APPENDIX 9B

RISK ASSESSMENT FOR MA TAU KOK GAS WORKS - SAFETI PARAMETERS

Default atmospheric temperature	298	K
Default atmospheric pressure	101325	N/m2
Relative humidity	75	%
Default surface roughness parameter	0.33	
Default surface temperature	293	K
Atmospheric molecular weight	28.966	
Atmospheric specific heat at constant pressure	1004	J/kg*K
Number of wind directions	16	
Pipe roughness	0.0457	mm
Excess Flow Valve velocity head losses	0	
Non-Return Valve velocity head losses	0	
Shut-Off Valve velocity head losses	0	
Frequency of bends	0	1/m
Frequency of couplings	0	1/m
Frequency of junctions	0	1/m
Upper volume change limit/step	0.5	
Lower volume change limit/step	0.15	
Minimum RV diameter ratio	1	
Relief valve safety factor	1.2	
Critical pressure greater than flow phase	0.34474	bar
Default line length	10	m
Default Liquid Fraction	1	fraction
Default volume changes	2.999999	per h
Maximum release duration	1800	s
Minimum temperature allowed	10	K
Maximum temperature allowed	1200	K
Maximum pressure allowed	1000	bar
Maximum liquid head allowed	100	m
Maximum release velocity	500	m/s
Range of release angles	90.00021	degree
Minimum drop size allowed	0	mm
Maximum drop size allowed	1000	mm
BLEVE radiation level 1	4	kW/m2
BLEVE radiation level 2	12.5	kW/m2
BLEVE radiation level 3	37.5	kW/m2
Jet flame radiation level 1	4	kW/m2
Jet flame radiation level 2	12.5	kW/m2
Jet flame radiation level 3	37.5	kW/m2
Pool fire radiation level 1	4	kW/m2
Pool fire radiation level 2	12.5	kW/m2
Pool fire radiation level 3	37.5	kW/m2
LFL fraction to finish	1	fraction
Effect radiation level	12.5	kW/m2
Radiation total dose	375000	J/m2
Maximum SEP for a BLEVE	400	kW/m2
Maximum SEP for a Jet flame	400	kW/m2
Explosion efficiency	0.1	
Explosion overpressure level 1	0.02068	bar
Explosion overpressure level 2	0.1379	bar
Explosion overpressure level 3	0.2068	bar
Minimum explosive mass	0	kg
Explosion location criterion	0	
Venting equation constant	24.82	N/m2
Blast damage coefficient: heavy damage	0.03	
Blast damage coefficient: light damage	0.06	
Bund minimum thickness	5	mm
Bund thermal conductivity	2.21	W/m*K
Bund roughness factor	2.634	
Bund thermal diffusivity (per second)	9.48e-007	m2
Solar radiation flux	0.5	kW/m2
Continuous Critical Weber number	12.5	
Print level	Diagnostic	
Flamm.: height for calculation of effects	0	m
Flamm.: result grid step in X-direction	10	m
Toxics: height for calculation of effects	0	m
Toxics: results grid step in X-direction	25	m

Toxics: result grid step in Y-direction	2.5	m
Atmospheric temp and pressure profile	3	
Wind speed profile	2	
Temperature reference height (m)	10	m
Wind speed reference height (m)	10	m
Cut-off height for wind speed profile (m)	1	m
Minimum integration step size (distance)	0.001	m
Maximum integration step size (distance)	10	m
Minimum integration step size (time)	0.1	s
Maximum integration step size (time)	10	s
Maximum Distance for Dispersion	1000	m
Minimum release velocity for cont. release	0.1	m/s
Default minimum release height	0	m
Maximum height for dispersion	1000	m
Toxics: minimum probability of death	0.001	
Droplet evaporation thermodynamics model	2	
Flammable mass calculation method	2	
Treatment of top of mixing layer	1	
Quasi-instantaneous transition parameter	0.8	
Multi-component toxic calculation method	1	
Accuracy for integration of dispersion	0.001	
Accuracy for droplet integration	0.001	
Turbulent Schmidt number	1.4	
Jet entrainment coefficient alpha1	0.11	
Jet entrainment coefficient alpha2	0.26	
Dense cloud parameter alpha (continuous)	1.6	
Dense cloud parameter beta (continuous)	0.015	
Dense cloud parameter gamma (continuous)	0.05	
Dense cloud parameter k (continuous)	0.15	
Dense cloud parameter alpha (instant)	1	
Dense cloud parameter beta (instant)	0.015	
Dense cloud parameter gamma (instant)	0.3	
Dense cloud parameter k (instantaneous)	1.2	
Passive entrainment coefficient (contin)	0.85	
Passive entrainment coefficient (instant)	0.65	
Ratio instantaneous/continuous sigma-y	1	
Ratio instantaneous/continuous sigma-z	1	
Drag coefficient between plume and air	0.15	
Drag coefficient between plume and ground	1.5	
Impact parameter - plume/ground	0.8	
Impact parameter - plume/top of mixing layer	1	
Base averaging time	10	s
Expansion zone length/source diameter ratio	0.01	
Toxics: cut-off rate for pool evaporation	0.001	kg/s
Height for concentration output	1	m
Flamm.: cut-off rate for pool evaporation	0.1	kg/s
Flamm.: accuracy of flammable mass calc	0.001	
Minimum vap fract for convection from ground	0.0015	fraction
Drop/expansion velocity for inst. release	0.8	m/s
Minimum cloud depth	0.02	m
Default bund height	3	m
Duration for jet fire averaging	20	s
Time to BLEVE	20	s
Expansion energy cutoff for droplet angle	690	J/m2
Flamm.: inclination	Variable	
Flamm.: angle of inclination	0	degree
Dense cloud parameter beta (pool vaporisation)	0.015	
Pool vaporisation entrainment parameter	1.5	
Distance multiple for full passive entrainment	2	
Density tolerance for cloud buoyancy	0.005	
Calculate jet fire?	Yes	
Automatic setting of Impact calculation grid	Yes	
Impact Calculation Grid: Lower X limit	36000	
Impact Calculation Grid: Upper X limit	40000	
Impact Calculation Grid: Lower Y limit	18000	
Impact Calculation Grid: Upper Y limit	22000	

Minimum case frequency considered_____1e-012
Minimum event probability considered_____1e-012
Fraction population outdoors, F-N_____0.2
Fraction population outdoors, night, F-N_____0.05
Fraction population outdoors, risk_____0.1
Fraction population outdoors, night, risk_____0.1
Fraction out killed by explosion R1_____0.75
Fraction in killed by explosion R1_____1
Fraction out killed by explosion R1-2_____0.25
Fraction in killed by explosion R1-2_____0.5
Fraction out killed by flash fire_____1
Fraction in killed by flash fire_____0.2
Fraction out killed by BLEVE_____1
Fraction in killed by BLEVE_____0.5
Fraction out killed by jet flame_____1
Fraction in killed by jet flame_____0.25
Fraction out killed by pool fire_____0.5
Fraction in killed by pool fire_____0.1
Fraction out killed by toxics_____1
Fraction in killed by toxics_____0.1
Pop omega factor (per person)_____0.0001
No sub-squares across ellipse in flamm. impct__4
Max times to subdivide a square in flamm. impct2
Multiplying factor for toxic F-N spread_____2
Probability of BLEVE_____1
Probability of fire_____0.25
Route 1a true jet. comb jet horiz. fraction____0.5
Route 1a true jet. prob. horiz. ignition_____0.5
Route 1a true jet. prob. horiz. jet fire_____0.9
Route 1a true jet. prob. horiz. explosion_____0.1
Route 1a true jet. prob. vertical ignition_____0.5
Route 1a true jet. prob. vertical jet fire_____0.9
Route 1a true jet. prob. vertical explosion____0.1
Route 3a true jet. comb jet horiz. fraction____0.5
Route 3a true jet. prob. horiz. ignition_____0.5
Route 3a true jet. prob. horiz. jet fire_____0.9
Route 3a true jet. prob. horiz. explosion_____0.1
Route 3a true jet. prob. vertical ignition_____0.5
Route 3a true jet. prob. vertical jet fire_____0.9
Route 3a true jet. prob. vertical explosion____0.1
Route 1b probability of delayed flash fire_____0.9
Route 1b probability of delayed explosion_____0.1
Route 2 probability of delayed flash fire_____0.9
Route 2 probability of delayed explosion_____0.1
Route 3b probability of delayed flash fire_____0.9
Route 3b probability of delayed explosion_____0.1
Route 4 probability of delayed flash fire_____0.9
Route 4 probability of delayed explosion_____0.1
Route 5 probability of immediate ignition_____0.1
Route 5 probability of early pool fire_____1
Route 5 probability of delayed pool fire_____0.25
Route 5 probability of delayed flash fire_____0.9
Route 5 probability of delayed explosion_____0.1
Route 6 probability of immediate ignition_____0.1
Route 6 probability of early pool fire_____1
Route 6 probability of delayed pool fire_____0.25
Route 6 probability of delayed flash fire_____0.9
Route 6 probability of delayed explosion_____0.1
Route 7 probability of immediate ignition_____0.1
Route 7 probability of early pool fire_____1
Route 7 probability of delayed pool fire_____0.25
Route 7 probability of delayed flash fire_____0.9
Route 7 probability of delayed explosion_____0.1
Route 8 probability of immediate ignition_____0.1
Route 8 probability of early pool fire_____1
Route 8 probability of delayed flash fire_____0.9

Route 8 probability of delayed explosion	0.1	
Route 9 probability of immediate ignition	0.1	
Route 9 probability of early pool fire	1	
Route 9 probability of delayed flash fire	0.9	
Route 9 probability of delayed explosion	0.1	
Route 10 probability of immediate ignition	0.1	
Route 10 probability of BLEVE	1	
Route 10 probability of delayed flash fire	0.9	
Route 10 probability of delayed explosion	0.1	
Route 11 probability of immediate ignition	0.1	
Route 11 probability of BLEVE	1	
Route 11 probability of delayed flash fire	0.9	
Route 11 probability of delayed explosion	0.1	
Route 12 probability of immediate ignition	0.1	
Route 12 probability of BLEVE	1	
Route 12 probability of delayed pool fire	0.5	
Route 12 probability of delayed flash fire	0.9	
Route 12 probability of delayed explosion	0.1	
Route 13 probability of immediate ignition	0.1	
Route 13 probability of BLEVE	1	
Route 13 probability of delayed flash fire	0.9	
Route 13 probability of delayed explosion	0.1	
Route 14 probability of immediate ignition	0.1	
Route 14 probability of BLEVE	1	
Route 14 probability of delayed pool fire	0.5	
Route 14 probability of delayed flash fire	0.9	
Route 14 probability of delayed explosion	0.1	
Route 15 probability of immediate ignition	0.1	
Route 15 probability of BLEVE	1	
Route 15 probability of delayed flash fire	0.9	
Route 15 probability of delayed explosion	0.1	
Route 16 probability of immediate ignition	0.1	
Route 16 probability of BLEVE	1	
Route 16 probability of delayed flash fire	0.9	
Route 16 probability of delayed explosion	0.1	
Route 17 probability of immediate ignition	0.1	
Route 17 probability of BLEVE	1	
Route 17 probability of delayed pool fire	0.5	
Route 17 probability of delayed flash fire	0.9	
Route 17 probability of delayed explosion	0.1	
Route 18 probability of immediate ignition	0.1	
Route 18 probability of BLEVE	1	
Route 18 probability of delayed flash fire	0.9	
Route 18 probability of delayed explosion	0.1	
Route 19 probability of immediate ignition	0.1	
Route 19 probability of BLEVE	1	
Route 19 probability of delayed pool fire	0.5	
Route 19 probability of delayed flash fire	0.9	
Route 19 probability of delayed explosion	0.1	
Route 20 probability of immediate ignition	0.1	
Route 20 probability of BLEVE	1	
Route 20 probability of delayed flash fire	0.9	
Route 20 probability of delayed explosion	0.1	
Probability of toxic	1	
1st Risk contour level	1	per yr
2nd Risk contour level	1	per yr
3rd Risk contour level	1	per yr
4th Risk contour level	1	per yr
5th Risk contour level	1	per yr
6th Risk contour level	1	per yr
7th Risk contour level	1e-005	per yr
8th Risk contour level	1e-006	per yr
9th Risk contour level	1e-007	per yr
10th Risk contour level	1e-008	per yr
1st Risk contour Color	Black	
2nd Risk contour Color	Black	

3rd Risk contour Color	Black	
4th Risk contour Color	Black	
5th Risk contour Color	Black	
6th Risk contour Color	Red	
7th Risk contour Color	Black	
8th Risk contour Color	Black	
9th Risk contour Color	Black	
10th Risk contour Color	Black	
Line thickness for contours	3	
Line type for contours (thickness =1 only)	Solid	
Minimum risk level	1e-009	per yr
Display risk criteria lines	Yes	
Maximum risk criteria line start N	1	
Maximum risk criteria line start F	0.001	per yr
Maximum risk criteria line end N	1000	
Maximum risk criteria line end F	0.0001	per yr
Minimum risk criteria line start N	1	
Minimum risk criteria line start F	1e-005	per yr
Minimum risk criteria line end N	1000	
Minimum risk criteria line end F	1e-006	per yr
Aversion index	1	