



TEASISTEMI

ENERGY AND ENVIRONMENT TECHNOLOGIES

QUANTITATIVE RISK ASSESSMENT



Quantitative Risk Assessment

The best practices for QRA

Unconventional hazard:

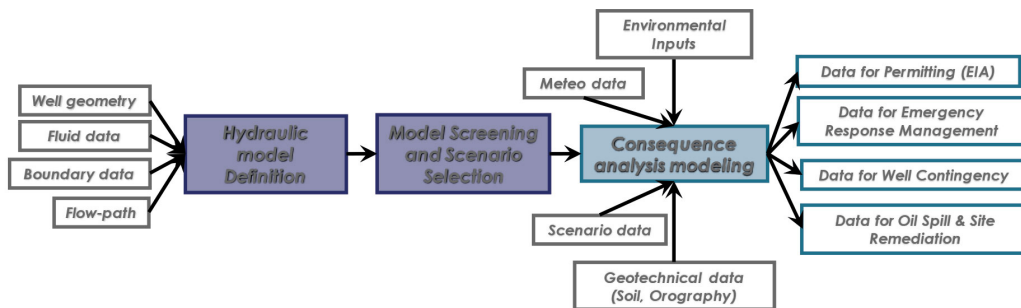
- 1) Large inventories
- 2) Long duration
- 3) Wide impacted (unconfined) areas



Blowouts

Pipelines loss of integrity

TEA developed a complete methodology for Risk Assessment associated with severe accidents for the O&G & Petrochemical industry :



FRA & Other Risk Studies

Fire Risk Analysis and other risk related activities

TEA currently performs Fire Risk Analysis in consistency with Company and best international standards.

The effect of engineering barriers (i.e. Emergency Depressurization and Blowdown systems) is taken into account to evaluate real discharge/fire characteristics (reduced fire impact distances means lower PFP requirements)

Sensitivity risk analysis for critical targets would allow for the characterization of PFP requirements (type and duration).

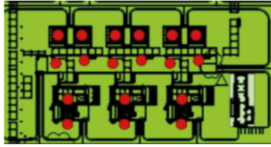
Rank	Source ID	Source description	Hole size	Stream	Consequence	Fire Risk contribution			Release duration
						inj/yr	n	PAU	
1	111	G00-VA-21-01 Condensate Separator	150mm	186 n	JetFire	1.69E-05	11%	25	
2	111	G00-VA-21-01 Condensate Separator	150mm	200 n	PoolFire	1.61E-05	11%	15	
3	113	G00-MA-21-01-A/B Condensate coalescer pre-filters	22mm	200 n	PoolFire	1.95E-05	9%	226	
4	113	G00-MA-21-01-A/B Condensate coalescer pre-filters	150mm	200 n	PoolFire	1.31E-05	9%	15	
5	113	G00-MA-21-01-A/B Condensate coalescer pre-filters	150mm	186 n	JetFire	1.29E-05	9%	25	
6	113	G00-MA-21-01-A/B Condensate coalescer pre-filters	70mm	200 n	PoolFire	1.31E-05	8%	201	
7	113	G00-MA-21-01-A/B Condensate coalescer pre-filters	70mm	186 n	JetFire	1.09E-05	7%	95	
8	111	G00-VA-21-01 Condensate Separator	22mm	200 n	PoolFire	8.83E-06	6%	226	
9	115	G00-VI-21-02 Condensate coalescer	150mm	200 n	PoolFire	8.13E-06	5%	15	
10	140	pipng from VI-21-02 Condensate coalescer to Condensate Stabiliser CB-21-01	150mm	200 n	PoolFire	5.65E-06	4%	15	
11	115	G00-VI-21-02 Condensate coalescer	150mm	186 n	JetFire	2.79E-06	2%	25	
12	111	G00-VA-21-01 Condensate Separator	70mm	200 n	PoolFire	1.64E-06	1%	201	

TEA has a consolidated experience in providing the following additional risk studies:

- Emergency Systems Survivability Analysis
- Escape Evacuation and Rescue Analysis
- SIMOPS Risk Analysis
- Building Risk Assessment
- Boat/Ship Impact Study
- Dropped Object Study
- SSIV location optimization

TEA Software for QRA & FERA

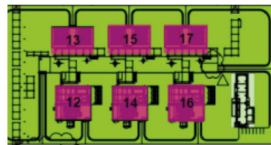
Processing Facilities Model



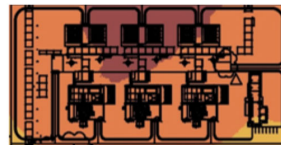
Punctual Risk Sources



Linear Risk Sources (Piping)



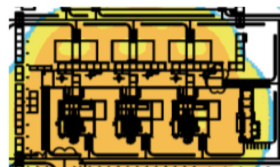
Definition of Potential Explosion Sites



Location Specific Individual Risk (LSIR)



VCE Asset Risks
> 140 mbar



VCE Asset Risks
> 400 mbar

A Risk Assessment Tool, TEARisk® has been specifically developed to support Onshore and Offshore Facilities Design Risk Analysis. TEARisk may be used to support both QRA and FERA analysis. TEARisk® is extremely flexible and allows for a robust definition of the processed risk sources.

TEARisk® would evaluate risks for both linear and punctual sources and quantify risks associated to fires, explosions and toxic dispersions.

Risk sources may be characterized at Unit/Area level (more generic & less expensive) or by Equipment (refined approach). Due to its multilayer structure, risks may be quantified for any hazard and for any equipment independently.

Explosion Risk Analysis

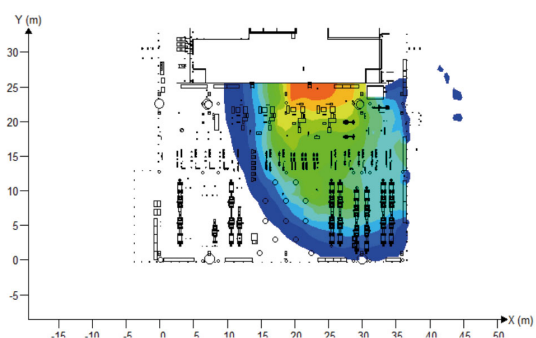
Explosion Modelling & Exceedance Analysis

TEA performs Explosion Risk Assessment (consistent with CCPS and COMAH proposed approaches) supported by alternative Vapour Cloud Explosion models.

- 1) VCE Modelling approach with Baker - Strehlow-Tang or Multi-energy models
- 2) CFD Dispersion, Ventilation and Explosion Modelling (FLACS)
- 3) VCE analysis results may be included into TEARisk software in terms of explosion risks for personnel (QRA) and assets (FERA).

Exceedance Analysis assesses, on a probabilistic basis, the expected blast overpressure loads on highly sensitive targets (i.e. Buildings, Control Room, Reactors etc...) and eventually identifies their expected Design Loads (DALs).

Exceedance Analysis would generally identify less stringent Blast Design Loads with respect to Consequence Based approach in a structured and auditable way.





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experience knowledge solutions

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