disaster preparedness report

National Weather Service

8060 13th Street, Room 1326
Silver Spring, Maryland 20910
Attn: W/OM11 - Donald Wernly/
Linda Kremkau/Jim Belville
Telephone: (301) 427-8090

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WHAT'S HAPPENING IN DISASTER PREPAREDNESS

o Kudo's It is a pleasure to announce that several people within the National Weather Service were recently recognized by NOAA and DOC for their work in disaster preparedness. Ron Stagno, WPM, WSO Houston, received the bronze medal for his innovative hurricane and tornado preparedness efforts in the Houston/Galveston area. Dave Sisk, Forecaster, WSFO Pittsburgh, received the bronze medal in developing a comprehensive flash flood warning system in western Pennsylvania. Marvin Miller, MIC, WSFO Cleveland, received the Administrator's Award for his severe weather disaster preparedness work in Ohio. Gentlemen, congratulations on your fine work!

o Private Sector Initiatives

-- The National Weather Service has been participating in a joint venture with the Campbell Soup Company involving the development of a severe weather brochure. As a result, a new hurricane awareness brochure is now available for our coastal offices in time for the hurricane season. The brochure entitled, "Safety Tips for Severe Weather or What To Do Before, During, After a Hurricane," provides hurricane awareness information, a supply checklist, a hurricane tracking chart, Campbell's products to be purchased in preparation for a hurricane, and things to do for entertainment. Over 200,000 copies have been sent to the Eastern and Southern Regions for distribution to all coastal offices. This brochure should be a centerpiece in NOAA's awareness efforts with local emergency management officials, local governments, schools, and other civic groups. This historic event illustrates the exciting possibilities that can ensue when the public and private sectors join forces for a common good. On a humorous note, Jim Campbell of the Warning and Forecast Branch, worked with the Campbell Soup Company to produce this fine brochure. (No, he's not related.) Jim has moved on and now he's the new Area Manager for the Weather Service Forecast Office in Minneapolis. We wish him well.

-- Quality Micro Systems Corporation, Mobile, Alabama, will distribute severe weather safety information in pay envelopes to its approximately 700 employees. Working with WSO Mobile MIC, Mike Pass, the corporation has taken an interest in severe weather safety, and the "wallet cards" on flash floods, tornadoes, lightning, and hurricanes lends itself well to the project. One card will be included with paychecks over the next 4 months.

-- Coors has produced a 13 by 28-inch color tracking chart with hurricane safety rules. It is being used for promotional purposes by the distributors and will be given out from Texas to Maine. It was put together with the help of the Brian Peters, Southern Region, who provided Coors with the tracking chart.

-- An excellent hurricane preparedness videotape was recently developed through the joint efforts of the NWS and several cooperating agencies in South Carolina. Dick Shenot, MIC, WSO Charleston, with assistance from Mary Parker, WPM, WSFO Columbia, worked with the South Carolina Coastal Council as well as the South Carolina Educational Television Network, South Carolina Sea Grant, and the South Carolina Preparedness Division. Dick developed the original concept which called for several independent tape segments each centered around a specific type of hurricane preparedness activity. Although principal funding came from the South Carolina Coastal Council and NOAA's Coastal Resource Management, the NWS and the other cooperating agencies contributed many in-kind and existing resources. An instruction booklet is being developed to supplement the tapes which will be telecast on Instructional Television, an arm of SC ETV which airs instructional programs in schools throughout the State. This videotape project is another excellent example of what can be achieved when state and Federal groups work toward the common goal of teaching coastal residents how to prepare for and respond to hurricanes.

o Children's Television Network CTW is in the process of producing a "BIG BIRD Get Ready for Hurricanes" family kit which includes a 16-page, four-color brochure; a recording of "The Hurricane Blues;" and a board game entitled "Hurricane Force." This family kit will provide basic hurricane facts, information about children and hurricanes, "Watch" and "Warning" tips, and suggestions for putting together a family safety plan and a family safety kit. These materials can be used in conjunction with existing hurricane materials and local hurricane information already available in many communities. The "BIG BIRD Get Ready for Hurricanes" kit is the first in a series of family kits that will cover other natural hazards including earthquakes, tornadoes, etc. CTW will test all materials for their effectiveness in reaching children and their families with important safety information before they go into final production. Funding for this project was provided by the Federal Emergency Management Agency with additional support from the American Red Cross and the National Weather Service. Included in this report is a copy of CTW's Facts Sheet.

o New Hazard Awareness Slides Weather Service Headquarters recently obtained new hazard awareness slides from the Southern Region for use in the preparedness program. All regions should have received them by this printing. The slides sets are described below.

-- The first set of slides were hailstones that fell in Del Rio, Texas, on March 16, 1987. The hailstones ranged from marble size to nearly 4 inches in diameter and caused considerable property damage ($15 to $16 million). Three people received minor injuries consisting of bruised shoulders and head lacerations. The path of the large hail was 2 miles wide and 7 miles long across the northern part of Del Rio. More than 1,500 homes were damaged along with four major car dealerships. Nearly all the houses and businesses in the storm's path received roof damage, window damage, holes through trailer roofs, and automobile damage.

-- There were three slides of a school bus and a school damaged by a tornado in Mannford, Oklahoma, April 28, 1984. These slides should graphically illustrate to educators that the only safe place during severe weather is the lower interior levels of reinforced structures and not in automobiles or buses.

-- Also, there are slides of two brothers and their sister with their hair standing on end from a thunderstorm-induced electric charge. All three were tragically killed when lightning struck moments after the pictures were taken. This occurred in a National Park in Colorado.

-- Finally, a set of five slides have been secured of the historic Binger, Oklahoma, tornado of May 22, 1981.

o Severe Weather Awareness Campaigns

Eastern Region

-- This year, WSFO Raleigh, North Carolina, decided to change the name of their Tornado Awareness Week to Severe Weather Awareness Week. Their main emphasis was to educate the public and the media on the difference between tornadoes and downbursts. In the past, they have stressed the dangers of tornadoes so much that every time some wind damage occurs, it is reported as a tornado. Now it's time to retreat a bit and point out that downbursts from severe thunderstorms actually produce most of the damage associated with severe weather. Attached is an information sheet on downbursts prepared by WPM, Dennis Decker, WSFO Raleigh, that was sent to the media, schools, amateur radio groups, and law enforcement agencies. It was also distributed at a series of media workshops that was held around the State.

-- Again this year for the Ohio Tornado Safety Week, an impressive media packet was mailed to nearly 2,000 agencies in Ohio in March. Each year, WSFO Cleveland focuses one of their media releases on a different aspect of severe weather preparedness. This year they decided to try to provide some publicity to their spotters. The spotter release focused on ham radio spotters but also touched other segments of their Ohio SKYWARN program. There was also a statewide mailing to elementary school principals to promote a poster contest and to reinforce the state law requiring tornado drills in schools. The Ohio Insurance Institute made "Twister" brochures available to elementary school children for the ninth consecutive year. The Institute bore the entire cost (in excess of $35,000) for the printing of 1.3 million brochures.

Central Region

Every state in the Central Region has either scheduled or completed a severe weather and/or flash flood drill or awareness campaign.

-- Following their ninth statewide tornado drill, WSFO Indianapolis reported that 63 replies to a media questionnaire were received in the first 8 days after the drill. Participation was the highest ever by the media, law enforcement, civil defense, schools, industries, and spotter groups. An estimated 900 hams checked in during the drill. Media interest was almost more than offices could handle. WSFO Indianapolis had more than 50 separate press interviews and TV and radio appearances.

-- The week of April 6 through 10 was Severe Weather Awareness Week in South Dakota and was sponsored by the NWS and the State Emergency and Disaster Service. The week was dedicated to public awareness of severe weather emphasizing the importance of proper safety. The Sioux Falls Weather Service Forecast Office sponsored an open house for the media and for NOAA Weather Wire subscribers in South Dakota during the severe weather awareness week.

-- March 22-28 was Michigan's Tornado Awareness Week. WSO Lansing has made a very strong effort this year to educate the public about the dangers of severe weather in Michigan. The campaign began with a meeting at WSO Lansing of all area broadcast media in which 22 stations attended. It helped to reinforce the lines of communication and served to educate the broadcasters in the terms used for forecasts and warnings. The meeting was followed by visits to individual stations to brief the broadcast staff and to make public service announcements that would later be aired during Michigan Tornado Awareness Week. WSO Lansing could be heard on nearly every radio station that broadcasts in the area and was visible in the Lansing State Journal and many other local newspapers. WSO Lansing also hosted a large display at Meridian Mall in East Lansing. The display, organized by MIC Bill Fortune, included displays from the Red Cross, Central Michigan Amateur Radio Club (spotters), radio station WILS, local emergency management agencies, and the Michigan State Police Emergency Management Division. They talked to over 500 people, handed out brochures, and showed several videotapes in one day. Also, Bill Fortune and Bill Bunting, Met. Intern, were the principle speakers at a severe weather seminar at Lansing Community College with over 200 in attendance.

On April 21 and 22, WSO Lansing participated in the Michigan 57th Annual Safety Conference. The display booth consisted of the severe weather poster rack (supplied by NWS Central Region Headquarters) and several locally produced posters, videotapes of the Minneapolis Tornado of July 1986 and Terrible Tuesday. WSO Lansing was again "on the road" with a display at the Michigan "SAFE '87" Conference. This event was dedicated primarily to Aviation Safety and WSO Lansing displayed NWS aviation products, graphics, and alphanumerics, as well as severe weather safety information.

WSO Lansing has been aggressive in its campaign, and they have already seen positive results. They have also enhanced the NWS image and made more people aware of the importance of NOAA Weather Radio. Keep up the good work!

Southern Region

-- WSFO Little Rock had their Severe Weather Awareness Week March 8-14. Sponsors of this event were the Red Cross, the Arkansas State Police, the Arkansas Office of Emergency Services and their County Coordinators, the Arkansas Department of Education, the U.S. Army Corps of Engineers, and the National Weather Service. MIC, Al Lee, and WPM, Nelson DeVilliers, went specifically to address preparedness safety measures for children, the elderly, and the handicapped.

-- WSFO Jackson WMP, David Imy, set up the week of May 18 through 22 as Lightning Awareness Week in Mississippi. This is a first for this State. David mailed out to all news media a 4-page packet which primarily dealt with lightning statistics. The packet also focused on the summer months and the danger of lightning. This week had to be moved from the first of June to avoid a conflict with a planned awareness week on hurricanes. The Hurricane Awareness Week is scheduled for June 8-12 for southern Mississippi.

-- Tennessee Governor Ned R. McWherter proclaimed the week of March 2-6 as Severe Weather Awareness Week in Tennessee. This was the 13th consecutive year that the National Weather Service, the Tennessee Emergency Management Agency, and all local county emergency management agency directors urged Tennesseans to join with their severe weather safety coalition, to not only learn the rules of safety, but to actively use those rules during severe weather events. Jim Poirier, WPM, WSFO Memphis, again sent out an impressive packet of awareness materials, and this was designed such that the electronic and print media could focus on a specific aspect of severe weather during each day of the Awareness Week.

Western Region

-- NWS offices in Nevada are working with the Governor on a Flood Awareness Week which is an annual event. Most of the activity will center around WSFO Reno. They've developed Flash Flood and Thunderstorm Facts sheets and distributed them to the media, the Nevada School Districts, all post offices, and all law enforcement agencies and fire departments in the state. The WSFO has also developed a map of flash flood-prone areas for Reno, Carson City, and Lake Tahoe to be used by both television and newspapers. WSFO Reno is going to run flash flood awareness tapes on NWR and is also working with local media (radio and television) to publicize flash flood/flood awareness.

o Eastern Washington/Northern Idaho Severe Weather Workshop On April 17, WSFO Seattle, WSO Spokane, and WSFO Boise conducted a severe weather workshop in Spokane for Emergency Services Directors, the media, and spotters in eastern Washington and northern Idaho. Addressed specifically were the problems of flash floods, severe thunderstorms, and tornadoes and the examination of operations of the NWS and the warning system. The workshop was very successful, and it provided a good opportunity to exchange information with users in the area and with State Emergency Services officials. Coverage of the workshop was made by Spokane TV stations with short spots on the evening news.

o Weather and the Memphis School System In an attempt to strengthen relations and introduce severe weather awareness/preparedness concepts to the education system in Memphis, the WSFO has taken three paths.

First, they have interested the school system in the material contained in the A.M. Weather for Teachers booklet. The Memphis School Board is considering reproducing the A.M. Weather Booklet for incorporation into the earth science curriculum.

Second, they have contacted the School Board regarding installation of mini-weather stations at a few local junior high schools. With several surplus Cotton Region shelters, inexpensive rain gages, and a few thermometers, it should improve grass roots contact at the schools, improve instruction in earth science, and serve as a source of motivation for students in earth science with hands-on experience.

Finally, they have provided the school system with copies of "Tornado Safety Rules in Schools." The School Board has decided to reproduce the tornado safety rules and provide a copy to each classroom teacher in the system -- that's 6,000 teachers. A number of WSFO Memphis staff members have contributed to the effort with the schools; the major contributor has been Larry Boatman, Weather Service Specialist. Larry has devoted time and made school contacts to lead the overall project, and without his efforts, the success achieved so far would not have been possible.

o Media/Emergency Management/NWS Workshop in Mobile, Alabama Mobile MIC, Mike Pass, working with the Baldwin County Emergency Management Agency recently conducted a 3-hour workshop for media and emergency management officials. The workshop centered around activities for the upcoming severe weather preparedness week but also included discussion of the Tri-State Exercise and hurricane preparedness. Mike noted that one of the most worthwhile aspects of the workshop was an exchange between NWS/media/emergency management on how to work together to best serve the public.

Also, Mike Pass, presented a 2 1/2-hour spotter training session to over 100 law enforcement, rescue squad, fire department, Civil Defense personnel, and others in Escambia County, Alabama. The meeting was sponsored by radio station WASG and the Atmore Advance newspaper, and as a result, media coverage of the event was tremendous. Following the meeting, Mike was presented with a nice plaque acknowledging this contribution to the safety and well-being of Escambia County citizens.

o Hurricane Awareness Atlanta WPM, Max Blood, working with the Georgia Emergency Management Agency (GEMA), declared the week of May 11 through 15 as Hurricane Awareness Week in Georgia. In addition to the awareness campaign, GEMA and the NWS conducted a hurricane simulation exercise on May 11 and 12. The simulation involved the release of hurricane information over the NOAA Weather Wire Service.

Besides hurricane awareness, Georgia is also thinking about tornado awareness for 1988! Max Blood will be meeting with GEMA officials soon to discuss setting the date for next year's Tornado Awareness Week. The date is set early so that the week will be included in the public school systems planning calendar.

o New Mexico Regional Severe Weather Meetings Albuquerque DMIC, Dick Wood, in coordination with the State of New Mexico's Civil Emergency Preparedness Division (CEPD) conducted the third in a series of weather workshops around the State. On March 5, county, state, and local government officials; police, fire, and Sheriff's Departments; and Emergency Preparedness officials met in Santa Rosa to enhance the dissemination of severe weather watches and warnings through information and discussion. The previous regional workshops were held in Gallup and Silver City and a fourth will be held in Roswell.

o Arizona Severe Weather Symposium The second annual Arizona Severe Weather Symposium, hosted by the Central Arizona Chapter of the American Meteorological Society (AMS), the Laboratory of Climatology of Arizona State University, and the Phoenix office of the National Weather Service, was held at the Phoenix Gateway Park Hotel on June 2-4, 1987. Principal focus this year related to meteorological research applied to southwestern U.S. weather phenomena and technological advances to be implemented within future National Weather Service functions. The generous sponsorship of American West Airlines, Southwest Airlines, U.S. Air, KTVK-TV Channel 3, KPHO-TV Channel 5, and KPNX-TV Channel 12 made this Symposium possible. Dr. Ted Fujita from the University of Chicago was the guest speaker at the AMS dinner in which he spoke about 40 years of severe weather research.

o WSO Tulsa Preparedness Meeting In preparation for the upcoming severe weather season in northeast Oklahoma, Tulsa WSO OIC, Ben Barker, and RFC HIC, Jack Bowman, held a joint WSO/RFC familiarization get-together. After the NWS briefing, the 35 or so county emergency managers and their assistants were treated to a tour of the city of Tulsa's new computerized flash flood monitoring system.

Also in northeast Oklahoma, a series of preparedness meetings was conducted by Ben Barker in the city of Tahlequah. The presentations included two morning talks to science groups at the senior high school and an afternoon talk to a group of 150 science students at the junior high school. The day ended with a combined public-spotter training session on the campus of Northeastern State University of Oklahoma with about 100 people in attendance. Tahlequah has a large population of native Americans from the Cherokee Nation, and about 25 native Americans took part in the public meeting.

Ben has been very busy these last couple of months. He's also conducted preparedness meetings with the power company for Tulsa, traveled to McAlester for talks to the supervisors and security guards at the Army Ammunition Depot and to city and county Civil Defense. At the Civil Defense meeting, Ben was surprised when the Mayor of McAlester gave him a formal welcome to the city and thanked the NWS for providing such training sessions to the area. That's the kind of surprise which makes anyone's day!

o Public TV Interview Steve Fortenberry, OIC, WSO El Paso, taped a 10-minute interview for KDBC-TV that was aired several times during the month of May. The interview covered how the NWS gathers weather information and uses it to prepare forecasts and warnings.

o Spotter Training in Sweetwater Sweetwater, Texas, site of a large tornado last year, marked the anniversary of that devastating storm with a spotter training session for police and fire officials, local amateur radio operators, and County Sheriff and the Department of Public Safety officers. A total of 55 people attended the 2-hour session put on by Bill Alexander, WPM, WSFO Lubbock, and Keith Hayes, MIC, WSO Abilene. This was the first spotter training session to be ever held in Nolan County.

o Natural Disaster Seminar in Puerto Rico San Juan Preparedness Specialist, Francisco Torres, traveled to the Mayaguez campus of the University of Puerto Rico to attend a National Science Foundation sponsored conference on Mitigation of Hazard due to Extreme Natural Events in America. Participants included a wide range of people from the U.S., the Caribbean area, Mexico, and South America.

o Training Sessions Ron Kuhn, OIC, WSO Charlotte, North Carolina, put together storm spotter training sessions with a total of 21 sessions in eight counties. Mecklenburg is putting together a videotape of the training session. The videotape will be shown over the city operated TV channel (32) and all law enforcement and fire/rescue personnel will be required to view the material. It will also be shown on the Charlotte cablevision which has some 80,000 subscribers and thereby also beneficial to our warning program. The 21 training sessions had a total of 488 in attendance.

o "Hamvention" Dayton, Ohio One of the largest conventions of ham operators in the United States gathered in Dayton, Ohio, with around 30,000 in attendance. WSO supervisors from Cincinnati, Columbus, Dayton, and other staff personnel supported this "Hamvention." A booth was also manned by the Dayton Amateur Radio Association. Severe weather literature was distributed as well as questions answered. Names and addresses of ham's not in the SKYWARN Program were also collected, and these lists will be distributed to the regions for further distribution to their offices.

o Amateur Radio Milestone This spring the NWS officially inaugurates an amateur radio base station at its Buffalo weather office. The new state of the art radio system will be manned by amateur radio volunteers whenever severe thunderstorms or tornadoes threaten. Thanks in large part to the efforts of amateurs in the Buffalo area, the new radio equipment was donated by the Buffalo Chamber of Commerce as a community service. Amateur radio volunteers plan to operate the base station during severe weather or other weather disaster emergencies as a service to people in Buffalo and the surrounding western New York area.

o Weather-related Traffic Casualties William E. Riebsame, Henry F. Diaz, Todd Moses, and Martin Price (1986) -- in the November AMS bulletin -- presented an exhaustive survey of weather-related losses in a paper entitled "The Social Burdens of Weather and Climate Hazards." A total of about 1,520 deaths a year in the U.S. occurred as a result of a variety of hazards (flood, hurricane, tornado, other windstorms, lightning, hail, cold, and heat). While some traffic losses were included in the source material, the death count was too low to include all weather-related traffic fatalities.

Data obtained from the U.S. Department of Transportation (1986) show 1.2 million traffic accidents were associated with "adverse atmospheric conditions" in 1985. The totals included rain (828,000), sleet (30,000), snow (271,000) fog (44,000), rain and fog (7,000), sleet and fog (1,000) and other (16,000). An additional 50,000 accidents occurred during unknown weather conditions. The grand total for the year from all causes was 6.1 million accidents. The human losses associated with accidents occurring during adverse atmospheric conditions in 1985 were 607,000 injuries and 6,210 deaths. This compares to a total of 3.36 million injuries and 43,795 deaths from all traffic accidents in 1985. Unfortunately, DOT statistics were not compiled in such a way that "adverse atmospheric conditions" could be definitely identified as the primary contributing factor in the casualties noted nor were dollar losses readily available. Nonetheless, it seemed likely that weather was a significant cause in a majority of the cases and that resultant dollar losses were hundreds of millions.

o Preliminary 1986 Weather Statistics Attached is a copy of the Summary of 1986 Natural Hazard Statistics. Albuquerque DMIC, Dick Wood, who has been maintaining information on weather-related facilities, has informed us that the preliminary statistics for 1986 indicate that deaths from all types of weather are below normal. The 1986 break-down of statistics looks like this.

Number of Deaths	Weather Type
94	Flash Floods
69	Winter Storms
68	Lightning
15	Tornadoes (least since 1916)
9 or 10	Hurricanes

Once again, flash floods head the list with the largest number of weather-caused fatalities; and automobiles continue to be the predominance location of flash flood deaths. The number of hurricane-related deaths is not yet available as figures are being firmed up between Dick and the National Hurricane Center.

o Tornado Tracking Chart WSFO Birmingham WPM, Chuck Terrell, recently assisted the Alabama Emergency Management Agency in preparing a tornado/ severe weather situation board for use by state and county EMA offices. The chart contains information on radar coverage, NWR frequencies, and NWS offices.

o Oklahoma Facts Below is a message from the Oklahoma Weather Service Office with some interesting facts.

RECORD REPORT
NATIONAL WEATHER SERVICE OKLAHOMA CITY OK
1215 PM CDT FRI MAY 1 1987

THE FINAL SCORE...OKLAHOMA 1 TORNADOES 0

FOR THE FIRST TIME IN NEARLY 40 YEARS...TORNADOES WERE NONEXISTENT IN OKLAHOMA DURING THE ENTIRE MONTH OF APRIL. APRIL NORMALLY IS THE SECOND MOST ACTIVE MONTH OF THE YEAR IN OKLAHOMA WITH AN AVERAGE OF ABOUT 11 TORNADOES EACH APRIL OVER THE PAST 4 DECADES. THE ACTUAL NUMBER VARIES FROM ZERO THIS YEAR TO AS MANY AS 40 IN APRIL 1957. THE LAST YEAR WITHOUT AN APRIL TORNADO IN OKLAHOMA WAS 1948.

AS WE MOVE ON INTO MAY WE MOVE INTO WHAT IS NORMALLY THE MOST ACTIVE MONTH FOR TORNADOES IN OKLAHOMA. AN AVERAGE MAY IN OKLAHOMA CONTAINS NEARLY 20 TORNADOES... WITH AS MANY AS 61 IN MAY 1960.

STATISTICS SHOW NO APPARENT CORRELATION THAT COULD BE USED TO PREDICT WHAT THE COMING MONTH MIGHT BE LIKE AS FAR AS TORNADOES. A QUIET APRIL IS FOLLOWED BY A QUIET MAY IN SOME YEARS AND AN ACTIVE MAY IN OTHERS. FOR EXAMPLE...APRIL OF LAST YEAR WAS A RELATIVELY INACTIVE MONTH WHILE THE FOLLOWING MAY WAS QUITE ACTIVE. APRIL 1982 ALSO WAS INACTIVE EXCEPT FOR ONE OUTBREAK ON APRIL 2...BUT IT WAS FOLLOWED BY THE SECOND MOST ACTIVE MONTH FOR TORNADOES ON RECORD IN MAY. ON THE OTHER HAND...QUIET APRILS WERE FOLLOWED BY QUIET MAYS IN 1958...1963... 1974...1975.

APRIL AND MAY TORNADO TOTALS IN OKLAHOMA BY MONTH ARE AS FOLLOWS...

	AP	MY		AP	MY		AP	MY		AP	MY		AP	MY
1941...	3	3	1951...	11	11	1961...	13	42	1971...	8	13	1981...	11	44
1942...	4	5	1952...	7	5	1962...	4	33	1972...	11	5	1982...	11	56
1943...	2	2	1953...	9	8	1963...	1	11	1973...	9	18	1983...	12	40
1944...	9	3	1954...	13	19	1964...	17	22	1974...	3	9	1984...	23	9
1945...	10	0	1955...	15	31	1965...	21	32	1975...	1	7	1985...	10	6
1946...	0	5	1956...	20	6	1966...	8	11	1976...	7	7	1986...	4	25
1947...	6	5	1957...	40	45	1967...	12	4	1977...	4	31	1987...	0	?
1948...	0	4	1958...	4	4	1968...	16	26	1978...	14	5			
1949...	14	33	1959...	3	35	1969...	10	5	1979...	17	7			
1950...	5	12	1960...	19	61	1970...	8	5	1980...	7	9			

NOTE THAT AN INCREASE IN PUBLIC AWARENESS OF TORNADOES OCCURRED IN THE LATE 1940S AND EARLY 1950S AS EFFORTS TO FORECAST SEVERE WEATHER INCREASED. AS A RESULT... RECORDS PRIOR TO ABOUT 1948 ARE LESS RELIABLE AND THE ACTUAL NUMBERS DURING THE 1940S PROBABLY WERE HIGHER.

o Weather Information in Telephone Directory Attached is a copy of weather information that was printed in the Baltimore telephone directory. The page layout was arranged by Fred Davis, MIC, WSO Baltimore, and included information on watches and warnings and other useful facts.

o Promoting Weather Radio Attached is part of the weather page from the Kansas City Times. At the top of the page, the local weather-by-phone number is listed along with frequencies of the area weather radio stations.

o Constitution Bicentennial Messages on NWR The NWS is expected to play a significant role in Bicentennial events leading to the ratification of the Constitution. Many Federal agencies have developed creative, low-cost programs and activities in support of the celebration. NOAA Weather Radio is our obvious forum for reaching a majority of the people across the country with interesting and informative messages. Short messages giving a chronology of events leading up to and beyond ratification of the Constitution have been supplied to NWR offices for broadcast several times each day. The NWR broadcast series is expected to start May 25.

This is an exciting program, not only for the Bicentennial celebration itself and the part the National Weather Service can play, but also as a way to increase exposure for the NWR program.

o Newcomer Welcome Packet, Chamber of Commerce, and NWR In an attempt to increase the visibility of NOAA Weather Radio, OIC, Jim Helms, WSO Columbus, Georgia, has written all the Chamber of Commerce offices in their "County Warning Area" encouraging them to include a copy of the NOAA Weather Radio brochure in their "Welcome Packet" for new residents. Inclusion of the brochure in the packet would be very beneficial. The response so far has been excellent.

o NWR on Hold...Don't Hang Up Recently, WSFO Jackson placed "NWR on Hold" on their office phone system. Tice Wagoner, MIC/AM, reported that since this went into effect a newspaper reporter called for some information and was placed on hold while the request data was being gathered. When the office staffer got back on the line, the reporter stated, "If you just left me on hold a little longer, I'd have gotten the information I was seeking!" Tice says other callers have requested to be placed "on hold" so they could listen to NWR. Obviously, the word about NWR has now reached new users.

o Union Pacific Railroad and NWS Forecasts Union Pacific Railroad officials are relying more heavily on NWS forecasts to serve their needs. Train engineers have been given radio receivers to monitor NWR broadcasts as they travel through individual NWR service areas in the Southern Region. To further support their operations and promote safety, Union Pacific officials have asked the NWS for the phone number of the local forecast recording in our offices. These numbers will be supplied to their depot foremen who can then obtain forecasts for points say "125 miles down the line," by calling NWS offices as needed and passing the information on to the train engineer. It is a pleasure to cooperate with the Union Pacific Railroad in this manner.

o NWS Exhibit in Lubbock For the third consecutive year and with the volunteer efforts of the staff, WSFO Lubbock completed a week long NWS display at the South Plains Mall. The display used two "pop-ups" available through MSD as well as numerous weather pamphlets and brochures. This year's display was afforded "spot" coverage by some of the local television and radio stations as well as coverage on their local NWR. Andy Anderson, MIC, WSFO Lubbock, and Jack Jackson, SMT, Lubbock, estimated over 10,000 people were exposed to the name "National Weather Service" during the week-long display. Naturally, the booth promoted NWR, and one radio retailer in the Mall reported that sales of weather radios tripled.

o Pittsburgh Boat Show WSFO Pittsburgh teamed with other safety organizations in the Pittsburgh area to work a booth at the Pittsburgh Boat Show sponsored by the Pittsburgh Safe Boating Committee. Other members include the American Red Cross, Western Pennsylvania Safety Council, Department of Environmental Resources, U.S. Coast Guard and Auxiliary, U.S. Power Squadrons, U.S. Army Corps of Engineers, the city of Pittsburgh, and the Pennsylvania Fish Commission, to name a few.

The Tri-Rivers Marine Trade Association, another committee member, held their Boat Show, "Dream Fleet '87" at the David L. Lawrence Convention Center in January 1987. Once again, WSFO Pittsburgh provided help in staffing a booth. About 8-9,000 people attended the show and the majority passed the committee booth where brochures were handed out. Many of the organizations involved with the committee had handouts at the booth, including the NWS. Lightning Safety Rules and NOAA Weather Radio brochures proved to be especially popular.

o New Orleans Hurricane Exercise This exercise was conducted in cooperation with the New Orleans City Civil Defense Organization, with participants from five Parishes in southeast Louisiana. The exercise consisted of the following components. First, a fictitious hurricane scenario was prepared and disseminated by the New Orleans WSFO. Second, individual exercises were conducted at Parish EOC's which included pre-storm preparation, evacuation decision making, shelter management, and post-storm recovery. Each Parish acted as an individual entity. The exercise was followed by a review of preparedness plans and a list of recommended changes to the plans. WSFO New Orleans learned a few things from the exercise which should help them to streamline and improve their hurricane operation. WSFO New Orleans, MIC, Glenn Trapp, and WPM, Mike Koziara, received a letter of commendation from the Mayor of the City of New Orleans, Sidney J. Barthelemy, with congratulations on a job well done for making the city's emergency preparedness hurricane exercise a success.

o Reader's Digest Article In the May issue of the Reader's Digest under book section, Mr. John Fuller wrote a story on the May 1985 tornadoes that struck Ohio and Pennsylvania. The article "Day of the Killer Tornadoes" was condensed from his forthcoming book Tornado Watch #211. In his article, Mr. Fuller really does the Weather Service justice. He interviewed people in every hamlet hit by the tornadoes and also visited many weather offices. He talked to many people including Fred Ostby, Marvin Miller, Dave Bell, and Chuck Heckler and found them to be terrifically cooperative and helpful in his research.

WHAT TO DO
BE PREPARED

- Each season use this safety and supply checklist:

_____Flashlight
_____Batteries
_____Portable Radio
_____First Aid Kit
_____Bottled Water
_____Sterno
_____Candles
_____Matches
_____Canned and Non-Perishable Foods
(Campbell's® Condensed and Ready-To-Serve soups, such as Chunky, Home Cookin'® and Swanson® Broths.)
_____Manual Can Opener
_____Hammer
_____Nails
_____Duct Tape
_____Plywood Boards
_____Rope
_____Canvas Tarpaulin
_____Inflatable Raft
_____Life Preservers
_____Eating Utensils
(Paper Plates, Cups, Plastic Forks)
_____Heating Utensils
(Pot, Mess Kits, Plastic Bags for storage of waste and trash)

- Learn location of official shelters and safe routes to get there.
- Power is often disrupted during severe weather, so you must be alert to alternative sources for cooking—as well as know how to conserve energy.

AFTER THE STORM

Listen to local officials for advice.

Drive carefully, watching for downed electric wires, flooded low spots, and undermined roads.

Report broken or damaged water, sewer and electrical lines.

Cautiously re-enter your home (if you've left). Check for gas leaks, food spoilage and water damage.

Communications Center
Campbell Place
Camden, NJ 08101-1799

SAFETY TIPS FOR WEATHER

OR WHAT TO DO BEFORE DURING AFTER A HURRICANE

A message from
Campbell's Soups
Your Best Friend in a Storm
and National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Hurricanes, regardless of name or gender, can cause inconvenience ranging from extraordinary to mild. With appropriate planning and awareness, it's possible to survive most hurricanes with minimal consequences. Injuries, loss of life and property often are the result of being unprepared and uninformed.

The hurricane season begins June 1 and continues through November, with the greatest number of hurricanes occurring in August, September and early October. Campbell Soup Company has prepared this leaflet that provides safety tips, planning suggestions and a list of food and supplies to help storm victims cope with severe weather.

THINGS TO DO

- **Be alert** to hurricane and tropical storm advisories. Listen to television reports, local radio or the National Oceanic and Atmospheric Administration (NOAA) Weather Radio to get information about advisory updates.
  Hurricane Watch—means a "possible" hurricane within 24 to 36 hours.
  Hurricane Warning—means a hurricane is expected within 24 hours or less.
- **Listen** carefully to local officials and **evacuate** the area if told to do so.
- **Leave** low lying or coastal areas and offshore islands as well as mobile homes for more substantial shelter. The storm surge, the most dangerous part of the hurricane, is a dome of water that comes across the coast as the hurricane makes landfall. Tides are 5 to 25 feet above normal and superimposed on the high tides are large wind-driven waves. Nine out of ten deaths caused by hurricanes, occur in the surge.
- **Stay** at home if dwelling is sturdy and on high ground. Stay indoors during the hurricane and away from windows on the downwind side of house.
- **Moor** your boat securely or move it to safe shelter.
- **Secure** outdoor objects or bring them indoors.
- **Protect** your windows with boards, shutters or tape.
- **Fuel** car.
- **Draw** enough water to last several days.
- **Bring** pets indoors.
- **Beware** the eye of the hurricane. This calm storm center can be deceptive by its clear sky and light winds. The hurricane's eye is bordered by winds and rains of maximum force that blow from the opposite direction to the winds and rains in the beginning half of the storm.

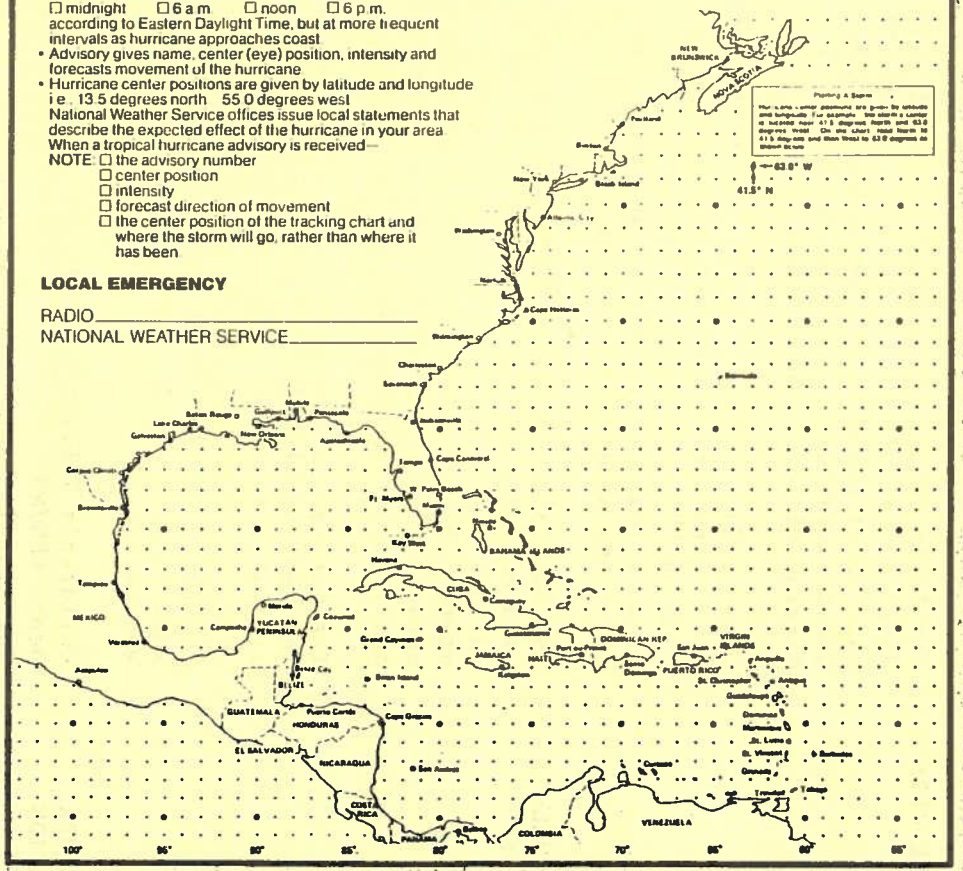
HURRICANE TRACKING CHART

- Advisories are numbered consecutively for each storm.
- Present location and intensity is described and expected movement is given, along with watches or warnings in effect.
- Advisories are issued at six-hour intervals
  ☐ midnight ☐ 6 a.m. ☐ noon ☐ 6 p.m.
  according to Eastern Daylight Time, but at more frequent intervals as hurricane approaches coast.
- Advisory gives name, center (eye) position, intensity and forecasts movement of the hurricane.
- Hurricane center positions are given by latitude and longitude i.e., 13.5 degrees north 55.0 degrees west
  National Weather Service offices issue local statements that describe the expected effect of the hurricane in your area.
  When a tropical hurricane advisory is received—
  NOTE: ☐ the advisory number
  ☐ center position
  ☐ intensity
  ☐ forecast direction of movement
  ☐ the center position of the tracking chart and where the storm will go, rather than where it has been.

LOCAL EMERGENCY

RADIO_____

NATIONAL WEATHER SERVICE_____



DURING THE STORM

A well stocked kitchen cabinet and some home entertainment, games and ideas can help keep the "weather" sunny indoors while you wait out the storm.

- Stock up on foods for balanced, wholesome eating. The most useful foods are those that require minimum preparation and no refrigeration, such as canned foods. Soups, meats, juices and evaporated milk are examples. Take into consideration the tastes of family members. Familiar foods are likely to be more acceptable in times of stress. Here are some suggestions:

  ☐ ***Campbell's® Condensed and Ready-To-Serve Soups (Chunky, Home Cookin'®, Swanson® Broths)***
  ☐ ***Campbell's® Dry Soup and Recipe Mix***
  ☐ ***Swanson® Chunk Chicken***
  ☐ ***Ready-to-eat cereals***
  ☐ ***Canned juices***
  ☐ ***Bottled water (approximately 1 gallon per person per day)***

- Coloring books and crayons can keep young minds busy to prevent boredom. Keep marbles, jacks, wooden blocks and a deck of cards tucked into a bag in the cabinet or pantry with emergency provisions for an instant "bag of tricks."
- When electric power is disrupted, turn off appliance and light switches, so electrical circuits won't be overloaded when energy returns.
  ☐ If you have a wood or coal stove in your home, it can be a useful alternative to electricity or gas for meal preparation. Camp stoves and sternos are alternatives but should be used outside the house (patio/porch) where ventilation is better (after storm).
  ☐ Keep your refrigerator and freezer door shut. Food will stay cold for hours if you can keep the cold air in (depending on type of appliance and amount of food in it). It is generally a good rule to use the most perishable foods first. You may be able to obtain dry ice from your local power company if energy is disrupted for long periods after the storm.

CHILDREN'S TELEVISION WORKSHOP

CHILDREN'S TELEVISION WORKSHOP
The Big Bird GET READY™ Series

NATURAL HAZARDS FAMILY KITS:

Children's Television Workshop has designed a Big Bird GET READY™ Series of Family Kits to reach children and their families with important safety information and facts about a range of natural hazards. To assist public safety experts in the effective use of the materials with families, a special training package will be available.

HURRICANE KIT:

The first kit is designed to encourage families to prepare ahead for a hurricane. It is for families everywhere, but especially those living in communities along the Gulf Coast, Atlantic Seaboard, Hawaii, Puerto Rico and the Virgin Islands. The kit has:

- a four color, illustrated booklet with safety tips, information and facts
- a "Hurricane Blues" soundsheet
- a "Hurricane Force" board game with science facts and safety information

EDUCATIONAL RESOURCE:

The "Big Bird GET READY™ For Hurricanes" Kit can be used by state and local emergency managers, civil defense and public safety officers, firefighters, Red Cross staff, National Weather Service and broadcast meteorologists, and others, to heighten public awareness and interest in preparing for hurricanes.

The kit can be used with existing hurricane materials and information already in many communities. The hurricane kit will be available in the summer of 1987.

FUNDING:

Federal Emergency Management Agency with additional support from the American Red Cross and the National Weather Service.

FOR FURTHER INFORMATION:

Children's Television Workshop
Dept. CES/NH
One Lincoln Plaza
New York, New York 10023

4/87

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE

WAS IT A TORNADO OR A THUNDERSTORM DOWNBURST?

The sign in the Smithfield store window said "TORNADO DAMAGE SALE". The day before, powerful winds ripped across Johnston County destroying a large lumber storage building, severely damaging an antique store and snapping off many trees. Most residents of the area were sure they were struck by a tornado. A National Weather Service survey team found evidence of 50 to 90 MPH winds in the Smithfield and Selma areas. Johnston county had been struck by a thunderstorm downburst and not a tornado.

In an average year North Carolina is struck by about twelve tornadoes, most of which are relatively weak. Actually downbursts winds from severe thunderstorms cause the greatest amount of wind damage. In 1986 the National Weather Service documented 287 downbursts with wind speed estimated between 58 and 90 MPH in North Carolina. Downbursts destroyed eleven homes and buildings and damaged ninety-eight others. They also destroyed or damaged twenty-eight mobile homes, blew cars and trucks off of roads, destroyed boats and blew out windows in cars and homes. Thousands of trees and powerlines were downed causing widespread power outages. One person was killed and 12 injured by downburst winds.

A downburst is produced in the downdraft or rain area of a thunderstorm. As a strong thunderstorm approaches, one usually notices a sudden change in wind speed and direction. Winds typically gust to 25 to 35 mph. Air temperatures may drop suddenly from the low 90s into the 70s. Occasionally downburst winds may reach speeds over 100 MPH. A strong downburst is frequently mistaken for a tornado. It may produce extensive damage and a roaring sound similar to a tornado.

What conditions in a severe thunderstorm can produce surface winds of 50 to 130 MPH? To answer that question we must look at a typical thunderstorm (fig. 1). In a mature thunderstorm there are two major parts. The updraft is the intake area where large amounts of heat and moisture are drawn into the storm. This is the area of the thunderstorm that is most likely to produce a tornado as a result of the air spiraling into the updraft. The other major part of a storm is the downdraft. This is produced partially by rain pulling air with it as it falls. To produce a very strong downdraft large amounts of rain must evaporate into the air. This cools the air and makes it heavier so it will rapidly accelerate downward producing a downburst.

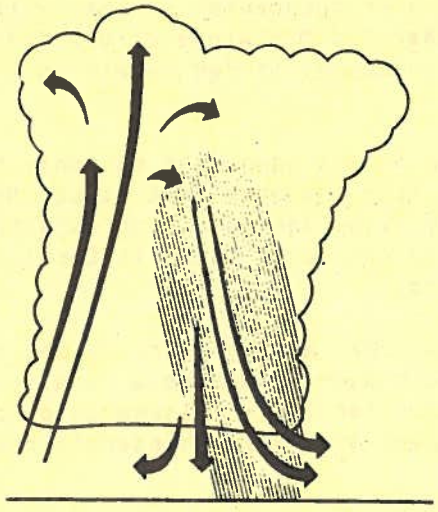


Fig. 1

When the downburst strikes the ground it may produce a horizontally rotating vortex (fig. 2). This horizontal, often ring shaped vortex, is seldom visible to an observer. The ring vortex can take on the characteristics of a tornado vortex in that it accelerates the air spiraling around it. Maximum downburst wind speeds are produced under this ring.

As the ring expands it can break into segments producing a burst swath. These segments can produce high winds up to three miles from the center of the storm.

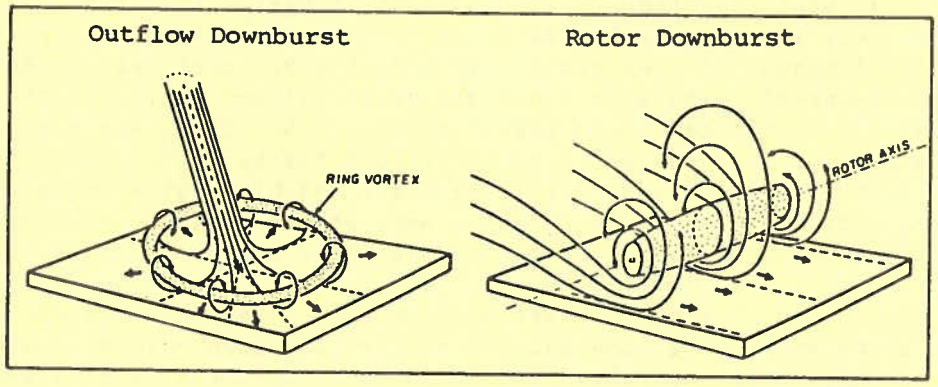


Fig. 2 courtesy T. Fujita

Another effect of the winds that spread out from a thunderstorm is low level wind shear. Downburst wind shear is responsible for many of the nation's airline disasters. A powerful downburst caused the crash of Delta Flight 191 at the Dallas-Ft Worth Airport on August 2, 1985. One of the most powerful downbursts ever documented in the eastern part of the nation occurred on August 1, 1983, when 130 MPH winds struck Andrews AFB. Air Force One, with the President on board, landed safely just 6 minutes before this powerful storm struck.

Wind damage from a downburst can only be compared to a small tornado. Large tornadoes, like the ones that struck North Carolina in 1984, are capable of taking many lives and producing catastrophic destruction. Storms of this magnitude do not occur in North Carolina every year. Downbursts and small tornadoes do.

When the National Weather Service issues a Severe Thunderstorm or Tornado Watch, remain alert. Tune to a local radio or television station, or to NOAA Weather Radio for later statements or possible warnings. Action is required when a tornado or severe thunderstorm warning is issued for your area.

SUMMARY OF 1986
NATURAL HAZARD DEATHS

RICHARD A. WOOD
DEPUTY METEOROLOGIST IN CHARGE
NATIONAL WEATHER SERVICE FORECAST OFFICE
ALBUQUERQUE, NM

THE ATTACHED DATA SHOWS THAT --- LIVES WERE LOST IN 1986 DUE TO FLASH FLOODS/FLOODS, HEAT, LIGHTNING, HIGH WINDS, TORNADOES, WINTER STORMS, AND HURRICANES/TROPICAL STORMS.

ALL OF THE NATURAL HAZARDS WITH ESTABLISHED "NORMALS" WERE BELOW NORMAL FOR THE YEAR. IN 1985, ONLY FLASH FLOODS/FLOODS WAS ABOVE NORMAL WITH 166 DEATHS.

EVENT	DEATHS	2Ø-YEAR NORMAL
FLASH FLOODS/FLOODS	94	163
HEAT	92*	---**
WINTER STORMS	69	---**
LIGHTNING	68	97
HIGH WINDS		---**
TORNADOES	15	98
HURRICANES AND TROPICAL STORMS	11	33

* ONLY 8 STATES REPORTED HEAT DEATHS IN "STORM DATA" IN 1986.
** 2Ø-YEAR NORMAL NOT YET ESTABLISHED.

HEAT DEATHS - 1986

RICHARD A. WOOD, DMIC
NATIONAL WEATHER SERVICE FORECAST OFFICE
ALBUQUERQUE, NM

EIGHT STATES (ARKANSAS, TENNESSEE, SOUTH CAROLINA, MISSISSIPPI, LOUISIANA, GEORGIA, ALABAMA, AND WISCONSIN) PROVIDED HEAT DEATH DATA IN 1986.

DEATHS MALE	FEMALE	AVERAGE AGE MALE	AVERAGE AGE FEMALE
40	52	64.2	69.1

AVERAGE AGE MALE AND FEMALE
67.0

AGE	MALE	FEMALE
0-9	1	0
10-19	2	0
20-29	2	0
30-39	2	0
40-49	3	2
50-59	6	5
60-69	6	10
70-79	7	17
80-89	10	13
90-99	1	4
100+	0	1
TOTAL	40	52

WINTER STORMS 1985-86 SEASON

RICHARD A. WOOD, DMIC
NATIONAL WEATHER SERVICE FORECAST OFFICE
ALBUQUERQUE, NM

THIS WAS A FIRST ATTEMPT TO COMPILE WINTER STORM MORTALITY STATISTICS. ONLY THOSE DEATHS DIRECTLY RELATED TO WINTER STORMS OR HEAVY SNOW WERE INCLUDED. THERE WERE 69 DEATHS IN THE 1985-86 WINTER SEASON DUE TO THE SNOW AND COLD.

MALES	FEMALES	EXPOSURE	CAR/TRUCK	HEART ATTACK	SHOVELING	AVALANCHE
52	17	38	22	3	2	4

AGES	MALE	FEMALE	MALE IN VEHICLE	FEMALE IN VEHICLE
Ø-9	1	Ø	Ø	Ø
1Ø-19	4	2	Ø	1
2Ø-29	1Ø	1	7	Ø
3Ø-39	7	4	1	3
4Ø-49	6	1	2	1
5Ø-59	1Ø	2	1	2
6Ø-69	1Ø	2	2	Ø
7Ø-79	3	3	Ø	1
8Ø-89	Ø	2	Ø	1
9Ø-99	1	Ø	Ø	Ø
TOTAL	52	17	13	9

AVERAGE AGE MALE	AVERAGE AGE FEMALE	AVERAGE AGE-MALE/FEMALE
45.Ø	51.5	46.6
PERCENT 75.4%	24.6%	

DEATHS BY STATES - NEW YORK 11; NEBRASKA AND NORTH CAROLINA 7; UTAH 5; SOUTH DAKOTA, COLORADO AND WISCONSIN 4; MISSISSIPPI, NEW HAMPSHIRE, MAINE, MONTANA, AND WASHINGTON 3; WYOMING, SOUTH CAROLINA, IOWA, AND LOUISIANA 2; OREGON, CALIFORNIA, TENNESSEE, AND KENTUCKY 1 EACH.

TORNADOES 1986

RICHARD A. WOOD, DMIC
NATIONAL WEATHER SERVICE FORECAST OFFICE
ALBUQUERQUE, NM

THE 15 TORNADO DEATHS IN 1986 WAS THE LOWEST TOTAL IN RECORDED HISTORY. THE PREVIOUS LOWEST TOTAL WAS 24 DEATHS IN 1981 IN RECORDS DATING BACK TO 1916. THERE WERE 763 CONFIRMED TORNADOES IN 1986 WHILE THE AVERAGE ANNUAL NUMBER OF TORNADOES IS ABOUT 700.

THE AVERAGE AGE OF THOSE KILLED IN 1986 WAS 45.1. THE AVERAGE AGE OF THOSE KILLED IN TORNADOES CONTINUES AS ONE OF THE HIGHEST OF ALL NATURAL HAZARDS.

DEATHS BY AGE (MALE/FEMALE)		DEATHS BY AGE (MALES)	DEATHS BY AGE (FEMALES)	DEATHS BY MONTHS	
1-9	3	0	3	FEBRUARY	2
10-19	1	0	1	MARCH	6
20-29	2	1	1	APRIL	2
30-39	2	2	0	MAY	1
40-49	0	0	0	JUNE	0
50-59	1	0	1	JULY	3
60-69	2	1	1	AUGUST	1
70-79	1	1	0		
80-89	3	2	1		
90-99	0	0	0		
100+	0	0	0		

AVERAGE AGE OF DEATHS: 45.1
DEATHS BY GENDER: 8 FEMALE (53%) AVERAGE AGE OF FEMALES: 34.0
7 MALES (47%) AVERAGE AGE OF MALES 57.7

LOCATION	MOBILE HOMES	PERMANENT HOME	VEHICLE	OTHERS	TOTAL
NORTH CAROLINA	3				3
OHIO	3				3
TEXAS	1	1	1		3
ALABAMA		2			2
INDIANA				1	1
IOWA			1		1
MISSOURI			1		1
NEW YORK				1	1
TOTAL	7	3	3	2	15
PERCENT	47%	20%	20%	13%	100%

HURRICANES/TROPICAL STORMS 1986

RICHARD A. WOOD, DMIC
NATIONAL WEATHER SERVICE FOECAST OFFICE
ALBUQUERQUE, NM

THREE HURRICANES/TROPICAL STORMS DURING 1986 PRODUCED 11 DEATHS.
ONE DEATH OCCURRED IN ANDREW AND FIVE EACH IN BONNIE AND CHARLEY.

AVERAGE AGE MALE	AVERAGE AGE FEMALE	AVERAGE AGE (MALE/FEMALE)
49.3	48.Ø	48.6

DEATHS BY STATES	
TX	4
MD	*3
NC	2
VA	1
LA	1

DEATHS BY MONTHS	
JUNE	6
AUGUST	5

AGE	MALE	FEMALE
Ø-9	Ø	Ø
1Ø-19	Ø	Ø
2Ø-29	1	1
3Ø-39	Ø	1
4Ø-49	Ø	Ø
5Ø-59	2	1
6Ø-69	1	Ø
7Ø-79	Ø	Ø
8Ø-89	Ø	1
9Ø-99	Ø	Ø
1ØØ+	Ø	Ø
TOTAL	4	4

STATE	BOAT	CAR/TRUCK	HOME	POND	UNDERTOW	AIRCRAFT	TOTAL
TX		2	1	1			4
MD						*3	*3
NC		1			1		2
VA		1					1
LA	1						1
TOTAL	1	4	1	1	1	*Ø	8

* AIRCRAFT DEATHS NOT DIRECTLY RELATED TO THE NATURAL HAZARD-THUS INDIVIDUAL DATA NOT INCLUDED.

LIGHTNING - 1986

RICHARD A. WOOD, DMIC
NATIONAL WEATHER SERVICE FORECAST OFFICE
ALBUQUERQUE, NM

THERE WERE 68 LIGHTNING DEATHS IN 1986. LAST YEAR ONLY 5 FEMALES OUT OF 74 DEATHS WERE KILLED BY LIGHTNING BUT THIS YEARS TOTAL INCREASED TO 15 FEMALE LIGHTNING DEATHS.

DEATHS MALES	FEMALES	AVERAGE AGE OF MALES	AVERAGE AGE OF FEMALES
53	15	31.0	28.1

AVERAGE AGE OF DEATHS (MALES AND FEMALES)

30.4

AGE	MALE	FEMALE
0-9	1	2
10-19	12	4
20-29	18	3
30-39	7	4
40-49	6	0
50-59	4	0
60-69	3	0
70-79	2	1
80-89	0	1
90-99	0	0
100+	0	0
TOTAL	53	15

STATE	TREE	OPEN FIELD	NEAR OR IN BLDG/HOME	BOAT	FISHING	BALL-FIELD	GOLF	BEACH	OTHER	TOTAL
FL	2	1	1	1		1		3	1	10
MI			4				1			5
AL	3	2								5
MD					1			4		5
GA	1	1	2							4
NC	2	1		1						4
TN	1	1	2							4
OK		3								3
MS		2				1				3
KY		1					1			2
LA				1	1					2
TX		1				1				2
OH						2				2
PA			1			1				2
MA	1		1							2
UT		2								2
IN	1									1
OR		1								1
SC			1							1
CO			1							1
IA				1						1
DE		1								1
SD		1								1
VA							1			1
AZ					1					1
IL							1			1
PR		1								1
TOTAL	11	19	13	4	3	6	4	7	1	68
PERCENT	16%	28%	19%	6%	4%	9%	6%	10%	2%	100%

C&P Telephone
A Bell Atlantic Company

Weather Information for the Baltimore Area

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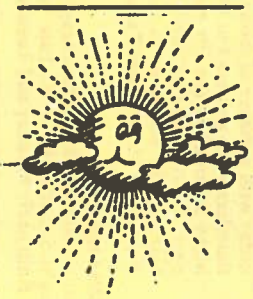
Climate

24 Hour Weather Information

Baltimore, Annapolis & Vicinity	936-1212
Chesapeake Bay, Extended, Mountain, Travel & Resort Forecasts	859-5380



With a year-round average temperature of 55° F. the Baltimore area has a moderate climate. The Chesapeake Bay and Atlantic Ocean to the east, and the Appalachian Mountains to the west help keep the region free of weather extremes often found in areas further inland on the same latitude. Freezing temperatures typically end in mid-April and resume in late October, the usual freeze-free period lasts approximately 194 days.

Rainfall occurs throughout the year, although the severest thunderstorms generally take place in the summer and early fall months.

Snowfall is relatively light, and occurs on an average of 22 days annually. Only seven days of the average year have snow of more than one inch, but this varies considerably from year to year. Snow is frequently mixed with rain and sleet, and seldom stays on the ground more than a few days. Occasional freezing rain may cause hazardous driving conditions during January and February.

In summer, the Baltimore area is under the influence of a semi-permanent high-pressure system known as the Bermuda High that brings warm humid air masses from the South. The proximity of large water bodies and the inflow of warm air contribute to the relatively high humidities found in Baltimore during much of the year.

The annual prevailing wind direction is from the west. Winter and Spring months have the highest average wind speed. Destructive velocities are rare and occur mostly during summer thunderstorms. Only rarely have hurricanes in the vicinity caused widespread damage, then primarily through flooding.

Mean Temperature per Month for the Period 1965-1985

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Fahrenheit	33	35	43	54	63	72	77	76	69	57	46	36
Centigrade	1	2	6	12	17	22	25	24	21	14	8	2

Average Precipitation in Inches

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
3.0	3.0	3.7	3.4	3.4	3.8	3.9	4.6	3.5	3.1	3.1	3.4

Average rainfall: 41.6 Snowfall: 21.5

Sunrise and Sunset for the Four Quarters of 1987

	Sunrise	Sunset
1987 Autumnal Equinox—September 22	6:54AM	7:04PM
1987 Winter Solstice—December 21	7:22AM	4:47PM
1987 Vernal Equinox—March 21	6:11AM	6:18PM
1987 Summer Solstice—June 21	5:40AM	8:36PM

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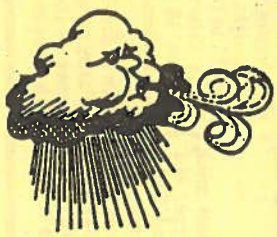
Weather Watches/ Warnings



A weather WATCH is usually issued if severe weather conditions—tornadoes, thunderstorms, hurricanes, flash floods—threaten the area. During a watch, residents should stay alert and listen to local television or radio for further information.

A weather WARNING is usually issued if severe weather is imminent or fully expected. Residents should take immediate action—find shelter, avoid unnecessary traveling, follow any other precautions suggested—and stay tuned to local broadcast stations for weather bulletins.

Small Craft Advisory—Such advisories are issued when wind and sea conditions are expected to cause problems for small craft. During the warmer season advisories are issued when winds of at least 20 knots are expected, since such winds can produce three foot waves. During the colder months minimum conditions for issuing advisories are winds of 25 knots, which can generate up to four foot waves.

Special Marine Warning—Such warnings are issued when sudden strong winds of at least 34 knots are expected. The most frequent use of special Marine Warnings is for approaching severe thunderstorms.

Gale—Winds of 39-54 miles per hour (34-47 knots), with or without rainfall.

Storm—Winds of 55-73 miles per hour (48-63 knots) with or without rainfall.

Hurricane—Winds of more than 74 miles per hour (64 knots), with gusts as high as 200 m.p.h. and torrential rains.

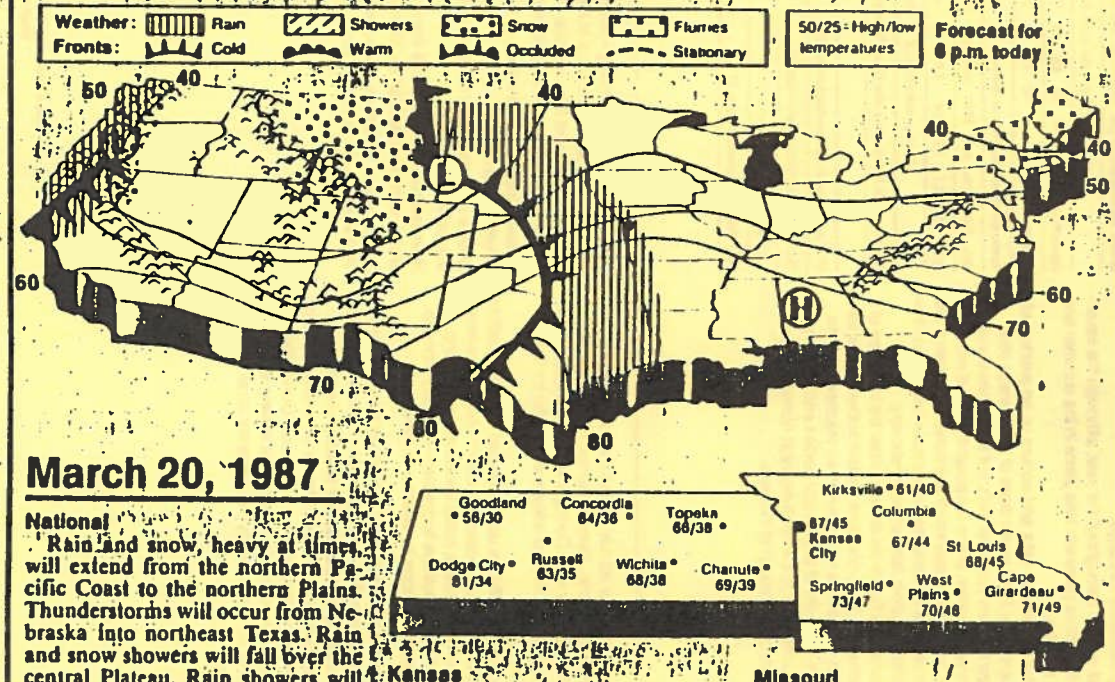
Continuous Weather Forecasts—Broadcast on VHF-FM KEC-83 At 162.40 MHZ

Weather

NATIONAL WEATHER SERVICE
24-HOUR RECORDED REPORT
(816) 471-4840

NATIONAL WEATHER SERVICE RADIO FREQUENCIES: Kansas City, Wichita, Joplin, Carndenton — 162.550 mhz
St. Joseph, Columbia, Springfield — 162.400 mhz
Topeka — 162.475 mhz

Today's forecasts



March 20, 1987

National

Rain and snow, heavy at times, will extend from the northern Pacific Coast to the northern Plains. Thunderstorms will occur from Nebraska into northeast Texas. Rain and snow showers will fall over the central Plateau. Rain showers will fall along the northern and central Pacific Coast and the northern Plateau. Snow will fall across the northern Atlantic Coast.

Kansas City

Partly cloudy, windy and mild; the high in the mid- to upper 60s. Mostly cloudy tonight and Saturday with a 50 percent chance of thundershowers and the low in the lower 50s; the high Saturday 55 to 60. Fair and mild Sunday with highs in the 60s; lows in the 40s.

Kansas

Partly cloudy today through Saturday with a slight chance of showers west today and a chance of thunderstorms east this afternoon and tonight. Highs today will be from 55 to the 60s; lows in the 30s. Highs Saturday will be 45 northwest to 58 southeast. Chance of showers Sunday through Tuesday.

Missouri

Partly cloudy and windy west with highs from around 60 to the lower 70s. Cloudy tonight and Saturday with a chance of showers and thunderstorms and lows in the 40s; highs Saturday in the 50s north to near 70 southeast. Fair Sunday with highs in the 60s; lows in the 40s. Rain likely Monday and Tuesday.

Lake of the Ozarks and southwest Missouri lakes

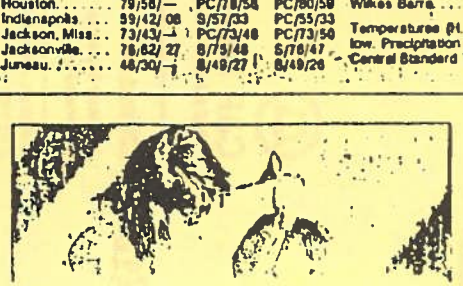
Partly cloudy; highs 65 to 73. Mostly cloudy tonight and Saturday with a chance of showers; lows 45 to 50, highs Saturday 62 to 70. Fair Sunday with highs in the 60s; lows in the 40s. Rain likely Monday and Tuesday.

City-by-city conditions

C-Clear F-Fair M-Missing S-Sunny SN-Snow
CL-Cloudy FG-Foggy PS-Ptly Sun SH-Showers T-Trace
D-Dust FR-Frzng Rn PC-Ptly Cldy SL-Sleet TH-Thdrstm
DR-Drizzle H-Haze R-Rain SM-Smoke W-Windy

	Thu. H/L/P	FORECAST Today W/H/L	Sat. W/H/L		Thu. H/L/P	FORECAST Today W/H/L	Sat. W/H/L
Albany	47/20/—	CL/42/28	PC/47/29	Las Vegas	62/45/—	PC/58/38	SH/56/39
Albuquerque	62/34/—	W/56/30	F/60/28	Little Rock	68/41/—	CL/70/47	PC/67/43
Amarillo	56/30/—	S/65/42	S/55/31	Los Angeles	61/50/—	F/67/48	SH/62/51
Anchorage	40/18/—	PC/36/20	CL/42/30	Louisville	56/48/.42	PC/63/38	PC/63/39
Asheville	64/36/.70	S/63/33	PC/64/33	Lubbock	71/43/—	S/75/51	S/64/48
Atlanta	58/44/.13	S/71/48	PC/70/47	Memphis	70/42/.12	F/70/47	CL/68/51
Atlantic City	51/36/—	PC/50/35	PC/50/35	Miami Beach	80/72/—	S/81/64	S/82/61
Austin	77/50/—	PC/82/57	PC/82/58	Midland-Odessa	69/42/—	S/76/50	S/70/41
Baltimore	58/36/—	S/54/34	PC/58/34	Milwaukee	45/37/.12	S/46/31	PC/47/31
Billings	50/31/.09	SN/35/29	SN/40/29	Mpls-St. Paul	48/40/—	PC/52/34	PC/50/33
Birmingham	68/44/.49	PC/72/44	CL/71/48	Nashville	69/44/—	F/67/42	PC/65/44
Bismarck	36/33/—	R/38/30	SN/32/29	New Orleans	76/60/—	PC/79/54	PC/76/60
Boise	47/29/—	PC/47/27	CL/48/30	New York	57/33/—	CL/46/36	PC/51/36
Boston	48/33/—	SN/38/32	CL/40/32	Norfolk, Va	47/38/.03	S/55/36	PC/54/36
Brownsville	82/58/—	PC/85/65	PC/86/65	North Platte	62/21/—	SH/56/39	CL/42/32
Buffalo	49/23/—	PC/46/27	PC/48/31	Oklahoma City	68/40/—	PC/67/53	F/65/44
Burlington, Vt	38/23/—	SN/37/26	CL/39/28	Omaha	58/32/—	PC/65/47	SH/61/43
Casper	42/31/—	SN/37/32	SN/39/27	Orlando	84/65/.32	S/82/58	S/83/58
Charleston, S.C.	82/54/.06	PC/69/48	PC/69/48	Philadelphia	58/30/—	PC/53/30	PC/53/33
Charleston, W.Va.	56/44/.11	S/59/35	S/61/32	Phoenix	78/52/—	PC/87/48	W/70/45
Charlotte, N.C.	62/41/.78	S/63/39	S/65/36	Pittsburgh	58/32/—	S/53/26	S/55/30
Cheyenne	57/27/—	SN/38/31	PC/36/28	Portland, Maine	40/30/—	SN/39/30	SN/43/29
Chicago	51/36/.09	S/52/32	PC/52/32	Portland, Ore.	60/36/.1	R/52/37	SH/53/37
Cincinnati	62/43/.06	S/60/33	S/59/34	Providence	49/30/—	SH/49/32	CL/42/32
Cleveland	47/30/—	S/48/28	S/52/29	Raleigh	68/42/.66	S/64/34	S/64/33
Columbia, S.C.	64/45/.37	PC/69/38	PC/69/40	Rapid City	56/26/—	R/41/34	SN/34/28
Columbus, Oh.	52/41/—	S/58/30	S/57/32	Reno	41/26/.06	PC/45/22	SN/43/27
Concord, N.H.	41/26/—	SN/40/30	CL/43/29	Richmond	60/35/—	S/57/36	PC/61/34
Dallas Ft. Worth	79/48/—	CL/77/54	PC/72/52	Sacramento	67/36/—	CL/53/32	SH/53/37
Dayton	64/36/.01	S/61/30	S/61/33	St. Louis	64/42/.11	PC/68/43	CL/61/40
Denver	64/32/—	W/55/36	S/53/26	Salt Lake City	40/32/.02	SN/42/27	PC/48/26
Des Moines	60/40/.07	CL/57/40	R/49/40	San Antonio	75/47/—	PC/82/57	PC/82/64
Detroit	65/31/—	S/52/28	S/53/30	San Diego	62/53/—	F/65/50	SH/60/52
Duluth	43/36/—	CL/43/32	PC/41/30	San Francisco	58/48/—	CL/53/43	SH/56/42
El Paso	71/43/—	S/63/49	S/67/36	San Juan, P.R.	83/70/—	S/84/70	S/86/70
Evansville	60/47/.05	S/61/38	CL/58/36	Sault Ste. Marie	51/28/—	S/50/28	S/50/27
Fairbanks	7/-3/—	PC/20/1	CL/36/7	Seattle	53/40/—	CL/53/38	CL/54/39
Fargo	43/37/.08	CL/48/33	CL/41/34	Shreveport	74/41/—	CL/77/51	PC/75/52
Flagstaff	45/31/—	PC/37/23	SN/40/18	Sioux Falls	54/36/.16	CL/53/37	R/41/36
Grand Rapids	54/31/—	S/52/28	S/53/30	Spokane	36/34/—	R/46/30	SH/46/30
Great Falls	31/27/.06	SN/34/25	SN/40/28	Syracuse	47/22/—	CL/42/28	PC/45/32
Greensboro, N.C.	46/39/.58	S/59/34	S/62/32	Tampa-St. Pbg.	80/64/.83	S/78/58	S/80/58
Hartford	47/25/—	CL/43/28	PC/46/29	Tucson	74/47/—	PC/82/41	W/66/28
Helena	35/28/.37	SN/38/24	SN/44/27	Tulsa	68/41/—	PC/68/53	F/66/48
Honolulu	84/69/.04	PC/85/69	PC/85/70	Washington	60/38/—	S/56/36	PC/56/40
Houston	79/58/—	PC/78/58	PC/80/59	Wilkes Barre	51/25/—	CL/45/26	PC/47/29
Indianapolis	59/42/.08	S/57/33	PC/55/33				
Jackson, Miss.	73/43/—	PC/73/48	PC/73/50				
Jacksonville	76/62/.27	S/75/48	S/76/47				
Juneau	46/30/—	S/49/27	S/49/26				

Temperatures (H, L) indicate daytime high/overnight low. Precipitation (P) is for 24 hours ending at 8 p.m. Central Standard Time (W weather forecast).



Almanac

Sun — Rises 6:23 a.m. Sets 6:30 p.m.
Moonrise, etc. — Moonrise, Venus, Sa

Kansas Missouri

DISASTER PREPAREDNESS ROSTER

APRIL 1987

NWS HEADQUARTERS STAFF

FTS - 427-8090

Donald R. Wernly, W/OM11	Chief, Warning and Forecast Branch
Linda S. Kremkau, W/OM11	Program Assistant
James D. Belville, W/OM11	Emergency Warning Meteorologist

EASTERN REGION

		FTS
Eugene Kilgore	Regional (WPM)	649-5455
Albert Kachic	Reg. Hydrologist	649-5464
John Kwiatkowski	Cleveland (WPM)	942-4949
Mary Jo Parker	Columbia, SC (WPM)	677-5501
Martin Ross	Philadelphia (WPM)	597-3696
Dick Calcaterra	Parkersburg, WV (WPM)	923-1344
Dennis Decker	Raleigh (WPM)	672-4436
Rich Schwerdt	Washington (WPM)	763-8275
Ralph Izzo	New York (Focal)	662-5340
Tim Scrom	Albany (Focal)	562-6586
Dave Dilley	Boston (Focal)	223-1354
Tom Dunham	Buffalo (Focal)	437-4800
Bill Drzal	Pittsburgh (Focal)	722-2882
Dave Sisk	Pittsburgh (Focal)	722-2882
Fred Ronco/John Rimkunas	Portland (Focal)	833-3552

SOUTHERN REGION

Brian Peters	Regional (WPM)	334-2812
Max Blood	Atlanta (WPM)	246-7586
Charles Terrell	Birmingham (WPM)	229-0837
Buddy McIntyre	Fort Worth (WPM)	334-8505
Ron Stagno	Houston (WPM)	526-5834
David Imy	Jackson (WPM)	490-4639
Nelson DeVilliers	Little Rock (WPM)	740-5331
Bill Alexander	Lubbock (WPM)	738-7362
Jim Poirier	Memphis (WPM)	222-6441
Don DeVore	Oklahoma City (WPM)	749-4155
Bill Hare	San Antonio (WPM)	730-5025
Francisco Torres-Cordero	San Juan (WPM)	8-809-753-4893
Dick Wood	Albuquerque (Focal)	474-2170
Mike Koziara	New Orleans (Focal)	682-6891
Larry Lahiff	Miami (Focal)	350-4303

CENTRAL REGION

		FTS
Larry Krudwig	Regional (WPM)	758-3239
Lee Larson	Regional Hydrologist	758-3229
R. Koeneman	Chicago (Focal)	353-4680
Larry Gabril	Ann Arbor (Focal)	378-2220
Brian Dowd	Des Moines (Focal)	862-4496
Diane DeCaire	Indianapolis (Focal)	331-4035
Beverly Poole	Louisville (Focal)	352-5210
Guy Tucker	St. Louis (Focal)	279-7018
Lee Anderson	Sioux Falls (Focal)	782-4244
Steven Schurr	Topeka (Focal)	752-2630
Bill Kneas	Denver (Focal)	327-3611
Bob Glancy	Cheyenne (Focal)	328-2376
John Miller	Minneapolis (Focal)	725-3400
Tom Zajdel	Milwaukee (Focal)	362-3243
Richard May	Bismarck (Focal)	783-4224
Gary Wiese	Omaha (Focal)	864-4207

WESTERN REGION

Richard Douglas	Regional (WPM)	588-4000
Tony Haffer	Dep. Reg. Hydrologist	588-5137
Al Dreumont	Boise (Focal)	554-9860
Chuck Conway	Los Angeles (Focal)	793-7215
Mike Franjevic	Phoenix (Focal)	261-3500
Don Northrop	Portland (Focal)	423-4340
Glenn Trapp	Reno (Focal)	470-5719
Bill Alder	Salt Lake City (Focal)	588-5133
Jan Null	San Francisco (Focal)	466-7767
Charles Ruscha	Seattle (Focal)	392-6087
Joe Johnston	Great Falls (Focal)	585-1311

ALASKA REGION

A. Jay Hull	Regional (WPM)	8-907-271-3886

PACIFIC REGION

Vacant	Regional (WPM)	8-808-836-1831