H.QRA - HSEAll Tools for Quantitative Risk Assessment

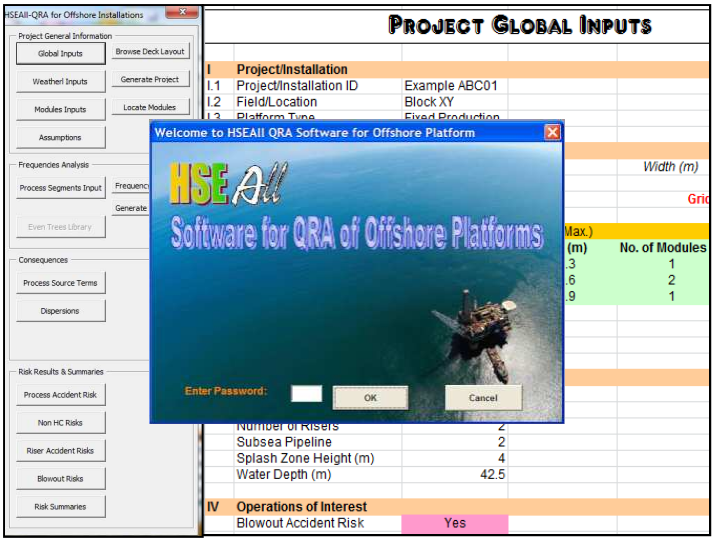
H.QRA Tools Kit has 04 modules:

1. H.QRA Plant - HSEAll QRA Tool for Onshore Installations;
2. H.QRA Pipelines - HSEAll QRA Tool for Onshore Pipelines;
3. **H.QRA Platform - HSEAll QRA Tool for Offshore Platforms;**
4. H.QRA Subsea Pipelines - HSEAll QRA Tool for Subsea Pipelines.

H.QRA - Module for Offshore Platform QRA

HSEAll is proud to introduce HSEAll Software for Quantitative Risk Assessment for Offshore Platforms.

Generally, Quantitative Risk Assessment (QRA) is a Process of Quantifying the Likelihoods and Consequences of potential accidents, those may occur in the installation and then combine them to produce the Risk level. Risk results shall be assessed against the relevant Risk Acceptance Criteria.



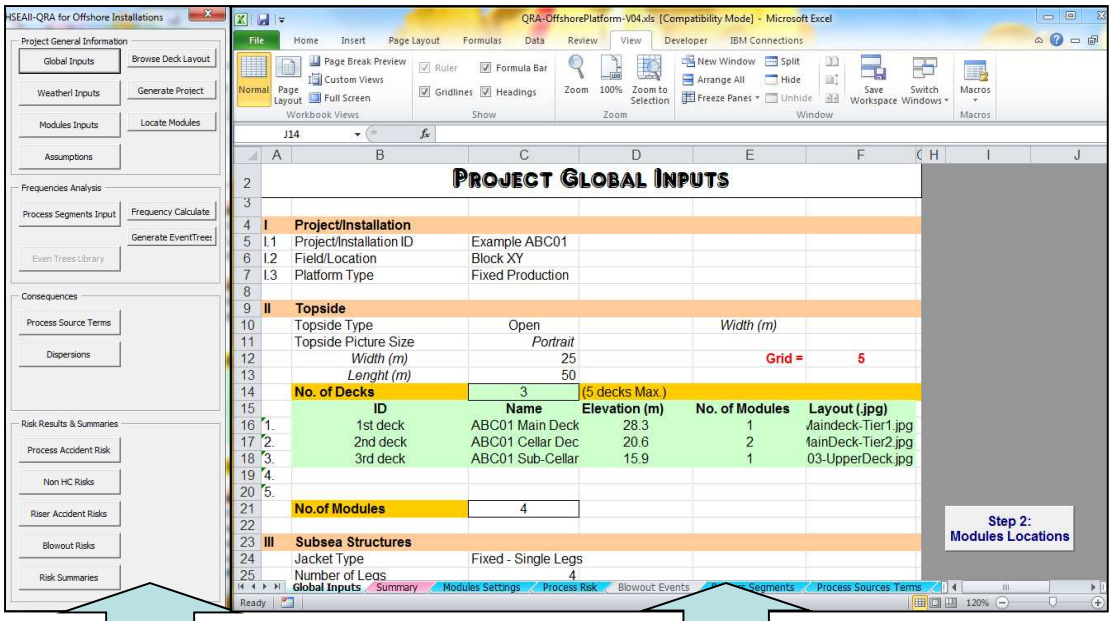
HSEAll QRA Tool:

- Users Friendly Interface;
- Specilizing in QRA for Offshore platforms operations;
- Consistent inputs hence saving time for data collection;
- Compresive and visual Risk Assessment results;
- Easy-to-used Excel-based Software;
- Complete QRA for an offshore platform within 5-10 days.

H.QRA - Module for Offshore Platform QRA

1. Interfaces of H.QRA - Module Offshore Platform

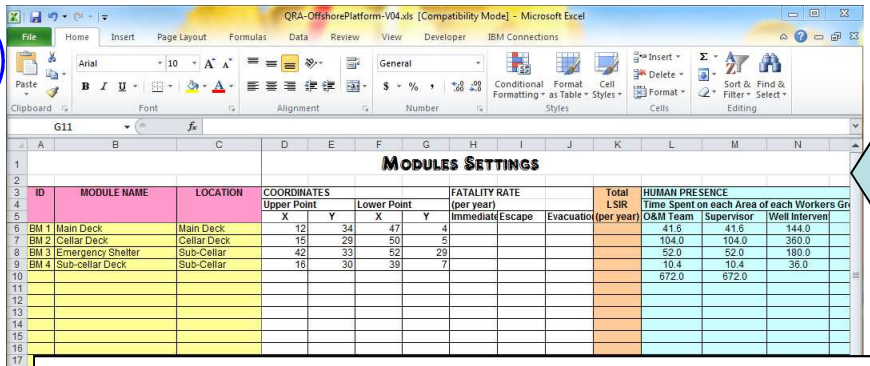
a.



Navigator Section guides Users throught out the QRA process.

Calculation Worksheets section presents Project Inputs and Data, Maps, Frequency and Consequence calculations and Risk results.

b.

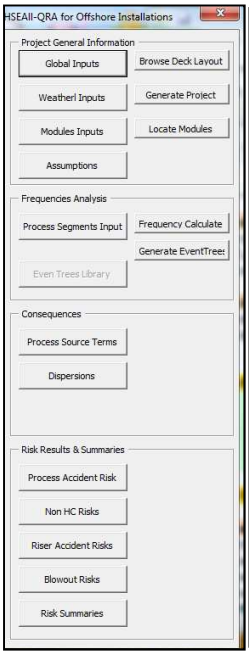


Setting the working 'Modules' data, including locations, workers groups & their presence, etc.

Setting Process Segments data, including Fluids, operating pressures, temp., flowrate,…as the inputs for Consequence calculations.

H.QRA - Module for Offshore Platform QRA

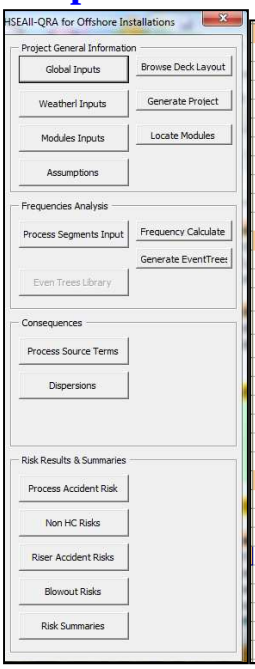
2. Input the Platform general information:



PROJECT GLOBAL INPUTS

I	**Project/Installation**				
I.1	Project/Installation ID	Example ABC01			
I.2	Field/Location	Block XY			
I.3	Platform Type	Fixed Production			
II	**Topside**				
	Topside Type	Open		*Width (m)*	
	Topside Picture Size	*Portrait*			
	Width (m)	25		Grid =	5
	Lenght (m)	50			
	No. of Decks	3	(5 decks Max.)		
	ID	**Name**	**Elevation (m)**	**No. of Modules**	**Layout (.jpg)**
1.	1st deck	ABC01 Main Deck	28.3	1	laindeck-Tier1.jpg
2.	2nd deck	ABC01 Cellar Dec	20.6	2	ainDeck-Tier2.jpg
3.	3rd deck	ABC01 Sub-Cellar	15.9	1	03-UpperDeck.jpg
4.					
5.					
	No.of Modules	4			
III	**Subsea Structures**				
	Jacket Type	Fixed - Single Legs			
	Number of Legs	4			
	Number of Risers	2			
	Subsea Pipeline	2			
	Splash Zone Height (m)	4			
	Water Depth (m)	42.5			
IV	**Operations of Interest**				
	Blowout Accident Risk	Yes			

3. Input the Platform Operation and Escape/Evacuation Information:



IV	**Operations of Interest**				
	Blowout Accident Risk	Yes			
	Process Event Risk	Yes			
	Riser Accident Risk	Yes			
	Subsea Pipelines Risk	Yes			
	Helicopter Accident Risk	Yes			
	Boat Transfer Risk	Yes			
	Occupational Risk	Yes			
	Ship Collision Risk	Yes			
	Dropped Object	Yes			
	Structure Risk	Yes			
IV	**Manning Distibution Parameters**				
	People On Board (POB)	15	OK		
	Worker Groups	*No of Personnel*	*%Time Offshore/yr*	*No. of Visit/yr*	
	Production Crew	3	46%	78	
	Maintenance Crew	3	46%	12	
	Well Intervention Crew	9	46%	59	
	Others	0			
	Process Area Patrol	*No. of people*	*Duration (min.)*	*Every (min.)*	
	Daytime				
	Nighttime				
	Maximum POB (in any case POB cannot more than:)			9	
V	**Escape & Evacuation**				
	Temporary Muster Point				
	E-House				
	Main Deck				
	Evacuation	*Capacity*	*Status*	*Utility Rate*	
	Life Boat			0%	
	Stand-by Vessel			40%	
	Liferaft			40%	
	Direct Evacuation to the Sea			20%	

H.QRA - Module for Offshore Platform QRA

4. Assumptions Settings:

ASSUMPTIONS & SETTINGS

I	**Frequencies Analysis Assumptions**					
I.1	Select Database					
	Leak Hole Size (mm)	Small	Medium	Large	Rupture	
		<20mm	20<d<80mm	>80mm	Full bore	
	Leak Size Distributions (%)	70.00%	15.00%	15.00%	0.00%	100.00%
I.2	Immediate Ignition Probabilities					
	Immediate Ignition - Gas Releases	5.00%	10.00%	15.00%	30.00%	
	Immediate Ignition - Oil Releases	1.00%	2.00%	5.00%	5.00%	
	Immediate Ignition - 2-phased	2.00%	4.00%	10.00%	10.00%	
I.3	Release Detection Probabilities					
	Gas Release Detection	10.00%	20.00%	30.00%	30.00%	
	Oil Release Detection	5.00%	10.00%	10.00%	10.00%	
	2-phased Release Detection	10.00%	15.00%	20.00%	20.00%	
I.4	Late Ignition Probabilities					
	Late Ignition - Gas Releases	5.00%	10.00%	15.00%	30.00%	
	Late Ignition - Oil Releases	1.00%	2.00%	5.00%	5.00%	
	Late Ignition - 2-phased	2.00%	4.00%	10.00%	10.00%	
I.5	Fire Detection Probabilities	1.00%	1.00%	1.00%	1.00%	
I.6	ESD Successful	1.00%	1.00%	1.00%	1.00%	
II	**Consequences Analysis Assumptions**					
II.1	Interested Radiation Level (KW/m2	37.5	20	4		
	Fatality Probability (%)	87.00%	16.00%	0.50%	*Use Probit ?*	Yes
II.2	Interested Overpressure Level (ps	5	1	0.1		
	Fatality Probability (%)				*Use Probit ?*	No
	Input Fatality Probability here =>				%	
II.3	Interested Windspeed (m/sec)	2	5	10		
	Stability Class / Pasquil	F	D	C		
	Downwind Factors	la he so anh huong lech Vung Anh huong theo chieu gio.				
	Wind Speed	37.5	20	4		
	Fire Radiation Zone	0.1	0.2	0.3		
	Explosion Overpressure	0.1	0.1	0.1		

Process Event Trees | Process Risk | Risers Events | Blowout Events

5. Platform Modules Settings and Operations Factors:

MODULES SETTINGS

ID	MODULE NAME	LOCATION	NATES			FATALITY RATE			Total	PRESENCE FACTORS			
			int	Lower Point		(per year)			LSIR	Time Spent on each Area of each Workers Group (H			
			Y	X	Y	Immediat	Escape	Evacuati	(per year)	Production	Maintenance	Well Interver	Others
BM1	Main Deck	Main Deck	4	40	26	5.58E-04	2.79E-04	4.07E-06	8.41E-04	1.00	2.00	6.00	
BM2	Mezz Deck	Mezz Deck	9	40	26	8.86E-04	4.56E-04	6.55E-06	1.35E-03	1.00	2.00		
BM3	CellarDeck-Process	Cellar Deck	3.8	40	26	8.86E-04	4.56E-04	6.55E-06	1.35E-03	0.50	1.00		
BM4	CellarDeck-Utility	Cellar Deck	2.5	53	22	2.61E-04	1.42E-04	1.98E-06	4.05E-04	0.50	1.00	2.00	
BM5	SubCellar	Sub-cellar Deck	4.5	36	24	6.67E-04	3.45E-04	5.00E-06	1.02E-03	1.00	2.00		
										Total Hours per Day/Trip			
										4.00	8.00	8.00	

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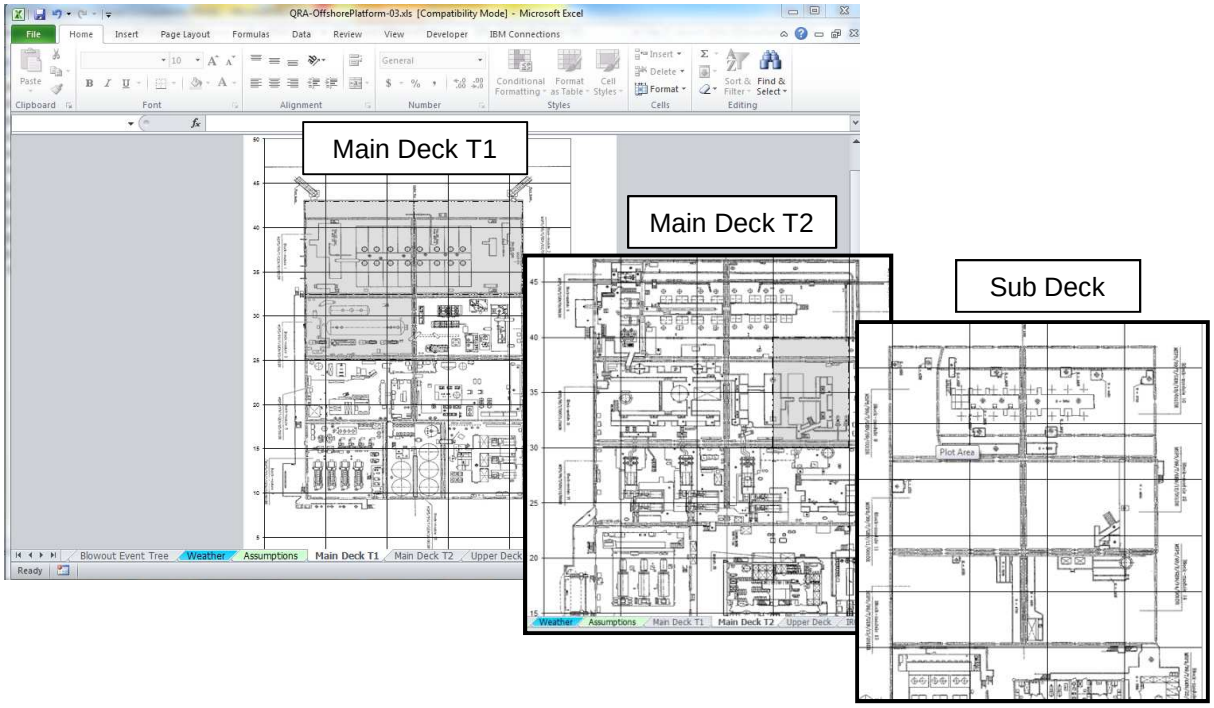
6. Visualizing Platform Layout, Floors/Decks and Modules:



7. Setting Process Segments those may cause HC leak incidents/accidents:

PROCESS SYSTEMS INPUTS

Segment ID	Process Segments Name	Fluid	Pressure (bar)	Temp. (degC)	Segment Type	Segment Location	Segment Point X	Segment Point Y	Leak Frequencies Small	Leak Frequencies Medium	Leak Frequencies Large
PS1	Wellhead to Choke Valve	2-phase(	30	70	Topside Process				1.37E-03	4.46E-04	1.15E-04
PS2	Choke Valve via Production Header, Test Header and Metering skid	2-phase(	30	70	Topside Process				5.45E-03	3.04E-03	3.99E-04
PS3	Closed drain system	2-phase(	0.1	25	Topside Process				1.68E-03	8.06E-04	2.20E-04
RSA	Riser Above Splash Zone	2-phase(	30	70	Riser-Above				2.33E-04	2.14E-04	4.00E-04
RSSPL	Riser Splash Zone & Subsea	2-phase(	30	70	Riser-Splash					1.59E-04	2.97E-04
PS	Process System on ABC Platform	2-phase(	16	60	Topside Process				8.94E-03	2.09E-03	1.30E-03
RSA	Riser Above Splash Zone	2-phase(	16	60	Riser-Above				2.33E-04	2.14E-04	4.00E-04
RSSPL	Riser Splash Zone & Subsea	2-phase(	16	60	Riser-Splash					1.59E-04	2.97E-04

EQUIPMENT COUNT

Centrifugal Pump, s
Centrifugal Pump,d
Column
Compressor, Centril
Compressor, Recipi
Filter
Fin/Fan Coolers
Heat Exchanger, Sh
Heat Exchanger, Tu
Piping, 0.75in. dian
Piping, 1in. diamete

The Process system shall be devided into separate Process Segments, having number of process equipment such as pressure vessels, pumps pipings, flanges, filters, pumps, etc. potentially cause leaks of hazardous subtances.

Leak frequecies of each Process Segment shall be calculated using 'Equipment Count methodology.

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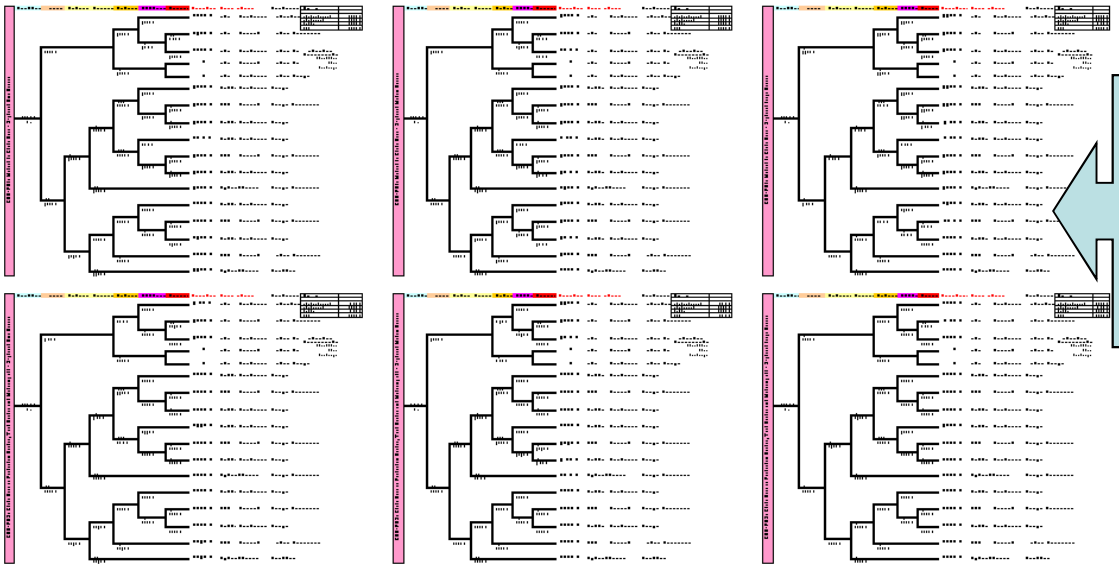
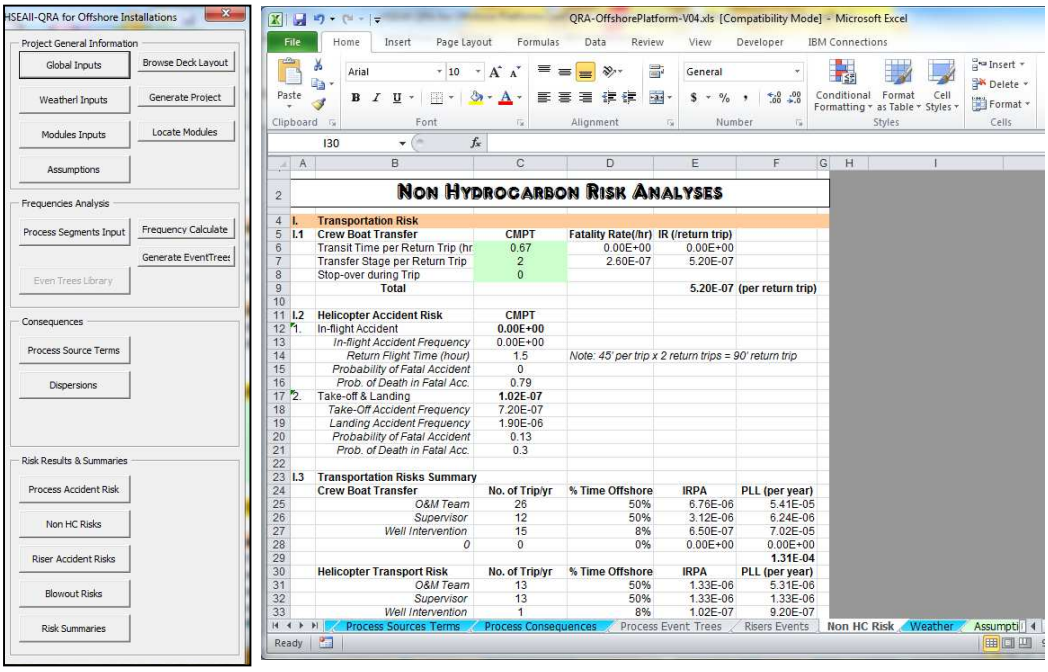
8. Generating Event Trees for each Process Segments accidental scenarios:



Each Process segment shall have 3 leak scenarios:
- Small
- Medium
- Large.

The generic leak frequencies and probabilities shall be automatically assigned to relevant Event Trees, to produce frequencies of Accidental Scenario Outcomes.

9. Analyzing the Risk of Non-Hydrocarbon incidents/accidents:



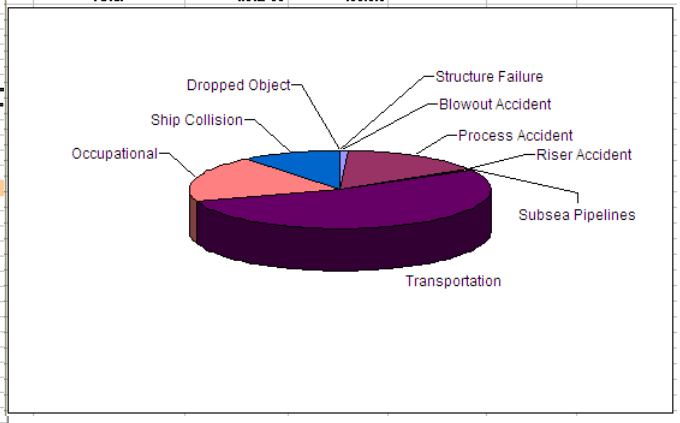
H.QRA - Module for Offshore Platform QRA

10. Risk Calculation Results:

PERSONNEL RISK ANALYSIS & ASSESSMENT SUMMARY

I.	**Hydrocarbon Risk**					
I.1	**Potential Loss of Life (F**	**Immediate**	**Escape**	**Evacuation**	**Total**	
	Blowout Accident	1.17E-05	2.33E-06	3.50E-07	1.44E-05	5.76%
	Process Accident	1.44E-04	8.28E-05	1.03E-06	2.28E-04	91.42%
	Riser Accident	4.30E-06	2.29E-06	4.36E-08	6.64E-06	2.66%
	Subsea Pipelines	2.34E-07	8.30E-08	8.30E-08	4.00E-07	0.16%
					2.49E-04	
I.2	**Location Specific Individual Risk (LSIR)**					
	Main Deck				8.41E-04	
	Mezz Deck				1.35E-03	
	CellarDeck-Process				1.35E-03	
	CellarDeck-Utility				4.05E-04	
	SubCellar				1.02E-03	
					4.96E-03	
I.3	**IRPA**	**Production Crew**	**Maintenance Cr**	**Well Interventio**	**Others**	
	Blowout Accident Risk	1.40E-06	4.32E-07	1.59E-06	0.00E+00	
	Process Event Risk	1.67E-05	5.15E-06	1.81E-05	0.00E+00	
	Riser Accident Risk	2.21E-06	2.21E-06	7.38E-07	0.00E+00	
	Subsea Pipelines Risk	1.33E-07	1.33E-07	4.45E-08	0.00E+00	
II.	**Non Hydrocarbon Risk**					
II.1	**Potential Loss of Life (F**	**Contributors**	**%**			
	Transportation	8.06E-04				
	Helicopter Accident Risk	*3.39E-04*				
	Boat Transfer Risk	*4.67E-04*				
	Occupational	2.90E-04				
	Ship Collision	1.60E-04				
	Dropped Object	3.00E-07				
	Structure Failure	3.23E-07				
	Total	**1.26E-03**				
II.2	**IRPA**	**Production Crew**	**Maintenance Cr**	**Well Interventio**	**Others**	
	Transportation	2.58E-05	3.97E-06	3.12E-05	0.00E+00	
	Helicopter Accident Risk	*0.00E+00*	*0.00E+00*	*1.73E-05*	*0.00E+00*	
	Boat Transfer Risk	*2.58E-05*	*3.97E-06*	*1.39E-05*	*0.00E+00*	
	Occupational Risk	6.17E-06	2.43E-06	1.19E-05	0.00E+00	
	Ship Collision Risk	4.10E-06	1.30E-06	6.30E-06	0.00E+00	
	Dropped Object	1.20E-08	3.80E-09	1.00E-08	0.00E+00	
	Structure Risk	8.50E-09	2.60E-09	1.30E-08	0.00E+00	
	Total					

III.	**Summary**		
III.1	**Potential Loss of Life (PLL)**		
	Categories	**PLL (per year)**	**Contributions (%)**
	Blowout Accident	1.44E-05	1.0%
	Process Accident	2.28E-04	15.1%
	Riser Accident	6.64E-06	0.4%
	Subsea Pipelines	4.00E-07	0.0%
	Transportation	8.06E-04	53.5%
	Occupational	2.90E-04	19.2%
	Ship Collision	1.60E-04	10.6%
	Dropped Object	3.00E-07	0.0%
	Structure Failure	3.23E-07	0.0%
	Total	**1.51E-03**	**100.0%**



11. Visualizing Risks against the set Risk Criteria:

Risk level of each Module will be assessed against the Set Criteria and present in each Module.

IV	Colours set for LSIR Levels	Set Value	Color
	Level 1 (Untolerable)	1.0E-03	Red
	Level 2 (ALARP-Upper Limit)	1.0E-04	Pink
	Level 3 (ALARP-Lower Limit)	1.0E-05	Blue
	Level 4 (Lowest)	1.0E-06	Green