Jet Fire

Workspace: 72438-2FSRURegas-7R

Study: FSRU in rigassificazione

Equipment Item: 7R Linee mandata pompe LNG Feed e collettore GNL

72438-2FSRURegas-7R\FSRU in rigassificazione\7R Linee mandata pompe LNG Feed e collettore GNL

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

Scenario (Leak) : 70mm

72438-2FSRURegas-7R\FSRU in rigassificazione\7R Linee mandata pompe LNG Feed e collettore GNL\70mm

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

Jet fire model results

INPUT DATA

Scenario

Elevation	**12,5**	m
Release angle from horizontal	**0**	deg

Jet Fire Parameters

Jet fire method	Cone model	
Wind orientation about the z-axis (anti-clockwise from the East)	**0**	deg

Rotation about the z-axis (anti-clockwise from the east)	**0**	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	68,255	kg/s
Temperature after atmospheric expansion	-160,343	degC
Liquid fraction	0,999206	fraction
Velocity after atmospheric expansion (input)	**62,8669**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	104,211	kW/m2
Fraction of emissivity	0,281408	fraction
Jet velocity	62,8669	m/s
Flame length	110,262	m
Frustum length	108,608	m
Frustum base width	2,62986	m
Frustum tip width	41,8363	m
Frustum lift-off distance	1,65393	m
Flame length in still air	99,1532	m
Hole to flame angle	0	deg
Expanded diameter	0,0597826	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

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	0,0287877	-1,38321	865.119	110,609	124,274	92,9804	203,589	43183,7
5	0,000174704	0,0479795	0,360367	1.709.491	95,0183	98,4409	85,5266	180,545	29385,5
7	0,02405	0,0671712	1,50883	2.677.313	86,2576	83,8074	81,3876	167,645	22710,6
12,5	6,52536	0,119949	3,48789	5.800.162	72,7593	61,437	75,8036	148,563	14043,3
37,5	98,7381	0,359846	7,23773	25.094.924	48,3583	25,4652	72,1763	120,535	3868,73

Radiation v Distance Results

INPUT DATA

Maximum distance	219,881	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	9,32608	0,00600428
4,48737	14,5327	0,159182
8,97474	20,6638	0,580658

13,4621	26,1637	0,84353
17,9495	31,3525	0,948089
22,4368	36,0631	0,982327
26,9242	37,5351	0,987484
31,4116	45,0628	0,997914
35,8989	49,3055	0,999243
40,3863	10,1967	0,0136483
44,8737	57,3752	0,999888
49,361	61,2424	0,999954
53,8484	65,0258	0,999981
58,3358	68,747	0,999992
62,8231	72,432	0,999996
67,3105	76,1225	0,999998
71,7979	78,8032	0,999999
76,2852	83,0882	1
80,7726	87,7105	1
85,26	92,3687	1
89,7474	97,2546	1
94,2347	104,211	1
98,7221	104,211	1
103,209	104,211	1
107,697	104,211	1
112,184	93,8644	1
116,672	49,3786	0,999256
121,159	36,5623	0,984274
125,646	29,4297	0,920816
130,134	24,2969	0,775297
134,621	20,3636	0,561052
139,108	17,31	0,344246
143,596	14,7868	0,173954
148,083	12,7003	0,0724426
152,57	10,9711	0,0251501
157,058	9,5328	0,00740361
161,545	8,33117	0,00188415
166,033	7,32218	0,000422614

170,52	6,47062	8,51261E-05
175,007	5,74786	1,56547E-05
179,495	5,13081	2,66604E-06
183,982	4,60158	4,26632E-07
188,469	4,14502	6,48231E-08
192,957	3,74908	9,44146E-09
197,444	3,40411	0
201,932	3,10208	0
206,419	2,83647	0
210,906	2,60187	0
215,394	2,39384	0
219,881	2,20864	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

Jet fire model results

INPUT DATA

Scenario

Elevation	**12,5**	m
Release angle from horizontal	**0**	deg

Jet Fire Parameters

Jet fire method	Cone model	
Wind orientation about the z-axis (anti-clockwise from the East)	**0**	deg
Rotation about the z-axis (anti-clockwise from the east)	**0**	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	68,255	kg/s
Temperature after atmospheric expansion	-160,343	degC
Liquid fraction	0,999206	fraction
Velocity after atmospheric expansion (input)	**62,8669**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	140,389	kW/m2
Fraction of emissivity	0,281408	fraction

Jet velocity	62,8669	m/s
Flame length	85,7094	m
Frustum length	84,4238	m
Frustum base width	3,88435	m
Frustum tip width	37,6716	m
Frustum lift-off distance	1,28564	m
Flame length in still air	99,1532	m
Hole to flame angle	0	deg
Expanded diameter	0,0597826	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

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	0,0213692	-1,38321	865.119	106,852	123,646	77,9597	184,812	41506,1
5	0,000174704	0,0356154	0,360367	1.709.491	89,5851	96,7251	71,6628	161,248	27222,3
7	0,02405	0,0498616	1,50883	2.677.313	80,4035	82,9673	67,7767	148,18	20957,1

12,5	6,52536	0,0890385	3,48789	5.800.162	67,068	62,9259	62,0738	129,142	13258,5
37,5	98,7381	0,267115	7,23773	25.094.924	45,663	30,8726	55,1926	100,856	4428,81

Radiation v Distance Results

INPUT DATA

Maximum distance	184,812	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	14,9258	0,182274
3,77167	24,7153	0,792373
7,54334	33,4466	0,967647
11,315	40,9124	0,994378
15,0867	47,644	0,998874
18,8583	54,0531	0,999755
22,63	60,0442	0,99994
26,4017	65,9146	0,999984
30,1734	71,6181	0,999996
33,945	77,1919	0,999999
37,7167	82,6487	1
41,4884	88,0281	1
45,26	93,4448	1
49,0317	98,6834	1
52,8034	104,055	1
56,575	108,732	1
60,3467	115,289	1
64,1184	121,137	1
67,8901	126,222	1

71,6617	140,389	1
75,4334	140,389	1
79,2051	140,389	1
82,9767	140,389	1
86,7484	140,389	1
90,5201	76,2943	0,999998
94,2917	55,146	0,99981
98,0634	44,0807	0,997361
101,835	36,477	0,983956
105,607	30,6751	0,939675
109,378	26,0479	0,839871
113,15	22,4	0,684012
116,922	19,3647	0,492797
120,693	16,822	0,30906
124,465	14,6868	0,168068
128,237	12,8881	0,0796031
132,008	11,367	0,0331492
135,78	10,075	0,0122805
139,552	8,97269	0,00409979
143,323	8,02753	0,00124872
147,095	7,2129	0,000350914
150,867	6,50807	9,2081E-05
154,638	5,89501	2,27657E-05
158,41	5,35929	5,34811E-06
162,182	4,88925	1,20352E-06
165,953	4,47501	2,61123E-07
169,725	4,10848	5,49458E-08
173,497	3,78293	1,1271E-08
177,268	3,49269	0
181,04	3,23305	0
184,812	3	0