

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

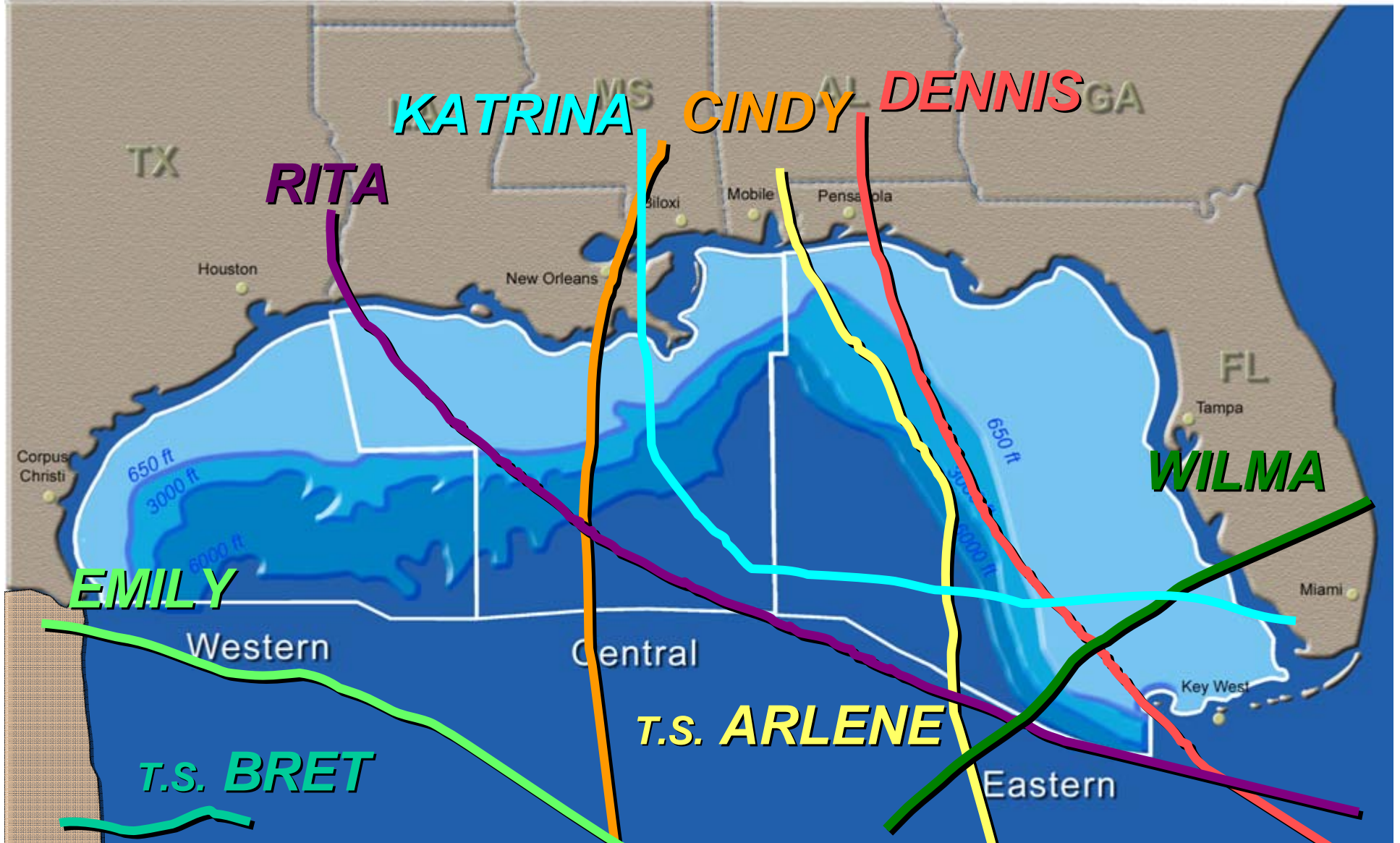
August 22, 2006
Baker Institute at Rice University

Chris Oynes

Regional Director
Gulf of Mexico OCS Region
Minerals Management Service

MMS

2005 HURRICANE SEASON



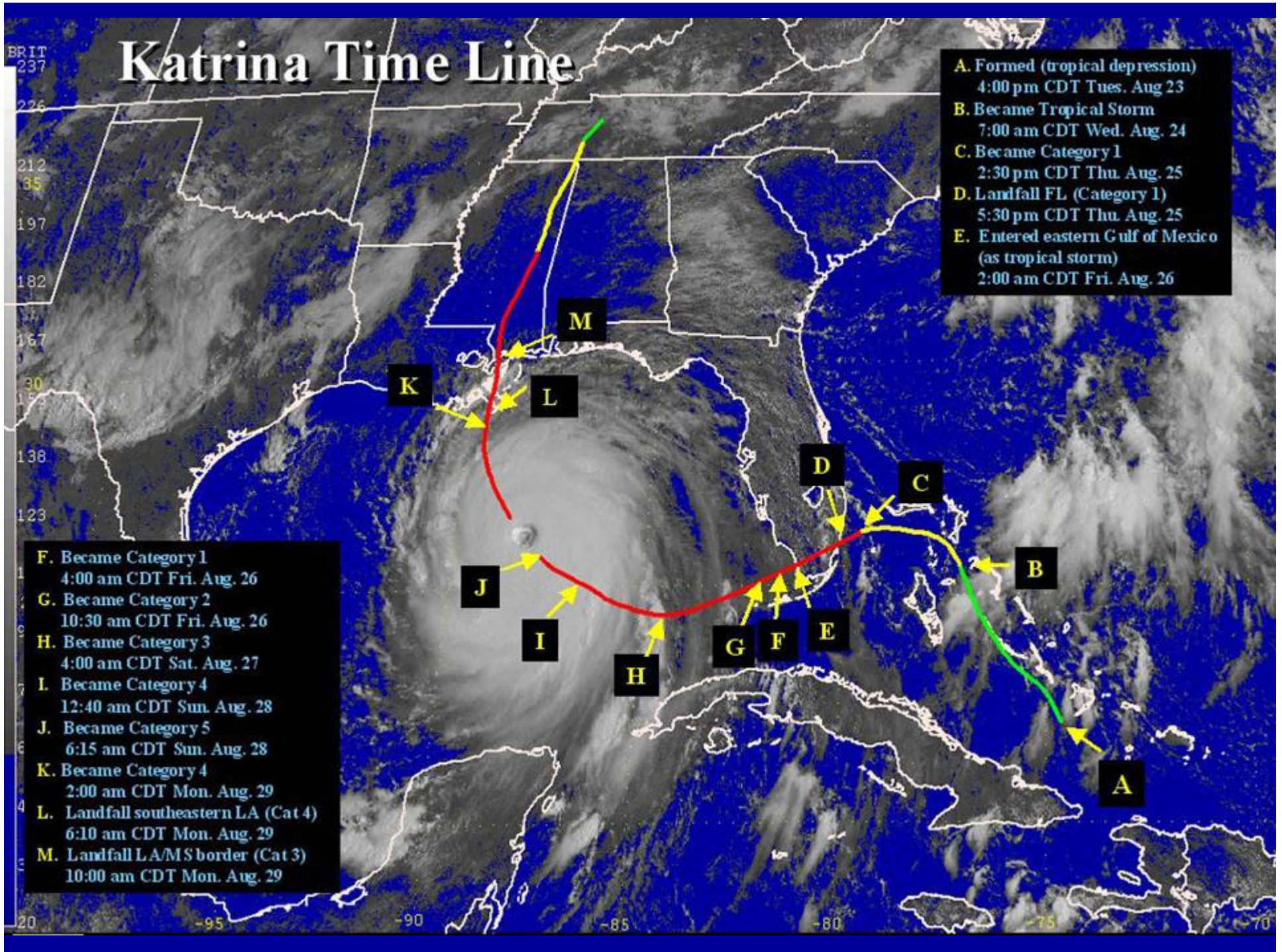
Multiple hurricanes and storms provide additional challenges and raise fatigue questions

Paths and strengths of
hurricanes are not fully
predictable

Katrina Time Line

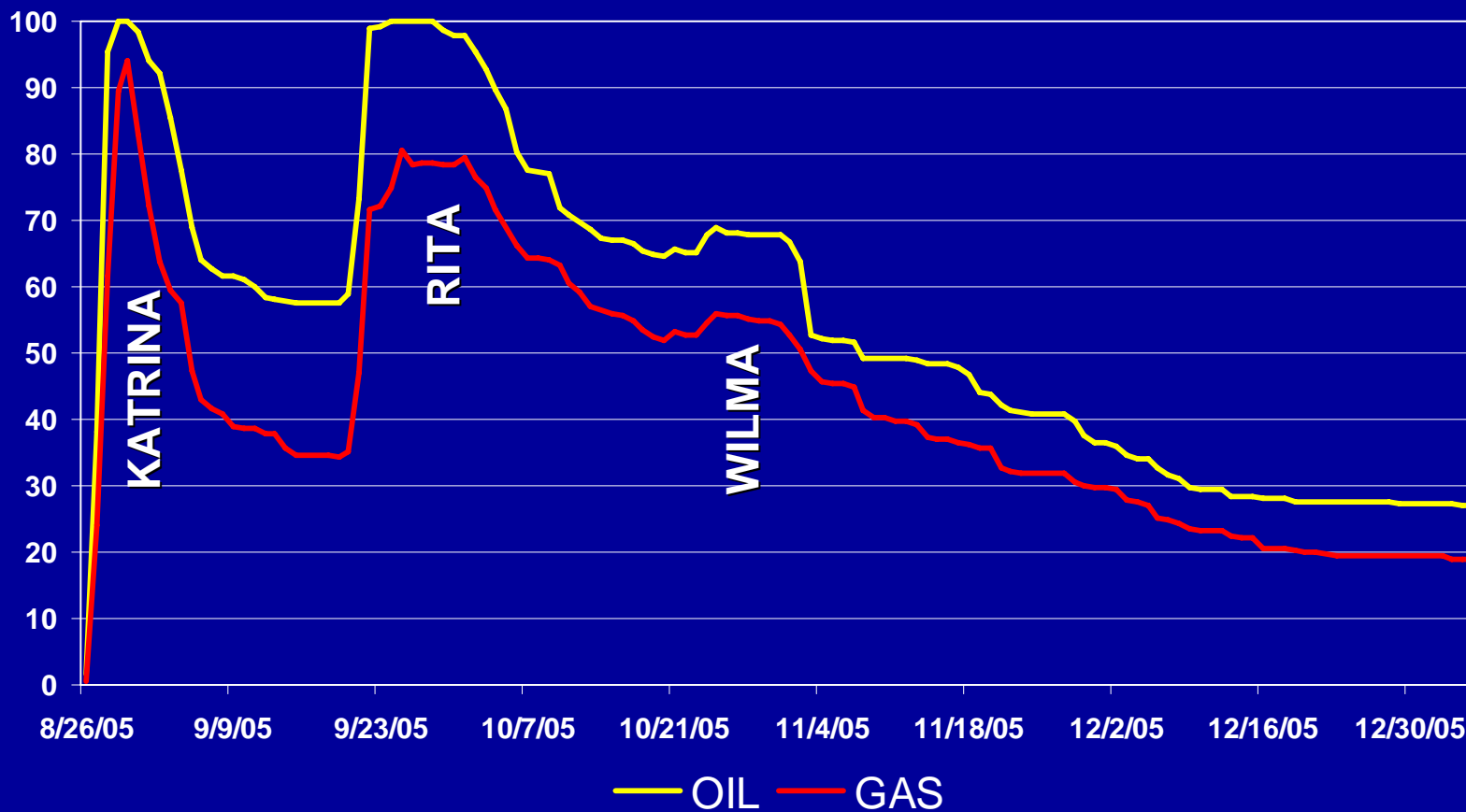
- A.** Formed (tropical depression)
4:00 pm CDT Tues. Aug. 23
- B.** Became Tropical Storm
7:00 am CDT Wed. Aug. 24
- C.** Became Category 1
2:30 pm CDT Thu. Aug. 25
- D.** Landfall FL (Category 1)
5:30 pm CDT Thu. Aug. 25
- E.** Entered eastern Gulf of Mexico
(as tropical storm)
2:00 am CDT Fri. Aug.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



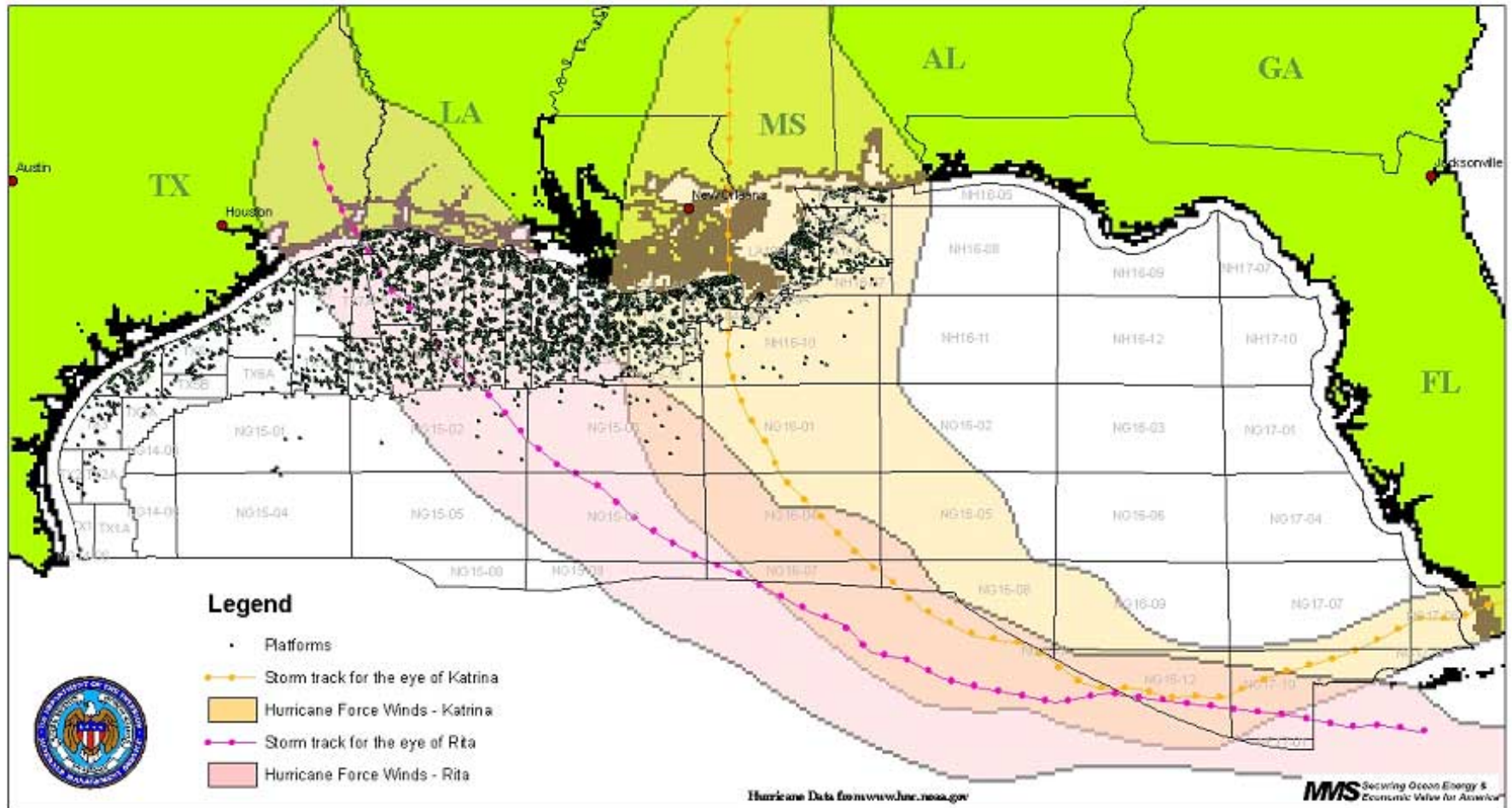
**Shut-in amounts of oil
and gas production can
be significant**

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

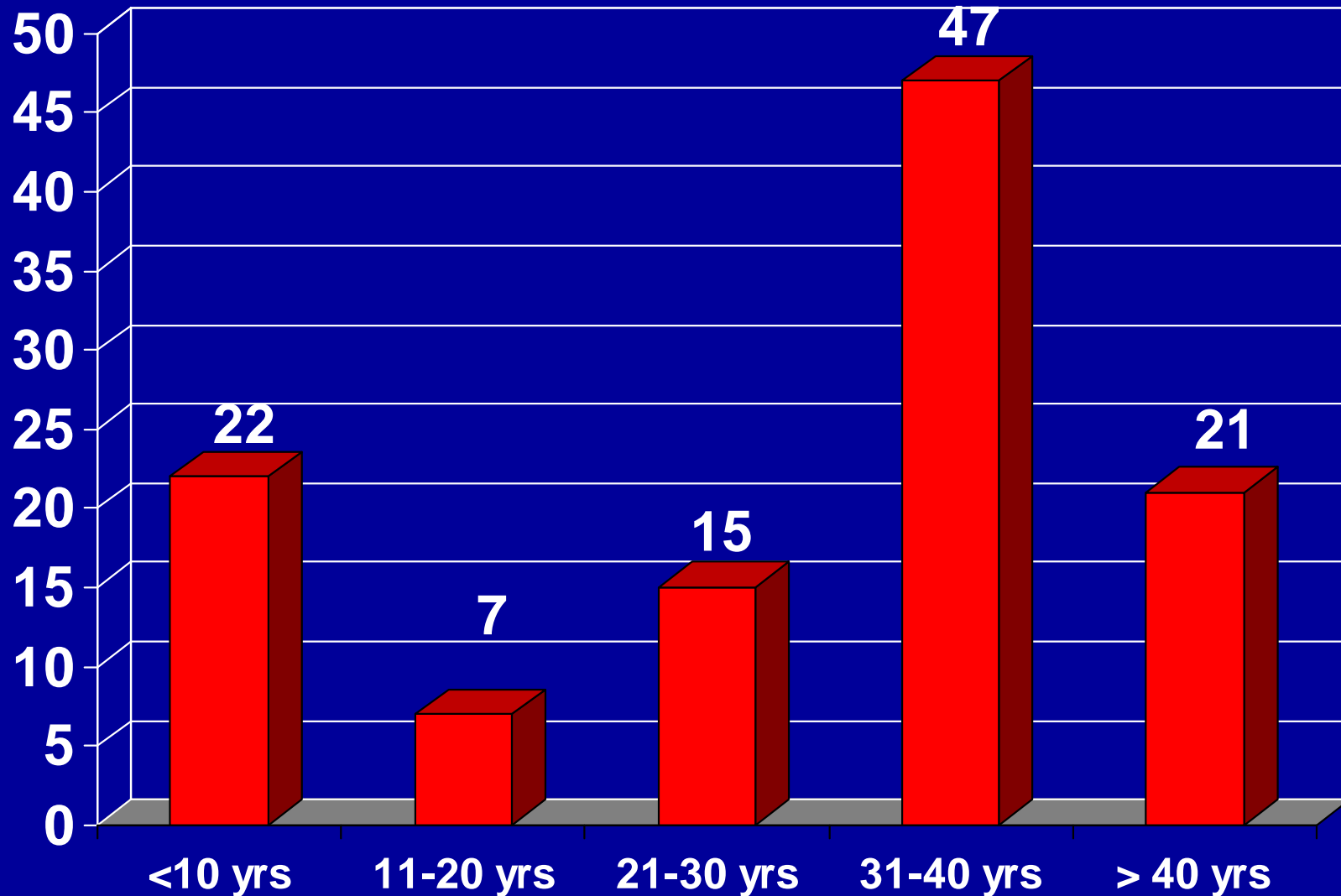
Types of Damage

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