Lessons Learned

Hurricanes Katrina & Rita

Louisiana Office of Homeland Security and Emergency Preparedness*
1776 Independence Boulevard
Baton Rouge, Louisiana 70806

Louisiana Office of Homeland Security & Emergency Preparedness* Lessons Learned

Event Name: Hurricane Katrina/Rita
Duration: 26 AUG – 29 NOV 2005

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* The functions of the Louisiana Office of Homeland Security and Emergency Preparedness were transferred to the Office of the Governor by Act 35 of the First Extraordinary Session of 2006 of the Louisiana Legislature, under the title, Governor's Office of Homeland Security and Emergency Preparedness.

Glossary of Terms and Acronyms

Advisory – Official information issued by tropical cyclone warning centers describing all tropical watches and warnings in effect along with details concerning location, intensity and movement as well as precautions that should be taken.

Contra-flow –Utilizing all lanes of traffic exiting evacuation area

COG- Continuity of Government

COOP- Continuity of Operations

EOC – State Emergency Operations Center

E-Team – Automated Emergency Management software used by State and Parish Emergency Operations Centers

Eye - The relatively calm center of the tropical cyclone that is more than one half surrounded by wall cloud.

FEMA - Federal Emergency Management Agency

Gale warning – A warning of 1- minute sustained surface winds in the range of 39 mph to 54 mph or greater regardless of duration that are either expected or observed over land.

Hurricane/Typhoon – A warm-core tropical cyclone in which the maximum sustained surface wind is 74 mph or more. The term hurricane is used for Northern Hemisphere cyclones east of the International Dateline to the Greenwich Meridian. The term typhoon is used for Pacific cyclones north of the Equator west of the International Dateline.

Hurricane Warning – A warning that sustained winds 74 mph or higher associated with a hurricane are expected in a specified coastal area in 24 hour or less. A hurricane warning can remain in effect when dangerously high water or a combination of dangerously high water and exceptionally high waves continue, even though winds may be less than hurricane force.

Hurricane Watch – An announcement of specific coastal areas that a hurricane or an incipient hurricane condition poses a possible threat, generally within 36 hours.

Lat. – Latitude

Long. – Longitude

Saffir-Simpson Scale – A scale used to define hurricane strength

Category 1 74-95 mph wind speed
Category 2 96-110
Category 3 111-130
Category 4 131-155
Category 5 156+

Shelter task force – Northern Louisiana Parishes outside of SE or SW Hurricane Task Force Areas that coordinate shelter openings in the northern portion of Louisiana

SITREP – Situation report

Storm Surge – An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the cyclone. Storm surge is usually estimated by subtracting the normal or astronomic high tide from the observed storm tide.

Southeast hurricane task force – Task force made up of Southeast Louisiana Parishes that are subject to coastal hurricane effects

Southwest hurricane task force – Task force made up of Southwest Louisiana Parishes that are subject to coastal hurricane effects

Tropical Cyclone – A warm-core, nonfrontal low pressure system of synoptic scale that develops over tropical or subtropical waters and has a definite organized surface circulation.

Tropical Depression – A tropical cyclone in which the maximum sustained surface wind speed is 33 mph or less.

Tropical Disturbance – A discrete tropical weather system of apparently organized convection – generally 100 to 300 nautical miles in diameter-originating in the tropics or subtropics, having a non-frontal migratory character, and maintaining its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field.

Tropical Storm – A tropical cyclone in which the maximum sustained winds within the range of 39 to 74 mph that are expected in a specified coastal area within 24 hours or less.

Tropical Storm Warning – A warning for tropical storm conditions including sustained winds within the range of 39 to 73 mph that are expected in a specified coastal area within 24 hours or less.

Tropical Storm Watch – An announcement that a tropical storm poses or tropical storm conditions pose a threat to coastal areas generally within 36 hours. A tropical storm watch should normally not be issued if the system is forecast to attain hurricane strength.

Tropical Wave – A trough or cyclonic curvature maximum, in the trade-wind easterlies. The wave may reach maximum amplitude in the lower middle troposphere.

Executive Summary

The storm named "Katrina" began as a Tropical Depression in the Atlantic Ocean on Tuesday, August 23, 2005. "Hurricane Katrina" morphed into the largest catastrophic incident ever to strike the United States. The storm made landfall at Buruas, Louisiana on Monday, August 29 at 6 a.m. By Tuesday, August 30, 2005, over one-third of Louisiana's economy was destroyed, 1.5 million Louisiana citizens were displaced, and one of the nation's jewel cities, New Orleans, lay in shambles.

The Louisiana Office of Homeland Security and Emergency Preparedness (LOHSEP) is the focal point for hurricane response in Louisiana, assisting the chief executive of parish and municipal governments who have overall responsibility by law for the direction and control of emergency operations in their respective jurisdictions. In addition, LOHSEP coordinates with FEMA for federal assistance when local and state resources are overwhelmed. These Lessons Learned for Hurricane Katrina are the result of self-critical analysis and are intended to assist LOHSEP achieve continuous improvement, while acknowledging the agency's accomplishments.

Considering the catastrophic nature of Hurricane Katrina, the benchmarks for success in the response to Katrina are reflected in the numbers: 1.3 million evacuated pre-landfall; 62,000 water, roof and attic rescues; 78,000 evacuated by bus and aircraft, including 12,000 hospital patients and their caregivers; 40,000 triaged at the LSU Pete Maravich Assembly Center TMOSA emergency room facility; another 2,000 triaged at Nicholls State TMOSA; no incidence of major secondary disease or health problems among evacuees; 40,000 housed at the Super Dome, all provided with food, water and shelter; 1,000 EMAC deployments; located shelter for 25,000 within 24 hours; and the first use of the National Disaster Medical System in U.S. history.

LOHSEP's success in the response to Katrina was due in large part to two factors: LOHSEP's ability to coalesce an ever growing number of state, federal and volunteer personnel at the Emergency Operations Center into a cohesive team; and LOHSEP's ability to leverage the available, but immediately overwhelmed, emergency responder personnel and resources in the field. The resilience, fortitude, creativity, and innovation demonstrated by Louisiana's first responders and the men and women who staff the Louisiana Office of Homeland Security and Emergency Preparedness, assisted by all of the local, state, federal, and volunteer partners, enabled Louisiana to respond to the challenges of Hurricane Katrina. When resources are overwhelmed by a catastrophic incident, only the dedication of people can compensate for the lack of available resources. In some cases, extraordinary cooperation and coordination created innovative, on-the-spot adaptations and solutions to unique challenges. Many lives were saved as a result. Those who were lost serve as the impetus to improve.

LOHSEP's emergency management preparation is responsible for the early evacuation of over 90% of the regional population, minimizing loss of life. The incredible success of the search and rescue effort cannot be overstated. Pre-Katrina modeling and predictions from the FEMA funded and directed Hurricane Pam planning workshop indicated that 60,000 would die from a Katrina-like storm. Instead, 60,000 were rescued.

While the Hurricane Pam workshop brought awareness on many levels to the monumental challenges to be faced in a catastrophic event, Louisiana did not expect the one-two punch of breached levees inundating 80% of the City of New Orleans, leaving only one route in and one route out of the City. Minimal access was compounded by the severe degradation of the five (5) levels of redundant interoperable communications by wind-damaged communication infrastructure and flood-damaged land lines.

Hurricane Katrina provided Louisiana and the nation the first opportunity to respond to a catastrophic incident under the new National Response Plan (December, 2004). It was the first time LOHSEP and other state agencies had fully activated under the State's new Emergency Operations Plan (April, 2005), which was then still in the planning and transition stage.

The National Response Plan acknowledges that a catastrophic event almost immediately exceeds resources normally available to State, local, tribal and private-sector authorities. Fully recognizing the enormous size of Katrina two days prior to landfall, and the limitations of State and local resources, Governor Kathleen Babineaux Blanco requested a federal emergency declaration. In her letter dated August 27, 2005 to the President of the United States through FEMA, the Governor wrote, "I have determined that this incident is of such severity and magnitude that effective response is beyond the capabilities of the State and local governments, and that supplementary Federal assistance is necessary to save lives, protect property, public health, and safety…"

In fact, Katrina and the ensuing flood did overwhelm all State and local resources. The evaluation of the actions of all responders, including those of the Louisiana Office of Homeland Security and Emergency Preparedness (LOHSEP), cannot be measured against the standards established for a "normal" disaster, that is, an event for which there are adequate resources and personnel available for the response. Katrina and the flood were not a "normal" disaster. A fair assessment of the State's response must be made in the context of its resources being "overwhelmed." Only then can the benchmarks for response to future catastrophic incidents be established.

On the national level, there must be a better comprehension and acceptance of the federal government's obligations to the states under the National Response Plan, and particularly the Catastrophic Incident Annex. The Stafford Act must be amended to address recovery from a catastrophic event. FEMA's statutory and regulatory obligations must be reconciled with the Stafford Act. The Department of Homeland Security must revise its grant process if true interoperable communications are to be achieved.

At the state level, modern budgetary constraints which limit dedication of public funds to assets which only "might" be used is a major challenge for emergency management. State agencies must become more active and engaged participants in the planning process.

As with all Caribbean storms, LOHSEP monitored the development of Katrina from its inception. LOHSEP activated the Crisis Action Team to monitor Hurricane Katrina at 1400 on Thursday, 25 AUG 2005, when the storm was still located in the Atlantic Ocean off the eastern coast of southern Florida. Monitoring continued as the storm made its way across Florida and into the Gulf of Mexico on Friday, 26 AUG 2005. LOHSEP made the first conference call to State, Parish, tribal and local agencies at 1700 on Friday. The State Emergency Operations Center (EOC) was fully activated by the morning of Saturday, 27 AUG 2005. Contact with State, Parish, tribal and local agencies was maintained throughout the storm and the ensuing response.

In the following event synopsis, Hurricane Katrina is followed throughout its course from 25 Aug 2005 to post landfall, and then the subsequent Hurricane Rita event, September 20-24, 2005 is discussed. The synopsis maintains situational awareness of the hurricanes' positions, wind speeds, direction, forward speed and forecast from initial entry into the Gulf through landfall. Key decisions are noted as actions are taken on each day of the event. Transition to the recovery phase is noted.

This report concentrates specifically on lessons learned in LOHSEP's functional areas where it is tasked to provide support and aid to the citizens of Louisiana. Specifically these Lessons Learned look at the following areas: Command and Control (ESF 5); Emergency Communications (ESF 2); Procedures, Planning, Staffing, Training, Facility (ESF 5); Logistics (ESF 7); and Public Information (ESF 15). In each area, participants noted accomplishments, concerns and challenges. After analysis, LOHSEP identified the following:

- Strengths to be maintained and sustained
- Potential areas for further improvement
- Recommendations for follow-up actions

The recommendations in these Lessons Learned should be viewed as suggestions for continued improvement. In some cases, the benefits of implementation are insufficient to outweigh the costs; in other cases, alternative solutions may be more effective. LOHSEP leadership will review these recommendations and determine the most appropriate action and funding needed for implementation.

Event Synopsis

Tropical Depression Twelve
Tuesday, 23 AUG 05 16:00 CDT

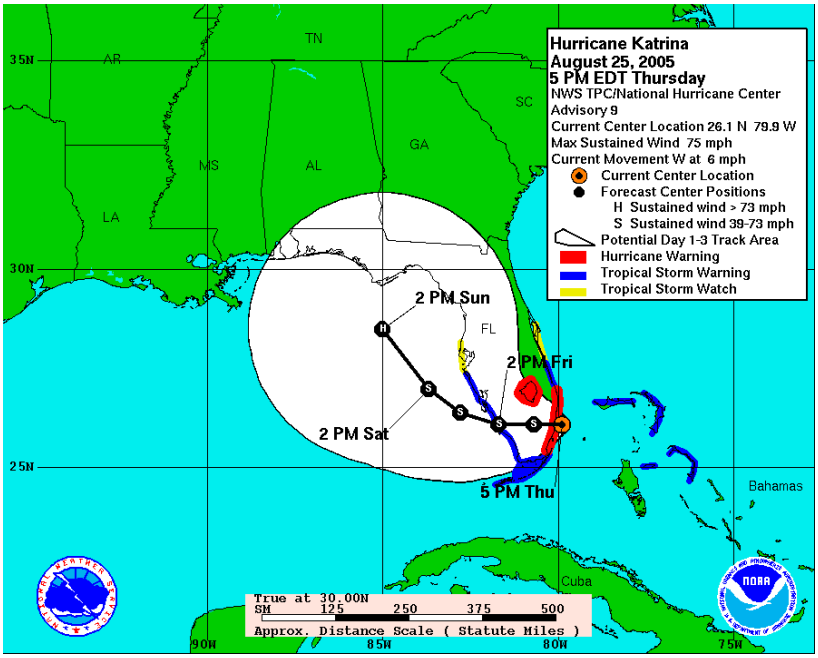
- **5:00 PM EDT: National Hurricane Center announces formation of Tropical Depression Twelve over the southeastern Bahamas. (Appendix A).**
- **LOHSEP begins receiving National Hurricane Center bulletins and updates per Standard Operating Procedure.**

Tropical Storm Katrina
Wednesday, 24 AUG 05 10:00 CDT

- **11:00 AM EDT: National Hurricane Center announces formation of tropical storm Katrina." (Appendix B).**

Hurricane Katrina
Thursday, 25 AUG 05 16:00 CDT

- **14:00 CAT Activated**
- **14:20 1st Alert issued**
- **16:00 The National Hurricane Center upgrades tropical storm Katrina to "Hurricane Katrina"(Appendix C).**
- **19:00 Katrina makes landfall in Florida.**



Hurricane Katrina
Friday, 26 AUG 05 04:00 CDT

- **08:26 Alert issued**

- **Checking Comm with Parishes**

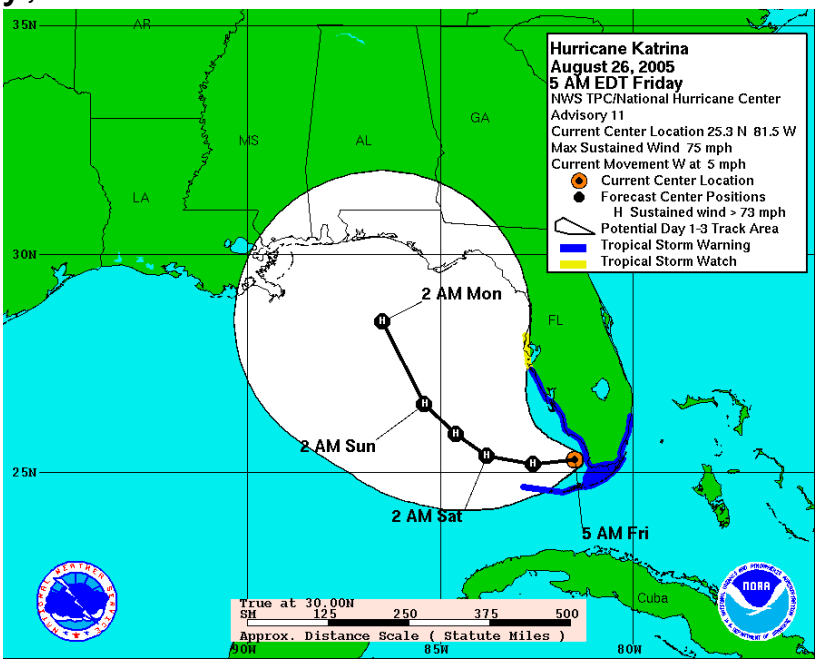
- **Conference Call set up For SETF**

- **Mouth of the Mississippi is on the outer edge of the cone of error**

- **10:00 AM CDT: NHC Advisory: "Majority of the NHC Models take Katrina inland over the Northeast Gulf Coast." (Appendix D).**

- **10:30 AM CDT: Katrina is upgraded to a Category 2 hurricane (Appendix E).**

- **10:30 AM CDT: NHC Advisory shows probability of landfall in New Orleans is 11%. Pensacola is 16%. (Appendix F).**



Hurricane Katrina
Friday, 26 AUG 05 16:00 CDT

- **16:00 The National Hurricane Center issues an advisory forecasting that Katrina would soon be a Category 3 hurricane (Appendix G). First indication that models have "shifted significantly westward" (Appendix H). Pensacola still listed as more likely landfall site. (Appendix I.)**

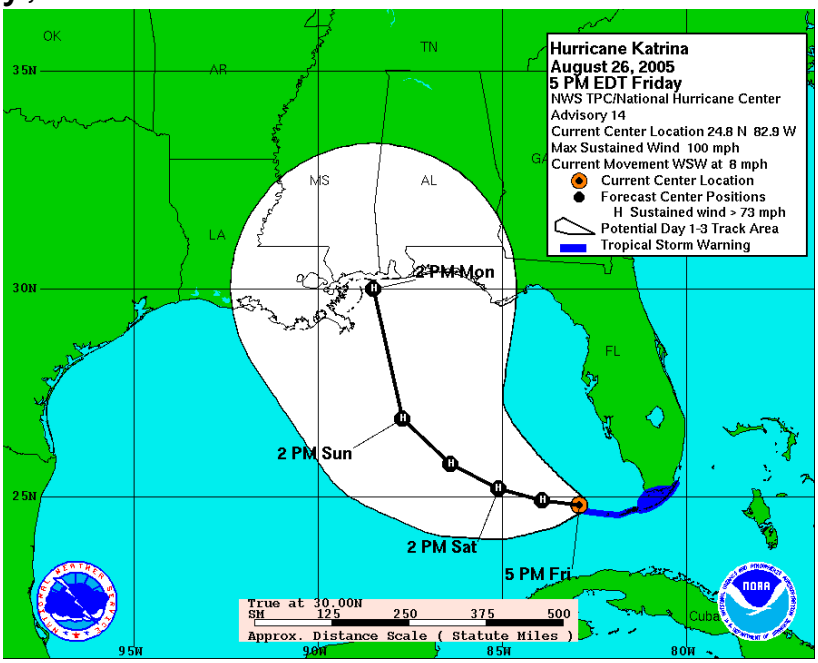
- **17:00 SETF Conf Call #1**

- **18:00 Governor Blanco declares a state of emergency for Louisiana (Appendix J).**

- **Alert issued**

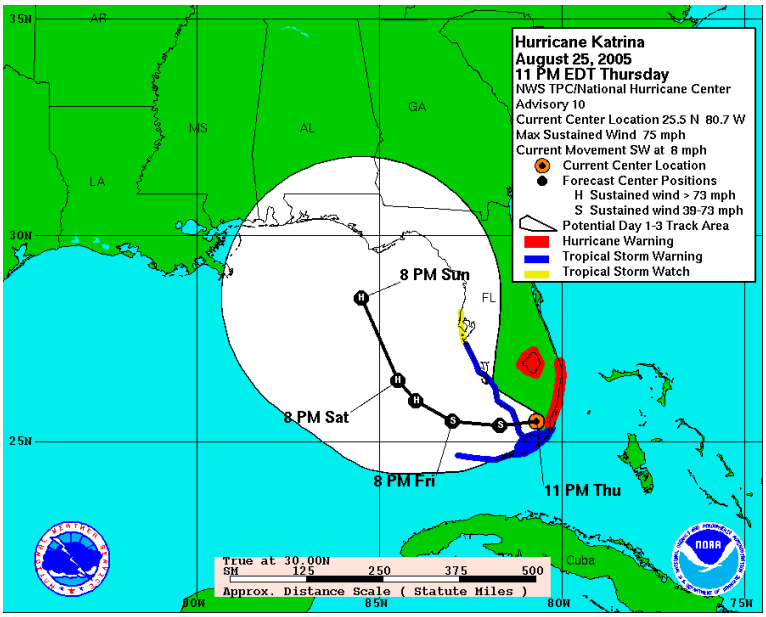
- **LSP & DOTD join CAT**

- **Announcement of EOC Level 3 activation for 07:30 27 AUG 05**



Hurricane Katrina
Friday, 26 AUG 05 22:00 CDT

- **22:00 NHC Advisory: "Guidance Spread has decreased and most of the reliable numerical model tracks are now clustered between the eastern coast of Louisiana and the coast of Mississippi." (Appendix K.) NHC landfall probability for New Orleans now equal to that of Pensacola(17%). (Appendix L.)**



- **23:00 LSP/DOTD ready for Phase 1 Evacuation**

Hurricane Katrina
Saturday, 27 AUG 05 04:00 CDT

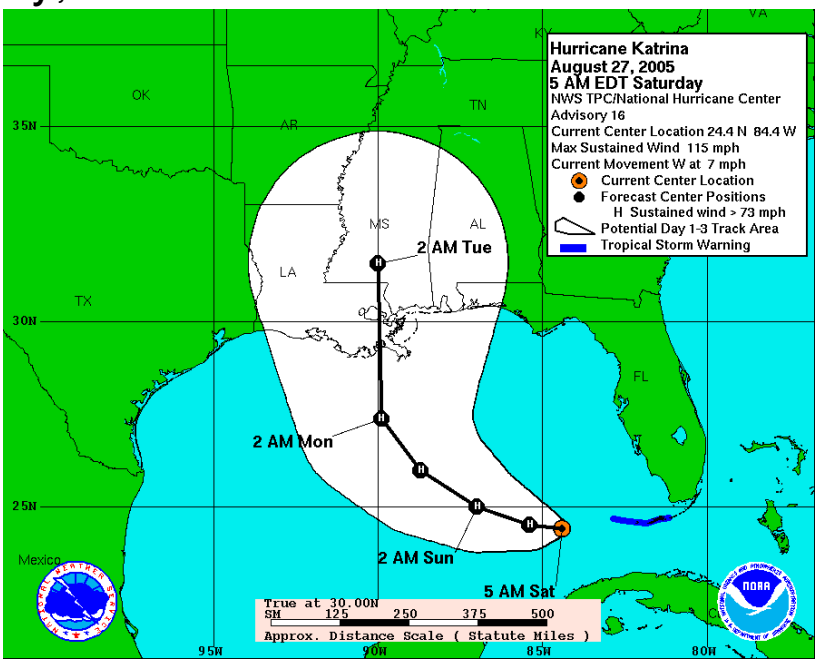
- **06:06 Alert issued Katrina at CAT 2**

- **07:00 EMAC-A team requested**

- **7 Parishes have declared precautionary evacuations for low lying areas**

Mandatory: St Charles

- **07:30 EOC at Level 3 SETF Call #2 Evacuations start in accordance with State Plans**

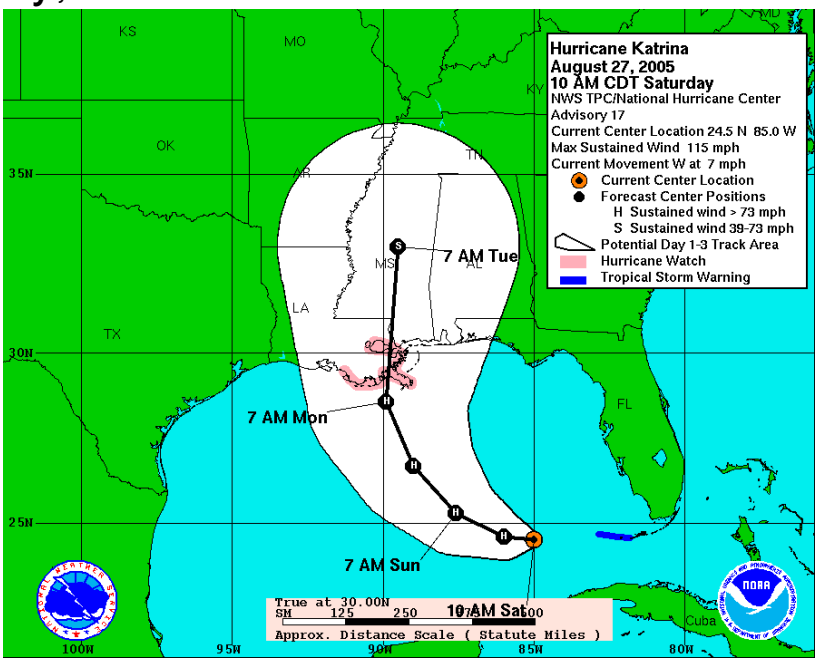


Hurricane Katrina
Saturday, 27 AUG 05 10:00 CDT

- **09:00 SWTF Call #1**
- **10:30 SETF Call #3**
- **10:30 Governor calls press conference at LOHSEP office, urging N.O. and all SE La. evacuation**
- **11:00 Katrina a CAT 3**
- **Governor requests that The President declare a Federal State of Emergency**
- **FEMA Region VI concurs with Governor's request**
- **FEMA liaison at EOC**
- **Transportation Control Center (TCC) staffed**
- **12:00 Phase 2 of SELA Evacuation commences, City of New Orleans opens Superdome as a Special Needs Shelter**

13:00 Governor joins Jefferson Parish President Aaron Broussard in press conference calling for evacuation

- **14:00 EOC at Level 1, SWTF Call # 2**



Hurricane Katrina
Saturday, 27 AUG 05 16:00 CDT

- **Katrina CAT 3**

- **14:00 State Special Needs Shelters open in Monroe and Alexandria, Louisiana.**

- **14:00 Governor joins Mayor Nagin in press conference calling for evacuation of New Orleans and SE region**

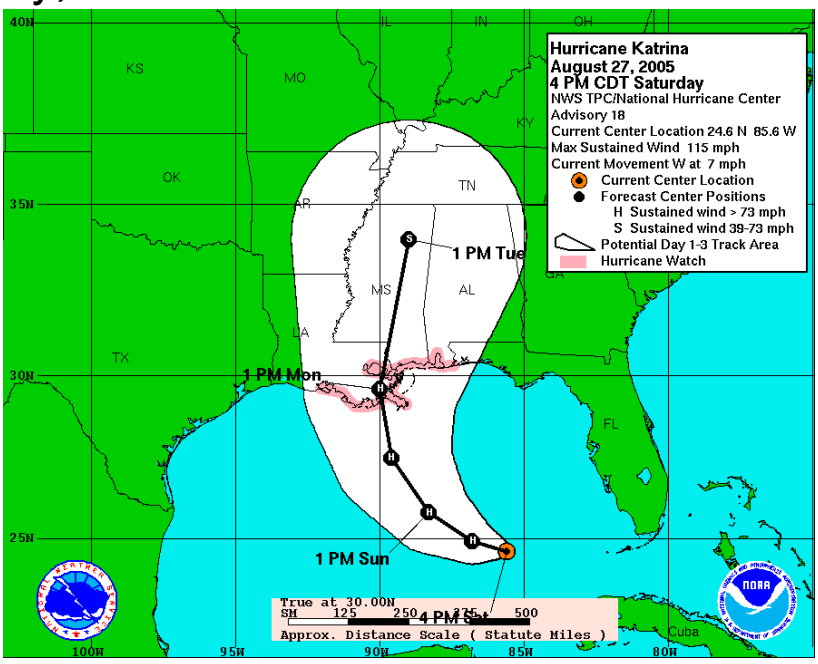
- **15:00 - 9 additional Parishes Declare; Pre-positioning of SAR assets; Commo & Security support required for EOC; Mandatory Evacuation Plaquemines Parish**

- **15:30 SETF Call #4**

- **16:00 Phase 3 Evacuation for SELA and Contra-flow**

- **1800 State Special Needs Shelter opens in Baton Rouge, LA**

- **19:00 Hurricane Watch issued for SELA incl. N.O.**

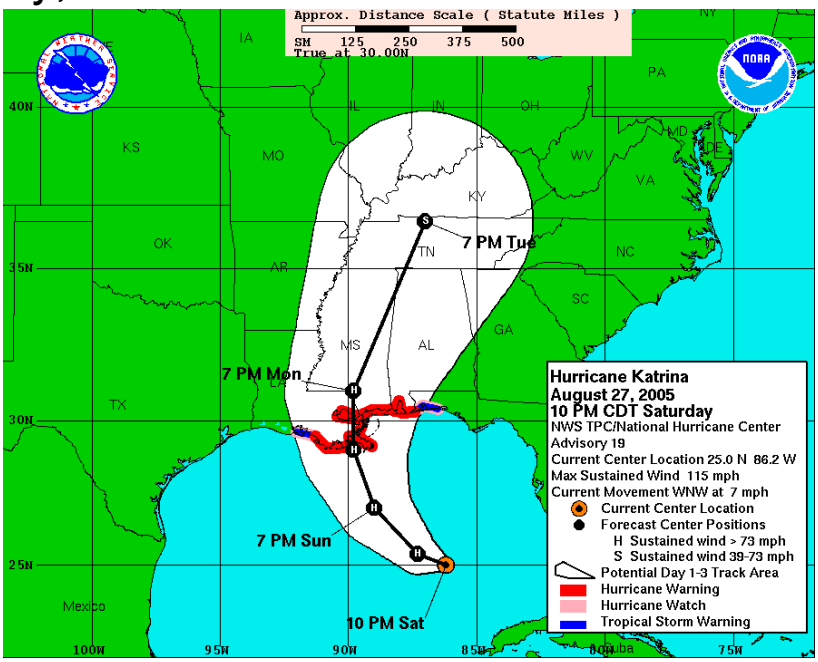


Hurricane Katrina
Saturday, 27 AUG 05 22:00 CDT

- **20:00 Conference Calls continue**

- **22:00 Hurricane warning issued for N. Central Gulf, CAT 4 projected by Sunday**

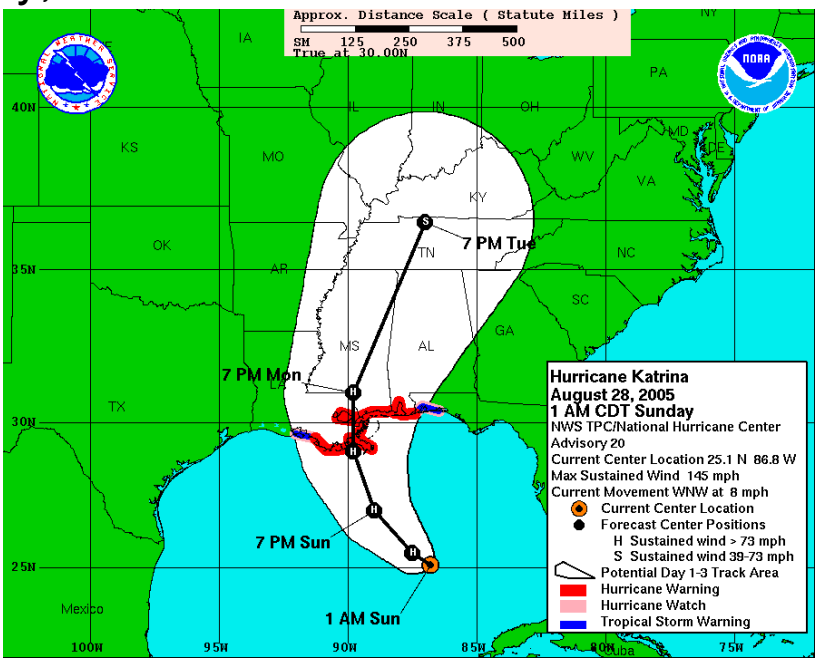
- **FEMA ERT-A & ERT-N Arrive at EOC**



Hurricane Katrina
Sunday, 28 AUG 05 01:00 CDT

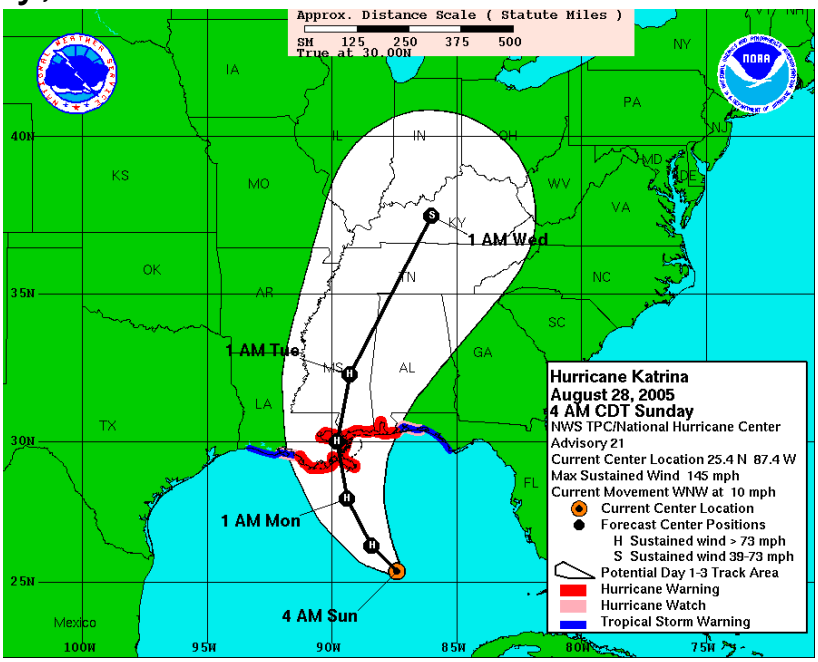
- **03:00 Katrina a CAT 4**

- **Shelters opening across North Central LA**



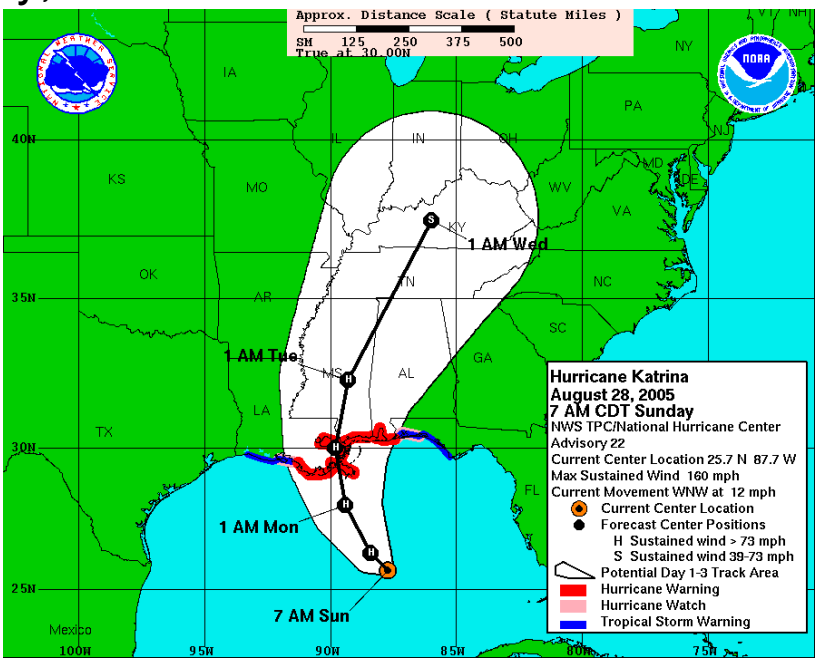
Hurricane Katrina
Sunday, 28 AUG 05 04:00 CDT

- **05:00 Hurricane warning from Morgan City to the AL/FL line, includes N.O. and Lake Ponchartrain**



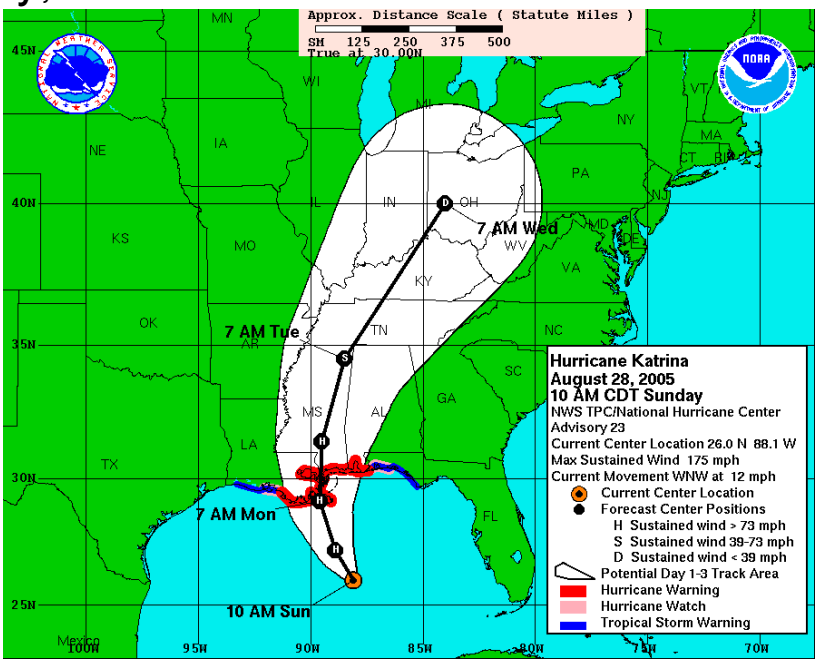
Hurricane Katrina
Sunday, 28 AUG 05 07:00 CDT

- **07:00 Conference Calls continue**
- **Katrina a CAT 5**
- **08:00 Hurricane warning from Morgan City to the AL/FL line, includes N.O. and Lake Pontchartrain**
- **09:00 Joined by Governor Blanco, Mayor Nagin calls for mandatory evacuation of New Orleans**



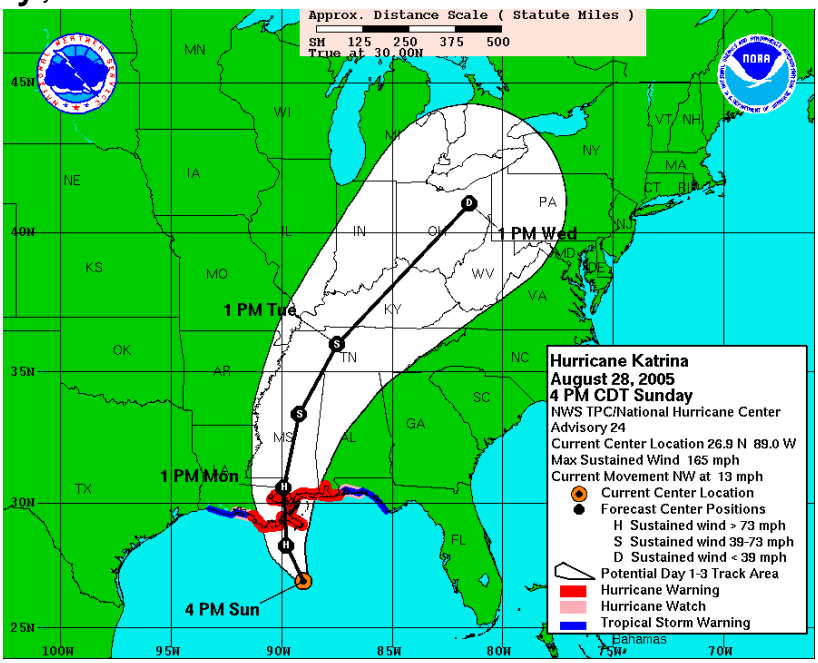
Hurricane Katrina
Sunday, 28 AUG 05 10:00 CDT

- **10:00 Conference calls continue**
- **11:00 Katrina 225 miles S/SE of mouth of the river**
- **Additional SAR assets pre-positioned**
- **Commodities pre-positioned at Camp B**
- **Evacuations continue**
- **13:00 CAT 5 180 miles S/SE of mouth of the river**



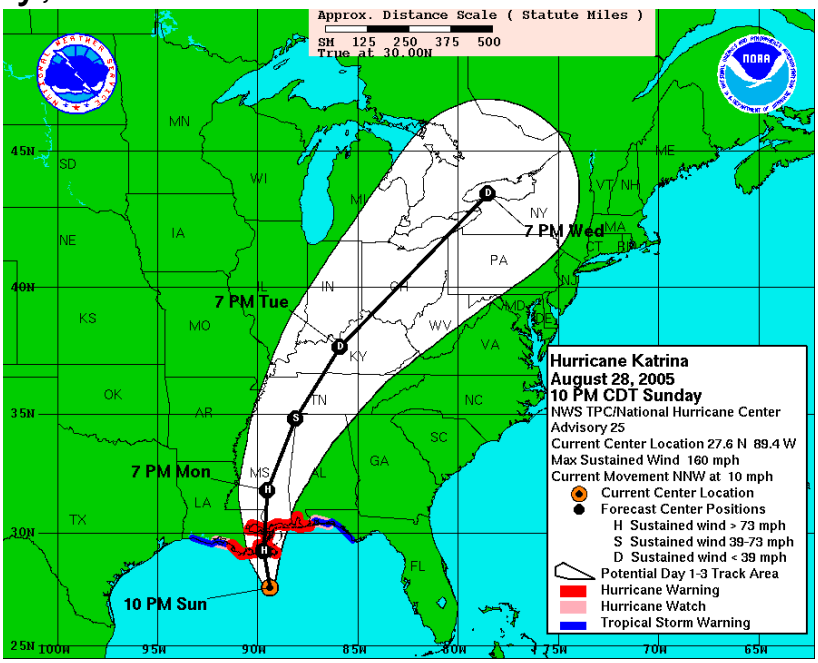
Hurricane Katrina
Sunday, 28 AUG 05 16:00 CDT

- **Conf calls continue**
- **N.O. Airport closed**
- **Superdome last resort shelter**



Hurricane Katrina
Sunday, 28 AUG 05 22:00 CDT

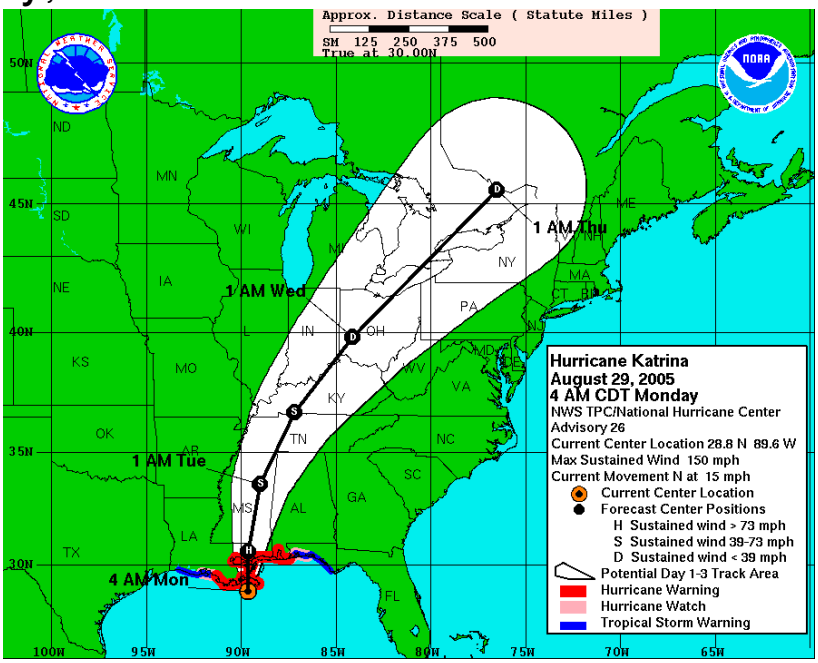
- **22:00 Katrina CAT 5**
- **LDWF Preparing for SAR**
- **LANG supporting NOPD**



SCS

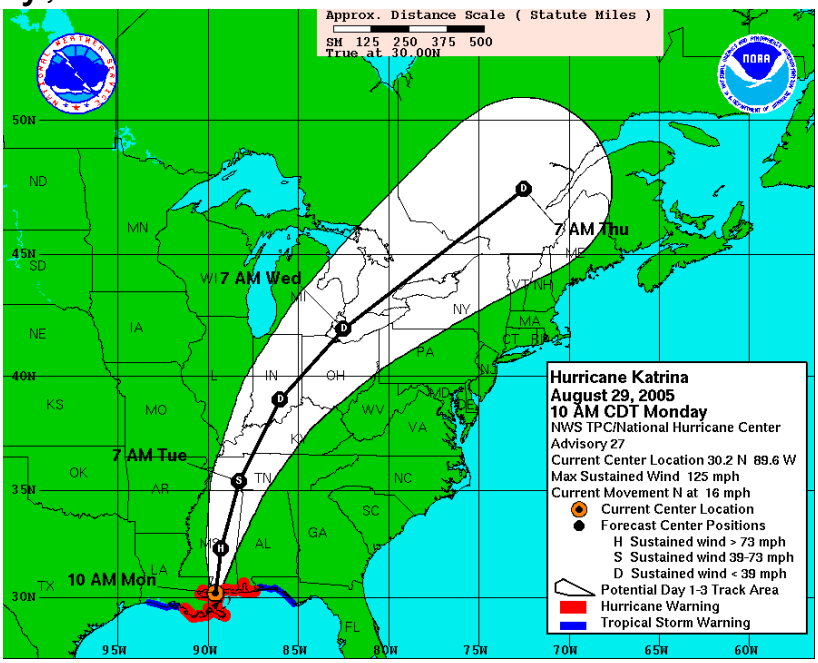
Hurricane Katrina
Monday, 29 AUG 05 04:00 CDT

- **04:00 Katrina CAT 4, near landfall**



Hurricane Katrina
Monday, 29 AUG 05 10:00 CDT

- **07:30 SETF Call #10**
- **08:00 Damage reports, Some levee breaches 9th Ward and St Bernard**
- **Lost contact w/some Parishes**
- **10:00 Eye moves ashore near LA/MS border at CAT 3**
- **Almost 300,000 households without Power**



Hurricane Katrina
Monday, 29 AUG 05 16:00 CDT

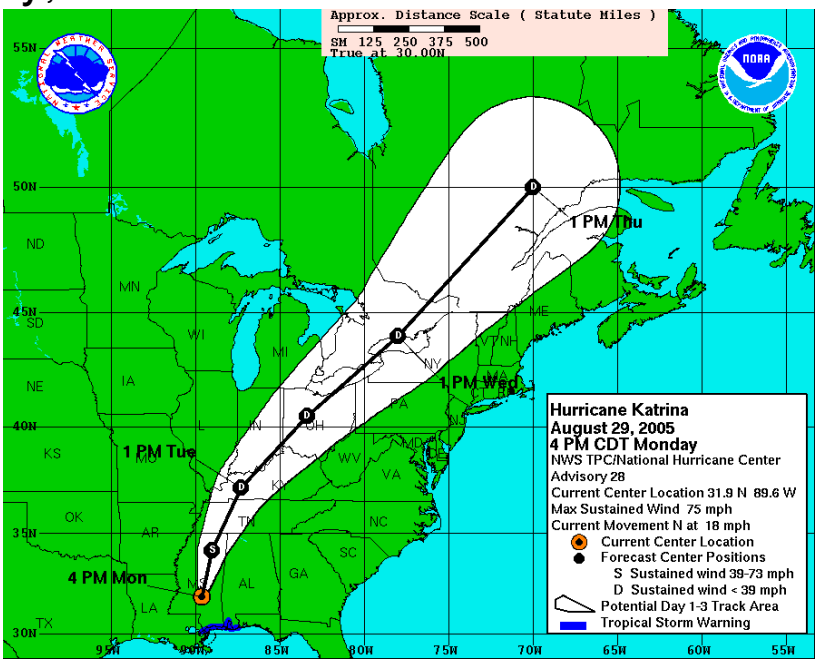
- **13:00 Levee breach reported at 17th St Canal**

- **First looting reported to LSP**

- **Wind still 70-80 mph in Kenner, LA as per LSP, roads still closed**

- **14:00 Continuing damage reports from Parishes**

- **16:00 400,000+ residences/buildings without power**



- **Communications disrupted throughout affected area due to power outages and equipment failures**

- **Louisiana National Guard begins Search and Rescue missions with Superdome as primary SAR evacuation shelter**

- **Superdome damaged by storm, shelter occupants moved to upper levels within Superdome and outer walkways.**

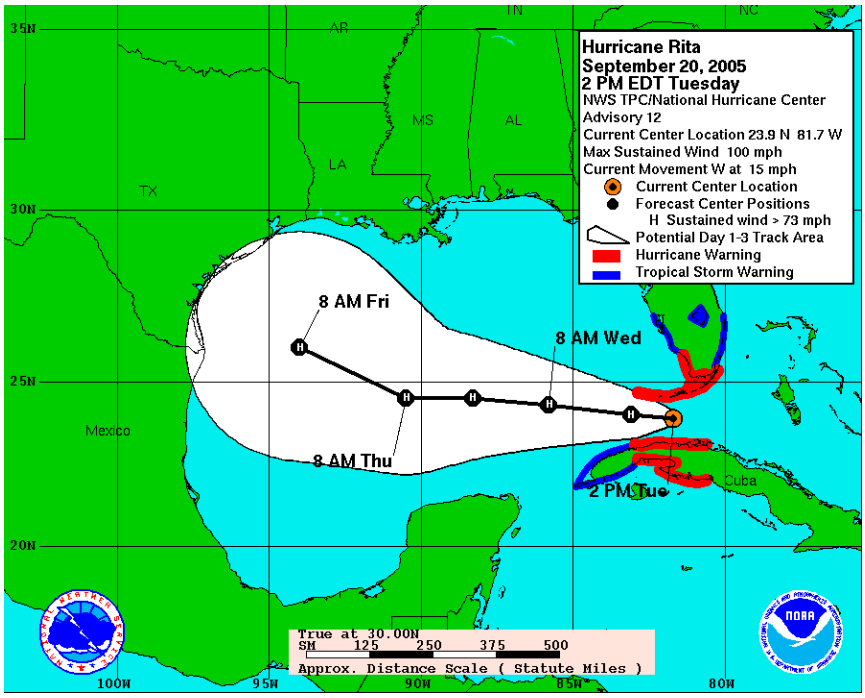
- **21:00 Additional Watercraft requested from USCG for SAR**

Hurricane Katrina – Post Landfall
30 AUG - 20 September 2005

- **Ongoing Operations: Search and Rescue, Temporary Medical, Security Missions, Sheltering, Commodities Support, Generator Support, Fuel Support.**
- **Superdome evacuation begins 1 September, completes 3 September**
- **Convention Center evacuation begins 2 September, completes 3 September**
- **Management of recovery efforts transition to Joint Field Office. Hurricane season continues, EOC prepares response to additional events.**

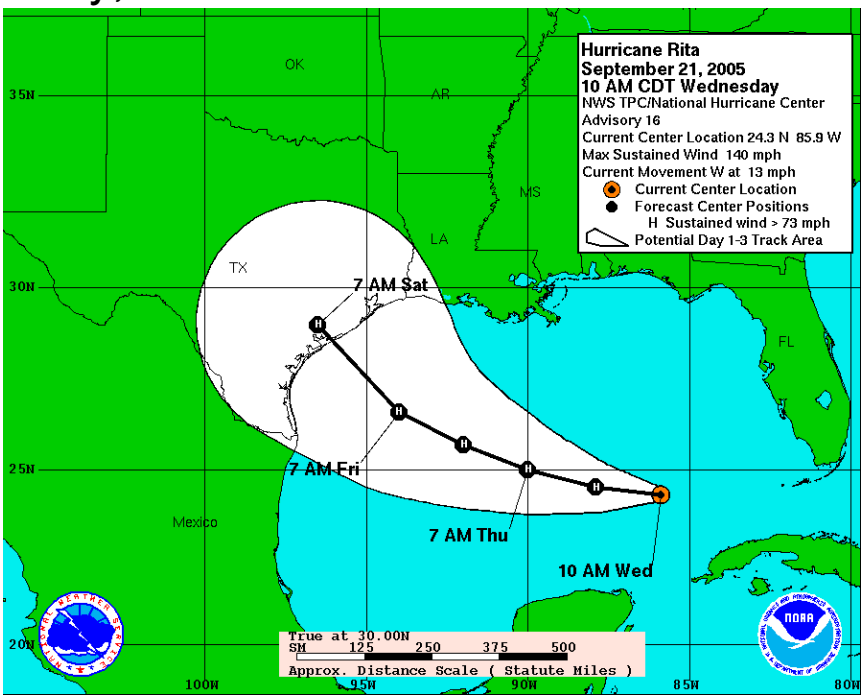
Hurricane Rita
Tuesday, 20 SEP 05 14:00 EDT

- **EOC still activated at Level 1**
- **Additional Shelters opened North of I-10**
- **Additional Special Needs Shelters opened**
- **Evacuation Conference Calls Commence w/SE & SW**
- **Contingencies for SE discussed**



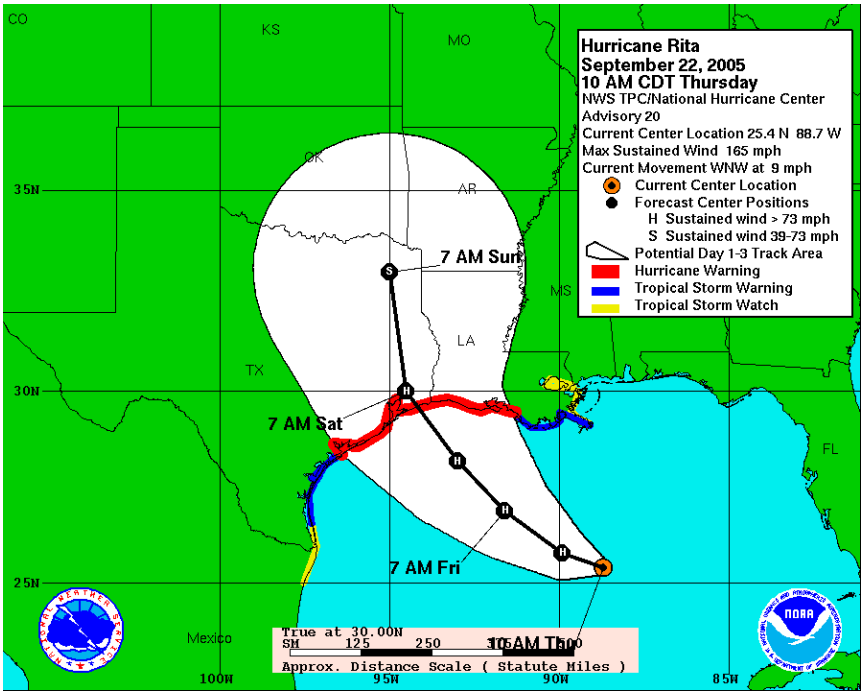
Hurricane Rita
Wednesday, 21 SEP 05 10:00 CDT

- **EOC still activated at Level 1**
- **Identifying Shelters**
- **Evacuation Conference Calls Continue w/SE & SW**
- **SW Louisiana enters cone of error**

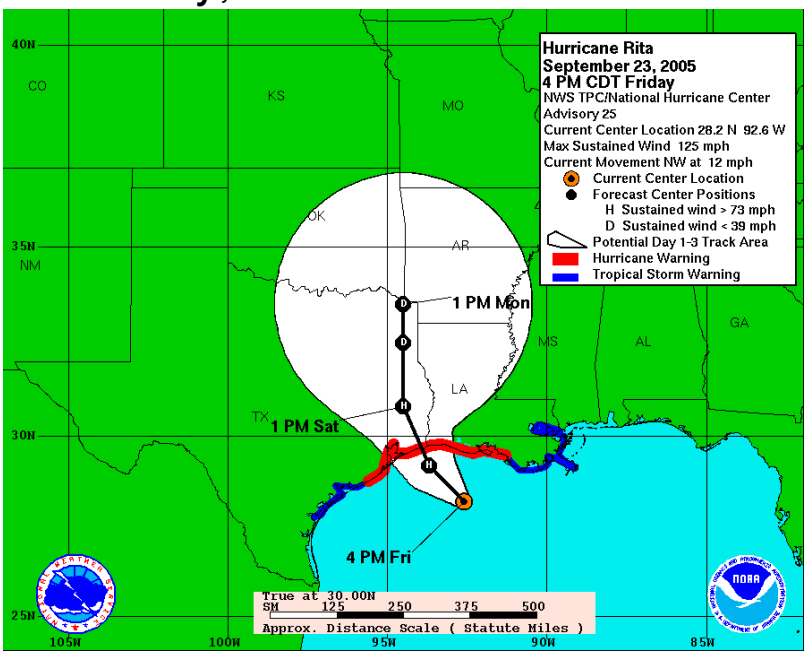


Hurricane Rita
Thursday, 22 SEP 05 10:00 CDT

- **Whatever wasn't hit by Katrina is targeted by Rita**
- **Governor Blanco proclaims a state of emergency effective 20 September 2005 (Appendix M)**

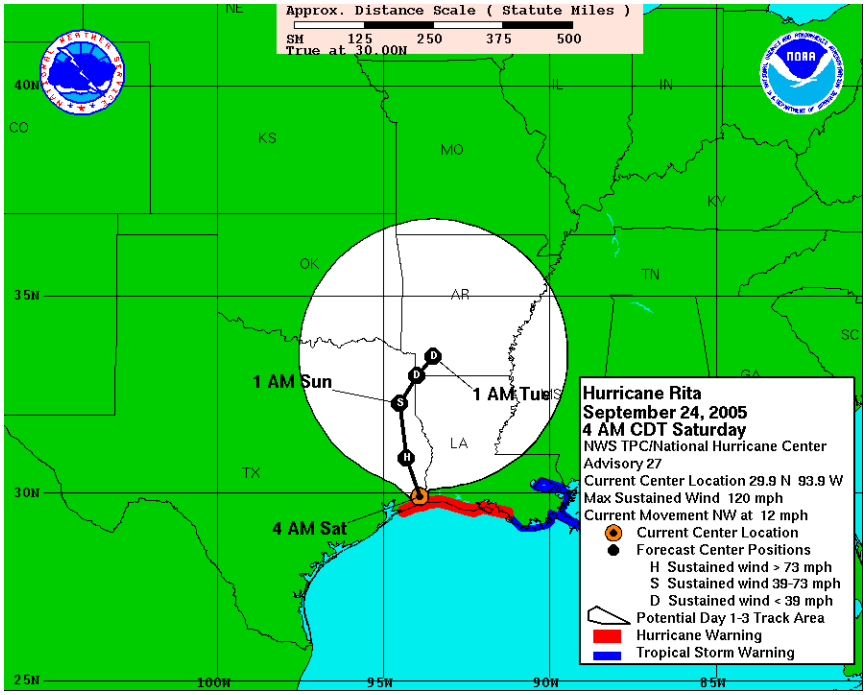


Hurricane Rita
Friday, 23 SEP 05 16:00 CDT



- **Cameron & Calcasieu in direct path of Rita, mandatory evacuations underway**
- **State and Federal assets being used to assist parish evacuations**

Hurricane Rita
Saturday, 24 SEP 05 04:00 CDT



- **Rita makes landfall, devastating Cameron Parish**
- **Virtually all of south Louisiana impacted by Hurricanes**
- **Entire state affected by impact of evacuations and sheltering**
- **Many parishes, including those in the north of the state providing shelter to evacuees, are again without power.**

Emergency Management Lessons Learned

a. Scope

The scope of the lessons learned process concentrates specifically on LOHSEP's functional areas where it is tasked to provide support and aid to the citizens of Louisiana. It includes the review and assessment of the following: Command & Control to include the Unified Command and Incident Management; State EOC Operations; EOC Support, including Communications and Information Management; Preparedness to include Planning, Training and Exercises; Logistics; and Public Information.

b. Strengths

1. Command & Control

- Straightforward, uncomplicated interface with parish, state and federal partners:

  Resulted from strong interpersonal relationships developed during previous hurricane responses and preparedness exercises, augmented by on-going contact between LOHSEP staff, local officials, federal personnel, and volunteer organizations. Recommend LOHSEP continue facilitating Parish, State and Federal meetings to identify, analyze and resolve emerging and emergent issues in emergency management, and to foster personal contacts and agency networking.

- State recommendations for evacuations

  Capitalized on successful evacuation planning process. Parish leaders are to be commended for following phased state evacuation plan. Recommend use of planning process as a model for other Emergency Support Function Planning.

- Contra-flow

  Success attributable to lessons learned from Hurricane Ivan. State retooled plan after it acknowledged negative traffic experience during Ivan evacuation, identified root causes, and created workable solution. Recommend State continue contra-flow as the primary means to evacuate large urban areas. Encourage additional roadways and infrastructure to facilitate evacuation.

- Pre-landfall Conference calls

  Pre-Katrina recommendation and follow up to streamline call protocol resulted in maximum participation, focused responses, and minimized length of calls. Continue conference call procedures, and develop conference call protocols for post-landfall and recovery.

- HAZMAT incidents

LSP & DEQ Hazardous materials personnel worked diligently to mitigate a potentially dangerous situation in St. Bernard Parish that may have affected relief efforts.

- The shelter task force worked tirelessly to identify additional sheltering in the State.

  Early request for shelter assistance and coordination with several other states and federal responders resulted in seamless placement of most victims within 5 days of landfall.

- Sustain life (medical services)

  Medical response outstanding. First ever deployment of NDMS which combined with the efforts of La. Department of Health and Hospitals and Louisiana National Guard Medical Command. Thousands of civilian first responders from all over the country assisted Louisiana health care providers. Medical services rapidly (within hours) established Temporary Medical Operating Staging Areas (TMOSAs) to triage evacuees. No significant secondary health problems were experienced in evacuee population.

- Loss of life limited (search and rescue)

  Search and Rescue personnel deployed while gale force winds were blowing and worked tirelessly to move people to high ground. National Guard, Coast Guard and other military helicopter pilots flew beyond the normal crew day. One hundred helicopters were flying over Greater New Orleans at the same time. DOTD ferries evacuated 7,000 victims from St. Bernard Parish. Wildlife and Fisheries, Louisiana National Guard, Sheriffs deputies, local law enforcement and volunteers conducted largest ever boat rescue, employing an estimated 600 boats.

2. Emergency Communications

- 800 MHz and radio operations

  In spite of damages inflicted by Katrina, the state's 800MHz system never went down. Recommend that Parishes be encouraged to purchase equipment that is compatible with the present 800 MHz system. For the long-term, State must pursue funding for 700 MHz system to increase level of communications redundancy. Where feasible, all government users of wireless communication to support emergency response users must be 700/800MHz compatible. Some local governments are not on either 700 or 800 MHz system.

- Satellite phones

  Portable satellite phones were rapidly deployed via helicopter to the Parishes to re-establish communications.

- IT system adaptable; IT support to other state agencies

  Although IT systems were strained, IT personnel were able to adapt and overcome difficulties during the event, rapidly adding additional servers, phones and capacities and capabilities to meet the ever-growing demand on the system. Recommend additional text messaging capabilities, as blackberries were most consistently reliable form of communications.

3. Procedures

- Pre-land fall Evacuation

  Highly successful. Rapidly deployed contra-flow despite short window from entry of storm into Gulf to landfall. No major vehicular accidents. Fuel available all along route. No bottle necks. Recommend continue phased evacuation and contra-flow as the primary means to evacuate large urban areas. Encourage additional roadways and infrastructure to facilitate evacuation.

4. Planning

- Pre-planning of commodities

  Commodity distribution plan was well thought out and executed. Continue to refine plan addressing emergency distribution to areas not accessible by land.

- Catastrophic planning

  Cohesiveness of unified command and maximum efforts in field resulted from cumulative knowledge and experience from past hurricanes and on-going training and exercises. Recommend LOHSEP seek funding and continue the catastrophic planning process, capturing lessons learned from actual events to enhance the local, state and national capabilities in responding to catastrophic events.

5. Staffing

- Texas and Mississippi representatives in the State EOC

  Presence of representatives from bordering states in the EOC enhanced capabilities prior to and during the event. Recommend LOHSEP continue to cooperate with surrounding states for immediate mutual aid. Continue to welcome representatives from those states to be present at the State EOC.

- EMAC

  Highly successful. Almost every state participated, along with 3 territories, assisted to provide medical, fire, police, EMS personnel, equipment, and other resources. Emergency managers in other states sheltered Louisiana's displaced citizens. The Emergency Management Assistance Compact brought in additional capabilities through States from around the country to augment State and Local responders.

- Augmentation from non-affected parishes

  Parish Emergency Management Directors from non-affected Parishes helped to augment the State Emergency Operations Center.

- Proactive Governor's Staff

  Individuals from the Governor's staff stepped in to assist with procurement of buses; established the Louisiana Disaster Fund; and brought in help from one of the nation's foremost experts in emergency management, James Lee Witt, to provide guidance in response operation, coordination with FEMA, and assistance to rebuild the public assistance program and processes.

- Agency "can do" attitude

  Personnel worked beyond the 12 hour duty day during activation of the EOC. Many personnel volunteered to work 18 to 20 hours without rest.

6. Logistics

- Pre-staging of assets

  Prestaging FEMA assets at Camp Beauregard, pre-positioning of search and rescue teams, DMAT teams, and DMORT teams allowed these resources to move into area quickly. Recommend LOHSEP continue to pre-stage assets at Camp Beauregard and other secure areas in the State to provide rapid response.

- Fuel and transportation issues rapidly addressed

  Louisiana Department of Agriculture is commended for rapid identification and coordination of fuel resources, followed by innovative and on-the-spot adaptation for delivery of fuel.

- Parish involvement in Commodity distribution concept

  Pre-storm meetings held to educate Parish Presidents and Emergency Managers on need to identify staging areas and points of distribution resulted in valuable time saving during response. Some parishes established commodity distribution points prior to landfall. Distribution centers were set up near devastated areas for maximum effectiveness.

- Footprint of Regional Staging Areas (RSA) /Points of Distribution (POD) infrastructure

  Parishes followed blue print for establishing staging areas for smooth MHE (materials, handling, equipment) along workable traffic flow.

- Logistics cell organization

  Organized by task to manage needs at lowest level, eliminating unnecessary steps in chain of command.

- Unified Logistics Element established in accordance with the National Response Plan (NRP)/National Incident Management System (NIMS).

  Very early on, State Logistics and FEMA Logistics worked together to establish a coordinated response. Success attributed to development of this concept during July 2005 catastrophic planning workshop. This is the first time entities coordinated under the National Response Plan. It is one area where the National Response Plan worked.

- Initiated "push" commodity concept; transitioned to "pull" concept.

  Initially, planners were required to forecast commodity needs and send supplies forward prior to receipt of requests for support. Later, needs were addressed based upon requests received from local officials based upon actual consumption of supplies in the affected area.

- Texas Forest Service Incident Management Team (IMT) for Regional Staging Area established and Command and Control

  Provided rapid setup of the Regional Staging Area.

- Designation of Louisiana National Guard Task Force for commodity distribution.

  Pre-planned use of LANG insured rapid set up and distribution of commodities.

- Rapid integration of DOD 13th COSCOM (Corps Support Command) for asset visibility.

  Met increasing needs for logistics distribution.

- Commercial power restoration

  Public Service Commission worked tirelessly to re-establish power rapidly in those areas that were accessible; provided pin point distribution of power to critical infrastructure; worked temporary drops of utilities at critical sites such as the Jefferson Parish sewer lift stations.

7. Public Information

- Evacuation

  A highly successful media campaign, which publicized the re-tooled phased evacuation plan, coupled with the distribution of the new evacuation maps by various public and commercial entities, effectively educated the public regarding evacuation routes and shelter information points. This resulted in efficient and effective movement of over 1.3 million citizens of the region prior to landfall. The on-going efforts of the Governor, Mayor and Parish Presidents and broadcasts by the local media contributed to this success. Over 90% evacuation achieved. City buses were sent to the neighborhoods Sunday afternoon and into the evening to transport residents to the city's shelter of last resort at the Super Dome. The Fire Chief of New Orleans conducted a neighborhood canvass to encourage people to leave or seek safety. There is much anecdotal information regarding many victims who were encouraged to leave, but who chose to stay. Recommend continued effort to address cultural attitude toward hurricane vulnerability.

- LSP/DOTD Traffic Center

  Managed routes and Contraflow ensuring routes were monitored, eliminating choke-points and facilitating onward movement of evacuees.

- Reversing media misinformation

  Airlift of media following completion of Search and Rescue allowed media to accurately report events in the impacted areas.

- Access to State Agency Public Information Officers via the Joint Information Center

  Enabled state leadership to conduct duties with minimal interruption while assuring that the media was continually informed.

c. Lessons Learned

1. Command & Control

Issue: Continuity of operations at the local level

- Discussion: All parishes need to have a continuity of operations plan (COOP) or a continuity of government plan (COG). In a catastrophic event such as Katrina, many local government administrations were completely devastated or became so overwhelmed as to be substantially ineffective during the initial response. Each local government should develop and exercise viable COG and COOP plans to minimize the loss of essential services, maintain law and order, and promote prompt initiation of recovery.

- Recommendation: Consider legislation providing specific guidance and incentives to encourage local governments to develop and exercise these COG and COOP plans. Develop procedures that allow a short term intervention from the state level to provide continuity of local government and/or operations in the event the local government cannot execute its appropriate continuity plan.

Issue: Unified command not properly exercised at local level

- Discussion: Some parishes have not yet adopted the National Incident Management System (NIMS), Incident Command System or need more training to fully implement the concept that all key players (emergency management, law enforcement, firefighting, public works, public health, health and safety, emergency medical services, local government, elected officials, etc.) work in a unified command to synchronize all efforts and requests for support to achieve maximum effect. The absence of the Incident Command System in some parishes hindered and/or delayed the ability of some state agencies to provide the appropriate resource when needed.

- Recommendation: LOHSEP must continue to train parish leadership on the National Incident Management System and the Incident Command System. Consideration should be given to changing state law to require implementation of this process with appropriate incentives to encourage compliance.

Issue: State Mobile Incident Command capability

- Discussion: LOHSEP currently has limited mobile command capability. Current capability consists of a few sedans and an SUV equipped with communications gear. The State needs Incident Command capability closer to the incident site. A mobile command post with Voice over IP capabilities and satellite connectivity will allow rapid set up after the storm and permit strategic movement to meet parish needs.

- Recommendation: Develop and acquire a mobile command post and assign a team capable of providing incident management at the State level at a forward location nearer the incident to provide real time situational awareness and communications capabilities. Team should have decision making authority for the State at the incident scene. Capability should provide robust communications and situational awareness capabilities.

Issue: State surge capability for incident management not available

- Discussion: Incident management teams trained in the National Incident Management System and the Incident Command System are needed to provide critical expertise and a surge capability to local emergency managers. These teams will assist in numerous areas such as operations, logistics, communications, etc. The teams' specific expertise and institutional knowledge will also assist in resource request issues and greatly shorten the timeline between submission and delivery.

- Recommendation: State Mobile Incident Management Teams need to be created. Teams will identify personnel and equipment needs of locals that are overwhelmed in an incident. Recommend LOHSEP take the lead in forming and training these teams, which should then develop a mobile training package and conduct routinely scheduled training with supported parishes to familiarize emergency managers with their mission and capabilities. These teams will assist LOHSEP in training emergency managers in the National Incident Management System and the Incident Command System. Additionally the teams will provide LOHSEP with a forward command element near the center of gravity and enhance a Parish's capability when overwhelmed.

2. Emergency Communications:

Issue: Interoperable communications system and common operating system

- Discussion: The current statewide 800 MHz system was the most robust and reliable communications system for emergency responders in the affected area following Katrina's landfall and flooding. However, the system became overloaded as the state moved large numbers of its responders into the affected area. At the same time, local responder communications were moved to the state 800 MHz system, and out of state volunteers began to appear in large numbers and use the state's 800MHz system. This overload, combined with the loss of public network connectivity failures caused a system degradation and impaired communications. Although there is a common operating system between parish and state EOCs, the statewide system must be expanded to assure collaborative information sharing in a common situational awareness environment among local, state, and federal agencies. Degraded communications among the emergency responder community severely interfered with their ability to deliver necessary services.

- Recommendation: Adoption of the Louisiana Totally Interoperable Environment plan as the official communications architecture for local and state government in Louisiana. Communications equipment purchases inconsistent with the plan should not permitted using public funds. The Department of Homeland Security should become further involved in mandating a common and collaborative architecture among the states which is based on a statewide interoperable system using open standards of communication protocols. In the short term, governmental agencies must be encouraged to purchase equipment which is compatible in the 700/800MHz environment. For the long term, the

state must secure funding for a statewide architecture with a 700 MHz foundation to provide greater interoperability and capacity for all of its emergency responders.

Issue: FEMA tracking mechanismneeded for all federal resources

- Discussion: Emergency management information systems at the federal, state, and local level need to be interoperable. Lack of a tracking mechanism for resource requests assigned to FEMA hampered decision makers and slowed the response time.

- Recommendation: With input from state and local governments, the federal government must develop and field an interoperable emergency management information system for federal, state, and local governments. This will provide situational awareness to emergency managers at all levels of government.

Issue: Availability of real-time imagery

- Discussion: The availability of real time imagery is critical during an operation of the magnitude of Katrina. The availability of this asset will allow for much better situational awareness for leaders at all levels. This asset will aid response efforts in the early days and hours of the operation, and certainly will aid in planning recovery efforts in the weeks following.

- Recommendation: Encourage federal agencies, such as the DOD to make real time imagery available to the emergency management community. LOHSEP will work through their respective channels to gain access. Once access is gained, the assets will be shared both laterally and vertically to provide critical situational awareness during disasters.

Issue: E-Team software overwhelmed by the catastrophic nature of this event.

- Discussion: Due to the magnitude of this event, the software used by the state was challenged. This software required many additional users, and shortfalls in the program soon became evident. E-team requires intensive training on the application to be effective. Throughout the event, State agencies and Parish EOCs were overwhelmed pressing additional workers into service who may not have been trained.

- Recommendation: Retool or replace E-Team to meet these objectives: Sort and Report key information rapidly; interoperable with State, Local, ESF and Support Agency systems; Capable of tailoring to user (State, Local, ESF, or Support Agency); and User-friendly, easily usable by those that have basic computer skills with minimal training. Contract robust ongoing technical assistance, maintenance and training for the system utilized.

Issue: LOHSEP IT Systems

- Discussion: During the event LOHSEP IT systems were continuously upgraded to meet the increased demands on the system. For example, the E-team application had to be replicated to three servers to keep up with the number of users of the system.

- Recommendation: Annually fund upgrades to LOHSEP IT systems to meet requirements for hurricane season.

Issue: Loss of Parish communication systems.

- Discussion: The LOHSEP currently provides a baseline level of statewide interoperability by issuing one 800MHz radio to each parish OEP. There is a variation of use and degree of use of 800MHz systems by the parishes. Parish use of the state 800MHz system was inconsistent among those parishes in the affected area following Katrina's landfall. Additionally, some of the 800MHz repeater sites operated by both the state and local governments went down due to a loss of public network connectivity.

- Recommendation: Assure a statewide common operating capability and system redundancy by adding a satellite communications system to all parishes located below I-10/I-12, and to key state facilities such as EOCs. Adding a fixed station 700/800MHz which will operate on the statewide system to each of the above described parish and state facilities would add another level of redundancy and common operating platform. Funding should be secured for all system enhancements so this does not become the burden of local governments. Acquisition of mobile or portable communication systems and capabilities to replace or augment communications in disaster areas would greatly add to the reliability of the system. Full implementation of the state's interoperability plan to facilitate a statewide 700MHz system which connects all legacy systems would provide full interoperability and another level of redundancy to provide secure and assured communications. A robust network device should be included to connect non-compatible radio systems as the new State infrastructure is implemented. This would allow a greater degree of immediate interoperability as well as a reach back to legacy systems as the new infrastructure is phased into place. Install satellite antennas in each of the southeast and southwest parishes which did not elect to pick up the monthly access fees, and then provide each parish with a satellite radio during hurricane season. The cost for the 14 affected parishes is $1400 to start up the units and about $1400 per month during hurricane season. Install 800MHz antennas at alternate EOC locations in parishes. Provide portable radios to the parishes during hurricane season, if they have not purchased radios on the state system by that time.

3. Procedures

Issue: Funding for Stafford Act tasking in the National Response Plan.

- Discussion: The National Response Plan authorizes federal agencies to accomplish certain tasks, such as recovery of human remains, but neither the NRP nor any other federal legislation provides funding to cover the mission.

- Recommendation: Encourage the Department of Homeland Security to review the National Response Plan and the Stafford Act to identify specific discrepancies between tasks and funding, and seek legislative action to modify the National Response Plan, change the Stafford Act, or specify other federal funding sources for all such tasking.

Issue: Stafford Act funding for a catastrophic event

- Discussion: The Stafford Act provides very limited support at the state and local level for recovery from a major disaster. The Stafford Act does not address the effects of a catastrophic event in which entire metropolitan areas or parishes are completely devastated, requiring years to recover. The Act does not take into consideration the resources required to address the displacement of one third of the population of a State, the loss of over 200,000 homes, the loss of almost all local tax revenue and the resultant effects on local and state economies, or the issues associated with temporary housing for over 300,000 people. These are only a few of the effects of a catastrophic incident; the residual impact will last for years.

- Recommendation: The United States Congress must amend the Stafford Act to define a catastrophic incident and specify a corollary level of federal assistance and resources which states will receive upon satisfaction of the qualifying criteria. Examples of resources or assistance are: payment of a percentage of government's normal operating costs for a specified period of time, providing more appropriate long term housing solutions and providing more robust assistance in long term recovery activities.

Issue: Availability of funding for pre-storm contracts/expenditures

- Discussion: State funding should be provided in order to execute pre-storm contracts for leasing and rental of emergency equipment, supplies, and real estate, as needed. The current situation allows for deficit spending immediately prior to storm, but does not allow for the execution of leases/contracts that require a retainer to insure that critical emergency equipment, supplies and real estate will be available. For example, generators for special needs shelters, equipment to support commodities distribution and real estate to support staging of forces all require a retainer to insure that capability is available when needed.

- Recommendation: State should review current policies and make necessary changes to permit retainer contracts for emergency equipment, supplies and real estate, and the State should provide the required funding to put contracts in place now for critical resources.

Issue: Power generation provided by the U.S. Army Corps of Engineers (USACE)

- Discussion: During an emergency response the USACE process for approval and placement of power generation requests is slow and unresponsive. The requirement to assess each facility slows the process by as much as 48 to 72 hours. Many requests for power generation were not approved by USACE until long after permanent power was restored. While locations that identify a need for emergency power can be assessed prior to an event, the assessment fee must be paid up front and the assessment is only valid for one year.

- Recommendation: USACE needs to streamline the process to be more responsive in an emergency situation. DHS should provide funds to pay the assessment fees for qualified facilities prior to an event. Assessments should remain valid until circumstances require a new assessment, rather than based on a one year artificial constraint.

Issue: Credentialing of law enforcement and medical personnel from other states

- Discussion: Law enforcement and medical personnel from other states must be commissioned or credentialed by the State of Louisiana before they can perform their respective functions. This requirement delayed the ability to employ these personnel.

- Recommendation: State agencies assigned as the primary ESF that employs these professions should immediately establish procedures for future operations. This may require a change to existing State law.

Issue: EOC Security policy

- Discussion: Due to the overwhelming nature of this event, security policies at the Emergency Operations Center had to be revised during the event.

- Recommendation: Revise the policy for admittance to the EOC. Provide badges, based on access level. Continuously provide a list of staff from other agencies that will work in the EOC. Pre-identify security officers that will work at the front desk during all-hazard incidents and provide training to those officers.

Issue: Procedures for tasking of State and Federal Support

- Discussion: The Operations desk is the only means of tasking State and Federal agencies in the State. Requests for support, as per the State Emergency Operations Plan, initiate at the local level from the Parish Incident Command as led by the Parish President and the

appointed Director of Homeland Security and Emergency Management (Parish Emergency Operations Center). During Katrina, elected officials and their staff, did not always understand the process for requesting state and federal support.

- Recommendation: Require training in emergency management procedures for all government leaders at the Local, Parish, and State levels. Establish Governmental Relations/Legislative liaison desk, outside of the EOC, to field inquiries from elected officials and staff.

4. Planning

Issue: Federal entities failed to adhere to the National Response Plan chain of command

- Discussion: The National Response Plan (NRP) provides for the appointment of a Principal Federal Official (PFO). This individual's responsibilities include resolving interagency conflict between federal agencies and providing situational awareness for the Secretary of Homeland Security; additionally, the Principal Federal Official serves as a representative of the President of the United States. The NRP expressly prohibits the PFO from directing or replacing the incident command structure already established. In the response to Hurricane Katrina, the PFO became an operational entity bypassing the federal incident command structure already established, the Joint Field Office (which included the Federal Coordinating Officer and the State Coordinating Officer). Additionally, the Department of Defense task force operated independently of both the Joint Field Office and the Principal Federal Official. This situation, in effect, created three federal chains of command operating in Louisiana in response to Katrina. The Catastrophic Incident Annex to the National Response Plan establishes the context and overarching strategy for implementing and coordinating an accelerated, proactive national response to a catastrophic incident. This annex establishes protocols to pre-identify and rapidly deploy key essential resources (e.g., medical teams, urban search and rescue teams, transportable shelters, medical and equipment caches, etc.) that are expected to be urgently needed/required to save lives and contain incidents. It allows federal agencies to lean forward and move resources into the affected area prior to being requested. The Secretary of the Department of Homeland Security or his designee must initiate implementation of the Catastrophic Incident Annex. The Secretary of the Department of Homeland Security did not declare this a catastrophic event until almost 36 hours after the storm even though the National Weather Service issued an eminent warning of the devastation that was likely to occur the day before storm landfall. If the Secretary of the Department of Homeland Security had implemented the Catastrophic Incident Annex, federal resources would have been in the affected area days sooner.

- Recommendation: The Federal Government should follow the National Response Plan as written with only one unified command to encompass all federal and state agencies. The Secretary of the Department of Homeland Security should implement the Catastrophic Incident Annex as soon as evidence exists for the potential of a catastrophic incident.

Issue: Parish Emergency Operations Plans

- Discussion: Parish emergency planning provided plans for evacuation transportation, however further planning is required and memorandums of understanding with local support entities to ensure their availability pre and post storm to respond needed. Further development of plans is required at the local level to ensure all resources are available. Planning of this nature has been identified through catastrophic planning workshops and locals started the planning process to take advantage of existing transportation should there be a need to evacuate. This planning was in progress, but Katrina intervened on Monday, August 29, 2005. When the city flooded, the Governor's staff working at the Emergency Operations Center at LOHSEP stepped up to commandeer buses for evacuation. On Thursday, September 1, 2005, LOHSEP was notified of the availability of RTA buses which survived the storm. By the time that qualified drivers from the Baton Rouge area were located on Friday, September 2, the FEMA bus stream was fully engaged. Security for the drivers of the RTA buses was an issue. Safety could not be guaranteed. It was determined that the interjection of another element in the evacuation process would confuse the flow of operations.

- Recommendation: LOHSEP should continue to review Parish plans as designated and make recommendations for improvement. Parishes need to further refine plans to include procedures and memorandums of understanding between all local levels of local government and local commercial entities that may be needed for evacuation.

Issue: Evacuations plan for medical community

- Discussion: The expectation of the medical community, particularly hospitals, must be clearly defined. In many instances it is expected that hospitals will not evacuate so as to provide a shelter of last resort for those that cannot evacuate (ie. nursing home patients with acute health care needs). Evacuation plans were not always adequate for much of the medical community (nursing homes, hospitals and home health agencies) for a disaster of this magnitude. Some entities did not have a plan, or had a plan that relied on contract support that was not available. It appears that numerous agencies contracted with a single vendor, which could support these contracts individually, but not simultaneously. When a contractor's resources are expended, LOHSEP may be forced to call on other state agencies for support, only to find that the assets are not available because the resources are already dedicated to pre-planned support missions

- Recommendation: The expectations of the medical community and the local offices of emergency preparedness (OEPs) who expect support pre and post-storm need to be clarified for the people they serve. Assets must be pre-positioned to support the clarified plans (i.e., generators above sea level, transportation for critically ill patients, etc.) to allow for evacuations of these critical infrastructures if the structures are not considered essential or used as a shelter of last resort. The medical community (nursing homes, group homes, etc.) must also develop viable evacuation plans, which should be filed with their local OEPs. These facilities must also have contingency plans if they are unable to follow through on their initial emergency plans. Measures should be developed for periodic review.

Issue: Formalized mutual aid plan for regional and state response

- Discussion: A viable mutual aid plan would have allowed first responders from other regions to respond to affected areas quicker. The current mutual aid plan is a concept plan only and has no statutory basis for enforcement. Additionally, it is based on a regional concept, but the regions identified have not been uniformly adopted by all agencies concerned. Many state agencies have developed their own regional boundaries based on their respective agency's needs or requirements.

- Recommendation: Formalize a statewide mutual aid plan. This may require an amendment to the existing disaster act and/or any other legislation that prescribes mutual aid regions.

Issue: Expedite continuation of the catastrophic planning process

- Discussion: The catastrophic planning sponsored by FEMA (Hurricane Pam) needs to be completed. Continuation of this planning will capture lessons learned from the preparation and response to Hurricanes Katrina and Rita while continuing to develop solutions to the challenges peculiar to Southeast Louisiana. The insights gained from this process will provide a national template for other areas vulnerable to a catastrophic threat.

- Recommendation: FEMA must fully fund and immediately continue the catastrophic planning process in coordination with the State of Louisiana.

Issue: Emergency Support Function plans

- Discussion: The Louisiana Disaster Act, La. R.S. 29:727, makes it clear that the Parish President, or in the case of New Orleans, the Mayor, is the individual in charge of an emergency within his respective jurisdiction. The Louisiana Emergency Operations Plan, provides that the initial actions of prevention, mitigation, preparedness, response and recovery operations are conducted by local government. The Disaster Act and the State Plan are thus in accord with the National Response Plan which provides, "Incidents are typically managed at the lowest possible geographic, organizational, and jurisdictional level." Under the State Plan, local authorities will exhaust their resources, and then use mutual aid agreements before turning to the state for assistance. Under the State Plan, the emergency support functions (ESF) identified in the plan are to be performed by designated state agencies and organizations, either in a Primary role or in a Support role. Where assigned as the Primary for an ESF, a state agency is required to develop procedures detailing how the requirements of the ESF will be met. State agencies assigned as a Support agency to a given ESF must also fully develop plans in accordance with their support requirements. The State Emergency Operations Plan was promulgated in April, 2005, and the state's agencies and departments were in the process of transitioning into the assigned responsibilities under the plan when Katrina struck four months later. As evidenced by the State's need to commandeer school buses to evacuate flood victims from New Orleans, not all state agencies assigned as the primary to an ESF had developed plans. Katrina struck at a time when DOTD was in the transition process to address the newly assigned responsibilities under ESF-1 Transportation. The assets of the former Primary for ESF-1, the National Guard, were dedicated to search and rescue. DOTD facilitated the evacuation routes and located fuel for school buses. It should be noted that the City of New Orleans did not request assistance with pre-landfall evacuation. The request for assistance is the trigger for DOTD and the state to provide assistance with pre-storm evacuation. Representatives of DOTD have already met with LOHSEP and the ESF-1 plan and procedures will be completed by the start of the 2006 hurricane season on June 1, 2006.

- Recommendation: The State should immediately take action to establish specific criteria and deadlines for all primary and supporting state agencies to develop and publish appropriate plans with required periodic reviews.

Issue: Misinterpretation of Provisions of Emergency Operations Plan

- Discussion: Entities unfamiliar with Louisiana's long history of emergency preparation and response and the relationship between local and state authorities have misinterpreted and/or misconstrued various provisions of the Emergency Operations Plan.

- Recommendation: Revise the applicable provisions of the Emergency Operations Plan to eliminate any future opportunity for misunderstanding.

5. Staffing

Issue: Permanent staffing at LOHSEP

- Discussion: A manpower study conducted in 2005 indicated that increasing requirements on the LOHSEP staff required additional personnel to manage the associated work load. Hurricane Katrina validated this manpower study and confirmed that the agency required a substantial increase in full time, qualified personnel to better prepare for and respond to emergencies.

- Recommendation: While additional full time positions have been added, additional staff and funding are required to prepare for the next catastrophic event. Recommend that the legislature authorize additional funding and positions for full-time personnel.

Issue: Permanent staffing for parish emergency management

- Discussion: Some parishes do not have full time emergency managers, adequate emergency management staffs or adequate emergency management facilities. As all disasters are local, it is imperative that parishes obtain the funding necessary to establish or develop the staffing and infrastructures required to support and execute their local emergency management responsibilities.

- Recommendation: Parishes must commit, to the extent possible, to fund emergency management with local revenue and take full advantage of matching federal funds available through external sources. The State should also give consideration to establishing incentive programs to encourage proper staffing at the parish level.

Issue: IT division nderstaffed to respond to major incidents as experienced during Katrina.

- Discussion: In addition to maintaining the IT and communications, LOSHEP, as the primary agency for ESF-2, must provide communication systems status and support the parishes with communication requirements. The new state plan outlines the requirements for ESF-2 procedures, which had been developed prior to Katrina, but not yet signed off by all the state agencies. The procedures were followed and staff from other state agencies supported this agency during Katrina. LOHSEP also provided IT network and support for other state agencies' staff at the JFO.

- Recommendation: Authorize and fund a "rapid response team" in the ESF-2 implementation plan to allow early call up of other state agencies' staff to support the EOC. Provide training drills to the Rapid Response Team.

6. Training

Issue: Education on the Emergency Management Assistance Compact (EMAC) process

- Discussion: Even though the EMAC process provided tremendous resources during the event, efficiency could be improved by educating local and state officials on the capabilities and procedures used by the State to request support through EMAC.

- Recommendation: LOHSEP in coordination with the Emergency Management Assistance Compact (EMAC) needs to develop a comprehensive training program to better educate state and local agencies on the EMAC program.

Issue: A clear understanding of National Response Plan (NRP) compliance concerning resource procurement at the lowest possible level (Parish, State, Federal)

- Discussion: Due to the lack of understanding of NRP guidelines, local officials delayed arrival of needed assets by "passing" procurement requests to the State, which should have been resourced at the lowest possible level. In some cases this led to delaying delivery of needed assets.

- Recommendation: Provide formal training to local governments to include the philosophy of "resource at lowest level possible" and how to accomplish this.

Issue: Continue training of State & Parish personnel in Incident Command System (ICS), the National Incident Management System (NIMS), the State Emergency Operations Plan and Procedures

- Discussion: The State of Louisiana has adopted NIMS and the ICS

- Recommendation: Continue training in NIMS and ICS, increasing availability of training opportunities to State and Local Emergency Management, First Responders and Supporting agencies

7. Facility

Issue: Emergency Support Functions (ESF) work areas

- Discussion: Emergency Support Function lead agencies require larger work-space off of the EOC floor. Some ESFs did their entire coordination on the EOC floor.

- Recommendation: The EOC needs to be remodeled. Rather than have each State Agency represented in the EOC, ESF lead agencies need to be represented in the EOC in order to provide Situation Reports and Tracking of missions. ESFs through planning and exercise need to create their own Emergency Operations Centers to coordinate their function with their State Supporting Agencies in accordance with the State Emergency Operations Plan. Recommend Subject Matter Expert (SME) representatives from each support agency be assigned to the ESF EOCs. ESF EOCs may need to be located out of the State EOC, depending on logistical and resource needs.

Issue: Emergency Operations Center

- Discussion: Due to the overwhelming nature of this event, the Emergency Operations Center was congested.

- Recommendation: The EOC needs to be remodeled. ESFs, EMAC and FEMA should be the only representatives on the floor along with some key support agencies, such as the National Guard. Request federal funding and planning assistance to re-design/re-model the State EOC.

Issue: Executive staff in the Overwatch needs improved information resources.

- Discussion: The IT and video requirements in the Overwatch should be upgraded to provide important situational awareness. There is a need for additional information display capabilities and status information from parishes.

- Recommendation: Provide additional projectors or plasma screens for information display. Provide replacement TVs. Provide additional workstations.

Issue: EOC video display matrix switch is at maximum capacity – there is limited expansion.

- Discussion: The 16 by 16 matrix switch used to provide switching for the EOC and Overwatch is at capacity. There were changes made just prior to Katrina to provide additional functionality for the Overwatch – this required additional internal connections to the matrix switch for four inputs to make a quad display for the Overwatch.

- Recommendation: Replace the EOC matrix switch with at 24 by 24 or 32 by 32 matrix. Replace (2) VCR units with VCR/DVD recorder units for input into the switch. Install additional cabling between the switch and the EOC to improve the functionality of the display systems.

Issue: Communications desk activities were impacted by the volume of radio operations required.

- Discussion: The 800 MHz radios and satellite units used for backup communications with the parishes are installed on the communications desk. One or more staff was required to man the radios and take down status or resource requests from the parishes. The volume of radio traffic involved and the number of phone calls competed with each other.

- Recommendation: Install 800 MHz/Public Safety radios in the radio room, after relocation of files.

8. Logistics

Issue: Logistics function within LOHSEP

- Discussion: LOHSEP has identified through manpower studies that a Logistics function must be created to establish and operate a State commodity distribution plan, as well as other logistical functions under ESF 7. There is no tracking method in place to route, process and track requests for support from the Federal level.

- Recommendation: Revise EOC Standard Operating Procedure (SOP) to include organizational structure for a robust logistics division that includes: contracting officer, command and control, specialty areas, and administrative staff.

Issue: Need complete Regional Staging Area (RSA) resource package (Shuttle fleet, Manpower, MHE, etc.)

- Discussion: Vehicles are needed for transportation of commodities under State control to local Points of Distribution (PODs). Original plan involved National Guard personnel and vehicle assets with assistance from FEMA via the United States Forestry Service. These assets were overwhelmed during this event requiring additional transportation assistance.

- Recommendation: LOHSEP ESF 7 must develop and refine commodity distribution support package in concert with local forecast and input, utilizing support agencies listed in the State EOP.

Issue: Timely status of request to FEMA and reporting of action closure.

- Discussion: Unable to follow Action Request Form (ARF) status due to lack of a Federal tracking mechanism that could give feedback to State and Locals. Asset visibility for FEMA resource requests, including buses, troops, aviation, generators, etc. was nearly non-existent

- Recommendation: FEMA must establish reporting mechanism for status of ARFs; establish protocol to obtain closure of action requests by local jurisdictions receiving support.

9. Public Information

Issue: Focused Public Information plan

- Discussion: Public Information effort was not able to tell America about Louisiana's contributions to the Katrina support effort. As a result, numerous inaccurate reports and stories were generated and perpetuated by the national media, civic and governmental leaders without ascertaining the facts. Many of these inaccuracies became accepted as the ground truth at the national level and have required significant effort to reverse. Additionally, public affairs issues and information sharing capabilities between state and local agencies were overwhelmed by the catastrophic nature of the event.

- Recommendation: The state should give consideration to revising the current Emergency Operations Plan for Emergency Support Function 15. The ESF primary takes the lead in establishing a Joint Information Center (JIC). Key tasks for the JIC are: each ESF primary and support agency should have a knowledgeable, articulate representative in the JIC; JIC develops a focused and targeted media plan; JIC implements a proactive plan to engage the media in all aspects of the operation.

Issue: Increase LOHSEP PIO personnel

- Discussion: Currently, the agency only has one PIO. In event of EOC activation, 1 person cannot cover entire scope of duties.

- Recommendation: LOHSEP needs to create a robust ESF 15 team in the event of activation to include a Joint Information Center (JIC).

Issue: Improve state and FEMA PIO coordination, cohesive state/federal messaging

- Discussion: During the height of the response effort, state agencies' public affairs personnel had very little knowledge of what FEMA public affairs was doing, and vice versa.

- Recommendation: Coordinate Local and State agency public information efforts with FEMA and take advantage of FEMA resources to compile and distribute consolidated messaging to the public via the media. This can be accomplished under the JIC structure, but only through directives of cabinet secretaries and elected statewide officials to respective staff.

Issue: Permanent facilities for Joint Information Center

- Discussion: The current State EOC facility does not have the capacity to handle a properly staffed and equipped JIC. During Katrina/Rita, a temporary facility in the rear parking area was used, but even that space was too small.

- Recommendation: A separate or attached facility to house the joint information center, equipped with appropriate fax, phone and computer connections for all parties involved including media. The facility would need a media briefing room, media work room with phones, fax, satellite uplink capability and wireless computer connections and enough space to house PIO support from all state agencies, including those of statewide, elected officials.

Issue: Lack of Access for media to affected area

- Discussion: During the event, media were frustrated by the inability to access and travel inside the affected areas. In the early hours the state did not have sufficient assets to accommodate the media. Victims took precedence over media on helicopters and watercraft. Inaccurate stories may have been tempered by escorting the media to the areas.

- Recommendations: Provide media with helicopter and/or ground transportation to affected areas.

Issue: Tell the story

- Discussion: Heroic efforts never reached the general public

- Recommendations: Each State ESF lead agency, as well as support agencies, needs to have an aggressive Public Information plan. Offensive not defensive. Work through LOHSEP and ESF-15.

A Closing Thought

Louisiana is not alone in its vulnerability to catastrophic events. There are lessons to be learned from Hurricane Katrina by all levels of government. The time to address these challenges and initiate change is now.

Appendix A– NHC Advisory, Tropical Depression Twelve

ZCZC MIATCDAT2 ALL
TTAA00 KNHC DDHHMM
TROPICAL DEPRESSION TWELVE DISCUSSION NUMBER 1
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 PM EDT TUE AUG 23 2005

DATA FROM AN AIR FORCE RESERVE UNIT RECONNAISSANCE AIRCRAFT...ALONG WITH OBSERVATIONS FROM THE BAHAMAS AND NEARBY SHIPS...INDICATE THE BROAD LOW PRESSURE AREA OVER THE SOUTHEASTERN BAHAMAS HAS BECOME ORGANIZED ENOUGH TO BE CLASSIFIED AS TROPICAL DEPRESSION TWELVE. THE INITIAL INTENSITY OF 30 KT IS BASED RECON WINDS OF 39 KT AT 800 FT...AND SHIP A8CI9 REPORTING 30-KT SUSTAINED WINDS AT 18Z IN THE NORTHEAST QUADRANT. UPPER-LEVEL OUTFLOW IS WEAK...BUT IMPROVING AS A SMALL ANTICYCLONE HAS BEEN DEVELOPING ABOVE THE LOW-LEVEL CENTER.

THE INITIAL MOTION ESTIMATE IS AN UNCERTAIN 310/07. THE LOW-LEVEL CENTER HAS BEEN REFORMING WITHIN A LARGE CLEAR AREA NOTED IN SATELLITE IMAGERY. HOWEVER...FLIGHT-LEVEL RECON WINDS CLEARLY INDICATE A BROAD BUT OTHERWISE WELL-DEFINED LOW-LEVEL WIND FIELD. THERE HAVE BEEN SEVERAL SMALL VORTICES DEVELOP WITHIN THE CONVECTION IN THE EASTERN SEMICIRCLE AND THEN ROTATE WESTWARD OUT FROM UNDER THE CONVECTION. THE INITIAL POSITION IS ROUGHLY THE GEOMETRIC CENTER OF ALL THE SMALL SWIRLS...BUT SOME RE-ORGANIZATION OF THE CENTER WITHIN THE CONVECTION IS POSSIBLE. TD-12 IS EXPECTED TO CONTINUE MOVING SLOWLY NORTHWESTWARD TOWARD A WEAKNESS IN THE MID-LEVEL SUBTROPICAL RIDGE. THIS WEAKNESS SHOWS UP BEST IN 500 MB DATA...AND THEN DISAPPEARS BELOW AND ABOVE THAT LEVEL. BY 36-48 HOURS...ALL OF THE GLOBAL MODELS AND THE GFDL MODEL FORECAST THE WEAKNESS TO FILL AND BE REPLACED BY A BROAD EAST-WEST ORIENTED RIDGE. THIS SHOULD HELP TO DRIVE THE CYCLONE MORE WESTWARD ACROSS SOUTHERN FLORIDA IN 60-72 HOURS...AND THEN INTO THE EASTERN GULF OF MEXICO BY 96 HOURS. THIS SCENARIO IS CONSISTENT WITH THE NHC MODEL CONSENSUS AND THE DEVELOPING SYNOPTIC PATTERN.

THE INTENSITY FORECAST IS A LITTLE TRICKY DUE TO THE UNCERTAINTY ON EXACTLY WHEN A WELL-DEFINED CENTER WILL DEVELOP AND HOW SOON CONVECTION WRAPS AROUND THE WEST SIDE OF THE CIRCULATION. THE UPPER-LEVEL FLOW IS FORECAST TO REMAIN STRONGLY DIFLUENT FROM THE NORTH FOR THE NEXT 24-36 HOURS...AND THEN BECOME NORTHEASTERLY TO EASTERLY AFTER THAT. SINCE THE SHEAR IS ALSO FORECAST TO REMAIN RELATIVELY LOW AT AROUND 10 KT AND SSTS WILL BE NEAR 31C UNDER THE CENTER...AT LEAST STEADY INTENSIFICATION APPEARS TO BE IN ORDER. IF CENTRAL CONVECTION DEVELOPS WITHIN THE NEXT 24 HOURS...THEN THIS SYSTEM COULD REACH HURRICANE STRENGTH BEFORE IT MAKES LANDFALL. THE OFFICIAL INTENSITY FORECAST IS SLIGHTLY LOWER THAN THE SHIPS MODEL.

THE NWS RULES GOVERNING THE NAMING OF TROPICAL CYCLONES SPECIFY

THAT...WITHIN A BASIN...WHEN A CYCLONE FORMS FROM THE REMNANT OF A PREVIOUSLY EXISTING CYCLONE...THE OLD NAME/NUMBER IS RETAINED. TROPICAL DEPRESSION TWELVE HAS A COMPLEX GENESIS THAT LIKELY INCLUDES A MID-LEVEL REMNANT OF FORMER TROPICAL DEPRESSION TEN. A REVIEW OF SATELLITE AND RAWINSONDE DATA OVER THE PAST WEEK OR SO SUGGESTS THAT A SECOND DISTURBANCE APPROACHED AND COMBINED WITH THE MID-LEVEL REMNANT OF TROPICAL DEPRESSION TEN ON 20 AUGUST. BECAUSE IT IS IMPOSSIBLE TO DETERMINE WHICH OF THESE TWO SYSTEMS IS ASSOCIATED WITH TODAY'S GENESIS...WE HAVE ELECTED TO USE THE DESIGNATION TWELVE RATHER THAN TEN FOR THE NEW DEPRESSION. THIS SITUATION DIFFERS FROM LAST YEAR'S REGENERATION OF IVAN...IN WHICH THE LOW-LEVEL REMNANT OF THAT SYSTEM REMAINED A DISTINCT FEATURE THAT COULD BE FOLLOWED CONTINUOUSLY UNTIL IT REGENERATED.

FORECASTER STEWART

FORECAST POSITIONS AND MAX WINDS

INITIAL	23/2100Z	23.2N	75.5W	30 KT
12HR VT	24/0600Z	24.0N	76.5W	35 KT
24HR VT	24/1800Z	25.0N	77.7W	40 KT
36HR VT	25/0600Z	25.7N	78.5W	45 KT
48HR VT	25/1800Z	26.0N	79.4W	60 KT
72HR VT	26/1800Z	26.3N	81.0W	50 KT...INLAND
96HR VT	27/1800Z	26.5N	83.5W	60 KT
120HR VT	28/1800Z	27.5N	86.0W	65 KT

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Source: http://www.nhc.noaa.gov/archive/2005/dis/al122005.discus.001.shtml?

Appendix B– NHC Advisory, Tropical Storm Katrina

ZCZC MIATCDAT2 ALL
TTAA00 KNHC DDHHMM
TROPICAL STORM KATRINA DISCUSSION NUMBER 4
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 AM EDT WED AUG 24 2005

SATELLITE IMAGERY...DOPPLER RADAR DATA FROM THE BAHAMAS AND MIAMI...
AND RECONNAISSANCE WIND DATA INDICATE TD-12 HAS BECOME MUCH BETTER
ORGANIZED THIS MORNING AND HAS STRENGTHENED INTO TROPICAL STORM
KATRINA. THE INITIAL INTENSITY OF 35 KT IS BASED ON AN 1153Z RECON
925 MB FLIGHT-LEVEL WIND REPORT OF 48 KT IN THE NORTHEAST QUADRANT
...WHICH EQUALS ABOUT 36 KT AT THE SURFACE USING A STANDARD 75
PERCENT REDUCTION FACTOR FOR THAT LEVEL. THIS INTENSITY IS ALSO
SUPPORTED BY A CONSENSUS INTENSITY ESTIMATE OF T2.5/35 KT FROM ALL
THREE SATELLITE AGENCIES. THE NEXT AIRCRAFT IS EXPECTED TO
INVESTIGATE KATRINA THIS AFTERNOON.

THE INITIAL MOTION ESTIMATE IS 330/07. KATRINA'S CENTER MAY BE
DEVELOPING A LITTLE MORE TO THE NORTH OF THE PREVIOUS FIXES IN
RESPONSE TO THE BURSTS OF DEEP CONVECTION THAT HAVE BEEN DEVELOPING
IN THE NORTHEAST QUADRANT OF THE LARGER CIRCULATION ENVELOPE.
HOWEVER...RADAR DATA SUGGESTS THAT SMALL VORTICES OR MESOCYCLONES
ARE BEING GENERATED WITHIN THE CONVECTIVE BURSTS...AND THEN
PROPAGATING WESTWARD ALONG THE NORTH SIDE OF LARGER CIRCULATION.
THE INITIAL POSITION REMAINS ROUGHLY IN THE GEOMETRIC CENTER OF ALL
THE SMALL VORTICES NOTED IN RADAR DATA. OVERALL...RECON DATA
INDICATE THE WIND FIELD CONTINUES TO CONSOLIDATE. THE FORECAST
TRACK REMAINS BASICALLY UNCHANGED FORM THE PREVIOUS ADVISORIES. THE
SUBTROPICAL RIDGE TO THE NORTH OF KATRINA THAT CURRENTLY EXTENDS
EAST-WEST ALONG 30-31N LATITUDE IS EXPECTED TO SLOWLY BUILD
EASTWARD...CAUSING THE CYCLONE TO TURN MORE WESTWARD AFTER 24 HOURS
AND CROSS THE SOUTHERN FLORIDA PENINSULA. AFTER EMERGING OVER THE
EASTERN GULF OF MEXICO IN 72 HOURS...THE WESTERN PORTION OF THE
RIDGE IS FORECAST TO WEAKEN AND ALLOW KATRINA TO MOVE
NORTHWESTWARD.

KATRINA HAS DEVELOPED A SYMMETRICAL UPPER-LEVEL OUTFLOW PATTERN
WITHIN A RELATIVELY WEAK SHEAR ENVIRONMENT. ALTHOUGH THE WIND FIELD
IS CURRENTLY ELONGATED EAST-WEST...STEADY INTENSIFICATION SEEMS
REASONABLE AT THIS TIME...ESPECIALLY AS AN UPPER-LEVEL LOW JUST
SOUTHWEST OF THE SYSTEM MOVES AWAY TO THE WEST. KATRINA IS EXPECTED
TO BECOME A HURRICANE PRIOR TO LANDFALL...WHICH IS SIMILAR TO THE
SHIPS AND GFDL MODELS.

FORECASTER STEWART

FORECAST POSITIONS AND MAX WINDS

INITIAL	24/1500Z	24.7N	76.7W	35 KT
12HR VT	25/0000Z	25.4N	77.4W	40 KT

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 24HR VT     25/1200Z 25.9N  78.4W    45 KT
 36HR VT     26/0000Z 26.0N  79.2W    55 KT
 48HR VT     26/1200Z 26.1N  80.1W    65 KT
 72HR VT     27/1200Z 26.3N  82.5W    40 KT
 96HR VT     28/1200Z 27.0N  84.5W    55 KT
120HR VT     29/1200Z 29.0N  86.0W    65 KT


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Source: http://www.nhc.noaa.gov/archive/2005/dis/al122005.discus.004.shtml?

Appendix C– NHC Advisory, Hurricane Katrina

ZCZC MIATCPAT2 ALL
TTAA00 KNHC DDHHMM
BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 9
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 PM EDT THU AUG 25 2005

...STRENGTHENING HURRICANE KATRINA BEARING DOWN ON THE SOUTHEAST COAST OF FLORIDA...
...NEW WARNINGS AND WATCHES ISSUED FOR FLORIDA...

AT 5 PM EDT...2100Z...THE HURRICANE WARNING HAS BEEN DISCONTINUED ALONG THE FLORIDA EAST COAST NORTH OF JUPITER INLET. A HURRICANE WARNING REMAINS IN EFFECT FOR THE SOUTHEAST FLORIDA COAST FROM JUPITER INLET SOUTHWARD TO FLORIDA CITY...INCLUDING LAKE OKEECHOBEE. PREPARATIONS TO PROTECT LIFE AND PROPERTY SHOULD HAVE BEEN COMPLETED.

AT 5 PM EDT...A TROPICAL STORM WARNING HAS BEEN ISSUED FOR ALL OF THE FLORIDA KEYS AND FLORIDA BAY FROM KEY WEST NORTHWARD. A TROPICAL STORM WARNING HAS ALSO BEEN ISSUED ALONG THE GULF COAST OF FLORIDA FROM LONGBOAT KEY SOUTH AND EASTWARD TO SOUTH OF FLORIDA CITY. A TROPICAL STORM WARNING REMAINS IN EFFECT ALONG THE FLORIDA EAST COAST FROM NORTH OF JUPITER INLET TO VERO BEACH.

A TROPICAL STORM WARNING REMAINS IN EFFECT FOR GRAND BAHAMA ISLAND ...BIMINI...AND THE BERRY ISLANDS IN THE NORTHWEST BAHAMAS. THIS WARNING MAY BE DISCONTINUED LATER TONIGHT.

AT 5 PM EDT...A TROPICAL STORM WATCH HAS BEEN ISSUED FOR PORTIONS THE FLORIDA WEST COAST FROM NORTH OF LONGBOAT KEY TO ANCLOTE KEY. A TROPICAL STORM WATCH REMAINS IN EFFECT FOR THE EAST-CENTRAL FLORIDA COAST FROM NORTH OF VERO BEACH TO TITUSVILLE... INCLUDING ALL OF MERRITT ISLAND. A TROPICAL STORM WATCH MEANS THAT TROPICAL STORM CONDITIONS ARE POSSIBLE WITHIN THE WATCH AREA... GENERALLY WITHIN 36 HOURS.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...INCLUDING POSSIBLE INLAND WATCHES AND WARNINGS...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

AT 5 PM EDT...2100Z...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 26.1 NORTH... LONGITUDE 79.9 WEST OR ABOUT 15 MILES EAST-NORTHEAST OF FORT LAUDERDALE FLORIDA AND ABOUT 25 MILES SOUTH-SOUTHEAST OF BOCA RATON FLORIDA.

KATRINA IS MOVING TOWARD THE WEST NEAR 6 MPH... 9 KM/HR...AND THIS GENERAL MOTION IS EXPECTED TO CONTINUE DURING THE NEXT 24 HOURS. ON THIS TRACK... THE CENTER SHOULD MOVE INLAND ALONG SOUTHEAST FLORIDA COAST LATER THIS EVENING.

REPORTS FROM A NOAA RECONNAISSANCE AIRCRAFT AND THE MIAMI NOAA
DOPPLER RADAR INDICATE MAXIMUM SUSTAINED WINDS HAVE INCREASED TO
75 MPH... WITH HIGHER GUSTS. KATRINA IS NOW A CATEGORY ONE
HURRICANE ON THE SAFFIR-SIMPSON SCALE. SOME SLIGHT STRENGTHENING
IS POSSIBLE BEFORE LANDFALL OCCURS...WITH WEAKENING EXPECTED
AFTERWARDS AS KATRINA MOVES INLAND ACROSS SOUTH FLORIDA AND THE
EVERGLADES TONIGHT AND FRIDAY.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 15 MILES... 30 KM...
FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP
TO 80 MILES...130 KM. DURING THE PAST HOUR...A GUST TO 64 MPH WAS
REPORTED AT BOCA RATON. DATA FROM A NOAA RECONNAISSANCE DATA AND
NOAA DOPPLER RADARS INDICATE SUSTAINED TROPICAL STORM-FORCE WINDS
ARE MOVING ONSHORE THE COASTAL AREAS OF PALM BEACH...BROWARD...AND
MIAMI-DADE COUNTIES IN SOUTHEAST FLORIDA.

THE MINIMUM CENTRAL PRESSURE RECENTLY REPORTED BY A NOAA
RECONNAISSANCE AIRCRAFT WAS 985 MB...29.09 INCHES.

STORM SURGE FLOODING OF 2 TO 4 FEET ABOVE NORMAL TIDE LEVELS...
ALONG WITH LARGE AND DANGEROUS BATTERING WAVES...CAN BE EXPECTED
NEAR AND TO THE NORTH OF WHERE THE CENTER MAKES LANDFALL IN FLORIDA.
STORM SURGE FLOODING OF 2 TO 4 FEET ABOVE NORMAL TIDE LEVELS...
ALONG WITH LARGE AND DANGEROUS BATTERING WAVES...CAN BE ALSO
EXPECTED IN AREAS OF ONSHORE WINDS IN THE BAHAMAS. STORM SURGE
VALUES WILL GRADUALLY DECREASE IN THE BAHAMAS LATER TODAY.

DUE TO ITS SLOW FORWARD SPEED...KATRINA IS EXPECTED TO PRODUCE A
SIGNIFICANT HEAVY RAINFALL EVENT OVER SOUTH FLORIDA...AND THE
CENTRAL AND NORTHWEST BAHAMAS. TOTAL RAINFALL ACCUMULATIONS OF 6 TO
10 INCHES WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES ARE POSSIBLE.

ISOLATED TORNADOES WILL ALSO BE POSSIBLE OVER SOUTHERN FLORIDA AND
THE FLORIDA KEYS.

REPEATING THE 5 PM EDT POSITION...26.1 N... 79.9 W. MOVEMENT
TOWARD...WEST NEAR 6 MPH. MAXIMUM SUSTAINED
WINDS... 75 MPH. MINIMUM CENTRAL PRESSURE... 985 MB.

INTERMEDIATE ADVISORIES WILL BE ISSUED BY THE NATIONAL
HURRICANE CENTER AT 7 PM EDT AND 9 PM EDT FOLLOWED
BY THE NEXT COMPLETE ADVISORY AT 11 PM EDT.

FORECASTER STEWART

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Source: http://www.nhc.noaa.gov/archive/2005/pub/al122005.public.009.shtml?

Appendix D– NHC Advisory, Models project landfall in Northeast gulf coast

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ZCZC MIATCDAT2 ALL
TTAA00 KNHC DDHHMM
HURRICANE KATRINA DISCUSSION NUMBER  12
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 AM EDT FRI AUG 26 2005

RECENT DATA FROM AN AIR FORCE RECON AIRCRAFT INDICATES KATRINA'S
CENTRAL PRESSURE IS MUCH LOWER...NOW AT 971 MB. MAXIMUM 700 MB
FLIGHT-LEVEL WINDS ARE 81 KT IN THE NORTHWEST QUADRANT...WHICH
SUPPORTS AT LEAST 70 KT SURFACE WINDS. HOWEVER...THE AIRCRAFT HAS
NOT SAMPLED THE WINDS IN THE EASTERN SEMICIRCLE WHERE NOAA/KEY WEST
DOPPLER RADAR VELOCITY DATA INDICATES WINDS AS HIGH AS 91 KT AT
AROUND 3000 FT...WHICH WOULD SUPPORT A SURFACE WIND ESTIMATE OF
ABOUT 75 KT. THE INITIAL INTENSITY OF 70 KT MAY TURN OUT TO BE A
LITTLE LOW.

THE INITIAL MOTION ESTIMATE IS 265/6. RADAR DATA INDICATES KATRINA
HAS CONTINUED TO MOVE SOUTH OF DUE WEST DURING THE PAST 6 HOURS.
MOST OF THE NHC MODEL GUIDANCE INDICATES THE TRACK SHOULD FLATTEN
OUT IN A MORE WESTWARD DIRECTION DURING THE NEXT 12 HOURS AS THE
INFLUENCE OF AN INVERTED TROUGH OVER THE CARIBBEAN SEA DECREASES.
THE MID-LEVEL SUBTROPICAL RIDGE TO THE NORTH AND NORTHWEST OF
KATRINA IS FORECAST BY THE ALL GLOBAL AND REGIONAL MODELS TO
GRADUALLY WEAKEN THROUGH THE FORECAST PERIOD AS A STRONG SHORTWAVE
TROUGH OVER THE CENTRAL U.S. DIGS SOUTHEASTWARD TOWARD THE NORTHERN
GULF OF MEXICO AND SOUTHEASTERN UNITED STATES. THE TIMING OF THE
EROSION OF THE RIDGE AND AN INDUCED NORTHWARD MOTION OF KATRINA IS
THE MAIN DIFFERENCE BETWEEN THE MODELS...WHICH HAS RESULTED IN A
LARGE SPREAD AFTER 48 HOURS. THE NOGAPS AND GFDN MODELS HAVE MADE A
LARGE JUMP TO THE WEST OVER LOUISIANA...WHEREAS THE MAJORITY OF THE
NHC MODELS TAKE KATRINA INLAND OVER THE NORTHEAST GULF COAST. THE
OFFICIAL FORECAST TRACK REMAINS IN THE RIGHT PORTION OF THE MODEL
GUIDANCE ENVELOPE.

STRENGTHENING TO A MAJOR HURRICANE IS EXPECTED. IN FACT...A RECENT
DROPSONDE REPORT RECEIVED FROM THE RECONNAISSANCE AIRCRAFT
INDICATES MAXIMUM WINDS ARE NOW UP TO 80 KT. SO...A SPECIAL
ADVISORY WILL BE ISSUED SHORTLY TO UPDATE THE CURRENT AND FORECAST
INTENSITIES.

FORECASTER STEWART

FORECAST POSITIONS AND MAX WINDS
INITIAL      26/1500Z 25.1N  82.2W    70 KT
 12HR VT     27/0000Z 25.2N  83.1W    75 KT
 24HR VT     27/1200Z 25.5N  84.3W    80 KT
 36HR VT     28/0000Z 26.2N  85.2W    85 KT
 48HR VT     28/1200Z 27.1N  85.9W    90 KT
 72HR VT     29/1200Z 29.5N  86.3W   100 KT
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 96HR VT     30/1200Z 34.5N  83.5W    35 KT...INLAND
120HR VT     31/1200Z 40.5N  77.0W    25 KT...DISSIPATING INLAND
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Source: http://www.nhc.noaa.gov/archive/2005/dis/al122005.discus.012.shtml?

Appendix E– NHC Advisory, Hurricane Katrina upgraded to CAT2

ZCZC MIATCPAT2 ALL
TTAA00 KNHC DDHHMM
BULLETIN
HURRICANE KATRINA SPECIAL ADVISORY NUMBER 13
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
1130 AM EDT FRI AUG 26 2005

...KATRINA RAPIDLY STRENGTHENING AS IT MOVES SLOWLY WESTWARD AWAY FROM SOUTH FLORIDA AND THE FLORIDA KEYS...

AT 11 AM EDT...1500Z...THE TROPICAL STORM WARNING FOR THE SOUTHEAST FLORIDA COAST FROM FLORIDA CITY NORTHWARD HAS BEEN DISCONTINUED.

A TROPICAL STORM WARNING REMAINS IN EFFECT FOR ALL OF THE FLORIDA KEYS AND FLORIDA BAY FROM DRY TORTUGAS NORTHWARD... AND ALONG THE FLORIDA GULF COAST FROM SOUTH OF FLORIDA CITY WESTWARD AND NORTHWARD TO LONGBOAT KEY. A TROPICAL STORM WARNING MEANS THAT TROPICAL STORM CONDITIONS ARE EXPECTED WITHIN THE WARNING AREA WITHIN THE NEXT 24 HOURS.

A TROPICAL STORM WATCH REMAINS IN EFFECT FOR PORTIONS OF THE FLORIDA WEST COAST FROM NORTH OF LONGBOAT KEY TO ANCLOTE KEY. A TROPICAL STORM WATCH MEANS THAT TROPICAL STORM CONDITIONS ARE POSSIBLE WITHIN THE WATCH AREA... GENERALLY WITHIN 36 HOURS.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...INCLUDING POSSIBLE INLAND WATCHES AND WARNINGS...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

AT 1130 AM EDT...1530Z...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 25.1 NORTH... LONGITUDE 82.2 WEST OR ABOUT 45 MILES NORTHWEST OF KEY WEST FLORIDA AND ABOUT 75 MILES SOUTH-SOUTHWEST OF NAPLES FLORIDA.

KATRINA IS MOVING TOWARD THE WEST NEAR 7 MPH...AND THIS MOTION IS EXPECTED TO CONTINUE FOR THE NEXT 24 HOURS.

RECENT REPORTS FROM AN AIR FORCE RESERVE UNIT HURRICANE HUNTER AIRCRAFT NOW INDICATE MAXIMUM SUSTAINED WINDS ARE NEAR 100 MPH... WITH HIGHER GUSTS. KATRINA IS NOW A CATEGORY TWO HURRICANE ON THE SAFFIR-SIMPSON SCALE. SOME STRENGTHENING IS FORECAST DURING THE NEXT 24 HOURS...AND KATRINA COULD BECOME A CATEGORY THREE OR MAJOR HURRICANE ON SATURDAY.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 25 MILES... 35 KM... FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 85 MILES. ANOTHER RECENT REPORT FROM A NOAA SHIP ANCHORED IN KEY WEST HARBOR INDICATED WIND GUSTS TO 86 MPH WERE STILL OCCURRING IN HEAVY RAIN SQUALLS.

THE MINIMUM CENTRAL PRESSURE RECENTLY REPORTED BY RECONNAISSANCE AIRCRAFT IS 971 MB...28.67 INCHES.

STORM SURGE FLOODING OF 3 TO 5 FEET ABOVE NORMAL TIDE LEVELS...
CAN BE EXPECTED ALONG THE WEST COAST OF FLORIDA IN AREAS OF ONSHORE
FLOW SOUTH OF VENICE... AND IN FLORIDA BAY. STORM SURGE SHOULD
CONTINUE TO DECREASE THIS MORNING ALONG THE EAST COAST OF FLORIDA.

KATRINA IS EXPECTED TO PRODUCE ADDITIONAL RAINFALL OF 5 TO 8 INCHES
OVER THE FLORIDA KEYS AND 3 TO 5 INCHES OVER NORTHWESTERN CUBA.
ISOLATED STORM TOTAL AMOUNTS OF 15 TO 20 INCHES ARE POSSIBLE OVER
THE FLORIDA KEYS.

ISOLATED TORNADOES ARE POSSIBLE TODAY OVER EXTREME SOUTHERN FLORIDA
AND THE FLORIDA KEYS.

REPEATING THE 1130 AM EDT POSITION...25.1 N... 82.2 W. MOVEMENT
TOWARD...WEST NEAR 7 MPH. MAXIMUM SUSTAINED
WINDS...100 MPH. MINIMUM CENTRAL PRESSURE... 971 MB.

AN INTERMEDIATE ADVISORY WILL BE ISSUED BY THE NATIONAL
HURRICANE CENTER AT 200 PM EDT FOLLOWED BY THE NEXT
COMPLETE ADVISORY AT 500 PM EDT.

FORECASTER STEWART

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NNNN

Source: http://www.nhc.noaa.gov/archive/2005/pub/al122005.public.013.shtml?

Appendix F – NHC Advisory, Special Probabilities #13

ZCZC MIASPFAT2 ALL
TTAA00 KNHC DDHHMM
HURRICANE KATRINA SPECIAL PROBABILITIES NUMBER 13
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
1130 AM EDT FRI AUG 26 2005

PROBABILITIES FOR GUIDANCE IN HURRICANE PROTECTION
PLANNING BY GOVERNMENT AND DISASTER OFFICIALS

AT 1130 AM EDT...1530Z...THE CENTER OF KATRINA WAS LOCATED NEAR
LATITUDE 25.1 NORTH...LONGITUDE 82.2 WEST

CHANCES OF CENTER OF THE HURRICANE PASSING WITHIN 65 NAUTICAL MILES
OF LISTED LOCATIONS THROUGH 8AM EDT MON AUG 29 2005

LOCATION	A	B	C	D	E	LOCATION	A	B	C	D	E
25.5N 84.3W	49	X	X	X	49	TAMPA FL	13	3	1	2	19
26.2N 85.2W	33	X	1	X	34	CEDAR KEY FL	4	7	4	3	18
27.1N 85.9W	14	8	2	1	25	ST MARKS FL	X	6	6	5	17
MUHA 230N 824W	1	1	X	X	2	APALACHICOLA FL	1	7	6	5	19
MARATHON FL	99	X	X	X	99	PANAMA CITY FL	X	5	7	6	18
MIAMI FL	X	X	1	2	3	PENSACOLA FL	X	X	6	10	16
W PALM BEACH FL	X	X	1	3	4	MOBILE AL	X	X	3	11	14
FT PIERCE FL	X	1	1	4	6	GULFPORT MS	X	X	2	11	13
COCOA BEACH FL	X	1	3	4	8	BURAS LA	X	X	3	10	13
DAYTONA BEACH FL	X	2	3	6	11	NEW ORLEANS LA	X	X	1	10	11
JACKSONVILLE FL	X	1	4	7	12	NEW IBERIA LA	X	X	X	7	7
SAVANNAH GA	X	X	1	7	8	PORT ARTHUR TX	X	X	X	3	3
CHARLESTON SC	X	X	X	4	4	GALVESTON TX	X	X	X	2	2
MYRTLE BEACH SC	X	X	X	2	2	GULF 29N 85W	4	10	4	3	21
KEY WEST FL	99	X	X	X	99	GULF 29N 87W	X	5	8	6	19
MARCO ISLAND FL	99	X	X	X	99	GULF 28N 89W	X	1	7	7	15
FT MYERS FL	56	X	X	X	56	GULF 28N 91W	X	X	1	8	9
VENICE FL	35	X	X	X	35	GULF 28N 93W	X	X	X	4	4

COLUMN DEFINITION PROBABILITIES IN PERCENT
A IS PROBABILITY FROM NOW TO 8AM SAT
FOLLOWING ARE ADDITIONAL PROBABILITIES
B FROM 8AM SAT TO 8PM SAT
C FROM 8PM SAT TO 8AM SUN
D FROM 8AM SUN TO 8AM MON
E IS TOTAL PROBABILITY FROM NOW TO 8AM MON
X MEANS LESS THAN ONE PERCENT

FORECASTER STEWART

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NNNN

Source: http://www.nhc.noaa.gov/archive/2005/prb/al122005.prblty.013.shtml?

Appendix G– NHC Advisory, Hurricane Katrina CAT3 warning

ZCZC MIATCPAT2 ALL
TTAA00 KNHC DDHHMM
BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 14
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 PM EDT FRI AUG 26 2005

...KATRINA CONTINUING TO MOVE WEST-SOUTHWESTWARD AWAY FROM THE FLORIDA KEYS...
...WATCHES AND WARNINGS DISCONTINUED FOR MAINLAND FLORIDA...

AT 5 PM EDT...2100Z...ALL WARNINGS AND WATCHES FOR PENINSULAR FLORIDA HAVE BEEN DISCONTINUED.

A TROPICAL STORM WARNING REMAINS IN EFFECT FOR THE FLORIDA KEYS AND FLORIDA BAY FROM KEY LARGO SOUTH AND WESTWARD TO KEY WEST AND THE DRY TORTUGAS.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...INCLUDING POSSIBLE INLAND WATCHES AND WARNINGS...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

AT 5 PM EDT...2100Z...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 24.8 NORTH... LONGITUDE 82.9 WEST OR ABOUT 70 MILES... WEST-NORTHWEST OF KEY WEST FLORIDA.

KATRINA IS MOVING TOWARD THE WEST-SOUTHWEST NEAR 8 MPH. THIS MOTION IS FORECAST TO CONTINUE THIS EVENING...WITH A GRADUAL TURN TOWARD THE WEST EXPECTED ON SATURDAY.

RECENT REPORTS FROM AN AIR FORCE RESERVE UNIT HURRICANE HUNTER AIRCRAFT INDICATE MAXIMUM SUSTAINED WINDS REMAIN NEAR 100 MPH... WITH HIGHER GUSTS. KATRINA IS A CATEGORY TWO HURRICANE ON THE SAFFIR-SIMPSON SCALE. SOME STRENGTHENING IS FORECAST DURING THE NEXT 24 HOURS...AND KATRINA IS FORECAST TO BECOME A CATEGORY THREE ...MAJOR... HURRICANE TODAY AND ON SATURDAY.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 25 MILES... FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 85 MILES. DURING THE PAST HOUR...A SUSTAINED WIND OF 81 MPH WITH A GUST TO 105 MPH WAS REPORTED AT DRY TORTUGAS C-MAN STATION LOCATED IN THE SOUTHERN EYEWALL. SUSTAINED WINDS OF TROPICAL STORM-FORCE ARE STILL OCCURRING ACROSS THE LOWER FLORIDA KEYS...WHILE WIND GUSTS TO TROPICAL STORM-FORCE ARE OCCURRING ACROSS THE MIDDLE TO UPPER FLORIDA KEYS.

THE MINIMUM CENTRAL PRESSURE RECENTLY REPORTED BY RECONNAISSANCE AIRCRAFT WAS 965 MB...28.50 INCHES.

STORM SURGE FLOODING OF 2 TO 4 FEET ABOVE NORMAL TIDE LEVELS... CAN BE EXPECTED ALONG THE SOUTHWEST COAST OF FLORIDA IN AREAS OF ONSHORE FLOW EAST OF CAPE SABLE... AND IN FLORIDA BAY. STORM SURGE WILL GRADUALLY SUBSIDE TONIGHT.

KATRINA IS EXPECTED TO PRODUCE ADDITIONAL RAINFALL OF 5 TO 8 INCHES OVER THE LOWER FLORIDA KEYS...WITH ISOLATED STORM TOTAL AMOUNTS OF 15 TO 20 INCHES. RAINFALL TOTALS OF 5 TO 10 INCHES ARE EXPECTED OVER NORTHWESTERN CUBA...AND 1 TO 3 INCHES OF RAINFALL IS EXPECTED OVER THE YUCATAN PENINSULA OF MEXICO.

ISOLATED TORNADOES ARE POSSIBLE THIS AFTERNOON AND TONIGHT OVER THE FLORIDA KEYS.

REPEATING THE 5 PM EDT POSITION...24.8 N... 82.9 W. MOVEMENT TOWARD...WEST-SOUTHWEST NEAR 8 MPH. MAXIMUM SUSTAINED WINDS...100 MPH. MINIMUM CENTRAL PRESSURE... 965 MB.

AN INTERMEDIATE ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 8 PM EDT FOLLOWED BY THE NEXT COMPLETE ADVISORY AT 11 PM EDT.

FORECASTER STEWART

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NNNN

Source: http://www.nhc.noaa.gov/archive/2005/pub/al122005.public.014.shtml?

Appendix H– NHC Advisory, "Shifted significantly westward"

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ZCZC MIATCDAT2 ALL
TTAA00 KNHC DDHHMM
HURRICANE KATRINA DISCUSSION NUMBER  14
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 PM EDT FRI AUG 26 2005

MOST RECENT REPORTS FROM AN AIR FORCE HURRICANE HUNTER AIRCRAFT
INDICATE THE CENTRAL PRESSURE HAS DROPPED TO 965 MB...BUT THE
FLIGHT-LEVEL WINDS HAVE ONLY INCREASED TO 94 KT AT 700 MB...WHICH
IS ABOUT AN 85-KT SURFACE WIND. A 1701Z DROPSONDE IN THE NORTHEAST
QUADRANT REPORTED 85 KT SURFACE WINDS. THEREFORE...THE INITIAL
INTENSITY IS HELD AT 85 KT FOR THIS ADVISORY...EVEN THOUGH THE
CENTRAL PRESSURE SUPPORTS ABOUT 95-KT SURFACE WINDS. THE EYEWALL IN
THE NORTHWEST QUADRANT HAS REMAINED OPEN...PROBABLY DUE TO DRY AIR
ENTRAINMENT...AND THIS MAY PARTLY EXPLAIN THE DIFFERENCE BETWEEN
THE OBSERVED WINDS AND WHAT THE CENTRAL PRESSURE TYPICALLY
SUPPORTS.

THE INITIAL MOTION IS WEST-SOUTHWESTWARD...OR 255 DEGRESS...AT 07
KT. KATRINA REMAINS CAUGHT BETWEEN THE NORTHEASTERLY FLOW ON THE
WEST SIDE OF AN INVERTED TROUGH OVER THE WESTERN CARIBBEAN SEA AND
THE NORTHEASTERLY FLOW IN THE SOUTHEAST QUADRANT OF THE SUBTROPICAL
RIDGE LOCATED TO THE NORTH AND NORTHWEST OF KATRINA. BOTH THE RIDGE
AND TROUGH ARE FORECAST TO SLOWLY WEAKEN OVER THE NEXT 12-24 HOURS
...WHICH ALLOW THE HURRICANE TO TURN MORE WESTWARD...AND MOST OF
THE NHC MODEL GUIDANCE AGREES ON THAT SCENARIO. AFTER 24 HOURS...
THE MODELS ARE IN GENERAL AGREEMENT ON A SHORTWAVE TROUGH CURRENTLY
OVER THE NORTHERN AND CENTRAL PLAINS STATES TO GRADUALLY DIG
SOUTHEASTWARD TOWARD THE CENTRAL AND WESTERN GULF OF MEXICO AND
ERODE THE RIDGE...WHICH ALLOWS KATRINA TO MOVE NORTHWARD BY 72
HOURS. AS A RESULT...THE MODELS HAVE SHIFTED SIGNIFICANTLY WESTWARD
AND ARE NOW IN BETTER AGREEMENT. THIS HAS RESULTED IN THE OFFICIAL
FORECAST TRACK BEING SHIFTED ABOUT 150 NMI WEST OF THE PREVIOUS
TRACK...ON THE EAST SIDE OF THE GUIDANCE ENVELOPE. HOWEVER...
PROJECTED LANDFALL IS STILL ABOUT 72 HOURS AWAY...SO FURTHER
MODIFICATIONS IN THE FORECAST TRACK ARE POSSIBLE.

KATRINA IS EXPECTED TO BE MOVING OVER THE GULF LOOP CURRENT AFTER 36
HOURS...WHICH WHEN COMBINED WITH DECREASING VERTICAL SHEAR...SHOULD
ALLOW THE HURRICANE TO REACH CATEGORY FOUR STATUS BEFORE LANDFALL
OCCURS. THIS IS CONSISTENT WITH THE SHIPS AND GFDL MODELS...WHICH
BRING KATRINA UP TO 118 KT. THE FSU SUPERENSEMBLE MODEL IS MORE
ROBUST AND BRINGS KATRINA UP TO 129 KT JUST BEFORE LANDFALL.

FORECASTER STEWART
FORECAST POSITIONS AND MAX WINDS
 INITIAL      26/2100Z 24.8N  82.9W    85 KT
 12HR VT     27/0600Z 24.9N  83.9W    90 KT
 24HR VT     27/1800Z 25.2N  85.1W    95 KT
 36HR VT     28/0600Z 25.8N  86.4W   100 KT
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Source: http://www.nhc.noaa.gov/archive/2005/dis/al122005.discus.014.shtml?

Appendix I – NHC Advisory, Special Probabilities #14

ZCZC MIASPFAT2 ALL
TTAA00 KNHC DDHHMM
HURRICANE KATRINA PROBABILITIES NUMBER 14
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 PM EDT FRI AUG 26 2005

PROBABILITIES FOR GUIDANCE IN HURRICANE PROTECTION
PLANNING BY GOVERNMENT AND DISASTER OFFICIALS

AT 5 PM EDT...2100Z...THE CENTER OF KATRINA WAS LOCATED NEAR
LATITUDE 24.8 NORTH...LONGITUDE 82.9 WEST

CHANCES OF CENTER OF THE HURRICANE PASSING WITHIN 65 NAUTICAL MILES
OF LISTED LOCATIONS THROUGH 2PM EDT MON AUG 29 2005

LOCATION	A	B	C	D	E	LOCATION	A	B	C	D	E
25.2N 85.1W	46	X	X	X	46	PENSACOLA FL	X	1	7	9	17
25.8N 86.4W	24	4	X	X	28	MOBILE AL	X	X	6	10	16
26.9N 87.7W	2	15	4	1	22	GULFPORT MS	X	X	5	11	16
MUHA 230N 824W	1	1	X	X	2	BURAS LA	X	X	8	9	17
MUAN 219N 850W	1	1	X	X	2	NEW ORLEANS LA	X	X	4	11	15
COCOA BEACH FL	X	X	1	1	2	NEW IBERIA LA	X	X	1	11	12
DAYTONA BEACH FL	X	X	1	3	4	PORT ARTHUR TX	X	X	X	7	7
JACKSONVILLE FL	X	X	1	5	6	GALVESTON TX	X	X	X	5	5
SAVANNAH GA	X	X	X	3	3	FREEPORT TX	X	X	X	4	4
KEY WEST FL	99	X	X	X	99	PORT O CONNOR TX	X	X	X	2	2
MARCO ISLAND FL	45	X	X	X	45	GULF 29N 85W	3	9	4	2	18
FT MYERS FL	19	1	X	X	20	GULF 29N 87W	X	8	8	4	20
VENICE FL	12	2	X	1	15	GULF 28N 89W	X	4	11	4	19
TAMPA FL	3	4	2	2	11	GULF 28N 91W	X	X	6	8	14
CEDAR KEY FL	1	4	4	3	12	GULF 28N 93W	X	X	1	8	9
ST MARKS FL	X	3	5	5	13	GULF 28N 95W	X	X	X	4	4
APALACHICOLA FL	X	6	6	5	17	GULF 27N 96W	X	X	X	2	2
PANAMA CITY FL	X	4	8	5	17						

COLUMN DEFINITION PROBABILITIES IN PERCENT
A IS PROBABILITY FROM NOW TO 2PM SAT
FOLLOWING ARE ADDITIONAL PROBABILITIES
B FROM 2PM SAT TO 2AM SUN
C FROM 2AM SUN TO 2PM SUN
D FROM 2PM SUN TO 2PM MON
E IS TOTAL PROBABILITY FROM NOW TO 2PM MON
X MEANS LESS THAN ONE PERCENT

FORECASTER STEWART

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NNNN

Source: http://www.nhc.noaa.gov/archive/2005/prb/al122005.prblty.013.shtml?

Appendix J – Hurricane Katrina Emergency Declaration, 48 KBB 2005

State of Louisiana

EXECUTIVE DEPARTMENT

PROCLAMATION NO. 48 KBB 2005

STATE OF EMERGENCY - HURRICANE KATRINA

WHEREAS, the Louisiana Homeland Security and Emergency Assistance and Disaster Act, R.S. 29:721, *et seq*., confers upon the governor of the state of Louisiana emergency powers to deal with emergencies and disasters, including those caused by fire, flood, earthquake or other natural or man-made causes, in order to ensure that preparations of this state will be adequate to deal with such emergencies or disasters and to preserve the lives and property of the citizens of the state of Louisiana;

WHEREAS, when the governor finds a disaster or emergency has occurred, or the threat thereof is imminent, R.S. 29:724(B)(1) empowers her to declare the state of disaster or emergency by executive order or proclamation, or both; and

WHEREAS, On August 26, 2005, Hurricane Katrina poses an imminent threat to the state of Louisiana, carrying severe storms, high winds, and torrential rain that may cause flooding and damage to private property and public facilities, and threaten the safety and security of the citizens of Louisiana;

NOW THEREFORE I, KATHLEEN BABINEAUX BLANCO, Governor of the state of Louisiana, by virtue of the authority vested by the Constitution and laws of the state of Louisiana, do hereby order and direct as follows:

SECTION 1: Pursuant to the Louisiana Homeland Security and Emergency Assistance and Disaster Act, R.S. 29:721, *et seq*., a state of emergency is declared to exist in the state of Louisiana as Hurricane Katrina poses an imminent threat, carrying severe storms, high winds, and torrential rain that may cause flooding and damage to private property and public facilities, and threaten the safety and security of the citizens of the state of Louisiana;

SECTION 2: The state of Louisiana's emergency response and recovery program is activated under the command of the director of the state office of Homeland Security and Emergency Preparedness to prepare for and provide emergency support services and/or to minimize the effects of the storm's damage.

SECTION 3: The state of emergency extends from Friday, August 26, 2005, through Sunday, September 25, 2005, unless terminated sooner.

IN WITNESS WHEREOF, I have set my hand officially and caused to be affixed the Great Seal of Louisiana, at the Capitol, in the city of Baton Rouge, on this 26th day of August, 2005.

/S/ Kathleen Babineaux Blanco
GOVERNOR OF LOUISIANA

ATTEST BY
THE GOVERNOR

/S/ Al Ater
SECRETARY OF STATE

Appendix K– NHC Advisory, Katrina Discussion #15

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ZCZC MIATCDAT2 ALL
TTAA00 KNHC DDHHMM
HURRICANE KATRINA DISCUSSION NUMBER  15
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 PM EDT FRI AUG 26 2005

THE SATELLITE PRESENTATION HAS CONTINUED TO IMPROVE AND CONSISTS OF
A PERFECT A COMMA-SHAPED CLOUD PATTERN WHICH BEGINS OVER WESTERN
CUBA AND WRAPS AROUND A LARGE CLUSTER OF VERY DEEP CONVECTION. THIS
BAND IS PROBABLY PRODUCING NEAR TROPICAL STORM FORCE WINDS ALONG
THE NORTH COAST OF WESTERN CUBA. ALTHOUGH THE EYE IS NOT CLEARLY
VISIBLE ON IR IMAGES...RADAR DATA INDICATE THAT THE EYE IS EMBEDDED
WITHIN THIS CIRCULAR AREA OF DEEP CONVECTION. T-NUMBERS FROM SAB
AND TAFB HAVE INCREASED TO 5.0 ON THE DVORAK SCALE. THEREFORE...
THE INITIAL INTENSITY HAS BEEN ADJUSTED TO 90 KNOTS. AN AIR FORCE
RECONNAISSANCE PLANE IS SCHEDULED TO BE IN KATRINA IN THE NEXT FEW
HOURS. THE HURRICANE IS EXPECTED TO BE UNDER A TYPICAL 200 MB
ANTICYLONE...WITH A CYCLONIC CIRCULATION EXTENDING UPWARD TO THAT
LEVEL. THIS IS THE TYPICAL PATTERN OBSERVED IN INTENSE HURRICANES.
IN ADDITION...KATRINA IS FORECAST TO MOVE DIRECTLY OVER THE WARM
LOOP CURRENT OF THE GULF OF MEXICO...WHICH IS LIKE ADDING HIGH
OCTANE FUEL TO THE FIRE. THEREFORE...THE OFFICIAL FORECAST BRINGS
KATRINA TO 115 KNOTS...OR A CATEGORY FOUR ON THE SAFFIR-SIMPSON
HURRICANE SCALE. THE GFDL IS MORE AGGRESSIVE AND CALLS FOR 124
KNOTS AND 922 MB. THE FSU SUPERENSEMBLE IS EVEN MORE AGGRESSIVE
BRINGING KATRINA TO 131 KNOTS.

KATRINA CONTINUES TO MOVE STUBBORNLY TOWARD THE WEST-SOUTHWEST OR
250 DEGREES AT 7 KNOTS ALONG THE EASTERN SIDE OF A VERY STRONG
DEEP-LAYER MEAN HIGH CENTERED OVER TEXAS. IN FACT...DATA FROM THE
NOAA JET JUST RELAYED BY THE METEOROLOGIST ONBOARD INDICATE THAT
THE HIGH CONTINUES TO BE VERY STRONG. HOWEVER...THIS FEATURE IS
EXPECTED TO MOVE WESTWARD AND LEAVE A WEAKNESS OVER THE CENTRAL
GULF OF MEXICO.  KATRINA WILL LIKELY TAKE THAT OPPORTUNITY AND
BEGIN TO TURN GRADUALLY TOWARD THE WEST-NORTHWEST AND THEN
NORTHWARD. THE OFFICIAL FORECAST BRINGS THE CORE OF THE INTENSE
HURRICANE OVER THE NORTH CENTRAL GULF OF MEXICO IN 48 HOURS OR SO.
IT IS WORTH NOTING THAT THE GUIDANCE SPREAD HAS DECREASED AND MOST
OF THE RELIABLE NUMERICAL MODEL TRACKS ARE NOW CLUSTERED BETWEEN
THE EASTERN COAST OF LOUISIANA AND THE COAST OF MISSISSIPPI.  THIS
CLUSTERING INCREASES THE CONFIDENCE IN THE FORECAST.

FORECASTER AVILA
FORECAST POSITIONS AND MAX WINDS
INITIAL      27/0300Z 24.6N  83.6W    90 KT
 12HR VT     27/1200Z 24.6N  84.6W   100 KT
 24HR VT     28/0000Z 25.0N  86.0W   115 KT
 36HR VT     28/1200Z 26.0N  87.5W   115 KT
 48HR VT     29/0000Z 27.0N  89.0W   115 KT
 72HR VT     30/0000Z 30.5N  89.5W   115 KT
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Source: http://www.nhc.noaa.gov/archive/2005/dis/al122005.discus.015.shtml?

Appendix L– NHC Advisory, Special Probabilities #15

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ZCZC MIASPFAT2 ALL
TTAA00 KNHC DDHHMM
HURRICANE KATRINA PROBABILITIES NUMBER  15
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 PM EDT FRI AUG 26 2005

PROBABILITIES FOR GUIDANCE IN HURRICANE PROTECTION
PLANNING BY GOVERNMENT AND DISASTER OFFICIALS

AT 11 PM EDT...0300Z...THE CENTER OF KATRINA WAS LOCATED NEAR
LATITUDE 24.6 NORTH...LONGITUDE  83.6 WEST

CHANCES OF CENTER OF THE HURRICANE PASSING WITHIN 65 NAUTICAL MILES
OF LISTED LOCATIONS THROUGH  8PM EDT MON AUG 29 2005

LOCATION           A  B  C  D  E   LOCATION           A  B  C  D  E

25.0N  86.0W      46  X  X  X 46   BURAS LA           X  2 11  6 19
26.0N  87.5W      20 10  X  X 30   NEW ORLEANS LA     X  X  8  9 17
27.0N  89.0W       1 15  6  1 23   NEW IBERIA LA      X  X  2 12 14
MUAN 219N 850W     2  X  X  X  2   PORT ARTHUR TX     X  X  X  9  9
JACKSONVILLE FL    X  X  X  2  2   GALVESTON TX       X  X  X  7  7
VENICE FL          1  1  X  1  3   FREEPORT TX        X  X  X  5  5
TAMPA FL           X  1  1  1  3   PORT O CONNOR TX   X  X  X  3  3
CEDAR KEY FL       X  1  1  3  5   GULF 29N 85W       1  9  3  2 15
ST MARKS FL        X  1  4  4  9   GULF 29N 87W       1 13  5  2 21
APALACHICOLA FL    X  5  5  3 13   GULF 28N 89W       X 11  9  2 22
PANAMA CITY FL     X  5  6  4 15   GULF 28N 91W       X  1 11  5 17
PENSACOLA FL       X  2  9  6 17   GULF 28N 93W       X  X  2  9 11
MOBILE AL          X  1  8  8 17   GULF 28N 95W       X  X  X  6  6
GULFPORT MS        X  1  8  9 18   GULF 27N 96W       X  X  X  3  3

COLUMN DEFINITION   PROBABILITIES IN PERCENT
A IS PROBABILITY FROM NOW TO  8PM SAT
FOLLOWING ARE ADDITIONAL PROBABILITIES
B FROM  8PM SAT TO  8AM SUN
C FROM  8AM SUN TO  8PM SUN
D FROM  8PM SUN TO  8PM MON
E IS TOTAL PROBABILITY FROM NOW TO  8PM MON
X MEANS LESS THAN ONE PERCENT

FORECASTER AVILA


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Source: http://www.nhc.noaa.gov/archive/2005/prb/al122005.prblty.015.shtml?

Appendix M– Hurricane Rita Emergency Declaration, 53 KBB 2005

State of Louisiana

EXECUTIVE DEPARTMENT

PROCLAMATION NO. 53 KBB 2005

STATE OF EMERGENCY - HURRICANE RITA

WHEREAS, the Louisiana Homeland Security and Emergency Assistance and Disaster Act, R.S. 29:721, *et seq*., confers upon the governor of the state of Louisiana emergency powers to deal with emergencies and disasters, including those caused by fire, flood, earthquake or other natural or man-made causes, to ensure that preparations of this state will be adequate to deal with such emergencies or disasters and to preserve the lives and property of the citizens of the state of Louisiana;

WHEREAS, when the governor finds a disaster or emergency has occurred, or the threat thereof is imminent, R.S. 29:724(B)(1) empowers her to declare the state of disaster or emergency by executive order or proclamation, or both; and

WHEREAS, Hurricane Rita poses an imminent threat to the state of Louisiana, carrying severe storms, high winds, and torrential rain that may cause flooding and damage to private property and public facilities, and threaten the safety and security of the citizens of Louisiana;

NOW THEREFORE I, KATHLEEN BABINEAUX BLANCO, Governor of the state of Louisiana, by virtue of the authority vested by the Constitution and laws of the state of Louisiana, do hereby order and direct as follows:

SECTION 1: Pursuant to the Louisiana Homeland Security and Emergency Assistance and Disaster Act, R.S. 29:721, *et seq*., a state of emergency is declared to exist in the state of Louisiana as Hurricane Rita poses an imminent threat, carrying severe storms, high winds, and torrential rain that may cause flooding and damage to private property and public facilities, and threaten the safety and security of the citizens of the state of Louisiana;

SECTION 2: The state of Louisiana's emergency response and recovery program is activated under the command of the director of the state office of Homeland Security and Emergency Preparedness to prepare for and provide emergency support services and/or to minimize the effects of the storm's damage.

SECTION 3: The state of emergency extends from Tuesday, September 20, 2005, through Thursday, October 20, 2005, unless terminated sooner.

IN WITNESS WHEREOF, I have set my hand officially and caused to be affixed the Great Seal of Louisiana, at the Capitol, in the city of Baton Rouge, on this 20th day of September, 2005.

/S/ Kathleen Babineaux Blanco
GOVERNOR OF LOUISIANA

ATTEST BY
THE GOVERNOR

/S/ Al Ater
SECRETARY OF STATE