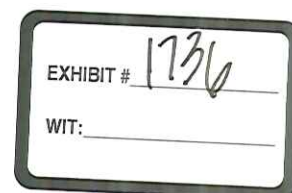


Gulf of Mexico SPU Risk Management SEEAC Brief

This brief describes Gulf of Mexico SPU (GoM) risk management activities in the following areas.

- ETPs
- MAR (GP 48-50) analyses
- Overall hazard and risk management
- The risk matrix



ETPs

The Group Defined ETPs (listed below) have been applied in GoM.

- GP 48-01 HSSE Review of Projects
- GP 48-02 Hazard and Operability Study
- GP 48-03 Layer of Protection Analysis
- GP 48-04 Inherently Safer Design
- GP 48-50 Major Accident Risk Process
- GP 32-30 Inspection and Testing of Equipment in Service
- GP 43-49 Pipeline Integrity Management Systems

There are deviations approved and anticipated on GP43-49 regarding lengths of pipeline/flowlines that are not able to be internally inspected in the defined time. There is also an approval requested for the use of What-If as opposed to HAZOP methodology (GP 48-02) for marine systems on Atlantis and it is anticipated that similar approvals will be requested for other assets.

Segment defined ETPs are being applied point forward. Gap assessments have been conducted on the existing assets. The impacts of the identified gaps are assessed using the risk matrix (per GDP 3.1-0001) and action plans developed.

The focus of the ETP application and assurance has been on the existing assets as opposed to drilling from Mobile Offshore Drilling Units (MODUs).

There are 18 Drilling Technical Practices and Drilling and Well Operations (DWO) Practices that are used in drilling. Deviations from these practices require SPUL approval.

The GoM Response team is undertaking a number of activities that require the use of engineering standards and engineering judgment. Where BP is directing or influencing activities, the team is endeavoring to use relevant ETPs and document/progress deviations for approval at the appropriate level.

MAR

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The Group Defined ETP on MAR, GP 48-50, describes the conduct of MAR analyses. GoM has conducted MAR analyses of their existing assets including those with drilling rigs. Drilling rigs involve both the drilling operation and the additional personnel required to conduct the drilling operations. These analyses consider both the risk the drilling operation imparts and the additional personnel supporting drilling that are exposed on the asset.

Mobile Offshore Drilling Units (MODUs) are located some distance from the existing assets, frequently over subsea equipment, and are owned/operated by other parties. MODUs have not been included in GoM MAR analyses to date. There are existing plans to include the MODUs when the MAR analyses are revalidated. They will be included from a point of view of the risk of SIMOPs (simultaneous operations occurring in the same place or near to one another), such as dropped objects on the subsea equipment below, and the risk of a loss of well control event impacting the BP and other personnel on the MODU as well as environmental risk. The risks within the MODU itself (e.g. a fire in the engine room) would not be considered.

MAR provides a high-level view of risk as it is a very defined, simplified, protocol. The detailed understanding of hazards and risks are gained through use of the ETPs and other hazard and risk management tools as discussed in the next section.

Hazard and Risk Management

Hazard and risk management in the GoM includes use of the Group and Segment Defined ETPs as well as additional tools such as Bow-Tie analysis (which focuses on barriers between the initiating events, the incident, and the impact). Hazard Identification (HAZID) Studies, Hazard and Operability (HAZOP) Studies, and Layer of Protection (LOPA) Analyses are conducted for ongoing operations, new projects, and changes. They are applied to such MODU operations as well tests, lightering, and various Simultaneous Operations (SIMOPS).

GoM is currently midway through a significant effort in the conduct Offshore Process Risk Assessments (OPRA). This includes fire and blast analysis, smoke ingress analysis, emergency escape evacuation and rescue (EEER) analysis, Essential Systems Survivability Analysis (ESSA), and QRA. The majority of these analyses will be completed in 2010, recommendations are currently being made as studies are completed, and defined plans are being developed for inclusion in forward year resource planning. Thunderhorse and Atlantis analyses are scheduled to be completed in first quarter 2011.

Risk Matrix

GoM has been using the "Assessment, prioritization, and management of risk" Implementation Draft Practice and is currently in the process of moving to the version of GDP 3.1-0001 issued in October 2009. For risks noted as "very high" and "high" per the Implementation Draft delineation, a risk management plan is developed which includes actions, accountabilities, and completion dates. GoM is currently moving to the current Practice and ongoing efforts include development of a risk management plan for medium level risks noted in the risk register. The risk register / risk matrix is updated as hazard and risk analyses on the assets identify an addition/deletion. The risk register / risk matrix is reviewed quarterly by the GoM Leadership Team and it is formalized annually. The risk management plans are referenced in the Annual Engineering Plan (AEP) authored by the GoM EA and provided to the Segment EA. There were concerns raised in compilation of the AEP in December 2009 that a number of the risk management plans had not been accomplished by the dates planned.

Attached is the GoM AEP which includes information on ETP implementation (Group Defined, Segment Defined, and Drilling / Completions), MAR, and the Hazard and Risk register.



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The higher risks on the matrix include helicopter transportation, loss of well control (LoWC), topsides hydrocarbon release and merchant vessel collision. To clarify, the LoWC risk as plotted on the risk matrix is based on the belief that a loss of well control event would be preceded by flow/pressure indicators that would allow time for safe evacuation of the personnel and thus is evaluated as a higher environmental risk.

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Appendix

GoM Risk Register & Matrix

Risk Register / Matrix

Consequence				Probability				
				All events that would be unlikely in the industry (<10 ⁻⁶ /yr)	Has never occurred within industry (10 ⁻⁶ to 10 ⁻⁵ /yr)	Similar event has occurred sporadically in industry (10 ⁻⁵ to 10 ⁻⁴ /yr)	Similar event has occurred abundantly in Group (10 ⁻⁴ to 10 ⁻³ /yr)	Likely to occur frequently (10 ⁻³ to 10 ⁻² /yr)
Health and Safety	Environmental Impact	Reputation	Severity	A	B	C	D	
>200 fatalities	>1,000,000 bbl of oil	Global coverage, global media damage and/or affecting int. operations	A	TH-HSE-26 TH-HSE-19	0	9	10	11
>50 fatalities	200M-1MM bbl of oil	Int'l media coverage, Regional (in Amer.) coverage, Regional brand damage. Likely to lead to change of regulations at regional level.	B	TH-HSE-30 MD-16	8	9	10	11
>10 fatalities	10M-500M bbl of oil	Regional media coverage by several outlets, coverage. Likely to lead to change of regulations at the national level.	C	TH-HSE-43 TH-HSE-17 MD-02 MD-10 HL-12 HM-01 NA-HSE-43 MA-HSE-01 AT-HSE-34	TH-HSE-43 PO-06 MD-31 PO-05 HL-04 PO-12 HL-11 HM-21 HM-03 HM-27 MA-HSE-13 MA-HSE-53	9	10	
>5-10 fatalities	1M-5M bbl of oil	National media attention or several local outlets. Profoundly by regulator.	D	None	TH-HSE-42 MD-08 MD-13 HM-12 TH-HSE-06 HL-01 HM-14 PO-07 HM-29 MA-HSE-06 NA-HSE-19 AT-HSE-TCR	9	GRU	

Mitigation Plan	# of High Risks in Plan	Asset Risk Register Item	Risk Rating (Major)	Risk Description	Primary Author
		TH-HSE-17	S: C3	Risk of helicopter deviating from planned flight path due to equipment, weather or pilot issues and potentially leading to a crash into the water, into the facility or onto the helideck. The included risk mitigation projects are in addition to ongoing risk mitigation plans. This risk mitigation projects are designed to enhance flight safety during in air transport and within the 500 meter zone of the facility.	Virgil Russell
		MD-10	S: C3		
		AT-HSE-54	S: C3		
		PO-12	S: C3		
		MA-HSE-1	S: C3		
		NA-HSE-43	S: C3		
		HL-12	S: C3		
1	7	HM-1	S: C3		
2	2	TH-HSE-8	E: A4	Loss of Well Control: Risk that uncontrolled flow during drilling, completion or well intervention activities have the potential for a loss of well control (LoWC) and release of hydrocarbons could, if ignited, lead to fire and explosion.	David A. Porter
		AT-HSE-99	E: D4		

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3	3	MD-1 MD-2 MD-8 MD-13	S: E4 S: C3 S: D4 S: D4	2" Release in Production Deck, Production Deck Mezzanine Deck Drill Deck/Compression	Asset
4	1	MD-16	S: B2	Merchant Vessel Collision: Risk that merchant vessel collision with the platform could potentially result in loss of life	Asset
5	1	MD-31	S: C4	Failure of the bondstrand piping as a result of a tube or rupture disc failure.	Asset
6	1	HL-1	S: D4	Blowdown event results in failure of flare system, resulting in discharge of hydrocarbons into the facility with ignition. Fire, Explosion, Environmental Release	Asset
7	2	HL-3 HL-4 HL-11	S: E5 S: C4 S: C4	1/2" Release in Production Deck 2" Release in Production Deck 2" Release in Mezzanine Deck	Asset
8	3	TH-HSE-2 TH-HSE-3 TH-HSE-6	S: D4 S: C3 S: D4	Release of gas (2000 psig), oil or NGL from 2" line resulting in jet fire, pool fire or explosion in: o production module o compression module o gas export, production lines, pig launchers/receivers	Asset
9	1	TH-HSE-15	E: C4	Small leak from subsea facilities due to corrosion / erosion of failed connections that is undetected for days	Asset
10	1	TH-HSE-19	S: A1	Merchant Vessel Collision: Risk that merchant vessel collision with the platform could potentially result in loss of life	Tim Ritz
11	1	TH-HSE-26	S: A1	Vessel impact of export pipework on column resulting in large hydrocarbon release	Asset
12	1	TH-HSE-30	S: B2	Terrorist Activity: Terrorist group attacks PDQ by boat	Asset
13	1	AT-HSE-TGR	S: D4	2" Hydrocarbon gas release on either the Compression or Production Module (This is a summation of the large hydrocarbon gas releases identified on the risk register for Atlantis)	Asset
14	1	HM-1	S: C3	Risk that, in the event that a helicopter crash onto the Horn Mountain helideck, jet fuel may not be adequately drained off the helideck.	Asset
15	1	HM-3	S: C4	Object is dropped while being lifted over various areas resulting in a hydrocarbon fire and fatalities	Asset
16	1	HM-14	S: D5	Potential for air intrusion into a hydrocarbon containing vessel resulting in potential explosive environment	Asset
17	2	HM-8 HM-12	S: D5 S: D5	Jet fire, explosion: Production Deck Cell Deck	Asset
18	1	HM-20	S: B3	Merchant Vessel Collision: Risk that merchant vessel collision with the platform could potentially result in loss of life	Asset
19	2	HM-21 HM-22	S: C3 S: C3	Fatigue of the production risers results in a loss of containment, fire/explosion and a release to the GoM, export risers (gas or oil) Failure of the equalization line for pig receiver KAQ-9050 results in a loss of hydrocarbons, ignition and potential fatalities / release (up to two valves)	Asset
20	1	HM-29	S: D5	Risers: Large bore (2") release of hydrocarbon gas, ignited causing fire and/or explosion	Asset
21	1	PO-5	S: C3		Asset

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				Large bore (2") release of hydrocarbon gas, ignited causing fire and/or explosion: Tree/production manifold: Well Bay	
22	2	PO-6 PO-7	S: C3 S: D4	Production deck separators	Asset
23	2	MA-HSE-6 MA-HSE-13	S: D4 S: D3	Upper deck gas release due to various causes Lower deck oil release due to various causes	Asset
24	1	MA-HSE-53	S: C3	Failure of the fiberbond pipe of the firewater main distribution line inside the hull at the time a fire is occurring	Asset
25	1	NA-HSE-19	S: D4	Compression Module gas leak leading to potential fire/explosion	Asset
26	1	NA-HSE-52	E: D4	Corrosion failure of the subsea flowlines resulting in an environmental and reputational impact	Asset
27	1	TH-HSE-NEW	n/a	Drill Derrick Support Plate	Asset
28	3	GRASP-NEW	S: D8 S: D9	Risk of fast rescue craft (FRC) used for infield personnel transfers, maintenance activities, and emergency drills results in potential injuries or fatalities.	GRASP Project