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
3R

Firmato digitalmente da:
Giovanni Romano
Data: 05/08/2024 15:36:53

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

Input Report

Workspace: 1RiempFSRU-3R

Riempimento FSRU-ME4

Study
1RiempFSRU-3R

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
		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

3R Collettore GNL riempimento FSRU

Pressure vessel

1RiempFSRU-3R\Riempimento FSRU-ME4

Tab	Group	Field	Value	Units
Material	Material	Material	GAS NATURALE	
		Specify volume inventory?	Yes	
		Mass inventory	39877,3	kg
		Volume inventory	87,7	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	17	m
		Tank head	0	m
	Direction	Outdoor release direction	Down - impinging on the ground	
		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	87,7	m3
		Tank vapour volume	0	m3
		Tank liquid volume	87,7	m3
		Tank liquid level	0,485968	m
		Maximum vapour release height	0,6	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

120mm

Leak

1RiempFSRU-3R\Riempimento FSRU-ME4\3R Collettore GNL riempimento FSRU

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	120	mm
		Use specified discharge coefficient?	Yes	
		Discharge coefficient	0,62	fraction
	Release location	Elevation	17	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/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	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-3R

Study: Riempimento FSRU-ME4

Equipment Item: 3R Collettore GNL riempimento FSRU

1RiempFSRU-3R\Riempimento FSRU-ME4\3R Collettore GNL riempimento FSRU

Material	**GAS NATURALE**	
East	0	m
North	0	m

Scenario (Leak) : 120mm

1RiempFSRU-3R\Riempimento FSRU-ME4\3R Collettore GNL riempimento FSRU\120mm

Weather: Category 2/F

INPUT DATA

Inventory data

Mass in vessel	**39877,3**	kg

Stagnation Data (upstream end for long pipe)

Initial pressure (gauge)	**5**	bar
Initial temperature	**-160**	degC
Fluid state	**Non-saturated liquid**	

Scenario data

Phase to be released	Liquid	
Tank head	0	m
Hole diameter	**120**	mm
Discharge coefficient	**0,62**	fraction

OUTPUT DATA

Mass flow rate	149,509	kg/s
Release duration	266,722	s

Orifice or pipe exit data (before atmospheric expansion)

Pressure	1,01325	bar
Temperature	-160,121	degC
Liquid mass fraction	**1**	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	**0,108111**	m
Velocity	46,8731	m/s

Weather: Category 5/D

INPUT DATA

Inventory data

Mass in vessel	**39877,3**	kg

Stagnation Data (upstream end for long pipe)

Initial pressure (gauge)	**5**	bar
Initial temperature	**-160**	degC
Fluid state	**Non-saturated liquid**	

Scenario data

Phase to be released	Liquid	
Tank head	0	m
Hole diameter	**120**	mm
Discharge coefficient	**0,62**	fraction

OUTPUT DATA

Mass flow rate	149,509	kg/s
Release duration	266,722	s

Orifice or pipe exit data (before atmospheric expansion)

Pressure	1,01325	bar
Temperature	-160,121	degC
Liquid mass fraction	**1**	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	**0,108111**	m

Velocity	46,8731	m/s

Dispersion Report

Workspace: 1RiempFSRU-3R

Study: Riempimento FSRU-ME4

Equipment Item: 3R Collettore GNL riempimento FSRU

1RiempFSRU-3R\Riempimento FSRU-ME4\3R Collettore GNL riempimento FSRU

Material	**GAS NATURALE**	
East	0	m
North	0	m

Scenario (Leak) : 120mm

1RiempFSRU-3R\Riempimento FSRU-ME4\3R Collettore GNL riempimento FSRU\120mm

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

					Masses or mass rates			
Observer number	**Release type**	**Start time [s]**	**Start downwind distance [m]**	**Unit**	**Release**	**Rainout**	**Pool vapour pick-up**	**Final**
1	Continuous	0	0	kg/s	149,509	149,301		29,3429

2	Continuous	0,22	-0,461952	kg/s	149,509	149,301		49,8843
3	Continuous	54,7086	-20,707	kg/s	149,509	149,301		122,927
4	Continuous	88,3289	-24,8962	kg/s	149,509	149,301		124,977
5	Continuous	123,621	-27,2847	kg/s	149,509	149,301		127,495
6	Continuous	158,336	-29,2742	kg/s	149,509	149,301		127,906
7	Continuous	192,444	-30,9332	kg/s	149,509	149,301		107,055
8	Continuous	200,879	-31,3167	kg/s	149,509	149,301		100,136
9	Continuous	200,88	-31,3167	kg/s	0	0	99,928	99,928
10	Continuous	214,882	-31,9014	kg/s	0	0		87,7419
11	Continuous	226,096	-32,3638	kg/s	0	0		77,6977
12	Continuous	259,371	-33,6112	kg/s	0	0		49,0405
13	Continuous	312,082	-33,8685	kg/s	0	0		25,4301
14	Continuous	586,655	-33,8685	kg/s	0	0		2,0049

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
Mixing layer height [m]	800

Observer Release Data and Observer Mass Data

					Masses or mass rates			
Observer number	**Release type**	**Start time [s]**	**Start downwind distance [m]**	**Unit**	**Release**	**Rainout**	**Pool vapour pick-up**	**Final**
1	Continuous	0	0	kg/s	149,509	149,301		0,208182
2	Continuous	0,22	-0,46182	kg/s	149,509	149,301		4,17918
3	Continuous	54,0892	-20,4935	kg/s	149,509	149,301		131,521
4	Continuous	87,4138	-24,5063	kg/s	149,509	149,301		124,76
5	Continuous	122,359	-26,7926	kg/s	149,509	149,301		126,905
6	Continuous	156,693	-28,6771	kg/s	149,509	149,301		129,364
7	Continuous	190,425	-30,2378	kg/s	149,509	149,301		131,22
8	Continuous	223,709	-31,5769	kg/s	149,509	149,301		132,645
9	Continuous	252,903	-32,6143	kg/s	149,509	149,301		119,214
10	Continuous	252,904	-32,6143	kg/s	0	0	119,005	119,005

11	Continuous	256,625	-32,7315	kg/s	0	0		111,161
12	Continuous	266,905	-33,0516	kg/s	0	0		87,7961
13	Continuous	304,013	-33,0516	kg/s	0	0		48,4845
14	Continuous	535,816	-33,0516	kg/s	0	0		3,5701

Early Pool Fire Report

Workspace: 1RiempFSRU-3R

Study: Riempimento FSRU-ME4

Equipment Item: 3R Collettore GNL riempimento FSRU

1RiempFSRU-3R\Riempimento FSRU-ME4\3R Collettore GNL riempimento FSRU

Material	**GAS NATURALE**	
East	0	m
North	0	m

Scenario (Leak) : 120mm

1RiempFSRU-3R\Riempimento FSRU-ME4\3R Collettore GNL riempimento FSRU\120mm

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

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	Land	
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	44,4451	m
Downwind distance of pool fire centre	0	m
Pool fire flame length	63,5416	m
Angle between pool fire axis and vertical	24,9119	deg
Flame emissive power	208,599	kW/m2
Total burn rate	149,042	kg/s
Radiative fraction	0,295857	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	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^ProbitN.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0143816	-1,38321	865.119	192,948	196,458	19,13	212,078	119086
5	0,000174704	0,0239694	0,360367	1.709.491	151,479	154,297	18,8469	170,326	73427,7
7	0,02405	0,0335572	1,50883	2.677.313	129,191	131,061	19,0785	148,27	53193,1
12,5	6,52536	0,0599	3,487	5.800.162	97,26	97,63	18,9502	116,216	2983

		235	89		63	12			3,3
37,5	98,7381	0,179771	7,23773	25.094.924	52,8062	50,7722	14,5564	67,3625	8422,88

Radiation v Distance Results

INPUT DATA

Maximum distance	212,078	m
Angle from wind direction	0	deg
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	208,599	1
4,32812	208,599	1
8,65623	208,599	1
12,9843	208,599	1
17,3125	208,599	1
21,6406	208,599	1
25,9687	140,742	1
30,2968	106,945	1
34,6249	88,7992	1
38,953	76,7259	0,999999
43,2812	67,7187	0,99999
47,6093	60,6538	0,999948
51,9374	54,6179	0,999785
56,2655	49,1156	0,999208
60,5936	44,1907	0,99743
64,9217	39,7813	0,992642
69,2498	35,8301	0,98134
73,578	32,29	0,957931
77,9061	29,1216	0,915381
82,2342	26,2902	0,847445

86,5623	23,7639	0,751969
90,8904	21,5128	0,63345
95,2185	19,5086	0,502883
99,5467	17,7252	0,374482
103,875	16,138	0,26102
108,203	14,7247	0,170289
112,531	13,4651	0,104151
116,859	12,3411	0,059882
121,187	11,3366	0,0324776
125,515	10,4372	0,0166808
129,843	9,63039	0,00814622
134,172	8,90523	0,00379822
138,5	8,25206	0,00169755
142,828	7,66246	0,000730032
147,156	7,1291	0,000303187
151,484	6,64557	0,000122011
155,812	6,20626	4,77272E-05
160,14	5,80628	1,82002E-05
164,468	5,44135	6,78397E-06
168,796	5,10773	2,47771E-06
173,125	4,81472	9,29079E-07
177,453	4,54659	3,45636E-07
181,781	4,29892	1,26852E-07
186,109	4,06978	4,59993E-08
190,437	3,85746	1,65036E-08
194,765	3,66044	0
199,093	3,47734	0
203,421	3,30696	0
207,75	3,14817	0
212,078	3	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	Land	
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	44,4451	m
Downwind distance of pool fire centre	0	m
Pool fire flame length	63,5416	m
Angle between pool fire axis and vertical	42,4517	deg
Flame emissive power	208,599	kW/m2
Total burn rate	149,042	kg/s
Radiative fraction	0,295857	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	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^ProbitN.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0143816	-1,38321	865.119	183,813	193,47	30,3948	214,207	111722
5	0,000174704	0,0239694	0,360367	1.709.491	145,513	152,929	30,1362	175,65	69910,7
7	0,02405	0,0335572	1,50883	2.677.313	124,602	130,695	29,7784	154,381	51160,5
12,5	6,52536	0,0599235	3,48789	5.800.162	94,891	98,8816	28,4864	123,377	29477,5
37,5	98,7381	0,179771	7,23773	25.094.924	57,147	54,4811	23,7799	80,927	9781,15

Radiation v Distance Results

INPUT DATA

Maximum distance	214,207	m
Angle from wind direction	0	deg
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

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

	radiation [kW/m2]	
0	208,599	1
4,37158	208,599	1
8,74316	208,599	1
13,1147	208,599	1
17,4863	208,599	1
21,8579	208,599	1
26,2295	147,142	1
30,6011	118,217	1
34,9726	101,518	1
39,3442	89,7337	1
43,7158	81,1771	0,999999
48,0874	73,9631	0,999997
52,459	67,9817	0,99999
56,8306	62,217	0,999963
61,2021	58,15	0,999906
65,5737	54,2346	0,999765
69,9453	49,5093	0,999279
74,3169	44,5707	0,997653
78,6885	39,8133	0,992698
83,06	35,3872	0,979315
87,4316	31,3615	0,948193
91,8032	27,759	0,887071
96,1748	24,5733	0,786697
100,546	21,7792	0,649146
104,918	19,3417	0,491185
109,29	17,222	0,337862
113,661	15,3807	0,210626
118,033	13,969	0,128638
122,404	12,753	0,0744096
126,776	11,6665	0,0402628
131,147	10,6958	0,020469
135,519	9,82791	0,0098241
139,891	9,05101	0,00447344
144,262	8,35441	0,00194205

148,634	7,72863	0,000807569
153,005	7,16531	0,000323083
157,377	6,6571	0,000124866
161,748	6,19759	4,67954E-05
166,12	5,78117	1,70645E-05
170,492	5,40294	6,074E-06
174,863	5,05864	2,11633E-06
179,235	4,74454	7,23665E-07
183,606	4,45737	2,43414E-07
187,978	4,19427	8,07077E-08
192,35	3,95274	2,64282E-08
196,721	3,73058	8,56135E-09
201,093	3,52584	0
205,464	3,33681	0
209,836	3,16197	0
214,207	2,99999	0