Marine Vessel Support

Planning
# APPENDIX 2  PHASE III / YELLOW ALERT CALCULATION SHEET

**TODAY'S DATE:**

**PRESENT OPERATION:**

**NOTE:** ENTER N/A FOR NON-APPLICABLE PROCEDURES.

<table>
<thead>
<tr>
<th>OPERATION CONFIGURATION</th>
<th>TIME REQ'D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 M/W Warm Up Hydraulics for Stinger</td>
<td></td>
</tr>
<tr>
<td>2 Insert Lay Down Head in Station</td>
<td></td>
</tr>
<tr>
<td>3 Perform NDE on joint in Station 3</td>
<td></td>
</tr>
<tr>
<td>4 Weld on Lay Down head (ST1, ST2, ST3)</td>
<td></td>
</tr>
<tr>
<td>5 Connect A&amp;R Cable to Lay Down Head</td>
<td></td>
</tr>
<tr>
<td>6 Transfer Tension To A&amp;R winch</td>
<td></td>
</tr>
<tr>
<td>7 Commence Laying Down of Pipe-Line</td>
<td></td>
</tr>
<tr>
<td>8 Abandon pipe with A &amp; B Cable (with or without ROV)</td>
<td></td>
</tr>
<tr>
<td>9 Reposition anchors or bring in anchors of wet store anchors</td>
<td></td>
</tr>
<tr>
<td>10 Jack in Stinger</td>
<td></td>
</tr>
<tr>
<td><strong>Option Taken</strong> – Bring in Anchors or Wet Storage Anchors Barge Under Tow</td>
<td></td>
</tr>
<tr>
<td>11 Bring in 2 Anchors</td>
<td></td>
</tr>
<tr>
<td>12 Hook up Tow Bridle to Tug</td>
<td></td>
</tr>
<tr>
<td>13 Wet Storage remaining anchors in field (pick up later if possible)</td>
<td></td>
</tr>
</tbody>
</table>

**Grand Total**

---

# SECURE AND EVACUATION TIME FORM

**DATE:**

**TIME:**

**VESSEL:**

**LOCATION:**

**MORNING WEATHER REPORT**

**CONDITION:**

**HOURS:**

<table>
<thead>
<tr>
<th>TIME DESCRIPTION</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong> SECURE FROM PRESENT OPERATION:</td>
<td>III</td>
</tr>
<tr>
<td><strong>B.</strong> RECOVER ALL ANCHORS:</td>
<td></td>
</tr>
<tr>
<td><strong>C.</strong> TOW FOR A SAFE HARBOR, SET-UP/SECURE</td>
<td></td>
</tr>
<tr>
<td><strong>D.</strong> TOW FOR DESIGNATED ANCHORAGE, AND SET-UP/SECURE</td>
<td></td>
</tr>
<tr>
<td><strong>E.</strong> TOW AWAY TO FAIR WEATHER:</td>
<td>+</td>
</tr>
</tbody>
</table>

**TOTAL TIME:**

---

**CONDITION III - STORM WATCH RADIUS**

\[(A) + (B) + (C OR D OR E) \times (\text{STORM SPEED}) = \text{STORM WATCH RADIUS}\]

\[
\left( \frac{\text{___}}{\text{___}} \right) + \left( \frac{\text{___}}{\text{___}} \right) + \left( \frac{\text{___}}{\text{___}} \right) \times \text{STORM SPEED} = \text{STORM WATCH RADIUS}
\]

**CONDITION IV - STORM WARNING RADIUS**

\[(B) + (C OR D OR E) \times (\text{STORM SPEED}) = \text{STORM WARNING RADIUS}\]

\[
\left( \frac{\text{___}}{\text{___}} \right) + \left( \frac{\text{___}}{\text{___}} \right) \times \text{STORM SPEED} = \text{STORM WARNING RADIUS}
\]

**CONDITION V - STORM EVACUATION RADIUS**

\[(C OR D OR E) \times (\text{STORM SPEED}) = \text{STORM EVACUATION RADIUS}\]

\[
\left( \frac{\text{___}}{\text{___}} \right) \times \text{STORM SPEED} = \text{STORM EVACUATION RADIUS}
\]
Communications
Forecasting and Monitoring Services
Pre Storm Checklist
Management Contingencies
Observations

1. Failure modes in general were typical, but there were some significant exceptions: large lateral movements and extents and a problem with one crossing
2. Currently available (reported) information on failures is not sufficiently detailed and consistent to understand root causes
3. Mudslides alone may not have caused the major displacements
Observations (cont’d)

- Coordination of response between companies and agencies was a success
- Sonar techniques worked well for initial assessment
- Pressure test with product was successfully used to assure integrity
- Incremental production loss due to pipeline damage was not necessarily large relative to other causes

Future Needs

- More accurate and detailed incident reporting
- Joint industry and/or regulatory effort to analyze Ivan failures
- Expand participation in API pipeline team
- Improved post-storm integrity plans
- Changes in standards or regulations???
Hurricane Ivan Storm Impact on Pipelines and Risers

Kevin Gaudet
Chevron Pipe Line Company

Hurricane Ivan Statistics

- Formed: September 2, 2004 as Tropical Depression Nine.

- Named Tropical Storm Ivan, September 3 then Hurricane Ivan on September 5, 2004.

- Highest Wind Speed: 165 mph (270 km/h), Category 5.

- Areas Affected: The windward Islands, especially Grenada, Jamaica, Grand Cayman, Cuba, Alabama, Florida, and much of the eastern United States.

- After Ivan’s rebirth, it re-entered the GOM affected Texas and Louisiana border.
Hurricane Ivan Effects

- September 7, 2004: Passed directly over Grenada causing major damage and loss of life.

- September 11, 2004: Passed over Jamaica causing significant wind and flood damage. (Also effecting the Cayman Islands)

- September 13, 2004: Brushed the western tip of Cuba.

- September 16, 2004: Struck the U.S. mainland near Gulf Shores, Alabama.

Hurricane Ivan Effects - Continued

- September 18, 2004: Remnants of Ivan drifted off the mid-Atlantic coast and unleashed tornadoes on the east coast.

- September 23, 2004: The revived Ivan made landfall near Cameron, Louisiana.

- Ivan damaged several Oil and Gas facilities in the Gulf of Mexico.

- Pipelines and Risers in the Gulf of Mexico were moved, separated and damaged by the power of the storm.
Hurricane Ivan MMS Data – Reports of Pipeline and Riser Damage

169 Reports of Pipeline and Riser Damage received by the MMS from Operators in the Gulf of Mexico for Liquid and Gas Pipelines.

The compiled list contained the following information:

5 – Dents on Pipelines and Risers
7 – Kinks Reported on Pipelines and Risers
60 – Separations Reported on Pipelines and Risers
2 – Reports on Risers Pulled Up.
4 – Ruptures on Pipelines and Risers.
7 – Twisted / Bent Reports on Pipelines and Risers.
Hurricane Ivan MMS Data - Reports of Pipeline and Riser Damage

31 – “Other” Categories that range from:
- Splits in the pipelines
- Cracks in the Welds
- Exposed pipelines
- Pipeline Crossing Damage
- Pipeline Movements – (Some in excess of 1 mile)
- Riser Clamp Damage

24 – Bent Risers
25 – Unknowns
4 - Unclassified

Hurricane Ivan MMS Data - Locations of Damage to Pipelines and Risers

Damage Report Locations and distance from the eye of Ivan:

- East Cameron – 1 Report – Approx. 272 mi. West
- South Marsh Island – 3 Reports – Approx. 218 mi. West
- Eugene Island – 2 Reports – Approx. 200 mi. West
- Ship Shoal – 7 Reports – Approx. 160 mi. West
- South Timbalier - 21 Reports – Approx. 125 mi. West
- Bay Marchand – 3 Reports – Approx. 120 mi. West
- Grand Isle – 6 Reports – Approx. 110 mi. West
Hurricane Ivan
MMS Data - Locations of Damage to Pipelines and Risers

West Delta – 6 Reports – Approx. 85 mi. West
Breton Sound – 3 Reports – Approx. 63 mi. West
South Pass – 15 Reports – Approx. 50 mi. West
Mississippi Canyon – 17 Reports – Direct Impact
Main Pass – 73 Reports – Direct Impact
Mobile Area – 5 Reports – Direct Impact
Viosca Knoll – 7 Reports – Direct Impact
Hurricane Ivan – Storm Track and Lease Locations

- Boarding Platform Risers Damaged – 43
- Departing Platform Risers Damaged – 45
- Platforms with Both Risers Damaged - 7
- Pipelines Damaged – 53
- Pipelines Damaged at Crossings or Pipeline Exposures- 9
- Pipelines Damaged at Subsea Tie-ins – 8
- Unknowns - 4
Hurricane Ivan
MMS Data - Damage Occurred

- Number of Pipelines with multiple damage locations:
  - 3 pipelines with 2 damage locations
  - 2 pipeline with 3 damage locations

- Pipeline and Riser damage reports relative to size:
  - 2” – 14” = 153
  - 16” – 36” = 16

Hurricane Ivan – Pipelines and Risers Damaged by Number and Size

<table>
<thead>
<tr>
<th>Pipelines</th>
<th>Risers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (inches)</td>
<td>Number Damaged</td>
</tr>
<tr>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>3</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>18</td>
<td>5</td>
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<tr>
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<td>4</td>
<td>8</td>
</tr>
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<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
</tr>
</tbody>
</table>
Hurricane Ivan – Pipeline and Riser Mudslide Activity

- 21 Reports of Damage to Pipelines and Risers due to mudslides.
- Reports of damage included:
  - Separation of break away joints (safety devices designed to separate at predetermined loads).
  - Severed pipelines.
  - Pipelines moving out of the Right of Way.
  - Risers and Pipelines Damaged due to toppled platforms.
Hurricane Ivan – Pipeline Mudslide Activity – 10” Pipeline

Hurricane Ivan – Pipeline Mudslide Activity – 8”, 10” & 20” Pipelines
Hurricane Ivan
MMS Data

Thanks to Ms. Elizabeth Komiskey with the Minerals Management Service for providing the pipeline and riser damage report information.
MISSISSIPPI DELTA PIPELINE SURVIVAL STRATEGIES

by
James R. Hooper
Fugro-McClelland Marine Geosciences

BRIEF REVIEW OF DELTA GEOMORPHOLOGY FROM YESTERDAY
**ELONGATE LANDSLIDES**

MUDFLOW ORIGIN, SEDIMENT TRANSPORT, AND DEPOSITION

**CHARACTERISTICS OF SEAFLOOR FAILURE FEATURES**

- **Mudflow gullies** tend to be geologically active. Down slope mudslide movements destructive to pipelines may occur at intervals from several times a year to once every few years.
CHARACTERISTICS OF SEAFLOOR FAILURE FEATURES (cont.)

- Mudflow lobes tend to be geologically active, but not (generally) as active as the gullies. Down slope mudslide movements destructive to pipelines may occur only every few years.

From Coleman et al, 1980
SEAFLOOR COLLAPSE DEPRESSIONS

From Coleman et al, 1980

Region of Collapse Depressions & Mudflow Gullies

Region of Mudflow Gullies

Region of Mudflow Lobes

COLLAPSE DEPRESSIONS

Example Collapse Depressions

Example Mudflow Gullies
CHARACTERISTICS OF SEAFLOOR FAILURE FEATURES (cont.)

• **Collapse depressions** are locally enclosed seafloor failures that are generally bounded by low scarps.
• They tend to be as geologically active as mudflow gullies.
• Active depths of failure range from 10-20 ft to 40-60 ft.

CONSIDER THE FOLLOWING PIPELINE ROUTE SELECTION SITUATIONS
SEAFLOOR GEOMORPHOLOGY OFFSHORE FROM SOUTH PASS

From Coleman et al., 1980

The wells must go near here

ROUTE PROBLEM #1

From Coleman et al., 1980

The wells must go near here (water depths ~80ft)
ROUTE 1 RISKS

- The pipeline may have to cross one or more collapse depressions.
- Seafloor lateral movements and/or loss of bearing support may cause periodic failures.
- Over a period of years, new collapse depressions may appear.

ROUTE 1 MITIGATION

- Failures are likely localized at collapse depressions, and the pipeline can be rerouted around the problem during early repairs, eliminating the problem.
ROUTE PROBLEM #2

These two failure areas likely to grow with time.

Likely to become major (expensive) problems

ROUTE 2 RISKS

- The pipeline must cross a mudflow gully plus several collapse features.
- Seafloor lateral movements in the gully and/or loss of bearing support in collapse depressions may cause periodic failures.
- Failure activity region may enlarge, depending on future hurricane wave activity.
ROUTE 2 MITIGATION

- Failures may be “fixable” over time, by local rerouting during pipeline repairs.
- On the other hand, conditions may get worse, and the pipeline may become an economic burden.

From Coleman et al, 1980

The wells must go near here
ROUTE 3 RISKS

• The pipeline must enter unmapped territory that is very likely to contain several mudflow gullies and numerous collapse depressions.
• The narrow “safe seafloor” regions along the route may be cut by growing mudflow gullies, creating major problem areas.
ROUTE 3 MITIGATION

• Failures may be “fixable” over time, by local rerouting during pipeline repairs.
• On the other hand, conditions may get worse, and the pipeline may become an economic burden.

ALTERNATIVE
ROUTE CONCEPT

From Coleman et al., 1980
Pipeline Breakout Session

July 27, 2005

Pipeline Breakout Session

Introduction

Michael Gordon
ExxonMobil Production Co.
Pipeline Impacts from Ivan

- 33,000 miles of pipeline in GOM; most pipelines performed satisfactorily
- Multiple failure modes
  - Unprecedented pipeline movement
  - Anchor line/chain damage
  - Reefed or sunken vessels
  - Rubbing of pipelines at crossings
  - Tension

Purpose of Breakout Session

- Review efforts of industry pipeline workgroup
- Address pipeline-specific hurricane issues
- Identify opportunities to improve on technology, design practices, operating practices, regulations and standards
- Share experiences and lessons learned – Participate!!!
Objectives

1. Summarize Observations
   (Successes and Failures)
2. Summarize What Was Learned
3. Identify Needs for Improvements
   - Operating Practices
   - Design Practices
   - Regulations/Standards
   - Technology

Today’s Schedule

- Introduction
  - Facilities & Geotechnical Storm Impact
  - Response Management – Industry Perspective
    - Break
  - Recovery (Operations, Assessment, Mitigation)
  - Data Gathering
    - Lunch
  - Open Forum and Panel Discussion
    - Break
    - Plenary Discussion – Air & Marine Vessel Support
    - Discussion on Breakout Sessions
- 8:00 – 8:15
- 8:15 – 9:15
- 9:15 – 10:00
  - Break
- 10:00 – 10:20
- 10:20 – 11:30
- 11:30 – 12:00
  - Break
- 12:00 – 1:00
- 1:00 – 2:30
  - Break
- 2:30 – 2:50
- 2:50 – 3:20
- 3:20 – 4:30
Facilities & Geotechnical
Storm Impact

- Pipeline damage locations

Response Management

- Preparations and evacuations
- Hurricane tracking
- Reconnaissance flights
- Operational response
- Head office response
- Incident Command System
Recovery

- Three phases of recovery:
  - Assessment of pipelines
  - Mitigation of pipeline damage
  - Return to operations
- Regulatory approvals
- What went well? What needs improvement?

Data Gathering

- Pipeline Team’s efforts
- JIP planning
  - Pre-storm vs. post-storm mapping of seafloor
  - Storm-related pipeline damage inventory
  - Analysis of pipeline failure causes
- Request for data or participation in JIP
Presenters and Panel Members

- Tom Wicklund, BP
- Kevin Gaudet, Chevron
- Michael Gordon, ExxonMobil
- Jim Hooper, Fugro-McClellan
- Alex Alvarado, MMS
- Mark Wrzyszczynski, Shell
- Aaron Demo, USCG
2005 Offshore Hurricane Readiness and Recovery Conference

Pipeline Failures Data Gathering

Tom Wicklund
BP Pipelines NA
July 27, 2005

Pipeline Team Focus

- How did pipelines on the OCS perform during Hurricane Ivan?
- Does pipeline performance data raise concern for the adequacy of current design standards?
- Did Ivan uncover pipeline installation or operational concerns that warrant further consideration?
- Was pipeline damage that resulted from Ivan different from historical experience in GoM?
Pipeline Data

- MMS pipeline damage data based on post Ivan NTL
- Detailed company data primarily provided by API team members (Shell, BP & Chevron)
  - Initial focus was on hurricane impacted lines;
  - Data collection effort expanded to include pipelines that performed well and were located within the swath

Data Analysis

- MMS post Ivan data obtained by API team
- Pipeline operators modified data and reevaluated
- Performed comparison of pipeline operators data to MMS data
- Not prudent to draw firm conclusions regarding cause of failures (based on MMS data)
Pipeline Failure Data Sheet

- Segment ID:
- Company:
- P.I. Name:
- Export or E&P:
- GoM Block Location:
- Water Depth:
- Pipeline Diameter:
- Wall Thickness:
- Pipe Grade:
- Year Installed:
- Design Basis (psig):
- Pipeline Orientation (relative to shore):
- Pipeline Contents:
- Failure Mode:
- S.G. w/contents:
- Burial Depth:
- Horizontal Displacement Distance:
- Horizontal Displacement Length:
- Notes:
- Weight Coat
- Mud Flow Area?
- Third Party Impact?
- Pipeline Crossing?

<table>
<thead>
<tr>
<th>Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

* Specific location of failure or damage

Observations Regarding Failure Modes

- General observations
  - No predominant failure mode, pipelines experienced various types;
  - BP, CVX and Shell experienced similar types of failures;
  - Performance in traditional mud slide areas consistent with historical performance;
  - Many failures in the delta area, west of the swath of the storm;

- Failure modes
  - Large lateral displacement (several thousand feet);
  - Anchor line/chain drag damage;
  - Reefed or sunken vessels being moved onto pipelines;
  - Req’d separation lost at crossings;
  - Pipeline failed due to tension;
  - Only 1 riser was lost in shallow water;
Findings

- More data analysis is req’d to draw conclusions:
  - failures from Ivan does not seem to be atypical to historical
  - possible exception of the near-shore Mississippi River delta area

- Opportunities to explore:
  - Implications of disturbance and uplifting of sedimentation at the mouth of the river
  - New mudflow areas possibly identified as a result of Ivan
    » May need to reconsider how we define mudflow areas
    » Potential for better mapping of unstable areas
  - Implications of storm surge; ebb or run-off; and turbid flows on design criteria or pipeline configuration/orientation

Path Forward

- Industry/government effort to identify/collection data critical to assessing pipeline performance
  - Understand possible factors which contributed to storm impact
  - Collect additional data required to perform analysis
    » Damage/failures
    » Mapping (pipe movement, mudslides, etc…)

- Expand make-up of API team to include representatives of oil and gas transmission companies and/or pipeline design consultants

- Pursue value added study or research opportunities
  - Geotechnical (mudslides, siting, seafloor mapping, etc…)
  - Storm trajectory impact on infrastructure configuration/orientation

- Outcome of pipeline performance assessment should determine need to revise pipeline standards
Immediate Needs

- Additional participants on API team*
- Industry data
  - Sonar/mapping data
  - Failure data

*contact any current team member
Hurricane Ivan Pipeline Subcommittee
Pipeline Response Management in the wake of Hurricane Ivan
July 27, 2005

Response Management Highlights

- Operations Preparatory Activities and Evacuation
- Hurricane Event and Tracking
- Reconnaissance Flights
- Field Operations Response
- Head Office Response
- National Response integrated with the ICS
Operations Preparation

- Evacuation of non-essential personnel
- Shutdown of Crude pipelines
- Evacuation of all personnel
- Shell Utilized ICS for the Evacuation.
- BP had ICS team on Standby during evacuation

Hurricane Event and Tracking

- Twice Daily updates from Impact Weather
- Wind and wave fields overlaid on pipeline system maps
- Located repair assets and placed on first refusal
- Shell, Chevron, & BP placed construction vessels on standby before storm
Reconnaissance Flights

- Viewed what appeared to be extensive topsides damage at many platforms
- Took several days to re-man the platforms (weather, damage, debris, utilities).
- Shell released standby vessels to other companies
- BP staffed Fort Jackson the morning after landfall to manage a suspected release on their MPOG system
MURPHY MEDUSA
MC 528

PETRONIUS PLATFORM
1,750 FT WATER DEPTH
QUARTERS & HELIPORT
DAMAGE
Operational Response

• Priority was given to production operations to make safe, re-man, clean up, repair and restore production operations
• Pipeline Operators communicated continuously with Production Operations to coordinate restarts and prioritize work.
• Pipelines were leak tested for 2 hours in accordance with Notice to Lessees
Operations Response (cont.)

- Overflights noted several sheens in MP 80 & 69
- Began surveying pipelines subsea
- Some pipelines were fully severed
- Shell immediately dispatched a live-boat operation manned by Stolt Divers and International Boats
- Initially had indications that MPOG 18inch pipelines may be compromised.

Drilling Rig Broke Loose from Mooring
Crossed Nakika Oil Line
With Rig Dragging Three Anchor Cables
Pipeline Head Office Response

- Sourced an available vessel to work in MP 69 (relatively shallow water)
- Sourced survey vessels with Sidescan and/or ROV capability to survey pipeline right of ways.
- Established a Project Command center to coordinate assets
- Established Port Operations with full time inspector to coordinate vessels

Inspection & Construction Equipment

- Survey: Moana Wave, Captain Blake, Emma McCall
- Dive Support Vessels: Barge 1, CalDiver II, Mystic Viking, Sea Fox
- Jackup Boats: Juan, Choctaw
- ROV Vessels: Merlin, Mystic Viking, Uncle John, Ocean Intervention
- Laybarge: Pecos Horizon
- Spud Barge: BH300, BH103
- Derrick Barge: Lili, Boaz
- Various tugs, supply boats, crew boats, quarters barges, material barges, etc.
- Multiple Response vessels (LA, TX, FL Responders and support craft) and equipment
Shell Pipeline Construction

Outcome

- Safety: Over 190,000 man hours with no recordable incidents
- Construction Timing: 43 days total (averages 184 people per 12 hour shift)
- Total Costs for Inspection, Cleanup, Repairs in 2004: >$40MM
- Expected Costs for Construction & Repairs in 2005: >$10MM
- Minimal Impact to Production – Less than a week for Nakika and 1 day for Cognac – Due to cooperation of all Agencies, Contractors and Operators.

Shell Pipeline Hurricane

Ivan Worksites

- Site 1 – Severed Delta 20’ line displaced ~2 miles to the east of its original position
- Site 2 – Nakika 18” line damaged at MPOG crossing in MP 69
- Site 3 – Nakika 18” line severed in MP 151
- Site 4 – Odyssey 12” line damaged in MP 70
- Site 5 – Delta 20” piggable wye pulled away from Odyssey 20”
- Site 6 – 8” line pulled away from platform at SP 60 & pipeline displaced
- Site 7 – Connection on Bud 8” to allow BP’s MPOG production to come online
- Site 8 – Sunken Jackup barge on Odyssey 20” in MP 309
- Site 9 – Disconnect Odyssey 12” from MP 289 “B” platform – reconfigure SSTI
Special Considerations

- Return of Hurricane Ivan
- Dynamic Bottom Environment
- Local and Displaced Wildlife
- New equipment
- Sharing of resources
- Different kind of leak
- New Security Requirements
Jackup Boat on Odyssey 20" in MP-309 – Site #8

Jackup Boat Recovery to Surface
South Pass 60 Severed 8-inch Riser – Site #6

NAKIKA Spool Severed in MP-151 – Site #3
MSRC - LOUISIANA RESPONDER AT NAKIKA SITE 2

Spool Piece Repairs on both MPOG & Nakika Pipelines at Crossing Location

End Connector

Nakika / MPOG Crossing – Site #2
National Response Integrated with ICS

- Established ICS to work with Federal, State and Local Authorities in overall response.
- Main focus was MP69, since this was the source of the visible oil.
- Priorities were clearly established
  - Stop the oil-regardless of where it was coming from
  - Protect the environment
  - Restore the pipeline systems
  - Do it all safely

Special Thanks

- Mike Coyne
- Tommy Hutto
- Jason Dollar
- MMS
- USCG
2005 Offshore Hurricane Readiness and Recovery Conference

Recovery From Ivan

Tom Wicklund
BP Pipelines NA
July 27, 2005

Recovery → Return to Service

- 3 Phases of Recovery
  - Assessment
  - Mitigation
  - Return to operations
- What went well
- What needs improvement
Scenario – Displaced Line

Assessment

» Office
  ▶ Review SCADA data (immediately after storm)
  ▶ Consultant studies (as data becomes available)

» Field
  ▶ Visual of topsides
  ▶ Over flights
  ▶ Sonar
  ▶ ROV surveillance
  ▶ Diver inspection
  ▶ Pressure test
  ▶ Pigging
Sonar Data of Displaced Pipe

Sonar Image @ MP144
Diver Photo

MITIGATE

- Equipment inspection & cleanup (topsides)
- Stabilization
- Pipe repair
- Pipe replacement
- Lift & move
- Lay new pipe
- Line lowering
- Spill response support
Regulator approval required

- MMS for pipe in OCS
  - Pressure test
  - Repairs
  - Relays
  - New lay
  - Modify/relinquish RoW
- OPS for pipe in state waters
- LaF&W for pipe in marshlands

Rebuild Crossings
Low Pressure Band Clamp

Pipe Replacement
Sonar After Pipe Move

Stabilize w/Screw Anchors
Return to Operations

- Temporary operations
  - Reduced pressures
  - Temporary connections
- Return to fully rated operations
- Idle/abandon

What Went Well

- Sonar – good 1st identifier of problem
- Interaction w/Agencies
- “Oil out” minimized during repairs
Areas for Improvement

- Post storm integrity plan
- Pre-storm sourcing
  - Vessels
  - Personnel
  - Materials
  - Services

Post Storm Integrity Plan