

*Oil, Gas, and Society:
Hurricane Preparations after Katrina*

August 22, 2006

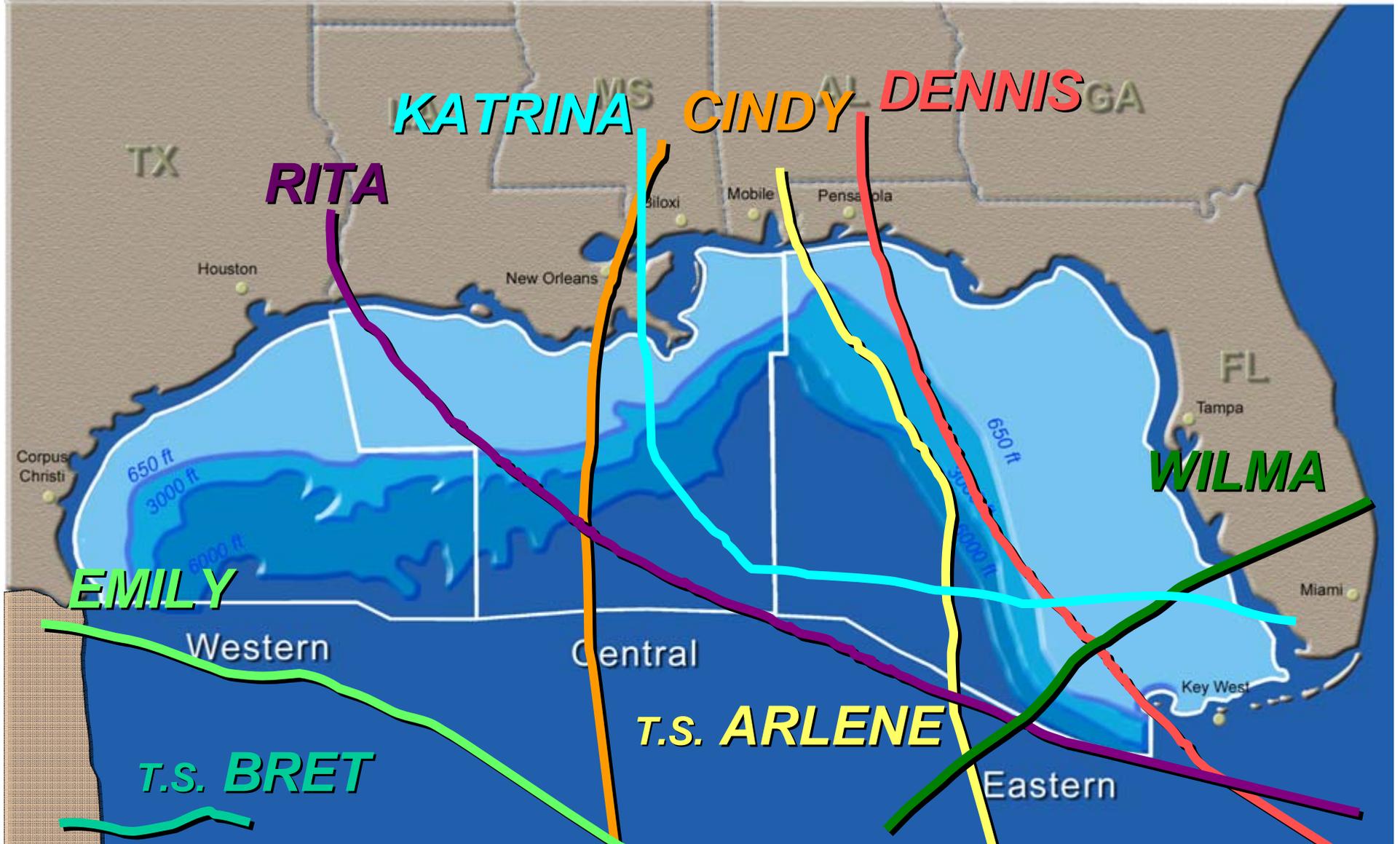
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MMS

2005 HURRICANE SEASON



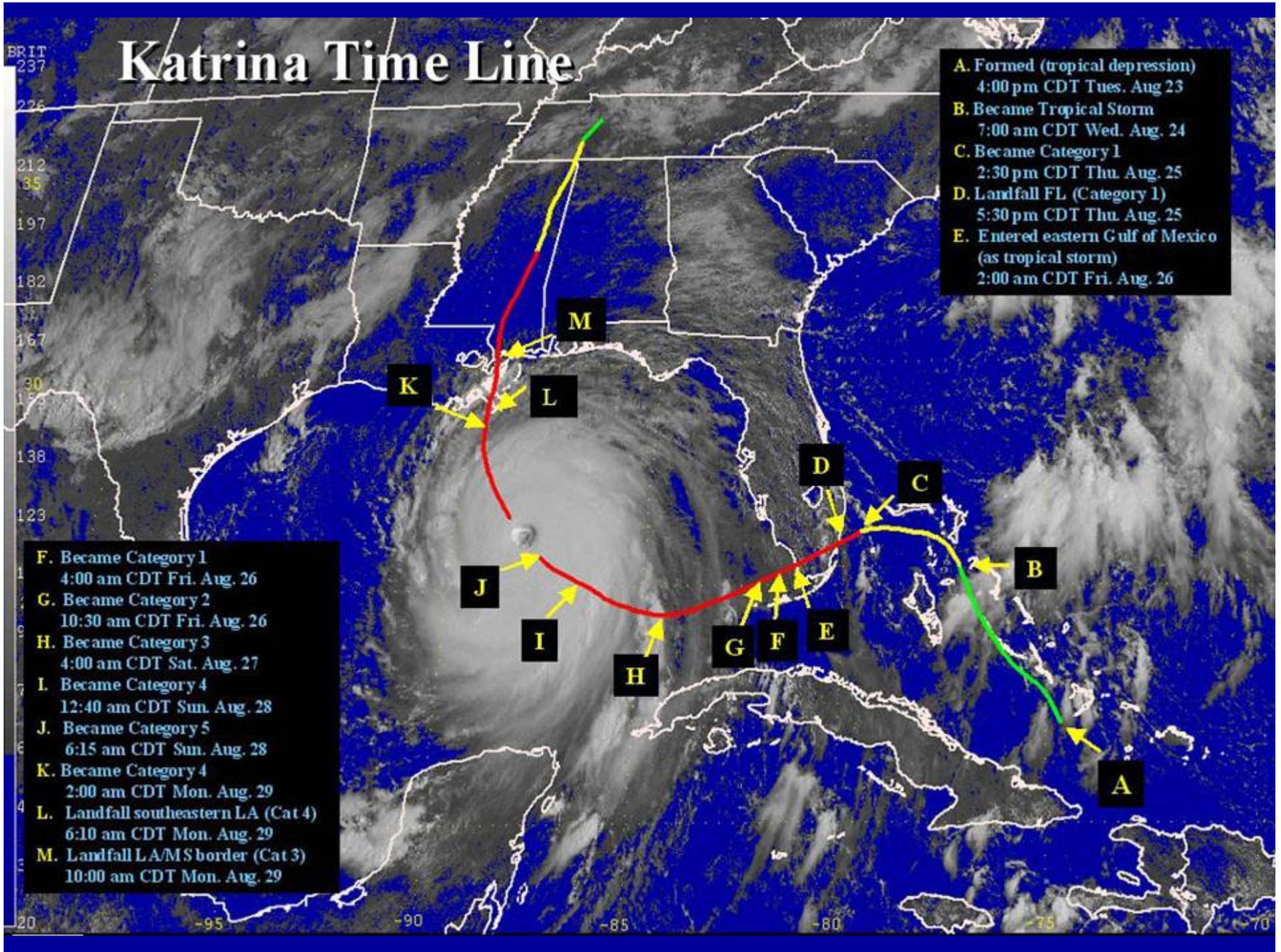
Multiple hurricanes and storms provide additional challenges and raise fatigue questions

Paths and strengths of
hurricanes are not fully
predictable

Katrina Time Line

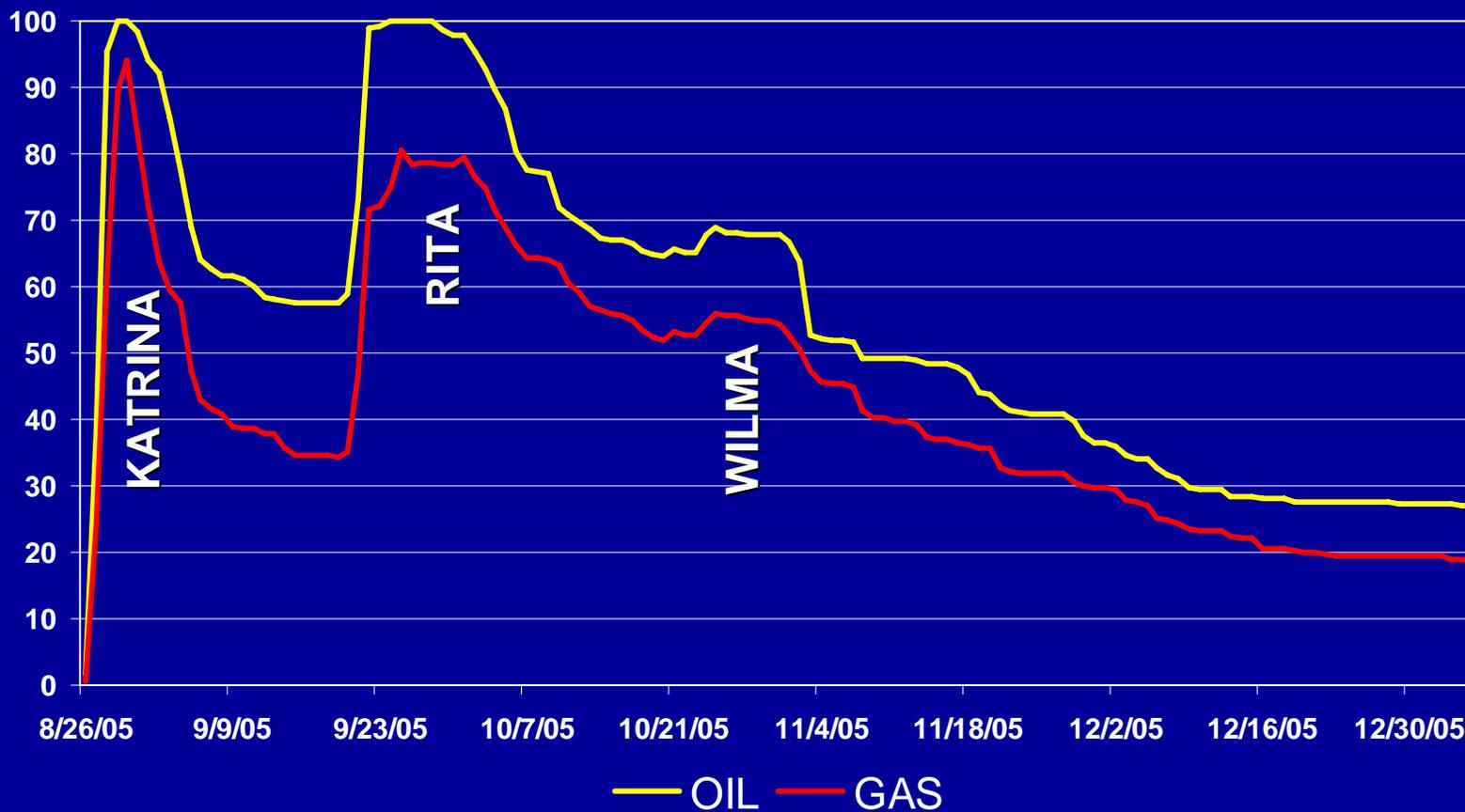
- A.** Formed (tropical depression)
4:00 pm CDT Tues. Aug. 23
- B.** Became Tropical Storm
7:00 am CDT Wed. Aug. 24
- C.** Became Category 1
2:30 pm CDT Thu. Aug. 25
- D.** Landfall FL (Category 1)
5:30 pm CDT Thu. Aug. 25
- E.** Entered eastern Gulf of Mexico
(as tropical storm)
2:00 am CDT Fri. Aug. 26

- F.** Became Category 1
4:00 am CDT Fri. Aug. 26
- G.** Became Category 2
10:30 am CDT Fri. Aug. 26
- H.** Became Category 3
4:00 am CDT Sat. Aug. 27
- I.** Became Category 4
12:40 am CDT Sun. Aug. 28
- J.** Became Category 5
6:15 am CDT Sun. Aug. 28
- K.** Became Category 4
2:00 am CDT Mon. Aug. 29
- L.** Landfall southeastern LA (Cat 4)
6:10 am CDT Mon. Aug. 29
- M.** Landfall LA/MS border (Cat 3)
10:00 am CDT Mon. Aug. 29



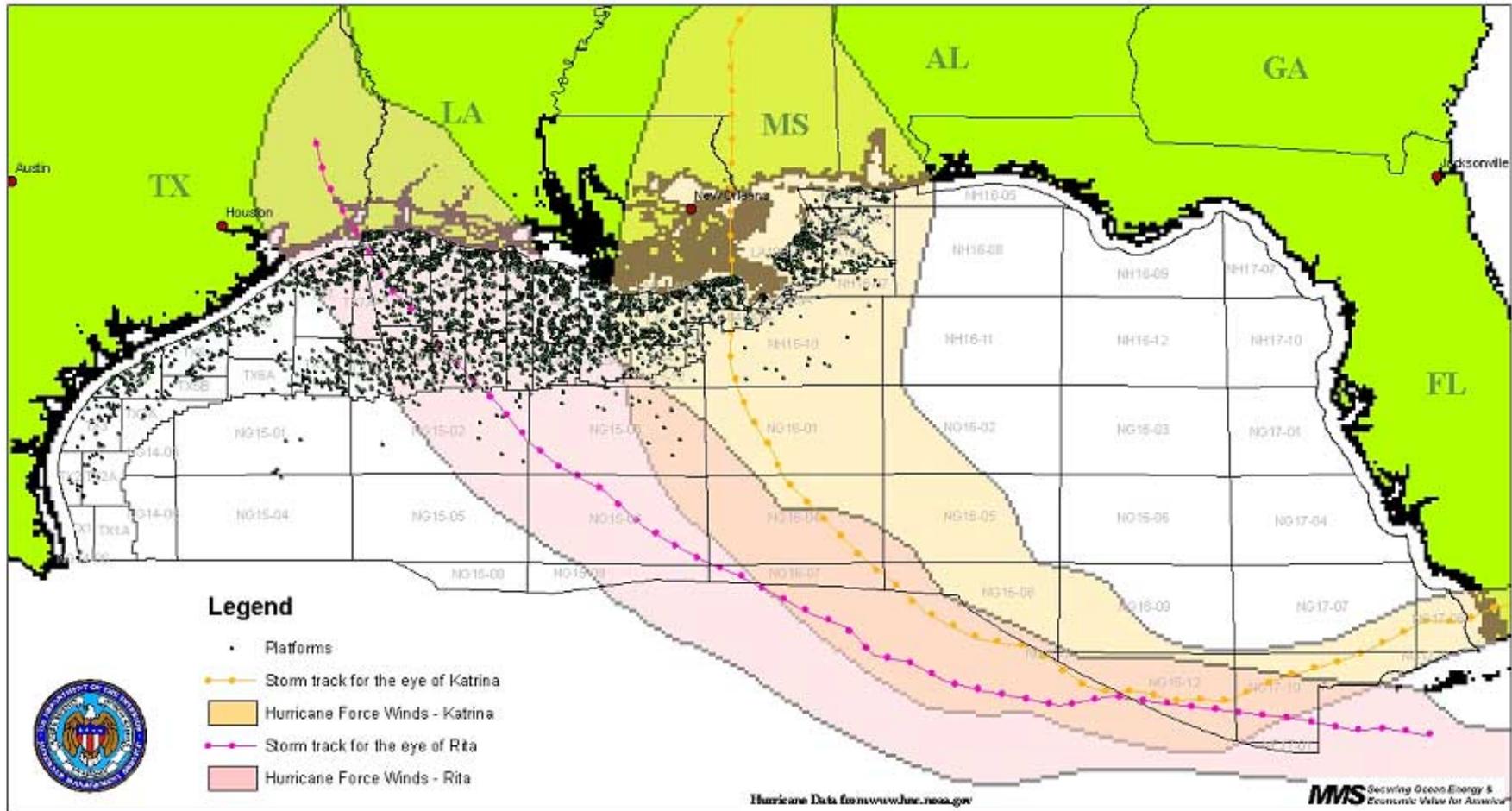
**Shut-in amounts of oil
and gas production can
be significant**

Percentage of GOM Production Shut-in



As of January 5, 2006

Hurricanes Rita and Katrina, August - September 2005





AP / David J. Phillip

Cameron, La., in coastal southwest Louisiana, was flooded after suffering extensive storm damage. Associated Press photo by David J. Phillip

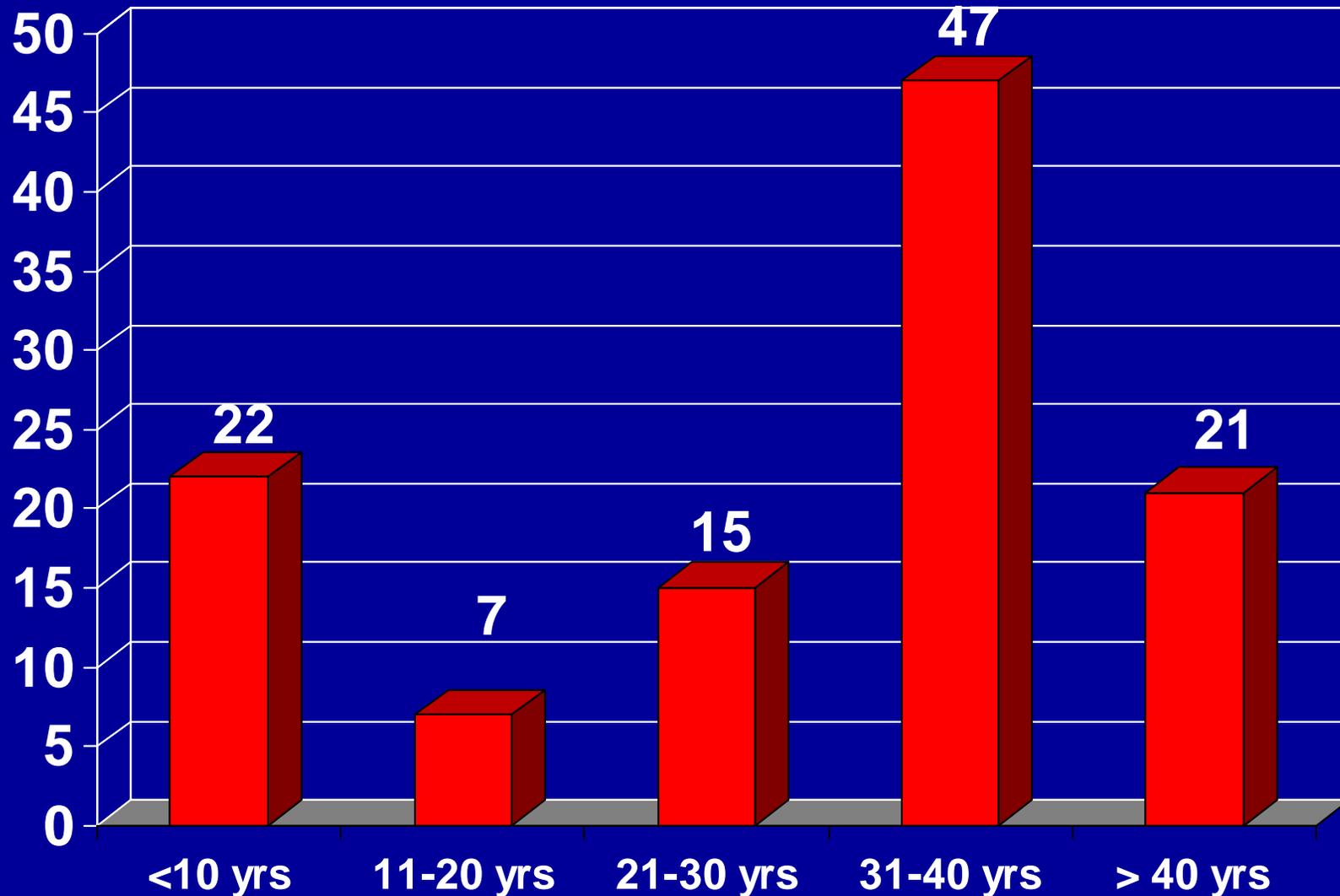
Types of Damage

Damaged & Destroyed Platforms

	Katrina	Rita
Destroyed	47	66
Extensive Damage	20	32



Platforms by Age Destroyed by Hurricanes Katrina and Rita



Toppled Platforms

Devon Energy SM 128 SA-1

➤ Before Rita



➤ After Rita



Toppled Platforms BT Operating EI 294 A

➤ Before Rita



➤ After Rita



Chevron Typhoon (Grounded at EI 270)



Damage Assessment Continues

Underwater inspections of structures will yield more damage over the coming year

Lost Rigs

- GlobalSantaFe High Island III
- GlobalSantaFe Adriatic VII



Unusual Effects on Pipelines

- Hurricane Ivan: one pipeline moved 3000 feet
- Hurricane Rita: one pipeline moved 5000 feet
- both occurred outside of mudslide area

Cause of Jackup Losses

- Wave inundation
- Foundation failures leading to wave inundation

What can be done?

- Air gap standards
- Site assessment standards
- Improved preloading
- Transponders

Moored Semi Submersibles; What Can Be Done?

- Mooring systems: increase number of lines, upgrade wire and chain, replace with polyester rope (?)
- Upgrade anchors
- Improved maintenance and inspection
- Improved site planning and mooring analyses
- Improved monitoring capabilities for evacuated rigs

MMS New Rig Requirements

- NTL's 2006 -G09 and G10 adopted new API standards
- API RP 95F and 95 J
- requires site specific assessment of rig suitability

Platform Design Standards

Work is underway to revise the design standards of platform structures

Conclusions

- 1) Multiple hurricanes have impacted production to a significant degree
- 2) Design of deepwater facilities appears adequate
- 3) Fatigue life of deepwater facilities may need to be reexamined
- 4) Only a small percentage of production structures were lost in multiple hurricanes
- 5) Hurricane caused oil spills from OCS facilities did not cause significant damage
- 6) The cause of pipeline movement needs to be examined