

Dados de Entrada do Trecho Uberaba-Ribeirão Preto / Estação Meteorológica de Araxá – Álcool Bombeado

Cenário	Liberação de produto desde o km 0+000 até o km 67+500. (Ø da linha=14")
Modelos de Simulação Utilizados	User Defined
Diâmetro do vazamento	355,6 mm (100% do diâmetro) 71,12 mm (20% do diâmetro) 17,78 mm (5% do diâmetro)
Direção do vazamento	Vertical (V) Angular 45° (A) Horizontal Impingement(HI)
Altura da linha	0 m
Substância	Etanol Bombeado
Velocidade de vazamento^{A, B}	3,9 m/s (100% do diâmetro) 56,9 m/s (20% do diâmetro) 121,3 m/s (5% do diâmetro)
Diâmetro de gota^{A, B}	17,4 mm (100% do diâmetro) 0,082 mm (20% do diâmetro) 0,018 mm (5% do diâmetro)
Tempo de vazamento	300 s (100% do diâmetro) 468 s (20% do diâmetro) 1152 s (5% do diâmetro)
Taxa de vazamento^{A, B}	183,5 kg/s (100% do diâmetro) 107,1 kg/s (20% do diâmetro) 14,3 kg/s (5% do diâmetro)
Temperatura	40°C
Área da poça^{A, B}	966,9 m ² (100% do diâmetro) 695,6 m ² (20% do diâmetro) 147,0 m ² (5% do diâmetro)
Volume de confinamento	1120 m ³
Considerações	
A – Calculado pelo LeakMap	
B – Os valores para ruptura foram retirados do Aglomerado Humano Vila Canindé (km 21,69). Os valores para furo com 20% do diâmetro foram retirados do Aglomerado Humano Vila Canindé (km 21,69). Os valores para furo com 5% do diâmetro foram retirados do Aglomerado Humano Vila Canindé (km 21,69).	



SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá HORIZONTAL IMPINGEMENT

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present

Area of Dike 695,6 m²

[Type of Bund Surface Concrete]

Bund Height 0,03 m

[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal impingementontal Impingement

Flammable

Method to use for explosions Multi-Energy

Jet Fire Method Shell

Dispersion

Number of Release Segments 1

Fluid Phase(1) Liquid

Discharge Velocity(1) 56,9 m/s

Droplet Diameter(1) 81,7 um

Duration of Discharge(1) 468 s

Final Temperature(1) 40 degC

Release Rate(1) 107,1 kg/s

Pre-Dilution Air Rates(1) 0 kg/s

Late Ignition Location No ignition location

Mass Inventory of material to Disperse 1E7 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]

Multi Energy Explosion

Use Unconfined Volumes	No
Use Fractions	No
Source 1 (Source in Use)	Yes
Source 2 (Source in Use)	No
Source 3 (Source in Use)	No
Source 4 (Source in Use)	No
Source 5 (Source in Use)	No
Source 6 (Source in Use)	No
Source 7 (Source in Use)	No
Source 1 (Strength)	5
Source 1 (Volume)	1120 m3

Geometry

Geometry shape	Point
Coordinates	Absolute
East(1)	0 m
North(1)	0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75 s		2,87044	2,81937
LFL (43000)	18,75 s		12,2111	11,5132
LFL Frac (43000)	18,75 s		12,2111	11,5132

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75 s		0	0
LFL (43000)	18,75 s		0	0
LFL Frac (43000)	18,75 s		0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard



Explosion Effects: Late Ignition

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

Explosion Model Used : Multi Energy
 Explosion Location Criterion: Cloud Center
 All distances are measured from the Source
 All flammable results are reported at the flammable effect height 0 m

			Maximum Distance (m) at Overpressure Level	
			DIA	NOITE
Overpressure	0,05	bar	23,7926	29,7149
Overpressure	0,1	bar	14,3488	17,2949
Overpressure	0,3	bar	Not Reachable	Not Reachable
Overpressure	0,4	bar	Not Reachable	Not Reachable
			Supplementary Data at 0,05 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	1,88228	4,28152
Used Flammable Mass				
Overpressure Radius		m	18,7926	24,7149
Distance to:				
- Ignition Source		m	10	10
- Cloud Front/Centre		m	10	10
- Explosion Centre		m	5	5
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	1,88228	4,28152
Used Flammable Mass				
Overpressure Radius		m	9,34877	12,2949
Distance to:				
- Ignition Source		m	10	10
- Cloud Front/Centre		m	10	10
- Explosion Centre		m	5	5
			Supplementary Data at 0,3 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	Not Reachable	Not Reachable
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	Not Reachable	Not Reachable
- Cloud Front/Centre		m	Not Reachable	Not Reachable
- Explosion Centre		m	0	0
			Supplementary Data at 0,4 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	Not Reachable	Not Reachable
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	Not Reachable	Not Reachable

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- Cloud Front/Centre	m	Not Reachable	Not Reachable
- Explosion Centre	m	0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		12,2111	11,5132
Furthest Extent	43000	ppm		12,2111	11,5132
				Heights (m) for above distances	
				DIA	NOITE
Furthest Extent	43000	ppm		0	0
Furthest Extent	43000	ppm		0	0

Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard



Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Release Segment 1			
Release Duration	s	468	468
Liquid Rainout	fraction	0,999995	0,999995
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	70,9806	73,1025
Pool Vaporization Rate	kg/s	1,38925	1,18762
Total Vapor Flowrate	kg/s	1,39025	1,18862
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	397,019	395,981
Pool Vaporization Rate	kg/s	1,98118	1,73964
Total Vapor Flowrate	kg/s	1,98218	1,74064
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	21132	21130,9
Pool Vaporization Rate	kg/s	0,672046	0,624878
Total Vapor Flowrate	kg/s	0,672046	1,73964
Maximum Pool Radius	m	14,8801	14,8801

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
		Radiation Level (kW/m2)	

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

		Distance (m)	
		DIA	NOITE
Radiation Level	3 kW/m2	67,2431	67,273
Radiation Level	18,3 kW/m2	35,296	35,1049
Radiation Level	36 kW/m2	20,5653	20,4532
Radiation Level	71,2 kW/m2		



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

			DIA	NOITE
			Distance (m)	
Radiation Level	3	kW/m2	67,2431	67,273
Radiation Level	18,3	kW/m2	35,296	35,1049
Radiation Level	36	kW/m2	20,5653	20,4532
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

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Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá VERTICAL

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 695,6 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Vertical

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 56,9 m/s
Droplet Diameter(1) 81,7 um
Duration of Discharge(1) 468 s
Final Temperature(1) 40 degC
Release Rate(1) 107,1 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

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[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	0,0340163	0,0330538
LFL (43000)	18,75	s	0,0468868	0,0439241
LFL Frac (43000)	18,75	s	0,0468868	0,0439241

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

Early Pool Fire Status NOITE
Hazard

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0468868	0,0439241
Furthest Extent	43000	ppm	0,0468868	0,0439241

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

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Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

Late Pool Fire Status	NOITE Hazard
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Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

	Release Segment 1	NOITE
Release Duration	s	468
Liquid Rainout	fraction	0,000133077
Maximum Pool Radius	m	0,698943

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

Radiation Level (kW/m2)	NOITE
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Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

			Distance (m)
Radiation Level	3	kW/m2	NOITE 93,4274
Radiation Level	18,3	kW/m2	92,0052
Radiation Level	36	kW/m2	
Radiation Level	71,2	kW/m2	

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Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

Radiation Level (kW/m2)

NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

Distance (m)

NOITE

Radiation Level	3	kW/m2	94,9348
Radiation Level	18,3	kW/m2	92,2723
Radiation Level	36	kW/m2	Not Reached
Radiation Level	71,2	kW/m2	Not Reached

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Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

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Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá ANGULAR-45

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 695,6 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Angle 45 deg
Outdoor Release Direction Angled from Horizontal impingementontal

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 56,9 m/s
Droplet Diameter(1) 81,7 um
Duration of Discharge(1) 468 s
Final Temperature(1) 40 degC
Release Rate(1) 107,1 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

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[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	0,0538486	0,0462727
LFL (43000)	18,75	s	0,0902023	0,0879319
LFL Frac (43000)	18,75	s	0,0902023	0,0879319

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0902023	0,0879319
Furthest Extent	43000	ppm	0,0902023	0,0879319

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

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Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

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Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
	Release Segment 1		
Release Duration	s	468	468
Liquid Rainout	fraction	0,094312	0,134492
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	171,61	172,923
Pool Vaporization Rate	kg/s	0,222914	0,256028
Total Vapor Flowrate	kg/s	97,2221	92,952
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	68,64	69,6581
Pool Vaporization Rate	kg/s	0,556781	0,639761
Total Vapor Flowrate	kg/s	97,556	93,3357
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	53,0156	53,2594
Pool Vaporization Rate	kg/s	0,718804	0,829487
Total Vapor Flowrate	kg/s	97,718	93,5254
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	45,2944	45,4856
Pool Vaporization Rate	kg/s	0,845511	0,978543
Total Vapor Flowrate	kg/s	97,8447	93,6745
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	77,6	39,9
Pool Vaporization Rate	kg/s	0,99876	1,10509
Total Vapor Flowrate	kg/s	97,9979	93,801
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	93,8775	71,4
Pool Vaporization Rate	kg/s	1,19754	1,26675
Total Vapor Flowrate	kg/s	98,1967	93,9627
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	9949,42	58,5425
Pool Vaporization Rate	kg/s	0,396128	1,43409
Total Vapor Flowrate	kg/s	1,19754	94,13
	Release Segment 1 Cloud Segment 8		
Cloud Segment Duration	s		12455,6
Pool Vaporization Rate	kg/s		0,470892
Total Vapor Flowrate	kg/s	0,396128	1,43409
Maximum Pool Radius	m	18,8692	22,6616

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

	Radiation Level (kW/m2)
DIA	NOITE

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Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	194,715	162,252
Radiation Level	18,3	kW/m2	169,317	132,317
Radiation Level	36	kW/m2	156,593	118,285
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

		Radiation Level (kW/m2)
		NOITE
DIA		



Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	224,599	197,852
Radiation Level	18,3	kW/m2	185,107	151,076
Radiation Level	36	kW/m2	168,286	132,345
Radiation Level	71,2	kW/m2	161,229	123,36

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá HORIZONTAL IMPINGEMENT

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 147 m2
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal impingementontal Impingement

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 121,3 m/s
Droplet Diameter(1) 18 um
Duration of Discharge(1) 1152 s
Final Temperature(1) 40 degC
Release Rate(1) 14,3 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	1,6465	1,76854
LFL (43000)	18,75	s	6,95237	6,80121
LFL Frac (43000)	18,75	s	6,95237	6,80121

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	6,95237	6,80121
Furthest Extent	43000	ppm	6,95237	6,80121

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1152	1152
Liquid Rainout	fraction	0,999978	0,999976
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	149,451	155,002
Pool Vaporization Rate	kg/s	0,33913	0,289412
Total Vapor Flowrate	kg/s	0,34013	0,290412
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	1002,55	998,696
Pool Vaporization Rate	kg/s	0,40263	0,359292
Total Vapor Flowrate	kg/s	0,40363	0,360292
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	20448	20446,3
Pool Vaporization Rate	kg/s	0,15554	0,145456
Total Vapor Flowrate	kg/s	0,15554	0,359292
Maximum Pool Radius	m	6,84044	6,84044

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

	DIA	NOITE
Radiation Level (kW/m2)		

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	33,4075	33,428
Radiation Level	18,3	kW/m2	17,392	17,2618
Radiation Level	36	kW/m2	8,10769	8,08921
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

		Radiation Level (kW/m2)
		NOITE
DIA		



Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

			DIA	NOITE
Radiation Level	3	kW/m2	33,4075	33,428
Radiation Level	18,3	kW/m2	17,392	17,2618
Radiation Level	36	kW/m2	8,10769	8,08921
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá VERTICAL

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 147 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Vertical

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 121,3 m/s
Droplet Diameter(1) 18 um
Duration of Discharge(1) 1152 s
Final Temperature(1) 40 degC
Release Rate(1) 14,3 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	0,0290996	0,0282945
LFL (43000)	18,75	s	0,0400865	0,0375947
LFL Frac (43000)	18,75	s	0,0400865	0,0375947

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0400865	0,0375947
Furthest Extent	43000	ppm	0,0400865	0,0375947

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá ANGULAR-45

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 147 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Angle 45 deg
Outdoor Release Direction Angled from Horizontal impingementontal

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 121,3 m/s
Droplet Diameter(1) 18 um
Duration of Discharge(1) 1152 s
Final Temperature(1) 40 degC
Release Rate(1) 14,3 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	1,7457	1,94824
LFL (43000)	18,75	s	4,30646	3,80052
LFL Frac (43000)	18,75	s	4,30646	3,80052

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	4,30646	3,80052
Furthest Extent	43000	ppm	4,30646	3,80052

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1152	1152
Liquid Rainout	fraction	0,00738645	0,00343426
Maximum Pool Radius	m	2,78883	1,93567

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

	DIA	Radiation Level (kW/m2) NOITE
--	-----	----------------------------------

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

			DIA	NOITE
Radiation Level	3	kW/m2	224,816	127,838
Radiation Level	18,3	kW/m2	220,22	124,722
Radiation Level	36	kW/m2	220,083	
Radiation Level	71,2	kW/m2		

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

	DIA	Radiation Level (kW/m2)
		NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

			DIA	Distance (m)
			NOITE	
Radiation Level	3	kW/m2	232,823	133,686
Radiation Level	18,3	kW/m2	224,673	127,228
Radiation Level	36	kW/m2	221,695	125,856
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-furo-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá VERTICAL

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 966,9 m2
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Vertical

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 3,9 m/s
Droplet Diameter(1) 1,74E4 um
Duration of Discharge(1) 300 s
Final Temperature(1) 40 degC
Release Rate(1) 183,5 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	2,1103	3,26479
LFL (43000)	18,75	s	8,05443	5,73267
LFL Frac (43000)	18,75	s	8,05443	5,73267

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	8,05443	5,73267
Furthest Extent	43000	ppm	8,05443	5,73267

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

		DIA	NOITE
	Release Segment 1		
Release Duration	s	300	300
Liquid Rainout	fraction	0,986757	0,990965
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	51,84	52,5625
Pool Vaporization Rate	kg/s	1,43265	1,30581
Total Vapor Flowrate	kg/s	3,86273	2,96373
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	249,027	248,304
Pool Vaporization Rate	kg/s	2,37703	2,19801
Total Vapor Flowrate	kg/s	4,8071	3,85593
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	21299,1	21299,1
Pool Vaporization Rate	kg/s	0,890358	0,830576
Total Vapor Flowrate	kg/s	2,37703	2,19801
Maximum Pool Radius	m	17,5435	17,5435

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

	DIA	NOITE
Radiation Level (kW/m2)		

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Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	78,6447	78,1373
Radiation Level	18,3	kW/m2	41,6385	40,8906
Radiation Level	36	kW/m2	25,6486	24,8999
Radiation Level	71,2	kW/m2	19,2248	18,6875

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

		Radiation Level (kW/m2)	
		DIA	NOITE



Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

			DIA	NOITE
Radiation Level	3	kW/m2	78,6447	78,1373
Radiation Level	18,3	kW/m2	41,6385	40,8906
Radiation Level	36	kW/m2	25,6486	24,8999
Radiation Level	71,2	kW/m2	19,2248	18,6875

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool c/ bomba-ruptura-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

**Dados de Entrada do Trecho Uberaba-Ribeirão Preto / Estação Meteorológica de Araxá –
Álcool não Bombeado**

<u>Cenário</u>	Liberação de produto desde o km 0+000 até o km 67+500. (Ø da linha=14")
<u>Modelos de Simulação Utilizados</u>	User Defined
Diâmetro do vazamento	355,6 mm (100% do diâmetro) 71,12 mm (20% do diâmetro) 17,78 mm (5% do diâmetro)
Direção do vazamento	Vertical (V) Angular 45° (A) Horizontal Impingement(HI)
Altura da linha	0 m
Substância	Etanol Parado
Velocidade de vazamento^{A, B}	2,0 m/s (100% do diâmetro) 38,3 m/s (20% do diâmetro) 60,5 m/s (5% do diâmetro)
Diâmetro de gota^{A, B}	6,88 mm (100% do diâmetro) 0,089 mm (20% do diâmetro) 0,032 mm (5% do diâmetro)
Tempo de vazamento	300 s (100% do diâmetro) 444 s (20% do diâmetro) 1926 s (5% do diâmetro)
Taxa de vazamento^{A, B}	92,7 kg/s (100% do diâmetro) 72,0 kg/s (20% do diâmetro) 7,1 kg/s (5% do diâmetro)
Temperatura	40°C
Área da poça^{A, B}	858,0 m ² (100% do diâmetro) 603,2 m ² (20% do diâmetro) 115,4 m ² (5% do diâmetro)
Volume de confinamento	1120 m ³
Considerações	
A – Calculado pelo LeakMap	
B – Os valores para ruptura foram retirados do Aglomerado Humano Vila Canindé (km 21,69). Os valores para furo com 20% do diâmetro foram retirados do Aglomerado Humano Vila Canindé (km 21,69). Os valores para furo com 5% do diâmetro foram retirados do Aglomerado Humano Vila Canindé (km 21,69).	



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Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá HORIZONTAL IMPINGEMENT

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 603,2 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal impingementontal Impingement

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 38,3 m/s
Droplet Diameter(1) 88,68 um
Duration of Discharge(1) 444 s
Final Temperature(1) 40 degC
Release Rate(1) 72 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

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[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m

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Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

The height for user defined concentrations is the user defined height 0 m

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

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
UFL (190000)	18,75	s	2,49239	2,47677
LFL (43000)	18,75	s	11,1076	10,2976
LFL Frac (43000)	18,75	s	11,1076	10,2976

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
UFL (190000)	18,75	s	0	NOITE 0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard



Explosion Effects: Late Ignition

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

Explosion Model Used : Multi Energy
 Explosion Location Criterion: Cloud Center
 All distances are measured from the Source
 All flammable results are reported at the flammable effect height 0 m

			Maximum Distance (m) at Overpressure Level	
			DIA	NOITE
Overpressure	0,05	bar	25,0753	27,4145
Overpressure	0,1	bar	14,9869	16,1506
Overpressure	0,3	bar	Not Reachable	Not Reachable
Overpressure	0,4	bar	Not Reachable	Not Reachable
			Supplementary Data at 0,05 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	2,2946	3,19383
Used Flammable Mass				
Overpressure Radius		m	20,0753	22,4145
Distance to:				
- Ignition Source		m	10	10
- Cloud Front/Centre		m	10	10
- Explosion Centre		m	5	5
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	2,2946	3,19383
Used Flammable Mass				
Overpressure Radius		m	9,98686	11,1506
Distance to:				
- Ignition Source		m	10	10
- Cloud Front/Centre		m	10	10
- Explosion Centre		m	5	5
			Supplementary Data at 0,3 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	Not Reachable	Not Reachable
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	Not Reachable	Not Reachable
- Cloud Front/Centre		m	Not Reachable	Not Reachable
- Explosion Centre		m	0	0
			Supplementary Data at 0,4 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	Not Reachable	Not Reachable
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	Not Reachable	Not Reachable

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- Cloud Front/Centre	m	Not Reachable	Not Reachable
- Explosion Centre	m	0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		11,1076	10,2976
Furthest Extent	43000	ppm		11,1076	10,2976
				Heights (m) for above distances	
				DIA	NOITE
Furthest Extent	43000	ppm		0	0
Furthest Extent	43000	ppm		0	0

Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

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Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Release Segment 1			
Release Duration	s	444	444
Liquid Rainout	fraction	0,999996	0,999995
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	69,7225	71,4025
Pool Vaporization Rate	kg/s	1,09082	0,926708
Total Vapor Flowrate	kg/s	1,09182	0,927708
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	375,332	373,652
Pool Vaporization Rate	kg/s	1,60898	1,41158
Total Vapor Flowrate	kg/s	1,60998	1,41258
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	21154,9	21154,9
Pool Vaporization Rate	kg/s	0,562663	0,523054
Total Vapor Flowrate	kg/s	1,60898	1,41158
Maximum Pool Radius	m	13,8566	13,8566

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		DIA	NOITE
			Radiation Level (kW/m2)

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		Distance (m)		
		DIA	NOITE	
Radiation Level	3	kW/m2	63,0677	63,0972
Radiation Level	18,3	kW/m2	33,0936	32,9097
Radiation Level	36	kW/m2	18,9008	18,7828
Radiation Level	71,2	kW/m2		



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	63,0677	63,0972
Radiation Level	18,3	kW/m2	33,0936	32,9097
Radiation Level	36	kW/m2	18,9008	18,7828
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

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Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá VERTICAL

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 603,2 m2
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Vertical

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 38,3 m/s
Droplet Diameter(1) 88,68 um
Duration of Discharge(1) 444 s
Final Temperature(1) 40 degC
Release Rate(1) 72 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

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[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	0,033995	0,0330331
LFL (43000)	18,75	s	0,0468574	0,0438967
LFL Frac (43000)	18,75	s	0,0468574	0,0438967

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0468574	0,0438967
Furthest Extent	43000	ppm	0,0468574	0,0438967

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

SUMMARY REPORT

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Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		DIA	NOITE
	Release Segment 1		
Release Duration	s	444	444
Liquid Rainout	fraction	0,00211448	0,0476805
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s		170,303
Pool Vaporization Rate	kg/s		0,0665891
Total Vapor Flowrate	kg/s		68,6336
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s		68,4
Pool Vaporization Rate	kg/s		0,165148
Total Vapor Flowrate	kg/s		68,7321
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s		53,7075
Pool Vaporization Rate	kg/s		0,214025
Total Vapor Flowrate	kg/s		68,781
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s		45,2306
Pool Vaporization Rate	kg/s		0,252644
Total Vapor Flowrate	kg/s		68,8196
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s		39,69
Pool Vaporization Rate	kg/s		0,285127
Total Vapor Flowrate	kg/s		68,8521
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s		131,016
Pool Vaporization Rate	kg/s		0,341797
Total Vapor Flowrate	kg/s		68,9088
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s		5067,85
Pool Vaporization Rate	kg/s		0,188819
Total Vapor Flowrate	kg/s		0,341797
Maximum Pool Radius	m	2,2304	10,7652

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

	Radiation Level (kW/m2)
DIA	NOITE



Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	80,6631	88,5009
Radiation Level	18,3	kW/m2	75,4528	72,6218
Radiation Level	36	kW/m2	74,9462	63,5742
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		Radiation Level (kW/m2)
		NOITE
	DIA	

**Radiation Effects: Late Pool Fire Ellipse****Path:** \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	84,7465	105,959
Radiation Level	18,3	kW/m2	77,6699	81,8429
Radiation Level	36	kW/m2	75,7635	69,6009
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions**Path:** \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

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Study Folder: seda

Phast 6.53.1

Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá ANGULAR-45

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 603,2 m2
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Angle 45 deg
Outdoor Release Direction Angled from Horizontal impingementontal

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 38,3 m/s
Droplet Diameter(1) 88,68 um
Duration of Discharge(1) 444 s
Final Temperature(1) 40 degC
Release Rate(1) 72 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

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[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	0,0553169	0,0471495
LFL (43000)	18,75	s	0,090759	0,088148
LFL Frac (43000)	18,75	s	0,090759	0,088148

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,090759	0,088148
Furthest Extent	43000	ppm	0,090759	0,088148

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

SUMMARY REPORT

Study Folder: seda

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Phast 6.53.1



Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

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Phast 6.53.1



Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Release Segment 1			
Release Duration	s	444	444
Liquid Rainout	fraction	0,109417	0,155771
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	164,481	165,766
Pool Vaporization Rate	kg/s	0,172193	0,197874
Total Vapor Flowrate	kg/s	64,2942	60,9823
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	66,5594	66,7969
Pool Vaporization Rate	kg/s	0,428872	0,49119
Total Vapor Flowrate	kg/s	64,5508	61,2757
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	51,2	51,36
Pool Vaporization Rate	kg/s	0,553993	0,636221
Total Vapor Flowrate	kg/s	64,676	61,4207
Release Segment 1 Cloud Segment 4			
Cloud Segment Duration	s	43,5625	43,6875
Pool Vaporization Rate	kg/s	0,651386	0,750242
Total Vapor Flowrate	kg/s	64,7734	61,5347
Release Segment 1 Cloud Segment 5			
Cloud Segment Duration	s	74,1975	39,1125
Pool Vaporization Rate	kg/s	0,768477	0,847724
Total Vapor Flowrate	kg/s	64,8905	61,6322
Release Segment 1 Cloud Segment 6			
Cloud Segment Duration	s	91,575	68
Pool Vaporization Rate	kg/s	0,917477	0,97128
Total Vapor Flowrate	kg/s	65,0395	61,7558
Release Segment 1 Cloud Segment 7			
Cloud Segment Duration	s	8547,52	57,9619
Pool Vaporization Rate	kg/s	0,327935	1,09176
Total Vapor Flowrate	kg/s	0,917477	61,8762
Release Segment 1 Cloud Segment 8			
Cloud Segment Duration	s		10902,7
Pool Vaporization Rate	kg/s		0,385983
Total Vapor Flowrate	kg/s	0,327935	1,09176
Maximum Pool Radius	m	16,2456	19,4912

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		Radiation Level (kW/m2)	
		DIA	NOITE

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	132,567	126,518
Radiation Level	18,3	kW/m2	109,83	99,7391
Radiation Level	36	kW/m2	97,9897	86,7057
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		Radiation Level (kW/m2)
		NOITE
DIA		



Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	157,616	156,358
Radiation Level	18,3	kW/m2	123,064	115,453
Radiation Level	36	kW/m2	107,571	98,2521
Radiation Level	71,2	kW/m2	Not Reached	91,1188

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá HORIZONTAL IMPINGEMENT

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 115,4 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal impingementontal Impingement

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 60,5 m/s
Droplet Diameter(1) 31,65 um
Duration of Discharge(1) 1926 s
Final Temperature(1) 40 degC
Release Rate(1) 7,1 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	1,21163	1,27216
LFL (43000)	18,75	s	5,42746	5,31964
LFL Frac (43000)	18,75	s	5,42746	5,31964

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	5,42746	5,31964
Furthest Extent	43000	ppm	5,42746	5,31964

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1926	1926
Liquid Rainout	fraction	0,999981	0,999979
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	242,581	252,81
Pool Vaporization Rate	kg/s	0,2406	0,206453
Total Vapor Flowrate	kg/s	0,2416	0,207453
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	1683,42	1673,19
Pool Vaporization Rate	kg/s	0,276257	0,249411
Total Vapor Flowrate	kg/s	0,277257	0,250411
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	18550,4	9553,91
Pool Vaporization Rate	kg/s	0,122527	0,132451
Total Vapor Flowrate	kg/s	0,122527	0,132451
Maximum Pool Radius	m	6,06077	6,06077

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

	DIA	NOITE
Radiation Level (kW/m2)		

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	29,9613	29,9799
Radiation Level	18,3	kW/m2	15,5517	15,4273
Radiation Level	36	kW/m2	7,07108	7,07108
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

		Radiation Level (kW/m2)
		NOITE
DIA		



Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	29,9613	29,9799
Radiation Level	18,3	kW/m2	15,5517	15,4273
Radiation Level	36	kW/m2	7,07108	7,07108
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá VERTICAL

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 115,4 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Vertical

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 60,5 m/s
Droplet Diameter(1) 31,65 um
Duration of Discharge(1) 1926 s
Final Temperature(1) 40 degC
Release Rate(1) 7,1 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	0,0290996	0,0282945
LFL (43000)	18,75	s	0,0400865	0,0375947
LFL Frac (43000)	18,75	s	0,0400865	0,0375947

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0400865	0,0375947
Furthest Extent	43000	ppm	0,0400865	0,0375947

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá ANGULAR-45

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 115,4 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Angle 45 deg
Outdoor Release Direction Angled from Horizontal impingementontal

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 60,5 m/s
Droplet Diameter(1) 31,65 um
Duration of Discharge(1) 1926 s
Final Temperature(1) 40 degC
Release Rate(1) 7,1 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	1,02228	0,662922
LFL (43000)	18,75	s	1,97286	1,20207
LFL Frac (43000)	18,75	s	1,97286	1,20207

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	1,97286	1,20207
Furthest Extent	43000	ppm	1,97286	1,20207

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	43000	ppm	0	0
Furthest Extent	43000	ppm	0	0

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1926	1926
Liquid Rainout	fraction	0,0104453	0,00778978
Maximum Pool Radius	m	2,80093	2,5096

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

	DIA	Radiation Level (kW/m2) NOITE
--	-----	----------------------------------

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	123,453	79,4424
Radiation Level	18,3	kW/m2	119,53	76,1103
Radiation Level	36	kW/m2		
Radiation Level	71,2	kW/m2		

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

	DIA	Radiation Level (kW/m2)
		NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

			DIA	Distance (m)
				NOITE
Radiation Level	3	kW/m2	132,518	87,8387
Radiation Level	18,3	kW/m2	124,334	80,2188
Radiation Level	36	kW/m2	121,345	77,7693
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-furo-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

User-Defined Data

Material

Material Identifier ETHANOL

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 858 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Vertical

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 2 m/s
Droplet Diameter(1) 6878 um
Duration of Discharge(1) 300 s
Final Temperature(1) 40 degC
Release Rate(1) 92,7 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

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[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (190000)	18,75	s	1,42202	1,25312
LFL (43000)	18,75	s	10,3186	7,63994
LFL Frac (43000)	18,75	s	10,3186	7,63994

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (190000)	18,75	s	0	0
LFL (43000)	18,75	s	0	0
LFL Frac (43000)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

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Explosion Effects: Late Ignition

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

Explosion Model Used : Multi Energy

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

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

			Maximum Distance (m) at Overpressure Level
			DIA
Overpressure	0,05	bar	29,0428
Overpressure	0,1	bar	16,9606
Overpressure	0,3	bar	Not Reachable
Overpressure	0,4	bar	Not Reachable

Supplementary Data at 0,05 bar

			DIA
Supplied Flammable Mass		kg	3,94166
Used Flammable Mass			
Overpressure Radius		m	24,0428
Distance to:			
- Ignition Source		m	10
- Cloud Front/Centre		m	10
- Explosion Centre		m	5

Supplementary Data at 0,1 bar

			DIA
Supplied Flammable Mass		kg	3,94166
Used Flammable Mass			
Overpressure Radius		m	11,9606
Distance to:			
- Ignition Source		m	10
- Cloud Front/Centre		m	10
- Explosion Centre		m	5

Supplementary Data at 0,3 bar

			DIA
Supplied Flammable Mass		kg	Not Reachable
Used Flammable Mass			
Overpressure Radius		m	0
Distance to:			
- Ignition Source		m	Not Reachable
- Cloud Front/Centre		m	Not Reachable
- Explosion Centre		m	0

Supplementary Data at 0,4 bar

			DIA
Supplied Flammable Mass		kg	Not Reachable
Used Flammable Mass			
Overpressure Radius		m	0
Distance to:			
- Ignition Source		m	Not Reachable

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- Cloud Front/Centre	m	Not Reachable
- Explosion Centre	m	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		10,3186	7,63994
Furthest Extent	43000	ppm		10,3186	7,63994
				Heights (m) for above distances	
				DIA	NOITE
Furthest Extent	43000	ppm		0	0
Furthest Extent	43000	ppm		0	0

Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard



Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

		DIA	NOITE
Release Segment 1			
Release Duration	s	300	300
Liquid Rainout	fraction	0,99081	0,992567
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	55,8756	56,6256
Pool Vaporization Rate	kg/s	1,10904	0,958574
Total Vapor Flowrate	kg/s	1,96098	1,64765
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	244,991	244,241
Pool Vaporization Rate	kg/s	2,00255	1,76167
Total Vapor Flowrate	kg/s	2,8545	2,45074
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	21299,1	21299,1
Pool Vaporization Rate	kg/s	0,761995	0,70767
Total Vapor Flowrate	kg/s	2,00255	1,76167
Maximum Pool Radius	m	16,526	16,526

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

		DIA	NOITE
		Radiation Level (kW/m2)	
		DIA	NOITE

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

		Distance (m)		
		DIA	NOITE	
Radiation Level	3	kW/m2	73,9375	73,9428
Radiation Level	18,3	kW/m2	38,8539	38,6259
Radiation Level	36	kW/m2	23,2522	22,9755
Radiation Level	71,2	kW/m2		

SUMMARY REPORT

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Phast 6.53.1



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

	DIA	NOITE
Radiation Level (kW/m2)		

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

			DIA	NOITE
			Distance (m)	
Radiation Level	3	kW/m2	73,9375	73,9428
Radiation Level	18,3	kW/m2	38,8539	38,6259
Radiation Level	36	kW/m2	23,2522	22,9755
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-álcool s/ bomba-ruptura-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

Dados de Entrada do Trecho Uberaba-Ribeirão Preto / Estação Meteorológica de Araxá – Gasolina Bombeada

<u>Cenário</u>	Liberação de produto desde o km 0+000 até o km 67+500. (Ø da linha=14")
<u>Modelos de Simulação Utilizados</u>	User Defined
Diâmetro do vazamento	355,6 mm (100% do diâmetro) 71,12 mm (20% do diâmetro) 17,78 mm (5% do diâmetro)
Direção do vazamento	Vertical (V) Angular 45° (A) Horizontal Impingement(HI)
Altura da linha	0 m
Substância	Gasolina
Velocidade de vazamento^{A, B}	3,9 m/s (100% do diâmetro) 57,4 m/s (20% do diâmetro) 124,3 m/s (5% do diâmetro)
Diâmetro de gota^{A, B}	13,60 mm (100% do diâmetro) 0,063 mm (20% do diâmetro) 0,013 mm (5% do diâmetro)
Tempo de vazamento	300 s (100% do diâmetro) 462 s (20% do diâmetro) 1104 s (5% do diâmetro)
Taxa de vazamento^{A, B}	173,5 kg/s (100% do diâmetro) 102,6 kg/s (20% do diâmetro) 13,9 kg/s (5% do diâmetro)
Temperatura	40°C
Área da poça^{A, B}	1086,9 m ² (100% do diâmetro) 803,0 m ² (20% do diâmetro) 206,0 m ² (5% do diâmetro)
Volume de confinamento	1120 m ³
Considerações	
A – Calculado pelo LeakMap	
B – Os valores para ruptura foram retirados do Aglomerado Humano Vila Canindé (km 21,69). Os valores para furo com 20% do diâmetro foram retirados do Aglomerado Humano Vila Canindé (km 21,69). Os valores para furo com 5% do diâmetro foram retirados do Aglomerado Humano Vila Canindé (km 21,69).	



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Phast 6.53.1



Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá HORIZONTAL IMPINGEMENT

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

User-Defined Data

Material

Material Identifier N-HEXANE

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 803 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal impingementontal Impingement

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 57,4 m/s
Droplet Diameter(1) 62,78 um
Duration of Discharge(1) 462 s
Final Temperature(1) 40 degC
Release Rate(1) 102,6 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

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Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (76800)	18,75 s		7,75954	8,45512
LFL (10500)	18,75 s		38,5195	37,6079
LFL Frac (10500)	18,75 s		38,5195	37,6079

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (76800)	18,75 s		0	0
LFL (10500)	18,75 s		0	0
LFL Frac (10500)	18,75 s		0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

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Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

Explosion Model Used : Multi Energy

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

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

			Maximum Distance (m) at Overpressure Level	
			DIA	NOITE
Overpressure	0,05	bar	64,475	70,3632
Overpressure	0,1	bar	39,6124	42,5416
Overpressure	0,3	bar	Not Reachable	Not Reachable
Overpressure	0,4	bar	Not Reachable	Not Reachable
			Supplementary Data at 0,05 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	20,5824	28,8405
Used Flammable Mass				
Overpressure Radius		m	49,475	55,3632
Distance to:				
- Ignition Source		m	30	30
- Cloud Front/Centre		m	30	30
- Explosion Centre		m	15	15
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	20,5824	28,8405
Used Flammable Mass				
Overpressure Radius		m	24,6124	27,5416
Distance to:				
- Ignition Source		m	30	30
- Cloud Front/Centre		m	30	30
- Explosion Centre		m	15	15
			Supplementary Data at 0,3 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	Not Reachable	Not Reachable
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	Not Reachable	Not Reachable
- Cloud Front/Centre		m	Not Reachable	Not Reachable
- Explosion Centre		m	0	0
			Supplementary Data at 0,4 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	Not Reachable	Not Reachable
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	Not Reachable	Not Reachable

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- Cloud Front/Centre	m	Not Reachable	Not Reachable
- Explosion Centre	m	0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		38,5195	37,6079
Furthest Extent	10500	ppm		38,5195	37,6079
				Heights (m) for above distances	
				DIA	NOITE
Furthest Extent	10500	ppm		0	0
Furthest Extent	10500	ppm		0	0

Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

Late Pool Fire Status	DIA	NOITE
	Hazard	Hazard



Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Release Segment 1			
Release Duration	s	462	462
Liquid Rainout	fraction	0,999974	0,99997
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	69,3056	71,4025
Pool Vaporization Rate	kg/s	4,95035	4,25343
Total Vapor Flowrate	kg/s	4,95302	4,25648
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	392,694	390,597
Pool Vaporization Rate	kg/s	6,98917	6,17115
Total Vapor Flowrate	kg/s	6,99185	6,17419
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	21138	21138
Pool Vaporization Rate	kg/s	2,09045	2,08842
Total Vapor Flowrate	kg/s	2,09045	2,08842
Maximum Pool Radius	m	15,9876	15,9876

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
		Radiation Level (kW/m2)	
		DIA	NOITE

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

		Distance (m)		
		DIA	NOITE	
Radiation Level	3	kW/m2	70,7538	70,3134
Radiation Level	18,3	kW/m2	16,9991	16,9991
Radiation Level	36	kW/m2		
Radiation Level	71,2	kW/m2		



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

	DIA	Radiation Level (kW/m2) NOITE
--	-----	----------------------------------

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	70,7538	70,3134
Radiation Level	18,3	kW/m2	16,9991	16,9991
Radiation Level	36	kW/m2	Not Reached	Not Reached
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá VERTICAL

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

User-Defined Data

Material

Material Identifier N-HEXANE

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 803 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Vertical

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 57,4 m/s
Droplet Diameter(1) 62,78 um
Duration of Discharge(1) 462 s
Final Temperature(1) 40 degC
Release Rate(1) 102,6 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

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Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (76800)	18,75	s	0,045234	0,0428684
LFL (10500)	18,75	s	0,0603492	0,0553415
LFL Frac (10500)	18,75	s	0,0603492	0,0553415

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (76800)	18,75	s	0	0
LFL (10500)	18,75	s	0	0
LFL Frac (10500)	18,75	s	0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	10500	ppm	0,0603492	0,0553415
Furthest Extent	10500	ppm	0,0603492	0,0553415

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

SUMMARY REPORT

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Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá ANGULAR-45

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

User-Defined Data

Material

Material Identifier N-HEXANE

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 803 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Angle 45 deg
Outdoor Release Direction Angled from Horizontal impingementontal

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 57,4 m/s
Droplet Diameter(1) 62,78 um
Duration of Discharge(1) 462 s
Final Temperature(1) 40 degC
Release Rate(1) 102,6 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
				NOITE
UFL (76800)	18,75	s	0,0871143	0,0842802
LFL (10500)	18,75	s	0,107821	0,0983928
LFL Frac (10500)	18,75	s	0,107821	0,0983928

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
				NOITE
UFL (76800)	18,75	s	0	0
LFL (10500)	18,75	s	0	0
LFL Frac (10500)	18,75	s	0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	10500	ppm	0,107821	0,0983928
Furthest Extent	10500	ppm	0,107821	0,0983928

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

SUMMARY REPORT

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Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-fenda-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá HORIZONTAL IMPINGEMENT

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

User-Defined Data

Material

Material Identifier N-HEXANE

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 206 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal impingementontal Impingement

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 124,3 m/s
Droplet Diameter(1) 13,39 um
Duration of Discharge(1) 1104 s
Final Temperature(1) 40 degC
Release Rate(1) 13,9 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

The height for user defined concentrations is the user defined height 0 m

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

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

Concentration(ppm)	Averaging Time		DIA	Distance (m)
UFL (76800)	18,75	s	3,29229	4,34501
LFL (10500)	18,75	s	17,8042	19,4562
LFL Frac (10500)	18,75	s	17,8042	19,4562

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
UFL (76800)	18,75	s	0	NOITE 0
LFL (10500)	18,75	s	0	0
LFL Frac (10500)	18,75	s	0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

Explosion Model Used : Multi Energy

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

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

			Maximum Distance (m) at Overpressure Level	
			DIA	NOITE
Overpressure	0,05	bar	26,2454	31,6932
Overpressure	0,1	bar	15,569	18,2791
Overpressure	0,3	bar	Not Reachable	Not Reachable
Overpressure	0,4	bar	Not Reachable	Not Reachable
			Supplementary Data at 0,05 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	1,6298	3,23251
Used Flammable Mass				
Overpressure Radius		m	21,2454	26,6932
Distance to:				
- Ignition Source		m	10	10
- Cloud Front/Centre		m	10	10
- Explosion Centre		m	5	5
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	1,6298	3,23251
Used Flammable Mass				
Overpressure Radius		m	10,569	13,2791
Distance to:				
- Ignition Source		m	10	10
- Cloud Front/Centre		m	10	10
- Explosion Centre		m	5	5
			Supplementary Data at 0,3 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	Not Reachable	Not Reachable
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	Not Reachable	Not Reachable
- Cloud Front/Centre		m	Not Reachable	Not Reachable
- Explosion Centre		m	0	0
			Supplementary Data at 0,4 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	Not Reachable	Not Reachable
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	Not Reachable	Not Reachable

SUMMARY REPORT

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Phast 6.53.1



- Cloud Front/Centre	m	Not Reachable	Not Reachable
- Explosion Centre	m	0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		17,8042	19,4562
Furthest Extent	10500	ppm		17,8042	19,4562
				Heights (m) for above distances	
				DIA	NOITE
Furthest Extent	10500	ppm		0	0
Furthest Extent	10500	ppm		0	0

Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard



Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

		DIA	NOITE
Release Segment 1			
Release Duration	s	1104	1104
Liquid Rainout	fraction	0,999874	0,999867
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	52,2006	146,41
Pool Vaporization Rate	kg/s	0,936926	1,16221
Total Vapor Flowrate	kg/s	0,938682	1,16406
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	21547,8	957,59
Pool Vaporization Rate	kg/s	0,670274	1,41874
Total Vapor Flowrate	kg/s	0,67203	1,42059
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s		20496
Pool Vaporization Rate	kg/s		0,584984
Total Vapor Flowrate	kg/s	0,670274	0,584984
Maximum Pool Radius	m	8,09764	8,09764

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

		DIA	NOITE
		Radiation Level (kW/m2)	
		DIA	NOITE

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

		Distance (m)		
		DIA	NOITE	
Radiation Level	3	kW/m2	46,1542	45,9159
Radiation Level	18,3	kW/m2	13,48	13,3811
Radiation Level	36	kW/m2	7,72109	7,70429
Radiation Level	71,2	kW/m2		

SUMMARY REPORT

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Phast 6.53.1



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

	DIA	NOITE
Radiation Level (kW/m2)		

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

			DIA	NOITE
			Distance (m)	
Radiation Level	3	kW/m2	50,0528	49,9853
Radiation Level	18,3	kW/m2	12,8231	12,7469
Radiation Level	36	kW/m2	9,10799	9,10799
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá VERTICAL

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

User-Defined Data

Material

Material Identifier N-HEXANE

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 206 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Vertical

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 124,3 m/s
Droplet Diameter(1) 0,01339 um
Duration of Discharge(1) 1104 s
Final Temperature(1) 40 degC
Release Rate(1) 13,9 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

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

Concentration(ppm)	Averaging Time			Distance (m)
			DIA	NOITE
UFL (76800)	18,75	s	0,0361948	0,0343381
LFL (10500)	18,75	s	0,0482602	0,0443232
LFL Frac (10500)	18,75	s	0,0482602	0,0443232

Concentration(ppm)	Averaging Time			Heights (m) for above distances
			DIA	NOITE
UFL (76800)	18,75	s	0	0
LFL (10500)	18,75	s	0	0
LFL Frac (10500)	18,75	s	0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

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

				Distance (m)
			DIA	NOITE
Furthest Extent	10500	ppm	0,0482602	0,0443232
Furthest Extent	10500	ppm	0,0482602	0,0443232

				Heights (m) for above distances
			DIA	NOITE
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá ANGULAR-45

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

User-Defined Data

Material

Material Identifier N-HEXANE

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 206 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Angle 45 deg
Outdoor Release Direction Angled from Horizontal impingementontal

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 124,3 m/s
Droplet Diameter(1) 0,01339 um
Duration of Discharge(1) 1104 s
Final Temperature(1) 40 degC
Release Rate(1) 13,9 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

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

Concentration(ppm)	Averaging Time			DIA	Distance (m)
					NOITE
UFL (76800)	18,75	s		2,20491	2,43412
LFL (10500)	18,75	s		5,53338	4,61288
LFL Frac (10500)	18,75	s		5,53338	4,61288

Concentration(ppm)	Averaging Time			DIA	Heights (m) for above distances
					NOITE
UFL (76800)	18,75	s		0	0
LFL (10500)	18,75	s		0	0
LFL Frac (10500)	18,75	s		0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

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

			DIA	Distance (m)
				NOITE
Furthest Extent	10500	ppm	5,53338	4,61288
Furthest Extent	10500	ppm	5,53338	4,61288

			DIA	Heights (m) for above distances
				NOITE
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-furo-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá VERTICAL

Base Case

CASE Name: Data

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

User-Defined Data

Material

Material Identifier N-HEXANE

Scenario

Building Wake Option None

Pipe

Line length 1 m

Vessel/Tank

Release Type Continuous

Location

Elevation 0 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 Bund present
Area of Dike 1087 m2
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Vertical

Flammable

Method to use for explosions Multi-Energy
Jet Fire Method Shell

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 3,9 m/s
Droplet Diameter(1) 1,36E4 um
Duration of Discharge(1) 300 s
Final Temperature(1) 40 degC
Release Rate(1) 173,5 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

Fireball Parameters

[Mass Modification Factor 3]

SUMMARY REPORT

Unique Audit Number: 642.136



Study Folder: seda

Phast 6.53.1

[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]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) Yes
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No
Source 1 (Strength) 5
Source 1 (Volume) 1120 m3

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

The height for user defined concentrations is the user defined height 0 m

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

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

Concentration(ppm)	Averaging Time			DIA	Distance (m)
					NOITE
UFL (76800)	18,75	s		6,53267	6,06967
LFL (10500)	18,75	s		48,7327	35,1634
LFL Frac (10500)	18,75	s		48,7327	35,1634

Concentration(ppm)	Averaging Time			DIA	Heights (m) for above distances
					NOITE
UFL (76800)	18,75	s		0	0
LFL (10500)	18,75	s		0	0
LFL Frac (10500)	18,75	s		0	0

Early Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

Explosion Model Used : Multi Energy

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

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

			Maximum Distance (m) at Overpressure Level	
			DIA	NOITE
Overpressure	0,05	bar	101,662	96,5604
Overpressure	0,1	bar	60,6245	55,5739
Overpressure	0,3	bar	Not Reachable	Not Reachable
Overpressure	0,4	bar	Not Reachable	Not Reachable
			Supplementary Data at 0,05 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	124,685	160,213
Used Flammable Mass				
Overpressure Radius		m	81,6621	81,5604
Distance to:				
- Ignition Source		m	40	30
- Cloud Front/Centre		m	40	30
- Explosion Centre		m	20	15
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	124,685	160,213
Used Flammable Mass				
Overpressure Radius		m	40,6245	40,5739
Distance to:				
- Ignition Source		m	40	30
- Cloud Front/Centre		m	40	30
- Explosion Centre		m	20	15
			Supplementary Data at 0,3 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	Not Reachable	Not Reachable
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	Not Reachable	Not Reachable
- Cloud Front/Centre		m	Not Reachable	Not Reachable
- Explosion Centre		m	0	0
			Supplementary Data at 0,4 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	Not Reachable	Not Reachable
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	Not Reachable	Not Reachable

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 642.136

Phast 6.53.1



- Cloud Front/Centre	m	Not Reachable	Not Reachable
- Explosion Centre	m	0	0

Flash Fire Envelope

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		48,7327	35,1634
Furthest Extent	10500	ppm		48,7327	35,1634
				Heights (m) for above distances	
				DIA	NOITE
Furthest Extent	10500	ppm		0	0
Furthest Extent	10500	ppm		0	0

Late Pool Fire Hazard

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

Late Pool Fire Status	DIA	NOITE
	Hazard	Hazard



Pool Vaporization Results

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

		DIA	NOITE
Release Segment 1			
Release Duration	s	300	300
Liquid Rainout	fraction	0,938259	0,958157
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	42,25	52,5625
Pool Vaporization Rate	kg/s	3,64515	4,18277
Total Vapor Flowrate	kg/s	14,3573	11,4426
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	17980,7	247,438
Pool Vaporization Rate	kg/s	2,70107	7,05837
Total Vapor Flowrate	kg/s	13,4132	14,3182
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s		19405
Pool Vaporization Rate	kg/s		2,46236
Total Vapor Flowrate	kg/s	2,70107	2,46236
Maximum Pool Radius	m	18,6003	18,6003

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

		DIA	NOITE
		Radiation Level (kW/m2)	
		DIA	NOITE

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

		Distance (m)	
		DIA	NOITE
Radiation Level	3 kW/m2	78,3174	77,395
Radiation Level	18,3 kW/m2	20,1188	19,7344
Radiation Level	36 kW/m2		
Radiation Level	71,2 kW/m2		



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	78,3174	77,395
Radiation Level	18,3	kW/m2	20,1188	19,7344
Radiation Level	36	kW/m2	Not Reached	Not Reached
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

Path: \seda\Estação de Araxá \Uberaba-Ribeirão Preto-14"-gasolina c/ bomba-ruptura-Estação de Araxá

		DIA	NOITE
Wind Speed	m/s	4,65	4,41
Pasquill Stability		B	E
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	20,25	21,17
Surface Temperature	degC	25,25	21,17
Relative Humidity	fraction	0,7765	0,7755