MAJOR ACCIDENT HAZARD RISK ASSESSMENT

DEEPWATER HORIZON

Revision: 01
29 AUGUST 2004

EXECUTIVE SUMMARY

From August 4, 2003 to August 8, 2003, a team of personnel from Transocean performed a Major Accident Hazard Risk Assessment on the Deepwater Horizon.

The purpose of the study was to demonstrate that adequate controls are in place so that HSE risks on the Deepwater Horizon can be considered both tolerable and ALARP (As Low As Reasonably Practicable).

In order to accomplish this, the hazards that might lead to a Major Accident were identified and measures shown to be in place to eliminate the hazards or mitigate the consequences of the hazards.

The study team examined hazards associated with individual compartments, critical systems, and the entire installation.

During the entire Major Accident Hazard Risk Assessment, the team developed twenty seven (27) recommendations. None of the recommendations were for hazards ranked 'High' Risk, nine (9) were for hazards ranked as 'Medium' Risk, fourteen (14) were for hazards ranked 'Low' Risk, and four (4) were unranked.

Each recommendation from the assessment will become an Action Item and assigned to a Responsible Person. Each recommendation will require follow up after which the results of the actions will be recorded and the report reissued. If no action was taken for a given recommendation, a reason must be recorded.

RISK MATRIX

The Risk Matrix is 5 x 5 with Severity along one axis and Likelihood along the other. The team should rate the Severity and Likelihood of each hazard using the appropriate criteria below. The Severity is divided into three categories: People, Assets, and Environment. The team should use whichever category results in the highest (worst) Risk Category.

Severity Rankings *(People)*

- Slight (1) – Hazard may reasonably result in a First Aid Case
- Minor (2) – Hazard may reasonably result in a Medical Treatment Case
- Significant (3) – Hazard may reasonably result in a Serious Injury Case
- Severe (4) - Hazard may reasonably result in a Fatality
- Extremely Severe (5) – Hazard may reasonably result in multiple Fatalities

Severity Rankings *(Assets)*

- Slight (1) – Hazard may reasonably result in equipment damage and downtime totaling less than $10,000
- Minor (2) – Hazard may reasonably result in equipment damage and downtime totaling between $10,000 and $50,000
- Significant (3) – Hazard may reasonably result in equipment damage and downtime totaling between $50,000 and $500,000
- Severe (4) – Hazard may reasonably result in equipment damage and downtime totaling between $500,000 and $5,000,000
- Extremely Severe (5) – Hazard may reasonably result in equipment damage and downtime totaling greater than $5,000,000

Severity Rankings *(Environment)*

- Slight (1) – Spill is contained onboard.
- Minor (2) – Spill to the environment of less than 1 bbl
- Significant (3) – Spill to the environment of 1 bbl to 5 bbl OR less than 1 ton
- Severe (4) – Spill to the environment of 5 bbl to 100 bbl OR greater than 1 ton
- Extremely Severe (5) – Spill to the environment of greater than 100 bbl

Likelihood Rankings

- Negligible (A) – Incident not known to have occurred in the industry
- Low (B) – Incident known to have occurred in the industry
- Medium (C) – Incident occurs on the given rig
- High (D) – Incident occurs as much as annually on the given rig
- Frequent (E) – Incident occurs more than annually on the given rig

After the Likelihood and Severity Rankings for the Hazard are determined, use the Risk Matrix to determine the Risk Category. Always use the 'Highest' or worse severity if the Severity Rankings for People, Assets, and/or Environment are different.

There are three Risk Categories:

- Low (Risk Rankings 1 through 9)
- Medium (Risk Rankings 10 through 17)
- High (Risk Rankings 18 through 25)

Any hazards that have a Risk Category of 'High' require a Recommendation unless considered ALARP. The recommendation does not have to be a way to remove or mitigate a risk, but may be a recommendation to investigate a hazard or situation where the team may not have the time, resources, expertise etc.

HAZARDS	CONSEQUENCES	PREVENTIONS	MITIGATIONS	RISK RANKING			RECOMMENDATIONS / COMMENTS
				S	L	RR	
Helicopter collision at helideck	Structural damage to rig Possibility of fire and explosion Possible injury to personnel Possible fatalities Possible environmental impact Possible loss of station keeping	Obstruction lights Helideck lighting Communication of weather conditions to incoming aircraft Procedures to check helideck for debris before landing Helideck ops under direction of HLO	Training in emergency / damage scenarios Availability of medical treatment Restricted access during landings and take-offs Announcement of ETA Emergency spill response Redundant controls (DP3 classification)	5	A	16	
Reservoir blowout (at Drill Floor)	Major environmental impact Multiple personnel injuries and/or fatalities. Major structural damage and possible loss of vessel.	Well control procedures and training of drill crew in well control Maintenance and testing of BOP's and other subsea and well control equipment Instrumentation and indication of well status. Hydrocarbon / Combustible Gas detection system. Redundant BOP controls.	Emergency response procedure, training and drills. Ability to move off station. Firefighting capabilities Ability to evacuate the rig. Availability of medical treatment including medivac Redundant BOP controls. Passive fire protection in highly populated areas of vessel. EX rated equipment to prevent ignition of blowout.	5	B	17	

HAZARDS	CONSEQUENCES	PREVENTIONS	MITIGATIONS	RISK RANKING			RECOMMENDATIONS / COMMENTS
				S	L	RR	
Shallow gas blowout (subsea)	Major environmental impact Multiple personnel injuries and/or fatalities. Possible loss of stability Possible structural damage	Seismic evaluation. Drilling pilot holes. History of wells in same field. Monitoring with ROV. Bubble watch.	Shallow gas drills Training in emergency / damage scenarios Availability of kill mud Ability to move off station. Availability of medical treatment including medivac Firefighting capabilities Ability to evacuate the rig. Compartmentalization and watertight integrity Spill response procedures	5	A	16	
Gas in riser	Possible ignition at surface with fire and or explosion Possible major structural damage Possible loss of riser Possible environmental impact Possible injury to personnel Possible fatalities	Good drilling practices Instrumentation and indication of well status Subsea isolation equipment Training in well control including required drills	Utilization of diverter system Ability to evacuate the rig Firefighting capabilities Availability of medical treatment including medivac Emergency spill response	5	B	17	

HAZARDS	CONSEQUENCES	PREVENTIONS	MITIGATIONS	RISK RANKING			RECOMMENDATIONS / COMMENTS
				S	L	RR	
BOP component failure.	Reduced well control capability depending on component Possible blowout with possible multiple fatalities and possible loss of rig. Possible environmental impact	Testing, inspections and maintenance.	Redundant BOP components. Spare parts on board Ability to effect repairs Availability of medical treatment including medivac Spill response procedures	5	B	17	
Failure of hydraulic supply.	Loss of some redundancy in control of BOP system. Reduced well control capability. Possible blowout with possible multiple fatalities and possible loss of rig.	Testing, inspections and maintenance.	Redundant pumps and lines. Accumulators on BOP. ROV intervention.	5	B	17	