Table 1-57 SAFETI Parameters for 2011C Case

Parameter	Value	Unit	Remark
Dispersion Parameters			
Expansion zone length/source diameter ratio	0.01		
Near Field Passive Entrainment Parameter	1		
Jet Model			Morton et.al.
Jet entrainment coefficient alpha1	0.17		
Jet entrainment coefficient alpha2	0.35		
Drag coefficient between plume and air	0		
Dense cloud parameter gamma (continuous)	0		
Dense cloud parameter gamma (instant)	0.30		
Dense cloud parameter k (continuous)	1.15		
Dense cloud parameter k (instantaneous)	1.15		
Modeling of instantaneous expansion			Standard Method
Maximum Cloud/Ambient Velocity Difference	0.1		
Maximum Cloud/Ambient Density Difference	0.015		
Maximum Non-passive entrainment fraction	0.3		
Maximum Richardson number	15		
Distance multiple for full passive entrainment	2		
Core Averaging Time	18.75	s	
Ratio instantaneous/continuous sigma-y	1		
Ratio instantaneous/continuous sigma-z	1		
Droplet evaporation thermodynamics model			Rainout, Non-equilibrium
Droplet equation solution method			Synchronized
Drop/expansion velocity for inst. release	0.8		
Expansion energy cutoff for droplet angle	690	J/kg	
Coefficient of Initial Rainout	0		
Flag to reset rainout position			Do not reset rainout position
Richardson Number for passive transition above pool	0.015		
Pool Vaporization entrainment parameter	1.5		
Ground Drag Model			New (Recommended)
Drag coefficient between plume and ground	1.5		
Richardson number criterion for cloud lift-off	-20		
Flag for Heat/Water vapor transfer			Heat and Water
Surface over which the dispersion occurs	Water		
Minimum temperature allowed	-262.1	degC	
Maximum temperature allowed	626.9	degC	
Minimum release velocity for cont. release	0.1	m/s	
Minimum Continuous Release Height	0	m	
Maximum distance for dispersion	50,000	m	
Maximum height for dispersion	1,000	m	
Minimum cloud depth	0.02	m	
Flag for mixing height			Constrained
Model In Use			Best Estimate
Calculate Lee Length			Calculate
Calculate Lee Half-Width			Calculate
Calculate Lee Height			Calculate
Calculate K-Factor			Calculate
Calculate Switch Distance			Calculate
Maximum Initial Step Size	10	m	
Minimum Number of Steps per Zone	5		
Factor for Step Increase	1.2		
Maximum Number of Output Steps	1,000		

Parameter	Value	Unit	Remark
Flag for finite duration correction			QI without Duration Adjustment
Quasi-instantaneous transition parameter	0.8		
Accuracy for integration of dispersion	0.001		
Accuracy for droplet integration	0.001		
Minimum integration step size (Instantaneous)	0.1	s	
Minimum integration step size (Continuous)	0.1	m	
Maximum integration step size (Instantaneous)	1,000	s	
Maximum integration step size (Continuous)	100	m	
Criterion for halting dispersion model			Risk based
Discharge Parameters			
Continuous Critical Weber number	12.5		
Instantaneous Critical Weber number	12.5		
Venting equation constant	24.82		
Relief valve safety factor	1.2		
Minimum RV diameter ratio	1		
Critical pressure greater than flow phase	3.447E4	N/m^2	
Maximum release velocity	500	m/s	
Minimum drop diameter allowed	0.00001	mm	
Maximum drop diameter allowed	10	mm	
Default Liquid Fraction	1	fraction	
Continuous Drop Slip factor	1		
Instantaneous Drop Slip factor	1		
Pipe-Fluid Thermal Coupling	0		
Number of Time Steps	100		
Maximum Number of Data Points	1,000		
Droplet Method	1.00		
Input Flash Mechanism			Do not force correlation
Tolerance	1E-6		
Excess Flow Valve velocity head losses	0		
Non-Return Valve velocity head losses	0		
Shut-Off Valve velocity head losses	0		
Frequency of bends in long pipes	0	/m	
Frequency of couplings in long pipes	0	/m	
Frequency of junctions in long pipes	0	/m	
Line length	10	m	
Pipe roughness	4.57E-5	m	
Default volume changes	26,280	/yr	
Elevation	1	m	
Atmospheric Expansion Method			Closest to Initial Conditions
Tank Roof Failure Model Effects			Instantaneous Effects (default)
Jet Fire Parameters			
Maximum SEP for a Jet Fire	400	kW/m2	
Jet Fire Averaging Time	20	s	
Jet fire radiation intensity level 1	7.3	kW/m2	
Jet fire radiation intensity level 2	14.4	kW/m2	
Jet fire radiation intensity level 3	20.9	kW/m2	
Rate Modification Factor	3		
Jet Fire Maximum Exposure Duration	30	s	
Jet fire radiation dose level 1	1,270,000		
Jet fire radiation dose level 2	5,800,000		
Jet fire radiation dose level 3	25,100,000		
Jet fire radiation probit level 1	2.73		
Jet fire radiation probit level 2	3.72		

Parameter	Value	Unit	Remark
Jet fire radiation probit level 3	7.50		
Jet fire radiation lethality level 1	0.01	fraction	
Jet fire radiation lethality level 2	0.5	fraction	
Jet fire radiation lethality level 3	0.9	fraction	
Calculate Dose			Unselected
Calculate Probit			Unselected
Calculate Lethality			Selected
Crosswind Angle	0	deg	
Shell Calculation Method			DNV Recommended
Use Johnson Method If Horizontal			Use Johnson
Pool Fire Parameters			
Minimum pool duration for pool fire risk (Inst. Releases)	10	s	
Minimum pool duration for pool fire risk (Cont. Releases)	10	s	
Pool fire radiation intensity level 1	7.3	kW/m2	
Pool fire radiation intensity level 2	14.4	kW/m2	
Pool fire radiation intensity level 3	20.9	kW/m2	
Pool Fire Maximum Exposure Duration	30	s	
Pool fire radiation dose level 1	1,270,000		
Pool fire radiation dose level 2	5,800,000		
Pool fire radiation dose level 3	25,100,000		
Pool fire radiation probit level 1	2.73		
Pool fire radiation probit level 2	3.72		
Pool fire radiation probit level 3	7.50		
Pool fire radiation lethality level 1	0.01	fraction	
Pool fire radiation lethality level 2	0.5	fraction	
Pool fire radiation lethality level 3	0.9	fraction	
Calculate Dose			Unselected
Calculate Probit			Unselected
Calculate Lethality			Selected
Fireball and BLEVE Blast Parameters			
Maximum SEP for a BLEVE	400	kW/m2	
Radiation Dose for BLEVE risk calculations	5,783,770		
Fireball radiation intensity level 1	7.3	kW/m2	
Fireball radiation intensity level 2	14.4	kW/m2	
Fireball radiation intensity level 3	20.9	kW/m2	
Mass Modification Factor	3		
Fireball Maximum Exposure Duration	30	s	
Fireball radiation dose level 1	1,270,000		
Fireball radiation dose level 2	5,800,000		
Fireball radiation dose level 3	25,100,000		
Fireball radiation probit level 1	2.73		
Fireball radiation probit level 2	3.72		
Fireball radiation probit level 3	7.50		
Fireball radiation lethality level 1	0.01	fraction	
Fireball radiation lethality level 2	0.5	fraction	
Fireball radiation lethality level 3	0.9	fraction	
Calculate Dose			Unselected
Calculate Probit			Unselected
Calculate Lethality			Selected
Temperature of fireball	2000	degK	
Calculation method for fireball			DNV Recommended
Ground Reflection			Ground Burst
Ideal Gas Modeling			Model as real gas

Parameter	Value	Unit	Remark
Flammables Parameters			
Height for calculation of flammable effects	0	m	
Flammable result grid step in X-direction	10	m	
LFL fraction to finish	0.85		
Flammable angle of inclination	0	deg	
Flammable inclination			Variable
Flammable mass calculation method			Mass between LFL and UFL
Flammable Base averaging time	18.75	s	
Radiation level for Jet/Pool Fire Risk	35.5	kW/m2	
Cut Off Fraction	0.001	fraction	
UFL Multiple	1		
Cut Off Time for Short Continuous Releases	20	s	
Observer type radiation modelling flag			Planar
Probit A	-38.48		
Probit B	2.56		
Probit N	1.333		
Height for reports			Centerline Height
Angle of Orientation	0	deg	
Relative Tolerance for radiation calculations	0.01	fraction	
Number of Lethality Ellipses	4.00		
Radiation Ellipse Interpolation			Intensity
Minimum Probability of Death	0.01	fraction	
Explosion Parameters			
Over Pressure Level 1	2068	N/m2	
Over Pressure Level 2	13,790	N/m2	
Over Pressure Level 3	20,680	N/m2	
Explosion Location Criterion			Cloud Front (LFL Fraction)
Minimum explosive mass	0	kg	
Min Explosion Energy	5,000,000	kJ	
Explosion Efficiency	0.1	fraction	
MPACT explosion higher damage zone coefficient	0.03		
MPACT explosion lower damage zone coefficient	0.06		
Explosion efficiency	0.1	fraction	
Air or Ground burst			Air burst
Early Explosion Mass Modification Factor	3		
Critical Separation Ratio	0.5		
Cloud Shape of Area Integration			Elliptical
Flammable Mass Calculation Type			Area Weighted Mass Integral
Explosion Type Calculation Method			Polynomial Curve-Fit Equations
Number of Blast Curve Discretization Points	30,000		
General Parameters			
Maximum release duration	3,600	s	
Height for concentration output	0	m	
Rotation	0	deg	
Minimum Z	0	m	
Maximum Z	1	m	
Pool Vaporization Parameters			
Toxics Cut-off rate for pool evaporation	0.001	kg/s	
Flammable Cut-off rate for pool evaporation	0.1	kg/s	
Concentration Power	1		
Maximum number of pool evaporation rates	10.00		
Pool minimum thickness	0.005	M	

Parameter	Value	Unit	Remark
Surface thermal conductivity	2.21	J/m.s.degK	
Surface roughness factor	2.634		
Surface thermal diffusivity (per second)	9.48E-07	m2/s	
Type of Bund Surface			Deep Open Water
Bund Height	0	m	
Bund Failure Modeling			Bund cannot fail
Toxics Parameters (Not Used)			
Toxics: minimum probability of death	0.001		
Toxics: height for calculation of effects	0	m	
Toxics: results grid step in Y-direction	2.5	m	
Toxics: results grid step in X-direction	25	m	
Multi-comp. toxic calc. method			Mixture Probit
Toxic Averaging Time (New Parameter)	600	s	
Probit calculation method			Use Probit
Building Exchange Rate	35,040	/yr	
Tail Time	1,800	s	
Do Indoor Calcs			Unselected
Wind dependent exchange rate			Case specified
Weather Parameters			
Atmospheric pressure	1.013E5	N/m2	
Atmospheric molecular weight	28.97		
Atmospheric specific heat at constant pressure	1,004	J/kg.degK	
Wind speed reference height (m)	10	m	
Temperature reference height (m)	0	m	
Cut-off height for wind speed profile (m)	1	m	
Wind speed profile			Power Law
Atmospheric Temperature and Pressure Profile			Temp.Logarithmic; Pres.Linear
Atmospheric temperature	9.85	degC	
Relative humidity	0.7	fraction	
Surface Roughness Parameter	0.043		
Surface Roughness Length	0.0009121	m	
Roughness or Parameter			Parameter
Dispersing surface temperature	9.85	degC	
Default surface temperature of bund	9.85	degC	
Solar radiation flux	500	W/m2	
Building exchange rate	4	/hr	
Tail Time	1,800	s	
Surface Type			
Mixing layer height for Pasquil Stability A	1300	m	
Mixing layer height for Pasquil Stability A/B	1080	m	
Mixing layer height for Pasquil Stability B	920	m	
Mixing layer height for Pasquil Stability B/C	880	m	
Mixing layer height for Pasquil Stability C	840	m	
Mixing layer height for Pasquil Stability C/D	820	m	
Mixing layer height for Pasquil Stability D	800	m	
Mixing layer height for Pasquil Stability E	400	m	
Mixing layer height for Pasquil Stability F	100	m	
Mixing layer height for Pasquil Stability G	100	m	
Event Tree Probabilities			
Probability of a BLEVE	1	fraction	
Probability of a Pool Fire	1	fraction	
Toxic Probability	1	fraction	
Continuous no Rainout Immediate Ignition	0.8	fraction	

Parameter	Value	Unit	Remark
Continuous no Rainout Long Duration Horizontal Fraction	0.6	fraction	
Continuous no Rainout Long Duration Horizontal Jet Fire	1	fraction	
Continuous no Rainout Long Duration Vertical Jet Fire	1	fraction	
Continuous no Rainout Short Duration Fraction	0	fraction	
Continuous no Rainout Short Duration BLEVE	0	fraction	
Continuous no Rainout Short Duration Flash Fire	0	fraction	
Continuous no Rainout Short Duration Explosion	0	fraction	
Continuous no Rainout Delayed Ignition Flash Fire	1	fraction	
Continuous no Rainout Delayed Ignition Explosion	0	fraction	
Continuous with Rainout Immediate Ignition	Collision – 0.8 Grounding – 0.2	fraction	
Continuous with Rainout Long Duration Horizontal Fraction	0.6	fraction	
Continuous with Rainout Long Duration Horizontal Jet Fire	0	fraction	
Continuous with Rainout Long Duration Horizontal Pool Fire	1	fraction	
Continuous with Rainout Long Duration Horizontal Jet Fire with Pool Fire	0	fraction	
Continuous with Rainout Long Duration Vertical Pool Fire	1	fraction	
Continuous with Rainout Long Duration Vertical Jet Fire	0	fraction	
Continuous with Rainout Short Duration Fraction	0	fraction	
Continuous with Rainout Long Duration Vertical Jet Fire with Pool Fire	0	fraction	
Continuous with Rainout Short Duration BLEVE with Pool Fire	0	fraction	
Continuous with Rainout Short Duration BLEVE alone	0	fraction	
Continuous with Rainout Short Duration Flash Fire with Pool Fire	0	fraction	
Continuous with Rainout Short Duration Flash Fire Alone	0	fraction	
Continuous with Rainout Short Duration Explosion with Pool Fire	0	fraction	
Continuous with Rainout Short Duration Explosion Alone	0	fraction	
Continuous with Rainout Short Duration Pool Fire	0	fraction	
Continuous with Rainout Residual Pool Fire	0.15	fraction	
Continuous with Rainout Delayed Ignition Flash Fire	1	fraction	
Continuous with Rainout Delayed Ignition Explosion	0	fraction	
Instantaneous no Rainout Immediate Ignition	0.8	fraction	
Instantaneous no Rainout BLEVE	1	fraction	
Instantaneous no Rainout Immediate Flash Fire	0	fraction	
Instantaneous no Rainout Immediate Explosion	0	fraction	
Instantaneous no Rainout Delayed Ignition Flash Fire	0.95	fraction	
Instantaneous no Rainout Delayed Ignition Explosion	0.05	fraction	
Instantaneous with Rainout Immediate Ignition	0.8	fraction	
Instantaneous with Rainout BLEVE with Pool Fire	1	fraction	
Instantaneous with Rainout BLEVE Alone	0	fraction	
Instantaneous with Rainout Immediate Flash Fire with Pool Fire	0	fraction	
Instantaneous with Rainout Immediate Flash Fire Alone	0	fraction	
Instantaneous with Rainout Immediate Explosion with Pool Fire	0	fraction	
Instantaneous with Rainout Immediate Explosion Alone	0	fraction	
Instantaneous with Rainout Immediate Pool Fire Alone	0	fraction	
Instantaneous with Rainout Residual Pool Fire	0.15	fraction	
Instantaneous with Rainout Delayed Ignition Flash Fire	0.95	fraction	
Instantaneous with Rainout Delayed Ignition Explosion	0.05	fraction	
Immediate Ignition	0.1	fraction	
Explosion Given Ignition	0.5	fraction	
Long Duration Jet Fire	0.5	fraction	
Short Duration Any Ignition of Cloud	0.5	fraction	
Short Duration Ignition of Cloud with Pool Fire	0	fraction	

Parameter	Value	Unit	Remark
Long Duration Horizontal Jet Fire with Pool	0	fraction	
Long Duration Vertical Jet Fire with Pool	0	fraction	
Short Duration Fraction for Effects	0	fraction	
Short Duration BLEVE not Flash Fire	0.5	fraction	
General Risk Parameters			
Use Free Field Modeling			No
Distance to Site Boundary	0	m	
Include Effects of Late Pool Fire			No
Minimum Case Frequency	1E-12		
Minimum Event Probability	1E-12		
Fraction of Population Outdoors for Societal Risk	0.1	fraction	
Fraction of Population Outdoors for Individual Risk	1	fraction	
Maximum Number of Subsquares across Ellipse	10		
Maximum Number of Subdivisions per Square	5		
Factor for Toxic F-N Spread	2		
Set Calculation Grid Size			No
Grid Bounds Minimum X (input)	-1,000	m	
Grid Bounds Maximum X (input)	1,000	m	
Grid Bounds Minimum Y (input)	-1,000	m	
Grid Bounds Maximum Y (input)	1,000	m	
Grid calculation method			Number of cells
MPACT cell size	10	m	
Maximum number of MPACT cells	100,000		
Aversion Index	1.20		
Outdoor Population Omega Factor	0.000168		
Indoor Population Omega Factor	0.000168		
Number of wind subdivisions per sector	1.00		
Method for handling Indoor/Outdoor Risk			Indoor and outdoor risk calculations
Inter-ellipse interpolation method			Weighted
Heavy Explosion Damage Outdoors	1	fraction	
Heavy Explosion Damage Indoors	1	fraction	
Light Explosion Damage Outdoors	0	fraction	
Light Explosion Damage Indoors	0.025	fraction	
Flash Fire Outdoors	1	fraction	
Flash Fire Indoors	0.1	fraction	
Fireball Societal Radiation Criteria Zone Outdoors	1	fraction	
Fireball Societal Radiation Criteria Zone Indoors	1	fraction	
Fireball Individual Radiation Criteria Zone Outdoors	1	fraction	
Fireball Individual Radiation Criteria Zone Indoors	1	fraction	
Fireball Societal Flammable Probit Zone Outdoors	0.14	fraction	
Fireball Societal Flammable Probit Zone Indoors	0	fraction	
Fireball Individual Flammable Probit Zone Outdoors	1	fraction	
Fireball Individual Flammable Probit Zone Indoors	0	fraction	
Jet Fire Societal Radiation Criteria Zone Outdoors	1	fraction	
Jet Fire Societal Radiation Criteria Zone Indoors	1	fraction	
Jet Fire Individual Radiation Criteria Zone Outdoors	1	fraction	
Jet Fire Individual Radiation Criteria Zone Indoors	1	fraction	
Jet Fire Societal Flammable Probit Zone Outdoors	0.14	fraction	
Jet Fire Societal Flammable Probit Zone Indoors	0	fraction	
Jet Fire Individual Flammable Probit Zone Outdoors	1	fraction	
Jet Fire Individual Flammable Probit Zone Indoors	0	fraction	
Pool Fire Societal Radiation Criteria Zone Outdoors	1	fraction	
Pool Fire Societal Radiation Criteria Zone Indoors	1	fraction	

Parameter	Value	Unit	Remark
Pool Fire Individual Radiation Criteria Zone Outdoors	1	fraction	
Pool Fire Individual Radiation Criteria Zone Indoors	1	fraction	
Pool Fire Societal Flammable Probit Zone Outdoors	0.14	fraction	
Pool Fire Societal Flammable Probit Zone Indoors	0	fraction	
Pool Fire Individual Flammable Probit Zone Outdoors	1	fraction	
Pool Fire Individual Flammable Probit Zone Indoors	0	fraction	
Toxics Outdoors	1	fraction	
Toxics Indoors	1	fraction	
Plant Parameters			
Length of In-Unit Pipes	10	m	
Path Factor for Inter-Unit Pipes	1.414		
Maximum Spacing Between Failures	50	m	
Maximum Pipe Inventory as a Fraction of Upstream Inventory	0.25	fraction	
Size for Leak Cases (as fraction of Pipe Diameter)	0.1	fraction	
Minimum Detection Time	3,600	s	
Normal Gas Flow Velocity	20	m/s	
Normal Liquid Flow Velocity	1	m/s	
Probability of Non-Ignition	0.5	fraction	
Minimum Volume Changes per Step	0.15		
Maximum Volume Changes per Step	0.5		
Bend Frequency for In Unit Pipes	0.2	/m	
Coupling Frequency for In Unit Pipes	0.5	/m	
Junction Frequency for In Unit Pipes	0.1	/m	
Probability First Valve Fails to Close on Demand	0.01		
Minimum Event Frequency for Generated Models	6.496E-07	/AvgeYear	
Smallest Leak Detectable as Fraction of Normal Flowrate	0.1	fraction	
Time to Shut Non-Return Valves	5	s	
Time to Shut Excess Flow Valves	5	s	
Calculate Rupture Cases			Yes
Divide Base Failure Rate Equally Along Length of Pipe			Yes
Prevent Flashing in Pipes			Yes