

# JET FIRE REPORT

Study Folder: RDS San Benedetto

Unique Audit Number: 3.469

PHAST 6.5



RDS San Benedetto

Study

6" 90 bar Horizontal

Base Case

Data



Weather: Study\Category 2/F

Speed: 2,00 m/s

Stability: F

\RDS San Benedetto\Study\6" 90 bar Horizontal

## Flame Data

### User-Defined Quantities

Model Correlation Type	<b>SHELL - Johnson</b>	
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	167,39	degC
Release Rate	1,67	kg/s
Liquid Fraction		fraction
Jet Angle from Horizontal	0,00	deg
Crosswind Angle	0,00	deg

	Input	Output
Flame Emissive Power		159,51 kW/m2
Expanded Radius		0,05 m
Jet Velocity	500,00	m/s
Flame Length		15,43 m
Frustrum Lift Off Distance		4,41 m
Frustrum Length		11,11 m
Frustrum Base Width		0,71 m
Frustrum Tip Width		2,30 m
Flame Length in Still Air		18,98 m
Hole to Flame Angle		13,56 deg
Plane Angular Rotation		0,00 deg

### Flame Co-ordinates

X	Z	R	Phi
m	m	m	deg
4,41	1,00	0,00	76,44
4,41	1,00	0,35	76,44
15,21	3,60	1,15	76,44
15,21	3,60	0,00	76,44

**Radiation Intensity Ellipse**

**User-Defined Quantities**

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

**Calculated Quantities**

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

Downwind semi-axis (A)	10,85	m
Crosswind semi-axis (B)	14,33	m
Offset Ratio (D)	1,18	
Effect Distance	23,65	m
Area	488,46	m2

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

Downwind semi-axis (A)	9,40	m
Crosswind semi-axis (B)	11,01	m
Offset Ratio (D)	1,27	
Effect Distance	21,34	m
Area	325,19	m2

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

Downwind semi-axis (A)	7,24	m
Crosswind semi-axis (B)	6,24	m
Offset Ratio (D)	1,48	
Effect Distance	17,93	m
Area	141,93	m2



**Radiation Distance**

**User-Defined Quantities**

Maximum Distance	30,42	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			0,88		
0,62			1,15		
1,24			1,74		
1,86			2,78		
2,48			4,74		
3,10			8,71		
3,72			16,93		
4,35			28,65		
4,97			41,84		
5,59			48,72		
6,21			49,50		
6,83			49,29		
7,45			48,86		
8,07			48,38		
8,69			47,90		
9,31			47,43		
9,93			46,94		
10,55			46,42		
11,17			45,82		
11,80			45,06		
12,42			44,01		
13,04			42,46		
13,66			40,07		
14,28			36,34		
14,90			31,00		
15,52			24,40		
16,14			18,91		
16,76			16,85		
17,38			14,45		
18,00			12,24		
18,62			10,27		
19,25			8,63		
19,87			7,28		
20,49			6,18		
21,11			5,29		
21,73			4,55		
22,35			3,95		

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X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
22,97			3,45		
23,59			3,04		
24,21			2,69		
24,83			2,39		
25,45			2,14		
26,07			1,92		
26,69			1,74		
27,32			1,58		
27,94			1,44		
28,56			1,31		
29,18			1,20		
29,80			1,11		
30,42			1,02		



**Weather:** Study/Category 5/D

**Speed:** 5.00 m/s

**Stability:** D

\RDS San Benedetto\Study\6" 90 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	167,39	degC
Release Rate	1,67	kg/s
Liquid Fraction		fraction
Jet Angle from Horizontal	0,00	deg
Crosswind Angle	0,00	deg

	Input	Output
Flame Emissive Power		153,82 kW/m2
Expanded Radius		0,05 m
Jet Velocity	500,00	m/s
Flame Length		16,18 m
Frustrum Lift Off Distance		4,41 m
Frustrum Length		11,82 m
Frustrum Base Width		0,71 m
Frustrum Tip Width		2,08 m
Flame Length in Still Air		18,98 m
Hole to Flame Angle		10,43 deg
Plane Angular Rotation		0,00 deg

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## Flame Co-ordinates

X	Z	R	Phi
m	m	m	deg
4,41	1,00	0,00	79,57
4,41	1,00	0,35	79,57
16,04	3,14	1,04	79,57
16,04	3,14	0,00	79,57

## Radiation Intensity Ellipse

### User-Defined Quantities

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

### Calculated Quantities

<b>Incident Radiation Level:</b>	<b>3,00</b>	kW/m2
Lethality Level	0,00	%
View Factor	0,02	
Dose Level	865.118,83	(W/m2)^Probit N.s
Downwind semi-axis (A)	10,81	m
Crosswind semi-axis (B)	14,01	m
Offset Ratio (D)	1,18	
Effect Distance	23,54	m
Area	476,07	m2
<b>Incident Radiation Level:</b>	<b>5,00</b>	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)	9,48	m
Crosswind semi-axis (B)	10,68	m
Offset Ratio (D)	1,27	
Effect Distance	21,49	m
Area	318,23	m2
<b>Incident Radiation Level:</b>	<b>12,50</b>	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)	7,52	m
Crosswind semi-axis (B)	5,92	m
Offset Ratio (D)	1,46	
Effect Distance	18,50	m
Area	139,99	m2

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## Radiation Distance

### User-Defined Quantities

Maximum Distance	32,07	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			0,88		
0,65			1,28		
1,31			1,95		
1,96			3,13		
2,62			5,42		
3,27			10,28		
3,93			20,35		
4,58			29,13		
5,24			46,09		
5,89			48,99		
6,55			49,28		
7,20			49,07		
7,85			48,78		
8,51			48,42		
9,16			48,08		
9,82			47,74		
10,47			47,39		
11,13			47,01		
11,78			46,56		
12,44			45,99		
13,09			45,16		
13,75			43,84		
14,40			41,56		
15,05			37,59		
15,71			31,24		
16,36			22,85		
17,02			18,62		
17,67			16,12		
18,33			13,21		
18,98			10,70		
19,64			8,67		
20,29			7,07		
20,95			5,83		
21,60			4,85		
22,25			4,09		
22,91			3,47		
23,56			2,98		

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X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
24,22			2,58		
24,87			2,25		
25,53			1,98		
26,18			1,75		
26,84			1,56		
27,49			1,40		
28,15			1,26		
28,80			1,13		
29,45			1,03		
30,11			0,94		
30,76			0,86		
31,42			0,79		
32,07			0,73		

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## RDS San Benedetto

### Study

#### 6" 90 bar Horizontal

##### Base Case

CASE Name:	Data	User-Defined Data
<b>Material</b>		
Material Identifier		METHANE
Type of Vessel		Pressurized Gas
Pressure Specification		Pressure specified
Discharge Pressure (gauge)		90 bar
Discharge Temperature		230 degC
Mass Inventory of material to discharge		2000 kg
<b>Scenario</b>		
Type of Event		Leak
Phase		Vapor
HoleDiameter		15 mm
Building Wake Option		None
<b>Location</b>		
[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
<b>Bund</b>		
Status of Bund		No bund present
[Type of Bund Surface		Concrete]
[Bund Height		0 m]
[Bund Failure Modeling		Bund cannot fail]
<b>Indoor/Outdoor</b>		
Outdoor Release Direction		Horizontal
<b>Flammable</b>		
Jet Fire Method		Shell
<b>Dispersion</b>		
Ignition Location		No ignition location
Mass Inventory of material to Disperse		2000 kg
<b>Fireball Parameters</b>		
[Mass Modification Factor		3]
[Calculation method for fireball		DNV Recommended]
[Temperature of fireball		1727 degC]
<b>Jet Fire Parameters</b>		
Jet fire radiation intensity level 1		3 kW/m2



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

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## Discharge Data

### User-Defined Quantities

Material	METHANE
Temperature	230,00 degC
Pressure	91,01 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	167,39 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

#### Continuous Release Data:

Mass Flowrate	1.66677E+000 kg/s
Release Duration	1.199,92 s
Orifice Velocity	500,00 m/s
Exit Pressure	50,03 bar
Exit Temperature	175,19 degC
Discharge Coefficient	0,87
Expanded Radius	0,05 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	167,39 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

#### Continuous Release Data:

Mass Flowrate	1.66677E+000 kg/s
Release Duration	1.199,92 s
Orifice Velocity	500,00 m/s
Exit Pressure	50,03 bar
Exit Temperature	175,19 degC
Discharge Coefficient	0,87
Expanded Radius	0,05 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		Category 2/F	Category 5/D
User Conc (10000)	18,75	s	28,9164	30,6065
UFL (165000)	18,75	s	2,43661	2,29893
LFL (44000)	18,75	s	9,80823	7,75154
LFL Frac (22000)	18,75	s	23,953	18,1965

Concentration(ppm)	Averaging Time		Category 2/F	Category 5/D
User Conc (10000)	18,75	s	0	0
UFL (165000)	18,75	s	1,00106	1,00091
LFL (44000)	18,75	s	1,04924	1,02282
LFL Frac (22000)	18,75	s	2,31213	1,29649

## 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	303162		297179
5	m	87684,6		73682,6
10	m	43232,8		35035,2

Distance		Category 2/F	Category 5/D
1	m	1,00009	1,00009
5	m	1,00798	1,00682
10	m	1,05208	1,04814

Distance		Conc.(ppm) at Core Avg.Time of 18,75 s	Category 2/F	Category 5/D
1	m	1,52618e-025		2,93328e-008
5	m	4461,34		10281,5
10	m	25931,4		22565,3

Distance		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 <sup>2</sup>	23,6533	23,5377
Radiation Level	5	kW/m <sup>2</sup>	21,3375	21,4936
Radiation Level	12,5	kW/m <sup>2</sup>	17,9276	18,5011

## Radiation Effects: Jet Fire Distance

			Category 2/F	Radiation Level (kW/m <sup>2</sup> ) Category 5/D
Distance Of Interest 1	m		1,47063	1,58724
Distance Of Interest 5	m		26,1157	43,0131
Distance Of Interest 10	m		46,8878	47,645

## Flash Fire Envelope

All flammable results are reported at the cloud centreline height

			Category 2/F	Category 5/D
Furthest Extent	22000	ppm	23,953	18,1965
Furthest Extent	44000	ppm	9,80823	7,75154

			Category 2/F	Category 5/D
Furthest Extent	22000	ppm	2,31213	1,29649
Furthest Extent	44000	ppm	1,04924	1,02282

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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	40,3803	27,7444
Overpressure	0,1379	bar	25,277	14,5945
Overpressure	0,2068	bar	24,0832	13,5551

			Supplementary Data at 0,02068 bar	
			Category 2/F	Category 5/D
Supplied Flammable Mass		kg	0,217221	0,143367
Used Flammable Mass		kg	0,217221	0,143367
Overpressure Radius		m	20,3803	17,7444
Distance to:				
- Ignition Source		m	20	10
- Cloud Front/Centre		m	20	10
- Explosion Centre		m	20	10

			Supplementary Data at 0,1379 bar	
			Category 2/F	Category 5/D
Supplied Flammable Mass		kg	0,217221	0,143367
Used Flammable Mass		kg	0,217221	0,143367
Overpressure Radius		m	5,27698	4,59446
Distance to:				
- Ignition Source		m	20	10
- Cloud Front/Centre		m	20	10
- Explosion Centre		m	20	10

			Supplementary Data at 0,2068 bar	
			Category 2/F	Category 5/D
Supplied Flammable Mass		kg	0,217221	0,143367
Used Flammable Mass		kg	0,217221	0,143367
Overpressure Radius		m	4,08321	3,55509
Distance to:				
- Ignition Source		m	20	10
- Cloud Front/Centre		m	20	10
- Explosion Centre		m	20	10

			Overpressures (bar gauge) at Distances	
			Category 2/F	Category 5/D
Distance	1	m	0,0621348	0,0510781
Distance	5	m	0,150007	0,121146
Distance	10	m	1	1

			Supplementary Data at 1 m	
			Category 2/F	Category 5/D
Supplied Flammable Mass		kg	0,216971	0,143367
Used Flammable Mass		kg	0,216971	0,143367

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		Supplementary Data at 5 m	
		Category 2/F	Category 5/D
Supplied Flammable Mass	kg	0,216971	0,143367
Used Flammable Mass	kg	0,216971	0,143367

		Supplementary Data at 10 m	
		Category 2/F	Category 5/D
Supplied Flammable Mass	kg	0,216971	0,143367
Used Flammable Mass	kg	0,216971	0,143367

## 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

6" 90 bar Vertical

Base Case

Data



Weather: Study\Category 2/F

Speed: 2,00 m/s

Stability: F

\RDS San Benedetto\Study\6" 90 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	167,39	degC
Release Rate	1,67	kg/s
Liquid Fraction		fraction
Jet Angle from Horizontal	90,00	deg
Crosswind Angle	0,00	deg

	Input	Output
Flame Emissive Power		134,36 kW/m2
Expanded Radius		0,05 m
Jet Velocity	500,00	m/s
Flame Length		13,65 m
Frustrum Lift Off Distance		2,54 m
Frustrum Length		11,13 m
Frustrum Base Width		0,82 m
Frustrum Tip Width		3,84 m
Flame Length in Still Air		18,98 m
Hole to Flame Angle		7,61 deg
Plane Angular Rotation		0,00 deg

### Flame Co-ordinates

X	Z	R	Phi
m	m	m	deg
0,00	3,54	0,00	7,61
0,00	3,54	0,41	7,61
1,47	14,57	1,92	7,61
1,47	14,57	0,00	7,61

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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

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

Downwind semi-axis (A)	12,12	m
Crosswind semi-axis (B)	12,26	m
Offset Ratio (D)	0,12	
Effect Distance	13,55	m
Area	466,80	m2

<b>Incident Radiation Level:</b>	<b>5,00</b>	<b>kW/m2</b>
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

<b>Incident Radiation Level:</b>	<b>12,50</b>	<b>kW/m2</b>
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



# JET FIRE REPORT

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## Radiation Distance

### User-Defined Quantities

Maximum Distance	13,55	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			2,68		
0,28			3,19		
0,55			3,67		
0,83			4,10		
1,11			4,49		
1,38			4,83		
1,66			5,10		
1,94			5,33		
2,21			5,50		
2,49			5,63		
2,77			5,68		
3,04			5,77		
3,32			5,80		
3,59			5,80		
3,87			5,78		
4,15			5,75		
4,42			5,70		
4,70			5,64		
4,98			5,58		
5,25			5,50		
5,53			5,42		
5,81			5,34		
6,08			5,25		
6,36			5,17		
6,64			5,08		
6,91			4,98		
7,19			4,89		
7,47			4,80		
7,74			4,71		
8,02			4,61		
8,30			4,52		
8,57			4,43		
8,85			4,34		
9,13			4,25		
9,40			4,17		
9,68			4,08		
9,95			3,99		

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X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
10,23			3,91		
10,51			3,82		
10,78			3,74		
11,06			3,66		
11,34			3,58		
11,61			3,50		
11,89			3,42		
12,17			3,35		
12,44			3,27		
12,72			3,20		
13,00			3,13		
13,27			3,06		
13,55			3,00		

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

\RDS San Benedetto\Study\6" 90 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	167,39	degC
Release Rate	1,67	kg/s
Liquid Fraction		fraction
Jet Angle from Horizontal	90,00	deg
Crosswind Angle	0,00	deg

	Input	Output
Flame Emissive Power		189,04 kW/m2
Expanded Radius		0,05 m
Jet Velocity	500,00	m/s
Flame Length		10,61 m
Frustrum Lift Off Distance		1,80 m
Frustrum Length		8,90 m
Frustrum Base Width		0,83 m
Frustrum Tip Width		3,28 m
Flame Length in Still Air		18,98 m
Hole to Flame Angle		19,04 deg
Plane Angular Rotation		0,00 deg

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## Flame Co-ordinates

X	Z	R	Phi
m	m	m	deg
0,00	2,80	0,00	19,04
0,00	2,80	0,42	19,04
2,90	11,21	1,64	19,04
2,90	11,21	0,00	19,04

## Radiation Intensity Ellipse

### User-Defined Quantities

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

### Calculated Quantities

<b>Incident Radiation Level:</b>	<b>3,00</b>	kW/m2
Lethality Level	0,00	%
View Factor	0,02	
Dose Level	865.118,83	(W/m2)^Probit N.s
Downwind semi-axis (A)	14,49	m
Crosswind semi-axis (B)	14,86	m
Offset Ratio (D)	0,19	
Effect Distance	17,24	m
Area	676,41	m2
<b>Incident Radiation Level:</b>	<b>5,00</b>	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)	9,53	m
Crosswind semi-axis (B)	9,84	m
Offset Ratio (D)	0,33	
Effect Distance	12,63	m
Area	294,54	m2
<b>Incident Radiation Level:</b>	<b>12,50</b>	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	17,24	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			7,14		
0,35			8,46		
0,70			9,57		
1,06			10,43		
1,41			11,03		
1,76			11,39		
2,11			11,44		
2,46			11,59		
2,82			11,50		
3,17			11,34		
3,52			11,12		
3,87			10,87		
4,22			10,60		
4,57			10,32		
4,93			10,03		
5,28			9,74		
5,63			9,45		
5,98			9,28		
6,33			9,10		
6,69			8,92		
7,04			8,70		
7,39			8,48		
7,74			8,24		
8,09			7,98		
8,45			7,74		
8,80			7,50		
9,15			7,25		
9,50			7,00		
9,85			6,76		
10,21			6,52		
10,56			6,28		
10,91			6,05		
11,26			5,82		
11,61			5,60		
11,97			5,38		
12,32			5,18		
12,67			4,98		

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X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
13,02			4,79		
13,37			4,60		
13,72			4,42		
14,08			4,25		
14,43			4,09		
14,78			3,93		
15,13			3,78		
15,48			3,63		
15,84			3,49		
16,19			3,36		
16,54			3,24		
16,89			3,12		
17,24			3,00		

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## RDS San Benedetto

### Study

#### 6" 90 bar Vertical

##### Base Case

CASE Name:	Data	User-Defined Data
<b>Material</b>		
Material Identifier		METHANE
Type of Vessel		Pressurized Gas
Pressure Specification		Pressure specified
Discharge Pressure (gauge)		90 bar
Discharge Temperature		230 degC
Mass Inventory of material to discharge		2000 kg
<b>Scenario</b>		
Type of Event		Leak
Phase		Vapor
HoleDiameter		15 mm
Building Wake Option		None
<b>Location</b>		
[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
<b>Bund</b>		
Status of Bund		No bund present
[Type of Bund Surface		Concrete]
[Bund Height		0 m]
[Bund Failure Modeling		Bund cannot fail]
<b>Indoor/Outdoor</b>		
Outdoor Release Direction		Vertical
<b>Flammable</b>		
Jet Fire Method		Shell
<b>Dispersion</b>		
Ignition Location		No ignition location
Mass Inventory of material to Disperse		2000 kg
<b>Fireball Parameters</b>		
[Mass Modification Factor		3]
[Calculation method for fireball		DNV Recommended]
[Temperature of fireball		1727 degC]
<b>Jet Fire Parameters</b>		
Jet fire radiation intensity level 1		3 kW/m2

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

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## Discharge Data

### User-Defined Quantities

Material	METHANE
Temperature	230,00 degC
Pressure	91,01 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	167,39 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

#### Continuous Release Data:

Mass Flowrate	1.66677E+000 kg/s
Release Duration	1.199,92 s
Orifice Velocity	500,00 m/s
Exit Pressure	50,03 bar
Exit Temperature	175,19 degC
Discharge Coefficient	0,87
Expanded Radius	0,05 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	167,39 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

#### Continuous Release Data:

Mass Flowrate	1.66677E+000 kg/s
Release Duration	1.199,92 s
Orifice Velocity	500,00 m/s
Exit Pressure	50,03 bar
Exit Temperature	175,19 degC
Discharge Coefficient	0,87
Expanded Radius	0,05 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	0,021198	0,061328
LFL (44000)	18,75	s	0,493768	0,648203
LFL Frac (22000)	18,75	s	1,17874	1,76495

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	3,31391	2,8608
LFL (44000)	18,75	s	8,98841	6,15293
LFL Frac (22000)	18,75	s	12,6629	8,20968

## 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	27740,8	34164,5
5	m	8715,11	9308,84
10	m	4999,58	5059,94

Distance		Heights (m) for above concentrations	
		Category 2/F	Category 5/D
1	m	11,7041	6,8895
5	m	18,4008	10,7991
10	m	21,8639	12,6762

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 <sup>2</sup>	13,5497	17,2438
Radiation Level	5	kW/m <sup>2</sup>	5	12,6328
Radiation Level	12,5	kW/m <sup>2</sup>	Not Reached	Not Reached

## Radiation Effects: Jet Fire Distance

			Category 2/F	Radiation Level (kW/m <sup>2</sup> ) Category 5/D
Distance Of Interest 1	m		4,34935	10,3159
Distance Of Interest 5	m		5,56992	9,96798
Distance Of Interest 10	m		3,97768	6,65566

## Flash Fire Envelope

All flammable results are reported at the cloud centreline height

			Category 2/F	Category 5/D
Furthest Extent	22000	ppm	1,17874	1,76495
Furthest Extent	44000	ppm	0,493768	0,648203

			Category 2/F	Category 5/D
Furthest Extent	22000	ppm	12,6629	8,20968
Furthest Extent	44000	ppm	8,98841	6,15293

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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