



## 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



## 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 1<sup>st</sup>
- 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



## 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

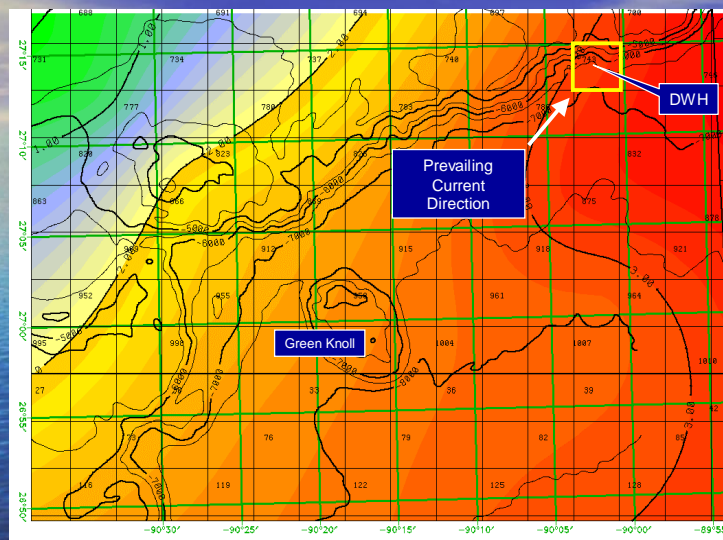


## Hurricane Ivan - Deepwater Horizon

- **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**



## Current Profile



## 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**



## 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



## 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



## 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

