

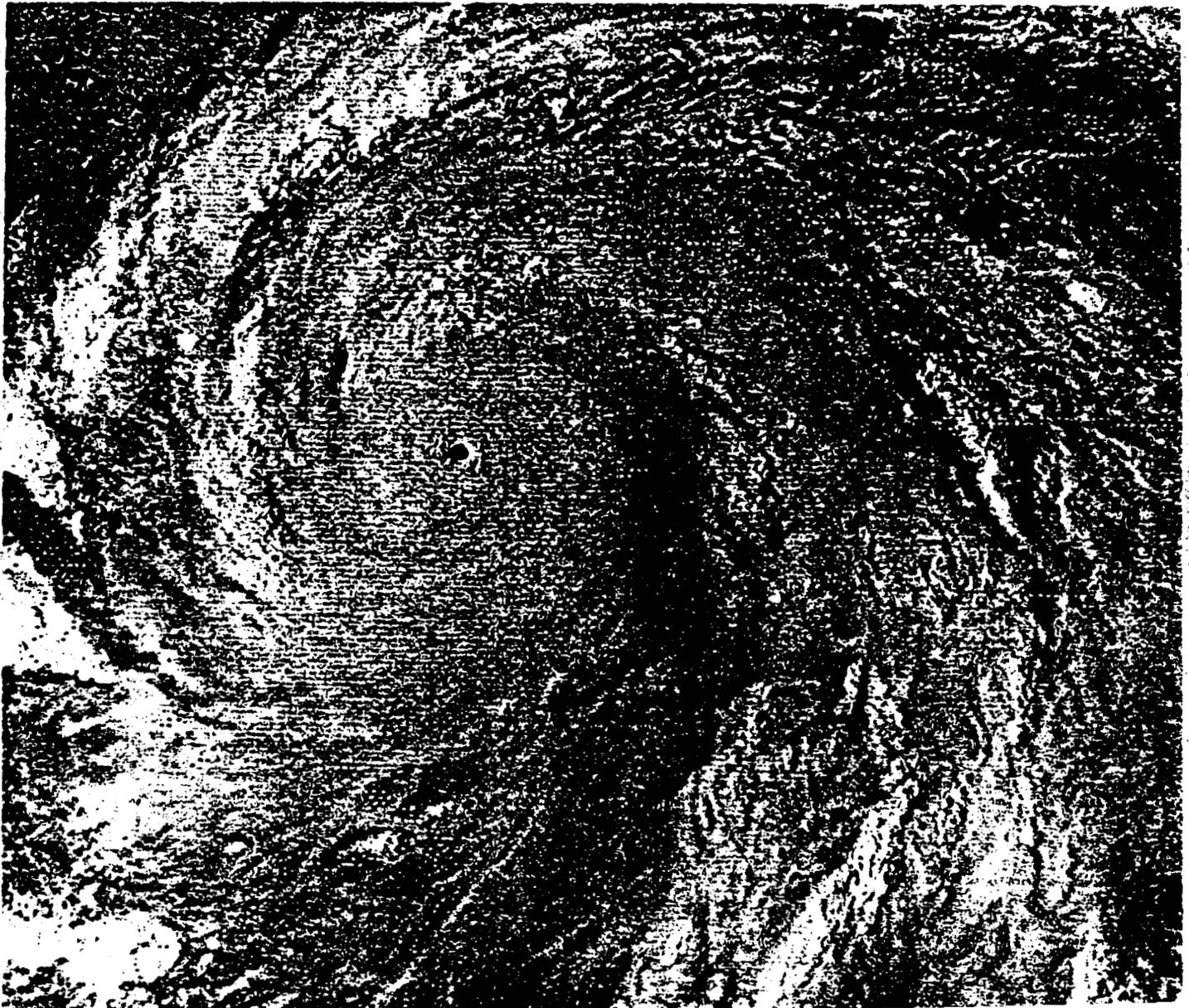
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Natural Disaster Survey Report

# Hurricane Gilbert Sept 3 - 16, 1988



U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Weather Service, Silver Spring, Maryland



# **National Oceanic and Atmospheric Administration Weather Bureau Hurricane Series**

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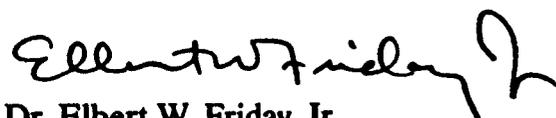
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## FOREWORD

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On September 17, 1988, after landfall by Hurricane Gilbert, a disaster survey team was designated to review the effectiveness of NOAA's public safety information services and to gather detailed first-hand information from the communities affected along the Texas Coast. The field survey was completed by September 22, 1988. This report is based on the findings of the Survey Team.



Dr. Elbert W. Friday, Jr.  
Assistant Administrator for  
Weather Services, NOAA

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## PREFACE

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On September 17, 1988, Dr. Elbert W. Friday, Jr., Assistant Administrator for Weather Services, designated a Disaster Survey Team to collect and report on the events pertaining to Hurricane Gilbert and the associated tornadoes.

The Team consisted of the following members:

Louis Boezi, Team Leader, Director, Transition Program Office

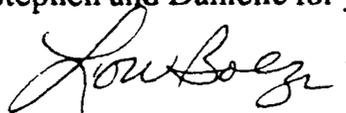
Joe Bocchieri, Chief, Services Evaluation Branch, Office of Meteorology

Gary Grice, Assistant Chief, Meteorological Services Division, Southern Region

Steve Harned, National Hurricane Program Leader, Office of Meteorology

Herb Lieb, Consultant, Public Affairs & Hurricane Preparedness

The team was escorted and aided by Al Dreumont, MIC, San Antonio. The team met initially on September 18, 1988, in San Antonio, Texas, with the National Academy of Science Disaster Survey Team. In San Antonio the team decided to split up to better cover the Texas coast. Mr. Harned and Mr. Lieb went to the Houston/Galveston Area, while Mr. Boezi, Mr. Bocchieri, Mr. Grice, Mr. Dreumont, Mr. Frerichs (NAS member) and Mr. Acquirre (NAS member) travelled to the Brownsville and Corpus Christi areas. National Weather Service Offices (WSOs), mayors, city managers, emergency management coordinators, newspaper managers, and T.V. weathercasters were visited by the team members, and as many interviews as possible were conducted. After returning from the Survey, the team members were ably assisted by William Lerner, who wrote Chapter 4, Stephen Frerichs, and Danielle Bishop. A special thank you to the team members for your professional work and to Bill, Stephen and Danielle for your invaluable assistance.



Lou Boezi, Team Leader

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# EXECUTIVE SUMMARY

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## The Storm

On September 16th, Hurricane Gilbert, the most powerful hurricane ever recorded in the Western Hemisphere, made landfall on the northeast coast of Mexico near La Pesca. Gilbert's winds measured in excess of 200 mph and the storm recorded the lowest barometric pressure ever in the Western Hemisphere. Gilbert's near linear track through the Caribbean and the Gulf of Mexico brought the storm over Jamaica, the northeast Yucatan Peninsula, and finally the northeastern Mexican Coast. The Yucatan landfall marked the first time since 1969 that a category 5 hurricane had made landfall in the Western Hemisphere. The U.S. is fortunate that Gilbert did not make a direct landfall on the U.S. coast.

The death toll from Gilbert was 316 people. Mexico reported the most deaths, 202 people. Other death statistics include: United States, 1; Jamaica, 45; Haiti, 30; Guatemala, 12; Honduras, 12; Dominican Republic, 5; Venezuela, 5; Costa Rica, 2; and Nicaragua, 2. Estimated damage from Gilbert was nearly 10 billion dollars. Jamaica alone had 6.5 billion dollars in damage, and the damage to Mexico was between 1 and 2 billion dollars. The most extensive damage in the United States was due to tornadoes in San Antonio. The total damage in the United States was estimated at 33 million dollars.

## NWS Services

The National Hurricane Center (NHC) position and 24 landfall forecasts were excellent relative to past performances. The 24 hour landfall forecast had an error of only 63 miles compared with the historical average of 129 miles. Coastal WSOs and Weather Service Forecast Office (WSFO) San Antonio performed excellently. NWS employees worked long hours under considerable pressure. Warnings, forecasts, and local statements were generally clear, timely, and accurate. The tornado threat in the U.S. associated with Gilbert was publicized in advance through Hurricane Local Statements.

The survey and evaluation were revealing and rewarding. Four salient conclusions can be drawn from the survey: 1) The U.S. Gulf Coast and public safety decision makers suffered from a paucity of tide data, 2) A trend toward more information sources and computer decision aids may have resulted in confusion and undermined public safety, 3) Emergency Management Coordinators (EMCs) in lower Texas keyed evacuation recommendations to NWS Hurricane Warning Advisories, 4) The infrastructure of the NWS is aging and, although modernization plans are underway, in the interim, public safety demands may overwhelm the aging infrastructure.

Along the Gulf coast many of the inhabited barrier islands, such as the Padre Islands, are accessible only via one roadway. Generally this roadway is 2-5 feet above sea level and very easily inundated. Thus, one key input in an evacuation recommendation for the islands is tide information. Currently, tidal gauges are sparse along the coast and some that were present were not operating because of equipment problems. A NOAA-wide effort to provide operational tide information should commence as quickly as possible. A multitude of information sources and computer aids now are available to public safety managers. The myriad of landfall forecasts and computer-driven decision aids are often conflicting and very confusing. A steady stream of conflicting information resulted in the controversial evacuation recommendation of Galveston Island, see Appendix A. Given this trend toward more information, the NWS should, through its preparedness activities, continue to educate its users on the content and quality of NWS forecast products.

Public officials keyed public safety decisions to NWS Hurricane Warning Advisories and consultations with local NWS managers. A high demand exists among Texas EMCs for personal contact with local NWS meteorologists. In fact, local public safety decision-makers requested the ability to work more closely with the NWS and to have better, higher resolution data, including graphics. Contact with the NWS is sought by EMCs for more specific or detailed information or to clarify information. The NWS is currently researching better methods of conveying essential information to public safety decision-makers; part of this research includes the use of graphical presentations.

Compounding any problems in meeting EMC's information demands is the aging infrastructure of the NWS. Communication systems are overloaded during severe weather situations such as Hurricane Gilbert. The WSO manager in Corpus Christi installed additional telephone lines in anticipation of Gilbert. Another example of the aging infrastructure includes the radar in Hondo Texas (outside of San Antonio) which was operating at reduced power levels because of magnetron problems. Although the NWS is modernizing its equipment, interim problems such as the Hondo radar must be recognized.

Although Hurricane Gilbert did not make landfall in the U.S., the storm did highlight several weaknesses in the U.S. public safety infrastructure. The ability to detect the weaker tornadoes associated with hurricanes, such as Gilbert, is one such weakness. Although the local NWS offices responded well to the tornado threat by warning for the tornado conditions, current technology is unable to detect the small scale, life threatening phenomena and provide specific advanced information about the tornado's approximate time of occurrence and path.

## CHAPTER 1

### HURRICANE GILBERT: THE EVENT AND ITS IMPACT

#### The History of the Storm

Hurricane Gilbert began as a tropical wave over northwest Africa. On September 3, 1988, this tropical wave left the African coast and moved over the open waters of the North Atlantic becoming a broad area of low pressure over the southern Atlantic between Africa and the Lesser Antilles. By September 8, 1988, an organized circulation center was apparent as the system approached the Windward Islands. The low was classified by the National Hurricane Center (NHC) as the 12th tropical depression of the 1988 hurricane season. By now the storm was located about 400 miles east of Barbados.

The tropical depression moved on a west northwest course at 15 knots (18 mph), and by September 9, tropical storm Gilbert was born (Fig. 1.1). By September 10, Puerto Rico began feeling the effects of the tropical storm. Winds gusted to 43 knots (50 mph) at Puerto Rico and to 51 knots (59 mph) at Saint Croix. Breakers to 12 feet were reported along the south coast, causing low areas to be flooded.

Gilbert strengthened rapidly and within 30 hours, the NHC upgraded it to a hurricane. Gilbert continued to strengthen as it brushed the southern coast of Hispaniola before passing directly over the island of Jamaica. As the hurricane passed over Jamaica, sustained winds were 110 knots (123 mph) which is a Category 3 hurricane on the Saffir-Simpson Scale.

Following the passage over Jamaica, Gilbert went through a remarkable intensifica-

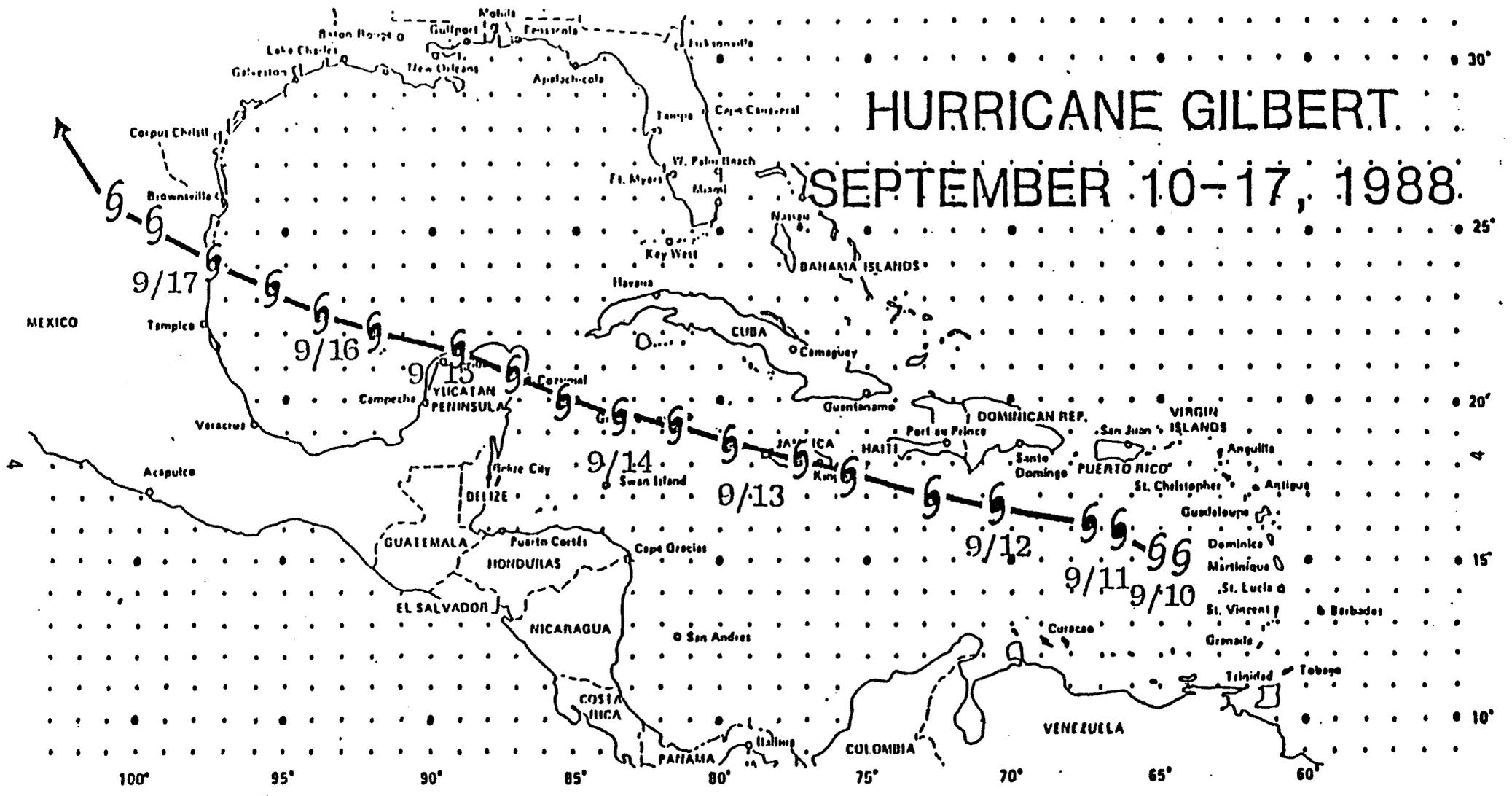
tion process with the central pressure falling from 960 mb (28.35 in.) to 888 mb (26.22 in.) in 24 hours. The 888 mb pressure was the lowest sea level pressure ever recorded in the Western Hemisphere. The low pressure was measured by a NOAA reconnaissance plane which also measured sustained winds of 160 knots (184 mph) at 10,000 feet with a peak gust to 173 knots (199 mph). Gilbert had become a Category 5 hurricane.

Extremely dangerous, Hurricane Gilbert continued to move west-northwest at 15 knots (17 mph), and on September 13, passed just south of Grand Cayman Island. With the passage of the hurricane, Grand Cayman reported sustained winds of 119 knots (137 mph) with gusts to 136 knots (157 mph) and 5 foot tides.

The passage of Gilbert over the northeast Yucatan Peninsula on September 14 marked the first time since 1969 (Hurricane Camille) that a Category 5 hurricane had made landfall in the Western Hemisphere. A 10 to 15 foot storm surge likely occurred along the immediate Yucatan coast near the point of landfall.

A somewhat weakened Gilbert moved from Yucatan into the Gulf of Mexico on September 15. The west-northwest track at 15 knots (17 mph) persisted in the Gulf and Gilbert reached the northeast Mexican coast just north of the town of La Pesca during the late afternoon of September 16. Gilbert, a Category 3 hurricane as it crossed the northeast Mexican coast, caused approximately a 10 foot storm surge. Along the lower Texas coast, 150 miles to the north, tides of 3 to 5 feet above normal were reported.

No official wind reports were available in Mexico where the hurricane made landfall. At Port Isabel, Texas, located about 150



# HURRICANE GILBERT

## SEPTEMBER 10-17, 1988

Figure 1.1.

miles north of landfall, an observer with a truck mounted anemometer reported gusts up to 53 knots (61 mph) to the National Weather Service Office (WSO).

### Hurricane Induced Tornadoes

In the United States, most destruction from Gilbert occurred from hurricane spawned tornadoes in south Texas on September 16 and 17 (Fig. 1.2). A total of 29 tornadoes were confirmed and there were 22 funnel cloud reports. The number of tornadoes is likely a conservative figure considering the sparse population in the area.

Fourteen of the tornadoes occurred on September 16 near the Texas Coast, and 15 occurred on the 17th, mostly well inland. The tornadoes on the 17th were considerably more destructive. Tornado path lengths were generally less than 1 mile on the 16th and up to 5 to 10 miles long on the 17th.

The most destructive tornado on the 16th occurred in Harlingen, Texas, near Brownsville. This tornado touched down on the south side of Harlingen and moved from the southeast to the northwest. The tornado collapsed one wall and the roof of a doctor's office. Windows were blown out of a nearby hospital and residences. Roof damage occurred to some homes and apartment complexes, and 20 to 30 cars lost windshields. Damage was estimated at 1 million.

The tornadoes on the 17th caused the greatest damage and the only death. A woman near San Antonio was killed early on the 17th when a tornado destroyed her mobile home. Later, a tornado struck Kelly Air Force Base in San Antonio causing extensive damage to about 12 warehouse storage buildings (Fig. 1.3). Damage to the base was estimated at 28 million dollars. Another tornado struck northwest San An-

tonio causing 4 million dollars damage to hospitals and residential areas (Fig. 1.4). Late in the afternoon of the 17th, several tornadoes also struck the Del Rio area causing extensive damage to three sub-divisions.

### Rainfall with Gilbert

Torrential rains accompanied the hurricane as it moved inland over Mexico. Five to 10 inches of rain fell along the coastal sections of Mexico with much greater amounts in the mountainous areas. Massive flooding in the Monterey, Mexico area caused about 200 deaths.

Gilbert's rains were generally beneficial to south Texas. Flooding was almost non-existent since the bulk of the heavy core rains fell in the mountains of Mexico. Almost 9 inches of confirmed rain fell in Aransas County near Corpus Christi as the hurricane moved inland. Rainfall amounts were generally 2 to 5 inches in the Brownsville and Corpus Christi area. Runoff from the rain into the Rio Grande did necessitate a release of water by the International Boundary Water Commission in their floodways. This caused some damage to crops that had been planted in the floodways.

Rains of 2 to 4 inches fell across parts of southwest Texas on September 18 with local amounts of 4 to 5 inches near Del Rio. Three to 5 inch rains accompanied the remains of Gilbert through northwest Texas and into central Oklahoma. In Oklahoma, up to 8 inches of rain fell in the central part of the state.

### Casualty and Damage Statistics

The death toll from Gilbert was 316 people. Mexico reported the most deaths, 202 people, most died with the floods in Monterey. Other death statistics included:



United States, 1; Jamaica, 45; Haiti, 30; Guatemala, 12; Honduras, 12; Dominican Republic, 5; Venezuela, 5; Costa Rico, 2; and Nicaragua, 2.

Estimated damage with Gilbert was nearly \$10 billion. Jamaica alone had \$6.5 billion in damage and the damage to Mexico was estimated between \$1 billion and \$2 billion. Reports from the Mexican government indicate that more than 60,000 homes were destroyed. The most extensive damage in the United States was from the tornadoes in San Antonio. Total damage in the United States was estimated at \$33 million.

With the exception of the tornadoes, hurricane induced damage in south Texas was light. Most damage was along the lower Texas Coast and the lower Rio Grande Valley from high winds and higher than normal tides. A few trees were uprooted and many limbs downed; however, only a few power poles and lines were downed. Agricultural damage was slight. Beach erosion ranged up to 4 feet along parts of the coast near Brownsville.

## CHAPTER 2

### **SUMMARY OF NWS PREPAREDNESS ACTION, INFORMATION AND WARNING SERVICE.**

#### Preparedness Actions

All National Weather Service (NWS) offices along the Texas coast (Beaumont-Pt. Arthur, Houston-Galveston, Victoria, Corpus Christi, and Brownsville) had performed extensive pre- and early hurricane season preparedness activities. Hundreds of presentations to the media, civic, industrial, and business groups reached thousands of people.

NWS officials met with emergency management coordinators (EMCs) before the hurricane season to ensure that strong links would exist between NWS offices and local emergency management offices during hurricane situations. Coordination with emergency management officials was strengthened in the Corpus Christi, Victoria, and Houston/Galveston areas because of monthly emergency management meetings that are held throughout the year. These meetings were attended by the local NWS Meteorologist in Charge (MIC).

As part of the NWS preparedness activities, Dr. Bob Sheets, Director of the NHC, participated in local meetings with all the coastal WSOs except Brownsville between May 9-12. In total, over a thousand people attended these meetings and media coverage was extensive. Other preparedness actions by Weather Service Forecast Office (WSFO) San Antonio included organizing a comprehensive coastal hurricane exercise to test AFOS backup procedures and links with the amateur radio groups along the coast. The successful drill was held July 28.

Although no major problems were encountered during the storm, there appeared to be some confusion among EMCs and the public concerning hurricane tornadoes as well as the use of hurricane probabilities. Hurricane induced tornadoes tend to be small and weak. They do not have the same characteristics as thunderstorm induced tornadoes and thus are more difficult to detect. The hurricane landfall probabilities were, at times, not used in conjunction with the 72-hour track forecasts and the two should be used together to show the uncertainty associated with forecasts of longer duration.

## Information

As the landfall threat increased along the Texas coast, information available to local EMCs was abundant. An overriding concern expressed by most EMCs, other governmental officials, and the media was that the multi-sources of information were too abundant (Table. 2.1). The myriad of landfall forecasts and computer driven evacuation decision aids were often conflicting and in the end, very confusing. A steady stream of conflicting information resulted in the recommendation Thursday, September, 15 1988, for an evacuation of Galveston Island (See Appendix I for complete story). City Manager/Emergency Management Coordinator, Doug Matthews, stated that a total evacuation would not have been recommended if not for the confusion from the many information sources (Galveston Daily News, Sat. Morning 9/17/88).

TABLE 2.1

Information Sources Available During Gilbert

TO: EMC in	NWS:		Self Operated Computer Program	ESTED (DPS)	GNV/ Local News	Weather Channel	Private Consul.
	tele- phone	N W S					
Brownsville	y	y	y	y	y	y	n
Port Isabel	n	y	y	n	y	y	n
Corpus Christi	y	y	y	n	y	y	n
Port Aransas	y	y	?	y	y	?	n
Port Lavaca & Port O'Connor	y	y	y	y	y	y	3 Source
Freeport	y	y	y	n	y	y	n
Galveston	y	y	y	y	y	n	3 Source
Houston	y	y	y	?	y	y	?

The Corpus Christi City Manager felt the national networks sensationalized the situation and that the local TV stations were more responsive in trying to provide helpful

information. The Acting EMC for Cameron County thought the national media was generally irresponsible and the local stations did a better job. However, there was a problem with a local TV station in Harlingen Friday afternoon (9/16) when it reported that "the worst was over." This prompted many evacuees to attempt a return to Port Isabel. When city officials from Port Isabel returned to the city from their shelter in Harlingen, they encountered high winds, driving rain and no power; they had to take immediate action to ensure people did not return home from the shelters. The worst was not over because Gilbert was still causing high winds and seas along the island.

## Warning Service

In response to the potentially devastating storm, the NWS hurricane watch and hurricane warning advisories for the Texas coast were issued with long lead times (51 and 36 hours respectively) by NHC. NHC performed outstandingly, especially considering the tremendous media demands on the center. A pre-arranged TV pool was instituted early in the week by NHC staff. This allowed maximum coverage with minimum disruption. Dr. Sheets held over 400 personal interviews and was named ABC's "Person of the week" on September 16.

WSFO San Antonio and the coastal WSOs increased operations early in the week in response to increased media and public interest. The forecast office maintained very strong contact with the coastal WSOs during the event. After each coordination call with NHC, a detailed administrative message was immediately sent to the WSOs outlining the decisions reached during the calls. Also, each office manager was called to discuss operational details in light of the latest information.

The role and actions of WSFO San Antonio deserve special attention. The location, functional management, and structure of NWS offices in south Texas is somewhat unique. The WSFO is located well inland (approximately 150 miles from the Gulf) with six WSOs located along the immediate coast. Because of the large number of WSOs (eight total) in south Texas, communications can be heavy between the WSOs and the WSFO. In addition, the South Texas Weather Wire (which carries NWS forecasts and warnings to media, government officials, and general public) is driven by the WSFO and can be overloaded by a significant weather event. During a potential major disaster, such as Gilbert, the staff at the WSFO must exercise control over incoming and outgoing communications (including the weather wire) and offer support and direction to the WSOs. During Hurricane Gilbert, WSFO San Antonio performed this function in an outstanding manner.

While Gilbert was in the Caribbean, WSFO San Antonio issued internal messages (over the AFOS computer system) to the coastal WSOs, and the Area Manager called each WSO manager to remind the staffs of essential points of operation. Internal messages were also distributed to the WSOs following NHC coordination calls indicating the forecast track of Gilbert and how the WSFO planned to handle weather problems in south Texas. These messages provided the WSOs with crucial advance information to be included in the local statements.

To avoid overcrowding of the weather wire, the WSFO prepared and issued information and preparedness statements applicable to all WSO areas. Several of these statements were transmitted in Spanish.

The WSFO/WSO partnership worked well during Gilbert. The WSFO provided guidance and support to the coastal WSOs freeing those offices to concentrate on local problems. It is ironic that after serving as coordinator for the coast, the greatest damage from Gilbert in the U.S. occurred in San Antonio proper.

The major warning service problem was the occasional inability for NWS offices to talk directly with Emergency Operation Centers (EOC). This was due to inadequate communications links existing between the NWS and the various EOC's. This is especially true in the very complex Houston-Galveston area where there are 50 EOCs. Related to the inadequate communications, the Corpus Christi Department of Public Safety (DPS) office stated they would like to have better access to NWS officials and information. They said that the various local statements from all WSOs in Texas, which are transmitted and received in their office, created confusion. Taking the time to sort out which local statement was pertinent to their area of responsibility hindered their decision making process.

## CHAPTER 3

### DISCUSSION OF DATA COLLECTION AND COMMUNICATIONS

#### Data Collection

In the absence of a direct U.S. landfall, data collection was minimally affected. However, concern was expressed by several EMCs regarding the availability of tide data. Along the Texas coast many of the barrier islands are accessible by only one roadway. Generally, this roadway is 2-5 feet above sea level and very easily inundated. Thus, one of the key inputs in an evacuation recommendation for the islands is tide information. Without a tidal gauge

there is no means of knowing how high the tides are and whether inhabitants can or should evacuate. In Corpus Christi the Police Chief felt that tide data were so important that he actually positioned people on the causeways during the height of the storm to radio tide levels to the city.

In Brownsville the WSO receives tide information from two HANDAR units and a National Ocean Survey (NOS) gauge. The South Padre HANDAR was waiting for a computer board; the NOS gauge had a recent change of equipment, and reference level information was not yet available. Thus, WSO Brownsville was also painfully uninformed.

During the south Texas tornadoes (Saturday 9/17), WSMO Hondo's radar was operating at lowered power levels at times due to magnetron problems. The aging technological infrastructure of the NWS is becoming more unreliable. Fortunately, the lowered power levels were compensated for by the expertise of the meteorologists in the area (see Chp. 4).

### Communications

Most communication systems worked as expected. The major problem, especially in the Houston/Galveston area was the great difficulty encountered at times in communicating between the NWS and EOCs due to the great load on systems, telephones especially. The MICs at Corpus Christi, Brownsville, and Port Arthur ordered additional telephone lines for the storm and these were used extensively.

All NWS offices were inundated with requests for live television interviews. As an example, the MIC, Richard Hagan, in Brownsville was roused out of bed at 2:00 p.m. after a 20 hour shift to do a live interview and Mike Pass, MIC, Houston, per-

formed nearly 24-hour non-stop interviews for national and local media stations. Other NWS employees faced a great demand for interviews.

A communication problem did exist with Kelly Air Force Base and WSFO San Antonio. The tornado siting and subsequent warning issued for the base (9/17) were not reported by the base personnel to the WSFO until five hours after the tornado touched down.

### AFOS Performance

A check of the SMCC AFOS log shows that for the three days (September 16-19) WSFO San Antonio experienced 10 outages. This is "average" AFOS operations performance and the outages were not storm related. This "average" failure rate is unacceptably high. The high failure rate becomes more critical during periods of life-threatening weather and points to the need for modernizing communications equipment.

## CHAPTER 4

### **AN EVALUATION OF THE PROCESSING, INTERPRETATION, AND DISSEMINATION OF NWS INFORMATION**

Warnings, forecasts, and statements were timely and effective. NWS forecasters predicting landfall for the U.S. were under unusual pressure because of the record breaking low atmospheric pressure of Gilbert. The intensity of the storm and its devastation of Jamaica and the Yucatan peninsula sensitized the population of coastal Texas to the event and contributed to a significant public response to NWS advisories. At the same time, the public's awareness focused greater attention on the accuracy of the NWS advisories.

National Hurricane Center

Gilbert posed major problems for meteorologists at NHC. Most objective hurricane forecast techniques and National Meteorological Center model guidance consistently predicted the hurricane to move to the northwest. A short-wave trough over the western part of the United States was expected to be the influencing factor. A west-northwest movement would bring the storm into Mexico or onto the relatively unpopulated lower Texas coast. A turn to the northwest or north would result in landfall over the much more densely populated upper Texas coast. In addition, the storm's intensity had decreased after its passage across the northern Yucatan. But the atmospheric conditions that had produced 175 mph winds and the lowest pressure on record in the Western Hemisphere were still in place. A concern was how much intensification would reoccur before landfall.

While the storm was still east of the Yucatan peninsula, the NHC forecast track predicted landfall on the upper Texas coast. Succeeding forecasts gradually pushed the track southward. By noon on the 15th Gilbert was in the Gulf of Mexico and was still forecast to hit Texas on the extreme southern part of the coast near the Mexican border. At that time, most objective guidance techniques and many private meteorologists were still forecasting the storm to turn north. NHC, however, did not issue any turn north advisories and Gilbert did not turn north until after making landfall in northern Mexico.

NHC forecasts of hurricane movement were excellent relative to past performance. The 24-hour forecast of Gilbert, the standard used to measure forecast error had an error of only 63 miles, while the average 24-hour error over the past 10 years is 129 miles. Figure 4.1 shows Gilbert's 24-hour

forecast and observed positions during the life of the storm. Table 4.1 compares the hurricane's position errors with previous years.

TABLE 4.1

Hurricane Gilbert Position Errors Versus Forecast Errors for Previous Years (Distance measured in statute miles)

	Position Error					24-hour Landfall Error
	Initial	12-hour	24-hour	48-hour	72-hour	
Gilbert	13(30)	30(30)	55(28)	125(24)	220(20)	63(1)
1987	21(1360)	51(132)	115(120)	255(98)	392(68)	146(3)
5 years 1983-87	21(598)	58(594)	123(512)	288(371)	409(253)	98(17)
10 years 1978-87	21(132)	60(1316)	129(1171)	274(840)	413(902)	72(42)

Number of forecasts in parentheses  
Distance between forecast position and actual position is in statute miles

Verification data on wind speed forecasts were not available at the time of this publication. However, a check of the wind forecasts from the marine advisories showed forecasters believed the storm would intensify from a Category 3 to a Category 4 after moving off the Yucatan Peninsula and into the Gulf of Mexico. On the 15th, maximum sustained winds were expected to increase from 120 mph to 140 mph. Early on the 16th, the forecast called for an increase to 130 mph. However, the highest winds remained steady at 120 mph during Gilbert's passage across the Gulf.

Tide and surge forecasts were excellent for the Yucatan and Mexico (Table 4.2). But the wording of the tide section in the advisories caused problems for verification on the Texas coast.

The 8 AM, September 15, advisory read: "Tides of 7 to 11 feet above normal may be expected in the warning area near and to the north of where the center crosses the coast. Tides of 4 to 6 feet above normal are

# HURRICANE GILBERT OBSERVED & 24-HOUR FORECAST POSITIONS

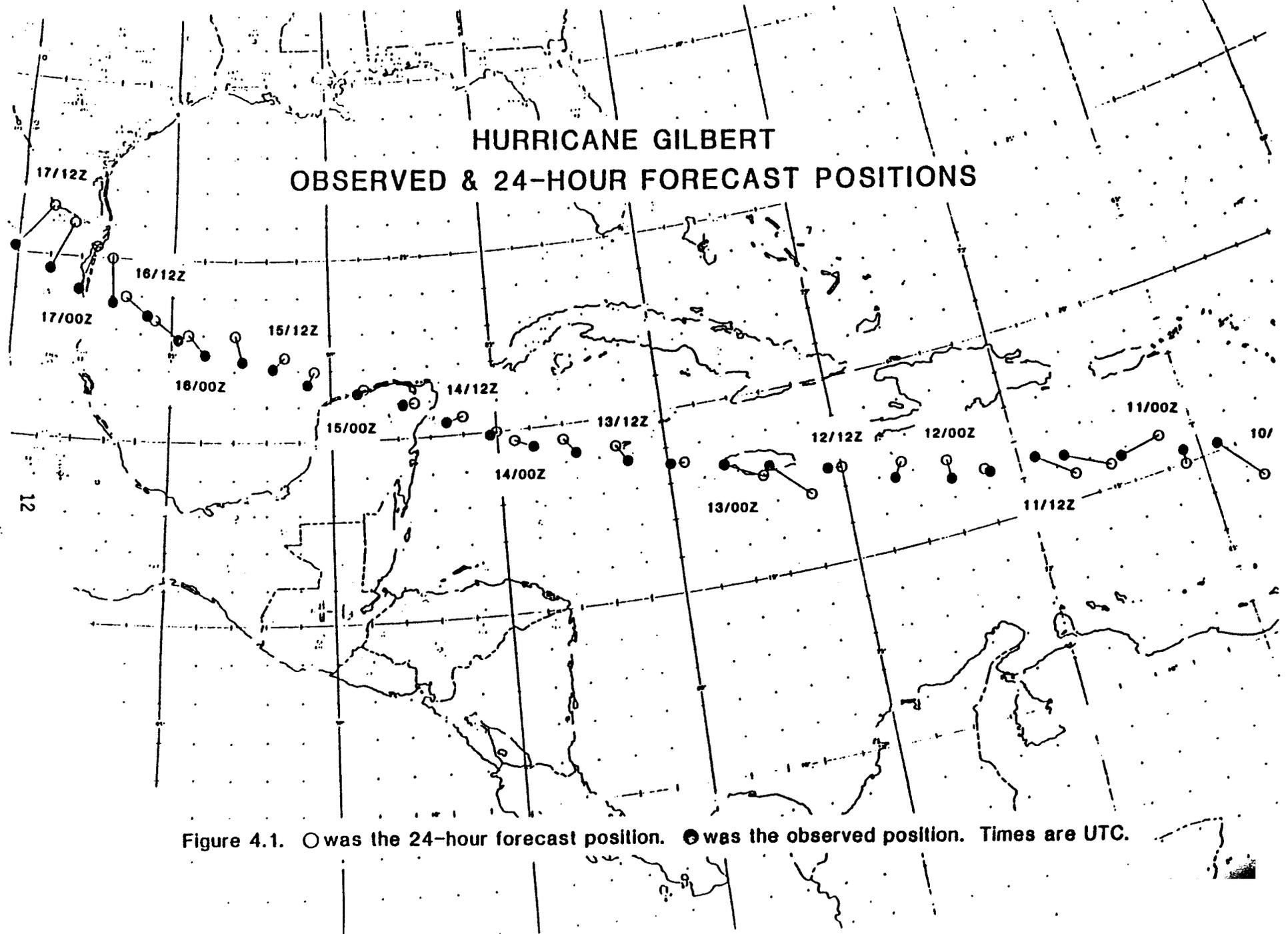


Figure 4.1. ○ was the 24-hour forecast position. ● was the observed position. Times are UTC.

likely elsewhere in the watch area." At 8 PM, the latter part of the message was changed to read: "...elsewhere on the Texas coast." This wording change causes some confusion. Did the phrase "to the north" mean all the way to the northern limit of

TABLE 4.2

Verification of Tide and Surge Forecasts

Location	Forecast	Observed/Estimated
Yucatan Peninsula	8-10 feet + waves	10 feet + 20-25 foot waves
Mexican Coast	7-11 feet	6-10 feet
Texas Coast	?	6 feet on South Padre Island
	?	4.4 feet on North Padre Island
	?	4 feet at Rockport
	4-6 feet	4.2 feet at Galveston
	4-6 feet	3+ feet at Sabine Pass (Port Arthur)

the warning area, or was it meant to cover an area only a short distance north of the eye? Did the phrase "elsewhere in the watch area" imply that the warning area was part of the watch area? Or was there a different tide forecast on another part of the coast that was also in the watch? In any event, specific and accurate tide data were not available in many places; this lack of data was a problem.

The Hurricane Watch for the Texas coast was issued 48 hours in advance of landfall and warnings were posted 33 hours in advance. No adjustments were required for the watch and warning areas (Fig. 4.2). Because of the publicity surrounding the storm and the large size of Gilbert, the public responded unusually well to the warning. In fact, many began preparing to evacuate before the watch advisory was issued.

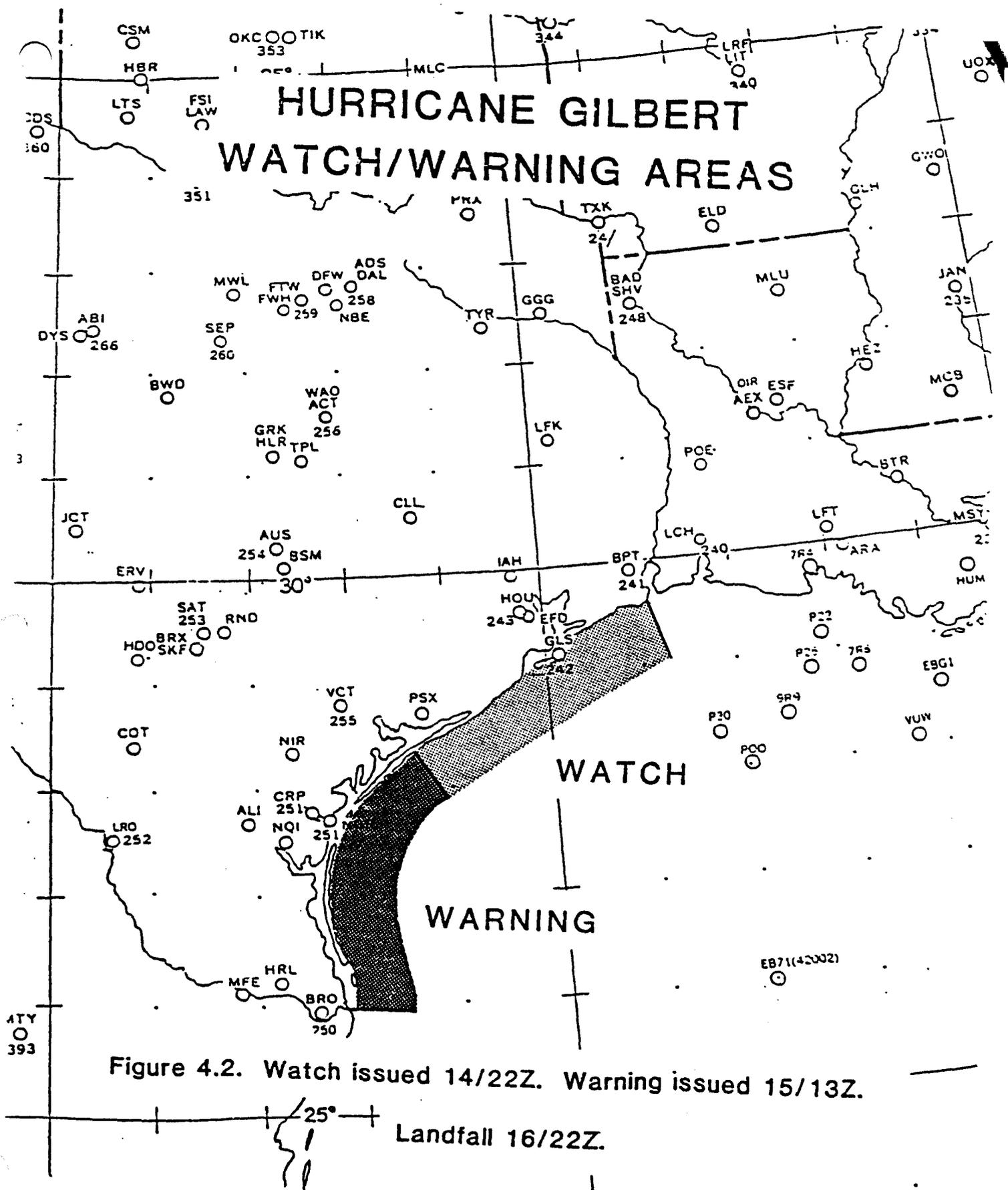
The threat of tornadoes was underplayed by NHC. The first mention in an NHC advisory was on the corrected version of the 11 AM CDT issuance on September 16: "A possible isolated tornado may accompany

the hurricane as it moves inland." The first touchdown was on the 16th at about 9:30 AM CDT near Pharr, Texas, based on National Severe Storms Forecast Center's (NSSFC) rough log. None of the succeeding advisories mentioned more than an isolated threat although tornadoes turned out to be the most significant aspect of the storm in the U.S.

NHC forecasts of rainfall associated with Gilbert predicted 5 to 10 inch storm totals until the 5 AM CDT issuance on the 16th. Amounts were subsequently raised to 10 to 15 inches and further adjusted to mention locally 20 inches on the next advisory at 11 AM. Actual amounts included 5.38 inches at Brownsville, 4.69 inches in east Corpus Christi, and 4.50 inches at Beeville. An unofficial report from the public indicated 8.71 inches near Lamar. Rainfall totals probably ranged upward to between 6 and 7 inches in places near the Mexican border, in areas west of San Angelo and Abilene in Texas, and west and north of Oklahoma City and Tulsa in Oklahoma. Isolated spots undoubtedly received higher amounts. Flooding was minimal. Heavy rains occurred in Mexico but amounts are unknown.

Local EMCs followed, and the media reported the hurricane probabilities issued by NHC. However, the probabilities were not used to trigger any decisions related to evacuation recommendations. Most evacuation recommendations were keyed to the warning advisory. Exceptions to the warning response occurred in the Galveston area. (See Appendix A)

Several media personnel and local officials expressed a desire for the NHC to include a rationale or explanation of the hurricane forecast. In particular, the general question arose: Why was the storm forecast to turn to the northwest or north, while it continued to move to the west-northwest. In



conjunction, most local media people strongly favored direct interviews with NHC.

### Weather Service Offices/Hurricane Local Statements (HLSs)

WSOs bore the brunt of the pressure, workload, and local community attention. The offices along the Texas coast performed admirably before the hurricane made landfall. The WSOs also did a good job of explaining how storm effects would vary depending on Gilbert's track. Afterward, coastal and inland WSOs and the WSFO handled the tornado and flood threats.

HLSs began in the evening (5 PM CDT) of September 14. (Emphasis is placed on statements from Brownsville, Corpus Christi and Victoria since they were in the warning area.) Brownsville spoke in general terms about the storm, explained the role local statements would play, and provided information on possible storm effects as well as the reliability of the forecasts. Corpus Christi listed county officials responsible for evacuation decisions and suggested preliminary preparation activities. Victoria supplied a checklist of useful items to buy and suggested preparatory activities. Brownsville and Corpus Christi both stressed in their early statements the size and strength of Gilbert and they warned that the coast would be affected well before the eye arrived. This fact is often lost since attention is usually focused on the location of the eye. At some WSOs there was a tendency to repeat too much of the information included in the NHC advisories.

The Hurricane Warning in Texas was issued at 8 AM, September 15. By then, WSOs were issuing all specific information available on tides, wave heights, and surf

conditions. However, specific tide information was not available for many places, and this proved to be a serious deficiency in the warning process. In their final storm report, Corpus Christi stated, "...our biggest problem was lack of accurate tide data in Corpus Christi Bay and the remainder of the area bay and inland waterway system." (Please refer to Chapter 3 for further information).

WSO Brownsville performed an excellent job advising the public on the tornado threat. Information on tornadoes was included on the evening of the 15th, 18 hours before the NHC's first mention of tornadoes. Brownsville stated, "The first [rain] bands to move onshore with a hurricane can spawn tornadoes." At 11 PM, the office mentioned that the threat of tornadoes would increase as the storm moved closer. Corpus Christi included the threat of tornadoes in their 5:45 AM statement on the 16th. Information concerning WSO tornado warning performance is included in the next section, Severe Weather.

In the hurricane watch area, WSOs Port Arthur and Houston/Galveston disseminated information on tides, coastal flooding, school closings, and general information and suggestions to prepare for possible evacuation. Both relayed Emergency Management Center suggestions and both warned of increased effects if the hurricane made a northward turn.

A number of local officials in the Brownsville area complained that the media indicated "the worst is over" shortly after the hurricane made landfall, but weather conditions remained hazardous for some time afterward. A check of the local statements indicated Brownsville advised: "Everyone presently in shelters should plan to remain there during the night. All unnecessary travel is strongly discouraged."

Corpus Christi stated: "Public officials in Calhoun County recommend that residents...be patient in returning to their homes." Most offices, as expected, had a heavy telephone and media interview load. These were handled well. Virtually all local officials and media people praised NWS responsiveness and cooperation. There was a large demand for communication in Spanish since much of the population in south Texas is Hispanic. WSFO San Antonio and WSO Brownsville interpreted advisories into Spanish on demand over the telephone. WSFO San Antonio, MIC, Al Dreumont, conducted TV and radio interviews in Spanish. Also, general hurricane preparation material was broadcast in Spanish over the NWWS.

The Padre Isles Property Owners Association rated the quality of service provided by WSO Corpus Christi. Members of this group were asked to complete a questionnaire on Hurricane Gilbert. One question asked respondents to rate the quality of information on NOAA Weather Radio. Of 23 replies 14 rated the service a "5" on a scale of 1 to 5, five others rated it a "4," and no one gave a rating below "3."

### Severe Weather

The only death and most of the injuries and damage caused by Gilbert were from the 29 known tornadoes spawned by the storm. Twenty-one of the 29 storms were in watch areas. Table 4.3 shows a breakdown of tornadoes by watch.

TABLE 4.3

Tornadoes in Watches Issued During Gilbert

Watch Number	Number of Tornadoes	In Watch	Not In Watch
419	12	6	6
420	2	2	0
421	0	0	0
422	12	10	2
423	3	3	0
424	0	0	0
425	0	0	0
<u>427</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	29	21	8

Most of the tornadoes were small, weak, and short-lived. However, one was a killer, four others caused injuries, and several more produced varying amounts of damage.

TABLE 4.4

Verification of Gilbert Tornado Watches Versus Previous Years

	Number Of Watches	Watches With Observed Tornado (%)	POD	FAR	CSI
Gilbert	8	4(50)	.72	.83	.35
1986	197	85(43)	.31	.95	.18
5 years 1982-1986	1135	567(50)	.40	.94	.19
10 years 1977-1986	2129	1008(47)	.32	.95	.17

NSSFC issued eight watches and four were associated with severe weather. The watches and the locations of the 29 tornadoes are detailed in Fig. 4.3, and Fig. 4.4. All times are CDT. Table 4.4 compares NSSFC's performance with verification scores from previous years

WSFO San Antonio and the WSOs in southern Texas alerted the public to the tornado threat. Information included in the HLSs has already been discussed. The

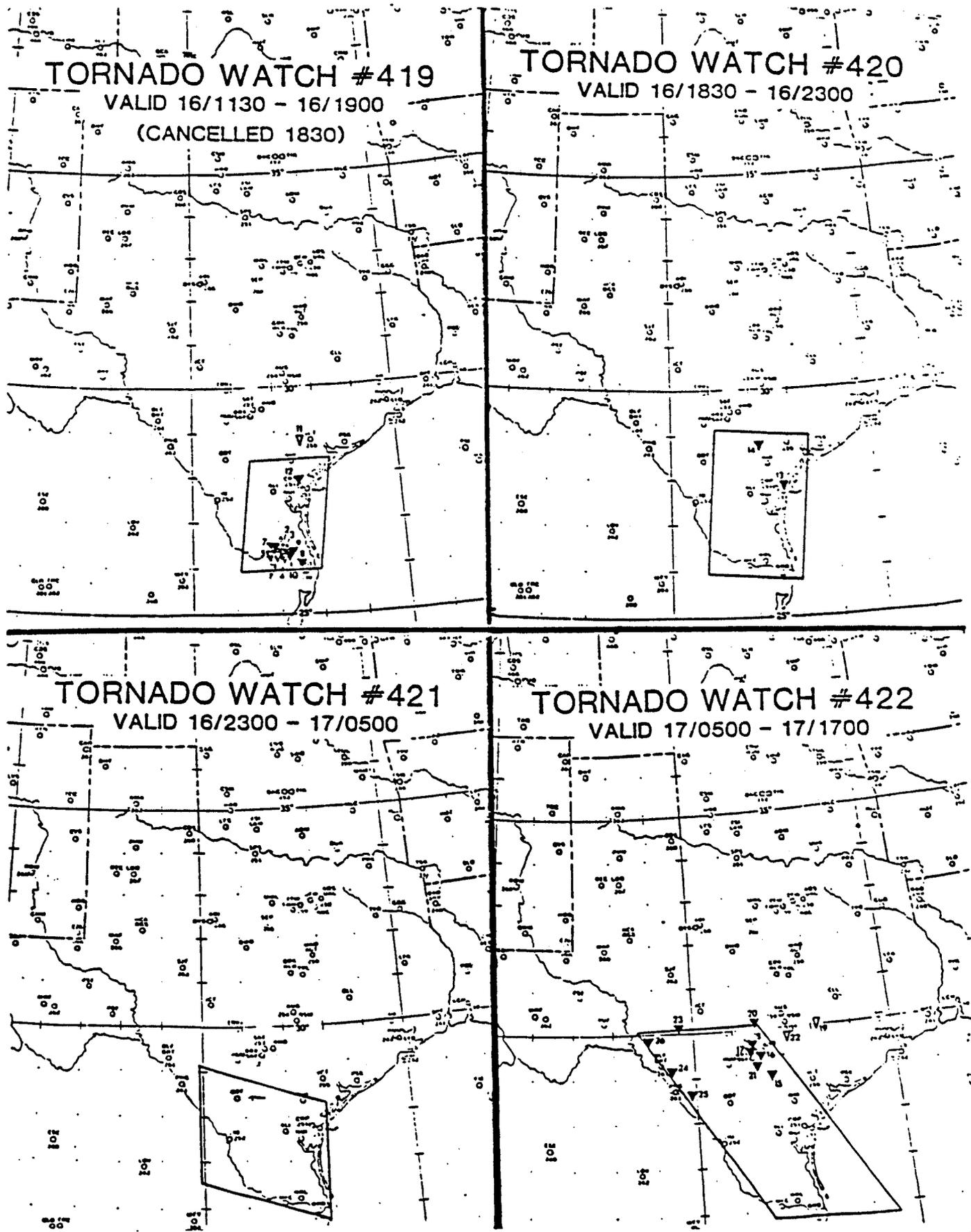


Figure 4.3. All times are CDT. ▼ are tornadoes within the watch area and valid time. ▽ are tornadoes not within the watch area and/or valid time. Numbers correspond to Table 4.5.

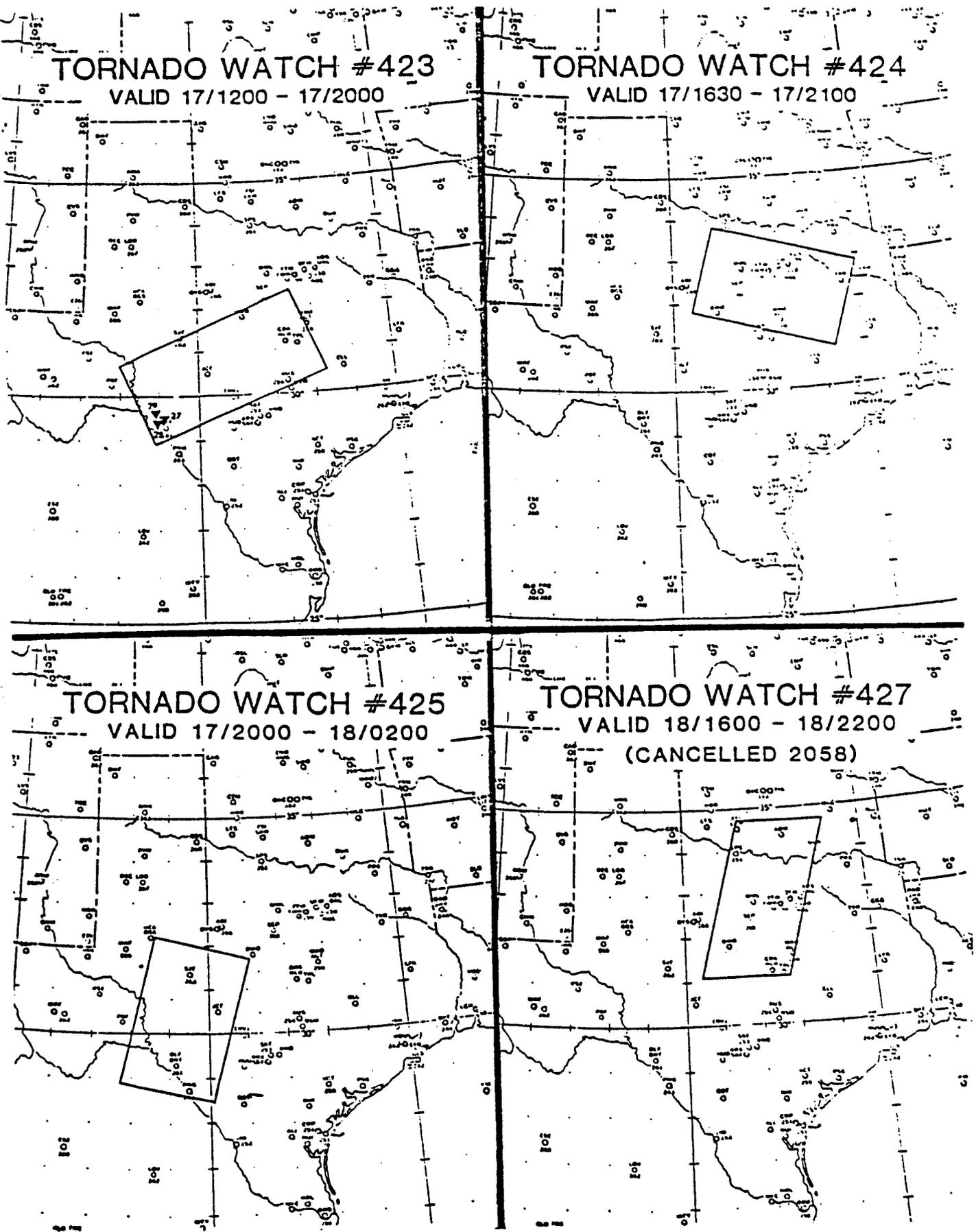


Figure 4.4. All times are CDT. ▼ are tornadoes within the watch area and valid time. ▽ are tornadoes not within the watch area and/or valid time. Numbers correspond to Table 4.5.

**TABLE 4.5  
TORNADOES ASSOCIATED WITH GILBERT**

##	DATE/ TIME	COUNTY	LOCATION	STA- TION	WARN	LEAD TIME	F#	REMARK
1	16/0945	Hildalgo	Pharr	BRO	NO	--	F0	0/0/DM
2	16/1000	Hildalgo	San Juan	BRO	NO	--	F0	0/0/DM
3	16/1045	Hildalgo	San Juan	BRO	NO	--	F0	0/1/DM
4	16/1115	Hildalgo	Donna	BRO	NO	--	F0	0/0/DM
5	16/1118	Hildalgo	McAllen	BRO	NO	--	F0	0/0/DM
6	16/1201	Hildalgo	Edcouch-LaVilla	BRO	NO	--	F0	0/0/DM
7	16/1230	Hildalgo	Edinburg	BRO	NO	--	F0	0/0/DM
8	16/1330	Cameron	Brownsville	BRO	NO	--	F0	0/0/DM
9	16/1400	Cameron	Harlingen	BRO	NO	--	F0	0/0/DM
10	16/1500	Cameron	Harlingen	BRO	NO	--	F1	0/0/D1
11	16/1704	Goliad	5 N Goliad	VCT	NO	--	F0	0/0/0
12	16/1730	Nueces	Corpus Christi	CRP	NO	--	F0	0/0/DM
13	16/2100	Nueces	Corpus Christi	CRP	NO	--	F1	0/0/D1
14	16/2200	Bee	Pettus	CRP	NO	--	F1	0/3/D28
15	17/0510	Karnes	4 W Karnes City	SAT	NO	--	F0	0/0/DM
16	17/0545	Bexar	S Bexar County	SAT	NO	--	F1	0/0/DM
17	17/0649	Bexar	Kelly AFB	SAT	YES	58	F2	1/1/D1
18	17/0730	Bexar	San Antonio	SAT	YES	19	F1	0/3/D6
19	17/0744	Val Verde	5 Sw LaGrange	AUS	NO	--	F0	0/0/DM
20	17/0900	Fayette	Canyon Lake	SAT	NO	--	F0	0/0/DM
21	17/0940	Comal	Near Jourdanton	SAT	NO	--	F0	0/0/0
22	17/1030	Atascosa	Near Prairie Lea	AUS	NO	--	F0	0/0/DM
23	17/1050	Caldwell	W Edwards County	SAT	NO	--	F0	0/0/0
24	17/1213	Edwards	20 N Eagle Pass	SAT	NO	--	F0	0/0/0
25	17/1345	Maverick	3 W Carrizo Springs	SAT	NO	--	F0	0/0/DM
26	17/1420	Dimmit	15 N Comstock	DRT	YES	0	F0	0/0/0
27	17/1745	Val Verde	Del Rio	DRT	YES	5	F2	0/20D3
28	17/1839	Val Verde	Lake Amistad	DRT	YES	59	F0	0/0/0
29	17/1852	Val Verde	Near Comstock	DRT	YES	12	F0	0/0/DM

All times are CDT. All locations are in Texas. Lead time in minutes.

Remarks: #/#/D# = deaths/injuries/damage in millions (DM = minor damage)

threat of severe weather was also included in forecasts and statements. Of the 29 tornadoes, warnings were issued for six. It is remarkable that any warnings were issued considering that most lasted for only a few minutes. In addition, current NWS field radar technology is not capable of detecting this type of severe weather. Despite this, WSFO San Antonio was able to warn for two of the tornadoes in its area of responsibility. WSO Del Rio turned in a truly outstanding performance given today's aging technological systems. There were four tornadoes in their area and they warned for each one.

Table 4.5 lists each of the tornadoes by time, county, location, station, whether a Warning was issued, lead time of warning, F#, and damage remarks. All times are CDT.

Table 4.6 compares the warning performance with previous years based on the official count of tornadoes. The Probability of Detection, or the probability of an event being covered by a forecast or warning, was lower for Gilbert's tornadoes. This was expected since the historical breakdown of tornadoes is F0 (76%), F1 (17%), F2 (5%), where F0 is weakest. The weaker tornadoes are the most difficult to warn for. For previous years (1950-1987), F0's and F1's were 33% and 37%, respectively, of the total warned. Warnings were issued for both F2's that occurred as a result of Gilbert. Because of the nature of hurricane spawned tornadoes, some NWS offices warned for the conditions rather than specific events. Current technology is insufficient for detecting these weaker phenomena. This explains why lead times are considerably longer than in previous years.

TABLE 4.6

Verification of Gilbert Tornado Warnings Versus Previous Years

	Events	Warned	Not Warned	POD	Lead Time
Gilbert	29	6	23	.21	26
1987	696	201	497	.29	12
5 years 1982-1987*	4736	1483	3255	.31	14

\* 1985 data is not available. Lead Time is in minutes.  
POD: Probability of Detection

### Rainfall and River Forecasts

The heavy precipitation forecasters of the National Meteorological Center's Forecast Branch issue quantitative precipitation forecasts (QPF). Twenty-four hour QPFs for September 16, 17, 18, and 19, 1988 and observed rainfall for the same time period are shown in Fig. 4.5 and 4.6.

The areas of heavy rainfall were delineated well, particularly in the period ending on the 19th. The West Gulf River Forecast Center (WGRFC) has forecast responsibility for the Rio Grande which required constant monitoring of the river's tributaries in Mexico. As Gilbert continued moving northwest, a 38-foot rise in less than 18 hours was experienced near Dryden, Texas, above the huge Amistad Reservoir. The excellent, and timely, forecasts provided by the WGRFC were extremely helpful to the International Boundary and Water Commission in safely operating flood control reservoirs in the middle Rio Grande Valley and in operating the engineered floodway systems along the lower Rio Grande. The lack of heavy rain in south Texas on the 16th resulted from the more southerly track of the hurricane.

# RAINFALL

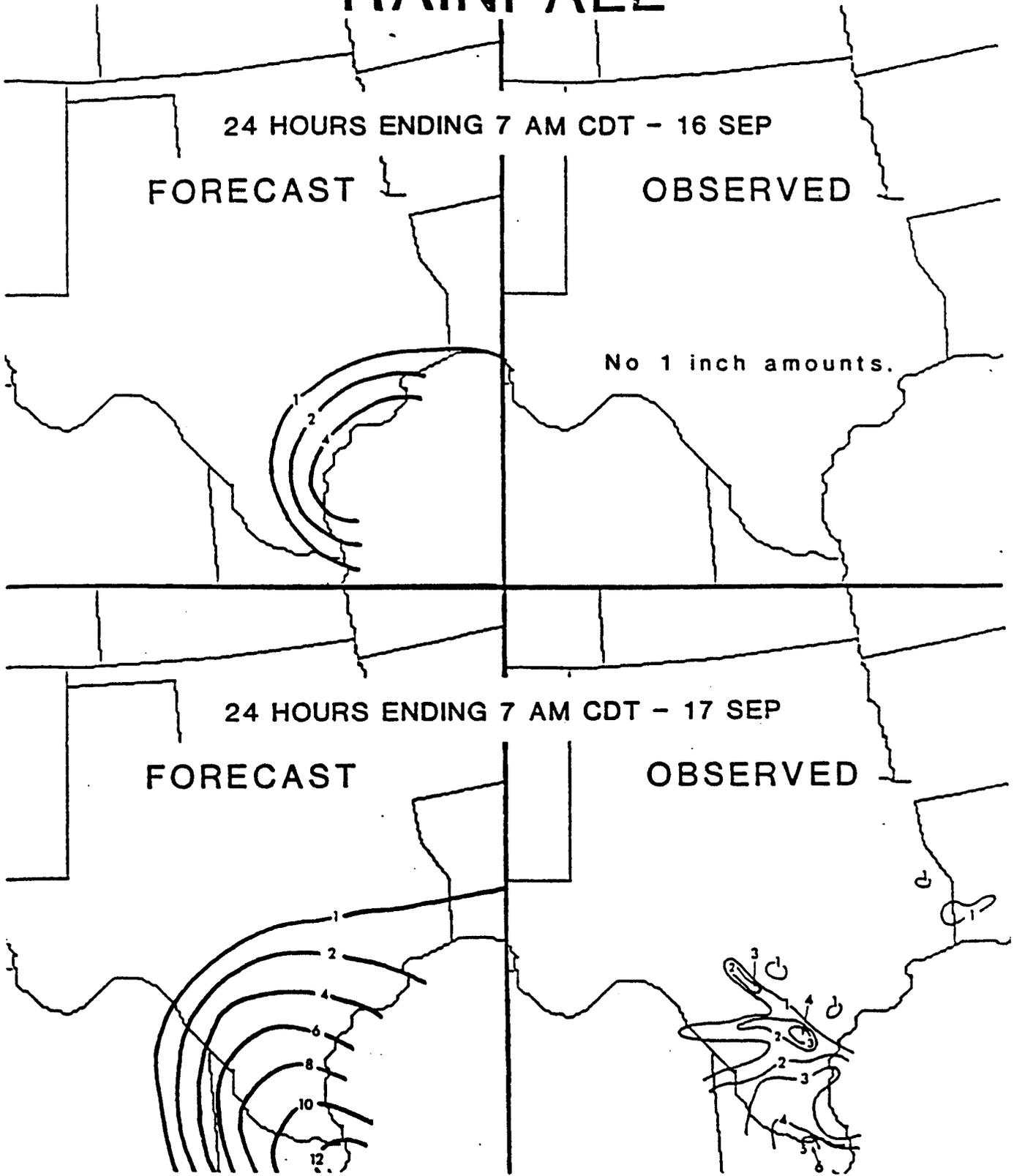
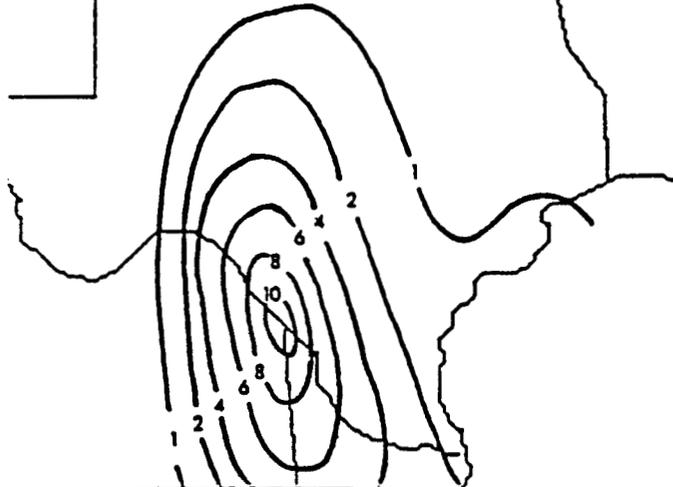


Figure 4.5. Isohyet values are in inches.

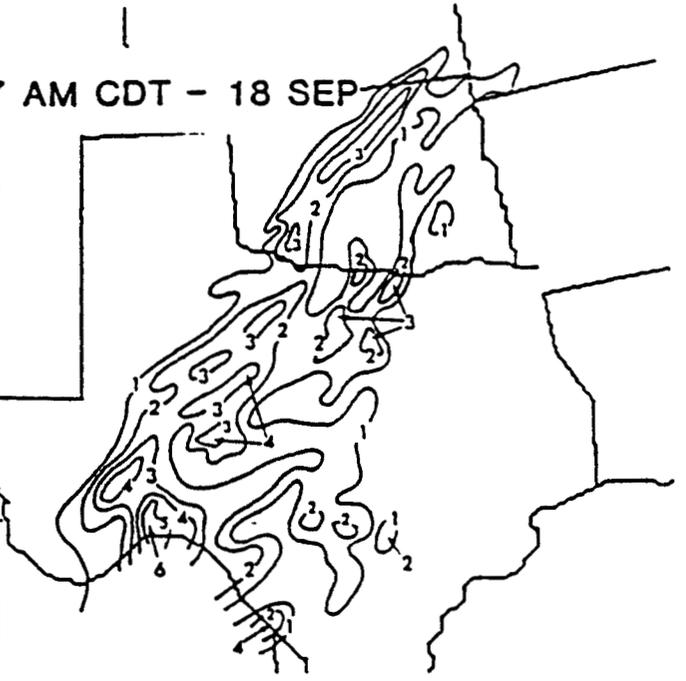
# RAINFALL

24 HOURS ENDING 7 AM CDT - 18 SEP

FORECAST



OBSERVED



FORECAST

OBSERVED

24 HOURS ENDING 7 AM CDT - 19 SEP

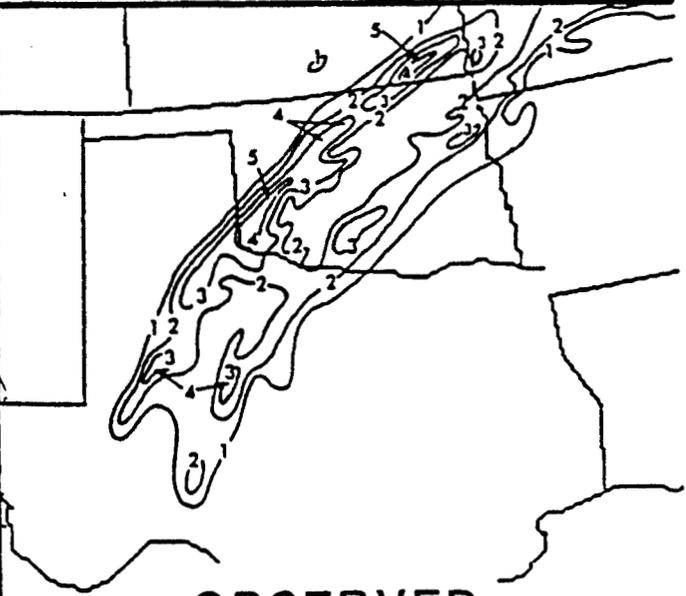
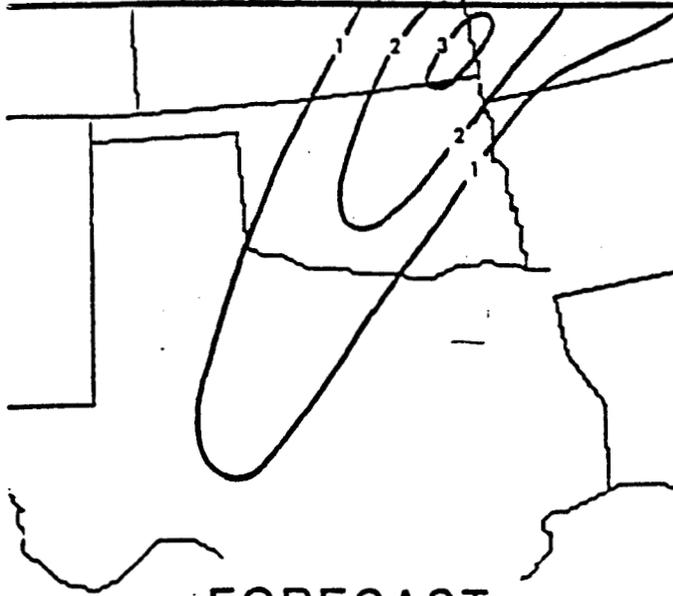


Figure 4.6. Isohyet values are in inches.

## Flooding

Since Gilbert produced relatively little rain in the United States, flooding was limited. WSFO San Antonio issued a flood warning at 3:20 AM CDT, September 18, for the Pecos River at Dryden above Amistad Reservoir. This is in a remote area where a flood stage is not defined. However, the river rose from 6 feet on the evening of the 17th to about 45 feet at 9 AM CDT on the 18th. Three fishing camps at Foster Ranch, about 20 miles downstream from Dryden, were warned and people and property were evacuated. Flooding occurs when the river is above 9 feet; the crest was estimated at over 20 feet.

WSO Del Rio issued two flash flood warnings. The first was for Val Verde County from 9:30 PM CDT on the 17th to 1:30 PM CDT on the 18th. This warning verified when Highway 163 North out of Comstock and Farm Road 1024 near Pandale were closed by high water. The second warning was also for Val Verde County and was issued for the period 9:30 AM CDT to 2:30 PM CDT on the 18th. The Devils River flooded during the warning valid time and a bridge on Highway 163 at Bakers Crossing was under water.

Most of the rain from Gilbert fell in Mexico. The resulting inflow into the Rio Grande River necessitated a release of water by the American and Mexican International Boundary & Water Commission (IBWC) into their respective floodways. The river went 5 feet over the bank at San Benito. Although this flooding is planned for, a statement was issued advising people with vulnerable property to take appropriate action if necessary. Any crops planted in the floodways were lost and livestock had to be removed from the floodways.

In general, operations and coordination among WSFO San Antonio, WSO Brownsville, the West Gulf RFC, and the IBWC went well. However the WSFO service hydrologist indicated that this event only tested the system; it was not a crisis. Potential weaknesses identified include:

1. Better communications between the IBWC at Mercedes and the San Antonio WSFO are needed to keep the RFC informed in a timely manner of water releases through their floodways and dams. This had a significant effect on river and flood forecasts.
2. Outdated current ratings at San Benito. This resulted in erroneous forecasts downstream.
3. The fact that observations and forecasts for Brownsville were being made below the area where flooding occurred. The flow at the downstream location was interpreted upstream, but the gauge needed for this (at the Brownsville Bridge) was removed. Also, downstream current ratings have not been kept up to date as the channel and capacity changed.

## **CHAPTER 5**

### **PUBLIC RESPONSE AND USER BENEFITS**

#### Public Response

The destructive history and size of Gilbert resulted in tremendous public interest and response. As Gilbert formed, interest in the storm rose along the coast. When it became apparent that Gilbert was deadly, destructive and the strongest storm on record, concern rose to great levels. Dr. Neil Frank of KHOU-TV in Houston remarked that he felt the public reacted strongly and quickly, in fact too much so.

He stated that people along the upper coast reacted 24 hours before it was necessary.

Thousands of Texans bought food, batteries, plywood, and other provisions for protection. In Brownsville and Corpus Christi hardware stores were initially sold out of plywood the day before the NHC issued the hurricane Watch for the Texas coast. Other shipments of plywood were sent into the area during the week, and some instances of price gouging were reported.

Many Texans acquired hurricane plotting maps from local TV stations and other businesses. As NHC reported the coordinates of Gilbert's eye, the public followed Gilbert's track. A problem with the fixation on the hurricane eye is that once the eye makes landfall the public may falsely believe that the threat from the hurricane is over. The fixation with the eye may have led local Harlingen newscasters to state "that the worst was over." People with hurricane plotting maps in shelters desired to leave once landfall had been reported.

### Emergency Management Coordinator's Response

All local officials interviewed stated the early issuances of the watches and warnings provided for more effective evacuation decision making. During the threat of landfall, public officials followed hurricane probabilities but did not use them in any public safety decision process. Critical public safety decisions were based on the issuance of the hurricane warning consultations with local NWS managers for reinforcement (the exceptions being in the Galveston/ La Marque area). A high demand among the EMCs existed for personal contact with NWS meteorologists. In fact, local public safety decision makers requested the ability to work closer with the

NWS and to have better, higher resolution data (including graphics).

### User Benefits

For hurricanes, the largest user benefit from NWS information is public safety. EMCs and the public are provided with pertinent meteorological information regarding safety and are given enough input to help with rational, life saving decisions. All evacuation recommendations in lower Texas issued by EMCs were keyed to the Hurricane Warning Advisory. In Brownsville, for instance, the evacuation recommendation for the coast was issued within 1/2 hour of the warning advisory. All EMCs desired a personal interface with an NWS meteorologist to aid them in their decision process.

Other economic benefits accrued to some local businesses and local industries that key production shutdown decisions to NWS advisories and/or probabilities. In the future, as a result of the Modernization and Restructuring of the NWS, the opportunity for more localized information should expand the direct benefits available from NWS services to both public safety decision makers and to private industry via private meteorologists.

## **CHAPTER 6**

### **FINDINGS AND RECOMMENDATIONS BY CHAPTER**

#### CHAPTER 1

##### **\*\*\* Finding 1.1 (The event and its impact)**

Hurricane Gilbert was the most powerful hurricane ever recorded in the Western Hemisphere. Winds measured in excess of 200 mph and the lowest barometric pres-

sure ever recorded were associated with Gilbert.

The passage of Gilbert over the northeast Yucatan Peninsula on September 14 marked the first time since 1969 that a category 5 hurricane made landfall in the Western Hemisphere. After passing over the Yucatan, a weakened Gilbert moved into the Gulf of Mexico on September 15. The west-northwest track persisted in the Gulf, and Gilbert reached the northeast Mexican coast just north of the town of La Pesca during the late afternoon of September 16 as a Category 3 hurricane.

The death toll from Gilbert was 316 people. Mexico reported the most deaths, 202 people. Other death statistics include: United States, 1; Jamaica, 45; Haiti, 30; Guatemala, 12; Honduras, 12; Dominican Republic, 5; Venezuela, 5; Costa Rica, 2; and Nicaragua, 2.

Estimated damage from Gilbert was nearly \$10 billion. Jamaica alone had \$6.5 billion in damage, and the damage to Mexico was between \$1 and \$2 billion. Reports from the Mexican government indicate that more than 60 thousand homes were destroyed. The most extensive damage in the United States was due to tornadoes in San Antonio. The total damage in the United States was estimated at \$33 million.

### **\*\*\* Finding 1.2 (Utility of Watches and Warnings)**

Early hurricane watches and warnings are essential with hurricanes the size and intensity of Gilbert since public evacuation decisions are keyed to these information products. All local officials interviewed stated the early issuances of the watches and warnings provided for a more effective evacuation.

### **\*\*\* Finding 1.3 (User's personal contact with NWS personnel)**

Local National Weather Service Managers are essential participants in the warning and preparedness process. During Gilbert, public officials followed hurricane probabilities but keyed critical actions to the hurricane advisories after discussion with local NWS managers for reinforcement. The one-on-one personal relationship provides the confidence and reinforcement for public safety decisions in a complex, highly stressful environment.

### **\*\*\* Finding 1.4 (Need for higher resolution in NWS products)**

New technologies exist that can provide the opportunity for better understanding and study of hurricane situations. It was apparent from this survey and others that a need for heavy rain and wind speed information on a higher spatial resolution along the coast and over open water exists. Currently, there is a paucity of observations from today's infrastructure. Such information along and near the coast is crucial during hurricane situations, e.g., in routing traffic. An important benefit of the Next Generation Radar (NEXRAD) will be the opportunity to determine winds with a higher spatial resolution than at present. Such information, used in improved HLSs, and, e.g., graphics, should provide local officials important information and additional confidence for evacuation and "all clear" recommendations.

### **\*\*\* Recommendation 1.4**

The NWS should continue its modernization plans. The new technologies associated with Modernization and Restructuring should increase the forecaster's capability to detect and predict weather phenomena on a finer time and

space scale (mesoscale) than is possible now. In addition to improved phenomena detection and product formulation, the NWS recognizes that dissemination of the information to emergency managers and the public is of utmost importance. Modernization and restructuring plans address the need for integrating an ever increasing flow of finer scale information to the forecaster, for rapid formulation of user products, and for rapid dissemination of those products to emergency officials and the public in both graphical and printed form.

## **CHAPTER 2**

### **\*\*\* Finding 2.1 (Proliferation of information)**

Users of weather information, especially EMCs, are becoming more sophisticated and are making more use of computers to display and interpret information. In concert with this trend, the quantity of information and the number of sources is also increasing. During Gilbert, EMCs, other government officials, and the media complained about the large quantity of information they received and about the conflicting nature of the various sources. This growing trend will be a problem if not handled properly. Since the increasing sources of information often conflict, the resulting indecisiveness undermines public safety.

### **\*\*\* Recommendation 2.1**

Given the trend toward more information, EMCs and other government officials responsible for making public safety decisions need to remain up-to-date about the sources and content of the information they receive. They must be able to prioritize the information and make judg-

ments on its value and applicability. The NWS should continue its preparedness activities and continue to educate its users on the content and quality of official NWS forecasts and warning products.

Also, the NWS should continue pursuing better means of conveying public safety information. For example, plans call for the ability to transmit graphics in addition to, or as a substitute to, printed matter. Graphic presentation of watch and warning information should reduce the need for users to absorb large quantities of printed information.

### **\*\*\* Finding 2.2 (Performance of the media)**

The national media tended to sensationalize the situation, whereas the local media stations were more responsive in trying to provide helpful information. However, as reported by George Gavito, acting EMC of Cameron County, and Manuel Hinojosa, City Manager, City of Port Isabel, a problem occurred when newscasters on a local station indicated "the worst was over" as hurricane Gilbert made landfall. Based on this news, people wanted to leave the shelters and return home. Also, Mitch Ammons, EMC of Rockport in Aransas county, felt that Bob Sheets added to the confusion in an interview with CNN when he said that the maximum storm surge was over as the hurricane made landfall. Mitch Ammons felt that this message gave a false sense of security.

### **\*\*\* Recommendation 2.2**

In its preparedness activities, the NWS needs to stress that dangerous weather conditions can occur before and after hurricane landfall. The best local source of information with regard to these conditions is the Hurricane Local Statement (HLS) issued by the local NWS office. Also, local

by the local NWS office. Also, local newscasters aside from the weathercaster should be encouraged to attend preparedness activities and educate themselves about public safety threats associated with hurricanes.

## **CHAPTER 3**

### **\*\*\* Finding 3.1 (Lack of tide information)**

EMCs had a problem in determining tide levels. Tide levels are vital for the decision to evacuate the islands, as most causeways are near sea level. Tide level data are sorely lacking all along the Gulf Coast; most locations don't have gauges, and many that are present are not reliable.

### **\*\*\* Recommendation 3.1**

Dr. Michael Speed of Corpus Christi State University would like to establish a tide gauge network in Corpus Christi Bay, but lacks funding. The Southern Region Headquarters of NWS and NOAA should coordinate with Dr. Speed in his effort and investigate the possibility of cost-sharing. Southern Region Headquarters should also act on the request for an additional HAND-AR unit for Port Mansfield.

In addition, the NWS should initiate a NOAA-wide effort to ensure that an operational network of tide gauges is installed along the Gulf coast. Not only must the tide gauges be installed but effective means for using the data for forecasts must also be instituted.

### **\*\*\* Finding 3.2 (Direct communications link between NWS Offices and Emergency Operating Centers (EOCs))**

The desire by EMCs to speak directly to NWS personnel was found to be widespread, despite the fact that all per-

tinent information is contained in statements issued by the NHC and local NWS offices. Due to the large number of EOCs affected along the Texas coast, direct communication between the NWS and the EOCs was at times impeded, especially telephone communication. Several EMCs felt they were getting too much information in the form of printed statements and had to call the NWS just to get a picture of what was happening. The TLETS provided a continuous stream of information, which was too hard to filter for pertinent material.

### **\*\*\* Recommendation 3.2**

As part of its modernization plans, the NWS recognizes the need for a direct communications link between its offices and local government officials. Finding 3.2 supports the need for a direct link.

Prior to the modernization, the NWS and local communities should pursue other means of direct communication. For example, Mike Pass, MIC of WSO Houston, recommended establishing a "hot-line" between the local office and the EOCs. Such a hot-line was established, for example, between the EOC in Corpus Christi and the local WSO. In the future, additional telephone lines should be considered by each MIC during a hurricane event.

### **\*\*\* Finding 3.3 (External coordination)**

Personnel at Kelly AFB, San Antonio, issued a tornado warning after a tornado had been spotted at 6:35 am CDT by base personnel. The tornado report was not communicated to WSFO San Antonio.

### **\*\*\* Recommendation 3.3**

WSFO San Antonio and Kelly AFB need to review and update their reciprocal communications agreement whereby both are

made aware of spotted tornado touchdowns and tornado warnings in real time.

## CHAPTER 4

### **\*\*\* Finding 4.1 (Performance of National Hurricane Center (NHC))**

The NHC 24 hour landfall forecast was excellent relative to past performances. The NHC watches and warnings provided useful information to local emergency managers for hurricane preparation purposes.

### **\*\*\* Finding 4.2 (Performance of the WSOs and WSFOs)**

The WSOs and WSFOs involved in hurricane Gilbert did an outstanding job. NWS employees worked long hours under considerable pressure. Warnings, forecasts, and statements were generally clear, timely, and accurate. The tornado threat was publicized well in advance through HLSs. Also, as noted in finding 2.2, several local officials complained that certain media indicated "the worst was over" right after Gilbert made landfall; the NWS offices, however, consistently warned about the continuing danger even after landfall.

### **\*\*\* Finding 4.3 (Ability to detect/predict tornados)**

The tornadoes that occurred in south Texas did more damage in the U.S. than the direct effects of hurricane Gilbert and resulted in loss of life. Although the NWS performance in issuing watches and warnings was remarkable considering today's technology, most of the tornadoes occurred before a watch or warning was issued.

### **\*\*\* Recommendation 4.3**

The NWS should continue with its modernization plans. NEXRAD, for example, brings the promise of determining regions of high probability of hurricane induced tornadoes based on in-situ wind fields (vertical and horizontal) and radial velocities within the storms. However, there is little or no experience with the ability of NEXRAD to detect tornadic activity spawned by hurricanes. Conditions associated with tornadoes occurring with hurricane landfall can be quite different than those associated with strong thunderstorms. For the latter situations, the capability of NEXRAD to detect tornadic activity aloft before touchdown has already been demonstrated.

### **\*\*\* Finding 4.4 (Rationale behind NHC forecasts)**

Several local officials expressed a need for a rationale behind the NHC forecast track. A Weathercaster from a local TV station in the Brownsville area said the NHC should tell people why the computers are predicting a trajectory that seems different than what they are plotting themselves; people were confused as to why the forecast track called for a more northerly component, since the storm persisted in its westward movement.

### **\*\*\* Recommendation 4.4**

The NHC should include the rationale behind the forecast track, if feasible given time constraints, in their advisories. The rationale should be written in layman's terms.

### **\*\*\* Finding 4.5 (Tornadoes in NHC advisories)**

There was a lack of emphasis on tornadoes in the NHC advisories and by NSSFC until tornadoes began to strike south Texas.

**\*\*\* Recommendation 4.5**

The NHC should include more information on tornadoes. This is especially true when the main effects of the storm miss the United States, as in Gilbert's case, and other effects, such as tornadoes, take on more importance.

**\*\*\* Finding 4.6 (Content of HLSs)**

There was a tendency by some WSOs to repeat too much of the information in NHC Advisories in their HLSs.

**\*\*\* Recommendation 4.6**

WSOs should ensure that they include only enough information from NHC Advisories to make their HLSs clear.

**\*\*\* Finding 4.7 (Demand for information in Spanish)**

Because of the large Hispanic population of southern Texas, there was a demand for Spanish-speaking NWS employees to answer phones, make broadcasts, and give interviews. Along these lines, WSO Houston has developed an outstanding outreach program to encourage hurricane awareness among the Hispanic community in the greater Houston area. Also, advisories and other information were translated into Spanish on request by WSFO San Antonio and WSO Brownsville. The two offices also gave radio and television interviews, and answered phones in Spanish. A TV station in Harlingen also broadcast hurricane information in Spanish.

**\*\*\* Recommendation 4.7**

The NWS should continue developing a preparedness program to increase service to the Hispanic population.

**\*\*\* Finding 4.8 (Numbering of HLSs)**

The wisdom of numbering HLSs was questioned. No other product issued by WSFOs and WSOs is numbered. In the "heat of battle" it is easy to make a numbering mistake. Necessary corrections add to workload, paper load, and product load on NWS.

**\*\*\* Recommendation 4.8**

The NWS should stop numbering HLSs as well as NHC advisories.

**\*\*\* Finding 4.9 (External communications)**

The River Forecast Center (RFC) was not always informed in a timely manner of water releases by the International Boundary Water Commission (IBWC).

**\*\*\* Recommendation 4.9**

The NWS should strengthen contacts with the IBWC in preparedness activities. In particular, communications facilities should be checked and plans for coordination should be reviewed.

**\*\*\* Finding 4.10 (Outdated river flow information)**

The river current rating at San Benito is outdated.

**\*\*\* Recommendation 4.10**

All ratings on the Rio Grande River should be checked and updated as necessary.

**\*\*\* Finding 4.11 (Need for more river gauges)**

River observations and forecasts for Brownsville are made below the flooding

area. There is no river gauge in the flood-prone area now.

action. The NWS should continue to promote this knowledge in its preparedness activities, especially in light of the trend in the growing number of information sources.

**\*\*\* Recommendation 4.11**

Install a gauge and begin taking observations and making forecasts in the area where flooding occurs, upstream from the present site.

**CHAPTER 5**

**\*\*\* Finding 5.1 (Public response to media coverage)**

Because of the great intensity of Gilbert and the resulting damage inflicted on Jamaica, the Cayman Islands, and the Yucatan peninsula, the hurricane was well advertised by the national media. Also, because of its large size, the threat from Gilbert was very apparent on satellite photos readily available to the public through the media. Due to this history and media coverage, many residents along the Texas coast evacuated earlier than necessary. Several EMCs felt that the national media overstated the weather conditions along the Texas coast just to make news, causing some EOCs to be swamped by telephone calls from all over the country.

**\*\*\* Recommendation 5.1**

While public awareness is inherently a good thing, over-reaction to a potential threat can cause problems if emergency management officials are not prepared to deal with it. Solutions to this problem will evolve slowly with time as the public becomes more educated on the nature of hurricanes, the nature of the NWS watch/warning system, and on the requirements for protective

## APPENDIX

### THE EVACUATION RECOMMENDATION FOR GALVESTON ISLAND

Mr. Doug Matthews, Galveston City Manager and Emergency Management Coordinator, recommended a total evacuation of Galveston Island at 8 PM Thursday, September 15, 1988. Although controversial, most residents and media in the area strongly support the decision. The following is the unfolding of events that led to the evacuation decision as told to the survey team by Mr. Matthews.

Throughout the day, Mr. Matthews was relying on the NWS forecasts that indicated the highest landfall possibility well south of Galveston. Following this forecast, there would be no need to issue an evacuation recommendation for Galveston.

Early in the afternoon, the Port of Galveston received a hard copy forecast (see page A3) from a private meteorological company stating that "... (the company) believes it (Hurricane Gilbert) will go onshore between Galveston and Corpus Christi during the early part of Friday afternoon." This was passed from the mayor to Mr. Matthews.

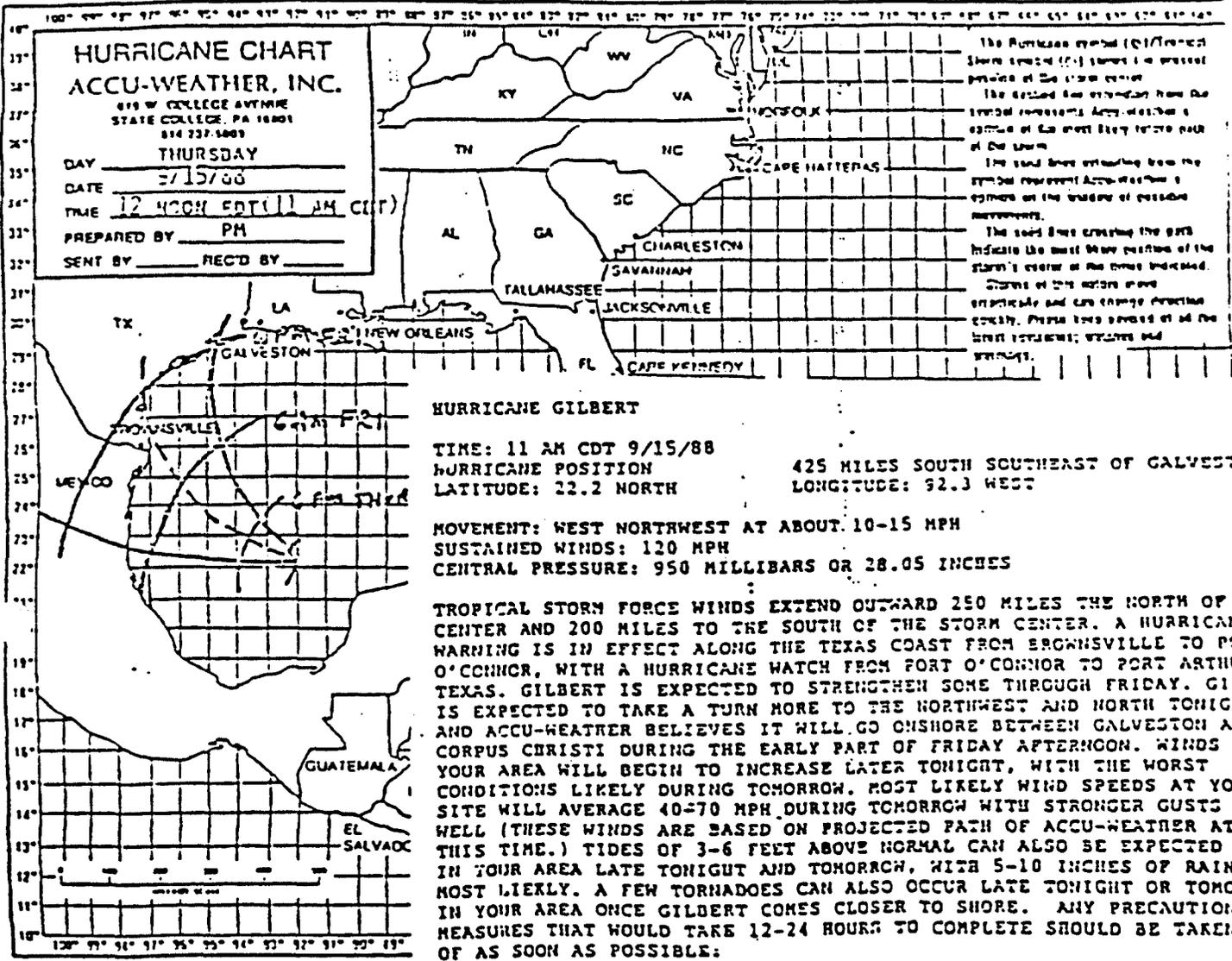
During the afternoon, the private weather service subscribed to by Galveston radio station KILE was also predicting landfall for near the same area.

At 4 PM, the City of La Marque (10 miles north of Galveston on the mainland) recommended evacuation for its citizens.

At 6:20 PM, his staff received via the TLETS a partial ESTED message (see page

A4) that, among other things, relayed the following. "Anticipated point of landfall 20 miles left of Freeport". Freeport is 40 miles southwest of Galveston. Although he and his staff felt the message was just a scenario, the wording was quite ambiguous. In the light of the afternoon's events, Mr. Matthews decided at 7:30 PM to recommend the complete evacuation of the Island. Also at this time, his staff told him that Dr. Sheets had said on CBS's "48 Hours" that the storm was turning to the north. [After reviewing the tape of the "48 Hours" program, it is evident that this was not true and that his staff had misinterpreted the message.]

Mr. Matthews said that he would not have called for the evacuation if he had not received the ESTED message. It was the final straw. See pages ii through viii for newspaper articles and editorials concerning the Galveston evacuation.



The Hurricane symbol (H) (Tropical Storm symbol (TS)) shows the present position of the storm center. The dashed line extending from the tropical depression, tropical storm or storm symbol shows the probable path of the storm. The solid lines extending from the symbol represent Accu-Weather's opinion on the nature of possible movements. The solid lines crossing the path indicate the most likely position of the storm's center at the times indicated. Storms of this nature move erratically and can change direction quickly. Please take account of all the latest instructions, updates and warnings.

**HURRICANE GILBERT**  
**TIME: 11 AM CDT 9/15/88**  
**HURRICANE POSITION** 425 MILES SOUTH SOUTHEAST OF GALVESTON  
**LATITUDE: 22.2 NORTH** LONGITUDE: 92.3 WEST  
**MOVEMENT: WEST NORTHWEST AT ABOUT 10-15 MPH**  
**SUSTAINED WINDS: 120 MPH**  
**CENTRAL PRESSURE: 950 MILLIBARS OR 28.05 INCHES**

TROPICAL STORM FORCE WINDS EXTEND OUTWARD 250 MILES THE NORTH OF CENTER AND 200 MILES TO THE SOUTH OF THE STORM CENTER. A HURRICANE WARNING IS IN EFFECT ALONG THE TEXAS COAST FROM BROWNSVILLE TO PORT O'CONNOR, WITH A HURRICANE WATCH FROM PORT O'CONNOR TO PORT ARTHUR TEXAS. GILBERT IS EXPECTED TO STRENGTHEN SOME THROUGH FRIDAY. GILBERT IS EXPECTED TO TAKE A TURN MORE TO THE NORTHWEST AND NORTH TONIGHT AND ACCU-WEATHER BELIEVES IT WILL GO ONSHORE BETWEEN GALVESTON AND CORPUS CHRISTI DURING THE EARLY PART OF FRIDAY AFTERNOON. WINDS IN YOUR AREA WILL BEGIN TO INCREASE LATER TONIGHT, WITH THE WORST CONDITIONS LIKELY DURING TOMORROW. MOST LIKELY WIND SPEEDS AT YOUR SITE WILL AVERAGE 40-70 MPH DURING TOMORROW WITH STRONGER GUSTS AS WELL (THESE WINDS ARE BASED ON PROJECTED PATH OF ACCU-WEATHER AT THIS TIME.) TIDES OF 3-6 FEET ABOVE NORMAL CAN ALSO BE EXPECTED IN YOUR AREA LATE TONIGHT AND TOMORROW, WITH 5-10 INCHES OF RAIN MOST LIKELY. A FEW TORNADES CAN ALSO OCCUR LATE TONIGHT OR TOMORROW IN YOUR AREA ONCE GILBERT COMES CLOSER TO SHORE. ANY PRECAUTIONARY MEASURES THAT WOULD TAKE 12-24 HOURS TO COMPLETE SHOULD BE TAKEN AS OF AS SOON AS POSSIBLE.

301A

G

EVAC 00007 GSA  
09/15/88 17.15.29  
EVACGSA 14867.GSA0.GSA

TXDPS AUSTIN09-15-88  
HURRICANE STUDY AREA

REF: HURRICANE GILBERT ESTED REPORT NR. 20

PASS THIS MESSAGE TO EMERGENCY MANAGEMENT. BASED UPON COMPUTER ANALYSIS OF SLOSH DATA AND CURRENT WEATHER SERVICE ADVISORY, THE FOLLOWING INFORMATION IS PROVIDED TO ASSIST LOCAL OFFICIALS IN ADVISING CITIZENS OF THE NEED TO EVACUATE. THIS IS NOT A PREDICTION OF LANDFALL BUT A TOOL TO ASSIST IN THE IDENTIFICATION OF THE LATEST ESTIMATED EVACUATION DECISION TIMES FOR COASTAL ZONES.

CURRENT HURRICANE INFORMATION

MOVEMENT SPEED (MPH)	15
WINDSPEED	120
LATITUDE	22.4
LONGITUDE	93.6
WEATHER BULLETIN DATE:	09/15/88 17:00

ANTICIPATED POINT OF LANDFALL  
20 MILES LEFT OF FREEPORT

INTC 00137 REG2 REG3 AGC  
09/15/88 17.29.45

ATTN HD  
IOAA 00130 INTC 00456 AZAA  
09/15/88 17.25.21  
IPAP SATHLSBRO  
TAA00 KBRO 152225  
:ZZZZ

~~BULLETIN~~  
~~HURRICANE GILBERT LOCAL STATEMENT NUMBER 10~~  
~~NATIONAL WEATHER SERVICE BROWNSVILLE TX~~  
125 PM CDT THU SEP 15 1988

..HURRICANE WARNING IN EFFECT FOR THE LOWER TEXAS COAST INCLUDING THE COASTAL COUNTIES OF CAMERON...WILLACY...AND KENEDY IN DEEP SOUTH TEXAS EVACUATIONS HAVE BEEN RECOMMENDED BY LOCAL GOVERNMENT OFFICIALS FOR ALL WATERFRONT COMMUNITIES IN BOTH CAMERON AND WILLACY COUNTIES. THIS INCLUDES PORT ISABEL...PORT MANSFIELD...LAGUNA HEIGHTS...AND LAGUNA VISTA. THESE ACTIONS SHOULD BE COMPLETED BEFORE SUNSET THIS THURSDAY EVENING IF AT ALL POSSIBLE.

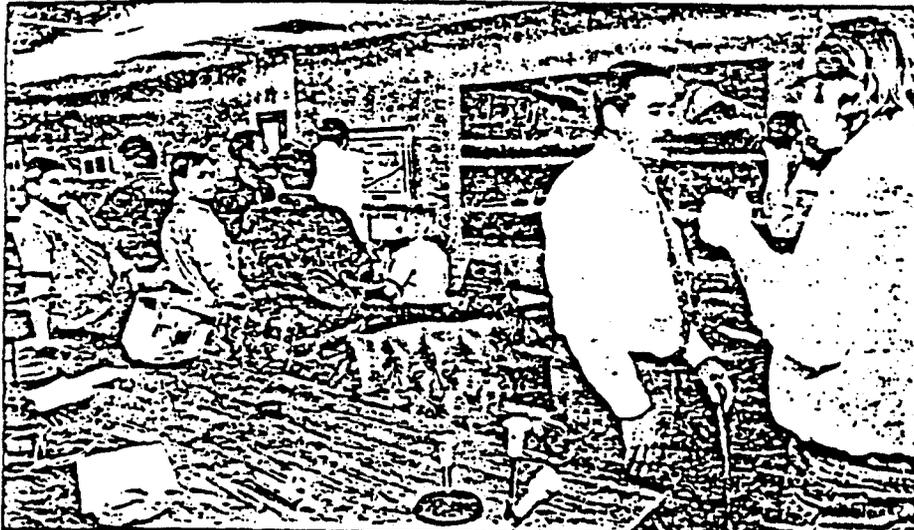
EVACUATION OF ALL COLONIAS AND MOBILE HOMES IN CAMERON AND WILLACY COUNTIES IS STRONGLY RECOMMENDED BY THE NATIONAL WEATHER SERVICE...AND HAS BEEN ADVISED BY LOCAL GOVERNMENT FOR THE AREA EAST OF 1947 IN CAMERON COUNTY.

WINDS HAVE CONTINUED A GRADUAL BUT STEADY INCREASE OVER THE LOWER COAST DURING THE AFTERNOON...AND ARE NOW AVERAGING 20 MPH OR MORE WITH GUSTS

# The Galveston Daily News

SATURDAY MORNING, SEPTEMBER 17, 1968

## Gilbert dupes most of Texas coast



## Matthews in the eye of special kind of storm

By DOLPH TELETON  
The Observer

Galveston City Manager Doug Matthews had not slept more than a few hours Thursday night when he was at the center of a special kind of hurricane — a storm of speculation, uncertainty, fear and confusion.

Yet on Friday morning Matthews' picture was painted mostly at his throat as he was short on information, tired, his eyes heavy.

If Matthews is called by four television news organizations to discuss the emergency operations center it did not show that Matthews had any more sleep than he had the night before.

"It's hard as the top," Matthews said Friday morning. Any time executive orders can be issued, Matthews said, the evacuation of Galveston is a decision that is being made when the storm is still westward of the island.

Matthews said the evacuation was a decision that was made when the storm was still westward of the island.

Galveston Mayor Jan Loefer said Matthews is known by his friends as a conservative and a man who rarely steps up in public but is very sensitive to criticism.

"Doug wants to be a public servant people can be proud of," Loefer said. "He often says he has to do a good job and be nervous — that's what he has to do."

"He cares a lot about his staff, and he is protective of the staff, which is a good thing," Mrs. C. Grubbs said.

Loefer and Houston public relations officer Ray Lee agreed to meet with Matthews, and the volunteers helped out in dealing with the news media this week.

Matthews said he had received from ACCU-Weather the "a private weather service" authorized by the city.

"At 1 p.m. Thursday Matthews' manager brought over a prediction he had received from ACCU-Weather that a private weather service authorized by the city.

"This is a Thursday morning and ACCU-Weather believes that Matthews is known by his friends as a conservative and a man who rarely steps up in public but is very sensitive to criticism.

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## Islanders can return

By JACK STENGLER  
The Observer

GALVESTON — Galveston residents will be allowed to return to the island on Friday if the weather is good and the hurricane threat is removed.

Local emergency officials officials said that the evacuation of Galveston was not necessary.

However, City Manager Doug Matthews said the city's Emergency Operations Center would remain open until 5 p.m. Friday.

"We are 75 percent prepared for the danger we are going to face," Matthews said. "We are going to watch the storm until 10 a.m. in case it turns out to be a bluff or moves back into the Gulf and head our way," Matthews said.

At the same time the hurricane watch was lifted, Matthews announced the end of the evacuation period for city residents.

"We are letting everyone know that the danger is over," Matthews said.

"I have no complaint with the evacuation, but most of those who left the city did so even before the evacuation was recommended Thursday night," Matthews said.

Estimates are 60 percent of the island's residents evacuated, with more than 60 percent of the island before the official evacuation was made.

"I feel like a great big heavy rock has been lifted off my back," the city manager said after the watch was lifted.

"What I'm going to do is to go home tonight and probably sleep for the next two days," he said. "I do have to be ready for a contingency plan."

Matthews said he is very sensitive to criticism and he is very sensitive to criticism. He also said he is very sensitive to criticism.

"I have to push it to the limit," he said. "I have to push it to the limit."

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City Manager Doug Matthews faces a barrage of questions from reporters after a Friday morning press conference

## Residents, others criticize evacuation

By JACK STENGLER  
The Observer

GALVESTON — City Manager Doug Matthews' decision to recommend evacuation of residents from the entire city Thursday night brought criticism, as expected, not only from some Galveston residents but also from Austin and Houston.

Reports from Houston said Matthews did not have the courtesy to notify city officials there that he was recommending evacuation.

"That is completely an error," the city manager said. "Phil Loefer (assistant emergency management coordinator) must notify a pre-set list of Houston officials before we announced our recommendation for evacuation."

"We called everyone on the list, compiled through agreement with Houston, but if someone did not get the word that is his problem."

Doug Matthews

"We called everyone on the list, compiled through agreement with Houston, but if someone did not get the word that is his problem."

Matthews also included in his deliberations on recommending the evacuation a message from the Texas Department of Public Safety reported in the state paper.

The evacuation of the island comes from a computer program developed for the state agency to provide evacuation routes for recommended evacuees in specific coastal areas should a hurricane hit.

Matthews said he considered the evacuation, along with other data and predictions, in making his 4 p.m. Thursday recommendation.

At 1 p.m. Thursday Matthews' manager brought over a prediction he had received from ACCU-Weather that a private weather service authorized by the city.

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# Matthews

Continued from 1-A

but they evacuate, and we evacuated the elderly and handicapped.

"But we went on the radio to answer questions from the public right after we made the decision, and the first thing we heard was they questioned where we got our information, and they called the decision absurd.

"I think it was unfair for Channel 11 to come on at 10:30 p.m. and begin to question the decision made in Galveston only."

It was a long week for Matthews, who said he got through it on "lots of coffee and Tylenol."

The city manager's week was made harder because he underwent knee surgery two weeks ago to repair an old football injury. He aggravated the knee recently in a fall. Hurricane Gilbert interrupted physical therapy sessions for one week, and Matthews hobbled through the week with a cane.

"But, you know, I really haven't had time to think much about fatigue," Matthews said. "I think after all this is over, I'll probably go somewhere and sleep for two days solid. But I feel fine for now."

Matthews was so busy during the week he never got time to board up his own home. He sent his wife, Janice, and two small children to stay with relatives in Beaumont, to better concentrate on running the city's emergency

office, then went to work, rarely taking time off.

Also during the week, Matthews' face was seen coast-to-coast as the world's media focused on the Texas Gulf Coast. A major part of his time was spent answering questions from more than 100 accredited newsmen and women. He was dozed almost constantly by TV crews.

"Doug's very articulate, and Galveston benefits by that," Mrs. Ware said. "People called me from all over the country and commented on how lucky we are to have a city manager who can go on television and represent the city so well."

Dealing with the media is a role Matthews takes seriously, and that was partly responsible for the neat ties and jackets he sported all week.

"Having so many media people around can be somewhat annoying," Matthews said. "But I don't allow them access for notoriety for me. I want the media to know everything I know so they don't exaggerate or miss the main point."

The city manager said he could not grade news coverage of the storm because he's been too busy to watch TV or read the papers.

"When I deal with the media, I think overall I want to portray two things to the people from out of town," Matthews said. "The first is that we are professional people

here in Galveston, and I want to be articulate. Yes, I have made a extra effort to look good because I want to be reflective of what our city is."

Matthews grew up in Galveston. He's the son of Mr. and Mrs. Jon Matthews, 1306 35th St. His mother is dead. Matthews, who is black, was a star halfback on Hal High School's first integrate football team in the late 1940s. "We still have the best record ever compiled by a Hal High team," Matthews said.

He also was captain of the team and vice president of the student council, and he was elected most likely to succeed his class.

"I think it was partly because of being elected most likely to succeed that I decided to come back here after college and go to work," Matthews said.

"I wanted to show people that you really can succeed in Galveston," said Matthews, who is the city's first black city manager.

He was a star football player to Lamar University in Beaumont and that is where he met his wife Janice. Matthews went to work to the city of Galveston in 1974 after graduation from Lamar. He served as assistant city manager under Steve Huffman and was appointed to replace Huffman when he resigned in March 1985.

The Matthews have two children, Murry, 8, and Ashley, 4.

# Criticize

Continued from 1-A

it (Gilbert) will turn more to the northwest and north during Thursday night and come onshore between Galveston and Corpus Christi early Friday.

"I studied that report, and discussed it with Mayor (Jan) Coggeshall and Marchand.

"At the same time another weather service subscribed to by Radio Station KILE also was predicting landfall for the storm in this same area.

Matthews said he learned that afternoon that La Marque was evacuating, and that the Village of Jamaica Beach and the Bolivar Peninsula already had evacuated."

"Although I disagreed with these projections of where the storm would make landfall, I had to consider the question of what if they were right and we were wrong," he said.

The city had decided to close City Hall and halt city services on Friday.

"I called the National Weather Service and, as expected, they could not guarantee the storm would not turn more in our direction."

Matthews said he received the DPS message about 6 p.m. "I read it over five times and just could not believe it. You can ask Ross Polk (assistant city manager) and Dancie Ware (publicist) who were with me," the city manager said.

"I still did not believe the landfall predictions, but here was another document which predicted the storm would come close enough to Galveston to result in

He said he also considered that was the document that resulted in La Marque recommending evacuation.

"This (DPS message) is a public document and I had to consider what if I merely ignored it, and someone found out I had it and made that fact and the message public," he said.

"I didn't want a 'Weathergate,' withholding public information, so I began leaning toward recommending evacuation, even though I still disagreed with the predictions.

"I didn't go out looking for this information, or any information to support recommending evacuation," Matthews said.

"If the DPS information is not intended to be used to help make decisions, then what good was the state spending \$8 million to \$10 million on this program?"

Also, about 6 p.m. the storm had slowed, Matthews said, indicating it could change direction and intensity.

He met with the city department heads at 7:30 p.m. to get their opinions. He said the decision was made to announce a recommendation for evacuation.

"Now, the consideration was when," he said. "If we had made the recommendation earlier, say 4 p.m., those evacuating the island would have gotten caught up in the Houston rush hour traffic.

"If we waited until 10 p.m., many people would have been getting ready for bed and then would have to get ready to leave the city, or if we had waited until the recommended time to begin evacuation of about 2 a.m. Friday everyone would have been asleep

announcement.

"If we waited until 6 a.m. Friday, and the storm did turn, it may have been too late.

"If we had not ordered an evacuation, and they were right and we were wrong, there could have been lives lost," the city manager said.

During Alicia in 1983, the weather service did not notify city officials that storm would hit the city until four hours before landfall, and were predicting it was going inland down the coast, Matthews said.

"Also, past records show that there is only a 70 percent accuracy in predicting the landfall of a storm when it is 15 hours out, and at 30 hours out no one can predict where a storm is going.

"I had said I would make a decision at 8 p.m., so this is what I did," Matthews said.

Other factors in the decision included that all the city's major employers were going to be closed Friday, banks were closed, schools were out and many other businesses in the city were boarded up.

The city's Emergency Management Operations team had plotted four possible paths for the storm and two would have had major impact on the island.

"In Texas we can only recommend evacuation, not order it, and I felt if the public was given all the information we had each person could decide for himself whether to go along with the recommendation or not," Matthews said.

"I made the decision, and can take the criticism. If I had the same situation again, I would

(Front page story)

THURSDAY MORNING, OCTOBER 6, 1959 THE GALVESTON DAILY NEWS 13-A

# City to rely on NWS, Matthews says

By JACK STENGLER  
The Daily News

GALVESTON — Hurricane data from private weather services will no longer be used by City Manager Doug Matthews in making emergency management decisions. "I have a message for all private weather services," Matthews

said Wednesday at the final 1959 meeting of the city's Emergency Management Advisory Committee.

"From now on there will be only one official data source which the city will recognize when dealing with emergency management involving a hurricane.

"From now on we will make

decisions on data from the National Weather Service and not consider predictions issued by any private service," he said.

This arose from predictions by several private services last month that Hurricane Gilbert would strike land between Corpus Christi and Galveston.

They also consistently said the

storm would take a northerly turn, which it did not.

Matthews said in view of all these reports, and other data, including no guarantee the storm would not head toward Galveston, he recommended evacuation of the city.

See CITY, 13-A

## City

Continued from 1-A

"I also have a message for the Texas Department of Public Safety," Matthews said.

He said the city entered the state-sponsored program which deals with predicting evacuation times for coastal areas, the developer Dr. Carlton Ruch of Texas A&M University was speaker at the city's emergency preparedness town meeting three years ago speaking on this program, and the city was cited by the state as a model for the country in use of this program.

During Gilbert's trek, the state sent out a message on the weather bureau wire predicting the storm would hit 20 miles to the left of Freeport.

"Then when this was proved wrong, someone with the DPS in Austin said I misread the message and should not have used it as the basis for recommending evacuation," Matthews said.

"I did not misread it, and I know it was only one tool to be used.

But, it came out on an official wire and with all the other information I was getting at the time about a possible northerly turn of the storm, I could not take a chance.

If I had ignored this message, and the storm hit the island or came close enough to severely damage the area, I'm sure they would have been the first to say they provided the data and I should have used it," the city manager said.

"The DPS cannot have it both ways. I think the governor should look at this department and program and, in light of the money spent on it, the DPS should either support it 100 percent or go away with it," he said.

Matthews said he will also ask the state to put in writing exactly what is needed to activate the Texas State Guard.

During emergency drills the guard has participated in pre-storm and storm management activities, but during Gilbert the city manager made two requests for guard assistance and was refused both times by the DPS.

"They said the guard would only be activated to assist in post-storm activities," Matthews said.

The city manager said he also was criticized because he held too many news conferences.

"If I had not held these news conferences the out-of-town news people would have found some city department head or a man on the street and then would have made their statements the official city policy," he said.

"I feel all information should come from one source," Matthews said.

The committee passed two resolutions, including one to be sent to Texas U.S. senators and local U.S. representatives urging acceleration of the timetable for installing the new doppler radar system in the county.

The other urges the federal government not to discontinue use of hurricane hunter aircraft in gathering storm data.

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# Houston Chronicle

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## Editorials

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### On side of caution

It is easy to criticize Galveston city officials for the decision to recommend evacuation of the island in the face of Hurricane Gilbert, and for what apparently was the basis of that decision. It's easy, and somewhat justified.

Galveston City Manager Doug Matthews recommended evacuation after reviewing a Department of Public Safety computer analysis, prepared by Texas A&M University, which he interpreted as predicting the hurricane would make landfall nearby in Brazoria County. That would have been a quite dangerous situation. The DPS says it periodically transmits these advised evacuation schedules based on a theoretical direct hurricane-hit on particular areas. The DPS says it sent nothing that said the hurricane would hit near Galveston.

The DPS message may have been subject to misinterpretation. Nevertheless, decisions should be based on official National Weather Service information.

This all sounds like some of the "fog" that typically surrounds an oncoming-hurricane situation, where there is a great deal of information coming from different sources. All that remains to be sorted out.

So be it. Galveston is an individual case and those involved will have to deal with it. Fair enough.

We would offer the thought, however, that in the aftermath of this hurricane alert there is going to be a whole lot of second-guessing, in both public and private sector, and an orgy of overbashing is not in anybody's best interest. In fact, it could be counterproductive in the future.

Time, effort and money expended and inconveniences suffered, which turn out in hindsight not to have been necessary, are awfully tempting targets. The problem is that if the criticism is overdone and isn't tempered with judgment, it can tend to make people reluctant to make decisions the next time and others reluctant to heed the decisions.

10/9/88

# Using only NWS a wise decision

In a decision that makes a lot of sense, Galveston City Manager Doug Matthews has announced that only the National Weather Service will be a recognized source of information as the city deals with hurricane alert situations.

The *Galveston Daily News* has run guest columns written by NWS employee Bob Fields (though he stresses that he writes as an individual and not as a NWS employee, which have graphically depicted the very real dangers created by conflicting forecasts in emergency situations.

While the forecasting of the weather remains, at best, a very inexact science, the NWS is as authoritative a source as is available — it provides, in fact, the basic information upon which, in most if not all cases, other services base their own predictions.

And NWS predictions are conservative, responsible ones. The NWS and the National Hurricane Center, during the time Gilbert was approaching and was in the Gulf of Mexico, consistently pointed to landfall in the Brownsville area. The two also, however, consistently included "alerts" that the storm *could* turn north and that coastal residents should remain wary.

In contrast, private weather services and broadcast forecasters "authoritatively" predicted landfall in a host of different locations.

The danger in that, of course, was accurately characterized in the fable of the boy who cried "Wolf!" so often that no one believed him when the wolf really came.

Doug Matthews' announcement this week effectively removes the "Cry Wolf!" potential.

## Looking back

25 years ago

Oct. 7, 1963 — Construction of a \$1,050,000 marine aquarium will begin in Galveston sometime in January. Jack Dismukes, president of Galveston Marine Aquarium, Inc. said today.

Dismukes appeared before the city zoning commission this morning with a request that the zoning of a portion of 38 acres of land owned by the company 115 feet west of the five-mile road near the Hilltop Motel be changed from residential to a business zone.

MIAMI, Fla. (AP) — Hurricane Flora lashed Cuba today for the fourth day in a row, dealing a

crushing blow to the already staggering economy of Fidel Castro's communist regime.

Half of the island's sugar, rice, coffee, cotton and cocoa crops were reported wiped out by the wind and the torrential rain, and Flora was far from through with Cuba. At 7 a.m. she had started to move once again across the stricken nation.

Mrs. E.B. Vogelpohl Jr., one of Galveston's busiest volunteers in community work, has been honored by being selected "Penelope of The Year" at the national convention of the Daughters of Penelope in San Diego.

## The Galveston Daily News

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