

PRELIMINARY REPORT

HURRICANE ELENA

28 AUGUST-4 SEPTEMBER

SYNOPTIC HISTORY

A WELL ORGANIZED CLOUD PATTERN MOVED OUT OF THE SAHARA DESERT AND WAS FIRST IDENTIFIED ON SATELLITE IMAGERY NORTH OF THE CAPE VERDE ISLANDS ON 23 AUGUST. THE UNUSUALLY FAST 30 KNOT WESTWARD MOTION, COMBINED WITH THE DRY SAHARAN AIR MASS SURROUNDING THE DISTURBANCE, APPARENTLY INHIBITED THE FORMATION OF A TROPICAL CYCLONE UNTIL THE SYSTEM APPROACHED CUBA THE EVENING OF 27 AUGUST. THE RAPID MOTION WAS THE RESULT OF A STRONG HIGH PRESSURE RIDGE BUILDING WESTWARD ACROSS THE ATLANTIC NORTH OF THE TROPICAL DISTURBANCE.

ELENA WAS NAMED ON 28 AUGUST WHEN THE CENTER WAS OVER CENTRAL CUBA AND RECONNAISSANCE AIRCRAFT MEASURED 45 TO 50 KNOT WINDS NORTH OF THE CENTER. IT MIGHT BE INTERESTING TO NOTE THAT THE CENTRAL PRESSURE DROPPED 9 MB WHILE THE CENTER WAS MOVING OVER CUBA. AFTER MOVING INTO THE GULF OF MEXICO NORTH OF HAVANA,

ELENA QUICKLY STRENGTHENED TO A HURRICANE ON 29 AUGUST. A MARKED DECREASE OF ELENA'S FORWARD MOTION BEGAN THE NEXT DAY AS STEERING CURRENTS COLLAPSED WITH THE APPROACH OF A FRONTAL TROUGH FROM THE NORTHWEST. ELENA TURNED AND TOOK AN EASTWARD COURSE FOR THE NEXT 36 HOURS IN RESPONSE TO A LOW PRESSURE SYSTEM MOVING RAPIDLY ACROSS PENNSYLVANIA INTO THE ATLANTIC. THE HURRICANE THEN STALLED OFF THE WEST COAST OF FLORIDA. DURING THIS PERIOD ELENA MAINTAINED

MAXIMUM WINDS OF AROUND 90 KNOTS.

AS PRESSURE BEGAN BUILDING OVER THE EASTERN U.S. ON 1 SEPTEMBER, THE HURRICANE ONCE AGAIN RESUMED A GRADUAL ACCELERATION TOWARD THE WEST NORTHWEST WITH INCREASING STRENGTH. THAT AFTERNOON, ELENA'S MINIMUM PRESSURE OF 951 MB WAS MEASURED BY NOAA RECONNAISSANCE AIRCRAFT. MAXIMUM WINDS WERE ESTIMATED TO BE 110 KNOTS. THE CENTER OF ELENA MADE LANDFALL NEAR BILOXI, MISSISSIPPI ON THE MORNING OF 2 SEPTEMBER.

METEOROLOGICAL STATISTICS

MAXIMUM WINDS REPORTED ON THE COAST WERE ON DAUPHIN ISLAND, ALABAMA WITH SUSTAINED WINDS OF 92 KNOTS AND GUSTS TO 118 KNOTS RECORDED. SOME OF THE HIGHER GUSTS OBSERVED WERE: GULFPORT, MISSISSIPPI 105 KNOTS, PASCAGOULA, MISSISSIPPI 100 KNOTS, PENSACOLA, FLORIDA 80 KNOTS, BILOXI, MISSISSIPPI 78 KNOTS, CEDAR KEY, FLORIDA 65 KNOTS, CLEARWATER BEACH, FLORIDA (NEAR TAMPA) 60 KNOTS, MOBILE, ALABAMA 52 KNOTS, KEY WEST, FLORIDA 48 KNOTS AND SLIDELL, LOUISIANA (NEAR NEW ORLEANS) 44 KNOTS.

THE LOWEST PRESSURE OBSERVED ON THE COAST WAS 953 MB AT PASCAGOULA, MISSISSIPPI. LOWEST PRESSURE OBSERVED BY A NOAA RECONNAISSANCE AIRCRAFT AT THE TIME OF LANDFALL WAS 959 MB.

TIDES WERE GENERALLY 3 TO 6 FEET ABOVE NORMAL ALONG THE COAST FROM GRAND ISLE, LOUISIANA TO SARASOTA, FLORIDA. THE LENGTH OF TIME AND AREA COVERAGE BY THESE HURRICANE PRODUCED TIDES WERE MOST UNUSUAL. THE MAXIMUM STORM SURGE WAS 10 FEET NEAR APALACHICOLA, FLORIDA WITH REPORTS OF BETWEEN 6 AND 8 FEET ON DAUPHIN ISLAND AND ALONG THE

COASTAL SECTIONS AROUND PASCAGOULA, MISSISSIPPI.

STORM RAINFALL TOTALS ALONG THE COAST RANGED FROM LESS THAN 2 INCHES AT KEY WEST, FLORIDA TO MORE THAN 11 INCHES AT APALACHICOLA, FLORIDA. INLAND, HEAVY RAINS IN NORTH CENTRAL ARKANSAS WERE IN EXCESS OF 8 INCHES AT A FEW LOCATIONS, BUT WERE MAINLY LESS THAN 2 INCHES.

THERE WERE SEVERAL TORNADOES IN CENTRAL FLORIDA DURING THE PERIOD ELENA WAS STALLED OFF THE WEST COAST OF FLORIDA. A NUMBER OF MOBILE HOMES PARKS NORTHEAST OF TAMPA SUSTAINED SEVERE DAMAGE WITH SOME INJURIES, BUT NO FATALITIES. AT LEAST A DOZEN TORNADOES WERE ALSO REPORTED IN COASTAL AREAS OF MISSISSIPPI, HOWEVER DAMAGE WAS LOCALIZED AND IT COULD NOT BE DETERMINED HOW MUCH OF THE DAMAGE WAS PRODUCED BY TORNADOES. MOST DAMAGE APPEARED TO BE FROM SEVERE SQUALLS.

CASUALTY AND DAMAGE STATISTICS

MORE THAN ONE HALF MILLION PEOPLE EVACUATED LOW-LYING COASTAL AREAS DURING THE APPROACH OF ELENA, WITH A LARGE SECTION OF THE MIDDLE GULF COAST BEING ASKED TO EVACUATE TWICE. THIS IS THE LARGEST NUMBER OF PEOPLE EVER EVACUATED AND MAY HAVE CONTRIBUTED TO THE FACT THERE WERE NO DEATHS IN THE AREA OF LANDFALL. THE FOUR DEATHS REPORTED WERE ATTRIBUTED TO FALLING TREES, AUTOMOBILE ACCIDENTS AND HEART ATTACKS. THE RED CROSS REPORTED 134 PEOPLE WERE HOSPITALIZED WITH 98 OF THIS TOTAL BEING STORM PRODUCED INJURIES AND THE REMAINDER STRESS RELATED PHYSICAL PROBLEMS.

SOME OF THE STATISTICS RELEASED BY THE RED CROSS WERE:

1. 760 SHELTERS HOUSED ABOUT 537,000 PERSONS.
2. 294 SINGLE FAMILY HOMES WERE DESTROYED WITH 1,808 SUFFERING

MAJOR DAMAGE AND 15,381 MINOR DAMAGE.

3. 541 MOBILE HOMES WERE DESTROYED WITH 1,268 SUFFERING MAJOR DAMAGE AND 1,374 MINOR DAMAGE.

4. 239 APARTMENTS OR CONDOMINIUMS WERE DESTROYED WITH 423 SUFFERING MAJOR DAMAGE AND 1,486 MINOR DAMAGE.

INSURED LOSSES FROM ELENA RANKED AS THE FOURTH LARGEST ON RECORD WITH A TOTAL OF 543 MILLION DOLLARS REPORTED BY THE AMERICAN INSURANCE SERVICES GROUP. ESTIMATES OF THE TOTAL ECONOMIC LOSS FROM ELENA WILL LIKELY EXCEED ONE BILLION DOLLARS.

FORECASTS AND WARNINGS

PRIOR TO REACHING THE CENTRAL GULF COAST THE TRACK OF ELENA, WITH THE EXCEPTION OF THE VERY RAPID MOTION, WAS TYPICAL OF THE CAPE VERDE-TYPE SYSTEM IN AUGUST. THEREAFTER, A 3-DAY ENCOUNTER WITH A FALL-TYPE FRONTAL LOW PRESSURE SYSTEM ALMOST BROUGHT THE CENTER BACK TO THE FLORIDA WEST COAST BEFORE IT TURNED TO A WEST NORTHWEST COURSE ON 1 SEPTEMBER. THE ERRATIC PATH ELENA TOOK IN THE GULF OF MEXICO CREATED A DIFFICULT FORECAST PROBLEM WHICH REQUIRED HURRICANE WARNINGS TO BE ISSUED AT ONE TIME OR ANOTHER FROM MORGAN CITY, LOUISIANA TO SARASOTA, FLORIDA. IN FACT, THE AREA FROM SOUTHEAST LOUISIANA TO THE FLORIDA PANHANDLE WAS UNDER A HURRICANE WARNING ON TWO DIFFERENT OCCASIONS (SEE ATTACHED FORECAST TRACK AND WARNING MAPS). THE NEAR COAST MOVEMENT PRODUCED HURRICANE WINDS OVER ONE OF THE MOST EXTENSIVE GULF COASTAL SECTIONS ON RECORD.

TABLE 1 SHOWS THE PROBABILITY PERCENTAGES IN EFFECT AT THE TIME WATCHES AND WARNINGS WERE ISSUED. IN MOST CASES 72-HOUR PROBABILITIES WERE 25 PERCENT OR MORE WHEN HURRICANE WARNINGS WERE ISSUED.

TABLE 1

PRELIMINARY BEST TRACK - HURRICANE ELENA

28 AUGUST - 4 SEPTEMBER 1985

<u>DATE</u>	<u>TIME</u> (GMT)	<u>POSITION</u>		<u>PRESSURE</u> (MB)	<u>WIND</u> (KT)	<u>STAGE</u>
		<u>LAT.</u>	<u>LONG.</u>			
8/28	0000	19.8	74.0	1012	30	Tropical Depression
	0600	20.8	76.0	1010	30	" "
	1200	21.8	78.0	1008	30	" "
	1800	22.6	80.0	1006	45	Tropical Storm
8/29	0000	23.2	81.8	1004	50	" "
	0600	24.0	83.5	1000	55	" "
	1200	25.0	85.0	994	65	Hurricane
	1800	25.9	85.8	990	70	"
8/30	0000	26.6	86.6	986	75	"
	0600	27.3	87.2	980	80	"
	1200	27.9	87.3	974	90	"
	1800	28.3	86.8	978	90	"
8/31	0000	28.4	86.0	977	90	"
	0600	28.6	85.3	976	90	"
	1200	28.8	84.4	975	90	"
	1800	28.8	84.0	974	90	"
9/01	0000	28.8	83.8	971	95	"
	0600	28.6	83.9	965	100	"
	1200	28.6	84.2	961	105	"
	1800	28.9	84.8	954	110	"
9/02	0000	29.4	85.9	953	110	"
	0600	29.7	87.3	957	105	"
	1200	30.2	88.8	959	100	"
	1800	31.0	90.4	990	60	Tropical Storm
9/03	0000	31.9	91.8	1000	45	" "
	0600	32.4	92.8	1004	30	Tropical Depression
	1200	33.2	93.7	1006	25	" "
	1800	34.5	94.0	1008	25	" "
9/04	0000	35.9	93.9	1010	20	" "
	0600	37.0	93.2	1010	20	" "
	1200	38.0	92.5	1010	20	" "
	1800	38.8	91.4	1010	20	" "
Landfall at:						
9/02	1300	30.4	89.2	959		Hurricane