets for office personnel and found that they often filled in and received overtime or compensatory time for office personnel on sick or emergency leave.

We discussed the operational demands of the Raleigh office with eastern region management. They stated that all of the region's WFOs have mentioned that operational demands have adversely affected training, research, and other office programs. Eastern region management also stated that WFO personnel have complained about the region's lack of training commitment and structure. The regional staff told us that NWS is committed to training, as evidenced by NWS's recent National Strategic Training and Education Plan.<sup>28</sup>

The goal of the Training and Education Plan is to better define, establish, and prioritize NWS's overall training requirements and implement a model that defines the required knowledge, skills, and abilities needed by NWS employees to successfully perform their job tasks. However, Raleigh personnel were unaware of the plan's details. While eastern region personnel

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<sup>27</sup>"Forecaster Development Program," *WSOM Chapter J-50*, January 16, 1986. "Sequence of Forecaster Development Program Training," *WSOM Chapter J-50*, March 22, 1991.

<sup>28</sup>NWS instituted this plan in September 1998 to support field training and education requirements through easily accessible, usable, and effective training materials.

emphasized that an office's MIC has to balance many programs, training should not be de-emphasized. Region personnel agreed that the Raleigh WFO needs to focus more on training.

In addition to the amount of time allocated to training, the Raleigh WFO needs to address the lack of a structured training program. The office does not have a structured training program for experienced forecasters and meteorologist interns, nor does it have a tracking mechanism to help ensure that employees obtain appropriate levels and types of training. To date, training has been ad hoc and incomplete. For example, some employees stated that training in the new AWIPS procedures, hydrology, office communications and team building, and safety equipment has been minimal. Some individuals wanted more weather "drills" to train for severe weather and hurricanes—similar to the weather drills they have received for winter weather storms.

The lack of a structured intern training program is one area of particular concern. Eastern region personnel stated that NWS has begun hiring meteorologist interns after a two-year hiring hiatus. While regional office personnel and Raleigh's science operations officer<sup>29</sup> emphasized the importance of training new interns, Raleigh's interns do not have a structured training program. Some of them feared that ad hoc training can slow career development. While Raleigh's current intern training includes scheduled in-house training sessions with experienced office forecasters, the interns did not clearly understand which classes were most important or the proper class sequence. The science officer agreed that a more structured intern program was needed because of the new radar, satellite, surface, and communications systems implemented in the 1990s.

We obtained a copy of an office intern training program being used at the Albany, New York, WFO. That office's program provides interns and new meteorologists with baseline knowledge of local and regional policies and procedures, local meteorological weather, and meteorological concepts before they work meteorological shifts. The plan has four phases:

(1) policy overview, (2) technical overview readings, (3) proficiency with computer software, and (4) on-the-job training. Each phase requires specific readings, formal and on-site classes, and informal instruction for each intern. Interns in the Albany WFO must have the science officer certify completion of each phase. One regional manager stated that this plan should benefit other forecast offices and all the eastern region offices have received a copy.

Raleigh WFO managers should consider the advantages and disadvantages of implementing such a program for their office. By having all requirements clearly documented and accessible to the staff, interns and new meteorologists will understand what training is needed, when it must be taken, and where it will be provided. In addition, the office should better track the staff's training sessions to determine whether each employee is receiving sufficient training.

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<sup>29</sup>The science operations officer is responsible for training at each WFO.

The MIC stated that a more structured training process has not been implemented because the office has been waiting for the regional office to issue updated guidelines on intern training. In June 1999, the eastern region sent its 23 WFOs an e-mail message outlining interim guidelines for intern training. The interim guidelines required all interns to take specific classes, including the training classes in phase 1 of NWS's Forecaster Development Program.<sup>30</sup> Until the eastern region issues updated training materials, the interim guidelines apply to all eastern region forecast offices. Therefore, the office's science operations officer should follow those regional guidelines and NWS's existing Forecaster Development Program.



Although agency officials disagreed with our assertion that training is a low priority in the Raleigh WFO, they agreed with our recommendation to improve the structure of the office's training program. The office is scheduled to implement a written training plan by December 5, 2000, including a database to track training needs and completion.

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<sup>30</sup>NWS initiated its Forecaster Development Program in January 1986 to provide uniform training and work experience for newly hired meteorologists to progress to full performance forecasters. Phase 1 teaches interns about WFO basic data collection and public service responsibilities.

## VI. Management and Administrative Improvements Are Needed

We discovered numerous deficiencies in management and administrative practices and procedures at the Raleigh WFO. Specifically, (1) the MIC does not have an effective strategy for achieving several of the office's stated goals, (2) the office lacks sound internal controls in several key administrative areas, (3) several safety and security vulnerabilities put office property at risk, (4) the MIC does not track expenditures against the office's budget, and (5) the office pays excessive rent for storage space.

### A. MIC should consider alternative strategies to accomplish office priorities

Although Raleigh WFO personnel emphasized that additional resources are needed for office programs, we believe that the office should first better allocate and marshal its existing resources. Other WFOs have used various strategies to accomplish their demanding workloads. For example, to augment existing resources, some offices have enlisted student interns to help with office priorities, such as the Skywarn and Cooperative Observer programs. Although the Raleigh office has used student interns in the past on research projects, the MIC should look to expand their use.

In addition, several WFOs have moved away from having typical public and aviation forecasters on each shift.<sup>31</sup> Instead, these offices divide the workload according to weather time rather than program area or products to better address immediate and long-term weather events.<sup>32</sup> According to the MICs at these offices, more of the meteorologists' time is available for other non-forecast priorities, such as research and training.

Specifically, short-term and long-term forecasters address different weather events. The short-term forecaster issues products and event-driven updates for time periods of less than an hour to several hours. Because the short-term forecaster is primarily event-driven, he or she may be

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<sup>31</sup>A typical forecast shift includes a public and aviation forecaster and a hydrometeorological technician. The public and aviation forecasters have specific programs and forecast schedules to maintain, such as public zone forecasts and airport forecasts. These two forecasters often perform comparable reviews and analyses, issuing forecasts for concurrent time frames and geographical areas. However, while preparing these types of forecasts, it can be disruptive to issue detailed forecasts for immediate severe weather events. The hydrometeorological technician on each shift receives data from different sources, interacts with emergency managers and others during severe weather events, operates the unit control position of the office's radar, and issues forecasts over NOAA Weather Radio.

<sup>32</sup>*Short-Term Forecast Tools and Concepts in a Modern NWS Forecast Office*, Dennis H. McCarthy, David L. Andra, Jr., and James K. Purpura, NWS, 1996.

excessively busy or free to receive training, work on research projects, or provide in-house assistance, such as data entry, with Cooperative Observer and Skywarn activities. This is important, because Raleigh personnel complained about not having enough time for training or research projects. The long-term forecaster is responsible for all scheduled forecast products up to five days, including public and aviation products. One WFO uses a slight variation of this short-term and long-term approach to forecasting. The office splits the scheduled products between the two shift forecasters.

We have not sufficiently evaluated this methodology to endorse it. However, on the surface, it appears to have potential for addressing a number of the resource concerns of the Raleigh WFO. The MIC stated that his staff wants to expand to the short- and long-term format used by some forecast offices. He stated that he will consider expanding the office's format and discuss this option with his staff in the near future.

#### **B. *Sound internal controls are needed in several key administrative areas***

The Raleigh WFO lacks adequate internal controls and procedures for controlling and reporting credit card purchases, maintaining a complete and accurate inventory, and controlling and documenting the use of official government vehicles.

##### Raleigh needs adequate controls over bankcard purchases

Currently, Raleigh has 10 bankcard holders, each with a monthly purchase limit of \$2,500. Based on an analysis of Raleigh's fiscal year 1999 bankcard activity report, we believe that the office does not need so many bankcard holders. According to the report, one cardholder had no activity for the entire year, and four cardholders had no activity for five or more months. In addition, officewide purchases were not significant. In order to better determine the total amount of purchases made by cardholders, we divided the office's fiscal year 1999 purchases into three categories: General Office Supplies, Operational Supplies, and Other Operational Purchases.<sup>33</sup> We found only two months, as shown in Table 1, where purchases by all cardholders exceeded the single cardholder monthly limit of \$2,500. Moreover, general office supplies were purchased by numerous cardholders, although at no point in the year did the total monthly purchases for such supplies exceed the administrative assistant's \$2,500 limit. To better control purchases and ensure that there is a need for the supplies being purchased, the office should reduce the number

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<sup>33</sup> We categorized the office's purchases in the following manner. **General Office Supplies:** Office supplies that are reordered on a frequent basis, such as paper, pens, and computer disks. **Operational Supplies:** Typically low cost items, such as wiring and cables, used to maintain operations and equipment. **Other Operational Purchases:** Major equipment or other operational purchases, such as computers.

of cardholders by eliminating those with little or no activity for the past year, and give primary responsibility for ordering general office supplies to the administrative assistant. All other purchases should be better controlled once a purchase card log (discussed on the next page) is developed and maintained.

**Table 1: Monthly Bankcard Purchases**

<b>Month</b>	<b>General Office Supplies</b>	<b>Operational Supplies</b>	<b>Operational Purchases</b>	<b>Totals</b>
Oct. - Nov. 1998	\$0.00	\$0.00	\$0.00	<b>\$0.00</b>
December 1998	441.44	190.98	449.00	<b>1081.42</b>
January 1999	1,042.74	165.37	436.61	<b>1,644.72</b>
February 1999	286.23	390.21	1,527.21	<b>2,203.65</b>
March 1999	357.16	454.74	310.93	<b>1,122.83</b>
April 1999	170.78	231.86	221.39	<b>624.03</b>
May 1999	267.48	1,609.00	59.00	<b>1,935.48</b>
June 1999	432.07	279.45	1,983.04	<b>2,694.56</b>
July 1999	1,309.10	414.55	1,907.37	<b>3,631.02</b>
August 1999	637.28	859.05	0.00	<b>1,496.33</b>
September 1999	390.77	416.06	114.00	<b>920.83</b>
<b>Totals</b>	<b>\$5,335.05</b>	<b>\$5,011.27</b>	<b>\$7,008.55</b>	<b>\$17,354.87</b>

Many of the office's bankcard problems also stem from the MIC not having an adequate purchase approval process in place for bankcard purchases. Consequently, the MIC is not aware of planned purchases. The MIC told us that he orally approves all purchases over \$50. However, from our discussions with numerous cardholders, we learned that not all of them are aware of the approval process. To alleviate such problems as duplicate and unnecessary purchases, the office should implement a clearly stated, written purchase approval process that will allow the MIC to better control office resources and track purchased items, stocked items, and items that need to be ordered.

According to departmental regulations, each cardholder should maintain a bankcard order log for all transactions.<sup>34</sup> At the time of our visit, each cardholder did not have such a log. To better track purchases, the MIC should also consider having a centrally controlled log. A detailed order log should help eliminate duplicate purchases, make it easier for the MIC to track his budget and the office's procurement activity, allow for better inventory reconciliation, and, in turn, save money.

Furthermore, we found that the office is not making a consistent effort to buy supplies from mandatory sources of supply, such as DOC Inventories, excess from other agencies, Federal Prison Industries, Inc. ("UNICOR"), or the General Services Administration, as required by the *NWS Eastern Region Administrative Guide*.<sup>35</sup> The guide specifically states that cardholders *must* make purchases from mandatory sources of supply unless they receive a waiver to purchase the needed items from an outside source. The example cited in the guide is the purchase of furniture. The guide states that "unless UNICOR grants the cardholder(s) a waiver to buy furniture from a different source, the cardholder(s) must purchase furniture from UNICOR." After reviewing the Raleigh WFO's past purchase card statements, we determined that it is practical for the office to adhere to the above guidelines. Most of the supply purchases made at commercial sources, such as Staples and Office Depot, could have been ordered through GSA. Nevertheless, we are aware that instances may arise when it is not practical to order items from mandatory sources of supply. One example would be a part needed for an emergency equipment repair in the field. In such cases, we would expect the purchase card holder to obtain the needed item from a convenient supply source at a reasonable cost.

In our review, we found examples of Raleigh WFO cardholders buying furniture from commercial sources, such as Office Depot and Walmart, instead of wholesale supply sources such as UNICOR. We found no evidence that the wholesale supply sources were ever considered for these purchases or that waivers were requested. The office should use mandatory supply sources when appropriate. If the needed item cannot be found at the suggested sources, then commercial sources should be considered after a waiver has been obtained.

The guide also requires that bankcard holders review their monthly statements for accuracy, write clear descriptions of the itemized purchases on the statement, attach appropriate documentation, and sign the back of the statement. In reviewing Raleigh's monthly bankcard statements, we found that bankcard holders provided vague descriptions, such as "office supplies," "tools," or

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<sup>34</sup>*Commerce Acquisition Manual*, Part 13, Chapter 1, "Commerce Purchase Card Procedures."

<sup>35</sup>*The National Weather Service Eastern Region Administrative Guide*, Section C, is consistent with the *Commerce Acquisition Manual*, Part 13, Chapter 1.

“hardware,” instead of clearly describing the supplies or equipment purchased. Cardholders also did not consistently attach original receipts to the bankcard statement for the MIC to review, as required.

#### Raleigh needs procedures for maintaining a complete and accurate inventory

The Raleigh WFO does not have an adequate system of control and accountability for personal property. According to departmental regulations and NWS guidelines, the MIC is responsible for maintaining inventory, including (1) ensuring effective administration and maintenance of a system of control and accountability for personal property; (2) ensuring that physical inventories are taken, records are reconciled, and discrepancies are investigated and resolved; and (3) ensuring that property is fully utilized and safeguarded from misuse or theft.<sup>36</sup> We found that controls over property were inadequate, resulting in both missing equipment and accountable property not being included on the official inventory.

Specifically, we found that the office’s inventory records are not accurate. The property custodian, designated by the MIC, tracks and maintains records for accountable inventory and sensitive items. However, no one in the office periodically reconciles bankcard activity and inventory records to ensure that purchases of accountable property were appropriately included on the office’s official inventory list. The MIC told us that he relies on the staff’s honesty in reporting accountable or sensitive item purchases to the custodian. The office has no other mechanism to record items that should be inventoried.

Consequently, we found several examples of missing property that should have been on the inventory list. In one example, although an employee purchased a digital camera with his bank card, there was no inventory entry made to reflect the purchase. When another employee inquired about the digital camera, the first employee reportedly denied the purchase. The custodian could not verify the purchase because she had no record of it on her inventory list. The purchase could not be verified from bankcard statements because, as previously discussed, the statements do not clearly itemize specific purchases and the office does not maintain a central purchase log. Therefore, the office purchased another digital camera. During a random property check, we found a copy of the packing slip for the missing camera, which enabled us to verify the original purchase and delivery to the office. After our site visit, Raleigh staff reportedly found the missing camera and placed it on the inventory list. We also learned, at a later date, that the office reportedly has another digital camera, not on the inventory list, that the regional office instructed the WFO to purchase approximately 2 years ago. The property custodian has taken measures to include the third camera on the property list.

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<sup>36</sup>Department of Commerce, *Personal Property Management Manual*, section 1.204.

The office's lack of an adequate system of control and accountability for personal property and its failure to reconcile purchase and inventory records leave government property subject to misuse and theft. This lack of control also can result in waste of government resources. It is important that the office follow the departmental inventory policy and maintain adequate internal controls over inventory, including reconciling purchase log entries with inventory records.

#### Raleigh needs to better control and document use of official vehicles

The Raleigh WFO has four official government vehicles for maintaining NWS field equipment and facilitating outreach efforts. One vehicle, a Chevrolet Astro van, is used primarily by the Cooperative Observer program manager and staff to make field visits to program sites for regular maintenance and repair of equipment and other program activities. A second Astro is used primarily by the office's management team for various administrative and management activities, such as to attend off-site meetings. Finally, two Ford Expeditions are used by the electronics technicians for transportation to radar and automated surface observing systems sites for regular maintenance and repair.

The eastern region's regional operations management letter on official motor vehicle management states that the vehicle custodian is responsible for maintaining and controlling a daily ledger of vehicle usage.<sup>37</sup> No such ledger exists at the Raleigh WFO. Consequently, we were unable to determine whether the office's use of its vehicles is consistent with department and federal guidance. We were also unable to adequately assess the need for four vehicles.

Similarly, the MIC is unable to adequately manage the office's use of official government vehicles. During our visit, a number of questions arose about whether the vehicles were being used for non-official government purposes. The MIC had no records to enable him to answer those questions. It is important that the WFO implement control procedures and better document vehicle usage. The office should maintain a log for each vehicle. In addition, the MIC should periodically review the log to ensure that the vehicles are being used in an appropriate manner and to determine whether there is a demonstrated need for the current number of vehicles. After our visit, the MIC reportedly implemented a system to track the use of official government vehicles.



In their written response, agency officials agreed with most of our recommendations in this section and have taken action on some them. For example, the MIC reported that he has reduced

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<sup>37</sup>Eastern region's Regional Operations Manual Letter E-6-94, Section 1.

the number of cardholders, required all cardholders to certify that they have reviewed and understand the regulations governing the use of the purchase card, and emphasized the need for all cardholders to maintain adequate documentation for their purchases and purchase routine supplies from mandatory sources when possible.

However, NWS stated that contrary to our report, the Raleigh MIC has an approval process in place that is in accordance with guidelines established in the *Commerce Acquisition Manual*. They further stated that subsequent to our visit, the MIC implemented a local written policy requiring pre-approval on any purchase over \$50. Raleigh also reported that it has completed a “wall-to-wall” inventory and tightened controls over its vehicles since our visit. Although the agency’s planned actions meet the general intent of our recommendations, we reiterate our recommendation to consider implementing a centrally controlled log for bankcard purchases to better track and control office spending.

**C. Security of delivered packages should be improved**

During our visit, we noticed several delivered packages sitting at the reception desk unopened. We were told that the office has an unwritten policy prohibiting the administrative assistant from opening any packages delivered and addressed to other office staff. Instead, the administrative assistant puts the package in the addressee’s mailbox, if it will fit, or leaves it on the front desk until it is claimed. We were told that the contents of the packages range from laptop computers, to digital cameras, to office supplies.

The current office policy creates the opportunity for incoming packages to be lost or stolen. It also reduces staff accountability for ordered supplies and equipment, and provides opportunities for claims of non-receipt. The front office door is not locked during the day shift, and the administrative assistant is often away from the front desk performing other duties. Thus, it presents the opportunity for someone to enter the office and walk off with the packages without being seen. All packages delivered to the office should be secured until claimed by the addressee. After our site visit, the office reportedly implemented a system whereby all packages are kept in the MIC’s office until claimed.



In its response, NWS stated that the administrative assistant, MIC, acting MIC, or shift supervisor will open all incoming packages and distribute them to the appropriate addressee. However, accountable property will be placed in the MIC’s office until added to the office’s official inventory.

**D. MIC should track expenditures against the WFO's budget**

The NWS eastern regional headquarters in Bohemia, New York, provides the Raleigh WFO with a fiscal year budget. The office's fiscal year 2000 operating budget was \$442,126. We found that the MIC does not effectively track office expenditures against the WFO's budget. Although the region provides the office with quarterly status of funds reports, the MIC was not aware of the office's current status of funds. The office does not maintain any type of spreadsheet to track expenditures.

Thirty-six percent of the office's budget is generally controllable by the office. Without accurate, up-to-date information on the status of the office's funds, the MIC cannot effectively plan for the use of these funds, manage the office's fiscal resources, and ensure that the office does not overspend.

After our visit to Raleigh, we learned that the MIC can access, via the Internet, budget reports showing the office's current fiscal status. Although the MIC noted that the system was cumbersome to use, we learned that the New York regional office had previously provided training to the MIC on how to access the information. The MIC should either develop a spreadsheet to track expenditures against the WFO's budget or use the information available on-line to better plan and manage use of the office's resources. With more accurate and timely information regarding the status of WFO funds, the MIC should be able to make more informed decisions regarding resource allocation, considering office priorities as well as funding availability.

Additionally, of the office's budgeted line items, utilities and rent make up over 64 percent of the office's total budget. As we detail below, the office pays excessive rent for equipment storage space. Also, no one certifies office phone bills, and Raleigh staff do not see the bills. Instead, the bills are sent directly to NOAA's Eastern Administrative Support Center (EASC) in Norfolk, Virginia, which pays the bills. The Raleigh office is unaware of the magnitude of this component of its monthly utility expenses. [REDACTED]

[REDACTED] EASC officials stated that they instead conduct periodic sample reviews of phone charges in their region. The center has reportedly had no problems with the appropriateness of Raleigh phone charges.

Nevertheless, the Raleigh office should request from EASC or the local telephone company a copy of their telephone charges to better track these expenditures and ensure that all calls are for official government use.

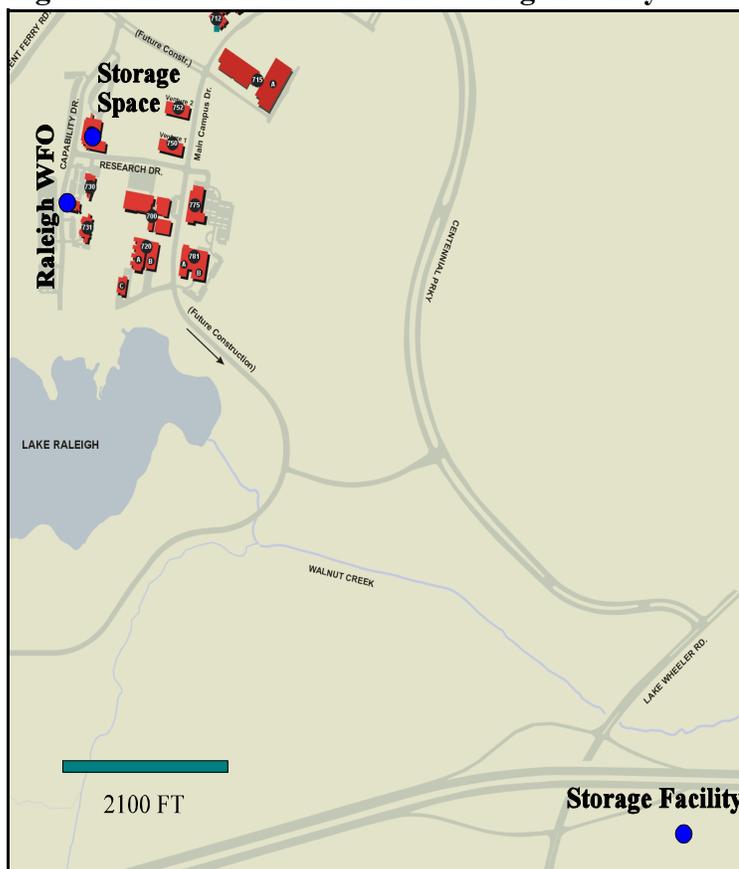


Subsequent to our review, all Eastern Region offices certify the telephone bills for their area of responsibility.

**E. Savings can be realized by eliminating some leased storage space**

The Raleigh office has two offices on North Carolina State University's Centennial Campus. The main office, which houses the staff, is located on the third floor of the Research III Building and consists of approximately 5,400 net usable square feet of office space. Its annual rent is \$172,800, and the lease expires in December 2013. The second office, located across the parking lot from the WFO, consists of 670 usable square feet of storage space. It is primarily used to store various parts and equipment for the office and field observation sites, including a surplus copying machine, an extra radar antenna, and Cooperative Observer repair equipment. The annual lease of \$13,701 (\$20.45/sq. ft.) expires on August 31, 2001. The MIC stated that the space is also used by the electronics technicians to repair Cooperative Observer equipment. However, there is sufficient space in the main office suite for such repair activities.

**Figure 2: Location of WFO and Storage Facility**



We believe that the Raleigh WFO pays excessive rent for this on-campus storage space, considering that there is no operational need to have the storage space so close to the office. The WFO also leases two 250-square-foot storage bins at an off-campus location less than 10 minutes

away from the WFO, as shown on the map in Figure 2. The public storage facility's annual lease is \$2,640 (\$5.28/sq. ft.). Items contained in the public storage facility include the office's surface observation equipment, van benches, computer equipment, observation devices, and miscellaneous items—much of which can be surplused or disposed of. The public storage facility is gated, and the space is secured with a GSA-approved lock. The on-campus storage space is secured only with a locked door knob.

We recommend that the WFO vacate the storage space on-campus and move the items stored there to the public storage facility and dispose of or surplus items stored in both locations that are no longer needed, saving NWS as much as \$13,701 if the lease is terminated by August 31, 2000. Both WFO and regional management agreed that the campus storage space may no longer be needed to accomplish the office's mission.



In their written response, agency officials agreed with our recommendation to analyze the cost-effectiveness and viability of eliminating the storage space on campus. Recommendations from an ongoing NWS cost-benefit analysis are scheduled to be provided to the Eastern Region Director by October 16, 2000.

## VII. Local and Regional Management Should Be More Attentive to Office Problems

As part of our review, we met with each available WFO staff member. We found that inattentive management, personality conflicts, and resentment over staffing decisions have combined to lower office morale, especially among the office's electronics technicians. It is incumbent upon the MIC to implement a more effective system of management and address the staff's concerns. We also believe that regional managers need to increase their attention to and oversight of the Raleigh WFO management issues.

Many of the noted problems involve personality conflicts between some of the Raleigh staff. Generally, such problems would not require significant management intervention, especially if the problems do not impact operations. However, Raleigh's problems have reached the point of potentially impacting WFO operations. As discussed on page 12, many of the office's systems-related responsibilities are either not being conducted or not being managed well. In an effort to address these problems, the MIC had the electronics technicians report directly to him [REDACTED]

Likewise, the MIC should be held accountable for effectively managing the WFO. He has not effectively used available management tools, such as performance appraisals and reprimands, to encourage staff to do their jobs and to discourage insubordination. The MIC needs to effectively manage the post's human resources and be responsible for building and maintaining professional working relationships among the staff. In addition, although NWS regional managers were aware of some of these issues, they did not intercede to resolve problems brought to their attention. When WFO managers fail to address problems at the local level, action should be taken at the regional level. We did not find that sufficient action was taken at either level.

Likewise, as noted in section VI on page 22, the WFO has numerous problems in its management and administrative operations and controls. We believe that regional management should have identified and corrected these long-standing administrative deficiencies. The regional office conducts various programmatic inspections at WFOs,<sup>38</sup> but does not, according to regional staff, conduct administrative inspections of those offices. Such administrative inspections would alert the regional office to specific WFO administrative deficiencies and allow the region and the WFO to work together in resolving them.

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<sup>38</sup>The regional office conducts various programmatic inspections, including reviews of systems and equipment, the upper air program, and surface observations.

We recommend that the regional office expand its current programmatic inspections of the WFO to cover administrative and management operations, including an assessment of the adequacy of (1) internal controls, (2) information technology security, (3) facilities, and (4) human and other resource management. The regional office should also provide management training to the MIC in a number of areas, including conflict resolution, human resource management, and internal administrative and management controls. Supervisory training should also be considered for other WFO managers, as necessary and as resources permit. Regional office personnel stated that NWS headquarters is preparing a new management course available to all NWS managers starting in fiscal year 2002. The course, being developed by NWS and the U.S. Army, will be similar to the Army's current Personnel Management for Executives course. In the interim, some MICs and other NWS managers have taken the Army course on developing leadership and management skills. Although we have not evaluated the Army course, one senior NWS manager recommended the 9-day course for all NWS managers. We believe that the Raleigh MIC would benefit from taking the Army course, or a similar management course, as soon as possible.



In its response, NWS reported that the Raleigh MIC will receive management training in FY 2001, and a conflict resolution training course is planned for all Raleigh personnel during the first quarter of FY 2001.

## RECOMMENDATIONS

We recommend that the Assistant Administrator for NWS instruct Raleigh WFO and eastern region management to take the following actions.

1. Consider using other office personnel on a part-time basis to assist with the Cooperative Observer program (see page 8).
2. Consider making Skywarn recruiting and training activities collateral responsibilities of additional WFO staff (see page 10).
3. Adhere to NWS information technology security policies, including (a) performing periodic security reviews, (b) periodically changing system passwords, and (c) updating virus software (see page 12).
4. 
5. Develop or acquire, and install an automated database to track maintenance activities for Cooperative Observer sites (see page 14).
6. Increase staff and management's understanding of the engineering management reporting system (see page 18).
7. Routinely and promptly input repair and preventative maintenance information into the engineering management reporting system (see page 18).
8. Implement quality control procedures for WFO products and emphasize to all forecasters the importance of quality control (see page 20).
9. Develop a structured training program for WFO interns and forecasters, including a database to track training needs and completion (see page 22).
10. Determine whether the intern program at the Albany WFO, or another WFO model, can be adapted in Raleigh (see page 22).

11. Consider piloting various strategies used by other WFOs, such as short-term/long-term forecasting, to free up resources for office priorities, such as research and the Skywarn and Cooperative Observer programs (see page 25).
12. Implement an approval process for bankcard purchases (see page 26).
13. Make a consistent effort to purchase routine supplies first from mandatory sources of supply, such as the General Services Administration, before pursuing commercial vendors (see page 26).
14. Instruct purchase cardholders to clearly identify on the bankcard statement specific items purchased and to attach original receipts to the statements for the MIC to review (see page 26).
15. Instruct each cardholder to maintain a purchase log, as required in the *Commerce Acquisition Manual*. Consider establishing a centrally controlled and located purchase log for all credit card transactions (see page 26).
16. Reduce, as appropriate, the number of cardholders in the WFO (see page 26).
17. Ensure that all accountable property maintained in the WFO is on the official inventory list (see page 29).
18. Once a purchase log is implemented, periodically reconcile entries with inventory records to ensure that purchases of accountable property are appropriately included on the official inventory list (see page 29).
19. Implement a vehicle log to control and better document vehicle use by office staff (see page 30).
20. Periodically analyze use of vehicles to ensure that they are being used in an appropriate manner and to determine whether there is a demonstrated need for the current number of official vehicles (see page 30).
21. Develop a system to better control, account for, and safeguard delivered packages (see page 31).

22. Track the office's budget by either developing a spreadsheet or using the information available on-line to better plan the office's resource allocation and track expenditures against the budget (see page 32).
23. Analyze the cost-effectiveness and viability of eliminating the storage space on campus and moving the items stored there to the storage facility off-campus. Items no longer needed should be surplus or disposed of. If the space is not needed, NWS should take immediate action to terminate the lease with the university. Such action could save NWS as much as \$13,701 on its lease, which expires in August 2001 (see page 33).
24. Provide basic management training to the MIC in appropriate areas, including conflict resolution, human resource management, and implementation of sound internal administrative and management controls (see page 35).
25. Expand the regional office inspections of WFOs to cover administrative and management operations, including an assessment of the adequacy of (a) internal controls, (b) information technology security, (c) facilities, and (d) human and other resource management (see page 35).

## AGENCY RESPONSE



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
CHIEF FINANCIAL OFFICER/CHIEF ADMINISTRATIVE OFFICER

SEP 28 2000

MEMORANDUM FOR: Johnnie Frazier  
Inspector General

FROM: Sonya G. Stewart  
Chief Financial Officer and  
Chief Administrative Officer

SUBJECT: OIG Draft Inspection Report: Raleigh Weather Forecast  
Office Provides Valuable Service But Needs Improved  
Management and Internal Controls, Report No. IPE-12661

Thank you for the opportunity to review and comment on the draft report on operations at the National Weather Services's Raleigh Weather Forecast Office (WFO). We are pleased that your review concluded that the Raleigh WFO delivers valuable services and products to the citizens of north central North Carolina. On September 13, 2000, the Raleigh office was awarded the Department of Commerce Gold Medal for superior performance in warnings and forecasts during Hurricane Floyd.

We agree with almost all of the findings and recommendations made in the draft report. The attached response identifies the necessary actions, some which are already underway, that will effectively implement the report's recommendations. Thanks again for the opportunity to comment on the draft report.

Attachments



National Oceanic and Atmospheric Administration (NOAA)  
Response to OIG Draft Report:

*Raleigh Weather Forecast Office (WFO) Provides Valuable Services but  
Needs Improved Management and Internal Controls, (IPE-1266)*

Observations & Conclusions

I. WFO Operations Are Generally Well Respected in North Carolina's Meteorological Community

We recommend that the word "Generally" be removed from the title of Section I. Section I, paragraph one, page 5, of the draft report states, "Without exception, each representative had favorable remarks regarding the quality of service received from the WFO." The Raleigh office is among the best in the National Weather Services's (NWS) Eastern Region in delivering accurate forecasts and warnings. WFO Raleigh has been awarded the Department of Commerce (DOC) Gold Medal (2000), the DOC Bronze Medal (1997), and a NOAA Unit Citation (1997).

The comment on page 7, Section I, paragraph 2, that research is not being implemented into operations is not unique to the Raleigh WFO. Goal number of 2 of the *NWS Strategic Plan*, "Capitalize on Science and Technological Advances," recognizes the critical need to infuse science and technology into operations. The NWS created the Office of Science and Technology (OST) as part of the realignment of Weather Service Headquarters, in part, to facilitate the infusion of science and technology into operations.

II. Improvements are Needed in the Cooperative Observer and Skywarn Programs

Section A. *More support is needed for the Cooperative Observer Program.*

The Raleigh WFO supports 76 observers, not 70 as stated in the draft report (page 8, paragraph 1). While we agree more support is needed for the Cooperative Observer Program (COOP), the Raleigh WFO meets the COOP requirements outlined in the *Weather Service Operations Manual* (WSOM) Chapter B-17 which states, "network stations should be spaced 25 miles apart." Also, there is at least one in every county supported by the Raleigh WFO.

The NWS has proposed an initiative to Congress to modernize the Cooperative Observer Program. The modernization initiative calls for improving timeliness and quantity of data, replacing antiquated equipment, and improving maintenance activities. The initiative, when funded, will include a study to determine the optimal mix of station spacing needed to meet program requirements and the type of hydrometeorological parameters necessary to support the requirements. We recommend deleting the reference on page 9 that states, "a Cooperative Observer network should be expanded to about 100 sites," because until the study is completed, the optimal number of COOP sites is unknown.

The statement in section IIA, page 9, first paragraph, "Before NWS restructured its forecast offices several years ago, each office had a dedicated manager for its Cooperative Observer activities" is incorrect. We recommend it be changed to, "Before NWS restructured its forecast offices several years ago, most states had a dedicated manager for its Cooperative Observer activities."

Section B. *Skywarn Network should be expanded.*

Raleigh's excellent severe weather statistics, is in part, due to the existing spotter network. We agree that Raleigh needs additional spotters in rural areas. Recruiting, training, and retaining spotters in rural areas is a NWS-wide challenge. Since the OIG's visit, the Warning Coordination Meteorologist (WCM) has recruited a new Skywarn coordinator for the rural counties of Raleigh's southern tier. Two spotter training classes have been conducted in these rural counties.

III. Controls over Information Systems Should be Strengthened

Section B. *The systems administrator should better manage the WFO's IT systems and equipment.*

We agree that the Electronics Systems Analyst (ESA) should be the office's computer systems administrator as noted on page 15, paragraph 2. The Raleigh ESA is the office's systems administrator, as such he oversees the maintenance of the WFO's electronic systems, systems software, and telecommunications equipment. However, we do not agree that the systems administrator has to be the same individual who customizes Advanced Weather Interactive Processing System (AWIPS) software as inferred in the report. Responsibility for customization and development of meteorological/hydrological applications software is assigned to the AWIPS focal point. The Science and Operations Officer (SOO) assists when necessary. The Meteorologist in Charge (MIC) will continue to ensure that individuals are held accountable for their performance.

V. The WFO Needs a Structured Training Program for Its Staff

We disagree with the conclusion on page 22, paragraph 1, that training is "... a low priority, as evidenced by the lack of a structured training program ..." The Raleigh office has a solid history of accomplishments in the training arena. Raleigh maintains a solid seasonal

familiarization training program. Seasonal familiarization for critical forecast problems was presented in seven forums that concentrated on severe storms, flash flooding, and inland threats associated with tropical cyclones. A winter weather training program is underway which focuses on satellite data interpretation, numerical weather prediction fundamentals, and cyclogenesis identification and intensification techniques.

The SOO and WCM have designed, maintained, and presented severe storms familiarization sessions. Five locally developed lessons addressing numerical weather prediction were given to the forecasters. AWIPS proficiency training addressed product generation and preparation software, radar functions, and severe weather configurations. To improve the structure of the program, the Raleigh office will implement a written training plan by December 5, 2000. The plan will include a database to track needs and completion.

#### **VI. Management and Administrative Improvements are Needed**

##### *Section C. Security of office should be enhanced.*

In reference to, "Access to WFO should be limited to NWS staff," on page 31, we believe the OIG team misunderstood the issue concerning the lock on the back door. Two years ago, Raleigh had the university install a lock on the back door. The back door is always locked from the stairwell and can only be opened by keys assigned to WFO personnel or university employees such as police, fire, or maintenance. After the OIG visit, the university confirmed that this policy is still in effect. The statement, "... the key is the same one used by other building occupants to access the facility's main door," (first paragraph, page 31) is incorrect.

##### *Section D. MIC should track expenditures against the WFO's budget.*

NWS's Eastern Region Headquarters (ERH) provides a monthly spending report to field offices, not quarterly as stated on page 12, paragraph 1.

Since March 2000, all Eastern Region offices certify the telephone bills for their area of responsibility. Telephone bills are sent directly to the responsible field office. The MIC reviews the bill and certifies that charges are legitimate.

### Response to OIG Recommendations

1. Consider using other office personnel on a part-time basis to assist with the Cooperative Observer program.

NOAA Response: We concur. The Raleigh MIC has commissioned a team to study and, if appropriate, recommend a more efficient and effective method to accomplish all tasks in the WFO, within existing resource limits. This study will include the Cooperative Observer Program, the Skywarn Program, research projects and short-term/long-term forecasting. The Albany, New York MIC will serve as a member of the team. The team's findings and recommendations will be provided to the Raleigh MIC by November 1, 2000.

2. Consider making Skywarn recruiting and training activities collateral responsibilities of additional WFO staff.

NOAA Response: We concur and will accomplish this recommendation as stated above.

3. Adhere to NWS information technology security policies, including (a) performing periodic security reviews, (b) periodically changing system passwords, and (c) updating virus software.

NOAA Response: We concur. On February 28, 2000, the MIC designated a Senior Forecaster as Information Technology System Security Officer (ITSSO). The *AWIPS Information Technology Security Policy*, page 7, section 3.5, states, "... the site ITSSO should be someone other than the System Administrator." At the direction of the MIC, the ITSSO:

- a. Reviews security logs twice a week and notifies the MIC and the Regional ITSSO of unusual or unexplained activities and prepare incident reports, when required;
- b. 
- c. Upgraded virus software on February 26, May 10, and September 30, 2000 and instituted weekly automatic downloading of virus software from the NOAA security site;
- d. Reports security activities to the MIC on a quarterly basis.

In addition, all Raleigh employees completed the on-line NOAA Information Technology Security Awareness Training Course and signed the AWIPS Security Policy acknowledgment sheet.

4. [REDACTED]

NOAA Response: We do not concur with this recommendation. [REDACTED]

5. Develop or acquire, and install an automated database to track maintenance activities for Cooperative Observer sites.

NOAA Response: We concur. The database associated with the Cooperative Observer Program, called the Cooperative Station Service Accountability (CSSA), is being modernized to track maintenance activities. The CSSA modernization is a national level issue managed by Weather Service Headquarters. The modernized CSSA is scheduled to become operational in the 2<sup>nd</sup> quarter of FY 2001. It will be a user-friendly, web-based database that will provide enhanced station maintenance accountability.

6. Increase staff and management's understanding of the engineering management reporting system.

NOAA Response: We concur. In March 2000, the Raleigh MIC conducted an Engineering Management Reporting System (EMRS) training session and a demonstration with the Electronic Technicians (ETs) and the Electronic Systems Analyst (ESA). This included a thorough review of EMRS program, procedures, and philosophy. The importance of proper usage was also stressed. To facilitate EMRS data input, a PC was installed in each ET cubicle. In addition, for the next year, the ETs and ESA will be scheduled semiannually to attend mandatory EMRS refresher training via the comprehensive training module on the NWS Office of Systems Operations EMRS Internet homepage. The Raleigh management team received an EMRS demonstration on September 18, 2000.

7. Routinely and promptly input repair and preventative maintenance information into the engineering management reporting system.

NOAA Response: We concur. In addition to the actions taken above, the Raleigh MIC issued a memorandum on September 5, 2000, to the ESA directing him to ensure the data in EMRS properly reflects the work performed by the ESA and his staff. The MIC reviews EMRS data on a monthly basis. Eastern Region Headquarters (ERH) reviews EMRS workload summaries region-wide on a monthly basis.

**8. Implement quality control procedures for WFO products and emphasize to all forecasters the importance of quality control.**

NOAA Response: We concur. The Raleigh office is developing an enhanced quality control plan that will evaluate products and services. The enhanced evaluation plan will require office program area focal points to regularly review products and services and provide feedback to staff and management. This will be augmented by partner and customer critiques and reviews of Raleigh products. Customer input will be analyzed both quantitatively and qualitatively to identify products and services where possible improvements are needed. After a review of the plan by ERH, Raleigh will implement the plan by October 31, 2000.

**9. Develop a structured training program for WFO interns and forecasters, including a database to track needs and completion.**

NOAA Response: We concur. The Raleigh Office will develop and implement a training plan that is approved by ERH by December 5, 2000.

**10. Determine whether the intern program at the Albany WFO, or another WFO model, can be adapted in Raleigh.**

NOAA Response: We concur and will implement this recommendation in the development of the training plan in response to recommendation 9.

**11. Consider piloting various strategies used by other WFOs, such as short-term/long term forecasting, to free up resources for office priorities, such as research and the Skywarn and cooperative Observer programs.**

NOAA Response: We concur and will implement this recommendation through the study in response to recommendation 1.

**12. Implement an approval process for bankcard purchases.**

NOAA Response: We do not concur. The Raleigh MIC has an approval process in place that is in accordance with guidelines established in the *Commerce Acquisition Manual (CAM)* 1313.301, (dated April 5, 2000), Section 3.4C, and Section 3.6. Prior to the April 5 guidance, the MIC followed the approval processes defined in the *Commerce Acquisition Manual* Part 13, Chapter 1. Additionally, the MIC implemented a local written policy requiring pre-approval on any purchase over \$50. This policy was issued to all cardholders on March 31, 2000.

13. Make a consistent effort to purchase routine supplies first from mandatory sources of supply, such as the General Services Administration, before pursuing commercial vendors.

NOAA Response: We concur. In July 2000, all cardholders certified that they had reviewed and understood the requirements outlined in CAM 1313.301 governing the use of the purchase card. Additionally, the MIC issued a memorandum dated September 11, 2000, to all cardholders emphasizing the requirement for proper documentation on bankcard statements and reminding them to consistently purchase routine supplies from mandatory sources when possible. A copy of CAM 1313.301 was attached to the memorandum.

14. Instruct purchase cardholders to clearly identify on the bankcard statement specific items purchased and to attach original receipts to the statements for the MIC to review.

NOAA Response: We concur, as indicated in our response to recommendation 13.

15. Establish a centrally controlled and located purchase log for all credit card transactions, as required in the *Commerce Acquisition Manual*.

NOAA Response: We do not concur. CAM 1313.301, does not require a centrally controlled purchase log for credit card transactions. CAM 1313.301, Section 3.6, B, Record Keeping, states, "The cardholder must maintain a Purchase Card Ordering Log and applicable justifications for all transactions made..." Section 1.4, D.9, Roles and Responsibilities, Approving Officials, states, "Ensuring that cardholders complete and reconcile Purchase Card Ordering Logs and Statements of Account before signing the statement of account..." All purchase cardholders were provided a copy of CAM 1313.301.

16. Reduce, as appropriate, the number of cardholders in the WFO.

NOAA Response: We concur. The Raleigh MIC has reviewed the need for government purchase cards and reduced the number of cardholders by four.

17. Ensure that all accountable property maintained in the WFO is on the official inventory list.

NOAA Response: We concur. On February 28, 2000, the Raleigh MIC established written policy specifying procedures to be followed for the storage, use, and tracking of sensitive property in the office. On March 2, 2000, an internal control procedure was implemented establishing guidelines for receiving, processing, and adding property to the office inventory list. Raleigh completed a wall-to-wall inventory May 15, 2000. All property is on the inventory list.

18. Once a purchase log is implemented, periodically reconcile entries with inventory records to ensure that purchases of accountable property are appropriately included on the official inventory list.

NOAA Response: We concur with periodically reconciling entries with inventory records to ensure that purchases of accountable property are appropriately included on the official inventory list. However, as noted above in our response to recommendation 15, we do not concur with establishing a centralized purchase log. The Raleigh MIC will continue to follow the regulations for inventory of purchases as stated in CAM 1313.301, Section 3.6, E. Presently, a wall-to-wall inventory of property is conducted on a yearly basis.

19. Implement a vehicle log to control and better document vehicle use by office staff.

NOAA Response: We concur. On February 14, 2000, internal control procedures for station vehicle use and tracking, as required in the Regional Operations Manual Letter (ROML) E-6-94, were implemented. A clip board was assigned to each vehicle containing a log sheet and the keys to the vehicle. The clip boards are placed next to the shift supervisors desk. When the vehicle is used, the shift supervisor makes an entry on the shift log sheet and the vehicle log sheet. When the vehicle is returned, the keys are placed back on the clip board, and entries are made into the shift log and vehicle log. When the vehicle log sheet is full, a copy is placed in a notebook in the MICs office and the original is given to the office vehicle custodian. The MIC will review the logs on a quarterly basis.

20. Periodically analyze use of vehicles to ensure that they are being used in an appropriate manner and to determine whether there is a demonstrated need for the current number of official vehicles.

NWS Response: We concur. The Raleigh MIC will conduct quarterly reviews of vehicle usage logs and assess need. ERH completed a region-wide review of vehicle usage and need, and reduced the number of vehicles region-wide at the beginning of Fiscal Year (FY) 1999. One vehicle at Raleigh was disposed of as a result of the review.

21. Change lock on the rear door of the WFO to limit office key holders to NWS employees and limited campus officials such as maintenance and security personnel.

NOAA Response: We do not concur. We believe a misunderstanding exists concerning this issue. Keys to access the backdoor have been provided to WFO personnel and only university police, fire, and maintenance personnel. The Raleigh MIC has again confirmed this is the case with university officials. Non-NWS employees with keys to the front door of the building housing the WFO cannot use their keys to unlock the backdoor.

**22. Develop a system to better control, account for, and safeguard delivered packages.**

NOAA Response: We concur. The Administrative Support Assistant (ASA), MIC, Acting MIC, or Shift Supervisor will open all incoming packages, depending upon who is present. Packages from known government sources will be directed to the addressee. Exceptions - accountable property will be placed in the MIC's office for addition to office inventory prior to release for use. Also, packages from unknown sources will be placed in the MIC's office for disposition.

**23. Track the office's budget by either developing a spreadsheet or using the information available on-line to better plan the office's resource allocation and track expenditures against the budget.**

NOAA Response: We concur. Action will be taken by October 31, 2000.

**24. Analyze the cost-effectiveness and viability of eliminating the storage space on campus and moving the items stored there to the facility off-campus.**

NOAA Response: We concur. ERH, Raleigh, and the Realty Section of the Eastern Administrative Support Center will analyze the cost-effectiveness and viability of eliminating the storage space on campus. A cost/benefit analysis and recommendations will be provided to the Eastern Region Director by October 16, 2000.

**25. Provide basic management training to the MIC in appropriate areas, including conflict resolution, human resource management, and implementation of sound internal administrative and management controls.**

NOAA Response: We concur. The Raleigh MIC will receive management training in FY 2001. He is scheduled to attend a Conflict Resolution course, a Leadership Training Course, and the Personnel Management for Executives course in FY01. In addition, the Eastern Region EEO Manager will conduct a conflict resolution training course for all Raleigh personnel during the first quarter of FY 2001.

**26. Expand the regional office inspections of WFOs to cover administrative and management operations, including an assessment of (a) internal controls, (b) information technology security, (c) facilities, and (d) human and other resource management.**

NOAA Response: We concur. ERH conducts office visits throughout the year. Beginning in FY 2001, the scope of ERH's visits has been expanded to include an assessment of (a), (b), (c), and (d). Checklists will be used to assist MSD personnel conduct inspections. Checklists will be completed by October 15, 2000, before the FY 01 visitation program commences.