

JET FIRE REPORT

Study Folder: RDS San Benedetto

Unique Audit Number: 3.197

PHAST 6.5



RDS San Benedetto

Study

4" 135 bar Horizontal

Base Case

Data



Weather: Study\Category 2/F

Speed: 2.00 m/s

Stability: F

\RDS San Benedetto\Study\4" 135 bar Horizontal

Flame Data

User-Defined Quantities

	SHELL - Johnson	
	METHANE	
Model Correlation Type		
Material		
Ambient Temperature	25,00	degC
Ambient Relative Humidity	0,75	fraction
Ambient Pressure	1,01	bar
Ambient Wind Speed	2,00	m/s
Maximum Exposure Duration	20,00	s
Elevation	1,00	m
Expanded Temperature	-96,48	degC
Release Rate	1,82	kg/s
Liquid Fraction		fraction
Jet Angle from Horizontal	0,00	deg
Crosswind Angle	0,00	deg

	Input	Output
Flame Emissive Power		163,80 kW/m2
Expanded Radius		0,03 m
Jet Velocity	500,00	m/s
Flame Length		16,03 m
Frustrum Lift Off Distance		4,61 m
Frustrum Length		11,52 m
Frustrum Base Width		0,75 m
Frustrum Tip Width		2,41 m
Flame Length in Still Air		19,73 m
Hole to Flame Angle		13,81 deg
Plane Angular Rotation		0,00 deg

Flame Co-ordinates

X	Z	R	Phi
m	m	m	deg
4,61	1,00	0,00	76,19
4,61	1,00	0,38	76,19
15,79	3,75	1,21	76,19
15,79	3,75	0,00	76,19

Radiation Intensity Ellipse

User-Defined Quantities

Observer Inclination	Variable	deg
Observer Orientation	Variable	deg
Exposure Duration	20,00	s

Calculated Quantities

Incident Radiation Level:	3,00	kW/m2
Lethality Level	0,00	%
View Factor	0,02	
Dose Level	865.118,83	(W/m2)^Probit N.s

Downwind semi-axis (A)	11,39	m
Crosswind semi-axis (B)	15,16	m
Offset Ratio (D)	1,18	
Effect Distance	24,79	m
Area	542,07	m2

Incident Radiation Level:	5,00	kW/m2
Lethality Level	0,00	%
View Factor	0,03	
Dose Level	1.709.490,54	(W/m2)^Probit N.s

Downwind semi-axis (A)	9,86	m
Crosswind semi-axis (B)	11,67	m
Offset Ratio (D)	1,27	
Effect Distance	22,34	m
Area	361,36	m2

Incident Radiation Level:	12,50	kW/m2
Lethality Level	6,53	%
View Factor	0,08	
Dose Level	5.800.161,90	(W/m2)^Probit N.s

Downwind semi-axis (A)	7,61	m
Crosswind semi-axis (B)	6,67	m
Offset Ratio (D)	1,47	
Effect Distance	18,76	m
Area	159,35	m2

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Radiation Distance

User-Defined Quantities

Maximum Distance	31,59	m
Angle from Wind Direction	0,00	deg
Height above Origin	0,00	m
Observer Inclination	Variable	deg
Observer Orientation	Variable	deg

Calculated Quantities

X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
0,00			0,99		
0,64			1,22		
1,29			1,76		
1,93			2,81		
2,58			4,81		
3,22			8,89		
3,87			17,56		
4,51			30,99		
5,16			45,38		
5,80			52,64		
6,45			53,16		
7,09			52,61		
7,74			51,89		
8,38			51,18		
9,03			50,51		
9,67			49,86		
10,32			49,23		
10,96			48,58		
11,60			47,87		
12,25			47,01		
12,89			45,89		
13,54			44,21		
14,18			41,70		
14,83			37,83		
15,47			32,29		
16,12			25,44		
16,76			19,60		
17,41			17,49		
18,05			15,01		
18,70			12,72		
19,34			10,69		
19,99			8,98		
20,63			7,58		
21,27			6,44		
21,92			5,51		
22,56			4,75		
23,21			4,12		

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X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
23,85			3,61		
24,50			3,17		
25,14			2,81		
25,79			2,50		
26,43			2,24		
27,08			2,01		
27,72			1,82		
28,37			1,65		
29,01			1,50		
29,66			1,37		
30,30			1,26		
30,95			1,16		
31,59			1,07		

 **Weather:** Study/Category 5/D
Speed: 5.00 **m/s** **Stability:** D

\RDS San Benedetto\Study\4" 135 bar Horizontal

Flame Data

User-Defined Quantities

Model Correlation Type	SHELL - Johnson	
Material	METHANE	
Ambient Temperature	25,00	degC
Ambient Relative Humidity	0,75	fraction
Ambient Pressure	1,01	bar
Ambient Wind Speed	5,00	m/s
Maximum Exposure Duration	20,00	s
Elevation	1,00	m
Expanded Temperature	-96,48	degC
Release Rate	1,82	kg/s
Liquid Fraction		fraction
Jet Angle from Horizontal	0,00	deg
Crosswind Angle	0,00	deg

	Input	Output
Flame Emissive Power		157,83 kW/m2
Expanded Radius		0,03 m
Jet Velocity	500,00	m/s
Flame Length		16,83 m
Frustrum Lift Off Distance		4,61 m
Frustrum Length		12,28 m
Frustrum Base Width		0,75 m
Frustrum Tip Width		2,19 m
Flame Length in Still Air		19,73 m
Hole to Flame Angle		10,59 deg
Plane Angular Rotation		0,00 deg

Flame Co-ordinates

X	Z	R	Phi
m	m	m	deg
4,61	1,00	0,00	79,41
4,61	1,00	0,38	79,41
16,68	3,26	1,10	79,41
16,68	3,26	0,00	79,41

Radiation Intensity Ellipse

User-Defined Quantities

Observer Inclination	Variable	deg
Observer Orientation	Variable	deg
Exposure Duration	20,00	s

Calculated Quantities

Incident Radiation Level:	3,00	kW/m2
Lethality Level	0,00	%
View Factor	0,02	
Dose Level	865.118,83	(W/m2)^Probit N.s
Downwind semi-axis (A)	11,36	m
Crosswind semi-axis (B)	14,86	m
Offset Ratio (D)	1,17	
Effect Distance	24,68	m
Area	530,10	m2
Incident Radiation Level:	5,00	kW/m2
Lethality Level	0,00	%
View Factor	0,03	
Dose Level	1.709.490,54	(W/m2)^Probit N.s
Downwind semi-axis (A)	9,96	m
Crosswind semi-axis (B)	11,35	m
Offset Ratio (D)	1,26	
Effect Distance	22,51	m
Area	354,94	m2
Incident Radiation Level:	12,50	kW/m2
Lethality Level	6,53	%
View Factor	0,08	
Dose Level	5.800.161,90	(W/m2)^Probit N.s
Downwind semi-axis (A)	7,91	m
Crosswind semi-axis (B)	6,35	m
Offset Ratio (D)	1,45	
Effect Distance	19,38	m
Area	157,80	m2

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Radiation Distance

User-Defined Quantities

Maximum Distance	33,36	m
Angle from Wind Direction	0,00	deg
Height above Origin	0,00	m
Observer Inclination	Variable	deg
Observer Orientation	Variable	deg

Calculated Quantities

X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
0,00			0,90		
0,68			1,30		
1,36			1,97		
2,04			3,18		
2,72			5,55		
3,40			10,61		
4,08			21,50		
4,77			31,30		
5,45			50,31		
6,13			52,99		
6,81			52,95		
7,49			52,48		
8,17			51,93		
8,85			51,40		
9,53			50,89		
10,21			50,40		
10,89			49,92		
11,57			49,43		
12,25			48,88		
12,93			48,22		
13,62			47,30		
14,30			45,89		
14,98			43,50		
15,66			39,35		
16,34			32,72		
17,02			23,91		
17,70			19,40		
18,38			16,81		
19,06			13,78		
19,74			11,15		
20,42			9,03		
21,10			7,37		
21,78			6,08		
22,46			5,06		
23,15			4,26		
23,83			3,62		
24,51			3,11		

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X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
25,19			2,69		
25,87			2,35		
26,55			2,07		
27,23			1,83		
27,91			1,63		
28,59			1,46		
29,27			1,31		
29,95			1,19		
30,63			1,08		
31,31			0,98		
32,00			0,90		
32,68			0,82		
33,36			0,76		

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Study

4" 135 bar Horizontal

Base Case

CASE Name:	Data	User-Defined Data
Material		
Material Identifier		METHANE
Type of Vessel		Pressurized Gas
Pressure Specification		Pressure specified
Discharge Pressure (gauge)		135 bar
Discharge Temperature		25 degC
Mass Inventory of material to discharge		2000 kg
Scenario		
Type of Event		Leak
Phase		Vapor
HoleDiameter		10 mm
Building Wake Option		None
Location		
[Elevation		1 m]
Dispersion Concentration of Interest		1E4 ppm
Averaging time associated with Concentration		Flammable
Distances of Interest(1)		1 m
Distances of Interest(2)		5 m
Distances of Interest(3)		10 m
ERPG selection		ERPG is not set
IDLH selection		IDLH is not set
STEL selection		STEL is not set
User Defined Averaging		No user defined averaging time supplied
Bund		
Status of Bund		No bund present
[Type of Bund Surface		Concrete]
[Bund Height		0 m]
[Bund Failure Modeling		Bund cannot fail]
Indoor/Outdoor		
Outdoor Release Direction		Horizontal
Flammable		
Jet Fire Method		Shell
Dispersion		
Ignition Location		No ignition location
Mass Inventory of material to Disperse		2000 kg
Fireball Parameters		
[Mass Modification Factor		3]
[Calculation method for fireball		DNV Recommended]
[Temperature of fireball		1727 degC]
Jet Fire Parameters		
Jet fire radiation intensity level 1		3 kW/m2

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Jet fire radiation intensity level 2	5 kW/m ²
Jet fire radiation intensity level 3	12,5 kW/m ²

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Discharge Data

User-Defined Quantities

Material	METHANE
Temperature	25,00 degC
Pressure	136,01 bar
Inventory	2.000,00 kg
Scenario	Leak
Fixed Duration	n/a s

Calculated Quantities

Weather: Study\Category 2/F

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
Final Temperature	-96,48 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	1.81815E+000 kg/s
Release Duration	1.100,02 s
Orifice Velocity	393,38 m/s
Exit Pressure	69,45 bar
Exit Temperature	-22,76 degC
Discharge Coefficient	0,86
Expanded Radius	0,03 m

Weather: Study\Category 5/D

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
Final Temperature	-96,48 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	1.81815E+000 kg/s
Release Duration	1.100,02 s
Orifice Velocity	393,38 m/s
Exit Pressure	69,45 bar
Exit Temperature	-22,76 degC
Discharge Coefficient	0,86
Expanded Radius	0,03 m

Consequence Results

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Distance to Concentration Results

The height for user defined concentrations is the user defined height 0 m

All toxic results are reported at the toxic effect height 0 m

All flammable results are reported at the cloud centreline height

Concentration(ppm) Averaging Time			Distance (m)	
			Category 2/F	Category 5/D
User Conc (10000)	18,75	s	115,29	67,2415
UFL (165000)	18,75	s	2,96524	2,69865
LFL (44000)	18,75	s	11,0954	8,80472
LFL Frac (22000)	18,75	s	33,8079	22,4676

Concentration(ppm) Averaging Time			Heights (m) for above distances	
			Category 2/F	Category 5/D
User Conc (10000)	18,75	s	0	0
UFL (165000)	18,75	s	1,00022	1,00014
LFL (44000)	18,75	s	1,00575	1,00283
LFL Frac (22000)	18,75	s	0,982425	1,00353

Concentration At Distance Results

The height for user defined concentrations is the user defined height 0 m

All toxic results are reported at the toxic effect height 0 m

All flammable results are reported at the cloud centreline height

Distance			Conc.(ppm) at Flammable Avg.Time of 18,75 s	
			Category 2/F	Category 5/D
1	m		376631	371679
5	m		98541,9	87362,1
10	m		48123,5	39109,8

Distance			Heights (m) for above concentrations	
			Category 2/F	Category 5/D
1	m		1,00001	1,00001
5	m		1,00078	1,00074
10	m		1,00453	1,00359

Distance			Conc.(ppm) at Core Avg.Time of 18,75 s	
			Category 2/F	Category 5/D
1	m		0	1,53848e-018
5	m		1360,79	5889,21
10	m		26308,5	24048,3

Distance			Heights (m) for above concentrations	
			Category 2/F	Category 5/D
1	m		0	0
5	m		0	0
10	m		0	0

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Jet Fire Hazard

Jet fire method used: SHELL - Johnson

Jet Fire Status	Category 2/F	Category 5/D
Flame Direction	Hazard	Hazard
	Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

This table gives the distances to the specified radiation levels for each jet fire listed in the above hazard table

			Category 2/F	Category 5/D
Radiation Level	3	kW/m ²	24,7877	24,6763
Radiation Level	5	kW/m ²	22,3393	22,5139
Radiation Level	12,5	kW/m ²	18,7623	19,3758

Radiation Effects: Jet Fire Distance

			Category 2/F	Radiation Level (kW/m ²) Category 5/D
Distance Of Interest 1	m		1,46485	1,5698
Distance Of Interest 5	m		40,3728	41,0671
Distance Of Interest 10	m		49,5402	51,2041

Flash Fire Envelope

All flammable results are reported at the cloud centreline height

			Category 2/F	Category 5/D
Furthest Extent	22000	ppm	33,8079	22,4676
Furthest Extent	44000	ppm	11,0954	8,80472

			Category 2/F	Category 5/D
Furthest Extent	22000	ppm	0,982425	1,00353
Furthest Extent	44000	ppm	1,00575	1,00283

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Explosion Effects: Late Ignition

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Front (LFL Fraction)

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Category 2/F	Category 5/D
Overpressure	0,02068	bar	51,5776	38,7373
Overpressure	0,1379	bar	35,587	24,8515
Overpressure	0,2068	bar	34,3231	23,754

			Supplementary Data at 0,02068 bar	
			Category 2/F	Category 5/D
Supplied Flammable Mass		kg	0,257796	0,168806
Used Flammable Mass		kg	0,257796	0,168806
Overpressure Radius		m	21,5776	18,7373
Distance to:				
- Ignition Source		m	30	20
- Cloud Front/Centre		m	30	20
- Explosion Centre		m	30	20

			Supplementary Data at 0,1379 bar	
			Category 2/F	Category 5/D
Supplied Flammable Mass		kg	0,257796	0,168806
Used Flammable Mass		kg	0,257796	0,168806
Overpressure Radius		m	5,58697	4,85154
Distance to:				
- Ignition Source		m	30	20
- Cloud Front/Centre		m	30	20
- Explosion Centre		m	30	20

			Supplementary Data at 0,2068 bar	
			Category 2/F	Category 5/D
Supplied Flammable Mass		kg	0,257796	0,168806
Used Flammable Mass		kg	0,257796	0,168806
Overpressure Radius		m	4,32307	3,75401
Distance to:				
- Ignition Source		m	30	20
- Cloud Front/Centre		m	30	20
- Explosion Centre		m	30	20

			Overpressures (bar gauge) at Distances	
			Category 2/F	Category 5/D
Distance	1	m	0,0660915	0,0551525
Distance	5	m	0,160441	0,131727
Distance	10	m	1	1

			Supplementary Data at 1 m	
			Category 2/F	Category 5/D
Supplied Flammable Mass		kg	0,246784	0,168806
Used Flammable Mass		kg	0,246784	0,168806

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		Supplementary Data at 5 m	
		Category 2/F	Category 5/D
Supplied Flammable Mass	kg	0,246784	0,168806
Used Flammable Mass	kg	0,246784	0,168806

		Supplementary Data at 10 m	
		Category 2/F	Category 5/D
Supplied Flammable Mass	kg	0,246784	0,168806
Used Flammable Mass	kg	0,246784	0,168806

Weather Conditions

		Category 2/F	Category 5/D
Wind Speed	m/s	2	5
Pasquill Stability		F	D
Surface Roughness Length		183,156	183,156
Surface Roughness Parameter		0,0999999	0,0999999
Atmospheric Temperature	degC	25	25
Surface Temperature	degC	25	25
Relative Humidity	fraction	0,75	0,75

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Study

4" 135 bar Vertical

Base Case

Data



Weather: Study\Category 2/F

Speed: 2,00 m/s

Stability: F

\RDS San Benedetto\Study\4" 135 bar Vertical

Flame Data

User-Defined Quantities

Model Correlation Type	SHELL - DNV recommended	
Material	METHANE	
Ambient Temperature	25,00	degC
Ambient Relative Humidity	0,75	fraction
Ambient Pressure	1,01	bar
Ambient Wind Speed	2,00	m/s
Maximum Exposure Duration	20,00	s
Elevation	1,00	m
Expanded Temperature	-96,48	degC
Release Rate	1,82	kg/s
Liquid Fraction		fraction
Jet Angle from Horizontal	90,00	deg
Crosswind Angle	0,00	deg

	Input	Output
Flame Emissive Power		135,58 kW/m2
Expanded Radius		0,03 m
Jet Velocity	500,00	m/s
Flame Length		14,19 m
Frustrum Lift Off Distance		2,64 m
Frustrum Length		11,57 m
Frustrum Base Width		0,85 m
Frustrum Tip Width		3,99 m
Flame Length in Still Air		19,73 m
Hole to Flame Angle		7,54 deg
Plane Angular Rotation		0,00 deg

Flame Co-ordinates

X	Z	R	Phi
m	m	m	deg
0,00	3,64	0,00	7,54
0,00	3,64	0,43	7,54
1,52	15,11	1,99	7,54
1,52	15,11	0,00	7,54

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Radiation Intensity Ellipse

User-Defined Quantities

Observer Inclination	Variable	deg
Observer Orientation	Variable	deg
Exposure Duration	20,00	s

Calculated Quantities

Incident Radiation Level:	3,00	kW/m2
Lethality Level	0,00	%
View Factor	0,02	
Dose Level	865.118,83	(W/m2)^Probit N.s

Downwind semi-axis (A)	12,74	m
Crosswind semi-axis (B)	12,87	m
Offset Ratio (D)	0,12	
Effect Distance	14,21	m
Area	515,19	m2

Incident Radiation Level:	5,00	kW/m2
Lethality Level	0,00	%
View Factor	0,04	
Dose Level	1.709.490,54	(W/m2)^Probit N.s

Downwind semi-axis (A)	Not Reached	m
Crosswind semi-axis (B)	Not Reached	m
Offset Ratio (D)	Not Reached	
Effect Distance		m
Area	n/a	m2

Incident Radiation Level:	12,50	kW/m2
Lethality Level	6,53	%
View Factor	0,09	
Dose Level	5.800.161,90	(W/m2)^Probit N.s

Downwind semi-axis (A)	Not Reached	m
Crosswind semi-axis (B)	Not Reached	m
Offset Ratio (D)	Not Reached	
Effect Distance	n/a	m
Area	n/a	m2

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Radiation Distance

User-Defined Quantities

Maximum Distance	14,21	m
Angle from Wind Direction	0,00	deg
Height above Origin	0,00	m
Observer Inclination	Variable	deg
Observer Orientation	Variable	deg

Calculated Quantities

X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
0,00			2,73		
0,29			3,26		
0,58			3,75		
0,87			4,20		
1,16			4,60		
1,45			4,94		
1,74			5,22		
2,03			5,45		
2,32			5,62		
2,61			5,74		
2,90			5,79		
3,19			5,88		
3,48			5,90		
3,77			5,90		
4,06			5,87		
4,35			5,83		
4,64			5,78		
4,93			5,72		
5,22			5,64		
5,51			5,57		
5,80			5,48		
6,09			5,39		
6,38			5,30		
6,67			5,21		
6,96			5,12		
7,25			5,02		
7,54			4,93		
7,83			4,83		
8,12			4,74		
8,41			4,64		
8,70			4,55		
8,99			4,45		
9,28			4,36		
9,57			4,27		
9,86			4,18		
10,15			4,09		
10,44			4,00		

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X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
10,73			3,92		
11,02			3,83		
11,31			3,75		
11,60			3,66		
11,89			3,58		
12,18			3,50		
12,47			3,42		
12,76			3,35		
13,05			3,27		
13,34			3,20		
13,63			3,13		
13,92			3,06		
14,21			3,00		

 **Weather:** Study/Category 5/D
Speed: 5.00 **m/s** **Stability:** D

\RDS San Benedetto\Study\4" 135 bar Vertical

Flame Data

User-Defined Quantities

Model Correlation Type	SHELL - DNV recommended	
Material	METHANE	
Ambient Temperature	25,00	degC
Ambient Relative Humidity	0,75	fraction
Ambient Pressure	1,01	bar
Ambient Wind Speed	5,00	m/s
Maximum Exposure Duration	20,00	s
Elevation	1,00	m
Expanded Temperature	-96,48	degC
Release Rate	1,82	kg/s
Liquid Fraction		fraction
Jet Angle from Horizontal	90,00	deg
Crosswind Angle	0,00	deg

	Input	Output
Flame Emissive Power		190,72 kW/m2
Expanded Radius		0,03 m
Jet Velocity	500,00	m/s
Flame Length		11,03 m
Frustrum Lift Off Distance		1,87 m
Frustrum Length		9,25 m
Frustrum Base Width		0,87 m
Frustrum Tip Width		3,41 m
Flame Length in Still Air		19,73 m
Hole to Flame Angle		18,85 deg
Plane Angular Rotation		0,00 deg



Flame Co-ordinates

X	Z	R	Phi
m	m	m	deg
0,00	2,87	0,00	18,85
0,00	2,87	0,43	18,85
2,99	11,62	1,70	18,85
2,99	11,62	0,00	18,85

Radiation Intensity Ellipse

User-Defined Quantities

Observer Inclination	Variable	deg
Observer Orientation	Variable	deg
Exposure Duration	20,00	s

Calculated Quantities

Incident Radiation Level:	3,00	kW/m2
Lethality Level	0,00	%
View Factor	0,02	
Dose Level	865.118,83	(W/m2)^Probit N.s
Downwind semi-axis (A)	15,17	m
Crosswind semi-axis (B)	15,54	m
Offset Ratio (D)	0,19	
Effect Distance	17,99	m
Area	740,37	m2
Incident Radiation Level:	5,00	kW/m2
Lethality Level	0,00	%
View Factor	0,03	
Dose Level	1.709.490,54	(W/m2)^Probit N.s
Downwind semi-axis (A)	10,04	m
Crosswind semi-axis (B)	10,33	m
Offset Ratio (D)	0,31	
Effect Distance	13,20	m
Area	325,87	m2
Incident Radiation Level:	12,50	kW/m2
Lethality Level	6,53	%
View Factor	0,07	
Dose Level	5.800.161,90	(W/m2)^Probit N.s
Downwind semi-axis (A)	Not Reached	m
Crosswind semi-axis (B)	Not Reached	m
Offset Ratio (D)	Not Reached	
Effect Distance	n/a	m
Area	n/a	m2

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Radiation Distance

User-Defined Quantities

Maximum Distance	17,99	m
Angle from Wind Direction	0,00	deg
Height above Origin	0,00	m
Observer Inclination	Variable	deg
Observer Orientation	Variable	deg

Calculated Quantities

X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
0,00			7,29		
0,37			8,65		
0,73			9,80		
1,10			10,68		
1,47			11,28		
1,84			11,64		
2,20			11,66		
2,57			11,81		
2,94			11,70		
3,30			11,52		
3,67			11,28		
4,04			11,02		
4,40			10,74		
4,77			10,45		
5,14			10,15		
5,51			9,84		
5,87			9,56		
6,24			9,39		
6,61			9,20		
6,97			9,01		
7,34			8,79		
7,71			8,55		
8,08			8,31		
8,44			8,05		
8,81			7,80		
9,18			7,55		
9,54			7,29		
9,91			7,04		
10,28			6,79		
10,65			6,55		
11,01			6,31		
11,38			6,07		
11,75			5,84		
12,11			5,62		
12,48			5,40		
12,85			5,19		
13,21			4,99		

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X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
13,58			4,80		
13,95			4,61		
14,32			4,43		
14,68			4,26		
15,05			4,09		
15,42			3,93		
15,78			3,78		
16,15			3,64		
16,52			3,50		
16,89			3,36		
17,25			3,24		
17,62			3,12		
17,99			3,00		

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RDS San Benedetto

Study

4" 135 bar Vertical

Base Case

CASE Name:	Data	User-Defined Data
Material		
Material Identifier		METHANE
Type of Vessel		Pressurized Gas
Pressure Specification		Pressure specified
Discharge Pressure (gauge)		135 bar
Discharge Temperature		25 degC
Mass Inventory of material to discharge		2000 kg
Scenario		
Type of Event		Leak
Phase		Vapor
HoleDiameter		10 mm
Building Wake Option		None
Location		
[Elevation		1 m]
Dispersion Concentration of Interest		1E4 ppm
Averaging time associated with Concentration		Flammable
Distances of Interest(1)		1 m
Distances of Interest(2)		5 m
Distances of Interest(3)		10 m
ERPG selection		ERPG is not set
IDLH selection		IDLH is not set
STEL selection		STEL is not set
User Defined Averaging		No user defined averaging time supplied
Bund		
Status of Bund		No bund present
[Type of Bund Surface		Concrete]
[Bund Height		0 m]
[Bund Failure Modeling		Bund cannot fail]
Indoor/Outdoor		
Outdoor Release Direction		Vertical
Flammable		
Jet Fire Method		Shell
Dispersion		
Ignition Location		No ignition location
Mass Inventory of material to Disperse		2000 kg
Fireball Parameters		
[Mass Modification Factor		3]
[Calculation method for fireball		DNV Recommended]
[Temperature of fireball		1727 degC]
Jet Fire Parameters		
Jet fire radiation intensity level 1		3 kW/m2

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Jet fire radiation intensity level 2	5 kW/m ²
Jet fire radiation intensity level 3	12,5 kW/m ²

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Discharge Data

User-Defined Quantities

Material	METHANE
Temperature	25,00 degC
Pressure	136,01 bar
Inventory	2.000,00 kg
Scenario	Leak
Fixed Duration	n/a s

Calculated Quantities

Weather: Study\Category 2/F

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
Final Temperature	-96,48 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	1.81815E+000 kg/s
Release Duration	1.100,02 s
Orifice Velocity	393,38 m/s
Exit Pressure	69,45 bar
Exit Temperature	-22,76 degC
Discharge Coefficient	0,86
Expanded Radius	0,03 m

Weather: Study\Category 5/D

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
Final Temperature	-96,48 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	1.81815E+000 kg/s
Release Duration	1.100,02 s
Orifice Velocity	393,38 m/s
Exit Pressure	69,45 bar
Exit Temperature	-22,76 degC
Discharge Coefficient	0,86
Expanded Radius	0,03 m

Consequence Results

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Distance to Concentration Results

The height for user defined concentrations is the user defined height 0 m
All toxic results are reported at the toxic effect height 0 m
All flammable results are reported at the cloud centreline height

Concentration(ppm)	Averaging Time		Distance (m)	
			Category 2/F	Category 5/D
User Conc (10000)	18,75	s	No Hazard	No Hazard
UFL (165000)	18,75	s	0,0235247	0,0714214
LFL (44000)	18,75	s	0,520024	0,810775
LFL Frac (22000)	18,75	s	1,67217	1,93584

Concentration(ppm)	Averaging Time		Heights (m) for above distances	
			Category 2/F	Category 5/D
User Conc (10000)	18,75	s	0	0
UFL (165000)	18,75	s	3,71377	3,3038
LFL (44000)	18,75	s	10,1357	6,88318
LFL Frac (22000)	18,75	s	14,1667	8,94033

Concentration At Distance Results

The height for user defined concentrations is the user defined height 0 m
All toxic results are reported at the toxic effect height 0 m
All flammable results are reported at the cloud centreline height

Distance		Conc.(ppm) at Flammable Avg.Time of 18,75 s	
		Category 2/F	Category 5/D
1	m	29264,5	38517,1
5	m	9414,91	9925,13
10	m	5324,72	5574,22

Distance		Heights (m) for above concentrations	
		Category 2/F	Category 5/D
1	m	12,2504	7,32963
5	m	19,0676	11,438
10	m	22,445	13,2846

Distance		Conc.(ppm) at Core Avg.Time of 18,75 s	
		Category 2/F	Category 5/D
1	m	<Min. Conc.	<Min. Conc.
5	m	<Min. Conc.	<Min. Conc.
10	m	<Min. Conc.	<Min. Conc.

Distance		Heights (m) for above concentrations	
		Category 2/F	Category 5/D
1	m	0	0
5	m	0	0
10	m	0	0

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Jet Fire Hazard

Jet fire method used: SHELL - DNV recommended

Jet Fire Status	Category 2/F	Category 5/D
Flame Direction	Hazard	Hazard
	Vertical	Vertical

Radiation Effects: Jet Fire Ellipse

This table gives the distances to the specified radiation levels for each jet fire listed in the above hazard table

			Category 2/F	Category 5/D
Radiation Level	3	kW/m ²	14,212	17,9865
Radiation Level	5	kW/m ²	5	13,1996
Radiation Level	12,5	kW/m ²	Not Reached	Not Reached

Radiation Effects: Jet Fire Distance

			Category 2/F	Radiation Level (kW/m ²) Category 5/D
Distance Of Interest 1	m		4,38753	10,4678
Distance Of Interest 5	m		5,69898	10,2594
Distance Of Interest 10	m		4,13892	6,98091

Flash Fire Envelope

All flammable results are reported at the cloud centreline height

			Category 2/F	Category 5/D
Furthest Extent	22000	ppm	1,67217	1,93584
Furthest Extent	44000	ppm	0,520024	0,810775

			Category 2/F	Category 5/D
Furthest Extent	22000	ppm	14,1667	8,94033
Furthest Extent	44000	ppm	10,1357	6,88318

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Weather Conditions

		Category 2/F	Category 5/D
Wind Speed	m/s	2	5
Pasquill Stability		F	D
Surface Roughness Length		183,156	183,156
Surface Roughness Parameter		0,0999999	0,0999999
Atmospheric Temperature	degC	25	25
Surface Temperature	degC	25	25
Relative Humidity	fraction	0,75	0,75