

SUMMARY REPORT

Unique Audit Number: 973.361



Study Folder: ELETROBRAS UAS

Phast 6.7



ELETROBRAS UAS



Simulações

H03

Base Case

CASE Name: Data

Path: \ELETROBRAS UAS\Simulações\H03

User-Defined Data

Material

Material Identifier	METHANE
Type of Vessel	Pressurized Gas
Pressure Specification	Pressure specified
Storage Pressure - gauge	160 bar
Temperature	40 degC
Volume Inventory	0,05 m3

Scenario

Scenario Type	Catastrophic rupture
Phase to be Released	Vapor
Building Wake Effect	None

Location

[Elevation	1 m]
Use ERPG averaging time	ERPG not selected
Use IDLH averaging time	IDLH not selected
Use STEL averaging time	STEL not selected
Supply a user defined averaging time	Not supplied

Bund

Status of Bund	No bund present
[Type of Bund Surface	User-Defined (Land)]
[Bund Height	0 m]
[Bund Failure Modeling	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
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Flammable

Explosion Method	TNT
Jet Fire Method	Cone Model

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	5,632 kg
Use Burst Pressure	No - Use release pressure for fireball

Fireball Parameters

[Mass Modification Factor	3]
[Calculation method for fireball	DNV Recommended]
[TNO model flame temperature	1727 degC]

Toxic Parameters

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[Indoor Calculations	Unselected]
[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0,05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D
System	Absolute
East(1)	0 m
North(1)	0 m

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Path: \ELETROBRAS UAS\Simulações\H03

DISCHARGE DATA for Weather: Global Weathers\Dia

Wind Speed:	1,37 m/s
Wind Speed at Height (Calculated)	0,85 m/s
Pasquill Stability:	A/B

USER-DEFINED QUANTITIES

Material	METHANE
Scenario	Catastrophic rupture
Inventory	5,63 kg
Fixed Duration	n/a s

Stagnation data (data at upstream end for long pipe):

- Pressure	161,01 bar
- Temperature	40,00 degC
- Fluid State	Pressurized gas

CALCULATED QUANTITIES

Mass Flow of Air (Vent from Vapor Space only)	n/a
Mass Flowrate	n/a kg/s
Release Duration	n/a s
Orifice or pipe exit data (before atmospheric expansion):	
- Pressure	n/a bar
- Temperature	n/a degC
- Vena Contracta Velocity (exit velocity for pipe releases)	n/a m/s
- Discharge Coefficient	n/a
Final data (after atmospheric expansion):	
- Temperature	-161,48 degC
- Liquid Mass Fraction	0,17 fraction
- Droplet Diameter	0,01 um
- Expanded Radius	n/a m
- Velocity	500,00 m/s

DISCHARGE DATA for Weather: Global Weathers\Noite

Wind Speed:	1,48 m/s
Wind Speed at Height (Calculated)	0,38 m/s
Pasquill Stability:	F

USER-DEFINED QUANTITIES

Material	METHANE
Scenario	Catastrophic rupture
Inventory	5,63 kg
Fixed Duration	n/a s

Stagnation data (data at upstream end for long pipe):

- Pressure	161,01 bar
- Temperature	40,00 degC
- Fluid State	Pressurized gas

CALCULATED QUANTITIES

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Mass Flow of Air (Vent from Vapor Space only)	n/a
Mass Flowrate	n/a kg/s
Release Duration	n/a s
Orifice or pipe exit data (before atmospheric expansion):	
- Pressure	n/a bar
- Temperature	n/a degC
- Vena Contracta Velocity (exit velocity for pipe releases)	n/a m/s
- Discharge Coefficient	n/a
Final data (after atmospheric expansion):	
- Temperature	-161,48 degC
- Liquid Mass Fraction	0,17 fraction
- Droplet Diameter	0,01 um
- Expanded Radius	n/a m
- Velocity	500,00 m/s



Consequence Results

Distance to Concentration Results

Path: \ELETROBRAS UAS\Simulações\H03

The height for user defined concentrations is the user defined height 0 m
 All toxic results are reported at the toxic effect height 1 m
 All flammable results are reported at the flammable effect height 0 m

Concentration(ppm)	Averaging Time		Distance (m)	
			Dia	Noite
UFL (165000)	18,75	s	1,02837	1,09345
LFL (44000)	18,75	s	2,46188	2,50115
LFL Frac (44000)	18,75	s	2,46188	2,50115

Concentration(ppm)	Averaging Time		Heights (m) for above distances	
			Dia	Noite
UFL (165000)	18,75	s	0	0
LFL (44000)	18,75	s	0	0
LFL Frac (44000)	18,75	s	0	0

Fireball Hazard

Path: \ELETROBRAS UAS\Simulações\H03

Fireball Flame Status	Hazard	
	Dia	Noite
	Hazard	Hazard

Radiation Effects: Fireball Ellipse

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Radiation Level			Distance (m)	
			Dia	Noite
5	kW/m2		38,8044	38,8563
12,5	kW/m2		23,5962	23,6278
37,5	kW/m2		10,6269	10,6477
35	kW/m2		11,3697	11,3907

Radiation Effects: Fireball Distance

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	Radiation Level (kW/m2)	
	Dia	Noite

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Flash Fire Envelope

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All flammable results are reported at the flammable effect height 0 m

			Distance (m)	
			Dia	Noite
Furthest Extent	44000	ppm	2,46188	2,50115
Furthest Extent	44000	ppm	2,46188	2,50115
			Heights (m) for above distances	
			Dia	Noite
Furthest Extent	44000	ppm	0	0
Furthest Extent	44000	ppm	0	0

Explosion Effects: Early Explosion

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Early Explosions are assumed to be centered at the release location
Explosion Model Used : TNT

			Dia	Noite
Supplied Flammable Mass		kg	5,6317	5,6317
			Distance (m) at Overpressure Levels	
			Dia	Noite
Overpressure	0,069	bar	24,7688	24,7688
Overpressure	0,1	bar	19,2713	19,2713
Overpressure	0,3	bar	9,62284	9,62284
			Used Mass (kg) at Overpressure Levels	
			Dia	Noite
Overpressure	0,069	bar	5,6317	5,6317
Overpressure	0,1	bar	5,6317	5,6317
Overpressure	0,3	bar	5,6317	5,6317

Weather Conditions

Path: \ELETROBRAS UAS\Simulações\H03

			Dia	Noite
Wind Speed		m/s	1,37	1,48
Pasquill Stability			A/B	F
Surface Roughness Length		mm	1000	1000
Surface Roughness Parameter			0,173718	0,173718
Atmospheric Temperature		degC	23,3	21,7
Surface Temperature		degC	28,3	21,7
Relative Humidity		fraction	0,798	0,847

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H04

Base Case

CASE Name: Data

Path: \ELETROBRAS UAS\Simulações\H04

User-Defined Data

Material

Material Identifier	HELIUM-3
Type of Vessel	Pressurized Gas
Pressure Specification	Pressure specified
Storage Pressure - gauge	160 bar
Temperature	25 degC
Volume Inventory	0,05 m3

Scenario

Scenario Type	Catastrophic rupture
Phase to be Released	Vapor
Building Wake Effect	None

Location

[Elevation	1 m]
Concentration of Interest	3,295E5 ppm
Averaging time associated with Concentration	User-defined

Bund

Status of Bund	No bund present
[Type of Bund Surface	User-Defined (Land)]
[Bund Height	0 m]
[Bund Failure Modeling	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
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Dispersion

Mass Inventory of material to Disperse	0,9195 kg
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Fireball Parameters

[Mass Modification Factor	3]
[Calculation method for fireball	DNV Recommended]
[TNO model flame temperature	1727 degC]

Toxic Parameters

[Indoor Calculations	Unselected]
[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0,05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D

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System	Absolute
East(1)	0 m
North(1)	0 m

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DISCHARGE DATA for Weather: Global Weathers\Dia

Wind Speed:	1,37 m/s
Wind Speed at Height (Calculated)	0,85 m/s
Pasquill Stability:	A/B

USER-DEFINED QUANTITIES

Material	HELIUM-3
Scenario	Catastrophic rupture
Inventory	0,92 kg
Fixed Duration	n/a s

Stagnation data (data at upstream end for long pipe):

- Pressure	161,01 bar
- Temperature	25,00 degC
- Fluid State	Pressurized gas

CALCULATED QUANTITIES

Mass Flow of Air (Vent from Vapor Space only)	n/a
Mass Flowrate	n/a kg/s
Release Duration	n/a s
Orifice or pipe exit data (before atmospheric expansion):	
- Pressure	n/a bar
- Temperature	n/a degC
- Vena Contracta Velocity (exit velocity for pipe releases)	n/a m/s
- Discharge Coefficient	n/a
Final data (after atmospheric expansion):	
- Temperature	-233,90 degC
- Liquid Mass Fraction	0,00 fraction
- Droplet Diameter	0,00 um
- Expanded Radius	n/a m
- Velocity	500,00 m/s

DISCHARGE DATA for Weather: Global Weathers\Noite

Wind Speed:	1,48 m/s
Wind Speed at Height (Calculated)	0,38 m/s
Pasquill Stability:	F

USER-DEFINED QUANTITIES

Material	HELIUM-3
Scenario	Catastrophic rupture
Inventory	0,92 kg
Fixed Duration	n/a s

Stagnation data (data at upstream end for long pipe):

- Pressure	161,01 bar
- Temperature	25,00 degC
- Fluid State	Pressurized gas

CALCULATED QUANTITIES

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Orifice or pipe exit data (before atmospheric expansion):	
- Pressure	n/a bar
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- Vena Contracta Velocity (exit velocity for pipe releases)	n/a m/s
- Discharge Coefficient	n/a
Final data (after atmospheric expansion):	
- Temperature	-233,90 degC
- Liquid Mass Fraction	0,00 fraction
- Droplet Diameter	0,00 um
- Expanded Radius	n/a m
- Velocity	500,00 m/s



Consequence Results

Distance to Concentration Results

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The height for user defined concentrations is the user defined height 0 m
 All toxic results are reported at the toxic effect height 1 m
 All flammable results are reported at the flammable effect height 0 m

Concentration(ppm)	Averaging Time		Dia	Noite	Distance (m)
User Conc (329480)	600	s	No Hazard	No Hazard	
Concentration(ppm)	Averaging Time		Dia	Noite	Heights (m) for above distances
User Conc (329480)	600	s	0	0	

Weather Conditions

Path: \ELETROBRAS UAS\Simulações\H04

		Dia	Noite
Wind Speed	m/s	1,37	1,48
Pasquill Stability		A/B	F
Surface Roughness Length	mm	1000	1000
Surface Roughness Parameter		0,173718	0,173718
Atmospheric Temperature	degC	23,3	21,7
Surface Temperature	degC	28,3	21,7
Relative Humidity	fraction	0,798	0,847