2005 Offshore Hurricane Readiness and Recovery Conference

July 26-27, 2005
InterContinental Houston Hotel
Houston, Texas

Welcome and Objectives

Sandi Fury, Chevron

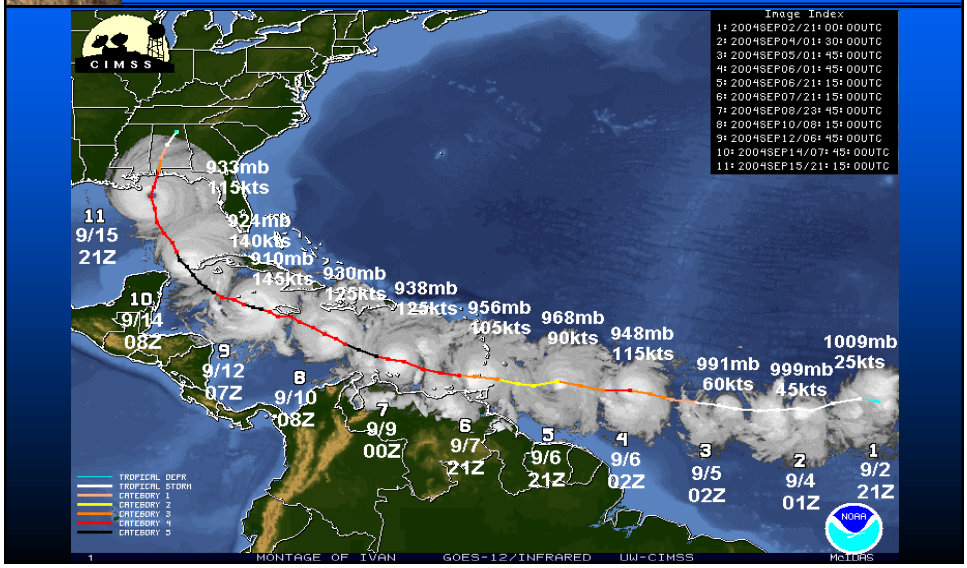
Conference Sponsers

- Co Sponsors:
  - American Petroleum Institute
  - Offshore Operators Committee
  - Minerals Management Service
  - United States Coast Guard
  - United States Department of Energy
  - Office of Pipeline Safety
  - National Ocean Industries Association
  - Offshore Marine Service Association
- Endorsed by:
  - International Association of Drilling Contractors

Conference Expectations

- This is a working technical conference designed to:
  - Advance our understanding of the metocean conditions possible from extreme storm events like Hurricane Ivan
  - Put Ivan into a historical context with regard to resulting environmental forces
  - Assess the performance of Gulf of Mexico infrastructure to Ivan: MODUs, platform rigs, production platfroms and pipelines
  - Identify gaps or opportunities for improvements to current design or operational standards that could improve the reliability and performance of infrastructure on the OCS to hurricane events
- We don't expect to have the answers to all of the questions by the end of the conference
- We do expect to leave the conference with a path forward to complete the performance assessment and answer the question "are the current design standards adequate?"

Hurricane Ivan



Industry Assessment

- Industry performance during Ivan was not atypical to historical hurricane performance, despite Ivan's severity
- Minimal release of oil to the environment is a testimony to the performance of safety devices / factors considered in design as well as prudent operational procedures
- Industry demonstrated the ability to move significant numbers of people from harms way through a timely and efficient evacuation
- Good collaboration by Industry in prioritizing use of resources in responding to exposure post Ivan
- Agency responsiveness to industry needs and requests facilitated return to normal operations

Industry Assessment

- Business Impact from Ivan was significant but generally resulted from the failure of a few pieces of infrastructure
- Opportunities have been identified for further consideration to improve reliability and performance of producing assets in the GOM to hurricane conditions

Opportunities for Further Consideration

Metocean

- Closer look at metocean conditions in shallow water
- Re-evaluate 100 yr and other return period wave heights
- Evaluate platform damage versus hindcasted waves
- Further validate deepwater currents

Opportunities for Further Consideration

Structural

- Sponsor a workshop to discuss structural damage caused by Ivan
- Consider need for additional guidance in RPs regarding securing of equipment on platform decks and topsides
- Consider air gap criteria for platform design and assessment
- Review guidance on identification of mudslide prone areas

Opportunities for Further Consideration

Drilling

- Consider establishment of reliability basis for GOM, including hurricane season
- Consider enhancements to API RP 4F to address loading issues and tie-downs associated with drilling structures

Opportunities for Further Consideration

- Pipeline
  - Better understand the factors contributing to pipeline performance during Ivan
    - » Consider geo-technical issues (mudslides, silting, seafloor mapping)
  - Update industry recommended practices based on research findings

Focus of Conference

- Collaboration of Industry and Government technical experts
  - To better understand performance issues and high-grade opportunities for further review
  - Further discussion of JIPs / studies as appropriate to address areas of concern or value added research opportunities
- Actively share derived information throughout industry

Today's Agenda

- Background
  - Work in progress – how did we get where we are?
- Perspective of the regulators
  - Performance of the Industry
  - Opportunities for improvement
- Grounding on the environmental conditions seen during Ivan
  - Metocean conditions and the relevance to current design standards
  - Advances in hurricane forecasting
  - Geotechnical issues associated with Ivan

2005 Offshore Hurricane Readiness and Recovery Conference

July 26-27,2005

Chris Oynes
MMS Regional Director
Gulf of Mexico Region

Topics

- The setting - GOM as an asset
- Why are we here - effects of hurricanes
- What is MMS doing
- Challenges - do we need to do more

The Setting - Gulf of Mexico as an Asset

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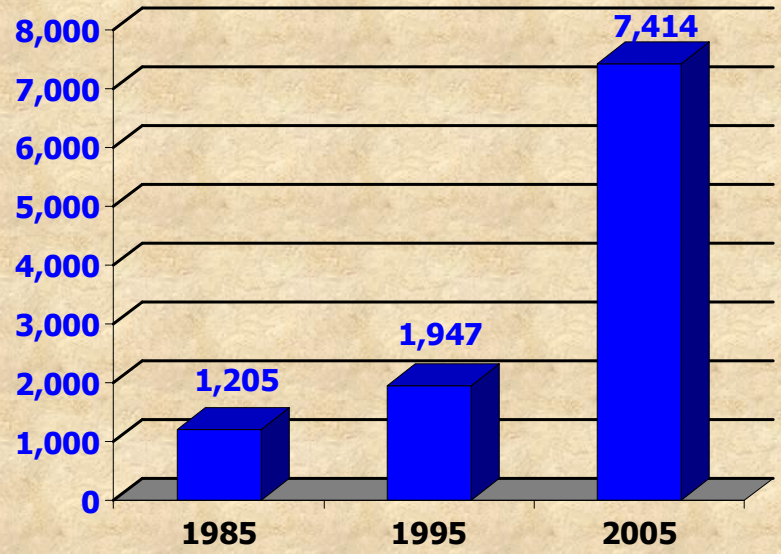
Leases in the Gulf 20 Years



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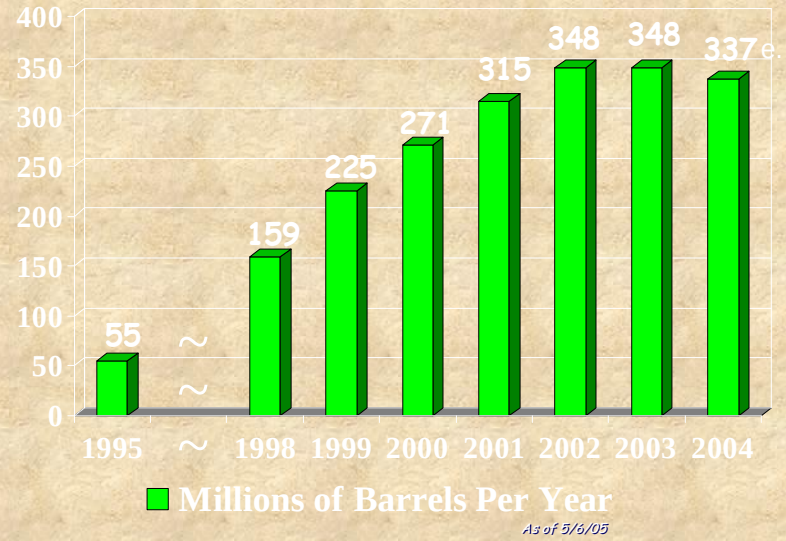
Gulf of Mexico Deep Water Oil Production



As of 5/6/05

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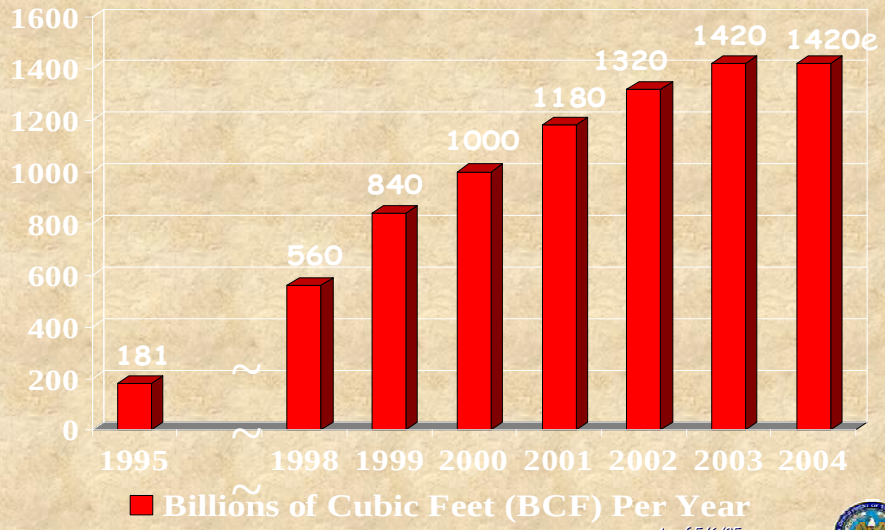
Gulf of Mexico Deep Water Gas Production



As of 5/6/05

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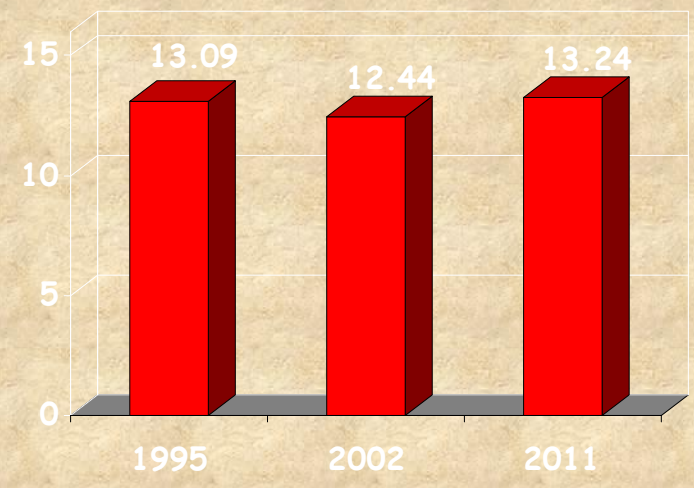
Future of the Gulf

Total Gas Production



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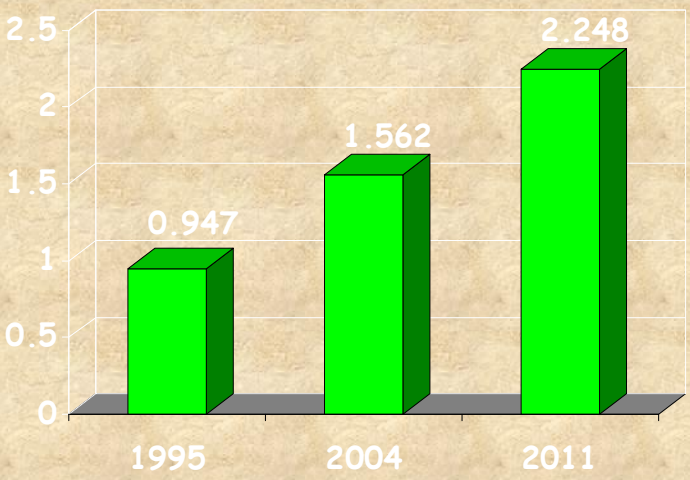
BCF/day MMS report 2004-065

Future of the Gulf
Oil Production is Exploding

Total Oil Production



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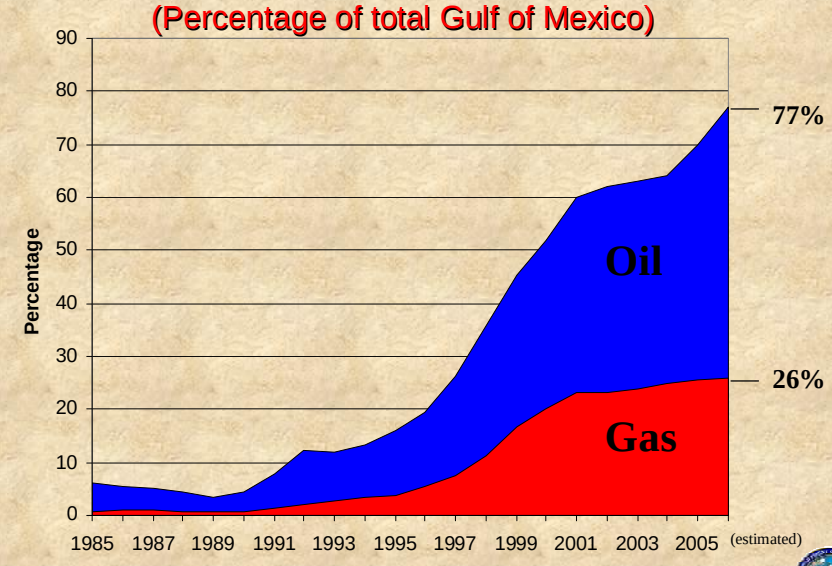
Millions of Barrels of Oil Per Day

GOM OCS Deepwater Production

(Percentage of total Gulf of Mexico)



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WHY ARE WE HERE?

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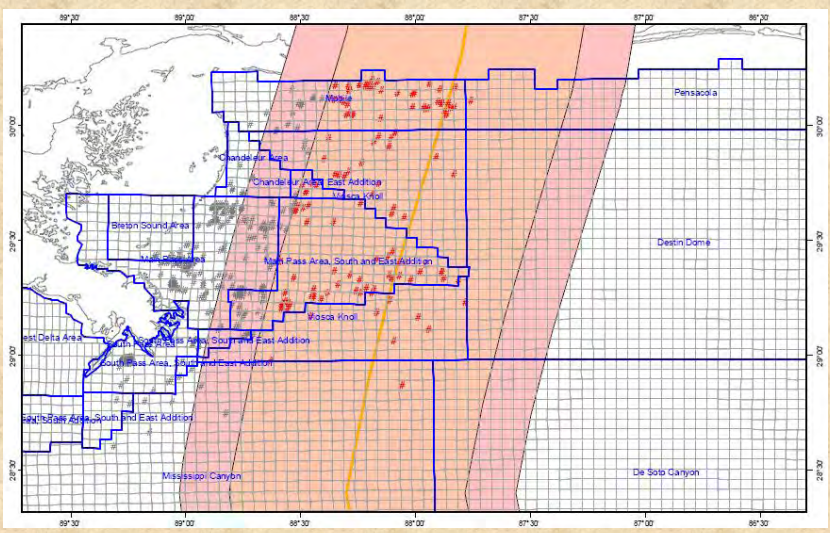
Path of Effects



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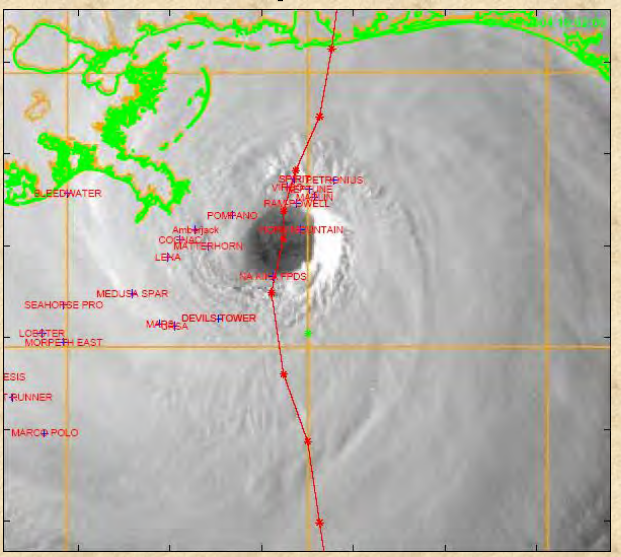
Ivan and Deepwater Facilities



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Damage from Hurricane Ivan

- Mobile Offshore Drilling Units
  - 5 adrift
- Platforms
  - 7 fixed platforms were destroyed
  - 31 platforms with serious damage
- Platform rigs
  - 1 leaning platform rig from Spar
  - 1 missing platform rig from Spar

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Reported Pipeline Damage

Reported Pipeline Damage Due to Natural Hazard

Storm	No. of Reported Pipelines Damaged	Pipelines 16" or Greater in Diameter	No. of Pipelines w/Damage Caused by Mudslides	No. of pipelines w/Damage Caused by Mooring Drag
Hurricane Andrew	448	12	11	0
Hurricane Claudette	2	0	0	0
Tropical Storm Bill	1	0	0	0
Tropical Storm Isidore	2	1	1	0
Hurricane Lili	112	4	1	0
Hurricane Ivan	102	12	17	1

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Before Hurricane Lili

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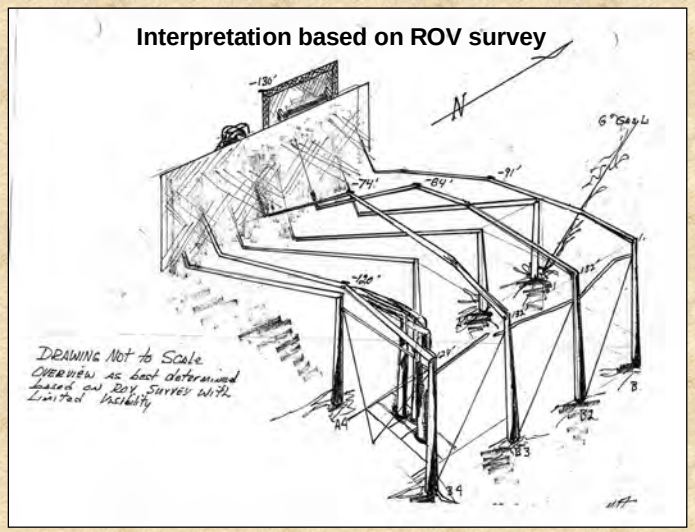
After Hurricane Lili



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After Hurricane Lili

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Before Hurricane Lili

Minerals Management Service

After Hurricane Lili

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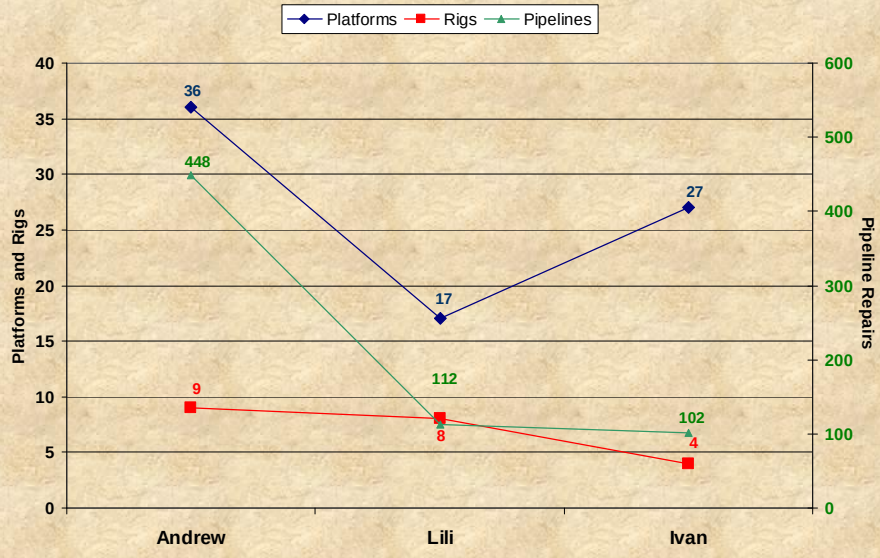
Storm Comparison: Serious Damage



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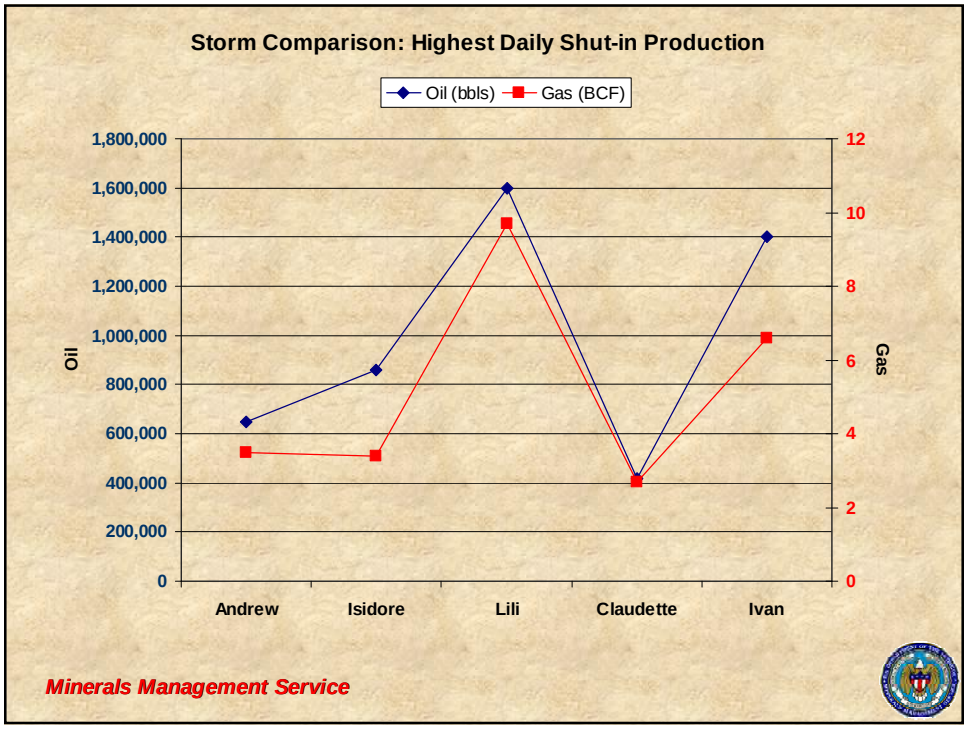
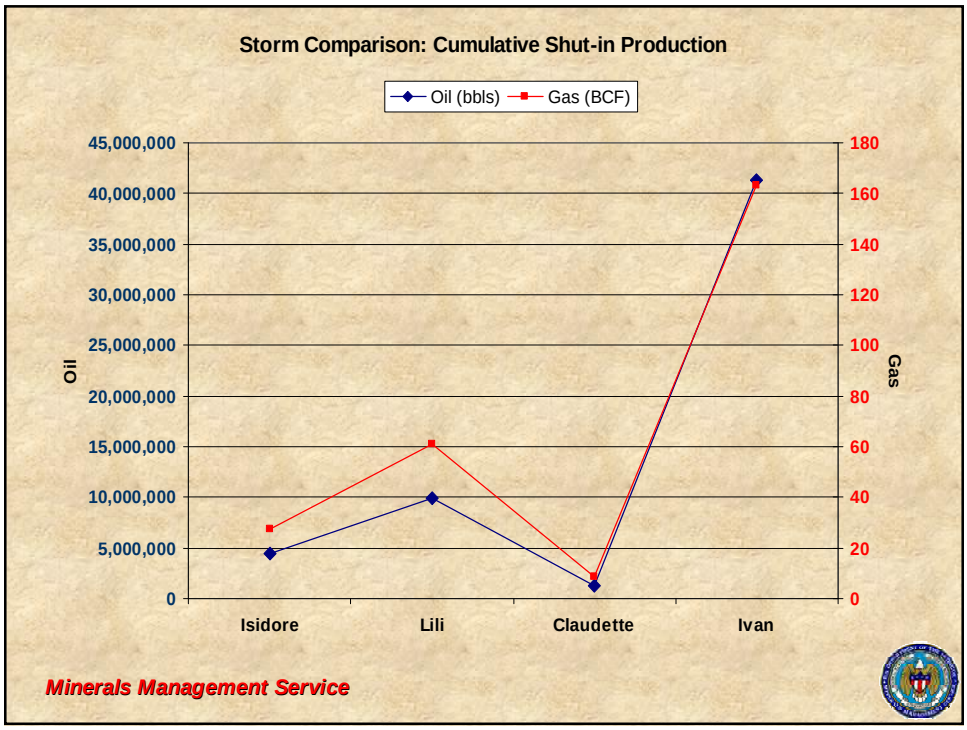

Storm Comparison: Highest Daily Shut-in Production
Oil (bbls)
Gas (BCF)
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Oil
12
10
8
6
4
2
0
Gas
Andrew
Isidore
Lili
Claudette
Ivan
Minerals Management Service


Storm Comparison: Cumulative Shut-in Production
Oil (bbls)
Gas (BCF)
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
Oil
180
160
140
120
100
80
60
40
20
0
Gas
Isidore
Lili
Claudette
Ivan
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WHAT IS MMS DOING?

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MMS Studies

- Awarded 6 contracts totaling over $600,000
- Studies will examine the impact of Hurricane Ivan on the Gulf of Mexico oil and gas infrastructure
- Will be used in assessing the adequacy of current design standards and regulations

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NTL No. 2005-G06

- Hurricane and Tropical Storm Evacuation and Production Curtailment Statistics NTL effective May 26, 2005
- Requires operators to submit statistics regarding evacuation of personnel and curtailment of production because of hurricanes, tropical storms, or other natural disasters
- Submittal of MMS Form MMS-132

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U.S. Department of the Interior
Minerals Management Service (MMS)

HURRICANE AND TROPICAL STORM EVACUATION
AND PRODUCTION CURTAILMENT STATISTICS
GULF OF MEXICO OCS REGION (GOMR)

SEND COMPLETED FORM VIA E-MAIL OR TELEFAX BEFORE 11:00 A.M. DAILY
DURING THE PERIOD OF EVACUATION AND SHUT-IN TO:

E-MAIL: EVACSTATS@MMS.GOV

FAX: GOMR (Primary) – (504) 736-2941
GOMR (Alternate) – (504) 736-2426
MMS Headquarters (if GOMR office is closed) – (703) 787-1093

Name of Hurricane or Tropical Storm: _____

Company: _____

Contact: _____ Telephone Number: _____

Date: _____ Time: _____

EVACUATION STATISTICS BY GOMR DISTRICT OFFICE

TYPE OF FACILITY	Lake Jackson	Lake Charles	Lafayette	Houma	New Orleans	TOTAL
No. of platforms evacuated or being evacuated						
No. of drilling rigs evacuated or being evacuated						

PRODUCTION SHUT-IN STATISTICS BY GOMR DISTRICT OFFICE

TYPE OF PRODUCTION	Lake Jackson	Lake Charles	Lafayette	Houma	New Orleans	TOTAL
Oil (BOPD)						
Gas (MMSCFD)						

MMS

MMS Form 132

- Submitted daily by operators who have any shut-in production or evacuation of any facility or rig
- Form is either emailed or faxed
- Required to be submitted by 11 a.m.

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Previous Studies

- MMS is reviewing study results on Hurricane Lili – Stress Engineering report on pipelines
- MMS is reviewing previous studies on Hurricane Andrew

Challenges for Industry and MMS – Do We Need to Do More??

Platforms

- WHAT CAN WE DO TO MINIMIZE DAMAGE?
  - Is API RP 2A 21st Edition adequate?
  - Is the 100 year storm criteria sufficient?
  - Should we install platforms in mudslide areas?
  - How do we make platform rigs more secure?
  - Should MODU's be removed from the vicinity of high volume facilities prior to a storm event?
  - How do you secure your facilities in environmentally sensitive areas?
  - Are synthetic mooring systems used on floating facilities adequate?

MODU's

- RIGS ADRIFT ARE NOT ACCEPTABLE!
  - Is the API RP 2SK Mooring Designs standard adequate?
  - What are the assumptions used in performing risk analysis for mooring near infrastructure? Are they sufficient??
  - Are the current standards for anchors and synthetic mooring systems adequate?
  - Are the current storm preparation and evacuation procedures adequate? Are operators allowing enough time to properly secure and prepare?
  - Are the recommended inspection schedules for mooring systems adequate?

Pipelines

- Are the current design standards adequate?
- Are the storm preparation procedures adequate?
- Should we lay pipelines in mudslide areas?
- Should pipelines be laid only perpendicular to mudslide areas?
- Do we need redundancy built into the major pipeline systems?
- Should lines be hydro-tested tested prior to returning pipelines to service?
- Should all pipelines be buried?

Future Efforts

- Continue working closely with industry and other federal agencies
- Continue to assess the effectiveness of current design standards and regulations
- MMS expects to act before and after studies completed

Big Picture – New Reality

- Rising production
- More infrastructure exposure
- Country's growing dependence on Gulf of Mexico
- Gulf of Mexico is one driver of the markets – press scrutiny is intense

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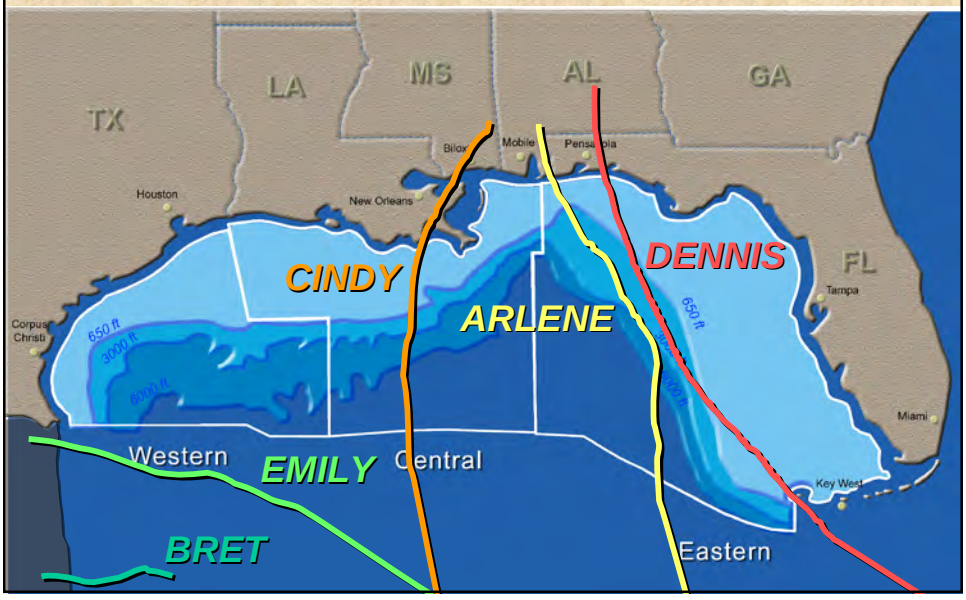
2005 HURRICANE SEASON

(To Date)



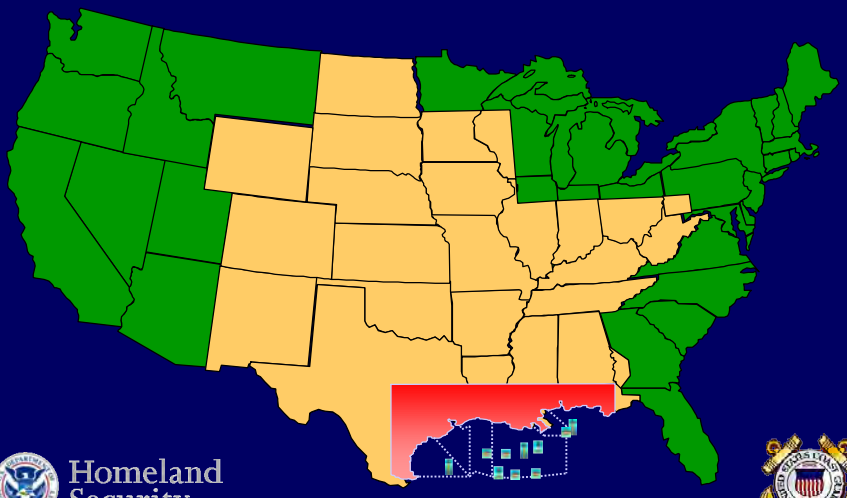
RESPONSE & RECOVERY FROM IVAN IN THE EIGHTH CG DISTRICT

Captain Ronald Branch

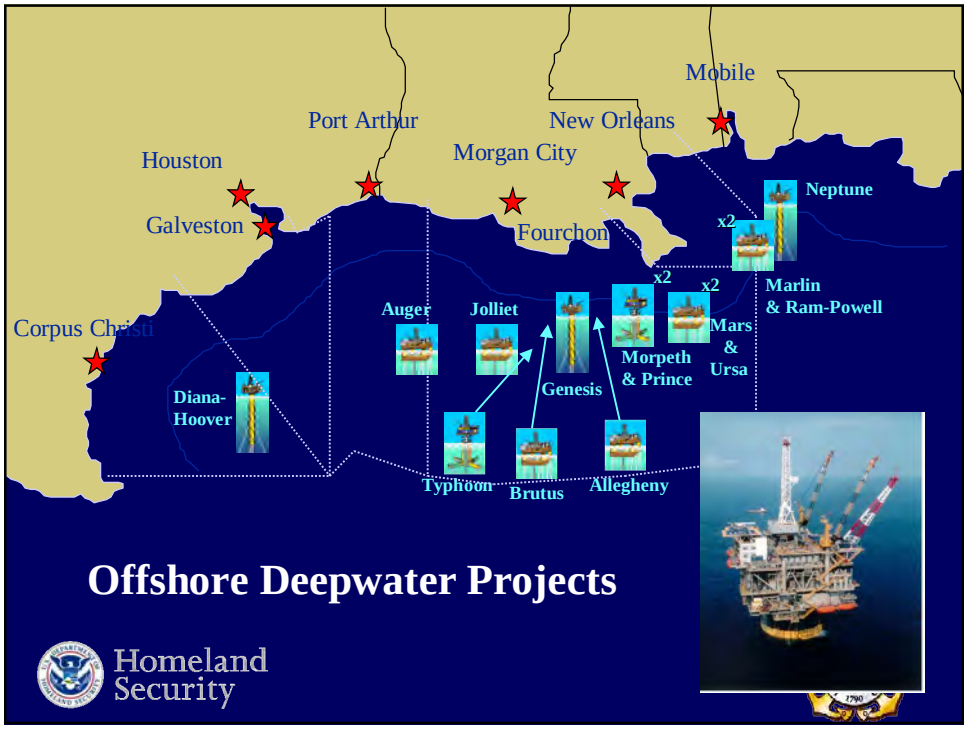
Chief, Marine Safety

Homeland Security

Eighth District – Offshore Region



Homeland Security



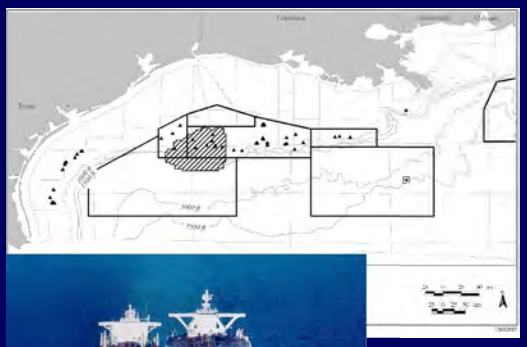
Helo Flights by CG Marine Inspectors

- CG Marine Inspectors fly offshore daily to conduct Annual Safety Inspections, Hull Exams, Deficiency Checks, New Construction Oversights, & MTSA Verifications on Floating Offshore Installations & MODUs
- Also, inspectors conduct Initial Safety Exams of Fixed Platforms
- CG Marine Inspectors average approx 300 flights per year

Homeland
Security

Lightering Zones

- 4 Designated Lightering Zones used by single-hulled tankers thru 2015
- 6 Traditional Lightering Areas used by double-hulled tankers (VLCCs/ULCCs)
- Largest & busiest in U.S.; receives 30% of the nation's crude oil



Homeland Security

Deepwater Ports – Oil & LNG

Louisiana Offshore Oil Port (LOOP)

- **18 mi offshore / 110' water depth**
- **3 Mooring Buoys**
- **Up to 1.2M BOPD**

Gulf Gateway Energy Bridge (LNG)

- **116 mi offshore/298' water depth**
- **Submerged Turret Loading**
- **270M cubic ft per day**

Homeland Security

IVAN OPS & IMPACT

Homeland Security

Ft. Walton Beach


Homeland
Security

Homeland Security

Channel Surveys

- **Coast Guard works closely with other Federal agencies such as Army Corps of Engineers and the National Oceanic and Atmospheric Administration**
- **Coast Guard partners with pilots associations and industry groups**

To open ports in as safe and efficient manner as possible.

Homeland Security

Homeland Security

Station Pensacola

Flooding and minor damage to CG facilities

- Station/ANT Pensacola
- Station Destin
- Station Panama City
- Station Station Venice
- Dauphin Island
- Group Mobile

Homeland Security

THUNDERHORSE

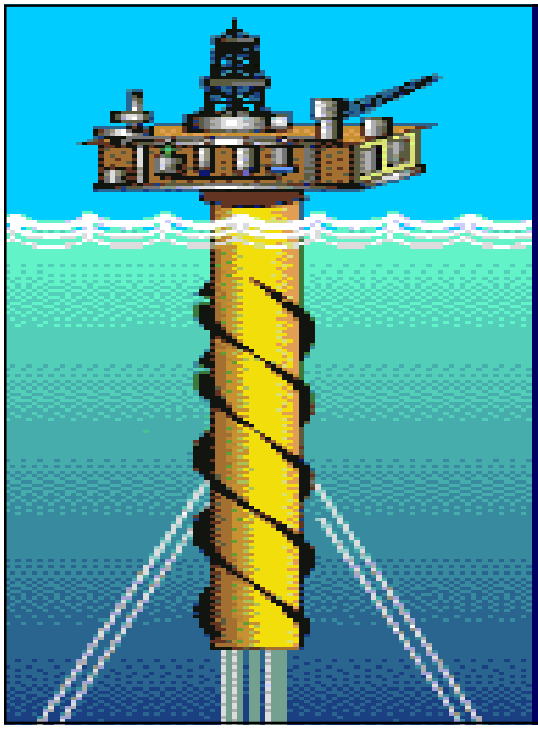
Homeland Security

Homeland Security

SUPPORT TO OTHER AGENCIES

- FEMA Region 4 (Atlanta) two CG reps for post-hurricane operations at Regional Response Coordination Center.
- FL, AL, MS & LA state Emergency Operations Centers all with CG reps assigned.

Homeland Security

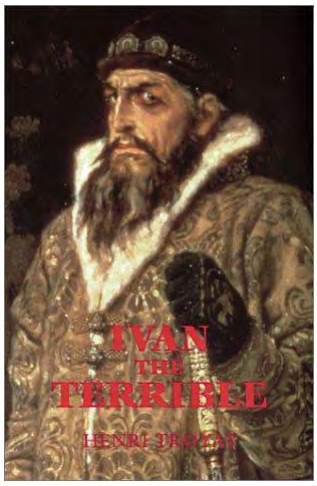


Voluntary Reporting of' Evacuation Initiative

2005 Offshore Hurricane Readiness and Recovery Conference
Regulatory Perspective

Don Howard
MMS Field Operations
Regional Supervisor

MMS Securing Ocean Energy & Economic Value for America



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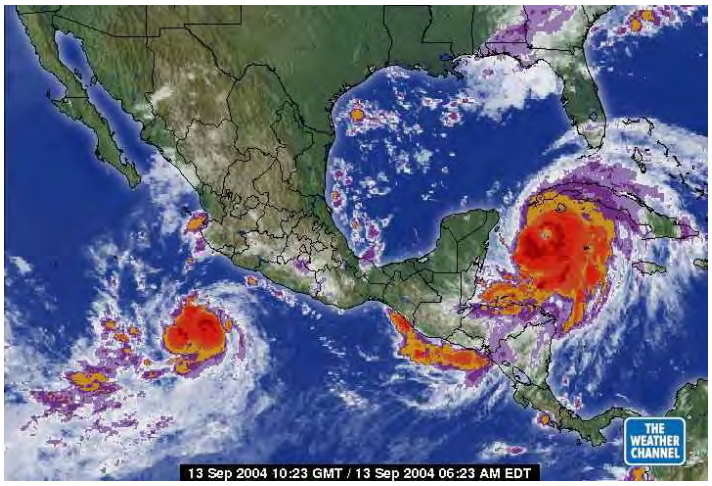
Ivan Entering the GOM



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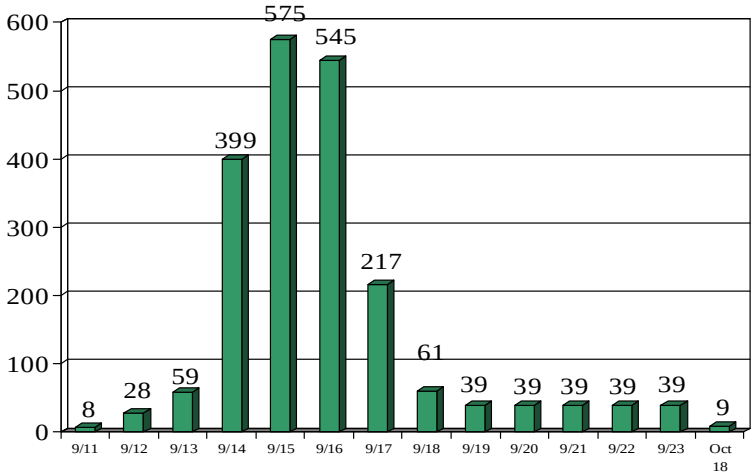
Platform Evacuations Due to Hurricane Ivan



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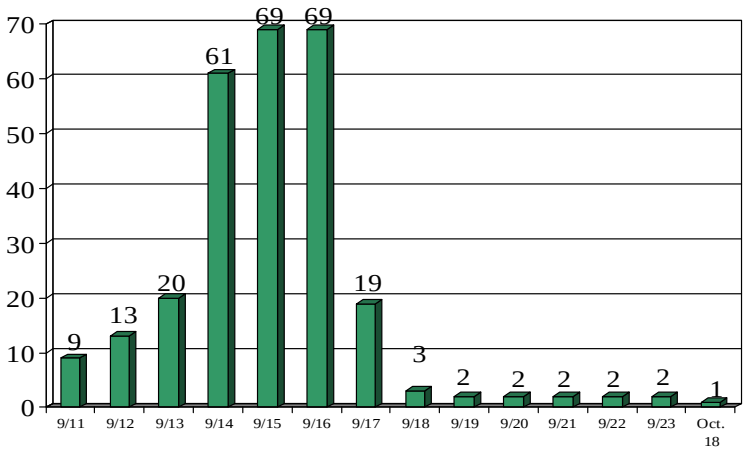
Rig Evacuations Due to Hurricane Ivan



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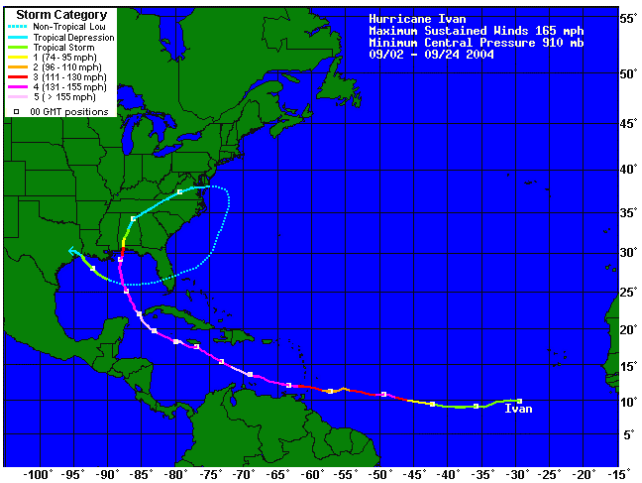
Ivan Storm Track



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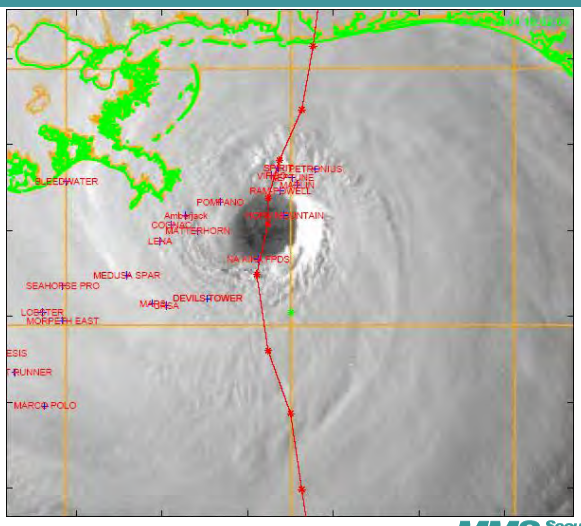
Ivan and Deepwater Facilities



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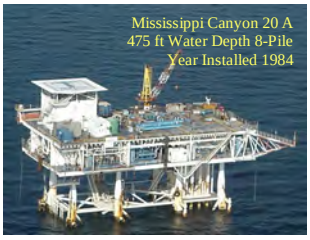
Destroyed by Hurricane Ivan


Main Pass 273 A
247 ft Water Depth 8-Pile
Year Installed 1969


Main Pass 305 C
244 ft Water Depth 8-Pile
Year Installed 1969


Main Pass 306 E
255 ft Water Depth 8-Pile
Year Installed 1969


Mississippi Canyon 20 A
475 ft Water Depth 8-Pile
Year Installed 1984

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Floater Damage

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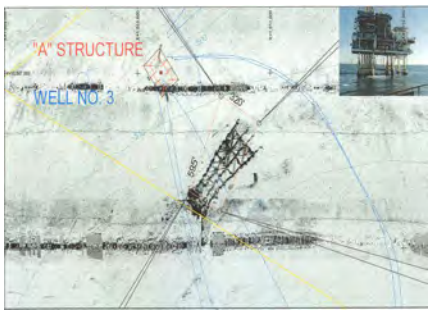
Hurricane Ivan GOM Structure Damage

- MODUs
  - 4 adrift with 1 leaning at 3 degrees
- Platforms
  - 7 fixed were destroyed
- Platform rigs
  - 1 leaning platform rig from Spar
  - 1 missing platform rig from Spar



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Hurricane Ivan GOM Pipeline Damage

(Updated 7/18/05)

- Reported Pipeline Failures: 169
- Pipelines with Multiple Failures: 5
- Pipelines with Failures due to Mudslides: 21

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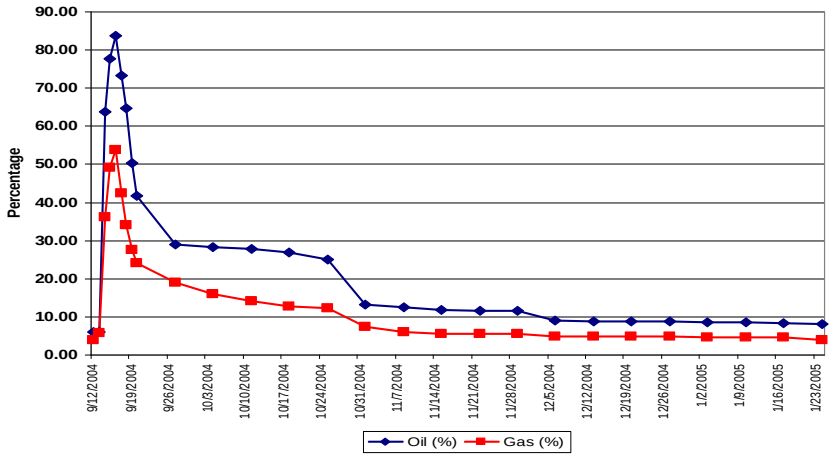
Percentage of GOM Daily Production Shut-in due to Hurricane Ivan



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GOM Production Lost due to Hurricane Ivan

- **Total Daily Lost Production (As of January 3, 2005)**
  - 148, 228 BOPD (Approx. **8.72 %** of Normal GOM Daily Production)
  - 593.69 MMCFD (Approx. **4.83%** of Normal GOM Daily Production)
- **Total Cumulative Lost Production from 9/11/04 to 1/3/05**
  - 38,357,900 BBLS of Oil (Approx. **6.34%** of Normal GOM Annual Production)
  - 151,736 MMCF of Gas (Approx. **3.41%** of Normal GOM Annual Production)
- **For perspective, current Daily Lost Production is equal to approximately:**
  - **.99%** of Average Daily US Consumption of Oil
  - **.75%** of Average Daily US Consumption of Gas

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Mudslide Area

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Hurricane Ivan Research

1. Review Mobile Offshore Drilling Unit (MODU) loss of station keeping ability
2. Assess Drilling and Workover Rig Storm Sea Fasteners on Offshore Floating Platforms During Hurricane Ivan
3. Assess Fixed Offshore Platforms in Hurricanes Ivan, Andrew and Lili
4. Assess Pipeline damages
5. Examine and review the mudflow/mudslide areas in the Gulf of Mexico caused by Hurricane Ivan
6. Develop a database of ocean currents

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Review Mobile Drilling Unit (MODU) Loss of Stationkeeping Ability

OBJECTIVES

Study MODU failures

Review the mooring criteria

Determine if new criteria would have helped

Dr. Malcolm Sharples

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Assess Drilling and Workover Rig Storm Sea Fasteners on Offshore Floating Platforms During Hurricane Ivan

Objectives:

- Assess the drilling rig fastener system
- Review rig tie-down criteria on floating production platforms

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Assess Fixed Offshore Platforms in Hurricane Ivan, Andrew and Lili

Objectives:

- Assess the effectiveness of structural design standards
- Recommend new standards

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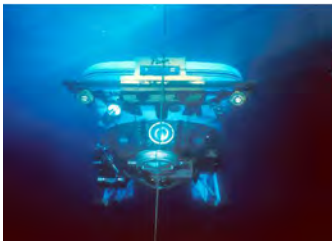
Pipeline Damage Assessment from Hurricane Ivan



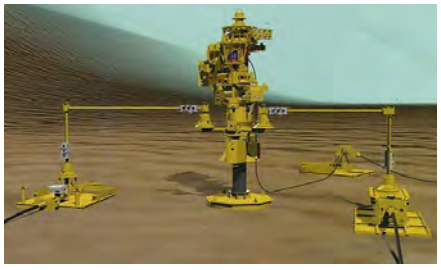
Objectives:

- ID root causes of damage.
- Compare design and installation methods.
- ID techniques to mitigate future PL damage.
- Recommend best practices and code changes.

DNV

MMS Securing Ocean Energy & Economic Value for America

A Pilot Study for Regionally-Consistent Hazard Susceptibility Mapping of GOM Submarine Mudslides

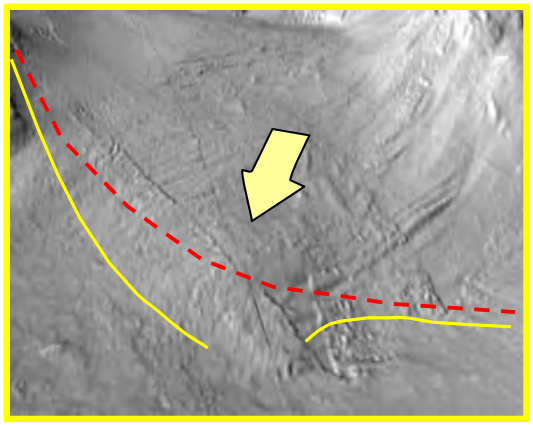


Objectives:

- Develop criteria for mapping slope susceptibility to mudslides.
- Evaluate effectiveness of mudslide susceptibility mapping by comparing against pre-Hurricane Ivan mudslide data

MMS Securing Ocean Energy & Economic Value for America

Mudslides During Hurricane Ivan and an Assessment of the Potential for Future Mudslides in the GOM



Objectives:

- Review mudslide areas resulting from Hurricane Ivan.
- Perform numerical analyses and numerical modeling of mudslide data.
- Map areas of high risk and/or where further evaluation is needed.

MMS Securing Ocean Energy & Economic Value for America

Path Forward

- New Standards?
- New Regulations?

MMS Securing Ocean Energy & Economic Value for America

U.S. Coast Guard

Marine Safety Office – New Orleans

OFFSHORE HURRICANE READINESS

July 26-27, 2005

1

Topics

- NIMS
- Hurricane IVAN
  - Widespread Damage to Infrastructure
  - Multiple Responses to Protect Environmentally Sensitive Areas
  - Lessons Learned

2

National Incident Management System (NIMS)

Overview

3

Homeland Security Presidential Directive 5

Directed Secretary, DHS to develop and administer:

National Incident Management System (NIMS)

Core set of concepts, principles and terminology for incident command and multiagency coordination

National Response Plan (NRP)

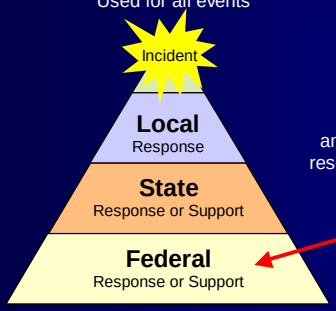
All-discipline, all-hazards plan

4

NIMS and NRP

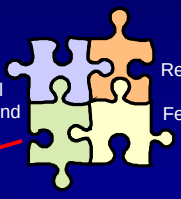
National Incident Management System (NIMS)

Used for all events



NIMS aligns command, control, organization structure, terminology, communication protocols, resources and resource-typing for synchronization of response efforts at all echelons of government

DHS integrates and applies Federal resources both pre and post incident



Resources, knowledge, and abilities from Federal departments & agencies

National Response Plan (NRP)

Activated for incidents of national significance

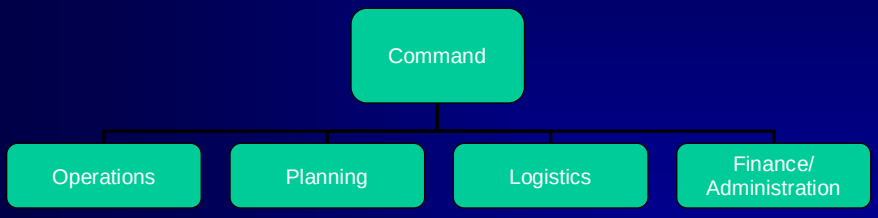
5

Command and Management
Incident Command System
Concepts and Principles

- Most incidents are managed locally
- Modular and scalable
- Interactive management components
- Enables diverse organizations to work together
  - Common terminology
  - Common standards
  - Common procedures
- Measurable objectives
- Minimal disruption to existing systems and processes
- User friendly and applicable across spectrum of emergency response and incident management disciplines

6

Command and Management
ICS Organization and Operations
Command and General Staff



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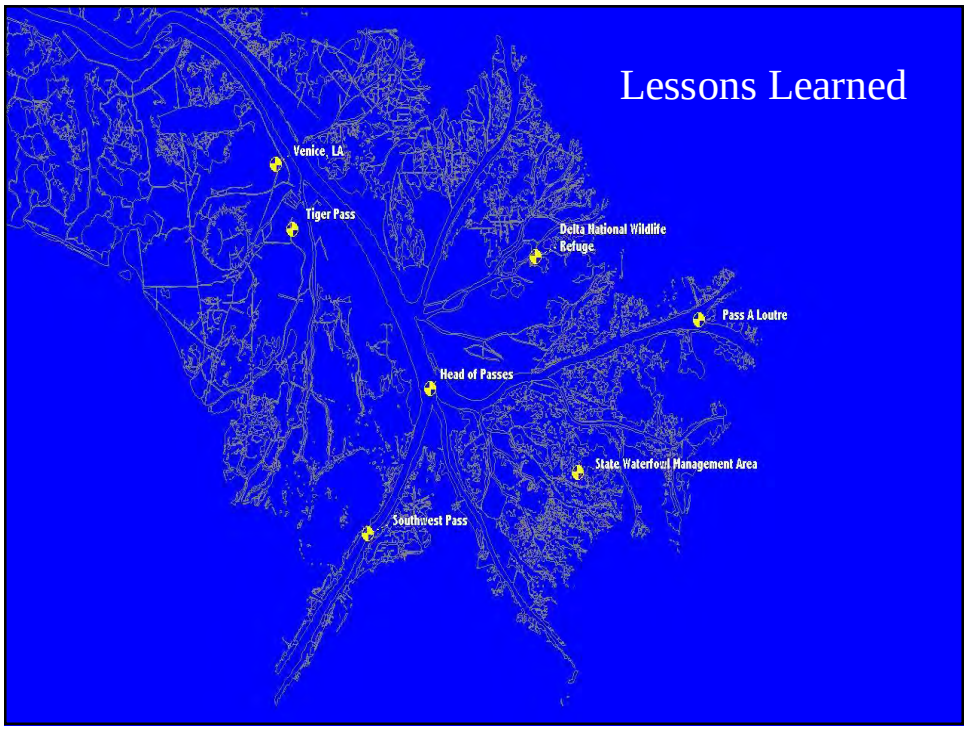
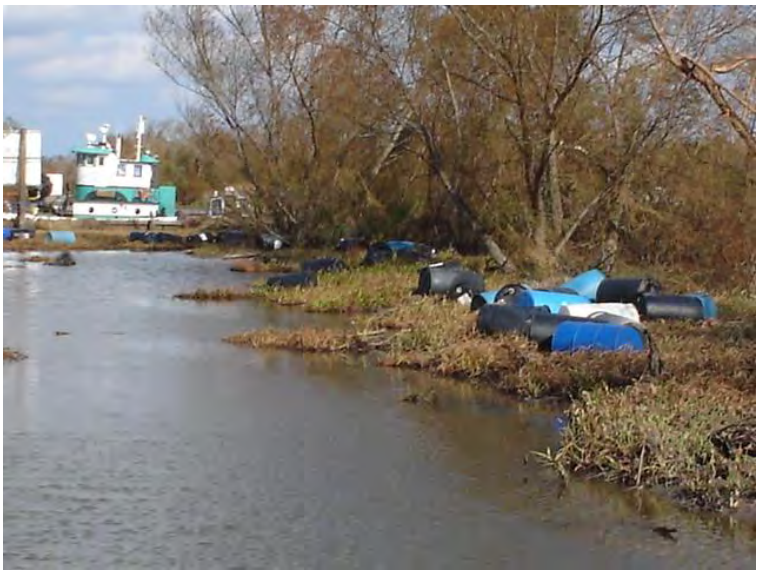
NIMS Information

- http://www.nimsonline.com/
- http://www.fema.gov/nims/nims.shtm

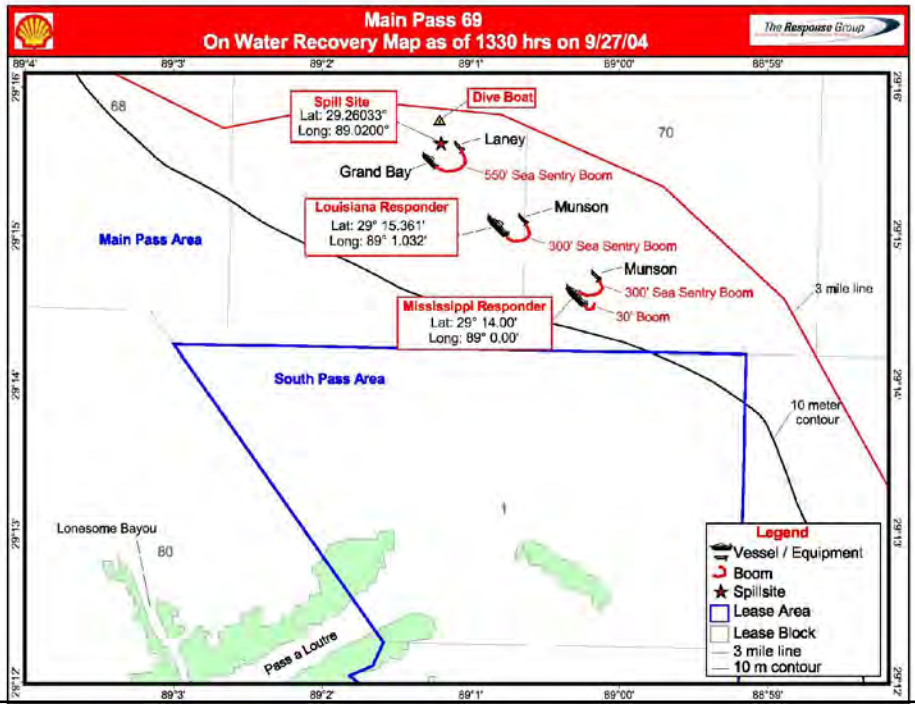
8


Lessons Learned
Venice, LA
Tiger Pass
Delta National Wildlife Refuge
Pass A Loutre
Head of Passes
State Waterfowl Management Area
Southwest Pass



Shell Devon Facility

15

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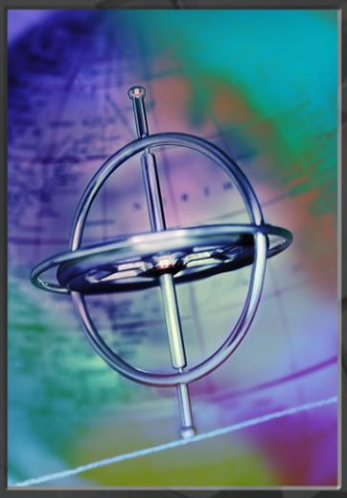
2004/10/03

Questions ?



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API

July 27-28, 2005

Hurricane Preparedness

- **NEI Implements a Five-Phase Hurricane Preparedness Plan**
- **Phase One**
  - **Guidelines for Continual Readiness**
    - **June 1 thru November 30**
    - **Update Severe Weather Notification List**
    - **Review Hurricane Evacuation Procedures**
    - **Review Emergency Response Procedures**

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2

Hurricane Preparedness

- **Phase Two**
  - **Receive Weather Alert or Storm Notification**
    - **Review Operations Forecast**
    - **Communication with Air and Marine Transportation**
    - **Review Hurricane Evacuation/Safety Procedures**
    - **Perform Safety System Checks**
- **Phase Three**
  - **Evacuation Preparedness**
    - **Secure Equipment and Function Test NAV Aids**
    - **Hold Pre-Evacuation Safety and Procedures Meeting**
    - **Evacuation Of Non-Essential Personnel**

3

Hurricane Preparedness

- **Phase Four**
  - **Shut-Down And Evacuation**
    - **Pump Liquid Hydrocarbons into Pipeline**
    - **Shut-In Wells and Subsurface Safety Valves**
    - **Close Incoming and Exit Pipelines**
    - **Shut-Down Operating Systems**
    - **Evacuate**

4

Hurricane Preparedness

- **Phase Five**
  - **Reboarding**
    - **Visual Inspection of Affected Area**
    - **Pre-Boarding Safety Meeting**
    - **Damage Assessment**
    - **Equipment Integrity Verification**
    - **Safety System Function Test**
    - **Facility Startup**

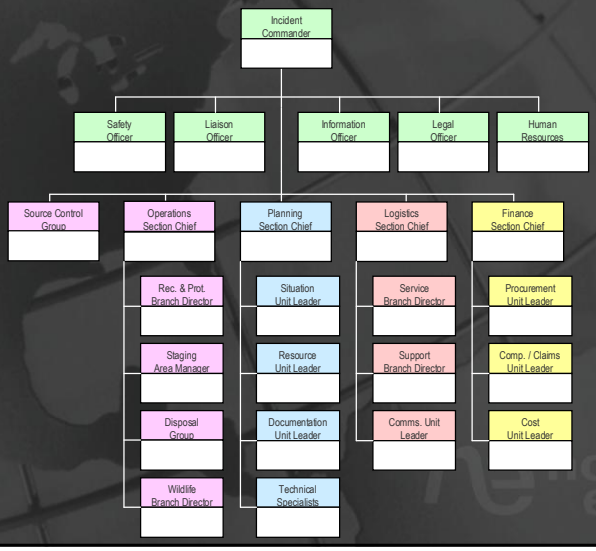
5

Emergency Management System

- **Goal**
  - **Develop a Proactive Response System Utilizing an Integrated Management System**
- **Objective**
  - **Establish a Command System to Manage Emergency Response and Crisis Operations**
- **Structure**
  - **Noble Energy Utilizes the Incident Command System That Was Adopted by The U.S. Coast Guard for Use in Oil Spills**
    - **ICS is now known as the National Incident Management System (NIMS) – its use is now mandated under the new National Response Plan approved in November,2004**

6

Incident Management Team Organization Chart



7

Incident Management Structure

- **Incident Command**
  - **Incident Commander and Staff to Manage The Event**
- **Operations**
  - **Organize and Manage Tactical Response Operations**
- **Source Control**
  - **Control and Stabilize the Source**
  - **Shoreline Protection Strategies**
  - **Site Specific Waste Management**
- **Planning**
  - **Incident Action Plan Development**
  - **Safety Security and Environment**
  - **Long View Strategy**

8

Incident Management Structure

- **Logistics**
  - **Support Of Personnel and Equipment**
  - **Communications**
- **Safety**
  - **Site Safety Plans**
  - **Site Security Plans**
- **Liaison**
  - **Regulatory / Media Communications**
- **Finance**
  - **Accounting**
  - **Contracting**
  - **Insurance**
  - **Procurement**

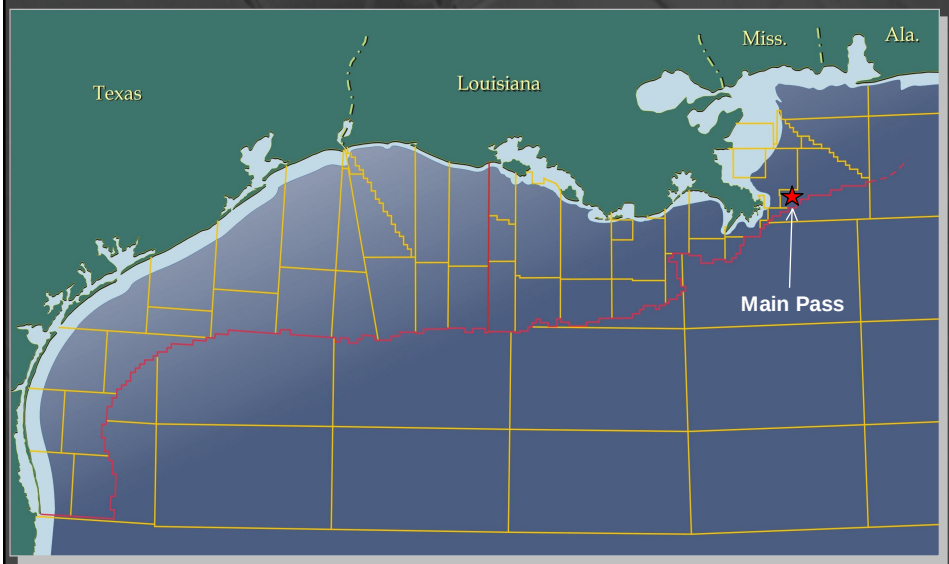
9

Response Levels

- **Noble has a Three Tier Level of Response Based On The Size and Scope of The Incident**
- **Tier One**
  - **Short Small Scale Incident With Minor Damage That Can Be Handled With Facility Personnel**
  - **Facility Personnel Engaged, IMT Members are Notified But Not Assembled**
- **Tier Two**
  - **Medium Scale Incident, Major Injury and or Limited Damage To Facility**
  - **Facility Personnel Engaged, IMT Members Assembled**
- **Tier Three**
  - **Major Incident, Aviation Emergency, Major Fire, Ivan**
  - **All IMT Members Assembled and External Response Organizations Activated**

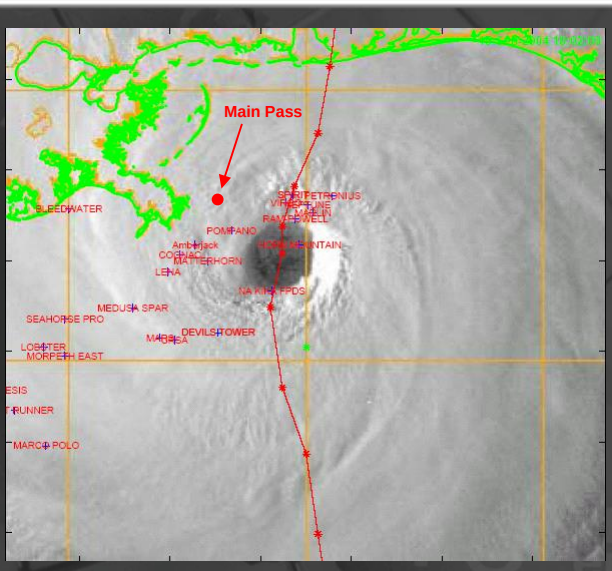
10

Gulf of Mexico



11

Hurricane Ivan



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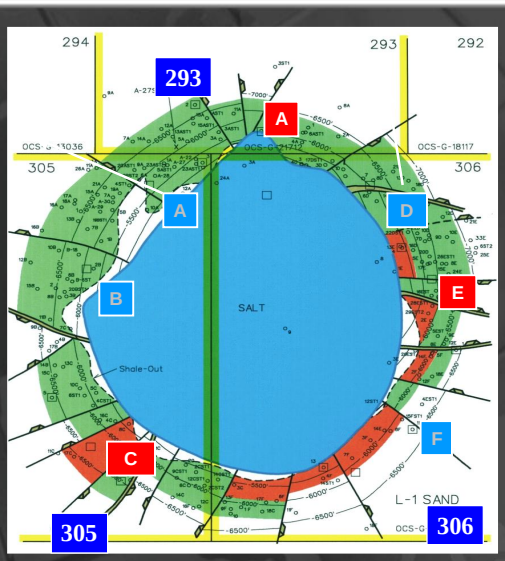
Main Pass 306 Field
MP 305, 306 & 293



13

Hurricane Ivan

- Fixed Wing Reconnaissance Reported Missing Platforms, No Pollution
- Confirmed Status By Two Helicopter Flights Reported Sheening From Standing Platforms
- Activated Emergency Response Team
- Activated Oil Spill Response Team
- Established Houston Command Post
- Agency Notifications
- Set up Venice Command Post

14

Planning Cycle

- NEI Segmented Planning into Two Functional Groups
- Operation Planning Group
  - Focus on the Current Incident
  - Assist on Logistic Setup
  - Support Incident Command
- "Long View" Planning Group
  - Focus On Long Range Strategy
  - Establish Goals and Objectives
  - Define Best Management Practices

15

Planning Stages

- Stage I – Stabilize Pollution and Safety
- Stage II – Damage Assessment
  - Existing Platforms
    - Structural Integrity
  - Lost Platforms
    - Site Survey
- Stage III – Structural Stabilization
  - Assessment
  - Planning
  - Execution

16

Planning Stages

- **Stage IV –Operational Planning**
  - **Salvage/P&A**
  - **RTP – (Return to Production)**
  - **Reserve Analysis**
- **Stage V – Execution**
  - **Salvage/P&A**
  - **RTP**
  - **Reserve Recovery**

17

Planning Considerations

- **Safety**
  - **Diver Safety**
  - **Personnel**
- **Pollution**
  - **Well Bore**
  - **Submerged Equipment**
  - **Support Vessels & Surface Equipment**
- **Weather**
  - **Seasonal Weather**
  - **Storms**

18

Planning Considerations

- **Operational**
  - **Equipment Availability**
  - **Operational Efficiency**
  - **Learning Curve**
  - **Communication**
- **Financial**
  - **Insurance**
  - **Accounting**

19

Lessons Learned

- **Early Reconnaissance**
- **Experienced Emergency Team**
  - **Periodic Emergency Drills**
  - **Strong Alternate Support**
- **Agency Alliances**
  - **MMS**
  - **US Coast Guard**
  - **State Agencies**
  - **US Customs**

20

Lessons Learned

- **Industry Alliances**
  - **Shared Resources**
    - **Transportation**
    - **Dive Vessels**
    - **Pollution Control Equipment**
    - **Emergency Response Peer Contacts**
  - **Contracting Issues**
    - **Operator to Operator**
    - **Operator to Vendor**
- **Planning Phase**
  - **Transitioning from Emergency Phase**
    - **Avoid Reactive Response**
  - **Source Industry, Environmental & Regulatory Experts**
  - **Target "Fit for Purpose" and "Best in Class"**

21

Offshore Hurricane Readiness & Recovery Conference

Pipeline Planning & Response

July 26, 2005
Houston, Texas

Pipeline Planning & Response

- Preparation for a Storm
- Monitoring During a Storm
- Recovery Efforts

Typical Phases of Storm Preparation/Response

Storm/Hurricane Planning Prior to the Season

Monitoring Storm to Determine Evacuation Plan

Securing Facilities & Installations

Evacuation

Monitoring

Assess Damage

Recovery Efforts

Restart

Advance Storm/Hurricane Planning

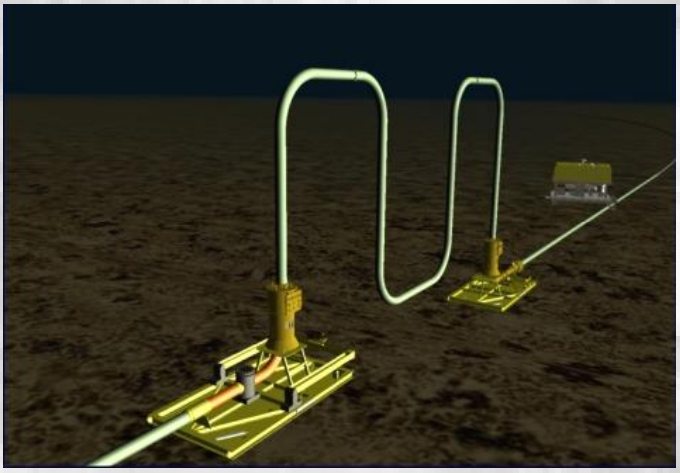
- Identify members of the Incident Command System & establish protocol for daily storm updates & evacuation planning.
- Establish requirements for evacuation and restart with producers.
  - Contact Control Center before evacuation.
  - Closing meter readings
  - Inform Control Center of any damage upon return
  - Obtain clearance prior to restart
- Place response vessels on standby as appropriate.

Repair Equipment Inventory - Shelf

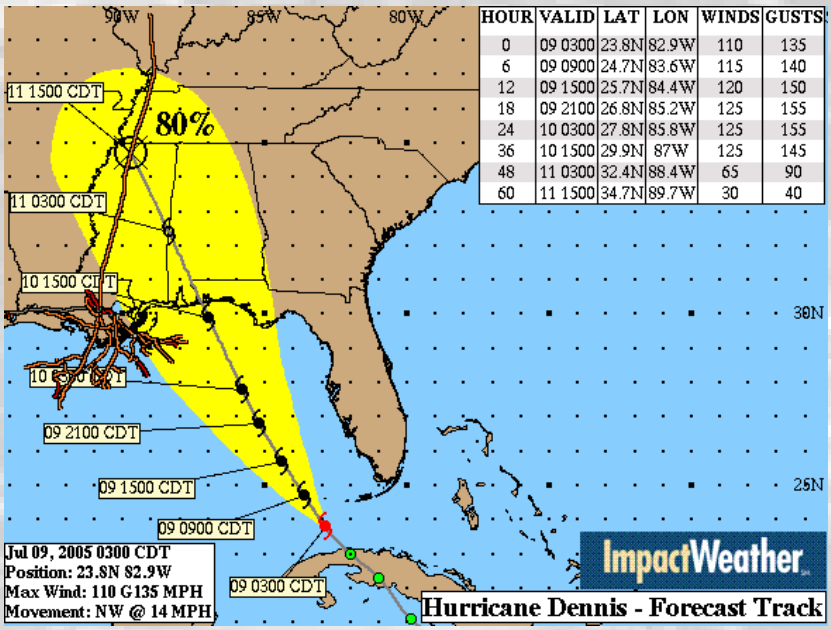



Repair Equipment Inventory - Deepwater

- ROV operated concrete removal tool, diamond wire saw, flooded member detector, lift frames, etc.
- ROV operated end connectors with upward looking hubs & collet connectors 12” through 20”

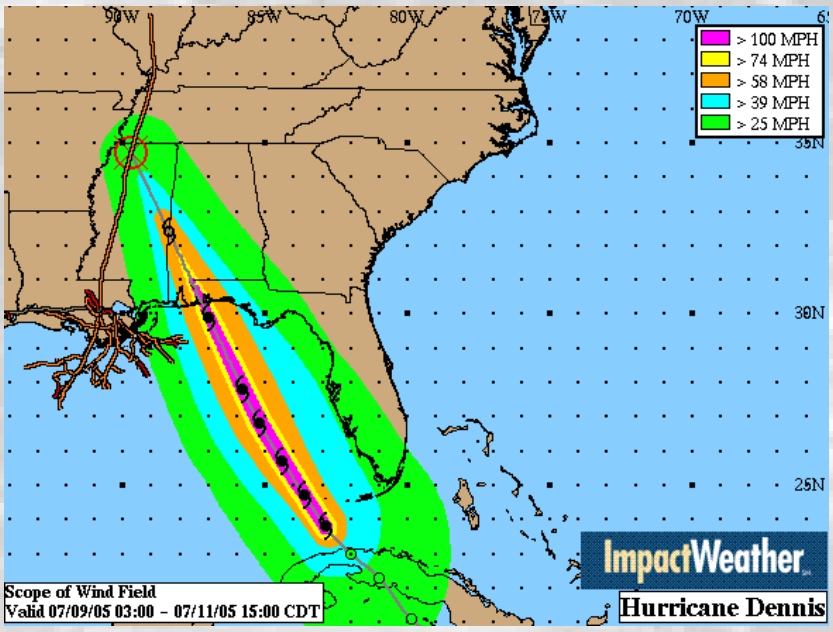


Monitoring Storm to Determine Evacuation Plans



HOUR	VALID	LAT	LON	WINDS	GUSTS
0	09 0300	23.8N	82.9W	110	135
6	09 0900	24.7N	83.6W	115	140
12	09 1500	25.7N	84.4W	120	150
18	09 2100	26.8N	85.2W	125	155
24	10 0300	27.8N	85.8W	125	155
36	10 1500	29.9N	87W	125	145
48	11 0300	32.4N	88.4W	65	90
60	11 1500	34.7N	89.7W	30	40

Monitoring Storm to Determine Evacuation Plans



Securing Pipelines & Related Facilities

- Confirm adequate inventory in tanks to maintain weight.
- Secure any loose items.
- Pump down the platform sump.
- Leave appropriate generator(s) running
- Establish communication procedures with drill rigs near any pipelines.
- Daily teleconferences with SPLC staff.

Monitoring During Storm

- Plot storm track, scope of wind, waves, etc. with respect to pipelines.
- Monitor pipeline pressures during storm via Control Center in Houston.
- Receive status updates on drill rig positions for those near pipelines.
- Communicate with staff to determine personal impacts.

Recovery Efforts

Reconnaissance Flights.

- Recon flights with fixed wing and large helicopters as soon as weather and sea conditions allow.
- Report any findings back to Pipeline Incident Commander.
- If lost communication at some platforms, these will be the first to re-man to read actual pressures on the system and restore remote communications.

Recovery Efforts

Standup Tests.

- Test only during daylight hours with aircraft monitoring line during test.
- Pressurize pipelines slowly. Calculate the number of barrels required to raise to the test pressure in advance.
- Hold test pressure for two hours while flying line to observe for any signs of oil.

Recovery Efforts

Release Investigations & Repair.

- Plot coordinates of any sheens observed with respect to pipelines using in-house software.
- If wind, current, and sheen location indicate that a pipeline is suspected to have a leak, mobilize boat to location to investigate.
- Develop response and repair plan for MMS, DOT, and USCG review/approval.

Transocean

Transocean Offshore Deepwater Drilling, Inc.

HURRICANE PREPAREDNESS IN USGOM



PHILOSOPHY

To have a predetermined, communicated plan that defines the procedures to conduct an orderly and safe evacuation of the company's drilling vessels when required.

The four main objectives:

- Protect personnel
- Protect the environment - secure the well properly
- Protect the asset - secure the rig properly
- Resume operations safely and efficiently

Transocean

PLAN PHASES AND ALERT ZONES

Phase I: Preparation (June 1 – November 30)

- Review Hurricane Evacuation Plan (HEP) by all personnel annually
- Document revisions and confirm with management by June 1st
- Monitor weather conditions inside/outside the GOM

Phase II: Warning Time

- Declared when a severe tropical disturbance originates around GOM or Caribbean Sea (Yellow Alert Zone)
- Continuous (24-hour) weather updates through third-party vendor

Phase III: Hurricane Alert

- Declared when a named storm with potential for hurricane force winds approaches within 72 hours of location or 24 hours outside of Red Alert Zone
- "Red Alert Zone" is when the time to secure/evacuate equals the hurricane travel time over the calculated distance

Transocean

PLAN PHASES AND ALERT ZONES

Phase IV: Secure/Evacuate

- Declared when a potential hurricane approaches within 24-36 hours of location or enters into calculated Red Alert Zone
  - Aid client with MMS notification for evacuation statistics

Phase V: Return to Work

- Declared when hurricane has passed

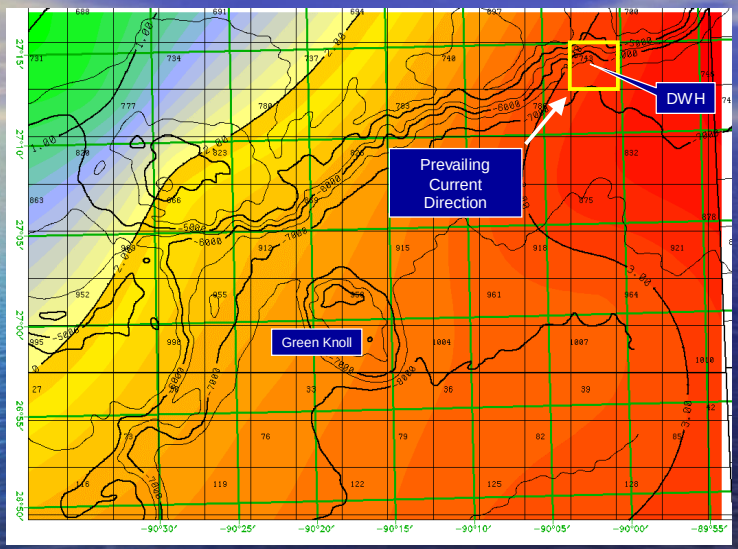
Transocean

Hurricane Ivan - Deepwater Horizon

- Waited on current with displaced riser from Sept 9 until disconnect on Sept 11
  - T-Time at disconnect was 81 hours including 36 hours of transit time away
  - Ivan on projected straight line path to location would have TS level winds within 90 hours
- **Rig experienced high currents > 3.5 knots due to migration of Ulysses Western Front current across location**
- **Performed disconnect with 3.3 knots surface current reading**

Transocean

Current Profile



Transocean

Hurricane Ivan - Deepwater Horizon

- Planned to move to SW/S to find lower currents to pull riser
  - Current field to SW extended 40 miles – 2.6 knots of current
  - Unable to drift with current to the NE due to proximity of escarpment - 2300' elevation within 2 miles
  - Unwilling to go SE or E due to high currents and approaching path of storm
  - Due to the high current and ability to only move at .3 knots (split SDC ring), rig remained in high currents
- 44 personnel remained with the rig through storm

Transocean

Effects of Hurricane Ivan on Horizon

- Closest proximity of eye to the rig was 110 miles
- Rig experienced 35'+ seas and 52+ knots wind
- Spider jumped out of gimbal once
- Highest current = 3.9 knots
- Post Hurricane Ivan, the rig had to move to SE to find lower currents of 1.3 knots

Transocean

Lessons Learned – Ivan/Deepwater Horizon

- Lessons Learned
  - High capacity rigs can successfully operate in extreme current events > 3.5 knots as outlined in high current operating guidelines
  - Appreciate impact of directionality of loop current and near seabed topography on ability to drift and pull riser to escape hurricane's path
  - Utilize current info from support vessel (if available) and account for slow transit speed (.3 knots if SDC ring split) to determine extended transit times with loop current present
  - Required extension of T-Times to account for current, hurricanes and bathymetry

Transocean

Hurricane Ivan - Deepwater Nautilus

- Progressive failure of pre-laid mooring system after encounter with metocean conditions which exceeded the design criteria for MODU's temporary moorings causing the rig to drift for 71 miles
- Action Items from Lessons Learned
  - Internal mooring strength reliability engineering study ongoing to quantify failure probabilities in order to quantifying risk
  - Installed Rig Tracker to continually monitor the location of the rig from shore during storm
  - Installed secure netting around communication equipment

Transocean