

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7

UTE Pampa rev 0 Hidrogenio

Study

Cenário 010

Base Case

Data



Weather: Global Weathers\Dia

Speed: 3.73 m/s

Stability: C/D

\\UTE Pampa rev 0 Hidrogenio\Study\Carregamento\Cenário 010

Flame Data

User-Defined Quantities

	DNV Recommended	
Calculation Method	n-NONANE	
Material		
Ambient Temperature	19.60	degC
Ambient Relative Humidity	0.64	fraction
Mass Modification Factor	3.00	
Potential Fireball Mass	857151.19	kg
Vapor Fraction	0.00	fraction
Actual Flammable Mass	0.00	kg
Vessel Burst Pressure (gauge)	0.00	bar

Input and/or Output Quantities

	Input	Output
Fireball Radius		0.00 m
Fireball Duration		0.00 s
Flame Emissive Power		0.00 kW/m2
Fireball Lift Off Height		0.00 m

No Fireball Occurred

Radiation Lethality Ellipse

Lethality Level:

Intensity Level

View Factor

Probit Level

Dose Level

$(W/m^2)^{Probit N.s}$

Downwind semi-axis (A)

Crosswind semi-axis (B)

Offset Ratio (D)

Effect Distance

Area

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7



Weather:

Global Weathers\Noite

Speed:

2.78

m/s

Stability: D

\UTE Pampa rev 0 Hidrogenio\Study\Carregamento\Cenário 010

Flame Data

User-Defined Quantities

Calculation Method	DNV Recommended
Material	n-NONANE
Ambient Temperature	16.50 degC
Ambient Relative Humidity	0.75 fraction
Mass Modification Factor	3.00
Potential Fireball Mass	857151.19 kg
Vapor Fraction	0.00 fraction
Actual Flammable Mass	0.00 kg
Vessel Burst Pressure (gauge)	0.00 bar

Input and/or Output Quantities

	Input	Output
Fireball Radius		0.00 m
Fireball Duration		0.00 s
Flame Emissive Power		0.00 kW/m2
Fireball Lift Off Height		0.00 m

No Fireball Occurred

Radiation Lethality Ellipse

Lethality Level:

Intensity Level
View Factor
Probit Level
Dose Level

$(W/m2)^{Probit N.s}$

Downwind semi-axis (A)
Crosswind semi-axis (B)
Offset Ratio (D)
Effect Distance
Area

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7

Cenário 023

Base Case

Data



Weather: Global Weathers\Dia

Speed: 3.73 m/s

Stability: C/D

\\UTE Pampa rev_0_Hidrogenio\Study\Retorno\Cenário 023

Flame Data

User-Defined Quantities

Calculation Method	DNV Recommended	
Material	n-NONANE	
Ambient Temperature	19.60	degC
Ambient Relative Humidity	0.64	fraction
Mass Modification Factor	3.00	
Potential Fireball Mass	1428.59	kg
Vapor Fraction	0.00	fraction
Actual Flammable Mass	0.00	kg
Vessel Burst Pressure (gauge)	0.00	bar

Input and/or Output Quantities

	Input	Output
Fireball Radius		0.00 m
Fireball Duration		0.00 s
Flame Emissive Power		0.00 kW/m2
Fireball Lift Off Height		0.00 m

No Fireball Occurred

Radiation Lethality Ellipse

Lethality Level:

Intensity Level

View Factor

Probit Level

Dose Level

$(W/m^2)^{Probit N.s}$

Downwind semi-axis (A)

Crosswind semi-axis (B)

Offset Ratio (D)

Effect Distance

Area

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7



Weather:

Global Weathers\Noite

Speed:

2.78

m/s

Stability: D

\UTE Pampa rev 0 Hidrogenio\Study\Retorno\Cenário 023

Flame Data

User-Defined Quantities

Calculation Method	DNV Recommended
Material	n-NONANE
Ambient Temperature	16.50 degC
Ambient Relative Humidity	0.75 fraction
Mass Modification Factor	3.00
Potential Fireball Mass	1428.59 kg
Vapor Fraction	0.00 fraction
Actual Flammable Mass	0.00 kg
Vessel Burst Pressure (gauge)	0.00 bar

Input and/or Output Quantities

	Input	Output
Fireball Radius		0.00 m
Fireball Duration		0.00 s
Flame Emissive Power		0.00 kW/m2
Fireball Lift Off Height		0.00 m

No Fireball Occurred

Radiation Lethality Ellipse

Lethality Level:

Intensity Level
View Factor
Probit Level
Dose Level

$(W/m2)^{Probit N.s}$

Downwind semi-axis (A)
Crosswind semi-axis (B)
Offset Ratio (D)
Effect Distance
Area

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7

Cenário 025

Base Case

Data



Weather: Global Weathers\Dia

Speed: 3.73 m/s

Stability: C/D

\UTE Pampa rev 0 Hidrogenio\Study\Hidrogênio\Cenário 025

Flame Data

User-Defined Quantities

Calculation Method	DNV Recommended	
Material	HYDROGEN	
Ambient Temperature	19.60	degC
Ambient Relative Humidity	0.64	fraction
Mass Modification Factor	3.00	
Potential Fireball Mass	920.14	kg
Vapor Fraction	1.00	fraction
Actual Flammable Mass	920.14	kg
Vessel Burst Pressure (gauge)	168.00	bar

Input and/or Output Quantities

	Input	Output
Fireball Radius		29.77 m
Fireball Duration		5.02 s
Flame Emissive Power		400.00 kW/m2
Fireball Lift Off Height		59.54 m

Flame Co-ordinates

X	Z	R	Phi
m	m	m	deg
0.00	29.77	0.00	0.00
0.00	31.57	10.18	0.00
0.00	36.74	19.14	0.00
0.00	44.66	25.78	0.00
0.00	54.37	29.32	0.00
0.00	64.71	29.32	0.00
0.00	74.43	25.78	0.00
0.00	82.35	19.14	0.00
0.00	87.52	10.18	0.00
0.00	89.31	0.00	0.00



Ellipse Results

User-Defined Quantities

Observer Inclination	Variable	deg
Observer Orientation	Variable	deg
Exposure Duration	5.02	s
Effect Height	0.00	m

Radiation Intensity Ellipse

Calculated Quantities

Incident Radiation Level:	3.00	kW/m2
Lethality Level	0.00	%
View Factor	0.01	
Probit Level	-4.92	
Dose Level	217,313.71	(W/m2)^Probit N.s
Downwind semi-axis (A)	263.79	m
Crosswind semi-axis (B)	263.79	m
Offset Ratio (D)	0.00	
Effect Distance	263.79	m
Area	218,610.46	m2
Incident Radiation Level:	12.50	kW/m2
Lethality Level	0.00	%
View Factor	0.03	
Probit Level	-0.05	
Dose Level	1,456,972.92	(W/m2)^Probit N.s
Downwind semi-axis (A)	125.70	m
Crosswind semi-axis (B)	125.70	m
Offset Ratio (D)	0.00	
Effect Distance	125.69	m
Area	49,635.02	m2
Incident Radiation Level:	37.50	kW/m2
Lethality Level	9.70	%
View Factor	0.09	
Probit Level	3.70	
Dose Level	6,303,724.86	(W/m2)^Probit N.s
Downwind semi-axis (A)	58.24	m
Crosswind semi-axis (B)	58.24	m
Offset Ratio (D)	0.00	
Effect Distance	58.24	m
Area	10,655.25	m2

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7

Incident Radiation Level:	44.00	kW/m2
Lethality Level	22.56	%
View Factor	0.11	
Probit Level	4.25	
Dose Level	7,801,117.40	(W/m2)^Probit N.s
Downwind semi-axis (A)	49.32	m
Crosswind semi-axis (B)	49.32	m
Offset Ratio (D)	0.00	
Effect Distance	49.32	m
Area	7,640.65	m2

Radiation Lethality Ellipse

Lethality Level:	1.00	%
Intensity Level	27.75	kW/m2
View Factor	0.07	
Probit Level	2.67	
Dose Level	4,219,984.47	(W/m2)^Probit N.s
Downwind semi-axis (A)	75.10	m
Crosswind semi-axis (B)	75.10	m
Offset Ratio (D)	0.00	
Effect Distance	75.10	m
Area	17,717.28	m2

Lethality Level:	50.00	%
Intensity Level	54.87	kW/m2
View Factor	0.14	
Probit Level	5.00	
Dose Level	10,470,272.18	(W/m2)^Probit N.s
Downwind semi-axis (A)	36.78	m
Crosswind semi-axis (B)	36.79	m
Offset Ratio (D)	0.00	
Effect Distance	36.79	m
Area	4,251.22	m2

Lethality Level:	99.00	%
Intensity Level	108.47	kW/m2
View Factor	0.27	
Probit Level	7.33	
Dose Level	25,978,582.16	(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

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7

Radiation Distance

User-Defined Quantities

Maximum Distance	263.79	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			77.26		
5.38			76.58		
10.77			74.62		
16.15			71.55		
21.53			67.65		
26.92			63.68		
32.30			58.89		
37.68			54.07		
43.07			49.07		
48.45			44.68		
53.83			40.59		
59.22			36.84		
64.60			33.44		
69.99			30.37		
75.37			27.62		
80.75			25.16		
86.14			22.96		
91.52			20.99		
96.90			19.23		
102.29			17.66		
107.67			16.25		
113.05			14.99		
118.44			13.85		
123.82			12.83		
129.20			11.91		
134.59			11.07		
139.97			10.32		
145.35			9.63		
150.74			9.01		
156.12			8.44		
161.50			7.92		
166.89			7.44		
172.27			7.00		
177.66			6.60		
183.04			6.23		
188.42			5.89		
193.81			5.57		
199.19			5.28		

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7

X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
204.57			5.01		
209.96			4.76		
215.34			4.52		
220.72			4.31		
226.11			4.10		
231.49			3.91		
236.87			3.73		
242.26			3.57		
247.64			3.41		
253.02			3.27		
258.41			3.13		
263.79			3.00		



Weather:

Global Weathers\Noite

Speed:

2.78

m/s

Stability: D

\UTE Pampa rev_0_Hidrogenio\Study\Hidrogênio\Cenário 025

Flame Data

User-Defined Quantities

Calculation Method	DNV Recommended
Material	HYDROGEN
Ambient Temperature	16.50 degC
Ambient Relative Humidity	0.75 fraction
Mass Modification Factor	3.00
Potential Fireball Mass	920.14 kg
Vapor Fraction	1.00 fraction
Actual Flammable Mass	920.14 kg
Vessel Burst Pressure (gauge)	168.00 bar

Input and/or Output Quantities

	Input	Output
Fireball Radius		29.77 m
Fireball Duration		5.02 s
Flame Emissive Power		400.00 kW/m2
Fireball Lift Off Height		59.54 m

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7

Flame Co-ordinates

X	Z	R	Phi
m	m	m	deg
0.00	29.77	0.00	0.00
0.00	31.57	10.18	0.00
0.00	36.74	19.14	0.00
0.00	44.66	25.78	0.00
0.00	54.37	29.32	0.00
0.00	64.71	29.32	0.00
0.00	74.43	25.78	0.00
0.00	82.35	19.14	0.00
0.00	87.52	10.18	0.00
0.00	89.31	0.00	0.00



Ellipse Results

User-Defined Quantities

Observer Inclination	Variable	deg
Observer Orientation	Variable	deg
Exposure Duration	5.02	s
Effect Height	0.00	m

Radiation Intensity Ellipse

Calculated Quantities

Incident Radiation Level:	3.00	kW/m2
Lethality Level	0.00	%
View Factor	0.01	
Probit Level	-4.92	
Dose Level	217,313.71	(W/m2)^Probit N.s
Downwind semi-axis (A)	264.09	m
Crosswind semi-axis (B)	264.09	m
Offset Ratio (D)	0.00	
Effect Distance	264.09	m
Area	219,109.49	m2
Incident Radiation Level:	12.50	kW/m2
Lethality Level	0.00	%
View Factor	0.03	
Probit Level	-0.05	
Dose Level	1,456,972.92	(W/m2)^Probit N.s
Downwind semi-axis (A)	125.83	m
Crosswind semi-axis (B)	125.83	m
Offset Ratio (D)	0.00	
Effect Distance	125.83	m
Area	49,743.47	m2
Incident Radiation Level:	37.50	kW/m2
Lethality Level	9.70	%
View Factor	0.09	
Probit Level	3.70	
Dose Level	6,303,724.86	(W/m2)^Probit N.s
Downwind semi-axis (A)	58.33	m
Crosswind semi-axis (B)	58.33	m
Offset Ratio (D)	0.00	
Effect Distance	58.33	m
Area	10,687.84	m2

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7

Incident Radiation Level:	44.00	kW/m2
Lethality Level	22.56	%
View Factor	0.11	
Probit Level	4.25	
Dose Level	7,801,117.40	(W/m2)^Probit N.s
Downwind semi-axis (A)	49.40	m
Crosswind semi-axis (B)	49.40	m
Offset Ratio (D)	0.00	
Effect Distance	49.40	m
Area	7,667.90	m2

Radiation Lethality Ellipse

Lethality Level:	1.00	%
Intensity Level	27.75	kW/m2
View Factor	0.07	
Probit Level	2.67	
Dose Level	4,219,984.47	(W/m2)^Probit N.s
Downwind semi-axis (A)	75.19	m
Crosswind semi-axis (B)	75.19	m
Offset Ratio (D)	0.00	
Effect Distance	75.19	m
Area	17,762.75	m2

Lethality Level:	50.00	%
Intensity Level	54.87	kW/m2
View Factor	0.14	
Probit Level	5.00	
Dose Level	10,470,272.18	(W/m2)^Probit N.s
Downwind semi-axis (A)	36.88	m
Crosswind semi-axis (B)	36.88	m
Offset Ratio (D)	0.00	
Effect Distance	36.88	m
Area	4,272.49	m2

Lethality Level:	99.00	%
Intensity Level	108.47	kW/m2
View Factor	0.27	
Probit Level	7.33	
Dose Level	25,978,582.16	(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

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7

Radiation Distance

User-Defined Quantities

Maximum Distance	264.09	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			77.37		
5.39			76.69		
10.78			74.72		
16.17			71.64		
21.56			67.72		
26.95			63.74		
32.34			58.94		
37.73			54.11		
43.12			49.11		
48.51			44.70		
53.90			40.61		
59.29			36.86		
64.68			33.45		
70.07			30.38		
75.45			27.63		
80.84			25.16		
86.23			22.96		
91.62			20.99		
97.01			19.23		
102.40			17.66		
107.79			16.25		
113.18			14.99		
118.57			13.85		
123.96			12.83		
129.35			11.91		
134.74			11.07		
140.13			10.32		
145.52			9.63		
150.91			9.01		
156.30			8.44		
161.69			7.92		
167.08			7.44		
172.47			7.00		
177.86			6.60		
183.25			6.23		
188.64			5.89		
194.03			5.57		
199.42			5.28		

FIREBALL REPORT

Unique Audit Number: 2,739,689



Study Folder: UTE Pampa rev_0_Hidrogenio

Phast 6.7

X Coordinates m	Y Coordinates m	Z Coordinates m	Incident Radiation kW/m2	Lethality Level %	View Factor
204.81			5.01		
210.20			4.76		
215.59			4.52		
220.98			4.31		
226.36			4.10		
231.75			3.91		
237.14			3.73		
242.53			3.57		
247.92			3.41		
253.31			3.27		
258.70			3.13		
264.09			3.00		