

	<b>PROGETTISTA</b>  <b>Tecnologia Ricerca Rischi</b>	<b>COMMESSA</b> NQ/R21300/L01	<b>UNITA'</b> -
	<b>LOCALITA'</b> PORTO TORRES (SS) (SARDEGNA)	<b>001-CI-E-60001</b>	
	<b>PROGETTO / IMPIANTO</b> FSRU Porto Torres e Opere Connesse	Allegato C.4.2_1	<b>Rev.</b> 00

Rif. TRR: 72556

## FSRU di PORTO TORRES e OPERE CONNESSE

### Rapporto Preliminare di Sicurezza ai sensi del D.Lgs. 105/15

#### ALLEGATO C.4.2\_1

#### ELABORATI DI CALCOLO 1R

0	Emissione per permessi	A.VISIGOTI	V.ROMANO	G.ROMANO	AGOSTO 2024
<b>Rev.</b>	<b>Descrizione</b>	<b>Elaborato</b>	<b>Verificato</b>	<b>Approvato</b>	<b>Data</b>

# Input Report

## Workspace: 1RiempFSRU-1R

### Riempimento FSRU-ME4-Water

Study

1RiempFSRU-1R

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set ME4-Water
		Obstructions to use for this study	Multi-Energy obstruction set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Default terrain
		Type of pool substrate and bunds	No bund
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

## 1Ra Manichette GNL carico FSRU

Pressure vessel

1RiempFSRU-1R\RIEMPIMENTO FSRU-ME4-Water

Tab	Group	Field	Value	Units
Material	Material	Material	GAS NATURALE	
		Specify volume inventory?	Yes	
		Mass inventory	4165,06	kg
		Volume inventory	9,16	m3
		Material to track	GAS NATURALE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	-160	degC
		Pressure (gauge)	5	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length		m
	Release location	Elevation	8,5	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe	Pipe roughness	0,045	mm

	characteristics			
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	9,16	m3
		Tank vapour volume	0	m3
		Tank liquid volume	9,16	m3
		Tank liquid level	0	m
		Maximum vapour release height	0	m

		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	No	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Default terrain	
		Type of pool substrate and bunds	No bund	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	None	
		Wind or release angle from North	0	deg
		Handling of	Trapped	

		droplets		
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4; 12,5; 37,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	20	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	

	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	5	
		Intensity levels	3; 5; 7; 12,5; 37,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	5	
		Intensity levels	3; 5; 7; 12,5; 37,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	



		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	20	s
Geometry	Geometry	East	0	m
		North	0	m



## 50mm

Leak

1RiempFSRU-1R\RIEMPIMENTO FSRU-ME4-WATER\1Ra Manichette GNL carico FSRU

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50	mm
		Use specified discharge coefficient?	Yes	
		Discharge coefficient	0,62	fraction
	Release location	Elevation	8,5	m
		Tank head	0	m
	Direction	Outdoor release direction	Down - impinging on the ground	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GAS NATURALE	
		Type of risk effects to model	Flammable only	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Default terrain	
		Type of pool substrate and bunds	No bund	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4; 12,5; 37,5	kW/m <sup>2</sup>
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	20	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	5	
		Intensity levels	3; 5; 7; 12,5; 37,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input	5	

		radiation levels		
		Intensity levels	3; 5; 7; 12,5; 37,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	20	s



# Discharge Report

## Workspace: 1RiempFSRU-1R

### Study: Riempimento FSRU-ME4-Water

### Equipment Item: 1Ra Manichette GNL carico FSRU

1RiempFSRU-1R\Riempimento FSRU-ME4-Water\1Ra Manichette GNL carico FSRU

Material	<b>GAS NATURALE</b>	
East	0	m
North	0	m

### Scenario (Leak) : 50mm

1RiempFSRU-1R\Riempimento FSRU-ME4-Water\1Ra Manichette GNL carico FSRU\50mm

### Weather: Category 2/F

#### INPUT DATA

##### Inventory data

Mass in vessel	<b>4165,06</b>	kg
----------------	----------------	----

##### Stagnation Data (upstream end for long pipe)

Initial pressure (gauge)	<b>5</b>	bar
Initial temperature	<b>-160</b>	degC
Fluid state	<b>Non-saturated liquid</b>	

##### Scenario data

Phase to be released	Liquid	
Tank head	0	m
Hole diameter	<b>50</b>	mm
Discharge coefficient	<b>0,62</b>	fraction

#### OUTPUT DATA

Mass flow rate	25,9564	kg/s
Release duration	160,464	s



### Orifice or pipe exit data (before atmospheric expansion)

Pressure	1,01325	bar
Temperature	-160,121	degC
Liquid mass fraction	<b>1</b>	fraction
Velocity at vena contracta (at exit for pipe releases)	46,8731	m/s
Discharge coefficient	0,62	

### Final Data (after atmospheric expansion)

Temperature	-160,343	degC
Liquid mass fraction	0,998608	fraction
Droplet diameter	319,833	um
Expanded diameter	<b>0,0450464</b>	m
Velocity	46,8731	m/s

## Weather: Category 5/D

### INPUT DATA

#### Inventory data

Mass in vessel	<b>4165,06</b>	kg
----------------	----------------	----

#### Stagnation Data (upstream end for long pipe)

Initial pressure (gauge)	<b>5</b>	bar
Initial temperature	<b>-160</b>	degC
Fluid state	<b>Non-saturated liquid</b>	

#### Scenario data

Phase to be released	Liquid	
Tank head	0	m
Hole diameter	<b>50</b>	mm
Discharge coefficient	<b>0,62</b>	fraction

### OUTPUT DATA

Mass flow rate	25,9564	kg/s
Release duration	160,464	s

#### Orifice or pipe exit data (before atmospheric expansion)

Pressure	1,01325	bar
Temperature	-160,121	degC
Liquid mass fraction	<b>1</b>	fraction
Velocity at vena contracta (at exit for pipe releases)	46,8731	m/s
Discharge coefficient	0,62	

#### Final Data (after atmospheric expansion)

Temperature	-160,343	degC
Liquid mass fraction	0,998608	fraction
Droplet diameter	319,833	um
Expanded diameter	<b>0,0450464</b>	m





Velocity	46,8731	m/s
----------	---------	-----



# Dispersion Report

## Workspace: 1RiempFSRU-1R

### Study: Riempimento FSRU-ME4-Water

### Equipment Item: 1Ra Manichette GNL carico FSRU

1RiempFSRU-1R\Riempimento FSRU-ME4-Water\1Ra Manichette GNL carico FSRU

Material	GAS NATURALE	
East	0	m
North	0	m

### Scenario (Leak) : 50mm

1RiempFSRU-1R\Riempimento FSRU-ME4-Water\1Ra Manichette GNL carico FSRU\50mm

Material to track	GAS NATURALE	
-------------------	--------------	--

### Weather: Category 2/F

Wind speed [m/s]	2
Pasquill stability	F stable - night with moderate clouds and light/moderate wind
Atmospheric temperature [degC]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5
Mixing layer height [m]	100

### Observer Release Data and Observer Mass Data

Observer number	Release type	Start time [s]	Start downwind distance [m]	Unit	Masses or mass rates			Final
					Release	Rainout	Pool vapour pick-up	
1	Continuous	0	0	kg/s	25,9564	25,9202	0,0361427	

2	Continuou s	0,22	-0,295643	kg/s	25,9564	25,9202		16,3428
3	Continuou s	22,741 1	-9,58425	kg/s	25,9564	25,9202		25,203
4	Continuou s	39,313 9	-9,59741	kg/s	25,9564	25,9202		25,2014
5	Continuou s	57,786 3	-9,59741	kg/s	25,9564	25,9202		24,9245
6	Continuou s	76,139 1	-10,0484	kg/s	25,9564	25,9202		24,97
7	Continuou s	94,399 2	-10,5917	kg/s	25,9564	25,9202		25,0388
8	Continuou s	112,59 2	-11,0528	kg/s	25,9564	25,9202		25,1392
9	Continuou s	130,73 6	-11,4571	kg/s	25,9564	25,9202		19,4986
10	Continuou s	133,74 1	-11,5203	kg/s	25,9564	25,9202		17,7506
11	Continuou s	133,74 2	-11,5203	kg/s	0	0	17,714 4	17,7144
12	Continuou s	142,16 6	-11,6942	kg/s	0	0		12,5613
13	Continuou s	148,84 2	-11,8176	kg/s	0	0		8,66977
14	Continuou s	173,42 4	-12,0324	kg/s	0	0		0,900241

**Weather: Category 5/D**

<b>Wind speed [m/s]</b>	<b>5</b>
<b>Pasquill stability</b>	<b>D neutral - little sun and high wind or overcast/windy night</b>
<b>Atmospheric temperature [degC]</b>	25
<b>Relative humidity [fraction]</b>	0,75
<b>Solar radiation flux [kW/m2]</b>	0,5
<b>Mixing layer height [m]</b>	800

**Observer Release Data and Observer Mass Data**

Observer number	Release type	Start time [s]	Start downwind distance [m]	Unit	Masses or mass rates			Final
					Release	Rainout	Pool vapour pick-up	
1	Continuou s	0	0	kg/s	25,9564	25,9202		0,036142 7
2	Continuou s	0,22	-0,295643	kg/s	25,9564	25,9202		1,35717
3	Continuou s	22,512 7	-9,46778	kg/s	25,9564	25,9202		29,5794
4	Continuou s	39,192 1	-9,46778	kg/s	25,9564	25,9202		24,775
5	Continuou s	57,619 1	-9,46778	kg/s	25,9564	25,9202		24,9963
6	Continuou s	75,923 7	-9,84429	kg/s	25,9564	25,9202		25,0749
7	Continuou s	94,137 7	-10,3561	kg/s	25,9564	25,9202		25,1724
8	Continuou s	112,28 5	-10,7866	kg/s	25,9564	25,9202		25,2119
9	Continuou s	130,38 5	-11,1635	kg/s	25,9564	25,9202		25,2725
10	Continuou s	148,44 8	-11,4954	kg/s	25,9564	25,9202		25,3241



11	Continuou s	155,79 1	-11,6189	kg/s	25,9564	25,9202		23,2772
12	Continuou s	155,79 2	-11,6189	kg/s	0	0	23,241 1	23,2411
13	Continuou s	164,21 5	-11,6976	kg/s	0	0		9,59722
14	Continuou s	172,36 5	-11,6976	kg/s	0	0		3,45965



# Early Pool Fire Report

## Workspace: 1RiempFSRU-1R

### Study: Riempimento FSRU-ME4-Water

### Equipment Item: 1Ra Manichette GNL carico FSRU

1RiempFSRU-1R\Riempimento FSRU-ME4-Water\1Ra Manichette GNL carico FSRU

Material	<b>GAS NATURALE</b>	
East	0	m
North	0	m

### Scenario (Leak) : 50mm

1RiempFSRU-1R\Riempimento FSRU-ME4-Water\1Ra Manichette GNL carico FSRU\50mm

#### Weather: Category 2/F

Wind speed [m/s]	2
Pasquill stability	<b>F stable - night with moderate clouds and light/moderate wind</b>
Atmospheric temperature [degC]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5

### Pool fire model results

Early pool fires are assumed to occur at a time when the initial PVAP rainout rate equals the pool fire burn rate, unless the thus calculated pool fire radius exceeds the maximum PVAP pool radius. For the latter case the early pool fire radius is assumed to be the maximum PVAP pool radius. The pool fire centre is located at the rainout point.

#### INPUT DATA

Correlation Type: Thomas / Johnson

Surface type	Water	
Pool fire elevation	0	m
Maximum exposure duration	20	s
Downwind distance of liquid rainout	0	m
Use two zone pool fire model	No	



## OUTPUT DATA

Pool fire diameter	11,7123	m
Downwind distance of pool fire centre	0	m
Pool fire flame length	38,7984	m
Angle between pool fire axis and vertical	33,2405	deg
Flame emissive power	179,749	kW/m <sup>2</sup>
Total burn rate	21,0675	kg/s
Radiative fraction	0,265654	fraction

## Radiation Intensity Ellipse Results

### INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	<b>1,7</b>	m

## OUTPUT DATA

### Radiation intensity

Incident radiation [kW/m <sup>2</sup> ]	Lethality [%]	View factor	Probit	Dose [(W/m <sup>2</sup> ) <sup>Probit</sup> N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m <sup>2</sup> ]
3	0	0,0166899	-1,38321	865.119	72,0087	73,6502	14,1263	86,135	16661,3
5	0,000174704	0,0278165	0,360367	1.709.491	55,7212	56,4645	13,6454	69,3666	9884,3
7	0,02405	0,0389432	1,50883	2.677.313	47,0456	46,9207	13,3746	60,4202	6934,79
12,5	6,52536	0,0695	3,487	5.800.162	34,59	33,09	12,1519	46,7428	3596,

Audit Number: 39708

Date: 05/08/2024 Time: 07:40

Page 2 of 9



		413	89		1	18			11
37,5	98,7381	0,2086	7,237	25.094.924	16,62	15,24	6,18092	22,803	796,0
		24	73		21	36			18

## Radiation v Distance Results

### INPUT DATA

Maximum distance	86,135	m
Angle from wind direction	0	deg
Observer direction	Variable	
Height of interest	<b>1,7</b>	m

### OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m <sup>2</sup> ]	Lethality level [fraction]
0	179,749	1
1,75786	179,749	1
3,51572	179,749	1
5,27357	179,749	1
7,03143	179,749	1
8,78929	118,548	1
10,5471	93,0815	1
12,305	76,8786	0,999999
14,0629	65,5371	0,999983
15,8207	57,2427	0,999884
17,5786	50,3357	0,999408
19,3364	45,3592	0,998056
21,0943	41,0989	0,994622
22,8521	37,3974	0,987073
24,61	34,48	0,974481
26,3679	31,9101	0,954176
28,1257	29,5273	0,922469
29,8836	27,2286	0,873946
31,6414	25,0871	0,806659
33,3993	23,1104	0,720903



35,1572	21,2905	0,620033
36,915	19,6167	0,510407
38,6729	18,0785	0,400274
40,4307	16,6661	0,297955
42,1886	15,3706	0,209979
43,9464	14,1835	0,139887
45,7043	13,097	0,088051
47,4622	12,1034	0,0523857
49,22	11,1955	0,0294923
50,9779	10,3663	0,0157393
52,7357	9,60919	0,0079802
54,4936	8,91804	0,00385406
56,2514	8,28699	0,00177798
58,0093	7,71062	0,000785814
59,7672	7,18393	0,000333741
61,525	6,70231	0,000136616
63,2829	6,26153	5,40602E-05
65,0407	5,85775	2,07386E-05
66,7986	5,4875	7,73379E-06
68,5564	5,14759	2,81093E-06
70,3143	4,83519	9,98193E-07
72,0722	4,5477	3,47126E-07
73,83	4,28282	1,18468E-07
75,5879	4,05678	4,33084E-08
77,3457	3,84882	1,57994E-08
79,1036	3,65499	0
80,8614	3,47417	0
82,6193	3,30533	0
84,3772	3,14753	0
86,135	2,99992	0

### Weather: Category 5/D

Wind speed [m/s]	5
Pasquill stability	D neutral - little sun and high wind or overcast/windy night
Atmospheric temperature [degC]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5

### Pool fire model results

Early pool fires are assumed to occur at a time when the initial PVAP rainout rate equals the pool fire burn rate, unless the thus calculated pool fire radius exceeds the maximum PVAP pool radius. For the latter case the early pool fire radius is assumed to be the maximum PVAP pool radius. The pool fire centre is located at the rainout point.

#### INPUT DATA

Correlation Type: Thomas / Johnson

Surface type	Water	
Pool fire elevation	0	m
Maximum exposure duration	20	s
Downwind distance of liquid rainout	0	m
Use two zone pool fire model	No	

#### OUTPUT DATA

Pool fire diameter	11,7123	m
Downwind distance of pool fire centre	0	m
Pool fire flame length	38,7984	m
Angle between pool fire axis and vertical	50,4076	deg
Flame emissive power	179,749	kW/m2
Total burn rate	21,0675	kg/s
Radiative fraction	0,265654	fraction

### Radiation Intensity Ellipse Results

#### INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	<b>1,7</b>	m

## OUTPUT DATA

### Radiation intensity

Incident radiation [kW/m <sup>2</sup> ]	Lethality [%]	View factor	Probit	Dose [(W/m <sup>2</sup> ) <sup>Probit</sup> N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m <sup>2</sup> ]
3	0	0,0166899	-1,38321	865.119	69,2134	72,5417	19,6443	88,8576	15773,5
5	0,000174704	0,0278165	0,360367	1.709.491	54,675	56,2281	18,9913	73,6663	9658,11
7	0,02405	0,0389432	1,50883	2.677.313	46,7749	47,1995	18,3083	65,0832	6935,85
12,5	6,52536	0,0695413	3,48789	5.800.162	35,7626	34,1335	16,664	52,4266	3834,95
37,5	98,7381	0,208624	7,23773	25.094.924	19,5973	16,416	10,0507	29,6479	1010,68

### Radiation v Distance Results

#### INPUT DATA

Maximum distance	88,8576	m
Angle from wind direction	0	deg
Observer direction	Variable	
Height of interest	<b>1,7</b>	m

#### OUTPUT DATA

Downwind distance [m]	Maximum incident	Lethality level [fraction]
-----------------------	------------------	----------------------------

	radiation [kW/m2]	
0	179,749	1
1,81342	179,749	1
3,62684	179,749	1
5,44026	179,749	1
7,25368	179,749	1
9,0671	127,249	1
10,8805	102,768	1
12,6939	88,2386	1
14,5074	76,8819	0,999999
16,3208	68,5271	0,999991
18,1342	61,3996	0,999956
19,9476	56,7596	0,99987
21,7611	51,0303	0,999498
23,5745	47,2898	0,998775
25,3879	43,5947	0,997036
27,2013	41,1872	0,994734
29,0147	38,3417	0,989652
30,8282	35,8531	0,98144
32,6416	33,9494	0,971166
34,455	32,158	0,956661
36,2684	30,2245	0,933391
38,0818	27,9176	0,890753
39,8953	25,5057	0,821772
41,7087	23,1574	0,723228
43,5221	20,9379	0,598146
45,3355	18,8788	0,458269
47,1489	16,9942	0,321416
48,9624	15,2872	0,20467
50,7758	13,7532	0,117812
52,5892	12,3827	0,0612589
54,4026	11,1634	0,0288402
56,2161	10,2507	0,01429
58,0295	9,46242	0,00690141
59,8429	8,74175	0,00314049



61,6563	8,08466	0,00135235
63,4697	7,48654	0,000553572
65,2832	6,94254	0,000216383
67,0966	6,44787	8,11265E-05
68,91	5,99792	2,92979E-05
70,7234	5,58837	1,02325E-05
72,5368	5,21525	3,4691E-06
74,3503	4,8749	1,14562E-06
76,1637	4,56404	3,69676E-07
77,9771	4,2797	1,16899E-07
79,7905	4,01922	3,63203E-08
81,6039	3,78022	1,11139E-08
83,4174	3,56059	0
85,2308	3,35842	0
87,0442	3,17204	0
88,8576	2,99992	0

