

Natural Disaster Survey Report

The Huntsville Tornado

November 15, 1989



U. S. Department of Commerce
National Oceanic and Atmospheric Administration
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Table of Contents

Table of Contents	i
List of Figures	ii
Preface	1
Executive Summary.....	2
Findings and Recommendations.....	3
Part I - Description and Impact of the Huntsville Tornado.....	8
Part II - Summary of Warning Services.....	11
Part III - Dissemination.....	15
Part IV - Preparedness Activities.....	18
Part V - User Response.....	20
Appendix A - WSO Huntsville Staffing	22
Appendix B - Chronology of Releases Related to the Huntsville Tornado	23
Appendix C - Television and Radio Station Dissemination Activities.....	38
Appendix D - Preparedness Activities Related to Madison County, AL, Conducted by WSO Huntsville	42
Appendix E - Individual Accounts.....	44
Appendix F - Summary of Deaths in the Huntsville Tornado including Age, Gender, and Location	47
Appendix G - Personnel Interviewed by NWS Survey Team	48

List of Figures

Figure 1 - Alabama Zone Map.....	50
Figure 2 -Convective Outlook from NSSFC	51
Figure 3 -Centreville Sounding at 1200 UTC 11/15/89.....	51
Figure 4 -Surface Analysis 2:00 pm CST 11/15/89.....	52
Figure 5 -Surface Analysis 4:00 pm CST 11/15/89.....	52
Figure 6 -500 Mb Heights and Vorticity at 1200 UTC 11/15/89.....	53
Figure 7 -500 Mb Data at 1200 UTC 11/15/89	53
Figure 8 -500 Mb Heights and Vorticity at 0000 UTC 11/16/89.....	54
Figure 9 -500 Mb Data Plot at 0000 UTC 11/16/89.....	54
Figure 10 -850 Mb Heights at 1200 UTC 11/15/89.....	55
Figure 11 -850 Mb Data Plot at 1200 UTC 11/15/89.....	55
Figure 12 -850 Mb Heights at 0000 UTC 11/16/89.....	56
Figure 13 -850 Mb Data Plot at 0000 UTC 11/16/89.....	56
Figure 14 -Huntsville Radar Plot at 2030 UTC 11/15/89	57
Figure 15 -Huntsville Radar Plot at 2124 UTC 11/15/89	58
Figure 16 -Huntsville Radar Plot at 2150 UTC 11/15/89	59
Figure 17 -Huntsville Radar Plot at 2256 UTC 11/15/89	60
Figure 18 -Map of Tornado Track from Huntsville Times, Nov. 19, 1989 Edition.....	61
Figure 19 - WSO Huntsville's County Warning Area.....	62

PREFACE

The National Oceanic and Atmospheric Administration's (NOAA) National Weather Service Southern Region Headquarters appointed a Regional Survey Team following the disastrous tornado that struck Huntsville, Alabama, Wednesday, November 15, 1989. The purpose of the survey was to assess the effectiveness of the warning system during this tragic event. The team consisted of Richard I. Coleman, Area Manager and Meteorologist in Charge, Weather Service Forecast Office (WSFO) Memphis, Tennessee; Max White, Dissemination and Public Service Meteorologist, Southern Region Headquarters, Fort Worth, Texas; and Brian E. Peters, Deputy Meteorologist in Charge, WSFO Birmingham, Alabama.

The team met at the Weather Service Office (WSO) Huntsville Monday morning, November 20, to plan its investigative strategy and to discuss the tornado event with members of the WSO staff. Later in the day the team toured the damage area and interviewed county emergency management officials, NASA personnel at the Redstone Arsenal, and area media. The team met Monday evening to review the experiences of the day and to discuss the plan for the remaining day of the field investigation.

On Tuesday, November 21, Richard Coleman and Brian Peters went to the damage scene and interviewed eye witnesses and individuals whose homes were severely damaged by the tornado. Max White with the assistance of Gary S. Petti,

Meteorologist in Charge and Area Manager, WSFO Birmingham, conducted media interviews. The team met briefly during the late afternoon for final discussions, then dispersed.

The team wishes to express its appreciation to the WSO Huntsville staff for their support, both logistic and otherwise, during the team's stay in Huntsville. Without their help, the team would never have completed its field work in the two days allotted. Particular thanks go to Brenda Page, Acting Official in Charge, for her many extra hours of support in direct assistance in the field survey work.

Members of the WSFO Birmingham staff assisted in the preparation of the meteorological scenario contained in this report, and their assistance is gratefully acknowledged. Expressions of gratitude are likewise in order to persons interviewed during what was certainly a hectic and traumatic time in their lives. Their cooperative spirit and responsiveness to the team's questions proved extremely valuable in assessing user response to the warning system. Individuals interviewed are listed in Appendix G.

Note that all times in this report are Central Standard Time (CST) unless otherwise annotated. UTC refers to Coordinated Universal Time (Greenwich Mean Time or Z time).

EXECUTIVE SUMMARY

Huntsville, Alabama, was struck by a deadly tornado around 4:30 pm on Wednesday, November 15, 1989. From an initial touchdown point on the Redstone Arsenal, the storm cut a destructive, 18.5-mile swath on its northeast trek across the southern sections of Huntsville. Plowing through businesses and heavily populated residential areas of the city, the tornado left a tragic legacy; 21 dead, 463 injured and damage estimated at 100 million dollars. Twelve of the 21 fatalities occurred in automobiles as many persons were homeward bound during the afternoon rush hour. The storm was rated an F4 on the Fujita Tornado Intensity Scale.

Historically, tornadoes are no strangers to persons in north Alabama, where Huntsville and Madison County are located. The region felt the destructive power of the April 3-4, 1974, Super Outbreak and records show that Madison county has had 25 tornadoes from 1950 through October, 1989.

Anyone listening to the NOAA Weather Radio (NWR) or monitoring the commercial broadcast media should have been aware that November 15th was expected to be a severe weather day. The Zone and Local Forecasts issued during the early morning, Tuesday, November 14, mentioned the possibility of severe thunderstorms on Wednesday. Subsequent forecasts and statements marked with increasing certainty the ominous nature of the events to come.

The National Severe Storms Forecast Center (NSSFC) issued a Public Severe Weather Outlook at 9:30 am Wednesday and highlighted the unusually strong potential for severe thunderstorms and tornadoes over the Tennessee Valley. The Birmingham Forecast Office followed with a Special Weather Statement at 10:50 am with the headline, "MAJOR SEVERE WEATHER THREAT

POISED FOR ALABAMA AND NORTHWEST FLORIDA". A Tornado Watch was in effect for Madison and adjacent counties from 12:30 pm to 8:00 pm. Soon after the issuance of the watch, emergency management officials, storm spotters and the NWS staff at Huntsville placed into effect a coordinated plan of action in accordance with established procedures.

Beginning at 12:45 pm, WSO Huntsville issued warnings for the west part of its county warning area (see Figure 19) as an intense squall line moved into northwest Alabama. Storm spotters reported large hail and intense straight-line winds associated with this squall line. At the time the tornado struck Huntsville, a Severe Thunderstorm Warning was in effect for Madison County. That warning, issued at 4:13 pm, was changed to a Tornado Warning at 4:35 pm based on a report relayed through the amateur radio spotter network of a tornado touchdown in the city.

Critical weather information was disseminated in a timely fashion over the NOAA Weather Wire Service (NWWS) and NWR and by many media outlets in Huntsville and adjacent areas providing the public with frequent weather updates on radio and "crawls" and live "cut-ins" on television. Links with spotter groups and emergency management and law enforcement officials worked well.

Some persons in the path of the tornado felt they were not adequately warned. Either they did not hear the Severe Thunderstorm Warning for Madison county or, if they did, the warning did not raise their level of concern for destructive weather clearly associated with a tornado. Yet, many others called in to local radio talk shows to say they knew well in advance that severe weather was likely for the area.

Tragically, many motorists were caught on congested streets and highways in the nearly pitch black conditions of the on-rushing storm. Undoubtedly, many never saw the tornado, making escape virtually impossible with such little time to react. There were however, several accounts of persons leaving their vehicles as the storm approached but most stayed in them.

Although the Jones Valley Elementary School was virtually destroyed by the storm, the timely actions of the principal and a teacher in charge of the Extended Daycare Program probably

spared the lives of 37 children and several other teachers. Acting in accordance with the principal's instructions, the teacher directed the children, accompanied by the other teachers, to a safer location under the stairwell on the first floor of the school. Several workmen who were painting in the teachers lounge, ran to the children and shielded them with their bodies as the storm struck.

The Survey Team believes the following findings and recommendations can serve as a means to highlight the strengths of the warning system and to identify areas where improvements are still possible.

Findings and Recommendations

1) Finding

The National Weather Service performed in an exemplary manner in carrying out its public safety mission. A Tornado Watch issued by the National Severe Storms Forecast Center (NSSFC) had been in effect for Madison County since 12:30 pm CST. WSO Huntsville had been issuing warnings and statements since mid-afternoon that detailed severe storms in counties to the west of Madison County. Because WSO Huntsville received no reports of, nor had any radar indications of tornadic activity in Madison County, a Severe Thunderstorm Warning was issued at 4:13 pm for Madison County based on the large hail report in Decatur (Morgan County just west of Huntsville/Madison County). The Severe Thunderstorm Warning lead time was 17 minutes which is considered to be significant with the current state of severe weather detection technology.

2) Finding

Important dissemination service was provided by the television and many radio stations serving the Huntsville/Decatur area. The positive and quick reaction by the news media was due in part to previous storm history, interest of residents in the area weather, and a close working relationship with WSO Huntsville. The NWS staff are known by media personnel involved in the warning effort. Several stations discontinued regular programming, including commercials, before, during, and after the tornado to provide continuous

coverage of the severe weather event. Those with emergency power provided special service as most commercial radio and tv stations lost power when the tornado struck.

3) Finding

All Huntsville television stations visited used a combination of "crawls or cut-ins" to pass on severe weather information to viewers. One station displays a Severe Thunderstorm or Tornado Watch/Warning symbol in a lower corner of the screen when a Watch or Warning is in effect in their viewing area. These are effective methods to enhance public awareness of fast-breaking weather events.

Recommendation

The National Weather Service should continue to encourage television stations which do not currently utilize such techniques to implement those procedures in order to enhance the dissemination of severe weather information.

4) Finding

In one of the first real tests of the new high speed Weather Wire in a major severe weather episode, the NWS proved effective in speeding critical weather information to subscribers. While there were only five (5) subscribers (2 TVs, 1 radio, 1 newspaper, 1 County EMA) in the Huntsville area, they benefitted from the receipt of warnings and statements within seconds of the time of entry into the system.

Recommendation

Renewed efforts should be made to encourage media, EMA officials, law enforcement, and private sector interests to subscribe to the upgraded Weather Wire.

5) Finding

Many people perceived that they were not "warned" about the possibility of severe weather or a tornado even though a Tornado Watch and a Severe Thunderstorm Warning were in effect when the tornado struck.

Recommendation

The NWS must continue to stress the dangers of severe thunderstorms and the possibility of tornadoes with little, or no, advance warning.

6) Finding

WSO Huntsville issued a Tornado Warning at 3:40 pm (valid until 4:45 pm) for Lawrence and Morgan Counties, followed by a Severe Thunderstorm Warning at 3:54 pm (valid until 5:00 pm) for Lawrence, Morgan, and Limestone Counties. The latter warning did not mention the status of the Tornado Warning previously issued leading to the conclusion that both warnings were in effect simultaneously for Lawrence and Morgan Counties. This proved to be confusing to the media, according to comments made to members of the Survey Team.

Recommendation

Unless they are specifically cancelled, warnings remain in effect until their expiration times; consequently, if a subsequent warning is issued for the same area, it should include a sentence in the text referring to the status of the earlier warning.

7) Finding

Many people in Huntsville were aware of basic tornado safety rules and there were numerous instances of individuals taking proper protective actions. While it is difficult to estimate the number of people who are alive because of the knowledge of safety rules, the death toll would have been higher had not many individuals reacted properly. Discussions with survivors clearly indicate that last minute protective measures did save lives and reduce injury.

Recommendation

The NWS should continue preparedness and public safety efforts. Since 1975 when some of the first organized tornado awareness weeks were begun, NWS offices have promoted public education about weather hazards. These mass media campaigns as well as group and individual awareness/educational efforts have a cumulative effect in raising the consciousness level of the public resulting in proper responses during severe weather.

8) Finding

There are a number of instances where persons took quick action to save themselves or others. The Survey Team was privileged to meet two individuals deserving of special note; they are Mrs. Dawson, Principal of the Jones Valley Elementary School, and Ms. Penney Cato, teacher in charge of the Extended Daycare Program at the school. It was Mrs. Dawson who because of her knowledge of tornado safety rules and her awareness of the severe weather potential that day, instructed Ms. Cato to take 37 children and several teachers to a place of safety on the lower level of the school. Ms. Cato followed these instructions and showed real courage under difficult conditions as she prepared the children for the approaching storm. Without a doubt, these two ladies aided by the other teachers and several painters who were in the building at the time, were instrumental in saving the lives of the children.

NOAA/National Weather Service Public Service Awards were presented to Mrs. Dawson and Ms. Cato by Mrs. Marilyn Quayle, wife of the Vice President of the United States. The presentation by Mrs. Quayle was made in a special ceremony conducted at the temporary Jones Valley Elementary School during the 1990 Severe Weather Awareness Week in Alabama.

9) Finding

Attrition of the WSO Huntsville staff due to deaths and transfers limited the time available to conduct outreach activities associated with the severe weather awareness program. The Survey Team noted that in spite of these limitations, there exists a good rapport between the staff and the user community.

10) Finding

Weather information currently reaches the Alabama Department of Public Safety via NOAA Weather Wire where it is then manually entered into the Alabama Law Enforcement Teletype System (LETS). This episode showed that significant fast breaking weather can overwhelm a manual relay system.

Recommendation

Since automated interfaces with LETS has proven effective in the rapid relay of weather information in other states, any state without this capability should seek a means to automatically relay severe weather information into their LETS.

11) Finding

The Emergency Broadcast System (EBS) Operational Plan for Huntsville, four other Alabama Operational Areas, and the State of Alabama EBS Plan are still in draft form. EBS is used for local emergencies and tested routinely as required by FCC regulations; however, it is not used for weather warnings.

Recommendation

State and local media, EMA officials, the FCC, and the NWS should renew efforts to make EBS a viable system for weather emergencies in Alabama.

12) Finding

Media accounts and Survey Team interviews revealed that individuals, schools, etc., utilize NOAA Weather Radio; however, many of these users have NWR receivers which are not equipped with battery backup capability. These receivers and NWR service became useless when electrical power was lost.

Recommendation

The advantage of having NWR receivers equipped with a battery backup should be stressed to all interested parties utilizing NWR. Users may want to upgrade their NWR units.

Part I

Description and Impact of the Huntsville Tornado

Huntsville is located in the north-central part of Alabama in southern Madison County. While the 1980 census listed the population of Huntsville as 142,513, the city has undergone substantial growth in the last decade with the expansion of high-tech and space-related industry and business. As a result, the current population is nearly 180,000. Huntsville is the county seat of Madison County and the home of the Redstone Arsenal.

Tornadoes are reasonably well known to the people of north-central Alabama. The historic April 3-4, 1974, tornado outbreak devastated a large part of northern Alabama including Madison County. The tornado database from the National Severe Storms Forecast Center (NSSFC) in Kansas City and 1989 Storm Data records indicate that 25 tornadoes have occurred in Madison County from 1950 through October, 1989. This places Madison County with the 5th highest number of tornado occurrences by county in Alabama. Those 25 tornadoes were responsible for 17 fatalities.

On the afternoon of Wednesday, November 15, 1989, around 4:30 pm, a tornado struck the southern portion of the city of Huntsville cutting a swath of destruction from southwest toward the northeast through a business section and a heavily populated residential area. Twenty one people died as a result of the tornado and 463 were injured. Eighteen people died in the tornado, and two other people died in early December and one in January from injuries sustained in the tornado (see Appendix F). Total damage estimates were placed around \$100 million.

The tornado struck during the beginning of rush hour and touched down initially on Redstone Arsenal and then moved into a business area crossing two major north-south highways. Twelve of the 21 deaths (57 percent) occurred in automobiles, a striking similarity to the 1979 Wichita Falls, Texas, tornado. In the Huntsville tornado, most of those killed in cars were in the process of performing normal tasks as opposed to seeking automobiles for safety.

As the thunderstorm moved into the southwest corner of Madison County at 4:15 pm, the staff on duty at the WSO at Huntsville International Airport observed a wall cloud and rain-free base with the thunderstorm. The wall cloud showed no signs of rotation and dissipated shortly after being spotted.

Shortly after this, between 4:20 and 4:30 pm, meteorologists working for NASA on the Redstone Arsenal observed a wall cloud and rain-free base with the thunderstorm as it moved across the southern portion of the Arsenal. Around 4:25 pm, they observed rotation in the wall cloud.

According to information shared with the National Weather Service by Duane Stiegler with Dr. Ted Fujita's group from the University of Chicago, the initial point of damage occurred 1 mile south-southwest of Madkin Mountain on the Redstone Arsenal near the intersection of Fowler Road and Mills Road. Trees were downed and some roof gutters damaged. From eyewitness accounts of the wall cloud, circulating air may have reached the ground without a visible funnel.

The tornado continued on a northeast track passing northeast of Building 5250 on the Arsenal. Little damage was done to that building. The storm then moved into a sparsely developed area, but it did do about \$1 million in damage to Huntsville's garbage-burning plant which was nearing the end of construction.

At this point, the tornado began to cross the old Huntsville Airport and a large portion of the adjacent municipal golf course. It was here that the tornado struck the Huntsville Police Academy which generated one of the first reports of the existence of the tornado. Two officers were injured at the Police Academy.

From the golf course, the tornado entered a business and heavily populated area of Huntsville. The tornado crossed Memorial Parkway (US 231 and State Highway 53), a major north-south traffic artery. The tornado destroyed a number of shopping complexes, office buildings, an apartment complex, and churches as it slowly crossed Airport Road. It crossed Whitesburg Road, another relatively major north-south highway.

Nineteen of the twenty-one fatalities occurred in the area between the intersection of Airport Road and Memorial Parkway and the intersection of Airport Road and Whitesburg Road. Eleven of the deaths occurred in automobiles, four in apartments, and four in commercial buildings.

From the intersection of Whitesburg Road and Airport Road, the tornado moved up Garth Mountain, as it continued on a northeast course. This took the tornado into a heavily wooded section. As it crossed the top of Garth Mountain and moved down the east side, it struck Jones Valley Elementary School on Garth Road.

Thirty-seven children, five teachers, and seven painters were in the school when the tornado struck. The children were part of an Extended Daycare Program conducted at the school. The lead

teacher of the day-care program moved the children from the second floor of the school building into a small open area under the stairway on the first floor. This action, first suggested by the school principal as she left for the day, saved the lives of the children. These actions are detailed in Appendix E.

One woman was killed in an automobile driving along Garth Road enroute to the school.

From the school, the tornado crossed Garth Road and moved across a portion of Jones Valley Subdivision, a development of well-constructed single family homes. The tornado severely damaged or destroyed a number of homes in the Jones Valley subdivision. It continued across Jones Valley moving up Huntsville Mountain. The area from Huntsville Mountain to the end of the tornado path is rural with only scattered structures. The tornado continued to destroy or severely damage whatever structures it encountered.

The tornado topped Huntsville Mountain and moved down the east side crossing U. S. 431. It travelled through this valley in the vicinity of Dug Hill before moving up and over Chestnut Knob. From Chestnut Knob the tornado traversed the Flint River valley referred to as Salty Bottoms, crossing the Flint River and U. S. 72 (Lee Highway). It crossed U. S. 72 one mile southeast of Brownsboro.

The tornado continued on an east-northeast track over Reed Mountain to a small lake at the headwaters of the Killingsworth Cove Branch, a small creek which feeds into the Flint River. The tornado path ended at the southeast tip of this small lake.

The total path length was 18.5 miles from the initial beginning on the Redstone Arsenal to its end at the headwaters of Killingsworth Cove Branch. The damage path was generally about one half mile wide; however, it reached nearly one mile in width

in the Flint River/U. S. 72 area. The tornado was classified as an F4 on the Fujita Tornado Scale.

A summary of damage from reports gathered by the Huntsville Times included:

259	Homes destroyed
130	Homes with major damage
148	Homes with minor to moderate damage

80	Businesses destroyed
8	Businesses damaged
3	Churches heavily damaged
2	Schools destroyed
10	Public buildings destroyed or heavily damaged
\$1.9 Million	in public utility damage

Part II

Summary of Warning Services

On the morning of November 15th, a short wave trough was over the central Rocky Mountain region and was forecast to move rapidly east-southeast across the middle and lower Mississippi Valley. The trough was forecast to assume a negative tilt across the southeastern United States by 6:00 am (1200 UTC) on the morning of the 16th.

Associated with the trough was a strong cold front pushing eastward along a line from the mid-Mississippi Valley to Texas. The front was expected to reach a line from the southern Appalachians to the Florida panhandle by 6:00 am on the 16th. The air mass over the southeast ahead of the cold front was unstable with surface dew points in the lower to mid 60s. The upper air sounding at Weather Service Meteorological Observatory (WSMO) Centreville, AL, at 6:00 am on Wednesday, November 15th, confirmed the unstable nature of the air mass. The Lifted Index on that sounding was -4 with a K-index of 29.

The 500 millibar (MB) wind over the frontal boundary was forecast to increase from around 50 knots on the morning of the 15th to near 70 knots by the morning of the 16th. The 850 MB jet blowing from the south-southwest was also forecast to strengthen to over 40 knots. By 6:00 pm (0000 UTC) on the 15th, the 850 MB jet was expected to be aligned along a line from southeast Louisiana to the southern Appalachians.

The combination of strong upper dynamics and moderate instability was expected to result in a significant development of severe weather from the mid-Tennessee Valley southward to the Gulf coast.

Severe weather potential for Alabama on Wednesday was first identified in the State Forecast Discussion (SFD) issued at 2:47 pm, Monday, November 13th. This discussion mentioned that a squall line would likely move through Alabama Wednesday, and the potential for severe weather would have to be monitored. The 4:05 pm Alabama Zone Forecast on Monday included a forecast of thunderstorms likely for the fourth period, Wednesday. The local forecast for Huntsville, issued by the Huntsville WSO, included the same information.

By Tuesday, November 14th, it became evident that a severe weather outbreak for Alabama was likely the following day. The evidence included strong positive vorticity advection and warm air advection accompanied by a rapid rise in dew points throughout the area. Additionally, a vigorous cold front was to push into the state adding to the already unstable conditions. The 3:34 am State Forecast Discussion on Tuesday expressed expectation of a line of thunderstorms ahead of the cold front with the mention of possible severe thunderstorms in the Wednesday forecast. The 5 am Zones and Huntsville Local Forecast included the wording "...showers and thunderstorms... some may be severe". This wording was carried forth in the 11 am forecasts.

The Tuesday afternoon forecast discussion, issued at 2:47 pm on the 14th, described the developing system as very strong with a severe weather producing squall line a possibility for Wednesday and Wednesday night ahead of the cold front. Projections in the SFD placed the cold front in Northwest Alabama by late Wednesday afternoon. The wording of "showers and thunderstorms...some

may be severe" was continued in the forecast for Wednesday.

The Convective Outlook issued by the NSSFC in Kansas City at 12:16 am (0616 UTC) placed Alabama and Mississippi within an area of moderate risk of severe thunderstorms.

The early morning State Forecast Discussion on Wednesday, November 15th, further emphasized the strong severe weather threat. The SFD was followed by a Special Weather Statement (SPS) from the WSFO highlighting the significant threat of severe weather to Alabama. This information was repeated in the 5:40 am issuance of the Alabama Weather Summary.

At 9:30 am, NSSFC forecasters issued a Public Severe Weather Outlook describing the weather situation and indicating that an outbreak of tornadoes and severe thunderstorms was forecast to develop Wednesday afternoon into Wednesday night across the Tennessee Valley. It was further described as a potentially dangerous weather situation and encouraged people to monitor the weather closely.

A 9:44 am State Forecast Discussion amplified on the developing weather situation and the severe weather threat. It also advised all Alabama and Northwest Florida Weather Offices to review staffing requirements and line up additional personnel for late in the afternoon and evening.

The Public Severe Weather Outlook from NSSFC was followed at 10:50 am by a Special Weather Statement from WSFO Birmingham. The statement was headlined "MAJOR SEVERE WEATHER THREAT POISED FOR ALABAMA AND NORTHWEST FLORIDA". The statement did a quick recap of the expected weather and encouraged people to review severe weather safety rules. All law enforcement and emergency management agencies (EMA) were encouraged to make plans for adequate staffing for the afternoon and

evening. A paragraph was included to appeal to the media for assistance in distributing weather watches, warnings, and statements. This SPS was followed within 20 minutes by safety rules for severe thunderstorms and tornadoes.

The 10:45 am Zone Forecast continued the mention of some thunderstorms being severe. The 11:20 am Alabama Weather Summary devoted two paragraphs to highlighting the potentially dangerous situation expected.

At 12:01 pm, the NSSFC issued Tornado Watch Number 750, which included part of Northwest Alabama, valid from 12:30 pm to 8:00 pm. The areal outline, prepared by WSFO Birmingham, was transmitted on the NOAA Weather Wire Service (NWWS) at 12:09 pm. The watch included 19 counties in North Alabama, one of which was Madison County, and one county in South Alabama. The Zone Forecast for the affected zones was updated at 12:30 pm to include the tornado watch. At that time, the wording in the forecast text was changed to read "...showers and thunderstorms ...some will be severe".

Because of the staff shortage at WSO Huntsville, the Alabama Area Manager coordinated with the Huntsville Acting Official in Charge (AOIC) on staffing requirements shortly after 8:00 am on Wednesday, November 15th. A meteorologist intern at WSFO Birmingham was available for detail to Huntsville. Around 10:30 am, the intern departed Birmingham to go to Huntsville, arriving there shortly after noon.

Prior to noon, the issuances from NSSFC and WSFO Birmingham were placed on the NOAA Weather Radio broadcasts from the Huntsville office. With the arrival of the NSSFC Tornado Watch, all EMA offices within Huntsville's county warning area were notified via telephone. Continuous weather radar coverage was begun, and the first radar observation was sent at 12:35 pm.

At 12:45 pm, a Special Weather Statement was issued detailing radar indications and reiterating the Tornado Watch and the need for people to review safety rules. Between 12:30 and 1:00 pm, the Huntsville-Madison County EMA office activated the amateur radio spotter network interface in the WSO radar room. An amateur radio operator is normally detailed to the WSO whenever a tornado watch affects the Huntsville area.

From 12:45 pm to 3:30 pm, the staff of WSO Huntsville collected information on various storms and interfaced with EMA and law enforcement agencies and media outlets. Severe Thunderstorm and Tornado Warnings and statements were issued primarily involving the counties in the western half of the Huntsville county warning area. A 3:15 pm Severe Weather Statement included the wording that "...These storms are dangerous and not to be taken lightly...the storms should reach the Huntsville area between 4 and 5 pm CST."

The WSO received a number of reports of severe weather. The reports, however, were mostly of hail and high wind including some reports of wind damage such as trees blown down. Specific details from the Huntsville warning log are contained in Appendix B.

At 3:40 pm, a Tornado Warning was issued for Lawrence and Morgan Counties. The warning was based on a possible hook echo on the Huntsville local warning radar. At 3:48 pm, three-quarter inch hail was reported in Decatur area of Morgan county which is just southwest of the city of Huntsville.

Due to the nature of the storm reports and to the dissipation of the hook echo configuration, the 3:40 pm Tornado Warning was changed to a Severe Thunderstorm Warning at 3:54 pm. Limestone County was also added to the warning. At this time the radar echo was exhibiting a bow shape with a cell top to 55,000 feet.

At 4:09 pm, large hail was again reported in the city of Decatur in Morgan County. Another hail report, this of "pea-size" hail at County Line road between Madison and Limestone Counties, was received at 4:10 pm.

A Severe Thunderstorm Warning was issued at 4:13 pm and included Morgan, Madison, and Limestone Counties. The warning was based on radar and the numerous hail reports. As the thunderstorm moved into Madison County, it moved across the Huntsville International Airport, location of the WSO. At 4:15 pm, a wall cloud was observed by WSO personnel. The wall cloud was not rotating and dissipated rapidly.

A 4:24 pm Severe Weather Statement highlighted the reports of hail and damaging winds in the warned areas. By 4:27 pm heavy rain and hail were falling at the WSO; the rain severely attenuated the radar.

The WSO received a report around 4:30 pm through the amateur radio spotter network of a tornado in the old airport area in Huntsville. Another spotter report at 4:32 pm said there was no tornado. Additional tornado reports were received at 4:33 pm.

The WSO staff began preparing a Tornado Warning for Madison County at 4:35 pm. The warning was broadcast "live" on NOAA Weather Radio (NWR) with the tone alert at this time. A problem with data lines between the SRWarn computer and AFOS was quickly cleared and resulted in only a slight transmission delay. The Tornado Warning was sent to AFOS from the SRWarn computer at 4:39 pm and sent immediately on the NWS. SRWarn refers to a PC-based program used by NWS offices to rapidly compose and transmit warning messages. AFOS refers to the main on-line computer system used throughout the NWS.

At 5:02 pm a Tornado Warning was issued for Jackson, Madison, and Marshall Counties as the

tornado-producing cell continued eastward. A 5:18 pm Severe Weather Statement cancelled the tornado warning for Madison county, but continued the warning for Jackson and Marshall Counties.

Additional statements and warnings were issued through 7:00 pm as the weather continued to

affect the eastern portion of the Huntsville county warning area. By 7:00 pm, the extra staff was being released.

Part III

Dissemination

Severe weather information was well disseminated in the Madison County and Huntsville area the day of the devastating tornado. The most effective methods of delivering weather forecasts and warnings were NOAA Weather Radio, NOAA Weather Wire Service, commercial radio and television, and the Huntsville-Madison County Emergency Management Agency (EMA) hot-line system. Several outstanding cases of delivering weather information to area residents were noted by the Survey Team. Because of time constraints, a visit was not made to the local Alabama Educational Television station, any cable television (CATV) offices, or the Emergency Broadcast System CPCS-1 station in Cullman, AL, which serves Huntsville and northern Alabama.

The following sections discuss the various dissemination systems and services utilized in association with the tornado disaster.

NOAA Weather Wire Service (NWWS)

The old, landline, 75-word-per-minute, Weather Wire was discontinued October 11, 1989. It was replaced by a new satellite delivery system operating at 1200 bits per second using ASCII code. The national vendor for the service is Contel ASC in Chantilly, VA.

Two of the three major television networks, one radio station, the daily newspaper, and the Madison County EMA in Huntsville have NWWS. The only major TV station in Huntsville not on NWWS has contacted Contel for service, but they currently receive NWS alphanumeric information via the Family of Services. The radio station the team visited in nearby Decatur, AL, is considering

subscribing. Two radio stations visited did not have NWWS due to limited budgets.

Dissatisfaction was voiced regarding the length of time it took Contel to respond to subscription requests and complete the requested installations; however, once the system became operational, everyone seemed happy with the increased circuit speed and product selectability options with the new NWWS.

Law Enforcement Teletype System (LETS)

To encourage all states to utilize LETS for the fan-out of weather information to other government agencies, the NWS has arranged to provide one agency per state with a free NWWS. In Alabama, the free NWWS went to the Alabama DPS Headquarters in Montgomery in the spring of 1989. The Alabama Department of Public Safety operates a statewide LETS. From the DPS State Headquarters, all DPS offices, County Sheriffs, and Police Departments are on this circuit. Hardware and software changes have not yet been made to allow NWWS data to be automatically routed on the Alabama LETS.

NOAA Weather Radio (NWR)

There are 10 NOAA Weather Radio transmitter sites in Alabama. The two in north Alabama, in Huntsville and Florence, are each programmed on a separate console at WSO Huntsville. NWR is monitored by all the EMA, TV, and radio stations contacted by the Survey Team (8 visits). Depending on the number of NWS personnel on duty, NWR information may lag slightly behind NWWS, as warnings are usually placed on NWWS first,

NAWAS second, and NWR third. The first report on NWR about the 4:30 pm tornado was given "live" with no script and incorrectly gave the location of the storm about a mile south of the actual damage area. This misinformation was corrected when the warning was again aired at 4:39 pm with script in hand.

During the Survey Team's visit to the Huntsville-Madison County EMA, officials stated somewhere between 25 and 40% of the audience acknowledged having an NWR receiver when asked during civic club talks. The EMA also received several reports of citizens and schools having NWR receivers without battery backup; these became useless when power was lost.

Emergency Broadcast System (EBS)

A meeting to establish EBS Operational Areas in Alabama was held on July 12, 1977, in Birmingham. According to the "February 1988 Annual EBS Report", there are nine (9) EBS Operational Areas in Alabama. Four (4) plans have been finalized; five (5) remain in draft form, including the State EBS Plan. One of the draft plans covers the Cullman-Huntsville area. The designated Common Program Control Station (CPCS-1) is WFMH-AM/FM in Cullman, AL. Comments from the stations visited clearly indicated that the North Alabama EBS was not a "working plan" even though EBS is tested weekly by local stations. The Mayor of Huntsville, working through the Madison County EMA, used the local EBS network several times during the tornado disaster. His message was used as the audio on TV-31. This had never been done before according to station officials.

While EBS is not used for weather warnings in northern Alabama, this does not appear to have been a detriment in this case since other dissemination systems accomplished the desired results.

Television/CATV

Five television stations serve the Huntsville area (the three major networks, one ETV station, and an independent station). The three major network stations were visited.

Huntsville is also served by Comcast Cablevision. This company was not visited. According to the "1989 Broadcasting/Cable Yearbook", Comcast has 36,846 subscribers with 62,419 homes in the franchised area (59% coverage). When the Survey Team visited the NBC network station (TV-48), it was learned that Comcast was carrying some of TV-48's programming during the afternoon which, very likely, included weather updates.

Only TV-48 displays a Severe Thunderstorm or Tornado Watch/Warning symbol in a lower screen corner whenever a watch or warning is in effect. Stations 19, 31, and 48 crawl NWS watches and warnings; 19 and 31 do live "cut-ins" for watches; all three "cut-in" for warnings.

Only TV-31 had emergency power (from an earlier ice storm experience) and stayed on during and after the storm. The other stations indicated plans are being made for emergency power at their transmitter sites. TV-19 is the only major network station that has a noon news report including a weather segment.

Specific details on the actions of these television stations during the afternoon of the tornado are presented in Appendix C.

Radio

Three radio stations in Huntsville and one in nearby Decatur, AL, were visited.

Three of the four stations stopped regular programming and even suspended commercials during the peak of severe weather awareness and during the aftermath of the disaster. One station

presented continuous weather coverage from 4:30 pm Wednesday through 1:00 pm Thursday.

Additional details on actions taken by the radio stations are found in Appendix C.

Sirens

The Huntsville-Madison County EMA operates a siren system composed of 41 units. A program is underway to educate the public to tune to local radio stations whenever the sirens sound. The sirens are tested the second Monday of each month.

Police/Department of Public Safety

The Team did not interview any law enforcement personnel.

Huntsville-Madison County EMA

Warnings are received in the Emergency Management Agency via NWS, NWR, NAWAS, HAMS, telephone, and UHF radio-link to WSO Huntsville.

The NWS called the EMA office at 12:15 pm with information about Tornado Watch # 750 that included Madison County. Based on this call, the EMA office went through their call-list and other designated actions whenever a Watch is in effect.

NWS/EMA training has produced around 450 spotters in the Madison County area. The spotter network was activated about 1:15 pm. EMA officials stated that 75% of the time the area is under a Tornado Watch, a tornado report will be received. EMA policy is to call law enforcement personnel to try and verify the report; call the NWS; and then alert area medical services.

EMA officials do not activate the city sirens for Severe Thunderstorm Warnings, nor was the 4:13 pm Severe Thunderstorm Warning read over the CD-media hot-line. EMA officials stated that severe thunderstorms should be expected in a Tor-

nado Watch. In addition to the sirens, EMA has 21 receivers in area schools. Pager/receivers are in 5 hospitals. A hot-line, ring-down system is also available that connects the EMA with 3 TV, 1 CATV, ETV, and 9 radio stations. Any, or all, of the agencies on the hot-line can be contacted as required.

The first report on the tornado to the EMA office came over the radio scanner at 4:35 pm about a possible touchdown at the Police Academy. Warnings on the tornado went out over the CD system at 4:37 pm.

According to EMA officials, without an actual, earlier report of a tornado, or radar indication, there is very little reason or cause to see how things could have been handled differently. EMA personnel complimented the NWS, Police, HAMS, and media for their actions.

NAWAS

There are an estimated 63 NAWAS drops in Alabama including the Huntsville-Madison County EMA and WSO Huntsville. Weather watches and warnings are broadcast over the Alabama NAWAS. Because the tornado struck in a populated area where dissemination of weather information was available via NWS, NWR, HAMS, and the many media outlets, NAWAS did not play a major role in the Huntsville tornado.

Summary

In summary, NWS forecasts, warnings, and statements were well disseminated by the media, EMA, and NWS. The general public, monitoring radio/TV/NWR, had the opportunity to be aware of the developing and ultimate severe weather. Several radio stations discontinued regular programming, including commercials, several hours prior to the tornado and continued giving uninterrupted weather and disaster information well after the storm struck.

Part IV

Preparedness Activities

The Weather Service Office (WSO) at Huntsville is responsible for severe weather warnings, weather preparedness, and warning coordination for ten counties in North Alabama. Preparedness programs consist of both organizational and individual training and education. Organizational training in severe storm identification is important for an effective warning system while individual education is essential to arm people with the proper protective measures used when severe weather threatens. Organizational activities are designed to encourage emergency operations plans, storm reporting networks, and effective warning dissemination. While these activities are underway, individuals must be made aware of safety measures for self protection.

Since 1975, each spring severe weather season has been preceded by a statewide Severe Weather Awareness Week. These weeks have usually been held in late February. During this week, people are encouraged to become familiar with severe weather safety rules, especially tornado safety. The National Weather Service Forecast Office in Birmingham mails out between 700 and 1000 information packages to news media outlets across the state. These packages provide information on severe weather and severe weather safety and are intended to reach the general public through mass media outlets such as newspapers and commercial broadcast stations.

The WSO staff also works closely with all Emergency Management Agencies (EMA) in their 10 county area. The WSO has a particularly good working relationship with the Huntsville-Madison County EMA.

The preparedness activities have decreased over the past three years due primarily to the marginal staffing level at the office. As shown in Appendix D, preparedness activities were more numerous in 1987 when the staffing level was higher. The number of preparedness contacts decreased in 1988 and further decreased in 1989. The Meteorologist-in-Charge (MIC) who is normally tasked to perform preparedness activities was unable to focus on this aspect of the job due to the need to frequently work operational shifts. A description of the staffing at Huntsville on November 15, 1989, can be found in Appendix A.

Despite the minimal time available for preparedness activities, the staff and MIC have maintained a good working relationship with EMA offices in North Alabama through telephone contacts and irregular visits by EMA officials to the WSO.

In Huntsville and Madison County, the WSO works with the EMA to keep the spotter network active. This includes assistance to the EMA in training activities such as the loaning of severe weather training and information films. The EMA office also activates the spotter network upon request by the WSO.

The Huntsville-Madison County EMA estimates that they have between 400 and 450 spotters composed of law enforcement officers, fire department personnel, and amateur radio operators. The EMA participates actively in spotter training occasionally doing spotter refresher courses themselves with the aid of films loaned by the WSO.

There are a total of 41 sirens in the city of Huntsville. The EMA office will not activate sirens purely on the basis of a public report of a tornado; they require some sort of confirmation from either the National Weather Service or the regular spotter network. Besides the sirens, there is a tone-alert

radio system with receivers in 21 schools and at the major hospitals, and a hotline system used to distribute emergency information to television, radio, and cable television outlets.

Part V

User Response

The Survey Team members conducted a number of interviews with victims of the Huntsville tornado. In addition to those accounts, a number of reports were reviewed through newspaper coverage. Several accounts were shared with the Survey Team by the meteorologists at NASA who have collected a number of first person stories. Individual accounts from Survey Team interviews are provided in Appendix E.

Many people, both those interviewed by the Survey Team and others, expressed a clear awareness of the threat of severe weather on November 15th. Even without the presence of a Tornado Warning (a Tornado Watch and Severe Thunderstorm Warning were in effect), many people in apartments, homes, and schools responded appropriately to the tornado danger. Interviews and later accounts indicated that many people in cars knew that was not a good place to be. At the heart of the tornado destruction, some people took steps to get out of cars. In one known case, a man received 100 stitches for injuries received after leaving his pickup truck; the truck had still not been located several days after the storm.

Others, in residential structures in Jones Valley, took recommended actions by seeking shelter in interior rooms. In one case, a woman with several children under her charge got seven people into two downstairs bathrooms; the only section of the house still standing after the tornado struck. At Jones Valley School, students in an after-school Extended Daycare Program were moved from the second floor to an area under a stairway on the first floor. This action directly saved the lives of 37 students and five

teachers since the upper floor of the school was totally destroyed.

A number of apartment complexes were struck and seriously damaged by the tornado, however, it is impossible to document actions of apartment dwellers since the Survey Team was unable to interview anyone who weathered the storm in an apartment.

A similar situation exists for mobile homes. Very few mobile homes were struck by the storm, but most of those that were struck were destroyed. Only one person was killed in a mobile home located in the eastern portion of Madison County.

Commercial buildings were vulnerable as the tornado moved through a section of businesses including several small shopping centers. Newspaper accounts indicated that many people knew to move away from the large glass windows. The construction of commercial buildings with the large span roofs made them susceptible to significant damage. Most of those commercial buildings that sustained serious damage from the tornado were bulldozed to the ground.

Perhaps the biggest tragedy in Huntsville was the fact that the tornado initially occurred in a densely populated area. After beginning on the Redstone Arsenal, the tornado moved across a golf course and immediately into an area of businesses and apartment complexes. Nineteen of the 21 deaths occurred in a one mile stretch of the tornado path along Airport Road roughly between Memorial Parkway and Whitesburg Road.

People involved in the normal going-home activities at 4:30 pm were confronted with a major

tornado. To further complicate the need for action, the thunderstorm turned the late afternoon to nearly pitch black conditions. This made it difficult if not impossible for drivers to recognize the tornado.

Even with recognition, the normally crowded highway arteries and lack of time to respond left motorists with few places to seek shelter.

Appendix A

WSO Huntsville Staffing

Staff on Duty:

Name	Position	Grade
Lary Burgett	Weather Service Specialist	GS-1341-11
David Jacobs	Weather Service Specialist	GS-1341-11
Brenda Page	Weather Service Specialist*	GS-1341-11
Scott Sharp	Meteorologist Intern	GS-1340-09

* indicates Acting Official in Charge

Hours and Assignments at WSO Huntsville:

Lary Burgett	Observations/Warnings	0800-2000
David Jacobs	Radar	1200-2400
Scott Sharp	NWR/warnings/statements**	0500-2100
Brenda Page	Severe weather/observations	1625-2400

** assigned to WSO Huntsville to supplement staff during severe weather threat.

WSO Huntsville staffing:

WSO Huntsville is authorized a staff level of 6 people, 5 Weather Service Specialists/Meteorologist Interns and the Meteorologist-in-Charge (MIC). A series of events, including staff illnesses and retirements, resulted in WSO Huntsville being minimally staffed for a period of time prior to this event, and at the time of the tornado, the WSO was two people below target staffing. This resulted in the WSO having limited capability to call in additional staff during periods of severe weather.

Knowing of this limitation, and expecting an active weather day, the Alabama Area Manager coordinated with the Acting OIC at Huntsville around 8:00 am on Wednesday, November 15th, and offered the assistance of one of the Meteorologist Interns at WSFO Birmingham. As a result, Mr. Scott Sharp was sent to Huntsville in the late morning to assist the staff.

Appendix B

Chronology of Releases Related to the Huntsville Tornado

The following are the actual releases made by the National Weather Service prior to and during the Huntsville Tornado of November 15, 1989. In some cases, especially with the Alabama Zone Forecasts, only the portion of the release relating to the Huntsville area are reproduced here, but any release reproduced in part will be so annotated. Following the releases are a listing of the Centreville WSMO radar observations and a list of the actions/reports recorded on the severe weather log at WSO Huntsville.

Note: Huntsville and Madison County are in Alabama Zone 2.

Releases:

ZCZC BHMZFPAL
TTAA00 KBHM 150316

ALABAMA ZONE FORECASTS
NATIONAL WEATHER SERVICE BIRMINGHAM AL
935 PM CST TUE NOV 14 1989

ALZ001 > 005-151100-
AL01-AL02-AL03-AL04-AL05-
ALABAMA ZONES 1 2 3 4 5
935 PM CST TUE NOV 14 1989

.TONIGHT...MOSTLY CLOUDY WITH A CHANCE OF SHOWERS AND THUNDERSTORMS. LOW IN THE UPPER 50S. SOUTHEAST WIND 10 TO 15 MPH. CHANCE OF RAIN 30 PERCENT.

.WEDNESDAY...SHOWERS AND THUNDERSTORMS...SOME MAY BE SEVERE. WINDY WITH SOUTH WINDS 15 TO 25 MPH. HIGH NEAR 70. CHANCE OF RAIN IS 90 PERCENT.

.WEDNESDAY NIGHT...THUNDERSTORMS ENDING EARLY AND TURNING COLDER. LOW AROUND 40. CONTINUED WINDY WITH NORTH WINDS 15 TO 25 MPH. CHANCE OF RAIN 80 PERCENT.

.THURSDAY...WINDY AND COLD. HIGH IN THE MID 40S.

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...Original text included the remainder of Alabama Zones 6 through 18...

NNNN

ZCZC MKCSWODY1
ACUS1 KMKC 150616
MKC AC 150700

CONVECTIVE OUTLOOK...REF AFOS NMC GPH940

VALID 151200 - 161200

THERE IS A MDT RISK OF SVR TSTMS TDA OVR MS AND AL...MUCH OF SRN TN... PTNS OF WRN AND NRN GA...AND THE WRN FL PNHDL. THE MDT AREA IS TO THE RGT OF A LN FM 40 WSW GPT HEZ GLH MEM BNA CSV AHN MCN PAM.

SURROUNDING THE AREA OF MDT RISK...THERE IS A SLGT RISK OF SVR TSTMS TO THE RGT OF A LN FM BPT TXK 60 NW JBR MDH LEX BLF HKY AGS 30 SE TLH.

GEN TSTMS ARE FCST TO THE RGT OF A LN FM LRD ACT HRO STL MKG OSC.

SHRTWV TROF INITIALLY OVR CNTRL ROCKIES AT 15/00Z IS FCST TO MOVE RPDLY ESEWD ACRS MID/LWR MS VLY AND ASSUME A SMWHT NEG TILT ACRS SERN U.S. BY END OF PD. ASSOC STG CDFNT PUSHES EWD FM MID MS VLY ...TX AT 15/12Z TO SRN APPLCNS...FL PNHDL AT 16/12Z. AMS AHD OF CDFNT EXPCD TO BE MDTLY UNSTABLE FM TN VLY SWD TO GULF COAST...WITH SFC DEWPTS IN LO TO MID 60S AND LIS IN -4 TO -6 RANGE. 500MB WINDS OVR FNTRL BNDRY ARE FCST TO INCR FM ARND 50KT TO NR 70KT BY END OF PD. SSWLY 850MB JET ALSO FCST TO STGTHN TO OVR 40 KT FM SE LA TO SRN APPLCNS BY 16/00Z. STG DYNAMICS COMBINED WITH MDT INSTBY EXPCD TO RESULT IN SGFNT SVR DVLPMNT TDA FM MID TN VLY SWD TO GULF COAST.

TSTMS DVLPG ALG CDFNT ATTN OVR SW MO ARE EXPCD TO INCR DURG RMNDR TNGT...PSBLY REACHING SVR LIMITS BY 12Z. ACTVTY EXPCD TO INTSFY FURTHER DURG THE DAY AND DVLPMNT ALG CDFNT ALG LWR MS VLY. AS ACTVTY MOVES EWD ACRS MS/AL...STG WIND FIELDS INDC PSBLTY OF SGFNT TORNADOS.. AND TORNADO THRT MAY EXTD EWD INTO WRN/NRN GA BY END OF PD. OTR SVR TSTMS ARE PSBL TO N ACRS NRN TN AND KY...HWVR PRIND INSTBY WILL BE MORE LIMITED THERE.

..COPE.. 11/15/89

NNNN

ZCZC BHMSFDBHM
TTAA00 KBHM 150903
NATIONAL WEATHER SERVICE BIRMINGHAM, AL
301 AM CST WED NOV 15 1989

VERY IMPRESSIVE SYSTEM HEADING OUR WAY. AT 5Z CDFNT FROM S ILL TO SE OKLA. DEW POINTS DROP OFF 30 DEGREES IN LESS THAN 100 MILES BEHIND FNT. BY 6PM CST TODAY NGM HAS FRONT ALONG MSL-BIX LN. BY 12Z THU 534 THKNS LN ON MSL WITH 522 LN NR MSL 12 HRS LATER. THE ONLY PLACE IN AL AND NWFL WHOS HIGH TEMPS THU WILL BE GREATER THAN WED NIGHT LOWS WILL BE DHN AND AQQ AND MAYBE MOB. STEADY OF FALLING TEMPS THU ALMOST EVERYWHERE. PLS READ SWODY1.

HSV 74/40/40 990 BHM 76/44/45 980 MGM 82/50/53 891
DHN 82/59/65 681 AUO 80/49/55 881 MOB 82/52/58 680
PNS 80/55/62 681 AQQ 80/62/69 681

.AL...WND ADVISORY AREA LAKES AL ZONES 1 2 3 4 5 6 7 8 9
.NWFL...NONE.

NNNN

ZCZC BHMZFPAL
TTAA00 KBHM 151039

ALABAMA ZONE FORECASTS
NATIONAL WEATHER SERVICE BIRMINGHAM AL
500 AM CST WED NOV 15 1989

ALZ001 > 005-151800-
AL01-AL02-AL03-AL04-AL05-
ALABAMA ZONES 1 2 3 4 5
500 AM CST WED NOV 15 1989

.TODAY...SHOWERS AND THUNDERSTORMS...SOME MAY BE SEVERE. A WIND ADVISORY IS IN EFFECT FOR AREA LAKES FOR SOUTH WINDS OF 15 TO 25 MPH. HIGH IN THE MID 70S. CHANCE OF RAIN IS 90 PERCENT.
.TONIGHT...THUNDERSTORMS ENDING EARLY AND TURNING COLDER. LOW AROUND 40. CONTINUED WINDY WITH NORTH WINDS 15 TO 25 MPH. CHANCE OF RAIN IS 90 PERCENT.
.THURSDAY...WINDY AND COLD. STEADY OR FALLING TEMPERATURES. HIGH AROUND 40. NORTH WIND 15 TO 25 MPH.

\$\$

...Original text included the remainder of Alabama Zones 6 through 18...

NNNN

ZCZC BHMSWSAL
TTAA00 KBHM 151135
ALABAMA WEATHER SUMMARY
NATIONAL WEATHER SERVICE BIRMINGHAM AL
540 AM CST WED NOV 15 1989

A MOIST SOUTHERLY WIND FLOW KEPT CLOUDS AND PATCHES OF RAIN OVER MOST OF ALABAMA DURING THE NIGHT. OVERNIGHT TEMPERATURES WERE IN THE 60S. THESE READINGS ARE WHAT WE USUALLY EXPECT FOR NORMAL HIGH TEMPERATURES FOR MID NOVEMBER.

RAINFALL AMOUNTS DURING THE NIGHT WERE GENERALLY LIGHT. RAINFALL TOTALS SINCE TUESDAY MORNING HAVE BEEN MOSTLY AROUND A HALF INCH BUT A FEW LOCATIONS HAVE REPORTED AMOUNTS AROUND ONE INCH.

A STRONG LOW PRESSURE SYSTEM WAS ADVANCING TOWARDS ALABAMA TODAY. THIS STORM SYSTEM HAS THE POTENTIAL TO TRIGGER SEVERE WEATHER ACROSS ALABAMA DURING THE NEXT 24 HOURS. RESIDENTS OF ALABAMA ARE ADVISED TO MONITOR THEIR LOCAL TV...RADIO OR NOAA WEATHER RADIO FOR THE LATEST WEATHER INFORMATION.

ONCE THE COLD FRONT ASSOCIATED WITH THE LOW PRESSURE SYSTEM MOVES ACROSS THE STATE TONIGHT NORTHERLY WINDS WILL USHER IN MUCH COLDER AIR. IN FACT HIGH TEMPERATURES ON THURSDAY ACROSS THE NORTH HALF OF THE STATE WILL ONLY BE IN THE 40S.

NNNN

ZCZC BHMSPSBHM
TTAA00 KBHM 151138
SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE BIRMINGHAM AL
500 AM CST WED NOV 15 1989

...SEVERE WEATHER THREAT TO ALABAMA AND NORTHWEST FLORIDA...

A POWERFUL STORM SYSTEM ORGANIZING OVER THE SOUTHERN PLAINS IS EXPECTED TO AFFECT MUCH OF THE SOUTHEAST...INCLUDING ALABAMA...DURING THE NEXT 24 HOURS.

FORECASTERS AT THE NATIONAL SEVERE STORM FORECAST CENTER IN KANSAS CITY MISSOURI HAVE ISSUED A PRELIMINARY OUTLOOK CALLING FOR A SIGNIFICANT THREAT OF SEVERE THUNDERSTORMS IN ALABAMA AND NORTHWEST FLORIDA...AS WELL AS PARTS OF ADJACENT STATES TODAY AND TONIGHT. A SEVERE THUNDERSTORM IS DEFINED BY THE NATIONAL WEATHER SERVICE AS ONE THAT PRODUCES HAIL 3/4 INCH OR LARGER AND/OR WIND GUSTS OF

58 MPH OR GREATER. THE STORM CENTER ALSO INDICATED THAT CONDITIONS MAY BECOME FAVORABLE FOR THE FORMATION OF TORNADOES.

THIS IS ONLY A PRELIMINARY OUTLOOK. THERE ARE NO SEVERE WEATHER WATCHES OR WARNINGS IN EFFECT FOR ALABAMA AT THIS TIME. THE GREATEST THREAT OF SEVERE WEATHER IN ALABAMA WILL PROBABLY BE FROM THIS AFTERNOON INTO THE NIGHTTIME HOURS.

RESIDENTS OF ALABAMA AND NORTHWEST FLORIDA SHOULD CHECK ON WEATHER DEVELOPMENTS DURING THE DAY. LISTEN TO RADIO AND TELEVISION STATIONS IN YOUR AREA TO FIND OUT IF A WATCH OR WARNING IS IN EFFECT. NOAA WEATHER RADIO...OPERATED BY THE NATIONAL WEATHER SERVICE...IS AN EXCELLENT SOURCE OF CONTINUOUS UP TO DATE INFORMATION ON SEVERE WEATHER.

EMERGENCY MANGAGEMENT OFFICIALS SHOULD PLAN TO HAVE WARNING CENTERS STAFFED THIS AFTERNOON AND TONIGHT. UTILITY COMPANIES AS WELL AS COUNTY AND LOCAL OFFICIALS MAY ALSO WANT TO MAKE PRELIMINARY PLANS TO HAVE ADDITIONAL PERSONNEL AVAILABLE SHOULD THE SEVERE WEATHER DEVELOP.

NNNN

ZCZC MKCSWODY1
ACUS1 KMKC 151229 AMD
MKC AC 151235 AMD

CONVECTIVE OUTLOOK...REF AFOS NMC GPH940

VALID 151235 - 161200

REF WW 747 TIL 18Z

OTRW...THERE IS A MDT RISK OF SVR TSTMS TDA OVR MS AND AL...MUCH OF SRN TN... PTNS OF WRN AND NRN GA...AND THE WRN FL PNHDL. THE MDT RISK AREA IS TO THE RGT OF A LN FM 40 WSW GPT HEZ GLH MEM BNA CSV AHN MCN PAM.

SURROUNDING THE AREA OF MDT RISK...THERE IS A SLGT RISK OF SVR TSTMS TO THE RGT OF A LN FM BPT TXK HOT BLV CMI SBN TOL PKB BLF HKY AGS 30 SE TLH.

GEN TSTMS ARE FCST TO THE RGT OF A LN FM LRD ACT HRO STL MKG OSC. SLGT RISK AREA EXPANDED NWD AS 12Z RAOBS INDC AMS ACRS THE WRN OH/ TN VLY MUCH MORE UNSTBL THAN FCST BY PROGS. 12Z PAH SOUNDING HAS MINUS 9 LIFTED INDEX WITH LRG POS AREA. SVR TSTM COMPLEX ACRS SRN IL E OF STL EXPCD TO RMN STG NEXT SVRL HRS AS WRM MOIST SWLY LOW LVL FLOW DESTABILIZES AMS ACRS INDIANA AND WRN OH.

..HIRT.. 11/15/89

NNNN

ZCZC MKCSWODY1
ACUS1 KMKC 151500
MKC AC 151500

CONVECTIVE OUTLOOK...REF AFOS NMC GPH940

VALID 151500 - 161200Z

WW NR 747 VALID TIL 18Z.

THERE IS A HIGH RISK OF SVR TSTMS PTNS OF ERN AR..ERN LA..MS..AL.. TN..KY..GA..NWRN FL. AREA IS TO RT OF LN FM 50 S GPT BTR ESF ELD JBR PAH SDF LEX LOZ TYS AHN AGS VLD 20 S TLH.

THERE IS ALSO A SLGT RISK OF SVR TSTM ELSW TO RT OF LN FM GLS SH HOT SLO DNV JXN MTC YNG INT CHS SSI CTY.

GEN TSTM ACTVY TO RT OF LN FM MFE ALI TYS STL MKG APN.

VIGOROUS UPR LVL TROF DIGGING SEWD INTO CNTRL U.S. IN RESPONSE TO VRY STG JET MAX MOVG SEWD OVR MT/WY. AMS HAS BECOME VRY UNSTBL FM LA ACRS MS INTO TN/KY WITH SFC BASED LI OF MINUS 7 TO MINUS 9. LATEST LFM TENDS TO SHOW NEG TILT TO TROF ACRS GULF CST STATES DURG PD AS STG BAND OF PVA MOVES EWD ACRS MS/AL/GA. PRONOUNCED MID LVL DRYING PROGD TO MOVE EWD ACRS LA/MS/AL TO N OF STG SUBTROP JET ORIENTED FM CNTRL TX EWD TO SRN FL. SVR TSTMS EXPCD TO EXPLODE DURG AFTN AHD STG CDFNT FM ERN PTNS AR/LA INTO TN/KY AND MOVE EWD ACRS VRY UNSTBL AMS. LOW LVL JET EXPCD TO CONT STG AHD CDFNT FM LA/MS INTO KY PROVIDING FVRBL MSTR CNVRGNC PAT. INCRSG UP LVL DVRGNC PAT OVR HIGH RISK AREA GIVES THREAT OF DMGG TORNADOES. ISOLD SVR TSTMS ALSO PSBL WITH SFC LOW MOVG NEWD ACRS IND/SERN MI/OH WHERE AMS HAS LI OF MINUS 3 TO MINUS 5.

A PUBLIC SEVERE WEATHER OUTLOOK WILL BE ISSUED SHORTLY UNDER AFOS HEADER MKCPWOMKC.

..WILSON.. 11/15/89

NNNN

ZCZC MKCPWOMKC
TTAA00 KMKC 151530
PUBLIC SEVERE WEATHER OUTLOOK
NATIONAL WEATHER SERVICE KANSAS CITY MO
KANSAS CITY MISSOURI
0930 AM CST WEDNESDAY NOVEMBER 15 1989

..SEVERE THUNDERSTORM OUTBREAK EXPECTED TODAY FROM THE TENNESSEE VALLEY INTO THE SOUTHEASTERN

STATES.

THE NATIONAL SEVERE STORMS FORECAST CENTER IN KANSAS CITY MISSOURI IS FORECASTING AN OUTBREAK OF SEVERE THUNDERSTORMS AND TORNADOES TODAY INTO TONIGHT OVER MUCH OF THE TENNESSEE VALLEY AND PARTS OF THE SOUTHEASTERN STATES.

THE STATES WHICH ARE MOST LIKELY TO EXPERIENCE THE BRUNT OF THE SEVERE THUNDERSTORM ACTIVITY INCLUDE PARTS OF EASTERN ARKANSAS...EASTERN LOUISIANA... MISSISSIPPI...ALABAMA...TENNESSEE...KENTUCKY...GEORGIA... AND PARTS OF NORTHWESTERN FLORIDA.

AN OUTBREAK OF TORNADOES AND SEVERE THUNDERSTORMS IS FORECAST TO DEVELOP WEDNESDAY AFTERNOON INTO WEDNESDAY NIGHT FROM EASTERN PORTIONS OF THE LOWER MISSISSIPPI VALLEY ACROSS THE TENNESSEE VALLEY TO THE CENTRAL GULF COAST. A STRONG COLD FRONT WILL SWEEP ACROSS THE SOUTHEASTERN STATES THIS AFTERNOON AND TONIGHT WITH SEVERAL AREAS OF LOW PRESSURE MOVING NORTHWARD ALONG THE COLD FRONT FROM THE LOWER MISSISSIPPI VALLEY ACROSS THE TENNESSEE AND OHIO VALLEYS TO THE LOWER GREAT LAKES. STRONG SOUTHERLY WINDS AHEAD OF THE COLD FRONT WILL BRING MOIST AND UNSTABLE AIR NORTHWARD INTO THE TENNESSEE VALLEY SETTING THE STAGE FOR AN EXPLOSIVE CONFRONTATION OF AIR MASSES.

SEVERE THUNDERSTORMS ARE EXPECTED TO DEVELOP LATE THIS MORNING AND EARLY THIS AFTERNOON FROM WESTERN KENTUCKY ACROSS WESTERN TENNESSEE ...EASTERN ARKANSAS...WESTERN MISSISSIPPI TO EASTERN LOUISIANA. LINES OF SEVERE THUNDERSTORMS ARE FORECAST TO MOVE RAPIDLY NORTHEAST ACROSS THE TENNESSEE VALLEY AND THE CENTRAL GULF COAST THIS AFTERNOON AND TONIGHT. THESE THUNDERSTORMS COULD PRODUCE DAMAGING TORNADOES...LARGE HAIL...AND DESTRUCTIVE WINDSTORMS.

ALL PERSONS IN THE THREATENED AREA ARE URGED TO REVIEW SAFETY RULES ...AND LISTEN TO RADIO..TV..OR NOAA WEATHER RADIO FOR LATER STATEMENTS AND POSSIBLE WATCHES OR WARNINGS. THIS IS A POTENTIALLY DANGEROUS WEATHER SITUATION FOR THE AFFECTED AREAS AND SHOULD BE MONITORED CLOSELY.

..LARRY WILSON..

NNNN

ZCZC BHMSFDBHM
TTAA00 KBHM 151544
STATE FORECAST DISCUSSION
NATIONAL WEATHER SERVICE BIRMINGHAM, AL
944 AM CST WED NOV 15 1989

REFERENCE SWODY1 AND PWOMKC.

THE SYSTEM DESCRIBED AS IMPRESSIVE ON THE LAST SFD LOOKS EVEN MORE IMPRESSIVE THIS MORNING. STRONG PVA FCST FOR SE STATE LATE THIS AFTERNOON AS 500 MB TROF DEEPENS AND MOVES INTO MISSISSIPPI VALLEY. MORNING SOUNDINGS INDICATIVE OF SVR WX WITH EQUILIBRIUM LVLS ARND 37 THSD WITH POTENTIAL MAX TOPS TO 48 THSD. ENERGY INDICES ALSO SUBSTANTIAL. CHART 24Y ALSO SHOWS SE STATES IN FAVORABLE POSITION WITH RESPECT TO BOTH SUB-TROPICAL JET AND MAIN JET.

ALL OF THAT ANTI-CLIMACTIC WITH REFERENCE TO THE TWO PRODUCTS ABOVE.

NOT PLANNING ANY MAJOR CHG TO CURRENT FCST. ALL OFFICES IN BHM AREA SHOULD REVIEW STAFFING REQUIREMENTS AND LINE UP ADDITIONAL PERSONNEL FOR LATE THIS AFTERNOON AND TNGT.

BESIDES STAFF PLANNING, WE ARE PREPARING A SPECIAL WX STATEMENT TO GO OUT AFTER ZONE PKG TO TRY TO DRAW MORE ATTENTION TO THE SITUATION.

WL ALSO ADD PHRASE TO "TONIGHT" ABT NEED FOR LAKE WIND ADVISORY.

.AL...LWA ZONES 1 THROUGH 9
.NWFL...NONE.

NNNN

ZCZC BHMZFPAL
TTAA00 KBHM 151635

ALABAMA ZONE FORECASTS
NATIONAL WEATHER SERVICE BIRMINGHAM AL
1045 AM CST WED NOV 15 1989

ALZ001 > 005-160000-
AL01-AL02-AL03-AL04-AL05-
ALABAMA ZONES 1 2 3 4 5
1045 AM CST WED NOV 15 1989

.THIS AFTERNOON...SHOWERS AND THUNDERSTORMS...SOME MAY BE SEVERE. LAKE WIND ADVISORY IN EFFECT FOR AREA LAKES FOR SOUTH WINDS OF 15 TO 25 MPH. HIGH IN THE MID 70S. CHANCE OF RAIN IS 90 PERCENT.

.TONIGHT...THUNDERSTORMS ENDING EARLY AND TURNING COLDER. LOW AROUND 40. CONTINUED WINDY WITH NORTH WINDS 15 TO 25 MPH. A LAKE WIND ADVISORY WILL BE REQUIRED. CHANCE OF RAIN IS 90 PERCENT.

.THURSDAY...WINDY AND COLD. STEADY OR FALLING TEMPERATURES. HIGH AROUND 40. NORTH WIND 15 TO 25 MPH.

\$\$

...ORIGINAL TEXT INCLUDED REMAINDER OF ALABAMA ZONES 6 THROUGH 18...

NNNN

ZCZC BHMSPSBHM
TTAA00 KBHM 151647
SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE BIRMINGHAM AL
1050 AM CST WED NOV 15 1989

...MAJOR SEVERE WEATHER THREAT POISED FOR...
...ALABAMA AND NORTHWEST FLORIDA...

ALL THE NEEDED INGREDIENTS ARE COMING INTO PLACE FOR A SEVERE WEATHER EVENT ACROSS ALABAMA AND THE FLORIDA PANHANDLE THIS AFTERNOON AND TONIGHT.

THE NATIONAL SEVERE STORMS FORECAST CENTER IN KANSAS CITY MISSOURI IS FORECASTING A HIGH RISK OF SEVERE THUNDERSTORMS OVER ALABAMA AND NORTHWEST FLORIDA THIS AFTERNOON...TONIGHT...AND THURSDAY MORNING. THESE THUNDERSTORMS COULD PRODUCE TORNADOES... LARGE HAIL AND DAMAGING WINDSTORMS.

THIS IS A VERY DANGEROUS WEATHER SITUATION. ITS IMPORTANT FOR ALL RESIDENTS TO REVIEW SEVERE WEATHER SAFETY RULES NOW BEFORE THE WEATHER TURNS THREATENING. ALL LAW ENFORCEMENT AND EMERGENCY MANAGEMENT AGENCIES SHOULD PREPARE NOW FOR ADEQUATE STAFFING THIS AFTERNOON AND TONIGHT.

SPECIAL NOTE TO MEDIA...THE NATIONAL WEATHER SERVICE ALWAYS DEPENDS ON THE MEDIA TO QUICKLY DISTRIBUTE WEATHER WATCHES AND WARNINGS AND CRITICAL WEATHER INFORMATION. PLEASE GEAR UP NOW TO GIVE FULL ATTENTION TO ALL WEATHER INFORMATION... ESPECIALLY WATCHES AND WARNINGS THIS AFTERNOON AND TONIGHT. THANKS IN ADVANCE.

SAFETY RULES COVERING SEVERE THUNDERSTORMS AND TORNADOES WILL BE SENT LATER THIS MORNING.

NNNN

ZCZC BHMSWSAL
TTAA00 KBHM 151720
ALABAMA WEATHER SUMMARY
NATIONAL WEATHER SERVICE BIRMINGHAM AL
1120 AM CST WED NOV 15 1989

A MOIST SOUTHERLY WIND FLOW KEPT CLOUDS AND PATCHES OF RAIN OVER MOST OF ALABAMA DURING THE MORNING HOURS. THE MORNING LOWS WERE IN THE 60S.

THESE READINGS ARE WHAT WE USUALLY EXPECT FOR NORMAL HIGH TEMPERATURES FOR MID NOVEMBER. SOME RECORDED LOW TEMPERATURES AROUND THE STATE....

ANNISTON... 63
CENTREVILLE 61
DOTHAN..... 66

GAGSDEN WAS THE ONLY STATION ACROSS THE STATE WITH A TEMPERATURE BELOW 60...ITS MORNING LOW WAS 57.

RAINFALL WAS WIDESPREAD ACROSS THE STATE LAST NIGHT. RAINFALL AMOUNTS WERE LIGHT...LESS THAN ONE TENTH OF AN INCH. MOBILE WAS THE ONLY EXCEPTION WITH NEARLY AN INCH AND ONE QUARTER /1.17/ DURING THE PAST 12 HOURS.

A STRONG WEATHER SYSTEM WITH ITS ASSOCIATED COLD FRONT WILL MOVE INTO THE MOIST AND UNSTABLE AIR MASS SITUATED OVER ALABAMA. SHOWERS AND THUNDERSTORMS...SOME STORMS ARE LIKELY TO BE SEVERE...ARE EXPECTED TO BREAK OUT OVER THE OF THE STATE LATE THIS AFTERNOON AND EVENING.

THIS IS A POTENTIALLY DANGEROUS WEATHER SITUATION. PERSONS ARE ADVISED TO KEEP ABREAST OF WEATHER CONDITIONS LATER THIS AFTERNOON AND EVENING BY LISTENING TO LOCAL TV..RADIO AND NOAA WEATHER RADIO.

NNNN

ZCZC MKCSELO
TTAA00 KMKC 151801
MKC WW 151801
TNZ000-MSZ000-ALZ000-160200-

BULLETIN - IMMEDIATE BROADCAST REQUESTED
TORNADO WATCH NUMBER 750
NATIONAL WEATHER SERVICE KANSAS CITY MO
1201 PM CST WED NOV 15 1989

..A..THE NATIONAL SEVERE STORMS FORECAST CENTER HAS ISSUED A TORNADO WATCH FOR

MUCH OF MIDDLE TENNESSEE
PARTS OF NORTHEAST MISSISSIPPI
AND PARTS OF NORTHWEST ALABAMA

FROM 1230 PM CST UNTIL 800 PM CST THIS WEDNESDAY AFTERNOON AND EVENING

THIS IS A PARTICULARLY DANGEROUS SITUATION WITH THE POSSIBILITY OF VERY DAMAGING TORNADOES. ALSO...LARGE HAIL...DANGEROUS LIGHTNING AND DAMAGING THUNDERSTORM WINDS CAN BE EXPECTED.

THE TORNADO WATCH AREA IS ALONG AND 80 STATUTE

MILES EAST AND WEST OF A LINE FROM 40 MILES SOUTH
SOUTHWEST OF COLUMBUS AFB MISSISSIPPI TO 35 MILES
NORTH NORTHEAST OF NASHVILLE TENNESSEE

REMEMBER....A TORNADO WATCH MEANS CONDITIONS ARE
FAVORABLE FOR TORNADOES AND SEVERE
THUNDERSTORMS IN AND CLOSE TO THE WATCH AREA.
PERSONS IN THESE AREAS SHOULD BE ON THE LOOKOUT FOR
THREATENING WEATHER CONDITIONS AND LISTEN FOR
LATER STATEMENTS AND POSSIBLE WARNINGS.

\$\$

C...TORNADOES AND A FEW SVR TSTMS WITH HAIL SFC AND
ALF TO 3 IN. EXTRM TURBC AND SFC WND GUSTS TO 80 KT. A
FEW CBS WITH MAX TOPS TO 500 . MEAN WIND VECTOR 250/40.

D...LNS OF SVR TSTMS EXPCD TO MOVE EWD ACRS TN/MS/AL IN
RESPONSE TO STG DIGGING UPR TROF. AMS VRY UNSTBL OVR
AREA WITH LI OF MINUS 8. STG DRYING MOVG INTO AREA AT
MID LVLS INCRSG THREAT OF DMGG TORNADOES.

E...OTR TSTMS...CONT WW 748..749.

...WILSON

NNNN

ZCZC BHMSLSAL

TTAA00 KBHM 151809

AREAL OUTLINE FOR TORNADO WATCH NUMBER 750
NATIONAL WEATHER SERVICE BIRMINGHAM AL
1201 PM CST WED NOV 15 1989

IN ALABAMA

THIS WATCH INCLUDES THE FOLLOWING COUNTIES...

IN NORTH ALABAMA 19 COUNTIES...

BLOUNT COLBERT CULLMAN FAYETTE
FRANKLIN JACKSON JEFFERSON LAMAR
LAUDERDALE LAWRENCE LIMESTONE MADISON
MARION MARSHALL MORGAN PICKENS
TUSCALOOSA WALKER WINSTON

IN SOUTH ALABAMA 1 COUNTY ...

GREENE

NNNN

ZCZC BHMSLSAL

TTAA00 KBHM 151812

AREAL OUTLINE FOR TORNADO WATCH NUMBER 750
CORRECTION

NATIONAL WEATHER SERVICE BIRMINGHAM AL

1201 PM CST WED NOV 15 1989 (added Sumter & Hale Counties)

IN ALABAMA

THIS WATCH INCLUDES THE FOLLOWING COUNTIES...

IN NORTH ALABAMA 19 COUNTIES...

BLOUNT COLBERT CULLMAN FAYETTE
FRANKLIN JACKSON JEFFERSON LAMAR
LAUDERDALE LAWRENCE LIMESTONE MADISON
MARION MARSHALL MORGAN PICKENS
TUSCALOOSA WALKER WINSTON

IN SOUTH ALABAMA 3 COUNTIES...

GREENE HALE SUMTER

NNNN

ZCZC BHMZFPAL

TTAA00 KBHM 151830

ALABAMA ZONE FORECASTS...UPDATED
NATIONAL WEATHER SERVICE BIRMINGHAM AL
1045 AM CST WED NOV 15 1989 (incorrect time)

ALZ001-002-004-005-160000-

AL01-AL02-AL04-AL05-

ALABAMA ZONES 1 2 4 5

1230 PM CST WED NOV 15 1989

...TORNADO WATCH UNTIL 8 PM CST...

.THIS AFTERNOON...SHOWERS AND THUNDERSTORMS...SOME
WILL BE SEVERE. LAKE WIND ADVISORY IN EFFECT FOR AREA
LAKES FOR SOUTH WINDS OF 15 TO 25 MPH. HIGH IN THE MID
70S. CHANCE OF RAIN IS 90 PERCENT.

.TONIGHT...THUNDERSTORMS ENDING EARLY AND TURNING
COLDER. LOW AROUND 40. CONTINUED WINDY WITH NORTH
WINDS 15 TO 25 MPH. A LAKE WIND ADVISORY WILL BE
REQUIRED. CHANCE OF RAIN IS 90 PERCENT.

.THURSDAY...WINDY AND COLD. STEADY OR FALLING
TEMPERATURES. HIGH AROUND 40. NORTH WIND 15 TO 25
MPH.

\$\$

...Remainder of text included Alabama Zones 3, 6, and 8...

NNNN

ZCZC BHMSPSBHM

TTAA00 KBHM 151834

SPECIAL WEATHER STATEMENT

NATIONAL WEATHER SERVICE BIRMINGHAM AL
1235 PM CST WED NOV 15 1989

...A TORNADO WATCH IS IN EFFECT FOR A PART OF
NORTHWEST AND WEST
CENTRAL ALABAMA UNTIL 800 PM TONIGHT...

AT 1230 PM THUNDERSTORMS WERE DEVELOPING OVER NORTHWEST ALABAMA. ONE OF THE STRONGER THUNDERSTORMS WAS OVER WALKER COUNTY AND ANOTHER WAS IN EASTERN TUSCALOOSA COUNTY. OTHERS WERE DEVELOPING OVER NORTHEAST MISSISSIPPI AND WILL BE MOVING INTO LAMAR AND MARION COUNTIES WITHIN THE NEXT HOUR. ALL THUNDERSTORMS WERE MOVING TO THE NORTHEAST AT 35 MILES AND HOUR.

THESE STORMS WERE DEVELOPING WELL AHEAD OF A COLD FRONT THAT WAS MOVING THROUGH ARKANSAS EARLY THIS AFTERNOON. THIS IS A VERY DANGEROUS WEATHER SITUATION. ITS IMPORTANT FOR ALL RESIDENTS TO REVIEW SEVERE WEATHER SAFETY RULES NOW AND LISTEN FOR POSSIBLE WARNINGS. ADDITIONAL SEVERE WEATHER WATCHES ARE LIKELY OVER OTHER PARTS OF ALABAMA LATER TODAY AS THE STRONG COLD FRONT PUSHES TO THE SOUTHEAST.

NNNN

ZCZC BHMSPSHSV
TTAA00 KHSV 151845

SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE HUNTSVILLE AL
1245 PM CST WED NOV 15 1989

...STRONG THUNDERSTORMS DEVELOPING OVER NORTH ALABAMA...

STRONG THUNDERSTORMS HAVE DEVELOPED RAPIDLY OVER NORTH ALABAMA EARLY THIS AFTERNOON. AT 1245 PM CST...WEATHER SERVICE RADAR AT HUNTSVILLE SHOWED THE STRONGEST STORMS TO THE WEST AND SOUTHWEST OF THE FLORENCE /TUSCUMBIA AREA...AND IN THE GUNTERSVILLE LAKE AREA IN MARSHALL COUNTY. OTHER STRONG THUNDERSTORMS WERE LOCATED NEAR HAMILTON AND NEAR LEWIS SMITH LAKE.

THESE STORMS WILL PRODUCE HEAVY DOWNPOURS...DANGEROUS CLOUD TO GROUND LIGHTNING..STRONG GUSTY WINDS AND SOME HAIL. THE STORMS WERE MOVING NORTHEAST AT 35 MPH. THIS MOVEMENT WILL TAKE A FEW OF THE STRONGEST STORMS TOWARDS THE QUAD CITIES...MOULTON AND SCOTTSBORO DURING THE NEXT 30 TO 60 MINUTES.

REMEMBER A TORNADO WATCH IS IN EFFECT FOR MUCH OF NORTH ALABAMA UNTIL 8 PM CST. BEFORE THE WEATHER TURNS THREATENING...NOW WOULD BE A GOOD TIME TO REVIEW SEVERE WEATHER SAFETY RULES.

NNNN

ZCZC BHMSFDBHM
TTAA00 KBHM 151903

STATE FORECAST DISCUSSION
NATIONAL WEATHER SERVICE BIRMINGHAM, AL
1259 PM CST WED NOV 15 1989

REFERENCE SWODY1 AND STATUS MESSAGES.

THERE IS GOING TO BE VELRY LITTLE TIME FOR AN SFD, SO WSOS ARE ADVISED THAT A PRELIMINARY EVENING FORECAST PACKAGE IS NOW UNDER WRKZFP AND WRKFLZ. UNLESS YOU HAVE STRONG REASONS LET'S NOT QUIBBLE TOO MUCH ABT THE FCST WORDING.

MY BASIC THOUGHT IS THE THE LOW TONIGHT WILL BE THE HIGH FOR THURSDAY. THINK THE FPC GUIDANCE IS A LITTLE TOO LOW - WENT CLOSER TO FWC GUIDANCE.

MAY BE MORE CLOUDS TOMORROW THAN INDICATED BUT MOST EFFORT GOING IN TO THE FIRST PERIOD.

.AL...LWA ZONES 1 THROUGH 15 AND 17 AND 18
.NWFL...LWA ZONE 3

NNNN

ZCZC MKCSWODY1
ACUS1 KMKC 151935
MKC AC 151900
CONVECTIVE OUTLOOK...REF AFOS NMC GPH940

VALID 151900 - 161200Z

REF WW 748 TIL 21Z...WW 749 TIL 23Z...AND WW 750 AND 751 TIL 02Z.

THERE IS A HIGH RISK OF SVR TSTMS PTNS OF MS..SE LA..AL..SC..WRN NC..TN..KY..GA..NWRN FL. AREA IS TO RT OF LN FM 50 S GPT BTR HEZ GLH MEM OWB SDF LEX LOZ AVL SSC CHS 20 S TLH.

THERE IS ALSO A SLGT RISK OF SVR TSTMS ELSW TO RT OF LN FM 20 S LCH MLU BYH HUF JXN MTC AOO IAD RIC HAT...CONTD...NRB PIE.

VIGOROUS UPR LVL TROF CONTS TO DIG SEWD ACRS THE CNTRL U.S. AS STG UPR LVL WND MAX MOVS SEWD INTO THE BASE OF THE TROF. INTNS CNVCTN HAS DVLPD AHD OF THE CDFNT ACRS THE LWR MS VLY/LWR OH VLY. IMPRSSIVE SFC PRES FALL AXIS FM ERN TN TO SERN LA INDC CONTD DEEPNG OF SFC SYS PRODG SGFNT SVR TSTMS/TORN OUTBREAK ACRS THAT AREA. CDFNT IS PROGD TO MOV ACRS WRN NC/NWRN FL BY END OF FCST PD WITH STG UPR LVL DVRGNC EXPCD TO CONT OVR SERN U.S. INTNS TSTMS ARE EXPCD TO CONT OVR HIGH RISK AREA AHEAD OF SFC SYS IN UNSTBL AMS WHR STG UPR LVL DVRG AREA CROSSES LO LVL JET MAX.

..SMITH.. 11/15/89

NNNN

ZCZC BHMSPSHSV BHM ATL
TTAA00 KHSV 151941

SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE HUNTSVILLE AL
140 PM CST WED NOV 15 1989

...STRONG THUNDERSTORMS INTENSIFYING OVER NORTH ALABAMA...

AT 140 PM CST WEATHER SERVICE RADAR AT HUNTSVILLE CONTINUED TO SHOW VERY STRONG THUNDERSTORMS OVER NORTH ALABAMA. A SEVERE THUNDERSTORM WAS ENTERING MARION COUNTY AND MAY AFFECT PARTS OF FRANKLIN AND LAWRENCE COUNTIES. RESIDENTS OF THESE COUNTIES SHOULD BE PREPARED TO TAKE COVER SINCE A WARNING MAY HAVE TO BE ISSUED.

ELSEWHERE ACROSS NORTH ALABAMA...STRONG THUNDERSTORMS WERE IN EASTERN LAUDERDALE COUNTY AND AROUND GUNTERSVILLE LAKE NEAR SCOTTSBORO. THE STORM IN EASTERN LAUDERDALE COUNTY DID PRODUCE HAIL A QUARTER TO A HALF INCH IN DIAMETER AT CHEROKEE IN COLBERT COUNTY.

REMEMBER A TORNADO WATCH IS IN EFFECT FOR MUCH OF NORTH ALABAMA. YOU SHOULD BE PREPARED TO TAKE SHELTER IF A WARNING IS ISSUED OR THE WEATHER BECOMES THREATENING.

NNNN

ZCZC BHMSPSHSV BHM ATL
TTAA00 KHSV 152035

SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE HUNTSVILLE AL
233 PM CST WED NOV 15 1989

...SEVERE WEATHER A GOOD POSSIBILITY OVER NORTH ALABAMA...

AT 230 PM CST WEATHER SERVICE RADAR AT HUNTSVILLE CONTINUED TO SHOW VERY STRONG OVER THE TENNESSEE VALLEY. A THUNDERSTORM CONTAINING A POSSIBLE TORNADO WAS IN MARION COUNTY. THIS STORM MAY AFFECT PARTS OF FRANKLIN AND LAWRENCE COUNTIES SHORTLY..THEREFORE A WARNING MAY HAVE TO BE ISSUED.

ELSEWHERE...THUNDERSTORMS...A FEW WHICH ARE SEVERE...WERE MOVING ACROSS PARTS OF NORTHERN MISSISSIPPI AND WESTERN TENNESSEE. THESE STORMS WILL BE AFFECTING PARTS OF NORTHWEST ALABAMA WITHIN THE

NEXT HOUR OR TWO.

REMEMBER A TORNADO WATCH IS IN EFFECT FOR MUCH OF NORTH ALABAMA. YOU SHOULD BE PREPARED TO TAKE SHELTER IF A WARNING IS ISSUED OR THE WEATHER BECOMES THREATENING.

NNNN

ZCZC BHMSVRHSV AL MS TN GA
TTAA00 KHSV 152043
ALC033-059-077-152145-

BULLETIN - IMMEDIATE BROADCAST REQUESTED
SEVERE THUNDERSTORM WARNING
NATIONAL WEATHER SERVICE HUNTSVILLE AL
241 PM CST WED NOV 15 1989

THE NATIONAL WEATHER SERVICE IN HUNTSVILLE HAS ISSUED A SEVERE THUNDERSTORM WARNING EFFECTIVE UNTIL 345 PM CST FOR PEOPLE IN THE FOLLOWING COUNTIES...

IN NORTH ALABAMA
...COLBERT...FRANKLIN...LAUDERDALE

AT 236 THIS AFTERNOON HUNTSVILLE RADAR INDICATED A LINE OF SEVERE THUNDERSTORMS MOVING INTO THE WESTERN SECTIONS OF LAUDERDALE...COLBERT...AND FRANKLIN COUNTIES.

THE THUNDERSTORMS WERE MOVING EAST AT AROUND 30 MPH AND WILL APPROACH THE QUAD-CITIES AREA AND RUSSELVILLE DURING THE NEXT HOUR.

A SEVERE THUNDERSTORM MOVING THROUGH MARION COUNTY MAY MOVE INTO SOUTHERN LAWRENCE COUNTY AND A WARNING MAY BE REQUIRED.

A TORNADO WATCH IS ALSO IN EFFECT FOR THE WARNED AREA. REMEMBER SEVERE THUNDERSTORMS CAN AND OCCASIONALLY DO PRODUCE TORNADOES WITH LITTLE OR NO ADVANCE WARNING. REMAIN CALM BUT BE ALERT TO RAPIDLY CHANGING WEATHER CONDITIONS.

NNNN

ZCZC BHMSVRHSV AL TN MS GA
TTAA00 KHSV 152102
ALC079-152200-

BULLETIN - IMMEDIATE BROADCAST REQUESTED
SEVERE THUNDERSTORM WARNING
NATIONAL WEATHER SERVICE HUNTSVILLE AL
301 PM CST WED NOV 15 1989

THE NATIONAL WEATHER SERVICE IN HUNTSVILLE HAS ISSUED A SEVERE THUNDERSTORM WARNING EFFECTIVE UNTIL 400 PM CST FOR PEOPLE IN THE FOLLOWING COUNTY...

IN NORTH ALABAMA
...LAWRENCE

AT 255 THIS AFTERNOON RADAR INDICATED A POSSIBLE SEVERE THUNDERSTORM MOVING INTO THE SOUTHWEST PART OF LAWRENCE COUNTY AND SHOULD PASS NEAR OR JUST SOUTH OF MOULTON DURING THE NEXT HOUR,

A SEVERE THUNDERSTORM WARNING REMAINS IN EFFECT UNTIL 345 THIS AFTERNOON FOR LAUDERDALE...COLBERT...AND FRANKLIN COUNTIES OF NORTHWEST ALABAMA.

A TORNADO WATCH IS ALSO IN EFFECT FOR THE WARNED AREA. REMEMBER SEVERE THUNDERSTORMS CAN AND OCCASIONALLY DO PRODUCE TORNADOES WITH LITTLE OR NO ADVANCE WARNING. REMAIN CALM BUT BE ALERT TO RAPIDLY CHANGING WEATHER CONDITIONS.

NNNN

ZCZC BHMSFDBHM
TTAA00 KBHM 152110 AMD
STATE FORECAST DISCUSSION UPDATED
NATIONAL WEATHER SERVICE BIRMINGHAM, AL
310 PM CST WED NOV 15 1989

REFERENCE SWODY1 AND STATUS MESSAGES.

THERE IS GOING TO BE VERY LITTLE TIME FOR AN SFD, SO WSOS ARE ADVISED THAT A PRELIMINARY EVENING FORECAST PACKAGE IS NOW UNDER WRKZFP AND WRKFLZ. UNLESS YOU HAVE STRONG REASONS LET'S NOT QUIBBLE TOO MUCH ABT THE FCST WORDING.

MY BASIC THOUGHT IS THAT THE LOW TONIGHT WILL BE THE HIGH FOR THURSDAY. THINK THE FPC GUIDANCE IS A LITTLE TOO LOW - WENT CLOSER TO FWC GUIDANCE.

MAY BE MORE CLOUDS TOMORROW THAN INDICATED BUT MOST EFFORT GOING IN TO THE FIRST PERIOD.

*** ADDED CCF TYPE INFORMATION IN THIS UPDATE ***

- HSV 40/40/22/40 100/0/0/0
- BHM 42/42/25/44 100/0/0/0
- MGM 46/50/26/52 100/0/0/0
- MOB 48/53/29/53 100/0/0/0
- AUO 48/51/25/50 100/0/0/0
- DHN 48/54/28/51 100/0/0/0
- PNS 51/59/30/52 100/0/0/0

AAQ 57/60/31/52 100/0/0/0

.AL...LWA ZONES 1 THROUGH 15 AND 17 AND 18
.NWFL...LWA ZONE 3

NNNN

ZCZC BHMSVSHSV
TTAA00 KHSV 152118

SEVERE WEATHER STATEMENT
NATIONAL WEATHER SERVICE HUNTSVILLE AL
315 PM CST WED NOV 15 1989

A SEVERE THUNDERSTORM WARNING REMAINS IN EFFECT UNTIL 345 PM FOR LAUDERDALE...COLBERT AND FRANKLIN COUNTIES...AND UNTIL 4 PM FOR LAWRENCE COUNTY. A TORNADO WATCH IS ALSO IN EFFECT FOR MUCH OF NORTH ALABAMA UNTIL 8 PM CST AND FOR MARSHALL...JACKSON AND DEKALB COUNTIES UNTIL 10 PM CST.

AT 315 PM CST THE SEVERE THUNDERSTORMS WERE MOVING ACROSS THE QUAD CITIES AREA...AND APPROACHING MOULTON FROM SOUTHWEST LAWRENCE COUNTY. HAIL UP TO THREE-QUARTERS OF AN INCH HAVE FALLEN OVER PARTS OF COLVERT COUNTY. PEA TO MARBLE SIZE HAIL HAS BEEN REPORTED AT PHIL CAMPBELL IN FRANKLIN COUNTY. THE STORMS WERE MOVING EAST AT 30 MPH.

THESE STORMS ARE DANGEROUS AND ARE NOT TO BE TAKEN LIGHTLY. IF YOU ARE IN THE PATH OF THESE STORMS...TAKE SHELTER IMMEDIATELY. THE STORMS SHOULD REACH THE HUNTSVILLE VICINITY BETWEEN 4 AND 5 PM CST.

NNNN

ZCZC BHMTORHSV
TTAA00 KHSV 152140
ALC079-103-152245-

BULLETIN - EBS ACTIVATION REQUESTED
TORNADO WARNING
NATIONAL WEATHER SERVICE HUNTSVILLE AL
340 PM CST WED NOV 15 1989

THE NATIONAL WEATHER SERVICE IN HUNTSVILLE HAS ISSUED A TORNADO WARNING EFFECTIVE UNTIL 445 PM CST FOR PEOPLE IN THE FOLLOWING COUNTIES...

IN NORTH ALABAMA
...LAWRENCE...MORGAN

AT 336 THIS AFTERNOON RADAR INDICATED A POSSIBLE TORNADO NEAR THE CITY OF MOULTON. THIS TORNADO WAS MOVING EAST NORTHEAST AT AROUND 30 MPH AND MAY

PASS NEAR THE CITY OF DECATUR DURING THE NEXT HOUR.

A SEVERE THUNDERSTORM WARNING REMAINS IN EFFECT UNTIL 345 PM FOR LAUDERDALE...COLBERT...AND FRANKLIN COUNTIES.

IF YOU ARE IN THE PATH OF A TORNADO...THE SAFEST PLACE IS A BASEMENT. GET UNDER A WORKBENCH OR PIECE OF STURDY FURNITURE. IF NO BASEMENT IS AVAILABLE...SEEK SHELTER IN AN INTERIOR ROOM SUCH AS A CLOSET ON THE LOWEST FLOOR. USE BLANKETS...PILLOWS... OR CUSHIONS TO COVER YOUR BODY. AVOID WINDOWS.

NNNN

ZCZC BHMSVRHSV AL TN MS GA
TTAA00 KHSV 152155
ALC079-083-103-152300-

BULLETIN - IMMEDIATE BROADCAST REQUESTED
SEVERE THUNDERSTORM WARNING
NATIONAL WEATHER SERVICE HUNTSVILLE AL
354 PM CST WED NOV 15 1989

THE NATIONAL WEATHER SERVICE IN HUNTSVILLE HAS ISSUED A SEVERE THUNDERSTORM WARNING EFFECTIVE UNTIL 500 PM CST FOR PEOPLE IN THE FOLLOWING COUNTIES...

IN NORTH ALABAMA
...LAWRENCE...LIMESTONE...MORGAN

AT 350 PM RADAR INDICATED POSSIBLE SEVERE THUNDERSTORMS MOVING THROUGH LAWRENCE AND NORTHERN MORGAN COUNTIES AND INTO LIMESTON COUNTIES. THESE THUNDERSTORMS HAVE PRODUCE LARGE HAIL...DAMGAING WINDS..AND INJURIES IN NORTHWEST ALABAMA.

A TORNADO WATCH IS ALSO IN EFFECT FOR THE WARNED AREA. REMEMBER SEVERE THUNDERSTORMS CAN AND OCCASIONALLY DO PRODUCE TORNADOES WITH LITTLE OR NO ADVANCE WARNING. REMAIN CALM BUT BE ALERT TO RAPIDLY CHANGING WEATHER CONDITIONS.

NNNN

ZCZC BHMZFPAL
TTAA00 KBHM 152152

ALABAMA ZONE FORECASTS
NATIONAL WEATHER SERVICE BIRMINGHAM AL
405 PM CST WED NOV 15 1989

ALZ001-002-004-160500-
AL01-AL02-AL04-

ALABAMA ZONES 1 2 4
405 PM CST WED NOV 15 1989

...TORNADO WATCH UNTIL 8 PM CST...
.REMAINDER OF THIS AFTERNOON AND TONIGHT...THUNDERSTORMS...SOME WILL BE SEVERE... ENDING EARLY. TURNING SHARPLY COLDER WITH A LOW AROUND 40. WINDY WITH WIND BECOMING NORTHWESTERLY 15 TO 25 MPH AND GUSTY. A LAKE WIND ADVISORY IS IN EFFECT FOR AREA LAKES. CHANCE OF RAIN IS 100 PERCENT EARLY.
.THURSDAY...WINDY AND COLD WITH STEADY OR FALLING TEMPERATURES. HIGH AROUND 40. NORTHWEST WIND 15 TO 25 MPH.
.THURSDAY NIGHT...FAIR AND QUITE COLD WITH A LOW IN THE LOWER20S.
.FRIDAY...SUNNY BUT COLD WITH A HIGH NEAR 40.

\$\$

...Text included remainder of Alabama Zones 3, and 5 through 18...

NNNN

ZCZC BHMSVSHSV
TTAA00 KHSV 152210

SEVERE WEATHER STATEMENT
NATIONAL WEATHER SERVICE HUNTSVILLE AL
409 PM CST WED NOV 15 1989

A SEVERE THUNDERSTORM WARNING IS IN EFFECT UNTIL 5 PM CST FOR LAWRENCE...MORGAN AND LIMESTONE COUNTIES.

THESE STORMS HAVE A HISTORY OF PRODUCING DAMAGING WINDS AND LARGE HAIL. HAIL THE SIZE OF GOLF BALLS HAVE BEEN REPORTED OVER PARTS OF MORGAN COUNTY INCLUDING THE DECATUR AREA. THESE STORMS HAVE PRODUCED DAMAGING WINDS...CAUSING A FEW BUILDINGS TO COLLAPSE AT LEIGHTON IN COLBERT COUNTY. TREES WERE ALOS DOWN IN COLBERT HEIGHTS.

THESE ESTORMS ARE DANGEROUS. IF YOU ARE IN THE PATH OF THESE STORMS... PARTICULARLY IN THE HUNTSVILLE VICINITY... YOU NEED TO BE THINKING ABOUT TKAING COVER. A WARNING WILL LIKELY BE ISSUED.

NNNN

ZCZC BHMSVRHSV
TTAA00 KHSV 152214
ALC083-089-103-152315-

BULLETIN - IMMEDIATE BROADCAST REQUESTED

SEVERE THUNDERSTORM WARNING
NATIONAL WEATHER SERVICE HUNTSVILLE AL
413 PM CST WED NOV 15 1989

THE NATIONAL WEATHER SERVICE IN HUNTSVILLE HAS
ISSUED A SEVERE THUNDERSTORM WARNING EFFECTIVE
UNTIL 515 PM CST FOR PEOPLE IN THE FOLLOWING COUNTIES...

IN NORTH ALABAMA
...LIMESTONE...MADISON...MORGAN

AT 410 THIS AFTERNOON RADAR INDICATED SEVERE
THUNDERSTORMS MOVING THROUGH LIMESTONE AND
NORTHERN MORGAN COUNTIES AND INTO MADISON COUNTY.
THESE THUNDERSTORMS HAVE BEEN PRODUCING VERY
LARGE HAIL AND DAMAGING WINDS.

A TORNADO WATCH IS ALSO IN EFFECT FOR THE WARNED
AREA. REMEMBER SEVERE THUNDERSTORMS CAN AND
OCCASIONALLY DO PRODUCE TORNADOES WITH LITTLE OR
NO ADVANCE WARNING. REMAIN CALM BUT BE ALERT TO
RAPIDLY CHANGING WEATHER CONDITIONS.

NNNN

ZCZC BHMSVSHSV
TTAA00 KHSV 152225

SEVERE WEATHER STATEMENT
NATIONAL WEATHER SERVICE HUNTSVILLE AL
424 PM CST WED NOV 15 1989

A SEVERE THUNDERSTORM WARNING IS IN EFFECT UNTIL 515
PM CST FOR MORGAN...LIMESTONE AND MADISON COUNTIES.

THESE STORMS HAVE A HISTORY OF PRODUCING DAMAGING
WINDS AND LARGE HAIL. HAIL THE SIZE OF GOLF BALLS
HAVE BEEN REPORTED OVER PARTS OF MORGAN COUNTY
INCLUDING THE DECATUR AREA. THESE STORMS HAVE
PRODUCED DAMAGING WINDS...CAUSING A FEW BUILDINGS
TO COLLAPSE AT LEIGHTON IN COLBERT COUNTY. TREES
WERE ALSO DOWN IN COLBERT HEIGHTS.

THE STORMS WERE CURRENTLY APPROACHING THE
HUNTSVILLE AREA. PERSONS IN THE PATH OF THESE STORMS
NEED TO TAKE SHELTER IMMEDIATELY. PERSONS LIVING TO
THE EAST AND SOUTHEAST OF HUNTSVILLE...INCLUDING
SUCH CITIES AS SCOTTSBORO AND GUNTERSVILLE NEED TO
BE READY TO TAKE QUICK ACTION.

A TORNADO WATCH IS IN EFFECT FOR MUCH OF NORTH
ALABAMA UNTIL 8 PM CST AND FOR MARSHALL...JACKSON
AND DEKALB COUNTIES UNTIL 10 PM CST.

NNNN

ZCZC BHMSVSHSV
TTAA00 KHSV 152236

SEVERE WEATHER STATEMENT
NATIONAL WEATHER SERVICE HUNTSVILLE AL
435 PM CST WED NOV 15 1989

SEVERE THUNDERSTORMS CONTINUED TO MOVE THROUGH
THE HUNTSVILLE AREA.

AT 435 PM CST...LARGE HAIL AND DAMAGING WINDS HAVE
OCCURRED IN PARTS OF NORTHWEST ALABAMA. STRONG
THUNDERSTORMS HAVE DESTROYED A HOUSE AND A HOUSE
TRAILER AT KILLEN IN EASTERN LAUDERDALE COUNTIES.
TREES ARE DOWN ALL OVER DECATUR. LARGE HAIL HAS
ALSO BEEN REPORTED OVER MOST OF MORGAN COUNTY.

NNNN

ZCZC BHMTORHSV
TTAA00 KHSV 152240
ALC089-152345-

BULLETIN - EBS ACTIVATION REQUESTED
TORNADO WARNING
NATIONAL WEATHER SERVICE HUNTSVILLE AL
439 PM CST WED NOV 15 1989

THE NATIONAL WEATHER SERVICE IN HUNTSVILLE HAS
ISSUED A TORNADO WARNING EFFECTIVE UNTIL 545 PM CST
FOR PEOPLE IN THE FOLLOWING COUNTY...

IN NORTH ALABAMA
...MADISON

AT 4:30 PM A TORNADO WAS REPORT IN SOUTH HUNTSVILLE
NEAR THE OLD AIRPORT AREA.

THE TORNADO HAS BEEN MOVING NORTHEAST 30 MPH.

IF YOU ARE IN THE PATH OF A TORNADO...THE SAFEST PLACE
IS A BASEMENT. GET UNDER A WORKBENCH OR PIECE OF
STURDY FURNITURE. IF NO BASEMENT IS AVAILABLE...SEEK
SHELTER IN AN INTERIOR ROOM SUCH AS A CLOSET ON THE
LOWEST FLOOR. USE BLANKETS...PILLOWS... OR CUSHIONS TO
COVER YOUR BODY. AVOID WINDOWS.

NNNN

ZCZC MKCWWAMKC
WWUS8 KMKC 152254
MKC WW-A 152254

STATUS REPORT ON WW NR 750

WW NR 750 IS NO LONGER IN EFFECT W OF A LN FM 35 NNW BNA TO 30 NNE CBM TO 50 ESE GWO. OTRW CONT WW.

SQLN IS MOVG E NR 30KT. TOPS ARE TO 480. A TORNADO IS REPORTED IN S HUNTSVILLE AL. LARGE SFC PRESSURE RISE/FALL COUPLET CONTINUES ACRS THE SQLN...ENHNCG THE LOW LVL
CNVGN AS THE LN MOVES THRU THE UNSTBL AIRMASS. WITH SUPPORTING DYNAMICS CONTG TO STRENGTHEN WDSPRD SVR ACTVTY WILL CONT WITH THE SQLN. CONT VALID PTN OF WW.

..ARNS.. 11/15/89

NNNN

ZCZC BHMTORHSV AL TN GA
TTAA00 KHSV 152303
ALC071-089-095-160000-

BULLETIN - EBS ACTIVATION REQUESTED
TORNADO WARNING
NATIONAL WEATHER SERVICE HUNTSVILLE AL
502 PM CST WED NOV 15 1989

THE NATIONAL WEATHER SERVICE IN HUNTSVILLE HAS ISSUED A TORNADO WARNING EFFECTIVE UNTIL 600 PM CST FOR PEOPLE IN THE FOLLOWING COUNTIES...

IN NORTH ALABAMA
...JACKSON...MADISON...MARSHALL

AT 500 PM CST RADAR INDICATED THUNDERSTORMS WITH POSSIBLE TORNADOES MOVING THROUGH SOUTHEAST MADISON COUNTY. THESE THUNDERSTORMS AND POSSIBLE TORNADOES WILL BE MOVING INTO JACKSON AND MARSHALL COUNTIES DURING THE NEXT HOUR.

THE TORNADOES HAVE HAD A HISTORY OF PRODUCING CONSIDERABLE DAMGAGE.

IF YOU ARE IN THE PATH OF A TORNADO...THE SAFEST PLACE IS A BASEMENT. GET UNDER A WORKBENCH OR PIECE OF STURDY FURNITURE. IF NO BASEMENT IS AVAILABLE...SEEK SHELTER IN AN INTERIOR ROOM SUCH AS A CLOSET ON THE LOWEST FLOOR. USE BLANKETS...PILLOWS... OR CUSHIONS TO COVER YOUR BODY. AVOID WINDOWS.

NNNN

ZCZC MKCSELO 363,0875 363,0850 330,0871 330,0900
WWUS9 KMKC 160017
MKC WW 160017
TNZ000-MSZ000-ALZ000-160017-

BULLETIN
TORNADO WATCH CANCELLATION
NATIONAL WEATHER SERVICE KANSAS CITY MO
0617 PM CST WED NOV 15 1989

THE NATIONAL SEVERE STORMS FORECAST CENTER HAS CANCELLED TORNADO WATCH NUMBER 750 ISSUED AT 1201 PM CST FOR
MUCH OF MIDDLE TENNESSEE
PARTS OF NORTHEAST MISSISSIPPI
AND PARTS OF NORTHWEST ALABAMA

..JOHNS..

NNNN

Radar Observations from WSMO Centreville, AL (CKL), taken Nov. 15, 1989

|CKL 2325 AREA 2TRWX5R/NC 17/190 71/160 184/165 263/140 C2438 MT 370 AT 57/34
^HK114321 IK243332 JJ224452453 KJ223142 LI1224551 MI122432 NI222442
OI2212421 PI1112321 QK12321 RK12221 =

|CKL 2225 LN 10TRWX/NEW 305/90 15/115 20W C2438 MT 400 342/86
AREA 1TRWX6R/NC 22/220 85/130 217/180 292/130 C2438 MT 370 AT 80/91
^HK1341 IJ1341 OO2 JI135215225 KI352222225 LH2242322332 MH224321102
NH12432 OH1233221 PI123211 QJ23211 RJ132 =

|CKL 2125 COR AREA 1TRWX2R-/NC 30/160 240/165 190W C2438 MT 400 AT 259/95
^HJ2 IJ45 IQ1 JH245 JO2 KH43 KO404 LG24 LO23 MH311 MO55 NH421 NO42
OH350054 PI220205 QI222 RJ11 =

|CKL 2125 AREA 1TRWX2R-/NC 30/160 240/165 190W C2438 MT 400 AT 259/95
^HJ2 IJ45 IQ1 JH245 JO2 KH43 KO404 LG24 LO23 MH311 MO55 NH421 NO42
OH350054 PI220205 QI222 RJ11

|CKL 2025 AREA 1TRWX3R-/NC 2/165 260/170 80W C2542 MT 370 AT 329/84
AREA 1TRWX1R-/NC 55/135 215/140 110W C2333 MT 310 AT 155/64
^GL4 HJ2 IH441 KH43 KO342 LG105 LO4 NJ22104 OOS2 PK32 QK305 RK32 =

|CKL 1925 AREA 4TRWX/NC 360/125 285/135 40W C2644 MT 320 AT 324/94

AREA 1TRWX1R-/NC 50/125 205/135 120W C2232 MT 350 AT 75/43
 ^HJ330021 IJ32001002 JI520042003 KI5000210222 LN54 MN2 NN32
 OJ32004
 PM25 QL24 =

|CKL 1835 COR AREA 1TRWX1R-/ + 25/125 225/120 210W C2530 MT
 350 AT 310/103
 ^II24300201 JH3002302211 KH5 KM10012 LH4 LM53412 MG2 MN5221
 NN11 QN2
 RK102 =

|CKL 1725 AREA 1RW +/+ 313/150 138/65 150W C2530 MT 200 AT
 325/48 TRWU NW PTN
 ^GH9 HH9 IK22 JG9 KG90023 KP2 LG20003 ML202 NG9 NL2 OL2
 PL202 QL302 =

|CKL 1625 AREA 1RW/NC 359/90 270/65 25W C2530 MT 190 AT 338/68
 ^IL2 JK2 KK2 LK2 NJ2 =

|CKL 1525 AREA 1RW/NEW 354/95 274/95 25W MT 170 AT 278/83
 ^IK1 MI2 NI2 =

|CKL 1425 PPINE =

**Chronology of Actions/Reports at WSO
 Huntsville**

12:00 pm Dave Jacobs arrived to help work the severe weather. Normal shift time would have been 4 pm.

12:01 pm SELS issued Tornado watch number 750, effective to 8pm. All available EMA offices were notified, and Bulletin was sent with tone alert on NWR.

12:05 pm Scott Sharp, WSFO Intern, arrived at this time and immediately started to help out.
 Continuous radar coverage began at this time and a radar observation was sent at 1235 pm.

12:45 pm Special weather statement was issued detailing radar indications and reiterating the tornado watch and the need to review safety rules.
 At about this time, the Madison County

EMA office established the spotter network interface in WSO Radar room.

12:45 pm Colbert County EMA reported 1/4 to 1/2 inch hail near Cherokee, Al.

1:11 pm WSFO BHM issued a Severe Thunderstorm Warning for Marion County (adjacent to Huntsville's counties) the warning was broadcast on NWR with tone alert.

1:35 pm Radar observation was transmitted.

1:40 pm Special Weather Statement was issued. Statement advised a warning may soon be issued for Franklin or Lawrence Counties.

1:48 pm WSFO BHM issued Severe Thunderstorm Warning for Marion County which was broadcast with tone alert on NWR.

2:09 pm WSFO BHM issued a Tornado Warning for Lamar and Marion Counties which was broadcast with tone alert on NWR.

2:33 pm Special Weather Statement was issued. Again, residents of Franklin and Lawrence Counties were advised that a warning may be forthcoming.

2:41 pm Severe Thunderstorm Warning was issued for Lauderdale, Colbert and Franklin counties.

2:50 pm 1/4 inch hail reported in Colbert County near Cherokee.

2:55 pm WSFO BHM issued Severe Thunderstorm Warning for Marion and Winston Counties which was put on NWR with tone alert.

2:59 pm 1/2 inch hail in Colbert County near Cherokee.

3:00 pm "Pea-sized" hail reported west Lauder-

dale County.

- 3:01 pm Severe Thunderstorm Warning issued for Lawrence County as severe storms move from BHM warned counties into our warning area.
- 3:05 pm 3/4 inch hail north of Cherokee in Colbert County.
- 3:06 pm "Pea to marble sized" hail near Phil Campbell in Franklin County.
- 3:15 pm Severe Weather Statement issued for warning area. Statement also said "These storms are dangerous and not to be taken lightly...the storms should reach the Huntsville area between 4 and 5 pm CST".
- 3:20 pm "Pea-size" hail and wind damage in Colbert County near Barton.
- 3:22 pm Trees reported blown down north of Florence in Lauderdale County.
- 3:30 pm Homes and vehicles severely damaged by straight-line winds (from EMA director report) in east Lauderdale County near Killen.
- 3:40 pm Tornado Warning issued for Lawrence and Morgan Counties. A possible hook was detected on radar.
- 3:42 pm "Golfball-size" hail in Colbert County between Oakville and Caddo.
- 3:48 pm 3/4 inch hail reported in Decatur area of Morgan County.
- 3:54 pm Severe Thunderstorm Warning issued for Limestone, Morgan and Lawrence Counties. Warning changed from Tornado Warning to Severe Thunderstorm Warning because of the nature of damage reports received. Radar did not show tornado indications, but cell top had reached 55,000 feet and exhibited a bow shape. At about this time Brenda Page (AOIC) called to check on weather and was asked to report in as soon as possible.
- 4:05 pm Wind damage and injuries reported northern Florence in Lauderdale County. Damage had occurred earlier.
- 4:09 pm Large hail again reported in Decatur, Morgan County.
- 4:10 pm "Pea-size" hail County Line Road (between Madison/Limestone Counties near WSO).
- 4:13 pm Severe Thunderstorm Warning issued for Morgan, Madison and Limestone Counties. Warning based on radar and numerous hail reports.
- 4:15 pm Wall cloud observed by WSO personnel. Cloud was not rotating and dissipated rapidly.
- 4:24 pm Severe Weather Statement issued. Hail and damaging winds highlighted for warned areas.
- 4:27 pm Heavy rain and hail at WSO. Radar severely attenuated. At about this time Brenda Page arrived at the WSO.
- 4:30 pm Spotters reported tornado at old airport area in Huntsville.
- 4:32 pm Another spotter said there was no tornado.
- 4:33 pm More tornado reports were received.
- 4:35 pm Tornado Warning issued for Madison County. The warning was sent out "live" on NWR with tone alert due to momentary outage on line between SRWarn computer and AFOS. Warning was sent on AFOS from SRWARN at 4:39 pm.
- 5:02 pm Tornado Warning issued for Jackson,

Madison and Marshall Counties as tornado producing cell continues past Huntsville.

5:18 pm Severe Weather Statement issued canceling Tornado Warning for Madison County... continuing warning for Jackson and Marshall Counties.

5:34 pm "Golf-ball" sized hail near Paint Rock in Jackson County.

5:40 pm Severe Weather Statement issued.

5:45 pm High winds and "golf-ball" sized hail at Rosalie in Jackson County.

5:55 pm Local storm report issued.

5:59 pm Tornado Warning issued for Marshall and DeKalb Counties.

6:00 pm "Pea-sized" hail and heavy rain at Grant in Marshall County.

6:20 pm Funnel cloud reported at Collinsville in DeKalb County.

6:30 pm Severe Weather Statement issued. Watch canceled for much of area (except Northeast corner).

Appendix C

Television and Radio Station Dissemination Activities

Television Stations

WHNT TV - 19, the Huntsville CBS station, felt advance warnings on the severe weather situation were excellent. First indications of upcoming inclement weather were available Tuesday night. TV-19 is the only major network station with a noon news program. Tornado Watch Number 750 was included in the noon weather show. Weather "crawls" and/or "cut-ins" were done every 15 to 30 minutes beginning at 12:30 pm. The crawls were composed and sent across the screen 2 to 3 times in a row every 5 to 10 minutes. The 4:13 pm Severe Thunderstorm Warning for Madison County was aired before the station lost power at 4:35 pm.

WAAY-TV, Channel 31, the ABC affiliate, was the only major network station to stay on the air after the tornado because emergency power was available. Many listeners called stating TV-31 was their source for storm information during the disaster. WAAY simulcasted with WAAJ-AM 1550 and WKQD-FM 93.3 until midnight. A chronology of the station's activities is shown below:

12:30 pm TOR WW # 750 put on the screen with a crawl.

1:30 pm Gary Dobs, weekday weathercaster, on the air for the first time with watch information and weather conditions in northeast MS.

after Cut-ins every 30 minutes at the request of General Manager, Mr. Smith; Mark Fox, weekend meteorologist, was plotting "watch boxes" and doing surface analyses.

2-300 pm Gary went on the air 3 times to further inform viewers about warnings in the east MS and west AL area (their viewing area included Franklin, Colbert, and Lauderdale Counties which were in a warning).

3-4:00 pm Gary went on the air 3 times (2 of which were fairly lengthy) to talk about warnings for Lawrence, Morgan, and Limestone Counties, and to inform of some damage reports in Lauderdale County.

4:13 pm Disseminated 4:13 pm Severe Thunderstorm Warning for Madison County.

4:15 pm On the air for an update with video of golfball hail in Morgan County and storm video from downtown Huntsville with a live report from auto/traffic reporter in the area.

4:20 pm Regular programming was stopped.

4:30- Received word of the tornado by police radio, broadcast that a tornado was on the ground at the city golf course. It was 4 minutes later before the warning for Madison County was received on NWWS. Weekday weathercaster remembers saying that the EMA was reporting a tornado. Then, TV-31's coverage switched to the news department and focused on the storm's affects.

after Several times the Mayor of Huntsville

4:35 pm went on local EBS (message monitored and became TV-31's audio, this had never been done before).

WAFF-TV, Channel 48, is the NBC affiliate in Huntsville. The chief weathercaster is Bob Baron who holds the AMS Seal of Approval. The station utilizes data from Kavorus and Family of Services. A lightning detection system, operational since May, 1989, is also available. Bob has the authority to interrupt programming at any time for weather emergencies with a station philosophy that people are more important than programs.

As a general policy, severe weather watches are "crawled" on the screen at least once every half-hour. All warnings for the entire TV-48 viewing area are broadcast live and then crawled followed by a watch or warning emblem in a lower screen corner.

WAFF viewers were advised as early as Monday of the possibility of bad weather by mid-week.

The day of the storm, TV-48 was broadcasting on Comcast, the CATV system for Huntsville.

There was some confusion in regard to the 3:40 pm and 3:54 pm warnings. A Tornado Warning was issued for Morgan County (adjacent county west of Huntsville in Madison County) at 3:40 pm. At 3:54 pm a Severe Thunderstorm Warning was issued for Morgan County. This seemed to indicate to TV-48 that the warning was downgraded and the storm appeared to be weakening. The 3:40 pm Severe Thunderstorm Warning for Morgan and Lawrence Counties aired at 3:44 pm. It is not known when the 4:13 pm Severe Thunderstorm Warning for Madison County was broadcast. At 4:37 pm the station received the report of the storm at the golf course on the east side of Redstone Arsenal. The 4:39 pm Tornado Warning over NWR was carried live on TV-48.

Radio Stations

WDRM - FM, Decatur, AL

WDRM does not subscribe to Weather Wire. Weather data is obtained from ACCU-Weather, Alan Archer out of Tampa, FL, Alden radar, NWR, The Weather Channel, and the AP wire.

The radio audience was informed Tuesday night that Wednesday would likely be a bad weather day. The more the NWS emphasizes the weather, the more WDRM does. The Public Weather Outlook issued by the NSSFC, and the Special Weather Statements out of WSFO Birmingham, added additional credence to the possibility of severe weather and were taken seriously.

WDRM prepared differently for the Wednesday storms. Based on NWS information, the entire staff was alerted to stay on station as of 8:30 am because the big news event and story of the day would likely be weather related.

By noon the weather was balmy, there was a thunderstorm line in western Tennessee. At 2:30 pm the station broke format to go to weather information every 4 to 5 minutes, or every two songs. Then it became weather after every song. Commercials were deleted.

General Manager & Co-Owner Mack Bramlett stated the station was aware of the 3:40 pm Tornado Warning for Lawrence and Morgan Counties (Decatur) based on the report of a tornado near Moulton, AL. At 3:55 pm, large hail was falling in Decatur and it sounded like a tornado was passing overhead. Mr. Bramlett notified the Decatur EMA. City sirens were sounded.

As mentioned earlier by TV-48, the sequence and type of warnings issued between 3:40 pm and 4:13 pm caused some confusion, but overall had no detrimental effect.

A tornado struck south Huntsville around 4:30 pm. WDRM returned to normal programming at 7:15 pm.

Mr. Bramlett stated, "The NWS outdid themselves for this storm, yet got the worst press. Yet, local people commented about how some people said they were not warned." WDRM received many calls congratulating them on their weather coverage with promises to listen to the station in the future during threatening weather.

WEUP - AM, Huntsville, AL

WEUP, a black-owned station, is associated with the Shearton Broadcast Network (SBN). The station has NWR with alarm, AP, and is on the Madison County EMA ring-down system. However, this system didn't ring the day of the tornado, but the problem will be investigated and fixed. Because of a limited budget, NWWS is unavailable. WEUP monitors WBHM and TV-31 (ABC WAAY). Information over monitored scanner channels gave first-hand, on-scene reports.

Based on the report of inclement weather in the Decatur area, more emphasis was given to weather. At the end of every song, or every other song, weather updates were given. All commercials and music were suspended from 4:30 to 8:30 pm. Some live reports from the tornado scene were done between 4:30 pm and midnight. The station usually reduces power at sundown, but stayed on full-power until midnight. Prerecorded severe weather safety rules, received from WSO Huntsville in the Spring and Fall, were aired Wednesday afternoon.

Station personnel knew of the Tornado Watch at least 2 hours before the storm struck. Specifics were not available, but Team members were told that the 4:13 pm Severe Thunderstorm Warning was broadcast.

Mr. Brewer, Assistant Manager, commented that severe weather was rather routine in the Huntsville area and people adjust to it. A lot of people were at work when the storm struck, but felt most were aware of storms in the area. In his view,

everything was handled as well as could be done considering how quickly the tornado formed.

WTAK - AM Radio, Huntsville, AL

The station monitors NWR, other media, and is on the Madison County EMA hot-line. It does not have AP, UPI, or NWWS. Mr. Buxton, Station Manager, felt that people sensed it would be a rough day weatherwise. Huntsville lies in "Tornado Alley" geographically according to Mr. Buxton.

WTAK aired the Tornado Watch and Warnings, but specific broadcast times were unavailable. Mr. Buxton stated that, "The best information possible was available in a terrible situation." He expressed no criticism of the warning system.

WBHP - AM Radio, Huntsville, AL

Reports on a monitored scanner increased staff awareness about the approaching severe weather. According to station personnel, the police scanner is best source of information, then spotters. A wind shear report at the airport caused WBHP to switch to emergency power. NWWS was pouring out information; NWWS is wired to the newsroom and must be reset after each warning alarm. Staff members stated the upgraded NWWS was like birthing a baby, painful and frustrating to get the installation, but once it was installed and operating, they loved it. Favorite aspects of the new NWWS are the circuit speed and ability to program desired products.

Upon hearing the report of a funnel cloud at the old airport, their chief engineer looked outdoors and saw the storm 2.5 miles to the southwest of the station. Station music was stopped and weather coverage began in earnest. WBHP was already broadcasting the Tornado Watch and the 4:13 pm Severe Thunderstorm Warning received on NWWS. NWR lags behind NWWS. NWWS was about 1

minute faster than NWR. Later the station got the 4:39 pm Tornado Warning from the NWS with the EBS request.

The first message on NWR around 4:36 pm, live broadcast, may have given the wrong shopping center as the storm location which was about 1 mile south of the actual touchdown point. This was corrected with the written 4:39 pm warning and when rebroadcast.

The Alabama State Weather Summary at 5:00 am mentioned the possibility of severe weather. The SELS Public Weather Outlook off the AP wire, not NWS, scared Mike Sweeney, News Director, and helped spur the station into a greater weather awareness posture.

From noon to 4 pm, reports of severe weather west of Huntsville seemed to be following a classic track according to the staff. Tornado Watch Number 750 became a part of the forecast which was broadcast 4 to 6 times per hour with the Watch every 2 songs or so. Safety rules received from WSFO

Birmingham were very good and useful. They paid off. The station received letters from people who got out of their cars and followed other severe weather safety precautions.

WBHP ran no commercials or music from 4:30 pm Wednesday to 1 pm Thursday. There should have been a heightened awareness of the weather and storms. The difference between a warning and watch was given to listeners.

The comment was made that more emphasis would have been given if a Tornado Warning had been in effect versus a Severe Thunderstorm Warning. People were "in their routine and still drive into storms".

Kevin Mason, News Director, was pleased on how the station, NWS, etc., handled things. The Chief Engineer said the station just needed a radar screen to monitor. WBHP monitors The Weather Channel.

Appendix D

Preparedness Activities Related to Madison County, Alabama, Conducted by WSO Huntsville

Below are summarized the documented preparedness activities in Madison County over the last three years. The National Weather Service, Southern Region, encourages documentation of preparedness related activities through the use of a Preparedness Contact Sheet, see Regional Operations Manual Letter S-11-82 filed with WSOM Chapter C-49. The Contact Sheet allows easy notation of the people, places, and actions involved in preparedness activities.

1989:

4/25/89 Spotter training session for fire department EMTs at Toney, AL, with 20 attendees.

2/20-24/88 Severe Weather Awareness Week in Alabama.

1988:

11/15/88 Spotter training session for Huntsville-Madison County EMA with 12 attendees.

4/22/88 Spotter training session for the Huntsville Amateur Radio Club in Huntsville with 90 attending.

3/3/88 Awareness/safety presentation to a meeting of the Daughters of the American Revolution in Huntsville with 36 attendees.

2/22-26/88 Severe Weather Awareness Week in Alabama.

2/18/88 Visited radio station WEUP-AM, a

predominantly Black station, and delivered severe weather awareness week public service announcements for use on the air.

2/5/88 Awareness/safety presentation and visit to the weather office by second graders from Westlawn Elementary School.

1987:

9/15/87 Spotter training session at the Huntsville Police Academy to 29 police cadets.

5/5/87 Awareness/safety presentation to the Jetplex Kiwanis Club with 21 attendees.

3/23/87 Awareness/safety presentation to the U. S. Coast Guard Auxiliary weather class at Calhoun Junior College with 16 attendees.

3/18/87 Spotter training to 22 security officers with Intergraph Corporation. Madison County EMA also participated.

3/6/87 Spotter training session for 25 people from the Madison, AL, Police Department and Madison County EMA.

2/23/87 Awareness/safety presentation to 66 people at the North Alabama Craftsmens Association in Huntsville.

2/22-28/87 Severe Weather Awareness Week in Alabama.

2/18/87 Interview with WAHR radio. Portions of interview were aired each day during Severe Weather Awareness Week.

2/12/87 Awareness/safety presentation to the Chaffee Homemakers Club with 18 attending.

2/5/87 Live interviews from NWS office by WAAY-TV including broadcast of eve-

ning weather program from the WSO.

1/16/87 Tornado safety presentation to the Huntsville High School Health Club with 200 attending.

Appendix E

Individual Accounts

Presented here are individual accounts from people in or near the path of the tornado.

Ms. Elizabeth Bath, resident near Jones Valley School

Ms. Bath lives in a Jones Valley residential subdivision across the street (east) of the Jones Valley School. Ms. Bath was at home when the tornado moved from the Jones Valley School through her subdivision. Her house was on the northern edge of the tornado path, receiving only minor damage.

She had been at home most of the day and was not aware that severe weather was expected. She had not listened to radio or television broadcasts during the day. Ms. Bath had a very keen sense of humor and was strongly religious.

Just prior to the tornado occurrence, her elderly pet poodle had been somewhat frantic and behaving in a strange fashion. Due to the age of the dog, Ms. Bath was concerned for the dog's well-being, so when it displayed unusual behavior she stopped what she was doing and sat down in the den with the dog to pray. The den was on the opposite side of the house from the tornado, but contained a large sliding glass doorway which remained intact. She noted that she took no particular notice of noise or other sounds with her attention focused on her dog.

Her house was pelted with a number of flying missiles including small pieces of pavement from the Jones Valley School. Pieces of asphalt the size of a waded-up sheet of paper were found in her yard and in the upstairs bathroom. One large piece of

marble, believed to have come from the school, went through the roof into the first floor kitchen. The piece of marble weighed easily 40 pounds. A portion of a brick from the school or another house came through the outside wall in an upstairs bedroom causing a large gash in the sheetrock to another wall as it ricocheted before landing on the floor.

Mr. & Mrs. Earl Feese, resident of Jones Valley Subdivision

Mr. and Mrs. Feese were at home when the tornado struck destroying their two story home. The first floor was left intact while the entire roof was removed from the second floor. They were both aware of the existence of bad weather and the Tornado Watch, however, they didn't expect the weather to affect them like it did.

Prior to the tornado strike, they had been watching Mr. Bob Baron on television. They were aware of the warning for the adjacent county, but they took no particular action. Mrs. Feese went upstairs shortly before the tornado struck to disconnect the power to a computer in one of the upstairs rooms. Their first notion that something was happening was the roaring sound of the wind and the sound of the house coming apart.

After disconnecting the computer upstairs, Mrs. Feese had come down stairs, and she and her husband were standing at the T-point of two downstairs hallways. As the house began to come apart, Mrs. Feese was pulled along one hallway toward the front of the house while Mr. Feese was pulled eastward toward the east end of the house.

Mr. Feese struggled against the wind and finally managed to grab hold of a door facing. The door, however, slammed shut on his hands, trapping him there. He was not able to get free until after the tornado was over and his wife came to assist him.

Outside, an 8000 pound motorhome parked on the east side of the house was flipped completely over.

As a side note, Mrs. Feese had undergone extensive heart surgery only one month before the tornado. In fact, when the Survey Team spoke with her, she had just come from a visit to the doctor's office where she had undergone a stress test. She said that if she survived the stress of going through the tornado, she could stand the stress test at the doctor's office.

Steve Goodman, Meteorologist at NASA

Mr. Goodman is a meteorologist working for NASA at a building on the Redstone Arsenal. On the afternoon of the 15th, Mr. Goodman and several co-workers observed the thunderstorm that produced the tornado. Early in the day, he and others at NASA had followed the developing weather with their lightning display and satellite imagery. As the thunderstorm approached the south side of Huntsville and the Redstone Arsenal, Mr. Goodman and several co-workers went outside to observe the weather firsthand.

Just south of his position, Mr. Goodman and the others observed a rain-free base and a wall cloud around 4:20 pm. There were indications in the clouds that the wall cloud was rotating. The sky went green and the wind went calm at their location. As the wall cloud passed south and east of them, Mr. Goodman described the wall cloud as broadening and lowering toward the ground, and the sky went pitch black. Scud clouds moved quickly, "screamed" using Mr. Goodman's words, in from the south to

north about a tenth of a mile from them and north to south just south of them, thus defining rotation estimated at one quarter mile in width.

Mrs. Marilyn Dawson, Principal of Jones Valley Elementary School

Mrs. Dawson listened to NOAA Weather Radio frequently throughout the day. The radio was in the "alert mode" when the Tornado Watch was issued, and her radio was activated. She knew it was going to be a bad day. Mrs. Dawson decided to leave the school around 4:15 pm. She told Penny Cato, Lead Teacher for the Extended Daycare Program, about the Tornado Watch and suggested Penny take the school children downstairs to ride out the bad weather. She gave Penny her NWR for weather updates.

Mrs. Dawson returned to the school within 10 minutes of the time the tornado struck and immediately helped remove the children from the rubble. She set up a command post and implemented a school disaster plan developed earlier in the year. Through her heroic efforts, all the children were accounted for.

She went into considerable detail with regard to post-disaster response. She credited an emergency management workshop she attended during the previous spring in Birmingham with providing her proper training which proved invaluable during this episode.

Penny Cato, Lead Teacher, Extended Daycare Program, Jones Valley Elementary School

Ms. Cato and five other teachers at Jones Valley Elementary School are in charge of children in the Extended Daycare Program. One of the teachers had left the school for the day but the others

led by Penny, took 37 children grades kindergarten through 5th grade, to the lowest floor of the school under a stairwell for added protection. She went outside under a walkway around 4:20 pm and observed extremely heavy rain, gusty winds, and frequent lightning. She didn't play the NWR in the presence of the children for fear of scaring them. Penny heard the Severe Thunderstorm Warning for Madison County and sought to reassure the children. Some of them were "hamming it up" with affected expressions of fear saying, "There is going to be a tornado", when the lights flickered at 4:33 pm.

At 4:36 pm glass and cement began to fly and fall around the children as the tornado struck the

school. Penny screamed for the children to "get down and cover your heads". About the same time seven painters who were in the school ran to the children and shielded them with their bodies undoubtedly protecting them from more serious and possibly fatal injury. The school alarm went off as the tornado struck and the clocks stopped at 4:38 pm.

Afterward, the wind was calm but heavy rain continued for awhile. Several children described the roar of the tornado as the sound of several freight trains.

Appendix F

Summary of Deaths in the Huntsville Tornado Including Age, Gender, and Location

Age	Sex	Location	Age	Sex	Location
86	Female	Automobile	46	Male	Automobile
68	Female	Mobile home	45	Male	Automobile
67	Female	Apartment	40	Female	Automobile
61	Female	Commercial building	36	Male	Automobile
52	Female	Apartment	33	Male	Commercial building
50	Female	Commercial building	30	Male	Automobile
49	Female	Automobile	25	Female	Apartment
48	Female	Automobile	23	Female	Automobile
47	Male	Commercial building	22	Female	Apartment
46	Male	Automobile	7	Male	Automobile
			2	Female	Automobile

Summary of Totals:

Gender: Males = 8 Females = 13

Locations: Automobiles 12
 Commercial Buildings 4
 Apartments 4
 Mobile homes 1

Total injuries included 463 people.

Appendix G

Personnel Interviewed by NWS Survey Team

- Mr. Eddie Barber, Missile Simulation Technician, U. S. Army, Huntsville, AL
- Mr. Bob Baron, Meteorologist, WAFF-TV, NBC, Channel 48, Huntsville, AL
- Ms. Elizabeth Bath, homeowner and resident, Jones Valley, Huntsville, AL
- Mr. Mack Bramlett, General Manager and co-Owner, WDRM-AM and FM, Decatur, AL
- Mr. Brewer, Assistant Manager, WEUP Radio, 1600 AM, Huntsville, AL
- Mr. Paul Buxton, WTAK Radio, 1000 AM, Huntsville, AL
- Mr. Greg Carroll, Production Manager, WAAY TV-31 (ABC), Huntsville, AL
- Ms. Penny Cato, Lead Teacher, Jones Valley Elementary School, Huntsville, AL
- Ms. Marilyn Dawson, Principal, Jones Valley Elementary School, Huntsville, AL
- Mr. & Mrs. Earl Feese, homeowners and residents, Jones Valley, Huntsville, AL
- Mr. Mark Fox, weekend meteorologist, WAAY TV-31 (ABC), Huntsville, AL
- Mr. Steve Goodman, Meteorologist with NASA, Redstone Arsenal, Huntsville, AL
- Mr. Moe Kunkle, Chief Engineer, WBHP (ABC) Radio 1230 AM, Huntsville, AL
- Mr. Kevin Mason, Program Director, WBHP (ABC) Radio 1230 AM, Huntsville, AL
- Mr. Phil Metlin, News Director, WHNT TV-19 (CBS), Huntsville, AL
- Mr. Buster Polard, Station Owner/General Manager, WBHP (ABC) Radio 1230 AM, Huntsville, AL
- Mr. Bill Soyck, Operations Manager, Huntsville-Madison County Emergency Management Agency, Huntsville, AL
- Mr. Mike Sweeney, News Director, WBHP (ABC) Radio 1230 AM, Huntsville, AL
- Mr. Cliff Windham, News Director, WAAY TV-31 (ABC), Huntsville, AL

Notes

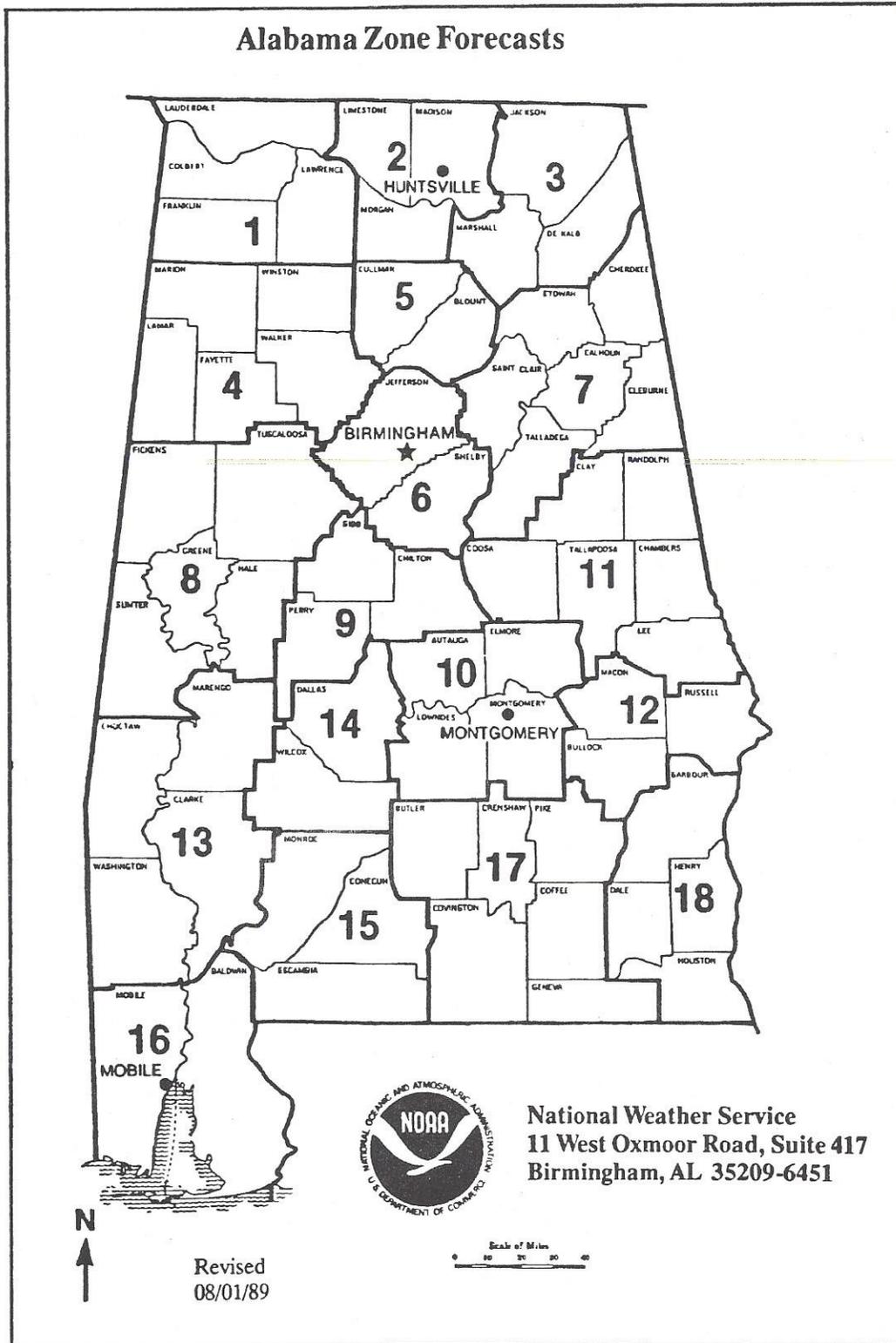


Figure 1, Alabama Zone Forecast Map

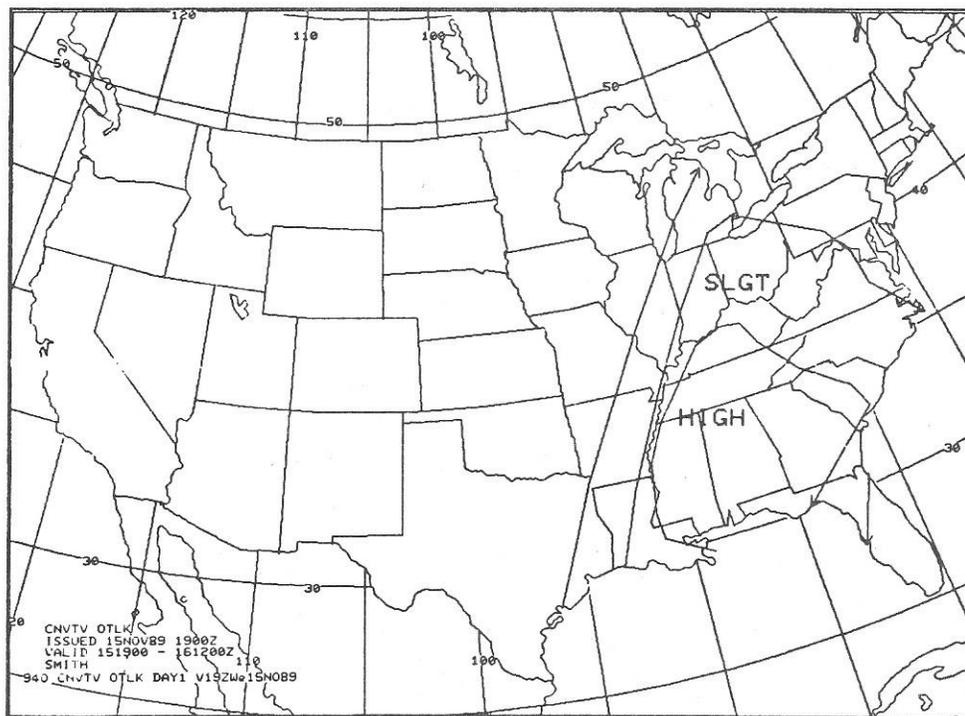


Figure 2, AFOS Convective Outlook from NSSFC

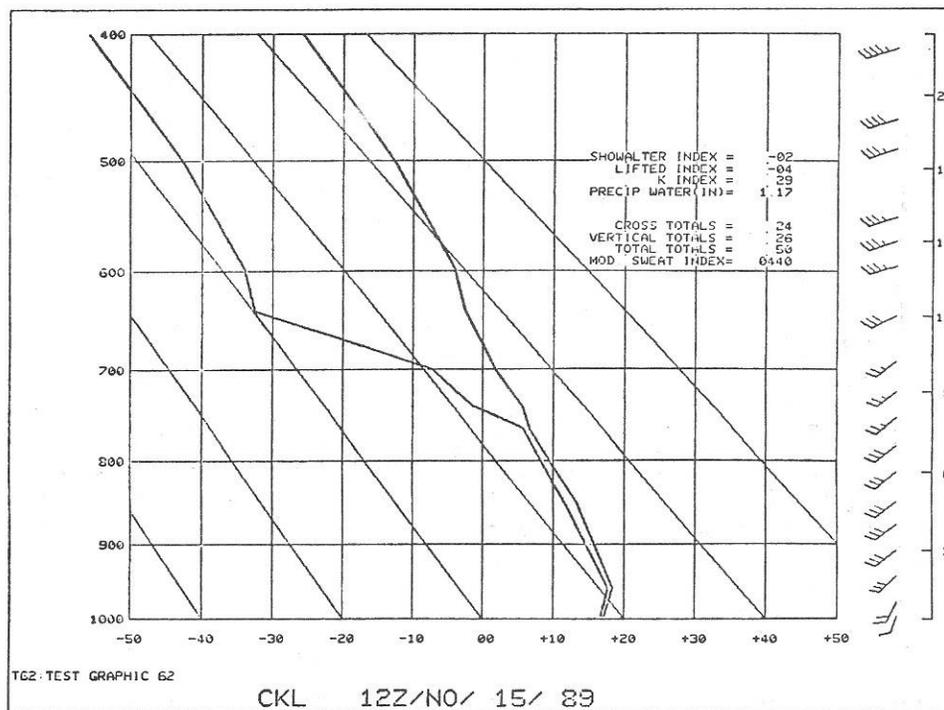


Figure 3, Centreville Sounding at 1200 UTC on 11/15/89

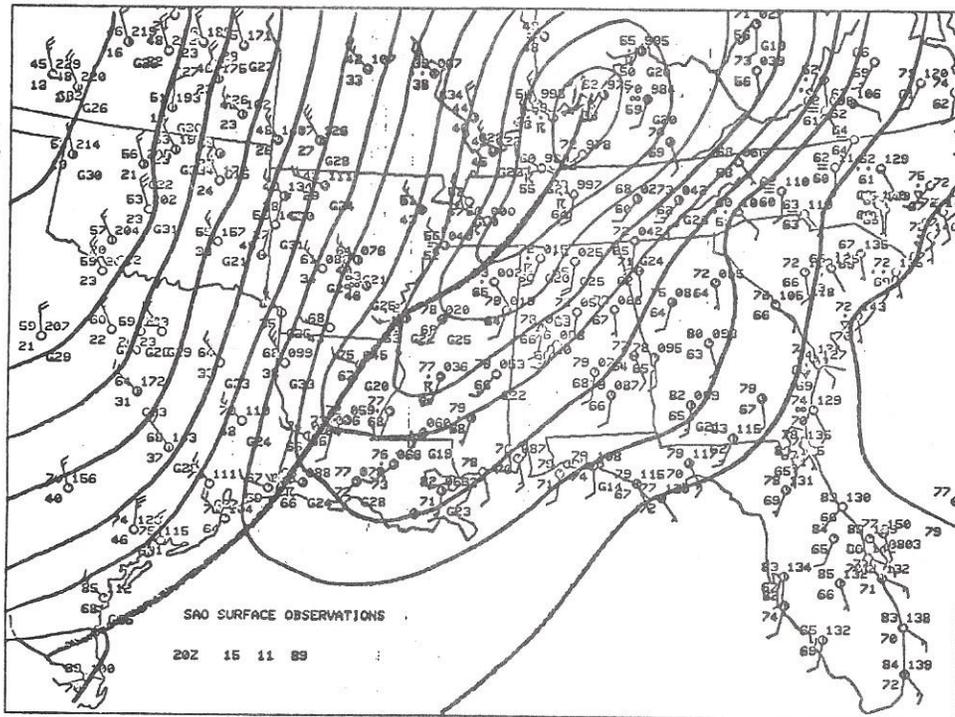


Figure 4, Surface Analysis, 2:00 pm CST 11/15/89

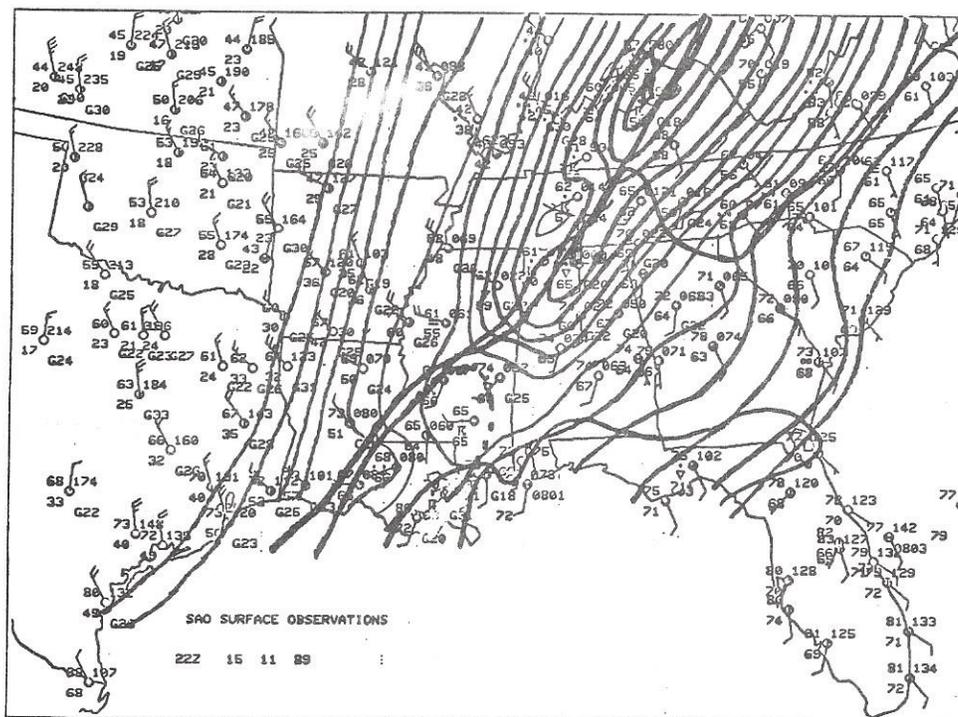


Figure 5, Surface Analysis, 4:00 pm CST 11/15/89

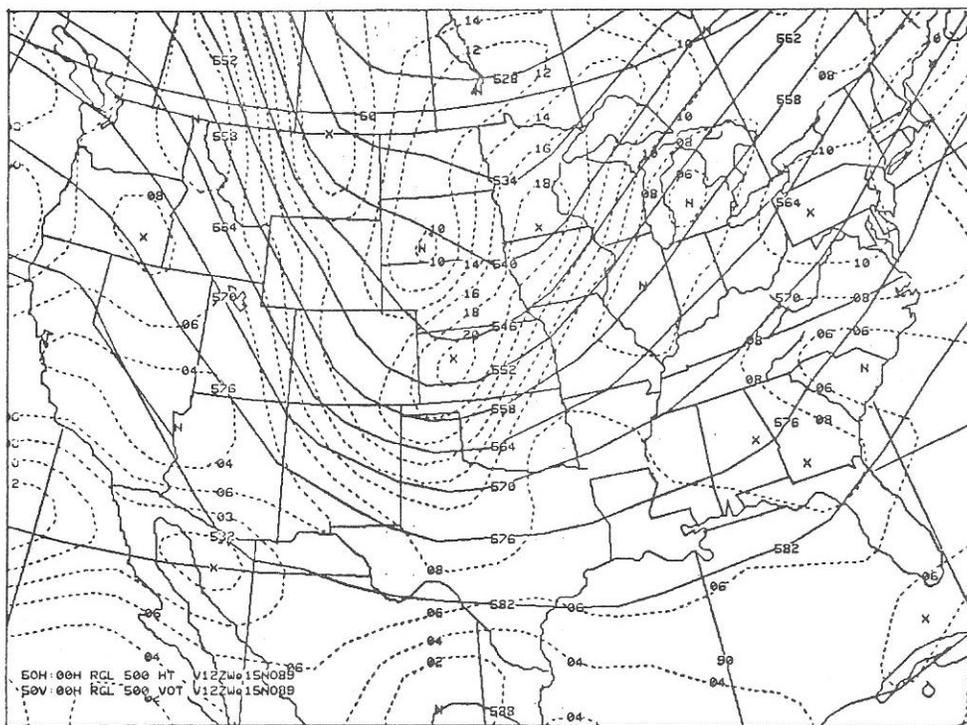


Figure 6, Heights & Vorticity at 500 Mb at 1200 UTC 11/15/89

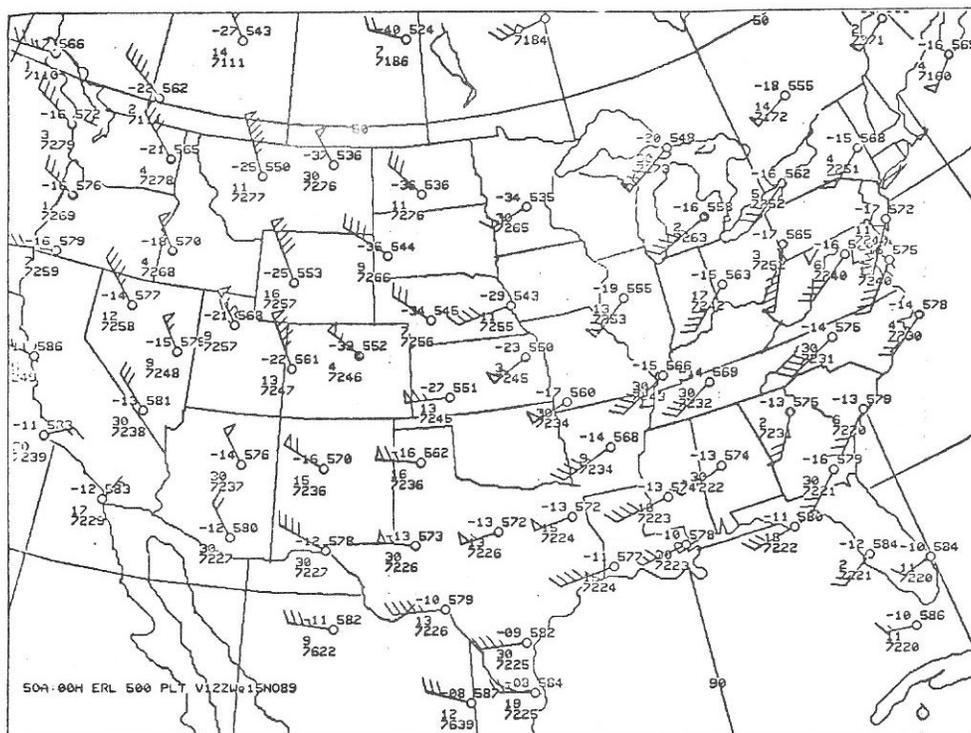


Figure 7, Data Plot at 500 Mb at 1200 UTC 11/15/89

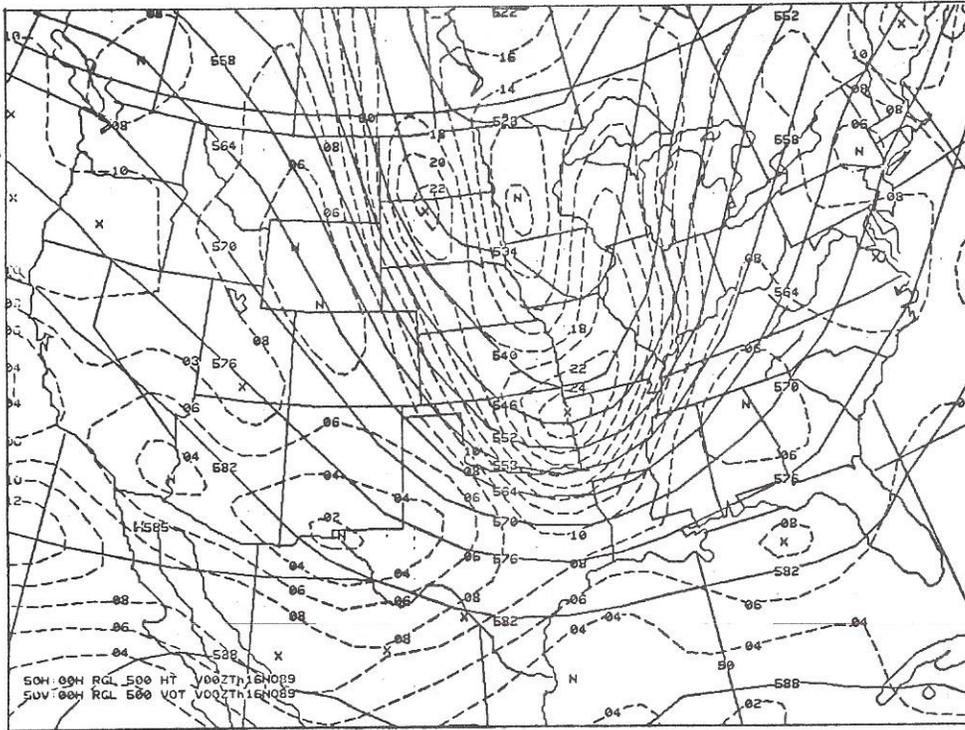


Figure 8, Heights & Vorticity at 500 Mb at 0000 UTC 11/16/89

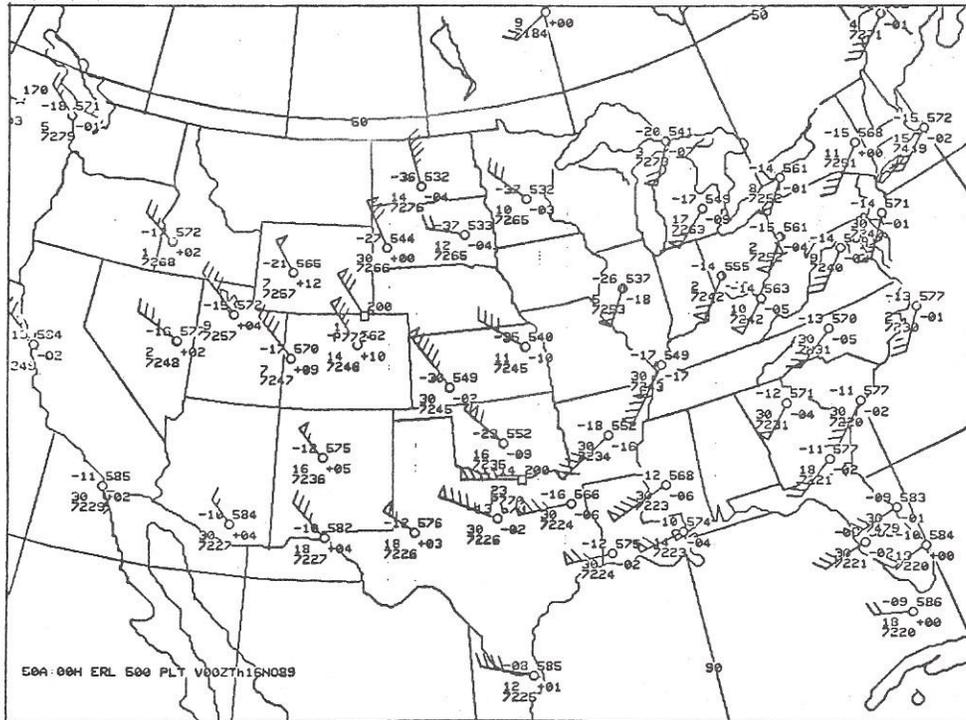


Figure 9, Data Plot at 500 Mb at 0000 UTC 11/16/89

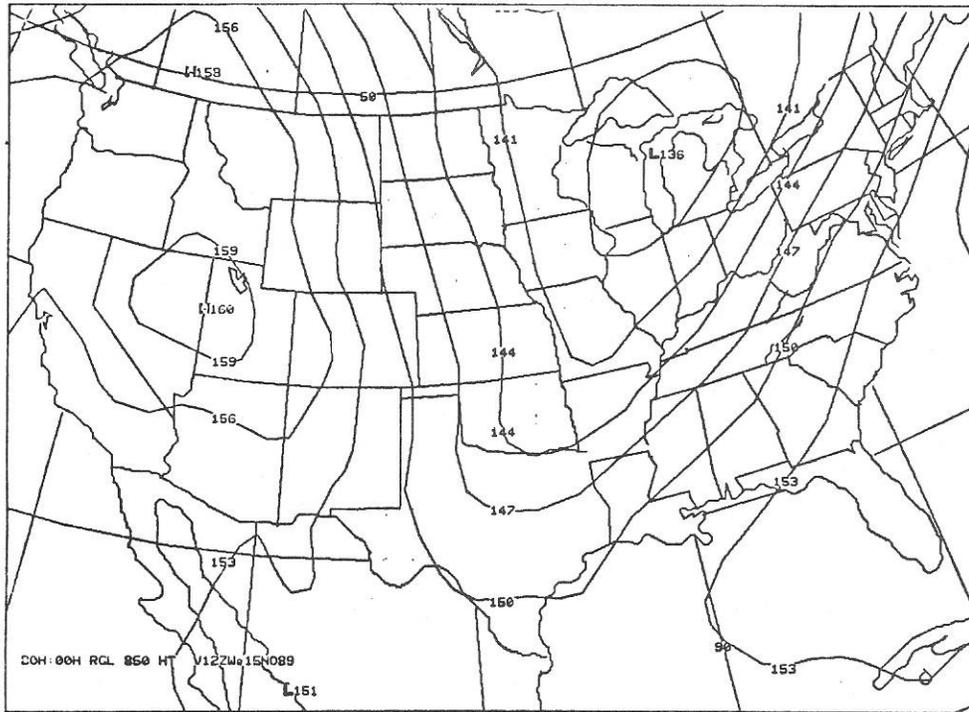


Figure 10, Heights at 850 Mb at 1200 UTC 11/15/89

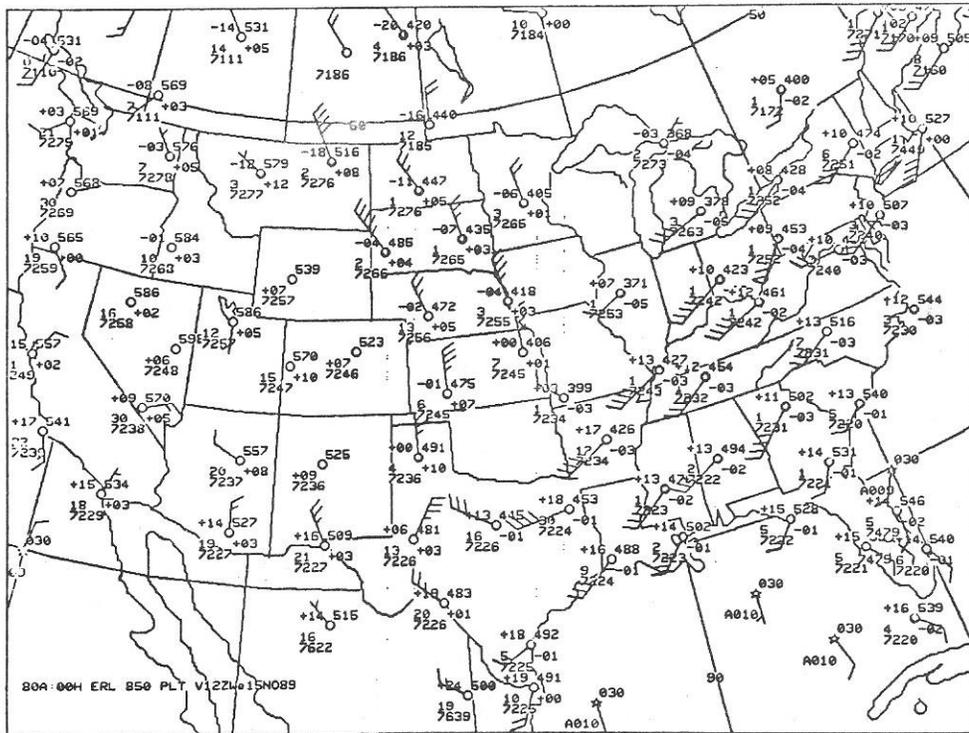


Figure 11, Data Plot at 850 Mb at 1200 UTC 11/15/89

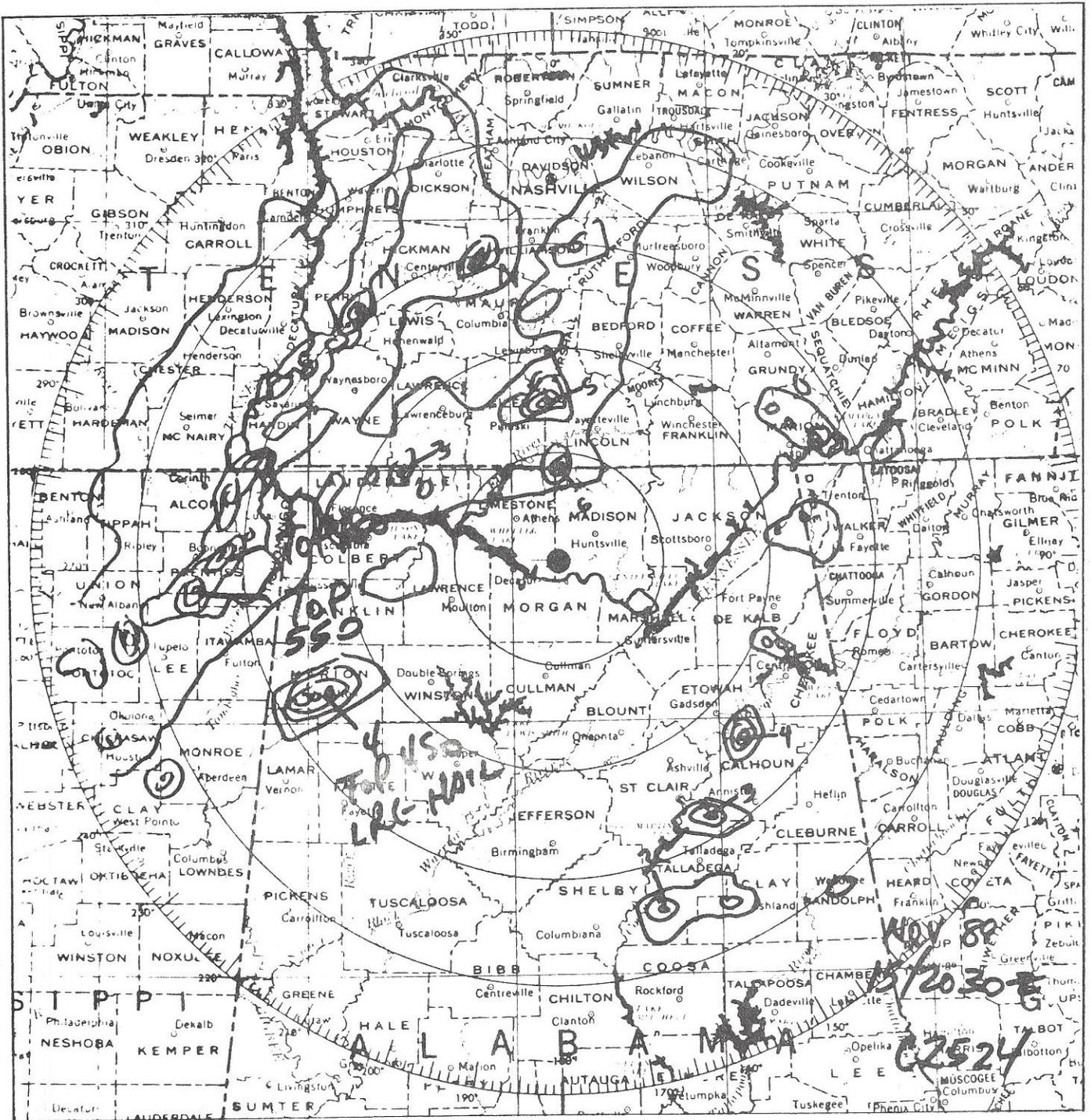


Figure 14, Huntsville Radar Plot at 2030 UTC 11/15/89

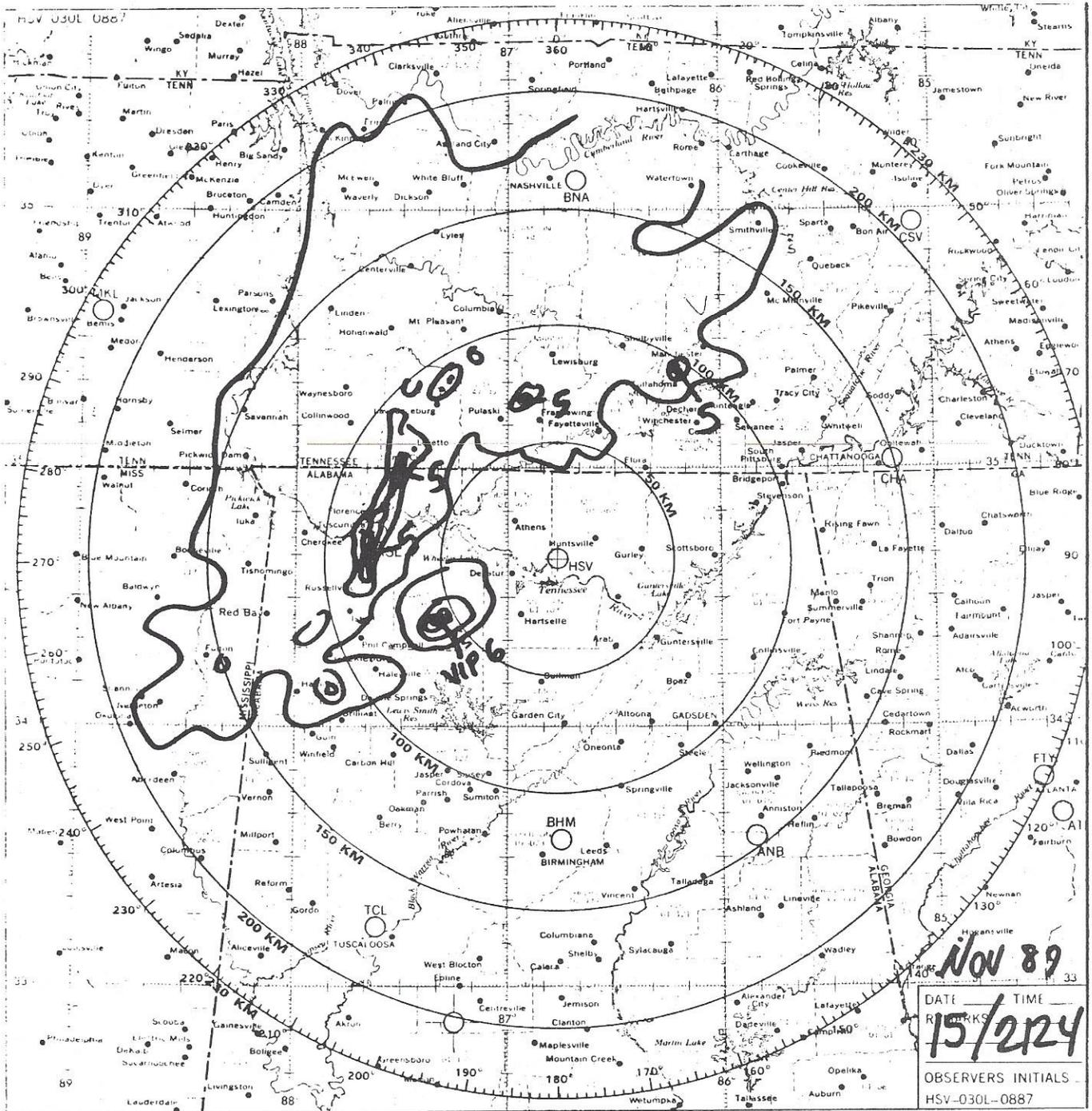


Figure 15, Huntsville Radar Plot at 2124 UTC 11/15/89

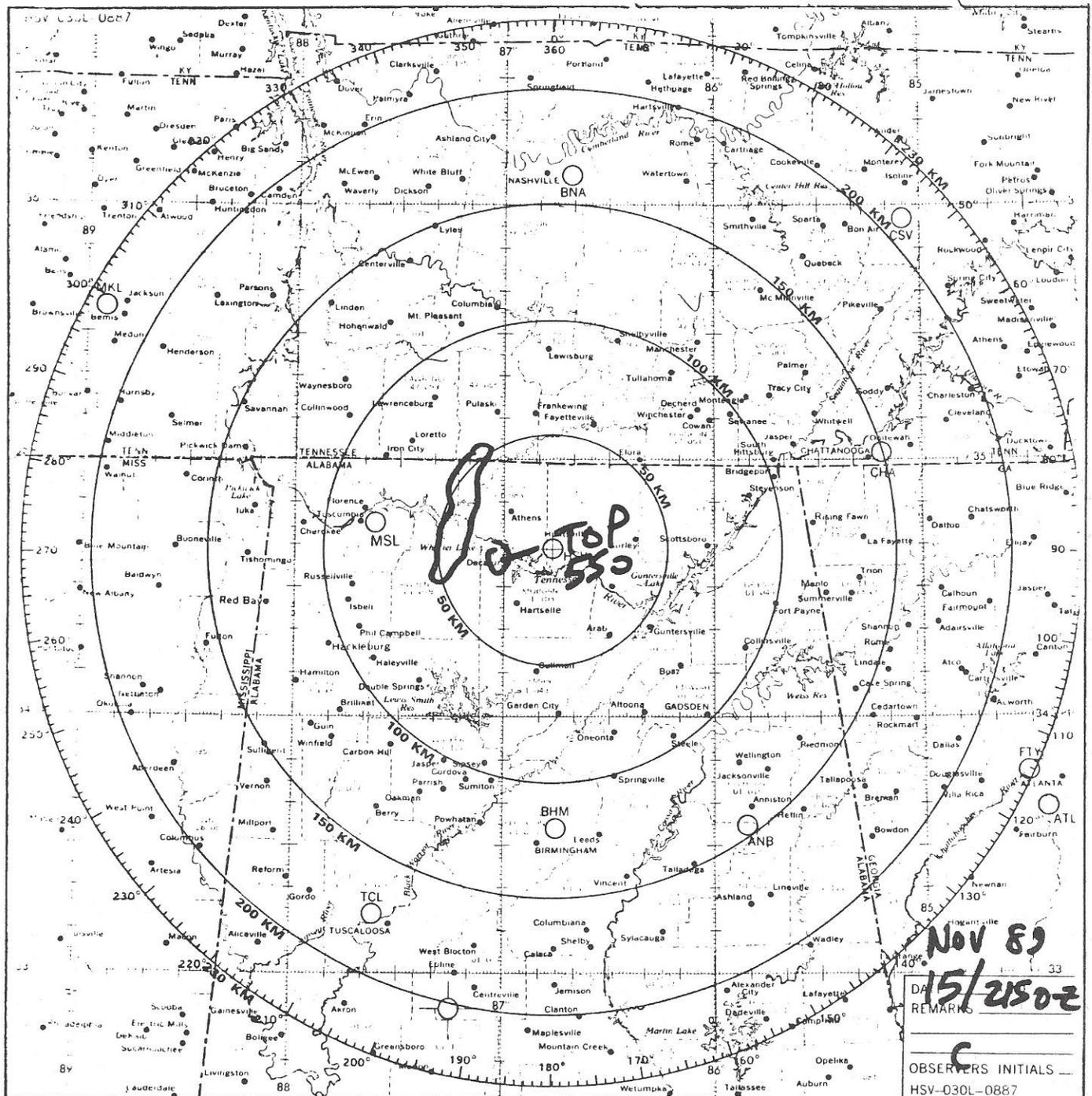


Figure 16, Huntsville Radar Plot at 2150 UTC 11/15/89

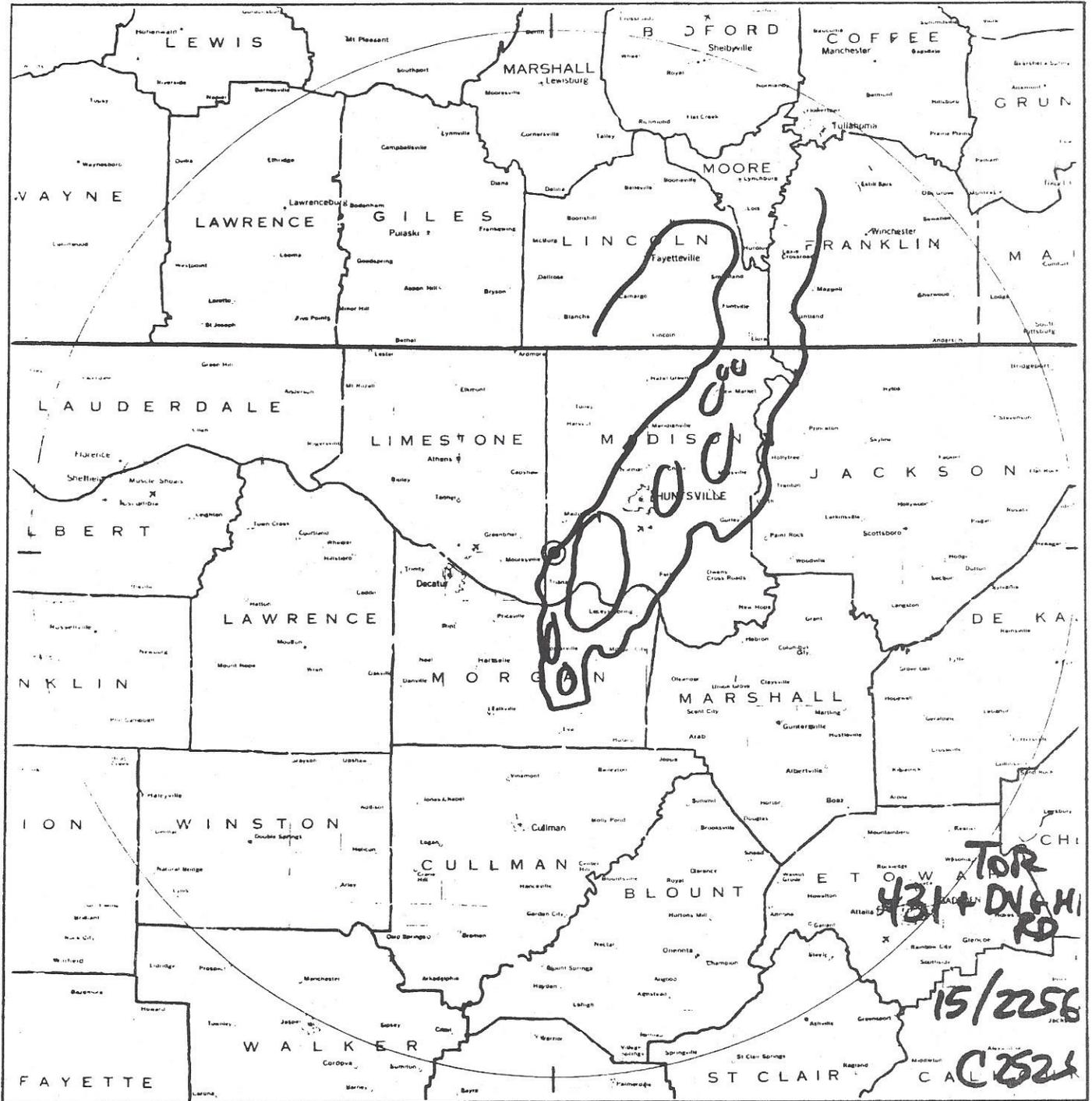


Figure 17, Huntsville Radar Plot at 2256 UTC 11/15/89

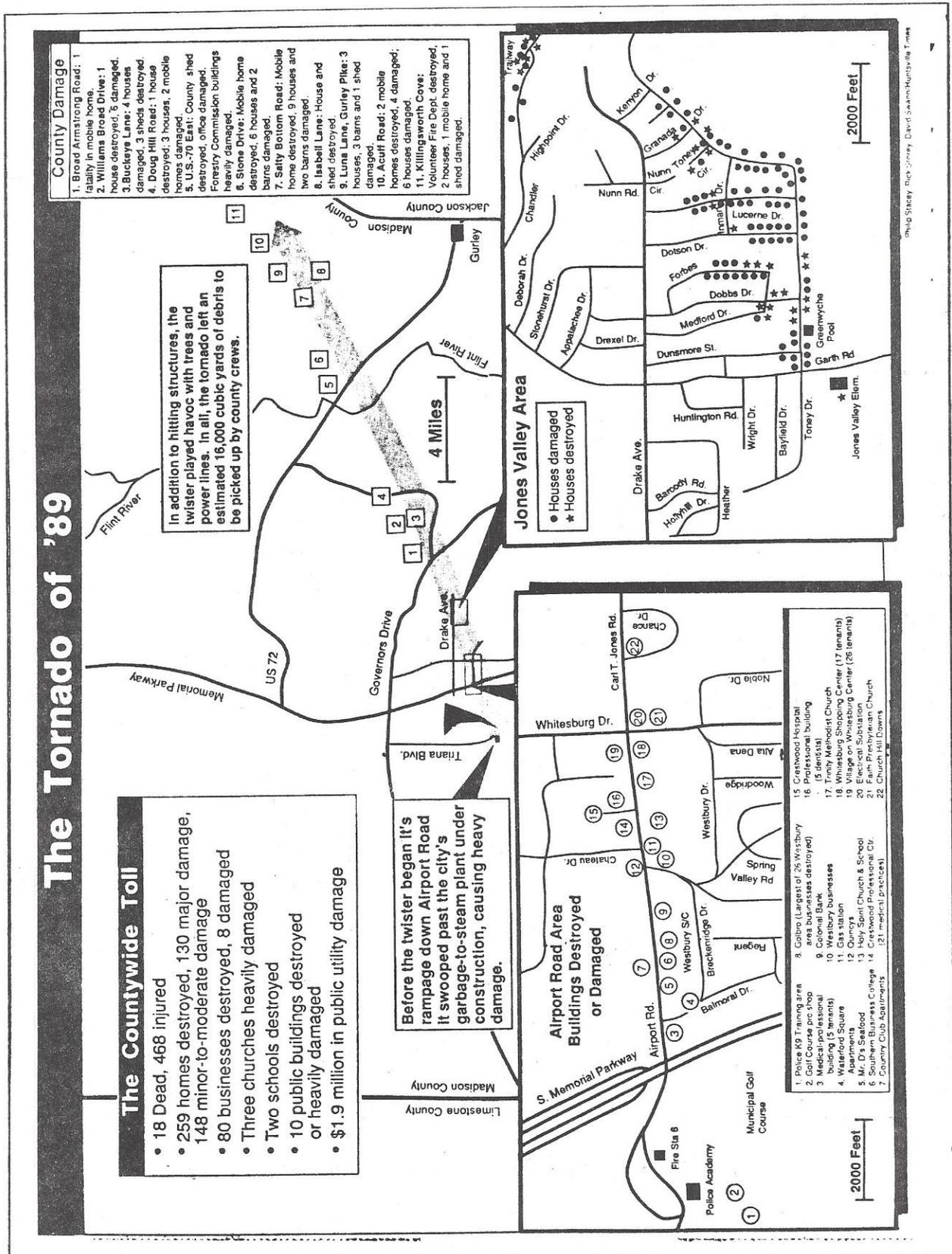


Figure 18, Map of Tornado Track from Huntsville Times



Figure 19, County Warning Area of WSO Huntsville, AL