

1.1 ENVIRONMENTAL RISK EVALUATION

The risk assessment for the proposed plant was made through Hazard Identification and Risk Assessment methodology. The various hazards that are relevant to the proposed processes and materials handled were considered and the risk potential was evaluated on a qualitative basis as shown in Table 1.

TABLE 1 - ENVIRONMENTAL RISK POTENTIAL EVALUATION

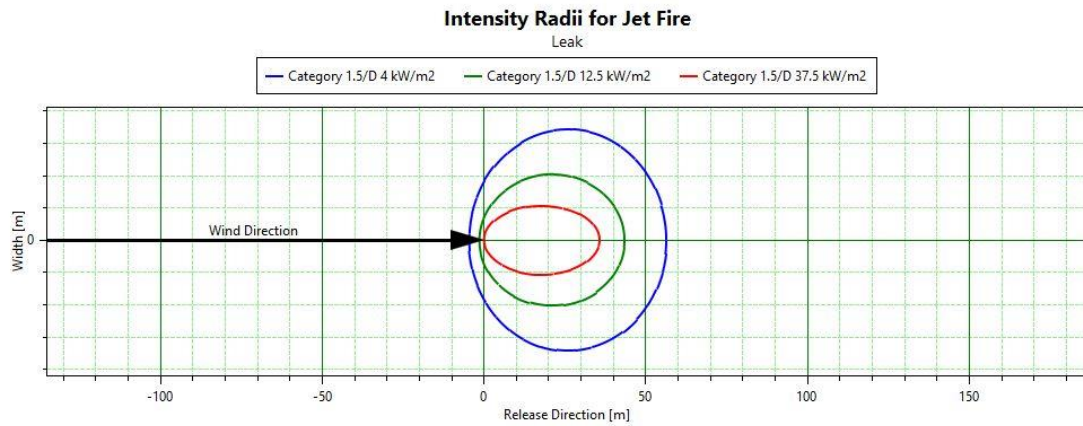
Sl. No.	Event	Rank			Risk potential
		Likelihood of occurrence	Likelihood of detection	Severity of consequence	
i)	LDO leak from the storage tank	Low (2)	Low (4)	Moderate (8)	48
ii)	Transformer oil leak and fire	Very low (1)	Low (4)	Moderate (8)	40
iii)	Uncontrolled dust emissions/failure of emission control system	Low (2)	Moderate (3)	Moderate (8)	40
iv)	Uncontrolled discharge of untreated plant wastewater	Very low (1)	High (2)	Low (6)	18
v)	Uncontrolled fire in FO storage tank	Very low (1)	Low (4)	High (10)	50

As risk from FO leak is maximum and has the maximum severity of consequence, consequence modeling for leakage scenarios of FO tank has been carried out using DNV Phast Lite 7.1 to quantify the extent of the impact from this event. For leakage from FO tank, heat radiation from early pool fire, late pool fire and jet fire.

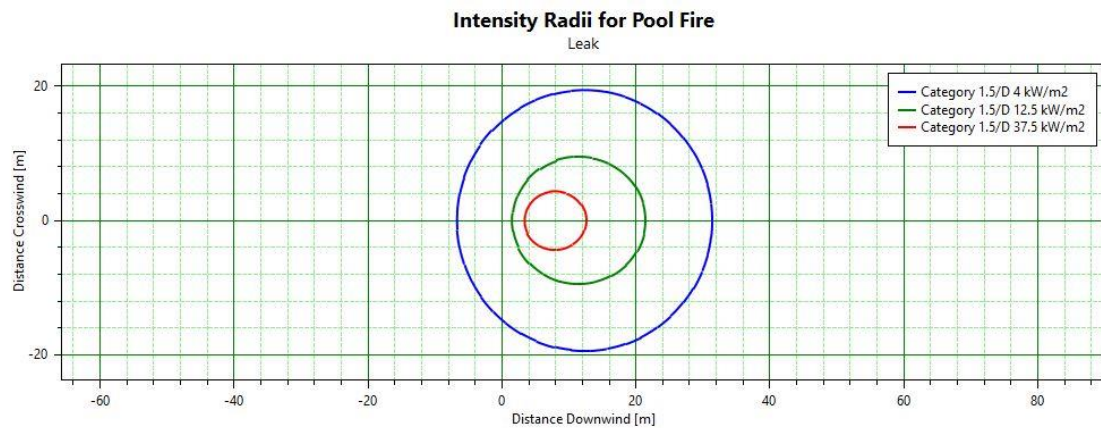
The intensity radii for jet fire, early pool fire and late pool fire arising due to leakage from FO tank have been shown in Fig. 1, 2 and 3 respectively. Three radiation levels of interest have been plotted corresponding to 4 kW/m² (pain threshold), 12.5 kW/m² (first degree burns) and 37.5 kW/m² (100% fatality and damage to process equipment without thermal protection) and the results have been tabulated in Table 2.

**TABLE 2 - RADIUS OF INFLUENCE OF HAZARD SCENARIOS FOR
LEAKAGE FROM FO STORAGE TANK**

Hazard scenario	Radiation levels		
	4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²
	Distance of influence (in m)		
Jet Fire	56	42	35
Early Pool Fire	32	23	12
Late Pool Fire	71	34	-



**FIG. 1 - DISTANCE OF INFLUENCE OF HEAT RADIATION FROM JET
FIRE**



**FIG. 2 - DISTANCE OF INFLUENCE OF HEAT RADIATION FROM EARLY
POOL FIRE**

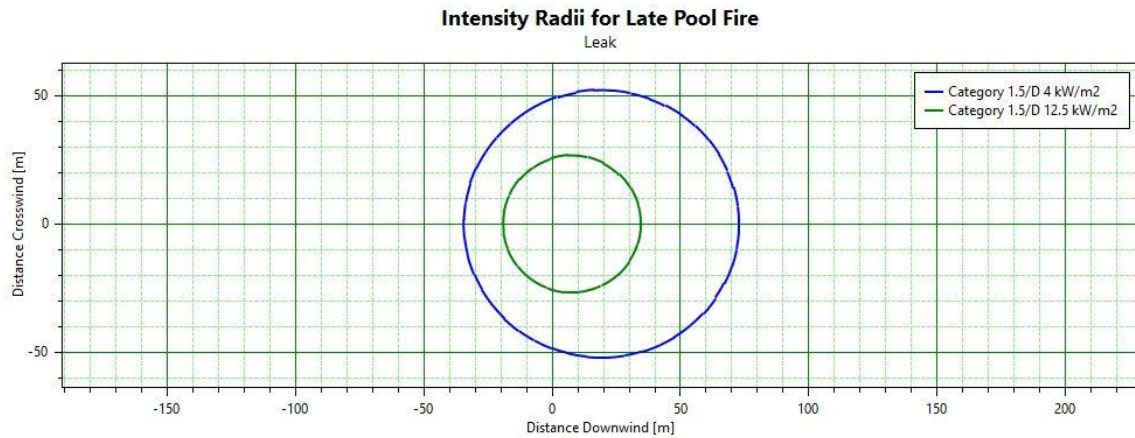


FIG. 3 - DISTANCE OF INFLUENCE OF HEAT RADIATION FROM LATE POOL FIRE

A HAZOP Study for the selected units/areas needs to be undertaken at the 'design-freeze' stage, when P&I diagrams, shop layout drawings, control logic diagrams, technical specifications etc are made ready. For these areas, 'Fault Tree Analysis' of the failure of equipment/valve component or due to human error can be carried out to assess more realistically the risk involved and draw up final management measures. It is also suggested to conduct HAZOP Study for the fuel gas distribution network to incorporate last minute corrections in the design of the system from fail-safe angle, prior to commissioning.