

RISK ASSESSMENT MATRIX

CONSEQUENCES					INCREASING LIKELIHOOD				
SEVERITY	PEOPLE	ASSETS	ENVIRONMENT	REPUTATION	A	B	C	D	E
					Never heard of in the industry	Heard of in the industry	Has happened in the Organization or more than once per year in the industry	Has happened at the location or more than once per year in the Organization	Has happened more than once per year at the location
0	No injury or health effect	No damage	No effect	No impact					
1	Slight injury or health effect	Slight damage	Slight effect	Slight impact					
2	Minor injury or health effect	Minor damage	Minor effect	Minor impact					
3	Major injury or health effect	Moderate damage	Moderate effect	Moderate impact					
4	PTD or up to 3 fatalities	Major damage	Major effect	Major impact					
5	More than 3 fatalities	Massive damage	Massive effect	Massive impact					

PTD = Permanent Total Disability

Raising the Standard

Glossary

ALARP:

As low as Reasonably Practicable (ALARP). Reducing Risks to ALARP means reducing risks to a level at which the cost and effort (time and trouble) of further Risk reduction are grossly disproportionate to the Risk reduction achieved.

Consequences:

Impact on People, Assets, Environment, and Reputation if a Hazard is released. The term Potential Consequences is used when looking at what might happen or what might have happened.

Consequential Business Loss (CBL):

The indirect loss due to asset damage, environmental impact, or impact on company reputation. CBL comprises elements such as loss of production, production downtime, customer impact, loss of market share, etc.

Hazard:

The potential to cause harm to people, damage to assets, business loss, and impact on the environment or reputation.

Industry:

This usually means the oil, gas, and petrochemical industry. However, in some instances the comparable industry may be based on the Hazard being assessed. For example, if a site is assessing Risk associated with electrical work on power lines, it is reasonable to consider Industry as the electrical distribution or power industry.

Likelihood:

Chance that a specified Consequence will happen. Likelihood is expressed qualitatively in terms of events that have happened in the particular industry, Organization, or Location. Likelihood is estimated on the basis of historical evidence or experience.

Location:

A large, self-contained worksite or a cluster of small, self-contained worksites which carry out the same activity. It is the smallest organizational unit that is used in the likelihood scale of the RAM. Examples in Upstream are: an offshore production platform, an onshore flow station, drilling rig, seismic unit.

Organization:

Within UA, each Business Unit is considered an Organization. For Heavy Oil, incidents in Manufacturing may be included as necessary.

Risk:

Risk is the likelihood that a specific undesired event will occur within a specified period. Risk is therefore a function of both the Likelihood and the Consequence of a specific Hazard being released.

Risk Assessment Matrix (RAM):

A qualitative risk assessment tool to identify the risk potential associated with the consequence of a particular hazard release scenario in order to understand what level of control and recovery analysis is required to manage the risk of the release of that hazard to ALARP.

Upstream Americas

UA Core Document - RAM Risk Assessment Matrix

November 2010

STEP 1. Identify Potential Consequences - Consider all worst-case consequences arising from credible hazard release scenarios.

STEP 2. Estimate the Severity of each Potential Consequence - Consider impact on people, assets, environment, and reputation, and rate severity of each from 0-5.

STEP 3. Estimate the Likelihood - Based on historical evidence or experience that such consequences have occurred within the industry, the organization, or a location. Rating is based on the consequence under consideration, NOT the likelihood that the hazard will be released.

STEP 4. Estimate the Risk Rating - The product of the consequence severity and the likelihood determines the risk rating on the matrix.

MODIFICATIONS TO THIS DOCUMENT, INCLUDING THE RISK ASSESSMENT MATRIX, ARE NOT ALLOWED UNDER ANY CIRCUMSTANCES.



Harm to People

LEVEL	DEFINITION
0	No injury or health effect
1	Slight injury or health effect <ul style="list-style-type: none"> No Treatment Case or First Aid Case Illnesses that result in noticeable discomfort, minor irritation or transient effects that are reversible after exposure stops
2	Minor injury or health effect <ul style="list-style-type: none"> Medical Treatment Case Lost Workday Case or Restricted Work Case where either has a duration of up to and including 5 days Illnesses with reversible health effects such as food poisoning and dermatitis
3	Major injury or health effect <ul style="list-style-type: none"> Lost Workday Case or Restricted Work Case where either has a duration exceeding 5 days Long term disabilities (previously called Permanent Partial Disabilities). Illnesses with irreversible health effects such as sensitization, noise induced hearing loss, chronic back disorders or repetitive strain injury Mental illness due to stress with reversible health effects
4	Permanent total disability or up to three fatalities <ul style="list-style-type: none"> Illnesses with irreversible health effects such as corrosive burns, asbestosis, silicosis Cancer Mental illness due to stress with irreversible health effects Car accident resulting in 1, 2, or 3 fatalities
5	More than three fatalities <ul style="list-style-type: none"> Illnesses with irreversible health effects such as multiple asbestosis cases traced to a single exposure situation Cancer in a large exposed population Major fire or explosion resulting in more than 3 fatalities

Damage to Asset*

LVL	DEFINITION
0	No damage
1	Slight damage <ul style="list-style-type: none"> Costs less than US \$10,000
2	Minor damage <ul style="list-style-type: none"> Costs between US \$10,000 and US \$100,000
3	Moderate damage <ul style="list-style-type: none"> Costs between US \$100,000 and US \$1 million
4	Major damage <ul style="list-style-type: none"> Costs between US \$ 1 million and US \$10 million
5	Massive damage <ul style="list-style-type: none"> Costs in excess of US \$10 million

Impact on Reputation

LVL	DEFINITION
0	No impact
1	Slight impact <ul style="list-style-type: none"> Local public awareness but no discernible concern No media coverage
2	Minor impact <ul style="list-style-type: none"> Local public concern Local media coverage
3	Moderate impact (Significant impact in region or country) <ul style="list-style-type: none"> Regional public concern Local stakeholders, e.g. community, NGO, industry and government are aware Extensive attention in local media. Some regional or national media coverage
4	Major impact (Likely to escalate and affect Group reputation) <ul style="list-style-type: none"> National public concern Impact on local and national stakeholder relations. National government and NGO involvement with potential for international NGO action Extensive attention in national media. Some international coverage Potential for regulatory action leading to restricted operations for impact on operating licenses
5	Massive impact (Severe impact on Group reputation) <ul style="list-style-type: none"> International public concern High level of concern amongst governments and action by international NGOs International media attention Significant potential for effect on national / international standards with impact on access to new areas, grants of licenses and/or tax legislation

* Does not include Consequential Business Loss

NGO= Non Governmental Organization

Environmental Effect

LEVEL	DEFINITION	GENERIC EXAMPLES	OFFSHORE GOM-SPECIFIC EXAMPLES
0	No effect		
1	Slight effect <ul style="list-style-type: none"> Slight environmental damage - contained within the premises 	<ul style="list-style-type: none"> Small spill in process area or tank farm area that readily evaporates Chemical spill below Reportable Quantity 	<ul style="list-style-type: none"> Hydrocarbon spill < 1 bbl or chemical spill < RQ 30-42 mg/l oil & grease in produced water/ completion fluid Flaring/venting event < 10% of facility target (as defined in Business Plan)
2	Minor effect <ul style="list-style-type: none"> Minor environmental damage, but no lasting effect 	<ul style="list-style-type: none"> Small spill off-site that seeps into the ground On-site groundwater contamination Complaints from up to 10 individuals Single exceedance of statutory or other prescribed limit 	<ul style="list-style-type: none"> 1-6 bbls spill of hydrocarbons PW sheen < 3 days or PW/completion fluid oil & grease result of 43-100 mg/l (PNC) Emergency sump sheen or static sheen failure (PNC) SBM & cuttings PNC (RPE failure and GC/MS failure, or ROC failure) Sanitary waste chlorine failure or floating solids observed (PNC) Failure to meet a regulatory or permit requirement (failure to sample, follow required protocol, report, or monitor) Flaring/venting event 10-25% of facility target (as defined in Business Plan) NORM management nonconformance or loss of radioactive marker tag Complaints from up to 10 individuals Single exceedance of regulatory or other prescribed limit
3	Moderate effect <ul style="list-style-type: none"> Limited environmental damage that will persist or require cleaning up 	<ul style="list-style-type: none"> Spill from a pipeline into soil/sand that requires removal and disposal of a large quantity of soil/sand Observed off-site effects or damage, e.g. fish kill or damaged vegetation Off-site groundwater contamination Complaints from community organizations (or more than 10 complaints from individuals) Frequent exceedance of statutory or other prescribed limit, with potential long-term effect DOT paperwork nonconformance (assigned moderate due to fine potential) 	<ul style="list-style-type: none"> Hydrocarbon spill > 6 bbl or chemical spill > RQ Observed off-site effects or damage (e.g. fish kill or damaged vegetation) Off-site groundwater contamination PW sheen > 3 days or PW/completion fluid oil & grease result greater than 100 mg/l (PNC) Any toxicity failure (PNC) Flaring/venting event 25-50% of facility target (as defined in Business Plan) Unauthorized discharge of whole SBM (no cuttings) or well fluids containing priority pollutants (PNC) Complaints from community organizations, or from > 10 individuals DOT paperwork nonconformance Multiple exceedances of regulatory or other prescribed limits with potential long-term effects Any incident of nonconformance (INC) issued by BOEM relating to environmental effects
4	Major effect <ul style="list-style-type: none"> Severe environmental damage that will require extensive measures to restore beneficial uses of the environment 	<ul style="list-style-type: none"> Oil spill that ends up on land areas (beaches, wetlands, etc.) requiring clean-up operations Off-site groundwater contamination over an extensive area Many complaints from community organisations or local authorities Extended exceedances of statutory or other prescribed limits, with potential long-term effects 	<ul style="list-style-type: none"> Oil spill that ends up on land areas requiring clean-up operations Significant deployment of oil spill response equipment or spill dispersant application Offsite groundwater contamination over an extensive area Flaring/venting event > 50% of facility target, or > 10% of UAD target (as defined in Business Plan) Many complaints from community organizations or local authorities Extended exceedance of regulatory or other prescribed limits, with potential long-term effects
5	Massive effect <ul style="list-style-type: none"> Persistent, severe environmental damage that will lead to a loss of commercial, recreational use or loss of natural resources over a wide area 	<ul style="list-style-type: none"> Oil spill resulting in pollution of a large part of a river estuary and extensive clean-up and remediation measures 	<ul style="list-style-type: none"> Crude oil spillage requiring extensive clean-up and remediation measures (e.g. blowout-type scenario, tanker collision with platform or pipeline)