



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

RISK ASSESSMENT MATRIX

Glossary

ALARP:

ALARP is short for As Low As Reasonably Practicable. Reducing Risks to ALARP means reducing the 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.

Consequence:

Impact on People, Assets, Environment and Reputation if a Hazard is released. In this guide the term Potential Consequence is used when looking at what might happen or what might have happened.

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 the 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. In this guide Likelihood is expressed qualitatively in terms of events that have happened in the particular Industry, Organisation or Location.

Location:

The smallest organisational unit that is used in the Likelihood scale of the RAM. Examples in the E&P are: offshore production platform, onshore flow station, drilling rig, seismic unit.

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.

Shell EP Americas

Risk Assessment Matrix

- STEP 1.** Identify **scenarios** and **potential consequences**
- STEP 2.** Estimate the **severity** of each potential consequence
- STEP 3.** Estimate the **likelihood** of those consequences occurring
- STEP 4.** Estimate the **risk** by combining the severity & likelihood



Harm to People

LEVEL	DEFINITION
0	No injury or health effect
1	Slight injury or health effect - Not affecting work performance and not affecting Daily Life Activities. Examples: <ul style="list-style-type: none"> • First aid cases and medical treatment cases. • Exposure to health hazards that give rise to noticeable discomfort, minor irritation or transient effects reversible after exposure stops.
2	Minor injury or health effect - Affecting work performance, such as restriction to work activities or need to take up to 5 days to fully recover. Or affecting Daily Life Activities for up to 5 days. Or reversible health effects. Examples: <ul style="list-style-type: none"> • Restricted work day cases or lost work day cases resulting in up to 5 calendar days away from work. • Illnesses such as skin irritation or food poisoning.
3	Major injury or health effect - Affecting work performance in the longer term, such as absence from work for more than 5 days. Or affecting Daily Life Activities for more than 5 days. Or irreversible damage to health. Examples: <ul style="list-style-type: none"> • Long term disabilities (previously called Permanent Partial Disabilities). • Illnesses such as sensitization, noise induced hearing loss, chronic back injury, repetitive strain injury or stress.
4	Permanent total disability or up to three fatalities - resulting from injury or occupational <ul style="list-style-type: none"> • Illnesses such as corrosive burns, asbestosis, silicosis, cancer and serious work-related depression. • Car accident resulting in 1, 2 or 3 fatalities.
5	More than three fatalities - resulting from injury or occupational illness. Examples: <ul style="list-style-type: none"> • Multiple asbestosis cases traced to a single exposure situation. • Cancer to a large exposed population. • Major fire or explosion resulting in more than 3 fatalities.

Damage to Asset

LEVEL	DEFINITION
0	No damage
1	Slight damage - Cost less than 10,000 US\$. Example: <ul style="list-style-type: none"> • No disruption to operation.
2	Minor damage - Costs between 10,000 and 100,000 US\$. Example: <ul style="list-style-type: none"> • Brief disruption to operation.
3	Moderate damage - Costs between 100,000 and 1 million US\$. Example: <ul style="list-style-type: none"> • Partial shutdown.
4	Major damage - Costs between 1 and 10 million US\$. Example: <ul style="list-style-type: none"> • Up to two weeks shutdown.
5	Massive damage - Costs in excess of 10 million US\$. Example: <ul style="list-style-type: none"> • Substantial of total loss of operation.

Environmental Effect

LEVEL	EFFECT	OFFSHORE	ONSHORE
0	None	No effect	No effect
1	Slight	<ul style="list-style-type: none"> • Less than 1 bbl spill of hydrocarbons (crude, condensate, diesel, etc.). • Chemical spill below a Reportable Quantity. • Produced water or completion fluid oil & grease result of 30-42 mg/L. • Less than 10% of area flaring/venting target. 	<ul style="list-style-type: none"> • Less than 5 bbl crude or brine. • Greater than 1 bbl chemical. • Letter of Violation. • Less than 10% of area flaring/venting target.
2	Minor	<ul style="list-style-type: none"> • Greater than 1 bbl spill of hydrocarbons. • Sheen from the produced water discharge point lasting < 3 days. • Produced water or completion fluid oil & grease result of 43-100 mg/L. • Sheen from an emergency sump (deck drainage non-compliance). • Static Sheen failure. • Synthetic-based mud & cuttings RPE failure and GC/MS failure. • Synthetic-based mud & cuttings ROC failure. • Sanitary waste (sewage) chlorine failure or floating solids observed. • Failure to follow a permit requirement (failure to capture a sample, fail to make an observation, required sampling protocol not followed). • Gas release 10-25% of area flaring/venting target. • NORM Management Nonconformance (e.g. rejection of scrap metal at yard due to radiation alarm). • Loss of radioactive marker tag. 	<ul style="list-style-type: none"> • Greater than 5 bbl crude or brine. • Greater than 5 bbl Chemical. • Letter of Non-Compliance. • Permit exceedence (Air, Water, Waste). • Complaints. • Less than 5 bbl spill to surface waters. • Gas release 10-25% of area flaring/venting target. • NORM Management Nonconformance (e.g. rejection of scrap metal at yard due to radiation alarm). • Loss of radioactive marker tag.
3	Moderate	<ul style="list-style-type: none"> • Greater than 6 bbl spill of hydrocarbons. • Chemical spill greater than Reportable Quantity. • Sheen from the produced water discharge point lasting > 3 days. • Produced water or completion fluid oil & grease result greater than 100 mg/L. • Gas toxicity failure (produced water, mud & cuttings, or chem-treated water). • Gas release 25-50% of area flaring/venting target. • Unauthorized discharge of whole SBM (no cuttings) or well fluids containing priority pollutants. • DOT Paperwork Nonconformance (assigned moderate due to fine potential). 	<ul style="list-style-type: none"> • Greater than 50 bbl crude or brine. • Chemical spill greater than Reportable Quantity. • Environmental Fine. • Spill Response or Hazwoper Response required. • Greater than 5 bbl spill to surface waters. • Gas release 25-50% of area flaring/venting target. • DOT Paperwork Nonconformance (assigned moderate due to fine potential)
4	Major	<ul style="list-style-type: none"> • Significant Deployment of Oil Spill Response Equipment or Spill Dispersant Application. • Chemical spill causing acute environmental impact (e.g. fish kill, emergency riser disconnect). • More than 50% of area flaring/venting target or more than 10% of SEPCo flaring/venting target. 	<ul style="list-style-type: none"> • Significant deployment of equipment or Hazwoper response required. • More than 50% of area flaring/venting target or more than 10% of SEPCo flaring/venting target.
5	Massive	<ul style="list-style-type: none"> • Severe environmental damage of large area (blowout-type scenario). 	<ul style="list-style-type: none"> • Severe environmental damage of large area.

Impact on Reputation

LEVEL	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 licences and/or tax legislation.