

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

Cenário	Liberação de produto desde o km 67+500 até o km 135+000. (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}	4,1 m/s (100% do diâmetro) 55,1 m/s (20% do diâmetro) 85,4 m/s (5% do diâmetro)
Diâmetro de gota^{A, B}	66,10 mm (100% do diâmetro) 0,180 mm (20% do diâmetro) 0,072 mm (5% do diâmetro)
Tempo de vazamento	300 s (100% do diâmetro) 516 s (20% do diâmetro) 1920 s (5% do diâmetro)
Taxa de vazamento^{A, B}	193,3 kg/s (100% do diâmetro) 103,6 kg/s (20% do diâmetro) 10,0 kg/s (5% do diâmetro)
Temperatura	40°C
Área da poça^{A, B}	1857,7 m ² (100% do diâmetro) 1823,2 m ² (20% do diâmetro) 458,3 m ² (5% do diâmetro)
Volume de confinamento	1160 m ³
Considerações	
A – Calculado pelo LeakMap	
B – Os valores para ruptura foram retirados do Aglomerado Humano denominado Ranchos (km 122,88). Os valores para furo com 20% do diâmetro foram retirados do Aglomerado Humano denominado Ranchos (km 122,88). Os valores para furo com 5% do diâmetro foram retirados do Aglomerado Humano denominado Ranchos (km 122,88).	



SUMMARY REPORT

Unique Audit Number: 656.516



Study Folder: seda

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Uberaba - Ribeirão Preto-14"-álcool c/ bomba-fenda Estação de Ribeirão Preto-Horizontal Impingement

Base Case

CASE Name: Data

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

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 1823 m2
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 55,1 m/s
Droplet Diameter(1) 180,2 um
Duration of Discharge(1) 516 s
Final Temperature(1) 40 degC
Release Rate(1) 103,6 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]

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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-fenda Estação de Ribeirão

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 (190000)	18,75	s		7,80353	13,4288
LFL (43000)	18,75	s		28,0855	38,8385
LFL Frac (43000)	18,75	s		28,0855	38,8385

Concentration(ppm)	Averaging Time			Heights (m) for above distances	
				DIA	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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-fenda Estação de Ribeirão

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

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Explosion Effects: Late Ignition

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

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	49,4039	84,3201
Overpressure	0,1	bar	29,6023	49,4847
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	17,3517	94,4714
Used Flammable Mass				
Overpressure Radius		m	39,4039	69,3201
Distance to:				
- Ignition Source		m	20	30
- Cloud Front/Centre		m	20	30
- Explosion Centre		m	10	15
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	17,3517	94,4714
Used Flammable Mass				
Overpressure Radius		m	19,6023	34,4847
Distance to:				
- Ignition Source		m	20	30
- Cloud Front/Centre		m	20	30
- Explosion Centre		m	10	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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-fenda Estação de Ribeirão

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		28,0855	38,8385
Furthest Extent	43000	ppm		28,0855	38,8385
				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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard



Pool Vaporization Results

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

		DIA	NOITE
Release Segment 1			
Release Duration	s	516	516
Liquid Rainout	fraction	0,999994	0,999994
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	94,5756	97,5156
Pool Vaporization Rate	kg/s	1,80139	1,36096
Total Vapor Flowrate	kg/s	1,80239	1,36196
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	421,424	419,621
Pool Vaporization Rate	kg/s	3,21649	2,51315
Total Vapor Flowrate	kg/s	3,21749	2,51415
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	21084	21082,9
Pool Vaporization Rate	kg/s	1,40938	1,23465
Total Vapor Flowrate	kg/s	1,40938	2,51315
Maximum Pool Radius	m	24,0903	24,0903

Radiation Effects: Early Pool Fire Distance

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

		DIA	NOITE
		Radiation Level (kW/m2)	

Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	102,057	102,057
Radiation Level	18,3	kW/m2	46,4976	46,4976
Radiation Level	36	kW/m2	28,9663	28,9663
Radiation Level	71,2	kW/m2	25,1017	25,1017



Radiation Effects: Late Pool Fire Distance

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

	DIA	NOITE
Radiation Level (kW/m2)		

Radiation Effects: Late Pool Fire Ellipse

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

			DIA	NOITE
				Distance (m)
Radiation Level	3	kW/m2	102,057	102,057
Radiation Level	18,3	kW/m2	46,4976	46,4976
Radiation Level	36	kW/m2	28,9663	28,9663
Radiation Level	71,2	kW/m2	25,1017	25,1017

Weather Conditions

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

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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

Base Case

CASE Name: Data

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

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 1823 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) 55,1 m/s
Droplet Diameter(1) 180,2 um
Duration of Discharge(1) 516 s
Final Temperature(1) 40 degC
Release Rate(1) 103,6 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]

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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-fenda Estação de Ribeirão

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	0,034012	0,0322874
LFL (43000)	18,75	s	0,0469062	0,0417281
LFL Frac (43000)	18,75	s	0,0469062	0,0417281

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

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Flash Fire Envelope

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

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0469062	0,0417281
Furthest Extent	43000	ppm	0,0469062	0,0417281

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

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

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Pool Vaporization Results

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

		DIA	NOITE
	Release Segment 1		
Release Duration	s	516	516
Liquid Rainout	fraction	0,247517	0,178805
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	224,251	212,431
Pool Vaporization Rate	kg/s	0,580273	0,294945
Total Vapor Flowrate	kg/s	78,5375	85,3707
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	691,899	84,27
Pool Vaporization Rate	kg/s	1,50251	0,748704
Total Vapor Flowrate	kg/s	79,4598	85,8245
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	17005,9	64,2994
Pool Vaporization Rate	kg/s	0,678313	0,975363
Total Vapor Flowrate	kg/s	1,50251	86,0511
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s		55,16
Pool Vaporization Rate	kg/s		1,15512
Total Vapor Flowrate	kg/s	0,678313	86,2309
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s		48,2425
Pool Vaporization Rate	kg/s		1,3088
Total Vapor Flowrate	kg/s		86,3845
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s		158,923
Pool Vaporization Rate	kg/s		1,56296
Total Vapor Flowrate	kg/s		86,6387
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s		16030,2
Pool Vaporization Rate	kg/s		0,524411
Total Vapor Flowrate	kg/s		1,56296
Maximum Pool Radius	m	24,0903	27,1485

Radiation Effects: Early Pool Fire Distance

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

	Radiation Level (kW/m2)
DIA	NOITE

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Radiation Effects: Early Pool Fire Ellipse

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

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		104,613	103,091
Radiation Level	18,3	kW/m2		60,7958	64,9762
Radiation Level	36	kW/m2		46,6705	52,5665
Radiation Level	71,2	kW/m2		44,4637	

Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)	
		DIA	NOITE

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Radiation Effects: Late Pool Fire Ellipse

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

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		127,243	148,262
Radiation Level	18,3	kW/m2		71,6839	86,7072
Radiation Level	36	kW/m2		54,1525	67,5299
Radiation Level	71,2	kW/m2		50,2879	62,7218

Weather Conditions

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

				DIA	NOITE
Wind Speed		m/s		1,25	1,25
Pasquill Stability				A/B	F
Surface Roughness Length		in		4,62348	4,62348
Surface Roughness Parameter				0,09	0,09
Atmospheric Temperature		degC		23	23
Surface Temperature		degC		28	23
Relative Humidity		fraction		0,651	0,651

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Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



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

Base Case

CASE Name: Data

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

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 1823 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

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) 55,1 m/s
Droplet Diameter(1) 180,2 um
Duration of Discharge(1) 516 s
Final Temperature(1) 40 degC
Release Rate(1) 103,6 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

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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-fenda Estação de Ribeirão

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	0,0502557	0,0425101
LFL (43000)	18,75	s	0,0890419	0,0852675
LFL Frac (43000)	18,75	s	0,0890419	0,0852675

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

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Flash Fire Envelope

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

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0890419	0,0852675
Furthest Extent	43000	ppm	0,0890419	0,0852675

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

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

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Unique Audit Number: 656.516

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Pool Vaporization Results

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

		DIA	NOITE
Release Segment 1			
Release Duration	s	516	516
Liquid Rainout	fraction	0,381345	0,347265
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	201,64	216,09
Pool Vaporization Rate	kg/s	0,783656	0,573122
Total Vapor Flowrate	kg/s	64,8763	68,1964
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	78,0856	85,8006
Pool Vaporization Rate	kg/s	2,01447	1,45665
Total Vapor Flowrate	kg/s	66,1072	69,08
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	60,6769	65,79
Pool Vaporization Rate	kg/s	2,60536	1,89461
Total Vapor Flowrate	kg/s	66,698	69,5179
Release Segment 1 Cloud Segment 4			
Cloud Segment Duration	s	51,6375	55,65
Pool Vaporization Rate	kg/s	3,07214	2,24069
Total Vapor Flowrate	kg/s	67,1648	69,864
Release Segment 1 Cloud Segment 5			
Cloud Segment Duration	s	45,8156	49,7319
Pool Vaporization Rate	kg/s	3,46878	2,53731
Total Vapor Flowrate	kg/s	67,5615	70,1606
Release Segment 1 Cloud Segment 6			
Cloud Segment Duration	s	80,4194	162,813
Pool Vaporization Rate	kg/s	3,97051	2,99285
Total Vapor Flowrate	kg/s	68,0632	70,6162
Release Segment 1 Cloud Segment 7			
Cloud Segment Duration	s	68,15	20186,2
Pool Vaporization Rate	kg/s	4,4489	0,835246
Total Vapor Flowrate	kg/s	3,97051	2,99285
Release Segment 1 Cloud Segment 8			
Cloud Segment Duration	s	18574,6	
Pool Vaporization Rate	kg/s	0,992962	
Total Vapor Flowrate	kg/s	4,4489	0,835246
Maximum Pool Radius	m	39,4086	37,8546

Radiation Effects: Early Pool Fire Distance

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

		Radiation Level (kW/m2)	
		DIA	NOITE

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Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	161,244	163,872
Radiation Level	18,3	kW/m2	108,501	113,205
Radiation Level	36	kW/m2	91,7745	97,0738
Radiation Level	71,2	kW/m2	88,3205	93,9203

Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
		NOITE
DIA		

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Radiation Effects: Late Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	223,719	224,702
Radiation Level	18,3	kW/m2	139,045	142,889
Radiation Level	36	kW/m2	113,611	118,215
Radiation Level	71,2	kW/m2	105,056	110,139

Weather Conditions

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

			DIA	NOITE
Wind Speed		m/s	1,25	1,25
Pasquill Stability			A/B	F
Surface Roughness Length		in	4,62348	4,62348
Surface Roughness Parameter			0,09	0,09
Atmospheric Temperature		degC	23	23
Surface Temperature		degC	28	23
Relative Humidity		fraction	0,651	0,651

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Phast 6.53.1

Uberaba - Ribeirão Preto-14"-álcool c/ bomba-furo Ribeirão Preto-Horizontal impingement

Base Case

CASE Name: Data

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

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 458,3 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 85,4 m/s
Droplet Diameter(1) 72,23 um
Duration of Discharge(1) 1920 s
Final Temperature(1) 40 degC
Release Rate(1) 10 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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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-furo Ribeirão Preto-

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		3,67536	5,55268
LFL (43000)	18,75	s		12,8593	15,9284
LFL Frac (43000)	18,75	s		12,8593	15,9284

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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-furo Ribeirão Preto-

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

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Explosion Effects: Late Ignition

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

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	23,7461	30,3353
Overpressure	0,1	bar	14,3256	17,6036
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	1,86835	4,61212
Used Flammable Mass				
Overpressure Radius		m	18,7461	25,3353
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	1,86835	4,61212
Used Flammable Mass				
Overpressure Radius		m	9,32565	12,6036
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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-furo Ribeirão Preto-

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		12,8593	15,9284
Furthest Extent	43000	ppm		12,8593	15,9284
				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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-furo Ribeirão Preto-

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

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Pool Vaporization Results

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

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1920	1920
Liquid Rainout	fraction	0,999976	0,999975
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	68,4756	294,981
Pool Vaporization Rate	kg/s	0,18828	0,378487
Total Vapor Flowrate	kg/s	0,18928	0,379487
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	32,5269	1625,02
Pool Vaporization Rate	kg/s	0,394555	0,549392
Total Vapor Flowrate	kg/s	0,395555	0,550392
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	26,1231	19680
Pool Vaporization Rate	kg/s	0,493053	0,320423
Total Vapor Flowrate	kg/s	0,494053	0,320423
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	22,9369	
Pool Vaporization Rate	kg/s	0,570251	
Total Vapor Flowrate	kg/s	0,571251	
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	37,6275	
Pool Vaporization Rate	kg/s	0,660611	
Total Vapor Flowrate	kg/s	0,661611	
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	21412,3	
Pool Vaporization Rate	kg/s	0,387208	
Total Vapor Flowrate	kg/s	0,388208	
Maximum Pool Radius	m	12,0781	12,0781

Radiation Effects: Early Pool Fire Distance

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

	Radiation Level (kW/m2)
DIA	NOITE

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Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	51,7727	51,7727
Radiation Level	18,3	kW/m2	22,5021	22,5021
Radiation Level	36	kW/m2	12,8662	12,8662
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
		NOITE
DIA		

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Radiation Effects: Late Pool Fire Ellipse

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

			DIA	NOITE
Radiation Level	3	kW/m2	54,5403	54,5403
Radiation Level	18,3	kW/m2	23,7979	23,7979
Radiation Level	36	kW/m2	13,689	13,689
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

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

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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Study Folder: seda

Phast 6.53.1

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

Base Case

CASE Name: Data

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

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 458,3 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) 85,4 m/s
Droplet Diameter(1) 72,23 um
Duration of Discharge(1) 1920 s
Final Temperature(1) 40 degC
Release Rate(1) 10 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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-furo Estação de Ribeirão

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	0,0291063	0,0276244
LFL (43000)	18,75	s	0,0401084	0,0356883
LFL Frac (43000)	18,75	s	0,0401084	0,0356883

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

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

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

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0401084	0,0356883
Furthest Extent	43000	ppm	0,0401084	0,0356883

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

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

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Pool Vaporization Results

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

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1920	1920
Liquid Rainout	fraction	0,109337	0,0656153
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	613,801	627,503
Pool Vaporization Rate	kg/s	0,0888265	0,0408467
Total Vapor Flowrate	kg/s	8,99546	9,38469
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	265,322	266,507
Pool Vaporization Rate	kg/s	0,205922	0,0962207
Total Vapor Flowrate	kg/s	9,11255	9,44007
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	209,878	209,891
Pool Vaporization Rate	kg/s	0,260295	0,122771
Total Vapor Flowrate	kg/s	9,16693	9,46662
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	181,922	179,53
Pool Vaporization Rate	kg/s	0,301689	0,143267
Total Vapor Flowrate	kg/s	9,20832	9,48711
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	313,117	306,585
Pool Vaporization Rate	kg/s	0,350009	0,167424
Total Vapor Flowrate	kg/s	9,25664	9,51127
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	393,355	380,714
Pool Vaporization Rate	kg/s	0,412725	0,199258
Total Vapor Flowrate	kg/s	9,31936	9,5431
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	5582,28	3299,4
Pool Vaporization Rate	kg/s	0,198755	0,1416
Total Vapor Flowrate	kg/s	0,412725	0,199258
Maximum Pool Radius	m	11,4763	9,15328

Radiation Effects: Early Pool Fire Distance

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

	Radiation Level (kW/m2)
DIA	NOITE

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Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	43,3312	48,5916
Radiation Level	18,3	kW/m2	31,7276	39,1088
Radiation Level	36	kW/m2	29,263	37,5972
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
		NOITE
DIA		

SUMMARY REPORT

Study Folder: seda

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Radiation Effects: Late Pool Fire Ellipse

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

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		76,5414	76,0297
Radiation Level	18,3	kW/m2		47,1181	51,7684
Radiation Level	36	kW/m2		37,4305	43,8286
Radiation Level	71,2	kW/m2		Not Reached	Not Reached

Weather Conditions

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

				DIA	NOITE
Wind Speed		m/s		1,25	1,25
Pasquill Stability				A/B	F
Surface Roughness Length		in		4,62348	4,62348
Surface Roughness Parameter				0,09	0,09
Atmospheric Temperature		degC		23	23
Surface Temperature		degC		28	23
Relative Humidity		fraction		0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



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

Base Case

CASE Name: Data

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

User-Defined Data

Dispersion

Duration of Discharge(1)	1920 s
Final Temperature(1)	40 degC
Release Rate(1)	10 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]
[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)	1160 m3

Geometry

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

Material

Material Identifier	ETHANOL
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Scenario

Building Wake Option	None
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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	458,3 m ²
	[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
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)	85,4 m/s
	Droplet Diameter(1)	72,23 um



Consequence Results

Distance to Concentration Results

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

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		1,2748	1,13262
LFL (43000)	18,75	s		2,25276	1,77773
LFL Frac (43000)	18,75	s		2,25276	1,77773

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

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

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

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

				DIA	Distance (m)
					NOITE
Furthest Extent	43000	ppm		2,25276	1,77773
Furthest Extent	43000	ppm		2,25276	1,77773

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

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Phast 6.53.1



Late Pool Fire Hazard

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

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Phast 6.53.1



Pool Vaporization Results

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

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1920	1920
Liquid Rainout	fraction	0,117971	0,0505544
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	613,801	630,01
Pool Vaporization Rate	kg/s	0,0954664	0,0323091
Total Vapor Flowrate	kg/s	8,91576	9,52676
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	265,322	268,491
Pool Vaporization Rate	kg/s	0,221203	0,0758679
Total Vapor Flowrate	kg/s	9,04149	9,57032
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	209,878	210,389
Pool Vaporization Rate	kg/s	0,279592	0,096695
Total Vapor Flowrate	kg/s	9,09988	9,59115
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	181,922	181,716
Pool Vaporization Rate	kg/s	0,324047	0,11278
Total Vapor Flowrate	kg/s	9,14434	9,60724
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	313,117	311,395
Pool Vaporization Rate	kg/s	0,375944	0,131853
Total Vapor Flowrate	kg/s	9,19624	9,62631
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	393,355	384,299
Pool Vaporization Rate	kg/s	0,443301	0,156822
Total Vapor Flowrate	kg/s	9,26359	9,65128
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	5965,24	1881,91
Pool Vaporization Rate	kg/s	0,20738	0,124971
Total Vapor Flowrate	kg/s	0,443301	0,156822
Maximum Pool Radius	m	11,9281	8,01981

Radiation Effects: Early Pool Fire Distance

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

	Radiation Level (kW/m2)
DIA	NOITE

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Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	60,7718	57,3865
Radiation Level	18,3	kW/m2	48,8171	48,8395
Radiation Level	36	kW/m2	46,1833	47,7116
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
		NOITE
DIA		

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Radiation Effects: Late Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	95,1786	81,6886
Radiation Level	18,3	kW/m2	64,7628	60,0046
Radiation Level	36	kW/m2	54,7516	53,1667
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

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

			DIA	NOITE
Wind Speed		m/s	1,25	1,25
Pasquill Stability			A/B	F
Surface Roughness Length		in	4,62348	4,62348
Surface Roughness Parameter			0,09	0,09
Atmospheric Temperature		degC	23	23
Surface Temperature		degC	28	23
Relative Humidity		fraction	0,651	0,651

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Phast 6.53.1

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

Base Case

CASE Name: Data

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

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 1858 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) 4,1 m/s
Droplet Diameter(1) 6,609E4 um
Duration of Discharge(1) 300 s
Final Temperature(1) 40 degC
Release Rate(1) 193,3 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]

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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-ruptura Estação de

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	1,91304	8,3579
LFL (43000)	18,75	s	21,8385	36,2707
LFL Frac (43000)	18,75	s	21,8385	36,2707

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

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

SUMMARY REPORT

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Phast 6.53.1



Explosion Effects: Late Ignition

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

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	77,0102	2,83288
Overpressure	0,1	bar	43,3356	1,40935
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	85,3386	0,00644675
Used Flammable Mass				
Overpressure Radius		m	67,0102	2,83273
Distance to:				
- Ignition Source		m	20	10
- Cloud Front/Centre		m	20	10
- Explosion Centre		m	10	0,000143933
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	85,3386	0,00644675
Used Flammable Mass				
Overpressure Radius		m	33,3356	1,4092
Distance to:				
- Ignition Source		m	20	10
- Cloud Front/Centre		m	20	10
- Explosion Centre		m	10	0,000143933
			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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-ruptura Estação de

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		21,8385	36,2707
Furthest Extent	43000	ppm		21,8385	36,2707
				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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool c/ bomba-ruptura Estação de

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Phast 6.53.1



Pool Vaporization Results

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

		DIA	NOITE
Release Segment 1			
Release Duration	s	300	300
Liquid Rainout	fraction	0,993329	0,996862
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	62,0156	62,8056
Pool Vaporization Rate	kg/s	1,6805	1,32846
Total Vapor Flowrate	kg/s	2,96994	1,93503
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	238,851	238,061
Pool Vaporization Rate	kg/s	3,46766	2,76533
Total Vapor Flowrate	kg/s	4,7571	3,3719
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	21299,1	21299,1
Pool Vaporization Rate	kg/s	1,44539	1,26545
Total Vapor Flowrate	kg/s	3,46766	2,76533
Maximum Pool Radius	m	24,3172	24,3172

Radiation Effects: Early Pool Fire Distance

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

		DIA	NOITE
			Radiation Level (kW/m2)
			NOITE

Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	103,005	102,984
Radiation Level	18,3	kW/m2	46,9969	46,9765
Radiation Level	36	kW/m2	29,3362	29,3157
Radiation Level	71,2	kW/m2	25,4074	25,387



Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	103,005	102,984
Radiation Level	18,3	kW/m2	46,9969	46,9765
Radiation Level	36	kW/m2	29,3362	29,3157
Radiation Level	71,2	kW/m2	25,4074	25,387

Weather Conditions

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

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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

Cenário	Liberação de produto desde o km 67+500 até o km 135+000. (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 Parado
Velocidade de vazamento^{A, B}	2,4 m/s (100% do diâmetro) 46,0 m/s (20% do diâmetro) 71,6 m/s (5% do diâmetro)
Diâmetro de gota^{A, B}	73,20 mm (100% do diâmetro) 0,197 mm (20% do diâmetro) 0,076 mm (5% do diâmetro)
Tempo de vazamento	300 s (100% do diâmetro) 522 s (20% do diâmetro) 4266 s (5% do diâmetro)
Taxa de vazamento^{A, B}	113,8 kg/s (100% do diâmetro) 86,0 kg/s (20% do diâmetro) 8,3 kg/s (5% do diâmetro)
Temperatura	40°C
Área da poça^{A, B}	1681,3 m ² (100% do diâmetro) 1681,3 m ² (20% do diâmetro) 440,0 m ² (5% do diâmetro)
Volume de confinamento	1160 m ³
Considerações	
A – Calculado pelo LeakMap	
B – Os valores para ruptura foram retirados do Aglomerado Humano denominado Ranchos (km 122,88). Os valores para furo com 20% do diâmetro foram retirados do Aglomerado Humano denominado Ranchos (km 122,88). Os valores para furo com 5% do diâmetro foram retirados do Aglomerado Humano denominado Ranchos (km 122,88).	



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Uberaba - Ribeirão Preto-14"-álcool s/ bomba-fenda Estação de Ribeirão Preto-Horizontal Impingement

Base Case

CASE Name: Data

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

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 1681 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 46 m/s
Droplet Diameter(1) 197,4 um
Duration of Discharge(1) 522 s
Final Temperature(1) 40 degC
Release Rate(1) 86 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) 1160 m3

Geometry

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

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Phast 6.53.1



Consequence Results

Distance to Concentration Results

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

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	7,38986	12,396
LFL (43000)	18,75	s	26,5417	36,8642
LFL Frac (43000)	18,75	s	26,5417	36,8642

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

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Explosion Effects: Late Ignition

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

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	58,7044	81,4641
Overpressure	0,1	bar	34,2354	48,0639
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	32,7407	83,2692
Used Flammable Mass				
Overpressure Radius		m	48,6917	66,4641
Distance to:				
- Ignition Source		m	20	30
- Cloud Front/Centre		m	20	30
- Explosion Centre		m	10,0127	15

			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	32,7407	83,2692
Used Flammable Mass				
Overpressure Radius		m	24,2227	33,0639
Distance to:				
- Ignition Source		m	20	30
- Cloud Front/Centre		m	20	30
- Explosion Centre		m	10,0127	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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-fenda Estação de Ribeirão

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		26,5417	36,8642
Furthest Extent	43000	ppm		26,5417	36,8642
				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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Pool Vaporization Results

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

		DIA	NOITE
	Release Segment 1		
Release Duration	s	522	522
Liquid Rainout	fraction	0,999994	0,999994
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	96,5306	99,5006
Pool Vaporization Rate	kg/s	1,60523	1,21013
Total Vapor Flowrate	kg/s	1,60623	1,21113
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	426,612	423,642
Pool Vaporization Rate	kg/s	2,90324	2,26614
Total Vapor Flowrate	kg/s	2,90424	2,26714
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	21076,9	21076,9
Pool Vaporization Rate	kg/s	1,29464	1,13459
Total Vapor Flowrate	kg/s	2,90324	2,26614
Maximum Pool Radius	m	23,1338	23,1338

Radiation Effects: Early Pool Fire Distance

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

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

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

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	98,3844	98,3844
Radiation Level	18,3	kW/m2	44,7221	44,7221
Radiation Level	36	kW/m2	27,7325	27,7325
Radiation Level	71,2	kW/m2	24,1452	24,1452



Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	98,3844	98,3844
Radiation Level	18,3	kW/m2	44,7221	44,7221
Radiation Level	36	kW/m2	27,7325	27,7325
Radiation Level	71,2	kW/m2	24,1452	24,1452

Weather Conditions

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

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Unique Audit Number: 656.516



Study Folder: seda

Phast 6.53.1

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

Base Case

CASE Name: Data

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

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 1681 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) 46 m/s
Droplet Diameter(1) 197,4 um
Duration of Discharge(1) 522 s
Final Temperature(1) 40 degC
Release Rate(1) 86 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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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-fenda Estação de Ribeirão

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		0,0339153	0,0321958
LFL (43000)	18,75	s		0,0467727	0,0416095
LFL Frac (43000)	18,75	s		0,0467727	0,0416095

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

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

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

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0467727	0,0416095
Furthest Extent	43000	ppm	0,0467727	0,0416095

			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: 656.516

Phast 6.53.1



Late Pool Fire Hazard

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

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Pool Vaporization Results

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

		DIA	NOITE
	Release Segment 1		
Release Duration	s	522	522
Liquid Rainout	fraction	0,308271	0,257565
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	222,756	215,356
Pool Vaporization Rate	kg/s	0,596873	0,357568
Total Vapor Flowrate	kg/s	60,0855	64,207
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	775,682	85,6669
Pool Vaporization Rate	kg/s	1,3712	0,906039
Total Vapor Flowrate	kg/s	60,8599	64,7555
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	17832,1	65,7
Pool Vaporization Rate	kg/s	0,679363	1,18031
Total Vapor Flowrate	kg/s	1,3712	65,0298
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s		55,58
Pool Vaporization Rate	kg/s		1,39698
Total Vapor Flowrate	kg/s	0,679363	65,2464
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s		48,5875
Pool Vaporization Rate	kg/s		1,58074
Total Vapor Flowrate	kg/s		65,4302
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s		161,51
Pool Vaporization Rate	kg/s		1,88116
Total Vapor Flowrate	kg/s		65,7306
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s		17209,8
Pool Vaporization Rate	kg/s		0,597486
Total Vapor Flowrate	kg/s		1,88116
Maximum Pool Radius	m	23,1338	29,8555

Radiation Effects: Early Pool Fire Distance

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

	DIA	NOITE
Radiation Level (kW/m2)		

SUMMARY REPORT

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Unique Audit Number: 656.516

Phast 6.53.1



Radiation Effects: Early Pool Fire Ellipse

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

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		99,9124	100,455
Radiation Level	18,3	kW/m2		55,4643	59,3044
Radiation Level	36	kW/m2		41,1454	45,9698
Radiation Level	71,2	kW/m2		38,8606	

Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)	
		DIA	NOITE

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Radiation Effects: Late Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	117,661	150,02
Radiation Level	18,3	kW/m2	63,9985	83,2422
Radiation Level	36	kW/m2	47,0089	62,6199
Radiation Level	71,2	kW/m2	43,4216	56,9991

Weather Conditions

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

			DIA	NOITE
Wind Speed		m/s	1,25	1,25
Pasquill Stability			A/B	F
Surface Roughness Length		in	4,62348	4,62348
Surface Roughness Parameter			0,09	0,09
Atmospheric Temperature		degC	23	23
Surface Temperature		degC	28	23
Relative Humidity		fraction	0,651	0,651

SUMMARY REPORT

Unique Audit Number: 656.516



Study Folder: seda

Phast 6.53.1

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

Base Case

CASE Name: Data

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

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 1681 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

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) 46 m/s
Droplet Diameter(1) 197,4 um
Duration of Discharge(1) 522 s
Final Temperature(1) 40 degC
Release Rate(1) 86 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: 656.516



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)	1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-fenda Estação de Ribeirão

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	0,0498585	0,0424164
LFL (43000)	18,75	s	0,0889412	0,0850307
LFL Frac (43000)	18,75	s	0,0889412	0,0850307

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

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Flash Fire Envelope

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

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0889412	0,0850307
Furthest Extent	43000	ppm	0,0889412	0,0850307

			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: 656.516

Phast 6.53.1



Late Pool Fire Hazard

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

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Pool Vaporization Results

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

		DIA	NOITE
Release Segment 1			
Release Duration	s	522	522
Liquid Rainout	fraction	0,463567	0,432271
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	202,351	216,09
Pool Vaporization Rate	kg/s	0,799073	0,597902
Total Vapor Flowrate	kg/s	46,9323	49,4226
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	79,05	85,8006
Pool Vaporization Rate	kg/s	2,05211	1,51517
Total Vapor Flowrate	kg/s	48,1853	50,3398
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	60,8494	65,79
Pool Vaporization Rate	kg/s	2,65363	1,96838
Total Vapor Flowrate	kg/s	48,7869	50,793
Release Segment 1 Cloud Segment 4			
Cloud Segment Duration	s	51,7725	55,65
Pool Vaporization Rate	kg/s	3,126	2,32633
Total Vapor Flowrate	kg/s	49,2592	51,151
Release Segment 1 Cloud Segment 5			
Cloud Segment Duration	s	45,9281	49,7319
Pool Vaporization Rate	kg/s	3,52719	2,63303
Total Vapor Flowrate	kg/s	49,6604	51,4577
Release Segment 1 Cloud Segment 6			
Cloud Segment Duration	s	81,03	164,377
Pool Vaporization Rate	kg/s	4,03635	3,11666
Total Vapor Flowrate	kg/s	50,1696	51,9413
Release Segment 1 Cloud Segment 7			
Cloud Segment Duration	s	69,3869	20467,3
Pool Vaporization Rate	kg/s	4,5319	0,86245
Total Vapor Flowrate	kg/s	50,6651	3,11666
Release Segment 1 Cloud Segment 8			
Cloud Segment Duration	s	18688,8	
Pool Vaporization Rate	kg/s	1,00761	
Total Vapor Flowrate	kg/s	4,5319	0,86245
Maximum Pool Radius	m	39,8008	38,6912

Radiation Effects: Early Pool Fire Distance

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

		Radiation Level (kW/m2)	
		DIA	NOITE

SUMMARY REPORT

Study Folder: seda

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Radiation Effects: Early Pool Fire Ellipse

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

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	151,404	152,818
Radiation Level	18,3	kW/m2	98,4557	101,433
Radiation Level	36	kW/m2	81,6711	85,0887
Radiation Level	71,2	kW/m2	78,1869	81,8392

Radiation Effects: Late Pool Fire Distance

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

	DIA	Radiation Level (kW/m2) NOITE
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SUMMARY REPORT

Study Folder: seda

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Radiation Effects: Late Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	214,905	215,31
Radiation Level	18,3	kW/m2	129,513	131,955
Radiation Level	36	kW/m2	103,885	106,871
Radiation Level	71,2	kW/m2	95,2122	98,5372

Weather Conditions

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

			DIA	NOITE
Wind Speed		m/s	1,25	1,25
Pasquill Stability			A/B	F
Surface Roughness Length		in	4,62348	4,62348
Surface Roughness Parameter			0,09	0,09
Atmospheric Temperature		degC	23	23
Surface Temperature		degC	28	23
Relative Humidity		fraction	0,651	0,651

SUMMARY REPORT

Unique Audit Number: 656.516



Study Folder: seda

Phast 6.53.1

Uberaba - Ribeirão Preto-14"-álcool s/ bomba-furo Ribeirão Preto-Horizontal impingement

Base Case

CASE Name: Data

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

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 440 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 70,6 m/s
Droplet Diameter(1) 76,2 um
Duration of Discharge(1) 4266 s
Final Temperature(1) 40 degC
Release Rate(1) 8,3 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: 656.516



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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-furo Ribeirão Preto-

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		3,58779	5,15721
LFL (43000)	18,75	s		12,6119	15,1502
LFL Frac (43000)	18,75	s		12,6119	15,1502

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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-furo Ribeirão Preto-

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

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Explosion Effects: Late Ignition

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

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	24,5217	31,2573
Overpressure	0,1	bar	14,7265	18,0622
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	2,10033	5,13421
Used Flammable Mass				
Overpressure Radius		m	19,4919	26,2573
Distance to:				
- Ignition Source		m	10	10
- Cloud Front/Centre		m	10	10
- Explosion Centre		m	5,02979	5
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	2,10033	5,13421
Used Flammable Mass				
Overpressure Radius		m	9,69666	13,0622
Distance to:				
- Ignition Source		m	10	10
- Cloud Front/Centre		m	10	10
- Explosion Centre		m	5,02979	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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- Cloud Front/Centre	m	Not Reachable	Not Reachable
- Explosion Centre	m	0	0

Flash Fire Envelope

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

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		12,6119	15,1502
Furthest Extent	43000	ppm		12,6119	15,1502
				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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-furo Ribeirão Preto-

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Pool Vaporization Results

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

		DIA	NOITE
	Release Segment 1		
Release Duration	s	4266	4266
Liquid Rainout	fraction	0,999976	0,999975
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	72,6756	578,403
Pool Vaporization Rate	kg/s	0,165417	0,412407
Total Vapor Flowrate	kg/s	0,166417	0,413407
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	34,965	3687,6
Pool Vaporization Rate	kg/s	0,345461	0,516778
Total Vapor Flowrate	kg/s	0,346461	0,517778
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	28,0819	17334
Pool Vaporization Rate	kg/s	0,432495	0,324291
Total Vapor Flowrate	kg/s	0,433495	0,324291
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	24,3	
Pool Vaporization Rate	kg/s	0,500263	
Total Vapor Flowrate	kg/s	0,501263	
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	41,6175	
Pool Vaporization Rate	kg/s	0,581103	
Total Vapor Flowrate	kg/s	0,582103	
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	16,6606	
Pool Vaporization Rate	kg/s	0,64978	
Total Vapor Flowrate	kg/s	0,65078	
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	21381,7	
Pool Vaporization Rate	kg/s	0,41136	
Total Vapor Flowrate	kg/s	0,41236	
Maximum Pool Radius	m	11,8345	11,8345

Radiation Effects: Early Pool Fire Distance

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

	Radiation Level (kW/m2)
DIA	NOITE

SUMMARY REPORT

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Radiation Effects: Early Pool Fire Ellipse

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

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	47,5604	47,5604
Radiation Level	18,3	kW/m2	20,5281	20,5281
Radiation Level	36	kW/m2	11,5674	11,5674
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

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

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

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

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	53,5381	53,5381
Radiation Level	18,3	kW/m2	23,3265	23,3265
Radiation Level	36	kW/m2	13,3782	13,3782
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

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

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

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Study Folder: seda

Phast 6.53.1

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

Base Case

CASE Name: Data

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

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 440 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) 70,6 m/s
Droplet Diameter(1) 76,2 um
Duration of Discharge(1) 4266 s
Final Temperature(1) 40 degC
Release Rate(1) 8,3 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

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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-furo Estação de Ribeirão

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	0,0291063	0,0276244
LFL (43000)	18,75	s	0,0401084	0,0356883
LFL Frac (43000)	18,75	s	0,0401084	0,0356883

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

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

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

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0401084	0,0356883
Furthest Extent	43000	ppm	0,0401084	0,0356883

			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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Phast 6.53.1



Late Pool Fire Hazard

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

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

		DIA	NOITE
Release Segment 1			
Release Duration	s	4266	4266
Liquid Rainout	fraction	0,105541	0,0583079
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	1239,04	1287,02
Pool Vaporization Rate	kg/s	0,137526	0,0605147
Total Vapor Flowrate	kg/s	7,56154	7,87656
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	567,21	574,907
Pool Vaporization Rate	kg/s	0,300145	0,135501
Total Vapor Flowrate	kg/s	7,72416	7,95155
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	457,131	458,908
Pool Vaporization Rate	kg/s	0,372366	0,169703
Total Vapor Flowrate	kg/s	7,79638	7,98575
Release Segment 1 Cloud Segment 4			
Cloud Segment Duration	s	769,875	398,792
Pool Vaporization Rate	kg/s	0,443312	0,195177
Total Vapor Flowrate	kg/s	7,86732	8,01122
Release Segment 1 Cloud Segment 5			
Cloud Segment Duration	s	1262,19	696,78
Pool Vaporization Rate	kg/s	0,536783	0,224307
Total Vapor Flowrate	kg/s	7,9608	8,04035
Release Segment 1 Cloud Segment 6			
Cloud Segment Duration	s	7264,82	888,882
Pool Vaporization Rate	kg/s	0,233189	0,261195
Total Vapor Flowrate	kg/s	0,536783	8,07724
Release Segment 1 Cloud Segment 7			
Cloud Segment Duration	s		4861,42
Pool Vaporization Rate	kg/s		0,162315
Total Vapor Flowrate	kg/s	0,233189	0,261195
Maximum Pool Radius	m	13,3903	10,5243

Radiation Effects: Early Pool Fire Distance

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

		Radiation Level (kW/m2)	
		DIA	NOITE

SUMMARY REPORT

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Unique Audit Number: 656.516

Phast 6.53.1



Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	39,0308	37,8626
Radiation Level	18,3	kW/m2	28,3972	29,4558
Radiation Level	36	kW/m2	26,3833	28,3938
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
		NOITE
DIA		

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

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Radiation Effects: Late Pool Fire Ellipse

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

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		81,9032	72,9862
Radiation Level	18,3	kW/m2		48,3247	45,6604
Radiation Level	36	kW/m2		37,321	36,6131
Radiation Level	71,2	kW/m2		Not Reached	Not Reached

Weather Conditions

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

				DIA	NOITE
Wind Speed		m/s		1,25	1,25
Pasquill Stability				A/B	F
Surface Roughness Length		in		4,62348	4,62348
Surface Roughness Parameter				0,09	0,09
Atmospheric Temperature		degC		23	23
Surface Temperature		degC		28	23
Relative Humidity		fraction		0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



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

Base Case

CASE Name: Data

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

User-Defined Data

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)	1160 m3

Geometry

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

Material

Material Identifier	ETHANOL
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Scenario

Building Wake Option	None
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Pipe

Line length	1 m
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Vessel/Tank

Release Type	Continuous
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Location

Elevation	0 m
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SUMMARY REPORT

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Phast 6.53.1

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	440 m ²
[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

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)	70,6 m/s
Droplet Diameter(1)	76,2 um
Duration of Discharge(1)	4266 s
Final Temperature(1)	40 degC
Release Rate(1)	8,3 kg/s
Pre-Dilution Air Rates(1)	0 kg/s
Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	1E7 kg



Consequence Results

Distance to Concentration Results

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

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	0,838814	0,589907
LFL (43000)	18,75	s	1,51107	1,08204
LFL Frac (43000)	18,75	s	1,51107	1,08204

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

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

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

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	1,51107	1,08204
Furthest Extent	43000	ppm	1,51107	1,08204

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

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

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Pool Vaporization Results

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

		DIA	NOITE
	Release Segment 1		
Release Duration	s	4266	4266
Liquid Rainout	fraction	0,150799	0,121381
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	1240,8	1292,4
Pool Vaporization Rate	kg/s	0,191263	0,119958
Total Vapor Flowrate	kg/s	7,23963	7,4125
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	569,702	575,998
Pool Vaporization Rate	kg/s	0,417332	0,270072
Total Vapor Flowrate	kg/s	7,4657	7,56261
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	460,02	459,662
Pool Vaporization Rate	kg/s	0,516421	0,339009
Total Vapor Flowrate	kg/s	7,56479	7,63155
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	773,758	399,388
Pool Vaporization Rate	kg/s	0,616272	0,390589
Total Vapor Flowrate	kg/s	7,66464	7,68313
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	1261	694,799
Pool Vaporization Rate	kg/s	0,748733	0,449741
Total Vapor Flowrate	kg/s	7,7971	7,74228
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	9230,68	876,475
Pool Vaporization Rate	kg/s	0,291133	0,525029
Total Vapor Flowrate	kg/s	0,748733	7,81757
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s		9301,31
Pool Vaporization Rate	kg/s		0,249254
Total Vapor Flowrate	kg/s	0,291133	0,525029
Maximum Pool Radius	m	16,1519	15,3353

Radiation Effects: Early Pool Fire Distance

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

	Radiation Level (kW/m2)
DIA	NOITE

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Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	55,9151	56,2064
Radiation Level	18,3	kW/m2	43,6702	44,9663
Radiation Level	36	kW/m2	40,9091	42,679
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
		NOITE
DIA		

SUMMARY REPORT

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Radiation Effects: Late Pool Fire Ellipse

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

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	106,899	105,814
Radiation Level	18,3	kW/m2	67,4692	68,0998
Radiation Level	36	kW/m2	54,6537	55,8043
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

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

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Unique Audit Number: 656.516



Study Folder: seda

Phast 6.53.1

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

Base Case

CASE Name: Data

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

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 1681 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) 2,4 m/s
Droplet Diameter(1) 7,323E4 um
Duration of Discharge(1) 330 s
Final Temperature(1) 40 degC
Release Rate(1) 113,8 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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-ruptura Estação de

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		4,43653	9,04558
LFL (43000)	18,75	s		20,9472	32,9229
LFL Frac (43000)	18,75	s		20,9472	32,9229

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

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

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Explosion Effects: Late Ignition

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

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	60,0647	82,7315
Overpressure	0,1	bar	34,9065	48,6945
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	35,5859	88,1245
Used Flammable Mass				
Overpressure Radius		m	50,0632	67,7315
Distance to:				
- Ignition Source		m	20	30
- Cloud Front/Centre		m	20	30
- Explosion Centre		m	10,0015	15
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	35,5859	88,1245
Used Flammable Mass				
Overpressure Radius		m	24,905	33,6945
Distance to:				
- Ignition Source		m	20	30
- Cloud Front/Centre		m	20	30
- Explosion Centre		m	10,0015	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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-ruptura Estação de

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		20,9472	32,9229
Furthest Extent	43000	ppm		20,9472	32,9229
				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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-álcool s/ bomba-ruptura Estação de

Late Pool Fire Status	DIA	NOITE
	Hazard	Hazard



Pool Vaporization Results

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

		DIA	NOITE
Release Segment 1			
Release Duration	s	330	330
Liquid Rainout	fraction	0,996792	0,998679
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	70,1406	71,4025
Pool Vaporization Rate	kg/s	1,38708	1,03669
Total Vapor Flowrate	kg/s	1,75218	1,18699
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	260,769	259,507
Pool Vaporization Rate	kg/s	2,98057	2,26259
Total Vapor Flowrate	kg/s	3,34567	2,41288
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	21269,1	21269,1
Pool Vaporization Rate	kg/s	1,28899	1,12716
Total Vapor Flowrate	kg/s	2,98057	2,26259
Maximum Pool Radius	m	23,1338	23,1338

Radiation Effects: Early Pool Fire Distance

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

		DIA	NOITE
		Radiation Level (kW/m2)	
		DIA	NOITE

Radiation Effects: Early Pool Fire Ellipse

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

		Distance (m)	
		DIA	NOITE
Radiation Level	3 kW/m2	98,4087	98,4566
Radiation Level	18,3 kW/m2	44,7464	44,7944
Radiation Level	36 kW/m2	27,7569	27,8048
Radiation Level	71,2 kW/m2	24,1695	24,2175



Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

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

			DIA	NOITE
			Distance (m)	
Radiation Level	3	kW/m2	98,4087	98,4566
Radiation Level	18,3	kW/m2	44,7464	44,7944
Radiation Level	36	kW/m2	27,7569	27,8048
Radiation Level	71,2	kW/m2	24,1695	24,2175

Weather Conditions

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

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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

Cenário	Liberação de produto desde o km 67+500 até o km 135+000. (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	Gasolina
Velocidade de vazamento^{A, B}	4,1 m/s (100% do diâmetro) 55,1 m/s (20% do diâmetro) 86,9 m/s (5% do diâmetro)
Diâmetro de gota^{A, B}	12,30 mm (100% do diâmetro) 0,068 mm (20% do diâmetro) 0,027 mm (5% do diâmetro)
Tempo de vazamento	300 s (100% do diâmetro) 510 s (20% do diâmetro) 1812 s (5% do diâmetro)
Taxa de vazamento^{A, B}	181,6 kg/s (100% do diâmetro) 98,5 kg/s (20% do diâmetro) 9,7 kg/s (5% do diâmetro)
Temperatura	40°C
Área da poça^{A, B}	1877,9 m ² (100% do diâmetro) 1845,5 m ² (20% do diâmetro) 471,9 m ² (5% do diâmetro)
Volume de confinamento	1160 m ³
Considerações	
A – Calculado pelo LeakMap	
B – Os valores para ruptura foram retirados do Aglomerado Humano denominado Ranchos (km 122,88). Os valores para furo com 20% do diâmetro foram retirados do Aglomerado Humano denominado Ranchos (km 122,88). Os valores para furo com 5% do diâmetro foram retirados do Aglomerado Humano denominado Ranchos (km 122,88).	



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Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-fenda Estação de Ribeirão Preto-Horizontal Impingement

Base Case

CASE Name: Data

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

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 1846 m2
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 55,1 m/s
Droplet Diameter(1) 68,13 um
Duration of Discharge(1) 510 s
Final Temperature(1) 40 degC
Release Rate(1) 98,5 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]

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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-fenda Estação de

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		28,838	47,2656
LFL (10500)	18,75	s		90,3332	120,026
LFL Frac (10500)	18,75	s		90,3332	120,026

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

Early Pool Fire Hazard

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

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Phast 6.53.1



Explosion Effects: Late Ignition

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

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	129,929	142,317
Overpressure	0,1	bar	88,562	100,95
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	171,179	1126,56
Used Flammable Mass				
Overpressure Radius		m	82,3172	82,3172
Distance to:				
- Ignition Source		m	80	120
- Cloud Front/Centre		m	80	120
- Explosion Centre		m	47,6116	60
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	171,179	1126,56
Used Flammable Mass				
Overpressure Radius		m	40,9504	40,9504
Distance to:				
- Ignition Source		m	80	120
- Cloud Front/Centre		m	80	120
- Explosion Centre		m	47,6116	60
			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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-fenda Estação de

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		90,3332	120,026
Furthest Extent	10500	ppm		90,3332	120,026
				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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-fenda Estação de

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Pool Vaporization Results

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

		DIA	NOITE
Release Segment 1			
Release Duration	s	510	510
Liquid Rainout	fraction	0,999968	0,999966
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	58,9056	93,1225
Pool Vaporization Rate	kg/s	3,94374	4,6113
Total Vapor Flowrate	kg/s	3,94694	4,61465
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	23,9044	416,878
Pool Vaporization Rate	kg/s	9,62081	8,19229
Total Vapor Flowrate	kg/s	9,62401	8,19564
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	14220,6	15982,2
Pool Vaporization Rate	kg/s	3,4899	2,89248
Total Vapor Flowrate	kg/s	3,4931	2,89248
Maximum Pool Radius	m	24,2372	24,2372

Radiation Effects: Early Pool Fire Distance

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

		DIA	NOITE
			Radiation Level (kW/m2)
			NOITE

Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	59,985	59,985
Radiation Level	18,3	kW/m2	18,7426	18,7426
Radiation Level	36	kW/m2		
Radiation Level	71,2	kW/m2		



Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

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

			DIA	NOITE
			Distance (m)	
Radiation Level	3	kW/m2	74,1833	74,1833
Radiation Level	18,3	kW/m2	25,2487	25,2487
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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-fenda Estação de

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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

Base Case

CASE Name: Data

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

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 1846 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) 55,1 m/s
Droplet Diameter(1) 68,13 um
Duration of Discharge(1) 510 s
Final Temperature(1) 40 degC
Release Rate(1) 98,5 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]

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Study Folder: seda

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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-fenda Estação de

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	0,0452744	0,0411151	
LFL (10500)	18,75	s	0,0604344	0,0517695	
LFL Frac (10500)	18,75	s	0,0604344	0,0517695	

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

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

			DIA	Distance (m)	
				NOITE	
Furthest Extent	10500	ppm	0,0604344	0,0517695	
Furthest Extent	10500	ppm	0,0604344	0,0517695	

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

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Phast 6.53.1



Weather Conditions

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

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

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Study Folder: seda

Phast 6.53.1

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

Base Case

CASE Name: Data

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

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 1846 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

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) 55,1 m/s
Droplet Diameter(1) 68,13 um
Duration of Discharge(1) 510 s
Final Temperature(1) 40 degC
Release Rate(1) 98,5 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

SUMMARY REPORT

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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-fenda Estação de

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	0,0852075	0,0814682
LFL (10500)	18,75	s	74,1434	0,0975556
LFL Frac (10500)	18,75	s	74,1434	0,0975556

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

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Explosion Effects: Late Ignition

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

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	82,652
Overpressure	0,1	bar	74,4179
Overpressure	0,3	bar	Not Reachable
Overpressure	0,4	bar	Not Reachable

Supplementary Data at 0,05 bar

			DIA
Supplied Flammable Mass		kg	0,747663
Used Flammable Mass			
Overpressure Radius		m	16,3854
Distance to:			
- Ignition Source		m	70
- Cloud Front/Centre		m	70
- Explosion Centre		m	66,2666

Supplementary Data at 0,1 bar

			DIA
Supplied Flammable Mass		kg	0,747663
Used Flammable Mass			
Overpressure Radius		m	8,15123
Distance to:			
- Ignition Source		m	70
- Cloud Front/Centre		m	70
- Explosion Centre		m	66,2666

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

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		74,1434	0,0975556
Furthest Extent	10500	ppm		74,1434	0,0975556
				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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-fenda Estação de

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Pool Vaporization Results

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

		DIA	NOITE
	Release Segment 1		
Release Duration	s	510	510
Liquid Rainout	fraction	0,00363969	0,000255129
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	165,766	
Pool Vaporization Rate	kg/s	0,0362072	
Total Vapor Flowrate	kg/s	98,1777	
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	69,8569	
Pool Vaporization Rate	kg/s	0,0856483	
Total Vapor Flowrate	kg/s	98,2271	
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	55,9331	
Pool Vaporization Rate	kg/s	0,107956	
Total Vapor Flowrate	kg/s	98,2494	
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	48,8469	
Pool Vaporization Rate	kg/s	0,124827	
Total Vapor Flowrate	kg/s	98,2663	
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	83,9575	
Pool Vaporization Rate	kg/s	0,144258	
Total Vapor Flowrate	kg/s	98,2857	
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	103,88	
Pool Vaporization Rate	kg/s	0,168947	
Total Vapor Flowrate	kg/s	98,3104	
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	245,231	
Pool Vaporization Rate	kg/s	0,13116	
Total Vapor Flowrate	kg/s	0,168947	
Maximum Pool Radius	m	3,56729	0,94779

Radiation Effects: Early Pool Fire Distance

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

	Radiation Level (kW/m2)
DIA	NOITE

SUMMARY REPORT

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Radiation Effects: Early Pool Fire Ellipse

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

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		77,7373	75,2478
Radiation Level	18,3	kW/m2		68,8219	72,5226
Radiation Level	36	kW/m2		65,9632	71,6617
Radiation Level	71,2	kW/m2		65,2031	71,6617

Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)	
		DIA	NOITE

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Radiation Effects: Late Pool Fire Ellipse

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

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		94,3338	83,7638
Radiation Level	18,3	kW/m2		72,959	75,644
Radiation Level	36	kW/m2		68,0524	72,9925
Radiation Level	71,2	kW/m2		Not Reached	72,3262

Weather Conditions

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

				DIA	NOITE
Wind Speed		m/s		1,25	1,25
Pasquill Stability				A/B	F
Surface Roughness Length		in		4,62348	4,62348
Surface Roughness Parameter				0,09	0,09
Atmospheric Temperature		degC		23	23
Surface Temperature		degC		28	23
Relative Humidity		fraction		0,651	0,651

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Study Folder: seda

Phast 6.53.1

Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-furo Ribeirão Preto-Horizontal impingement

Base Case

CASE Name: Data

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

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 471,9 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 86,9 m/s
Droplet Diameter(1) 27,39 um
Duration of Discharge(1) 1812 s
Final Temperature(1) 40 degC
Release Rate(1) 9,7 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

Unique Audit Number: 656.516



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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-furo Ribeirão Preto-

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)	
				DIA	NOITE
UFL (76800)	18,75	s	12,2793	19,5073	
LFL (10500)	18,75	s	41,7887	50,4897	
LFL Frac (10500)	18,75	s	41,7887	50,4897	

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

Early Pool Fire Hazard

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

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

SUMMARY REPORT

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Phast 6.53.1



Explosion Effects: Late Ignition

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

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	84,4748	97,6896
Overpressure	0,1	bar	52,6343	59,8959
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	43,2307	72,2959
Used Flammable Mass				
Overpressure Radius		m	63,3604	75,207
Distance to:				
- Ignition Source		m	40	40
- Cloud Front/Centre		m	40	40
- Explosion Centre		m	21,1144	22,4826
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	43,2307	72,2959
Used Flammable Mass				
Overpressure Radius		m	31,52	37,4133
Distance to:				
- Ignition Source		m	40	40
- Cloud Front/Centre		m	40	40
- Explosion Centre		m	21,1144	22,4826
			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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-furo Ribeirão Preto-

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		41,7887	50,4897
Furthest Extent	10500	ppm		41,7887	50,4897
				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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-furo Ribeirão Preto-

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Pool Vaporization Results

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

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1812	1812
Liquid Rainout	fraction	0,999864	0,99986
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	66,8306	71,8256
Pool Vaporization Rate	kg/s	0,666488	0,527554
Total Vapor Flowrate	kg/s	0,667812	0,528915
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	32,67	34,78
Pool Vaporization Rate	kg/s	1,37795	1,09471
Total Vapor Flowrate	kg/s	1,37927	1,09607
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	25,9394	27,9544
Pool Vaporization Rate	kg/s	1,70743	1,36533
Total Vapor Flowrate	kg/s	1,70876	1,36669
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	22,7906	24,2
Pool Vaporization Rate	kg/s	1,95727	1,57386
Total Vapor Flowrate	kg/s	1,9586	1,57522
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	38,775	20,8
Pool Vaporization Rate	kg/s	2,24798	1,74436
Total Vapor Flowrate	kg/s	2,2493	1,74572
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	15650,6	18058,3
Pool Vaporization Rate	kg/s	1,09675	0,95381
Total Vapor Flowrate	kg/s	1,09807	0,955172
Maximum Pool Radius	m	12,256	12,256

Radiation Effects: Early Pool Fire Distance

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

	Radiation Level (kW/m2)
DIA	NOITE

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Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	38,2191	38,2191
Radiation Level	18,3	kW/m2	10,4106	10,4106
Radiation Level	36	kW/m2	6,57427	6,57426
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
		NOITE
DIA		

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Radiation Effects: Late Pool Fire Ellipse

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

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	50,1585	50,1585
Radiation Level	18,3	kW/m2	13,2664	13,2664
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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-furo Ribeirão Preto-

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

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Phast 6.53.1



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

Base Case

CASE Name: Data

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

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 471,9 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) 86,9 m/s
Droplet Diameter(1) 27,39 um
Duration of Discharge(1) 1812 s
Final Temperature(1) 40 degC
Release Rate(1) 9,7 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

Unique Audit Number: 656.516



Study Folder: seda

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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-furo Estação de Ribeirão

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		0,0362109	0,0328898
LFL (10500)	18,75	s		0,0482954	0,0413968
LFL Frac (10500)	18,75	s		0,0482954	0,0413968

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

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

				DIA	Distance (m)
					NOITE
Furthest Extent	10500	ppm		0,0482954	0,0413968
Furthest Extent	10500	ppm		0,0482954	0,0413968

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

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



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

Base Case

CASE Name: Data

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

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 471,9 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

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) 86,9 m/s
Droplet Diameter(1) 27,39 um
Duration of Discharge(1) 1812 s
Final Temperature(1) 40 degC
Release Rate(1) 9,7 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

SUMMARY REPORT

Unique Audit Number: 656.516



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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) 1160 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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-furo Estação de Ribeirão

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		1,59284	1,41117
LFL (10500)	18,75	s		2,81602	2,11982
LFL Frac (10500)	18,75	s		2,81602	2,11982

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

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

			DIA	Distance (m)
				NOITE
Furthest Extent	10500	ppm	2,81602	2,11982
Furthest Extent	10500	ppm	2,81602	2,11982

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

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Weather Conditions

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

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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

Base Case

CASE Name: Data

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

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 1878 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) 4,1 m/s
Droplet Diameter(1) 1,23E4 um
Duration of Discharge(1) 300 s
Final Temperature(1) 40 degC
Release Rate(1) 181,6 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]

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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) 1160 m3

Geometry

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

SUMMARY REPORT

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Consequence Results

Distance to Concentration Results

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

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	18,3716	43,9961
LFL (10500)	18,75	s	91,2101	138,215
LFL Frac (10500)	18,75	s	91,2101	138,215

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-ruptura Estação de

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Explosion Effects: Late Ignition

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

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	121,653	160,997
Overpressure	0,1	bar	80,2863	119,63
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	442,049	1749,9
Used Flammable Mass				
Overpressure Radius		m	82,3172	82,3172
Distance to:				
- Ignition Source		m	80	130
- Cloud Front/Centre		m	80	130
- Explosion Centre		m	39,3359	78,6795
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	442,049	1749,9
Used Flammable Mass				
Overpressure Radius		m	40,9504	40,9504
Distance to:				
- Ignition Source		m	80	130
- Cloud Front/Centre		m	80	130
- Explosion Centre		m	39,3359	78,6795
			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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-ruptura Estação de

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		91,2101	138,215
Furthest Extent	10500	ppm		91,2101	138,215
				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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-ruptura Estação de

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Phast 6.53.1



Pool Vaporization Results

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

		DIA	NOITE
Release Segment 1			
Release Duration	s	300	300
Liquid Rainout	fraction	0,967148	0,982341
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	45,2256	61,2306
Pool Vaporization Rate	kg/s	3,69781	4,30875
Total Vapor Flowrate	kg/s	9,66372	7,51556
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	16,79	239,636
Pool Vaporization Rate	kg/s	9,77097	8,72835
Total Vapor Flowrate	kg/s	15,7369	11,9352
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	14864,6	16984,7
Pool Vaporization Rate	kg/s	3,51278	3,00282
Total Vapor Flowrate	kg/s	9,47869	8,72835
Maximum Pool Radius	m	24,449	24,449

Radiation Effects: Early Pool Fire Distance

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

		DIA	NOITE
			Radiation Level (kW/m2)
			NOITE

Radiation Effects: Early Pool Fire Ellipse

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

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	72,9231	73,3181
Radiation Level	18,3	kW/m2	24,706	24,8643
Radiation Level	36	kW/m2		
Radiation Level	71,2	kW/m2		



Radiation Effects: Late Pool Fire Distance

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

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

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

			DIA	NOITE
			Distance (m)	
Radiation Level	3	kW/m2	74,6854	74,6585
Radiation Level	18,3	kW/m2	25,4779	25,4509
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 Ribeirão Preto\Uberaba - Ribeirão Preto-14"-gasolina c/ bomba-ruptura Estação de

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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

Cenário	Liberação de produto desde o km 135+000 até o km 238+500. (Ø da linha=24”).
Modelos de Simulação Utilizados	User Defined
Diâmetro do vazamento	609,9 mm (100% do diâmetro) 121,92 mm (20% do diâmetro) 30,48 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}	6,1 m/s (100% do diâmetro) 61,0 m/s (20% do diâmetro) 120,7 m/s (5% do diâmetro)
Diâmetro de gota^{A, B}	15,70 mm (100% do diâmetro) 0,087 mm (20% do diâmetro) 0,036 mm (5% do diâmetro)
Tempo de vazamento	300 s (100% do diâmetro) 558 s (20% do diâmetro) 1758 s (5% do diâmetro)
Taxa de vazamento^{A, B}	842,7 kg/s (100% do diâmetro) 337,4 kg/s (20% do diâmetro) 41,7 kg/s (5% do diâmetro)
Temperatura	40°C
Área da poça^{A, B}	5561,7 m ² (100% do diâmetro) 5080,6 m ² (20% do diâmetro) 1212,5 m ² (5% do diâmetro)
Volume de confinamento	4950 m ³
Considerações	
A – Calculado pelo LeakMap	
B – Os valores para ruptura foram retirados do Aglomerado Humano denominado Região de Sítios (km 189,19). Os valores para furo com 20% do diâmetro foram retirados do Aglomerado Humano denominado Região de Sítios (km 189,19). Os valores para furo com 5% do diâmetro foram retirados do Aglomerado Humano denominado Região de Sítios (km 189,19).	



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Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão Preto-Horizontal Impingement

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

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 5081 m²

[Type of Bund Surface Concrete]

Bund Height 0,03 m

[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 61 m/s

Droplet Diameter(1) 87,08 um

Duration of Discharge(1) 558 s

Final Temperature(1) 40 degC

Release Rate(1) 337,4 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)	4950 m3

Geometry

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

SUMMARY REPORT

Study Folder: seda

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Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

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	14,018	25,2259
LFL (43000)	18,75	s	50,5206	72,9862
LFL Frac (43000)	18,75	s	50,5206	72,9862

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24'-álcool c/ bomba-fenda Estação de Ribeirão

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	114,755	160,678
Overpressure	0,1	bar	69,6503	97,521
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	205,067	562,988
Used Flammable Mass				
Overpressure Radius		m	89,7547	125,678
Distance to:				
- Ignition Source		m	50	70
- Cloud Front/Centre		m	50	70
- Explosion Centre		m	25	35

			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	205,067	562,988
Used Flammable Mass				
Overpressure Radius		m	44,6503	62,521
Distance to:				
- Ignition Source		m	50	70
- Cloud Front/Centre		m	50	70
- Explosion Centre		m	25	35

			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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		50,5206	72,9862
Furthest Extent	43000	ppm		50,5206	72,9862
				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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
Release Segment 1			
Release Duration	s	558	558
Liquid Rainout	fraction	0,999997	0,999997
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	107,122	109,202
Pool Vaporization Rate	kg/s	4,75724	3,61823
Total Vapor Flowrate	kg/s	4,75837	3,61941
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	452,059	449,979
Pool Vaporization Rate	kg/s	8,94697	6,99525
Total Vapor Flowrate	kg/s	8,9481	6,99642
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	21040,8	21040,8
Pool Vaporization Rate	kg/s	3,9055	3,41492
Total Vapor Flowrate	kg/s	8,94697	6,99525
Maximum Pool Radius	m	40,2145	40,2145

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
			Radiation Level (kW/m2)
			NOITE

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	162,005	162,005
Radiation Level	18,3	kW/m2	75,8554	75,8554
Radiation Level	36	kW/m2	50,0238	50,0238
Radiation Level	71,2	kW/m2	41,2269	41,2269



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Radiation Level (kW/m2)		

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

			DIA	NOITE
			Distance (m)	
Radiation Level	3	kW/m2	162,005	162,005
Radiation Level	18,3	kW/m2	75,8554	75,8554
Radiation Level	36	kW/m2	50,0238	50,0238
Radiation Level	71,2	kW/m2	41,2269	41,2269

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Unique Audit Number: 656.516



Study Folder: seda

Phast 6.53.1

Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão Preto-Vertical

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

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 5081 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) 61 m/s
Droplet Diameter(1) 87,08 um
Duration of Discharge(1) 558 s
Final Temperature(1) 40 degC
Release Rate(1) 337,4 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: 656.516



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) 4950 m3

Geometry

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

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

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	No Hazard	NOITE No Hazard
LFL (43000)	18,75	s	No Hazard	No Hazard
LFL Frac (43000)	18,75	s	No Hazard	No Hazard

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Late Pool Fire Hazard

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool c/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
	Release Segment 1		
Release Duration	s	558	558
Liquid Rainout	fraction	0,283412	0,198948
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	243,36	241,026
Pool Vaporization Rate	kg/s	2,02318	1,10519
Total Vapor Flowrate	kg/s	243,8	271,38
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	550,33	92,95
Pool Vaporization Rate	kg/s	3,59903	2,88496
Total Vapor Flowrate	kg/s	245,376	273,16
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	469,972	72,0469
Pool Vaporization Rate	kg/s	4,1649	3,73797
Total Vapor Flowrate	kg/s	3,59903	274,013
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	20336,3	60,5375
Pool Vaporization Rate	kg/s	2,31042	4,41521
Total Vapor Flowrate	kg/s	4,1649	274,69
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s		53,28
Pool Vaporization Rate	kg/s		4,98992
Total Vapor Flowrate	kg/s	2,31042	275,265
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s		179,622
Pool Vaporization Rate	kg/s		5,85711
Total Vapor Flowrate	kg/s		276,132
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s		20900,5
Pool Vaporization Rate	kg/s		1,6244
Total Vapor Flowrate	kg/s		5,85711
Maximum Pool Radius	m	40,2145	53,737

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool c/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
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Radiation Level (kW/m2)

NOITE

SUMMARY REPORT

Study Folder: seda

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Phast 6.53.1



Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	169,649	171,373
Radiation Level	18,3	kW/m2	92,6278	105,174
Radiation Level	36	kW/m2	69,2296	84,7107
Radiation Level	71,2	kW/m2	61,9528	79,1814

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

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

SUMMARY REPORT

Study Folder: seda

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Phast 6.53.1



Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		187,672	258,738
Radiation Level	18,3	kW/m2		101,523	148,451
Radiation Level	36	kW/m2		75,6911	116,361
Radiation Level	71,2	kW/m2		66,8942	103,365

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

			DIA	NOITE
Wind Speed		m/s	1,25	1,25
Pasquill Stability			A/B	F
Surface Roughness Length		in	4,62348	4,62348
Surface Roughness Parameter			0,09	0,09
Atmospheric Temperature		degC	23	23
Surface Temperature		degC	28	23
Relative Humidity		fraction	0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão Preto-Angular-45

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

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 5081 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

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) 61 m/s
Droplet Diameter(1) 87,08 um
Duration of Discharge(1) 558 s
Final Temperature(1) 40 degC
Release Rate(1) 337,4 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

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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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

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	0,0862241	0,0847203
LFL (43000)	18,75	s	0,114223	0,0982237
LFL Frac (43000)	18,75	s	0,114223	0,0982237

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,114223	0,0982237
Furthest Extent	43000	ppm	0,114223	0,0982237

			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: 656.516

Phast 6.53.1



Late Pool Fire Hazard

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24'-álcool c/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
	Release Segment 1		
Release Duration	s	558	558
Liquid Rainout	fraction	0,43965	0,412124
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	237,16	251,223
Pool Vaporization Rate	kg/s	2,79022	2,13592
Total Vapor Flowrate	kg/s	191,852	200,485
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	82,3556	89,18
Pool Vaporization Rate	kg/s	8,08004	6,01886
Total Vapor Flowrate	kg/s	197,142	204,368
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	63,665	69,66
Pool Vaporization Rate	kg/s	10,5253	7,7842
Total Vapor Flowrate	kg/s	199,588	206,134
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	54,675	59,7431
Pool Vaporization Rate	kg/s	12,2539	9,11497
Total Vapor Flowrate	kg/s	201,316	207,464
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	93,4469	100,069
Pool Vaporization Rate	kg/s	14,325	10,7319
Total Vapor Flowrate	kg/s	203,387	209,081
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	114,988	130,91
Pool Vaporization Rate	kg/s	16,7814	12,1509
Total Vapor Flowrate	kg/s	205,844	10,7319
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	20953,7	20899,2
Pool Vaporization Rate	kg/s	3,59287	3,36451
Total Vapor Flowrate	kg/s	16,7814	12,1509
Maximum Pool Radius	m	79,4407	77,4133

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24'-álcool c/ bomba-fenda Estação de Ribeirão

	Radiation Level (kW/m2)
DIA	NOITE

SUMMARY REPORT

Study Folder: seda

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Phast 6.53.1



Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	270,751	274,789
Radiation Level	18,3	kW/m2	177,85	184,414
Radiation Level	36	kW/m2	150,282	157,5
Radiation Level	71,2	kW/m2	140,296	147,955

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

		Radiation Level (kW/m2)
		NOITE
DIA		

SUMMARY REPORT

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Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	393,222	395,501
Radiation Level	18,3	kW/m2	239,647	245,24
Radiation Level	36	kW/m2	196,441	202,878
Radiation Level	71,2	kW/m2	175,804	182,833

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-fenda Estação de Ribeirão

			DIA	NOITE
Wind Speed		m/s	1,25	1,25
Pasquill Stability			A/B	F
Surface Roughness Length		in	4,62348	4,62348
Surface Roughness Parameter			0,09	0,09
Atmospheric Temperature		degC	23	23
Surface Temperature		degC	28	23
Relative Humidity		fraction	0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-Horizontal impingement

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

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 1213 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 120,7 m/s
Droplet Diameter(1) 36,25 um
Duration of Discharge(1) 1758 s
Final Temperature(1) 40 degC
Release Rate(1) 41,7 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

Unique Audit Number: 656.516



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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

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		6,22143	10,5153
LFL (43000)	18,75	s		22,159	29,9785
LFL Frac (43000)	18,75	s		22,159	29,9785

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

SUMMARY REPORT

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Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

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	51,1866	56,4193
Overpressure	0,1	bar	30,5368	33,0922
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	19,6782	28,3674
Used Flammable Mass				
Overpressure Radius		m	41,0917	46,4193
Distance to:				
- Ignition Source		m	20	20
- Cloud Front/Centre		m	20	20
- Explosion Centre		m	10,0949	10
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	19,6782	28,3674
Used Flammable Mass				
Overpressure Radius		m	20,4419	23,0922
Distance to:				
- Ignition Source		m	20	20
- Cloud Front/Centre		m	20	20
- Explosion Centre		m	10,0949	10
			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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		22,159	29,9785
Furthest Extent	43000	ppm		22,159	29,9785
				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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1758	1758
Liquid Rainout	fraction	0,999986	0,999986
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	242,581	258,406
Pool Vaporization Rate	kg/s	1,52029	1,15183
Total Vapor Flowrate	kg/s	1,52129	1,15283
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	1515,42	1499,59
Pool Vaporization Rate	kg/s	1,9395	1,58155
Total Vapor Flowrate	kg/s	1,9405	1,58255
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	19842	19842
Pool Vaporization Rate	kg/s	0,977992	0,863695
Total Vapor Flowrate	kg/s	0,977992	0,863695
Maximum Pool Radius	m	19,6456	19,6456

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

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

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	84,8471	84,8471
Radiation Level	18,3	kW/m2	38,2052	38,2052
Radiation Level	36	kW/m2	23,2342	23,2342
Radiation Level	71,2	kW/m2	20,6562	20,6562



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

			DIA	NOITE
			Distance (m)	
Radiation Level	3	kW/m2	84,8471	84,8471
Radiation Level	18,3	kW/m2	38,2052	38,2052
Radiation Level	36	kW/m2	23,2342	23,2342
Radiation Level	71,2	kW/m2	20,6562	20,6562

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Ribeirão Preto-

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão Preto-Vertical

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

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 1213 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) 120,7 m/s
Droplet Diameter(1) 36,25 um
Duration of Discharge(1) 1758 s
Final Temperature(1) 40 degC
Release Rate(1) 41,7 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]

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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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

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	0,0291063	0,0276244
LFL (43000)	18,75	s	0,0401084	0,0356883
LFL Frac (43000)	18,75	s	0,0401084	0,0356883

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0401084	0,0356883
Furthest Extent	43000	ppm	0,0401084	0,0356883

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

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Phast 6.53.1



Late Pool Fire Hazard

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

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Phast 6.53.1



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool c/ bomba-furo Estação de Ribeirão

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1758	1758
Liquid Rainout	fraction	0,0588142	0,0203441
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	559,322	585,64
Pool Vaporization Rate	kg/s	0,170409	0,0481909
Total Vapor Flowrate	kg/s	39,4179	40,8998
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	238,74	246,683
Pool Vaporization Rate	kg/s	0,4008	0,114201
Total Vapor Flowrate	kg/s	39,6482	40,9659
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	187,897	193,278
Pool Vaporization Rate	kg/s	0,50859	0,145894
Total Vapor Flowrate	kg/s	39,756	40,9975
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	161,556	166,375
Pool Vaporization Rate	kg/s	0,590834	0,170483
Total Vapor Flowrate	kg/s	39,8383	41,0221
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	279,435	282,584
Pool Vaporization Rate	kg/s	0,687577	0,199624
Total Vapor Flowrate	kg/s	39,935	41,0513
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	347,869	353,338
Pool Vaporization Rate	kg/s	0,814268	0,238172
Total Vapor Flowrate	kg/s	40,0617	41,0898
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	9448,78	4312,94
Pool Vaporization Rate	kg/s	0,311293	0,155454
Total Vapor Flowrate	kg/s	0,814268	0,238172
Maximum Pool Radius	m	16,7193	10,0535

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool c/ bomba-furo Estação de Ribeirão

	DIA	NOITE
Radiation Level (kW/m2)		

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Phast 6.53.1



Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	67,6422	76,4833
Radiation Level	18,3	kW/m2	51,5012	65,9861
Radiation Level	36	kW/m2	47,033	64,0298
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

		Radiation Level (kW/m2)
		NOITE
DIA		

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Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	113,672	105,844
Radiation Level	18,3	kW/m2	73,0569	79,5644
Radiation Level	36	kW/m2	59,8868	70,8589
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão Preto-Angular-45

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

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 1213 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

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) 120,7 m/s
Droplet Diameter(1) 36,25 um
Duration of Discharge(1) 1758 s
Final Temperature(1) 40 degC
Release Rate(1) 41,7 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

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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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

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	1,74304	0,0402763
LFL (43000)	18,75	s	3,9028	3,25833
LFL Frac (43000)	18,75	s	3,9028	3,25833

Concentration(ppm)	Averaging Time		DIA	Heights (m) for above distances
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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

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

			DIA	Distance (m)
Furthest Extent	43000	ppm	3,9028	3,25833
Furthest Extent	43000	ppm	3,9028	3,25833

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

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Late Pool Fire Hazard

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

		DIA	NOITE
	Release Segment 1		
Release Duration	s	1758	1758
Liquid Rainout	fraction	0,0860275	0,0718918
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	565,251	586,851
Pool Vaporization Rate	kg/s	0,242605	0,155288
Total Vapor Flowrate	kg/s	38,3553	38,8574
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	241,309	245,472
Pool Vaporization Rate	kg/s	0,569799	0,371426
Total Vapor Flowrate	kg/s	38,6825	39,0735
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	190,421	191,677
Pool Vaporization Rate	kg/s	0,723157	0,475883
Total Vapor Flowrate	kg/s	38,8358	39,178
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	164,125	164,526
Pool Vaporization Rate	kg/s	0,840679	0,557236
Total Vapor Flowrate	kg/s	38,9533	39,2593
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	282,894	278,364
Pool Vaporization Rate	kg/s	0,979213	0,654127
Total Vapor Flowrate	kg/s	39,0919	39,3562
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	349,838	346,068
Pool Vaporization Rate	kg/s	1,16047	0,782069
Total Vapor Flowrate	kg/s	39,2731	39,4842
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	11492,7	11798,3
Pool Vaporization Rate	kg/s	0,396355	0,327814
Total Vapor Flowrate	kg/s	1,16047	0,782069
Maximum Pool Radius	m	20,3039	19,0269

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

	DIA	NOITE
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Radiation Level (kW/m2)

NOITE

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Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	107,653	114,379
Radiation Level	18,3	kW/m2	88,7184	96,8215
Radiation Level	36	kW/m2	83,055	91,747
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

		Radiation Level (kW/m2)
		NOITE
DIA		

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Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	162,632	166,912
Radiation Level	18,3	kW/m2	114,652	121,533
Radiation Level	36	kW/m2	99,3036	106,945
Radiation Level	71,2	kW/m2	96,5269	104,528

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-furo Estação de Ribeirão

			DIA	NOITE
Wind Speed		m/s	1,25	1,25
Pasquill Stability			A/B	F
Surface Roughness Length		in	4,62348	4,62348
Surface Roughness Parameter			0,09	0,09
Atmospheric Temperature		degC	23	23
Surface Temperature		degC	28	23
Relative Humidity		fraction	0,651	0,651

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Study Folder: seda

Phast 6.53.1

Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de Ribeirão Preto

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

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 5562 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) 6,1 m/s
Droplet Diameter(1) 1,573E4 um
Duration of Discharge(1) 300 s
Final Temperature(1) 40 degC
Release Rate(1) 842,7 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]

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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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

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		2,17088	11,6946
LFL (43000)	18,75	s		52,4233	69,0984
LFL Frac (43000)	18,75	s		52,4233	69,0984

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

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Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

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	154,859	161,014
Overpressure	0,1	bar	89,601	95,1755
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	621,067	1152,61
Used Flammable Mass				
Overpressure Radius		m	129,859	131,014
Distance to:				
- Ignition Source		m	50	60
- Cloud Front/Centre		m	50	60
- Explosion Centre		m	25	30
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	621,067	1152,61
Used Flammable Mass				
Overpressure Radius		m	64,601	65,1755
Distance to:				
- Ignition Source		m	50	60
- Cloud Front/Centre		m	50	60
- Explosion Centre		m	25	30
			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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		52,4233	69,0984
Furthest Extent	43000	ppm		52,4233	69,0984
				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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

Late Pool Fire Status	DIA	NOITE
	Hazard	Hazard



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

		DIA	NOITE
Release Segment 1			
Release Duration	s	300	300
Liquid Rainout	fraction	0,992348	0,996493
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	67,6506	67,6506
Pool Vaporization Rate	kg/s	4,56016	3,70733
Total Vapor Flowrate	kg/s	11,0086	6,66279
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	233,216	233,216
Pool Vaporization Rate	kg/s	10,4666	8,5481
Total Vapor Flowrate	kg/s	16,915	11,5036
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	21299,1	21299,1
Pool Vaporization Rate	kg/s	4,35056	3,80752
Total Vapor Flowrate	kg/s	10,4666	8,5481
Maximum Pool Radius	m	42,0755	42,0755

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

		DIA	NOITE
		Radiation Level (kW/m2)	
		DIA	NOITE

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

		Distance (m)	
		DIA	NOITE
Radiation Level	3 kW/m2	168,84	168,877
Radiation Level	18,3 kW/m2	79,2994	79,3368
Radiation Level	36 kW/m2	52,6044	52,6419
Radiation Level	71,2 kW/m2	43,2018	43,2392

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	168,84	168,877
Radiation Level	18,3	kW/m2	79,2994	79,3368
Radiation Level	36	kW/m2	52,6044	52,6419
Radiation Level	71,2	kW/m2	43,2018	43,2392

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool c/ bomba-ruptura Estação de

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

Dados de Entrada do Trecho Ribeirão Preto-REPLAN / Estação Meteorológica de Ribeirão Preto – Álcool não Bombeado

Cenário	Liberação de produto desde o km 135+000 até o km 238+500. (Ø da linha=24”).
Modelos de Simulação Utilizados	User Defined
Diâmetro do vazamento	609,9 mm (100% do diâmetro) 121,92 mm (20% do diâmetro) 30,48 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}	3,9 m/s (100% do diâmetro) 49,2 m/s (20% do diâmetro) 57,0 m/s (5% do diâmetro)
Diâmetro de gota^{A, B}	24,30 mm (100% do diâmetro) 0,053 mm (20% do diâmetro) 0,013 mm (5% do diâmetro)
Tempo de vazamento	402 s (100% do diâmetro) 630 s (20% do diâmetro) 5562 s (5% do diâmetro)
Taxa de vazamento^{A, B}	536,6 kg/s (100% do diâmetro) 272,0 kg/s (20% do diâmetro) 19,7 kg/s (5% do diâmetro)
Temperatura	40°C
Área da poça^{A, B}	4792,6 m ² (100% do diâmetro) 4792,6 m ² (20% do diâmetro) 1131,3 m ² (5% do diâmetro)
Volume de confinamento	4950 m ³
Considerações	
A – Calculado pelo LeakMap	
B – Os valores para ruptura foram retirados do Aglomerado Humano denominado Região de Sítios (km 189,19). Os valores para furo com 20% do diâmetro foram retirados do Aglomerado Humano denominado Região de Sítios (km 189,19). Os valores para furo com 5% do diâmetro foram retirados do Aglomerado Humano denominado Região de Sítios (km 189,19).	



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Ribeirão Preto-REPLAN-24''-álcool s/ bomba-fenda Estação de Ribeirão Preto-Horizontal Impingement

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool s/ bomba-fenda Estação de Ribeirão

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 4793 m2
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 49,2 m/s
Droplet Diameter(1) 13,2 um
Duration of Discharge(1) 630 s
Final Temperature(1) 40 degC
Release Rate(1) 272 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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

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 (190000)	18,75	s		13,1558	23,7764
LFL (43000)	18,75	s		47,6966	68,7265
LFL Frac (43000)	18,75	s		47,6966	68,7265

Concentration(ppm)	Averaging Time			Heights (m) for above distances	
				DIA	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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

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Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

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	104,412	147,247
Overpressure	0,1	bar	61,9927	88,3272
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	170,585	457,124
Used Flammable Mass				
Overpressure Radius		m	84,4123	117,247
Distance to:				
- Ignition Source		m	40	60
- Cloud Front/Centre		m	40	60
- Explosion Centre		m	20	30

			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	170,585	457,124
Used Flammable Mass				
Overpressure Radius		m	41,9927	58,3272
Distance to:				
- Ignition Source		m	40	60
- Cloud Front/Centre		m	40	60
- Explosion Centre		m	20	30

			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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		47,6966	68,7265
Furthest Extent	43000	ppm		47,6966	68,7265
				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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
Release Segment 1			
Release Duration	s	630	630
Liquid Rainout	fraction	0,999997	0,999997
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	117,181	120,451
Pool Vaporization Rate	kg/s	4,49017	3,41491
Total Vapor Flowrate	kg/s	4,49117	3,41591
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	514,075	510,805
Pool Vaporization Rate	kg/s	8,17113	6,40583
Total Vapor Flowrate	kg/s	8,17213	6,40683
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	20968,7	20968,7
Pool Vaporization Rate	kg/s	3,67083	3,2123
Total Vapor Flowrate	kg/s	8,17113	6,40583
Maximum Pool Radius	m	39,0581	39,0581

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
		Radiation Level (kW/m2)	
		DIA	NOITE

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	157,81	157,81
Radiation Level	18,3	kW/m2	73,7808	73,7808
Radiation Level	36	kW/m2	48,5171	48,5171
Radiation Level	71,2	kW/m2	40,0705	40,0705



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Radiation Level (kW/m2)		

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

			DIA	NOITE
				Distance (m)
Radiation Level	3	kW/m2	157,81	157,81
Radiation Level	18,3	kW/m2	73,7808	73,7808
Radiation Level	36	kW/m2	48,5171	48,5171
Radiation Level	71,2	kW/m2	40,0705	40,0705

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Unique Audit Number: 656.516



Study Folder: seda

Phast 6.53.1

Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão Preto-Vertical

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

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 4793 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) 49,2 m/s
Droplet Diameter(1) 52,74 um
Duration of Discharge(1) 630 s
Final Temperature(1) 40 degC
Release Rate(1) 272 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) 4950 m3

Geometry

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

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

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	No Hazard	NOITE No Hazard
LFL (43000)	18,75	s	No Hazard	No Hazard
LFL Frac (43000)	18,75	s	No Hazard	No Hazard

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

Late Pool Fire Hazard

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

	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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
Release Segment 1			
Release Duration	s	630	630
Liquid Rainout	fraction	0,295845	0,235093
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	257,603	304,503
Pool Vaporization Rate	kg/s	1,93048	1,39471
Total Vapor Flowrate	kg/s	193,461	209,449
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	579,043	601,497
Pool Vaporization Rate	kg/s	3,43612	2,81968
Total Vapor Flowrate	kg/s	194,966	210,874
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	504,735	524,721
Pool Vaporization Rate	kg/s	3,90712	3,20322
Total Vapor Flowrate	kg/s	3,43612	2,81968
Release Segment 1 Cloud Segment 4			
Cloud Segment Duration	s	20258,6	20169,3
Pool Vaporization Rate	kg/s	2,19037	1,72146
Total Vapor Flowrate	kg/s	3,90712	3,20322
Maximum Pool Radius	m	39,0581	39,0581

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
			Radiation Level (kW/m2)
			NOITE

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

		Distance (m)		
		DIA	NOITE	
Radiation Level	3	kW/m2	155,345	156,349
Radiation Level	18,3	kW/m2	83,8047	91,5162
Radiation Level	36	kW/m2	61,8771	71,4182
Radiation Level	71,2	kW/m2	55,5009	66,1125

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Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

	Radiation Level (kW/m2)
DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

			DIA	Distance (m)
			NOITE	
Radiation Level	3	kW/m2	179,941	194,066
Radiation Level	18,3	kW/m2	95,9115	110,036
Radiation Level	36	kW/m2	70,6479	84,7725
Radiation Level	71,2	kW/m2	62,2012	76,3258

SUMMARY REPORT

Study Folder: seda

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Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Ribeirão Preto-REPLAN-24''-álcool s/ bomba-fenda Estação de Ribeirão Preto-Angular-45

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool s/ bomba-fenda Estação de Ribeirão

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 4793 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

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) 49,2 m/s
Droplet Diameter(1) 52,74 um
Duration of Discharge(1) 630 s
Final Temperature(1) 40 degC
Release Rate(1) 272 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

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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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

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		0,0862003	0,0846644
LFL (43000)	18,75	s		0,114045	0,098182
LFL Frac (43000)	18,75	s		0,114045	0,098182

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,114045	0,098182
Furthest Extent	43000	ppm	0,114045	0,098182

			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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

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Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool s/ bomba-fenda Estação de Ribeirão

		DIA	NOITE
	Release Segment 1		
Release Duration	s	630	630
Liquid Rainout	fraction	0,499347	0,461078
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	254,402	268,141
Pool Vaporization Rate	kg/s	2,92369	2,1927
Total Vapor Flowrate	kg/s	139,101	148,779
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	90,6281	98,5819
Pool Vaporization Rate	kg/s	8,24694	6,00198
Total Vapor Flowrate	kg/s	144,425	152,589
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	71,1294	77,4331
Pool Vaporization Rate	kg/s	10,5246	7,67881
Total Vapor Flowrate	kg/s	146,702	154,266
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	61,2625	65,475
Pool Vaporization Rate	kg/s	12,2532	9,00648
Total Vapor Flowrate	kg/s	148,431	155,593
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	104,593	111,625
Pool Vaporization Rate	kg/s	14,3676	10,6268
Total Vapor Flowrate	kg/s	150,545	157,213
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	128,197	141,875
Pool Vaporization Rate	kg/s	16,9869	12,2447
Total Vapor Flowrate	kg/s	153,165	158,831
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	20889,8	20836,9
Pool Vaporization Rate	kg/s	3,69921	3,41754
Total Vapor Flowrate	kg/s	16,9869	12,2447
Maximum Pool Radius	m	80,4313	77,871

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool s/ bomba-fenda Estação de Ribeirão

	Radiation Level (kW/m2)
DIA	NOITE

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Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		244,903	248,613
Radiation Level	18,3	kW/m2		155,429	162,133
Radiation Level	36	kW/m2		128,752	136,228
Radiation Level	71,2	kW/m2		119,36	127,361

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

		Radiation Level (kW/m2)	
		DIA	NOITE

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Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	377,484	378,578
Radiation Level	18,3	kW/m2	222,295	227,568
Radiation Level	36	kW/m2	178,679	185,015
Radiation Level	71,2	kW/m2	157,753	164,836

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-fenda Estação de Ribeirão

			DIA	NOITE
Wind Speed		m/s	1,25	1,25
Pasquill Stability			A/B	F
Surface Roughness Length		in	4,62348	4,62348
Surface Roughness Parameter			0,09	0,09
Atmospheric Temperature		degC	23	23
Surface Temperature		degC	28	23
Relative Humidity		fraction	0,651	0,651

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Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-Horizontal impingement

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-

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 1131 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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 m/s
Droplet Diameter(1) 13,2 um
Duration of Discharge(1) 5562 s
Final Temperature(1) 40 degC
Release Rate(1) 19,7 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]

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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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-

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		5,33384	8,63094
LFL (43000)	18,75	s		19,4935	25,6009
LFL Frac (43000)	18,75	s		19,4935	25,6009

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

SUMMARY REPORT

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Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-

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	23,6507	54,4439
Overpressure	0,1	bar	14,2782	32,1096
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	1,83995	24,8978
Used Flammable Mass				
Overpressure Radius		m	18,6507	44,4439
Distance to:				
- Ignition Source		m	10	20
- Cloud Front/Centre		m	10	20
- Explosion Centre		m	5	10
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	1,83995	24,8978
Used Flammable Mass				
Overpressure Radius		m	9,27816	22,1096
Distance to:				
- Ignition Source		m	10	20
- Cloud Front/Centre		m	10	20
- Explosion Centre		m	5	10
			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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		19,4935	25,6009
Furthest Extent	43000	ppm		19,4935	25,6009
				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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool s/ bomba-furo Ribeirão Preto-

		DIA	NOITE
	Release Segment 1		
Release Duration	s	5562	5562
Liquid Rainout	fraction	0,999987	0,999986
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	79,21	735,766
Pool Vaporization Rate	kg/s	0,396913	1,04008
Total Vapor Flowrate	kg/s	0,397913	1,04108
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	37,43	4826,23
Pool Vaporization Rate	kg/s	0,84349	1,26806
Total Vapor Flowrate	kg/s	0,84449	1,26906
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	30,3756	16038
Pool Vaporization Rate	kg/s	1,054	0,839175
Total Vapor Flowrate	kg/s	1,055	0,839175
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	25,9069	
Pool Vaporization Rate	kg/s	1,2179	
Total Vapor Flowrate	kg/s	1,2189	
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	45,3781	
Pool Vaporization Rate	kg/s	1,41465	
Total Vapor Flowrate	kg/s	1,41565	
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	18,09	
Pool Vaporization Rate	kg/s	1,583	
Total Vapor Flowrate	kg/s	1,584	
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	21363,6	
Pool Vaporization Rate	kg/s	1,07989	
Total Vapor Flowrate	kg/s	1,08089	
Maximum Pool Radius	m	18,9764	18,9764

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool s/ bomba-furo Ribeirão Preto-

	DIA	NOITE
Radiation Level (kW/m2)		

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Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	70,4696	70,4696
Radiation Level	18,3	kW/m2	31,3366	31,3366
Radiation Level	36	kW/m2	18,6144	18,6144
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-

	Radiation Level (kW/m2)	
	DIA	NOITE

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Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		82,2225	82,2225
Radiation Level	18,3	kW/m2		36,9471	36,9471
Radiation Level	36	kW/m2		22,3897	22,3897
Radiation Level	71,2	kW/m2		19,987	19,987

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Ribeirão Preto-

				DIA	NOITE
Wind Speed		m/s		1,25	1,25
Pasquill Stability				A/B	F
Surface Roughness Length		in		4,62348	4,62348
Surface Roughness Parameter				0,09	0,09
Atmospheric Temperature		degC		23	23
Surface Temperature		degC		28	23
Relative Humidity		fraction		0,651	0,651

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Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão Preto-Vertical

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

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 1131 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 m/s
Droplet Diameter(1) 13,2 um
Duration of Discharge(1) 5562 s
Final Temperature(1) 40 degC
Release Rate(1) 19,7 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]

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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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

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	0,0291063	0,0276244
LFL (43000)	18,75	s	0,0401084	0,0356883
LFL Frac (43000)	18,75	s	0,0401084	0,0356883

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

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

			DIA	Distance (m)
				NOITE
Furthest Extent	43000	ppm	0,0401084	0,0356883
Furthest Extent	43000	ppm	0,0401084	0,0356883

			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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

		DIA	NOITE
	Release Segment 1		
Release Duration	s	5562	5562
Liquid Rainout	fraction	0,112079	0,0617404
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	1442,1	1646,33
Pool Vaporization Rate	kg/s	0,368354	0,177196
Total Vapor Flowrate	kg/s	17,8604	18,6609
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	669,302	744,879
Pool Vaporization Rate	kg/s	0,796225	0,392106
Total Vapor Flowrate	kg/s	18,2883	18,8758
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	1083,67	598,146
Pool Vaporization Rate	kg/s	0,98344	0,488158
Total Vapor Flowrate	kg/s	18,4755	18,9719
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	3114,07	521,207
Pool Vaporization Rate	kg/s	0,851074	0,558611
Total Vapor Flowrate	kg/s	18,3431	19,0423
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	14916,2	915,013
Pool Vaporization Rate	kg/s	0,467254	0,637765
Total Vapor Flowrate	kg/s	0,851074	19,1215
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s		1181,27
Pool Vaporization Rate	kg/s		0,735824
Total Vapor Flowrate	kg/s	0,467254	19,2195
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s		11492,1
Pool Vaporization Rate	kg/s		0,309541
Total Vapor Flowrate	kg/s		0,735824
Maximum Pool Radius	m	18,9764	18,3438

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

	DIA	NOITE
Radiation Level (kW/m2)		

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Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	47,6114	46,5107
Radiation Level	18,3	kW/m2	32,1623	34,4082
Radiation Level	36	kW/m2	27,9912	31,7081
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

		Radiation Level (kW/m2)
		NOITE
DIA		

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Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	103,843	106,452
Radiation Level	18,3	kW/m2	58,5678	62,4747
Radiation Level	36	kW/m2	44,0103	48,3019
Radiation Level	71,2	kW/m2	41,6077	46,0738

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

			DIA	NOITE
Wind Speed		m/s	1,25	1,25
Pasquill Stability			A/B	F
Surface Roughness Length		in	4,62348	4,62348
Surface Roughness Parameter			0,09	0,09
Atmospheric Temperature		degC	23	23
Surface Temperature		degC	28	23
Relative Humidity		fraction	0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão Preto-Angular-45

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

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 1131 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

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 m/s
Droplet Diameter(1) 13,2 um
Duration of Discharge(1) 5562 s
Final Temperature(1) 40 degC
Release Rate(1) 19,7 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

SUMMARY REPORT

Unique Audit Number: 656.516



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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

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		0,0417279	0,040276
LFL (43000)	18,75	s		0,0862519	0,0799795
LFL Frac (43000)	18,75	s		0,0862519	0,0799795

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard

Flash Fire Envelope

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

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

				DIA	Distance (m)
					NOITE
Furthest Extent	43000	ppm		0,0862519	0,0799795
Furthest Extent	43000	ppm		0,0862519	0,0799795

				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: 656.516

Phast 6.53.1



Late Pool Fire Hazard

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool s/ bomba-furo Estação de Ribeirão

		DIA	NOITE
	Release Segment 1		
Release Duration	s	5562	5562
Liquid Rainout	fraction	0,138796	0,130595
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	1572,12	1650,39
Pool Vaporization Rate	kg/s	0,486143	0,362055
Total Vapor Flowrate	kg/s	17,4519	17,4893
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	734,278	745,712
Pool Vaporization Rate	kg/s	1,04091	0,803792
Total Vapor Flowrate	kg/s	18,0066	17,9311
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	598,809	598,723
Pool Vaporization Rate	kg/s	1,27808	1,00258
Total Vapor Flowrate	kg/s	18,2438	18,1299
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	1013,55	521,664
Pool Vaporization Rate	kg/s	1,51185	1,14896
Total Vapor Flowrate	kg/s	18,4776	18,2762
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	1680,6	912,412
Pool Vaporization Rate	kg/s	1,81187	1,3137
Total Vapor Flowrate	kg/s	18,7776	18,441
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	14526	1174,2
Pool Vaporization Rate	kg/s	0,537496	1,51797
Total Vapor Flowrate	kg/s	1,81187	18,6453
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s		15996,9
Pool Vaporization Rate	kg/s		0,519846
Total Vapor Flowrate	kg/s	0,537496	1,51797
Maximum Pool Radius	m	26,0251	26,9131

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-álcool s/ bomba-furo Estação de Ribeirão

	Radiation Level (kW/m2)
DIA	NOITE

SUMMARY REPORT

Study Folder: seda

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Phast 6.53.1



Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	70,0031	72,8208
Radiation Level	18,3	kW/m2	53,1109	56,3538
Radiation Level	36	kW/m2	48,3209	51,746
Radiation Level	71,2	kW/m2		

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

		Radiation Level (kW/m2)
		NOITE
DIA		

SUMMARY REPORT

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Phast 6.53.1



Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

				Distance (m)	
				DIA	NOITE
Radiation Level	3	kW/m2		150,785	157,757
Radiation Level	18,3	kW/m2		91,4205	96,6609
Radiation Level	36	kW/m2		72,8155	77,6136
Radiation Level	71,2	kW/m2		68,3813	72,8733

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-furo Estação de Ribeirão

			DIA	NOITE
Wind Speed		m/s	1,25	1,25
Pasquill Stability			A/B	F
Surface Roughness Length		in	4,62348	4,62348
Surface Roughness Parameter			0,09	0,09
Atmospheric Temperature		degC	23	23
Surface Temperature		degC	28	23
Relative Humidity		fraction	0,651	0,651

SUMMARY REPORT

Unique Audit Number: 656.516



Study Folder: seda

Phast 6.53.1

Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de Ribeirão Preto

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

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 4793 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) 2,428E4 um
Duration of Discharge(1) 402 s
Final Temperature(1) 40 degC
Release Rate(1) 536,6 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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

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		5,2788	14,8075
LFL (43000)	18,75	s		37,2469	62,4299
LFL Frac (43000)	18,75	s		37,2469	62,4299

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

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	120,607	3,12661
Overpressure	0,1	bar	67,5363	1,55543
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	334,04	0,00866797
Used Flammable Mass				
Overpressure Radius		m	105,607	3,12654
Distance to:				
- Ignition Source		m	30	10
- Cloud Front/Centre		m	30	10
- Explosion Centre		m	15	6,9609e-005
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	334,04	0,00866797
Used Flammable Mass				
Overpressure Radius		m	52,5363	1,55536
Distance to:				
- Ignition Source		m	30	10
- Cloud Front/Centre		m	30	10
- Explosion Centre		m	15	6,9609e-005
			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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	43000	ppm		37,2469	62,4299
Furthest Extent	43000	ppm		37,2469	62,4299
				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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

Late Pool Fire Status	DIA	NOITE
	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

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Phast 6.53.1



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

		DIA	NOITE
	Release Segment 1		
Release Duration	s	402	402
Liquid Rainout	fraction	0,99273	0,998187
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	81	81,9025
Pool Vaporization Rate	kg/s	4,33506	3,5467
Total Vapor Flowrate	kg/s	8,23626	4,51981
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	322,003	321,101
Pool Vaporization Rate	kg/s	8,70915	7,1836
Total Vapor Flowrate	kg/s	12,6104	8,15671
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	21197	21197
Pool Vaporization Rate	kg/s	3,74518	3,28541
Total Vapor Flowrate	kg/s	8,70915	7,1836
Maximum Pool Radius	m	39,0581	39,0581

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

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

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	157,825	157,836
Radiation Level	18,3	kW/m2	73,7951	73,8067
Radiation Level	36	kW/m2	48,5314	48,543
Radiation Level	71,2	kW/m2	40,0848	40,0964



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

			DIA	NOITE
			Distance (m)	
Radiation Level	3	kW/m2	157,825	157,836
Radiation Level	18,3	kW/m2	73,7951	73,8067
Radiation Level	36	kW/m2	48,5314	48,543
Radiation Level	71,2	kW/m2	40,0848	40,0964

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-álcool s/ bomba-ruptura Estação de

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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

Cenário	Liberação de produto desde o km 135+000 até o km 238+500. (Ø da linha=24”).
Modelos de Simulação Utilizados	User Defined
Diâmetro do vazamento	609,9 mm (100% do diâmetro) 121,92 mm (20% do diâmetro) 30,48 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}	6,1 m/s (100% do diâmetro) 59,8 m/s (20% do diâmetro) 123,6 m/s (5% do diâmetro)
Diâmetro de gota^{A, B}	5,56 mm (100% do diâmetro) 0,058 mm (20% do diâmetro) 0,014 mm (5% do diâmetro)
Tempo de vazamento	300 s (100% do diâmetro) 546 s (20% do diâmetro) 1656 s (5% do diâmetro)
Taxa de vazamento^{A, B}	801,0 kg/s (100% do diâmetro) 314,1 kg/s (20% do diâmetro) 40,6 kg/s (5% do diâmetro)
Temperatura	40°C
Área da poça^{A, B}	5970,5 m ² (100% do diâmetro) 5521,7 m ² (20% do diâmetro) 1256,7 m ² (5% do diâmetro)
Volume de confinamento	4950 m ³
Considerações	
A – Calculado pelo LeakMap	
B – Os valores para ruptura foram retirados do Aglomerado Humano denominado Região de Sítios (km 189,19). Os valores para furo com 20% do diâmetro foram retirados do Aglomerado Humano denominado Região de Sítios (km 189,19). Os valores para furo com 5% do diâmetro foram retirados do Aglomerado Humano denominado Região de Sítios (km 189,19).	



SUMMARY REPORT

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Study Folder: seda

Phast 6.53.1

Ribeirão Preto-REPLAN-24''-gasolina c/ bomba-fenda Estação de Ribeirão Preto-Horizontal Impingement

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24''-gasolina c/ bomba-fenda Estação de

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 5522 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 59,8 m/s
Droplet Diameter(1) 57,84 um
Duration of Discharge(1) 446 s
Final Temperature(1) 40 degC
Release Rate(1) 314,1 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

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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) 4950 m3

Geometry

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

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

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	56,8385	88,4331
LFL (10500)	18,75	s	168,81	223,46
LFL Frac (10500)	18,75	s	168,81	223,46

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard



Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

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	213,518	276,306
Overpressure	0,1	bar	146,421	209,21
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	2381,93	5258,9
Used Flammable Mass				
Overpressure Radius		m	133,518	133,518
Distance to:				
- Ignition Source		m	160	220
- Cloud Front/Centre		m	160	220
- Explosion Centre		m	80	142,788
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	2381,93	5258,9
Used Flammable Mass				
Overpressure Radius		m	66,4213	66,4213
Distance to:				
- Ignition Source		m	160	220
- Cloud Front/Centre		m	160	220
- Explosion Centre		m	80	142,788
			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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		168,81	223,46
Furthest Extent	10500	ppm		168,81	223,46
				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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

Late Pool Fire Status	DIA	NOITE
	Hazard	Hazard

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Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

		DIA	NOITE
	Release Segment 1		
Release Duration	s	446	446
Liquid Rainout	fraction	0,999981	0,99998
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	108,16	100
Pool Vaporization Rate	kg/s	16,485	11,5507
Total Vapor Flowrate	kg/s	16,491	11,557
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	419,425	389,25
Pool Vaporization Rate	kg/s	29,8154	23,7315
Total Vapor Flowrate	kg/s	29,8214	23,7377
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	61,425	17412,9
Pool Vaporization Rate	kg/s	26,3036	7,43887
Total Vapor Flowrate	kg/s	29,8154	23,7315
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	14967	
Pool Vaporization Rate	kg/s	8,28742	
Total Vapor Flowrate	kg/s	26,3036	7,43887
Maximum Pool Radius	m	41,9239	41,9239

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

	DIA	NOITE
Radiation Level (kW/m2)		

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

			DIA	NOITE
		Distance (m)		
Radiation Level	3	kW/m2	91,3513	91,3513
Radiation Level	18,3	kW/m2	32,6758	32,6758
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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

	DIA	Radiation Level (kW/m2)
		NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

			DIA	Distance (m)
			NOITE	
Radiation Level	3	kW/m2	114,703	114,703
Radiation Level	18,3	kW/m2	42,9364	42,9364
Radiation Level	36	kW/m2	Not Reached	Not Reached
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

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Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de Ribeirão Preto-Vertical

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

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 5522 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) 59,8 m/s
Droplet Diameter(1) 57,84 um
Duration of Discharge(1) 446 s
Final Temperature(1) 40 degC
Release Rate(1) 314,1 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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

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	No Hazard	NOITE No Hazard
LFL (10500)	18,75	s	11,2158	No Hazard
LFL Frac (10500)	18,75	s	11,2158	No Hazard

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

Early Pool Fire Status	DIA Hazard
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SUMMARY REPORT

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Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24'-gasolina c/ bomba-fenda Estação de

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	129,475
Overpressure	0,1	bar	74,3858
Overpressure	0,3	bar	Not Reachable
Overpressure	0,4	bar	Not Reachable

Supplementary Data at 0,05 bar

			DIA
Supplied Flammable Mass		kg	223,896
Used Flammable Mass			
Overpressure Radius		m	109,623
Distance to:			
- Ignition Source		m	10
- Cloud Front/Centre		m	10
- Explosion Centre		m	19,8515

Supplementary Data at 0,1 bar

			DIA
Supplied Flammable Mass		kg	223,896
Used Flammable Mass			
Overpressure Radius		m	54,5343
Distance to:			
- Ignition Source		m	10
- Cloud Front/Centre		m	10
- Explosion Centre		m	19,8515

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

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

				Distance (m)
			DIA	
Furthest Extent	10500	ppm	11,2158	
Furthest Extent	10500	ppm	11,2158	
				Heights (m) for above distances
			DIA	
Furthest Extent	10500	ppm	0	
Furthest Extent	10500	ppm	0	

Late Pool Fire Hazard

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

Late Pool Fire Status	DIA Hazard
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SUMMARY REPORT

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Phast 6.53.1



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

		DIA
	Release Segment 1	
Release Duration	s	446
Liquid Rainout	fraction	0,0011347
	Release Segment 1 Cloud Segment 1	
Cloud Segment Duration	s	147,623
Pool Vaporization Rate	kg/s	0,0319564
Total Vapor Flowrate	kg/s	313,776
	Release Segment 1 Cloud Segment 2	
Cloud Segment Duration	s	61,9031
Pool Vaporization Rate	kg/s	0,0767188
Total Vapor Flowrate	kg/s	313,82
	Release Segment 1 Cloud Segment 3	
Cloud Segment Duration	s	48,88
Pool Vaporization Rate	kg/s	0,0971458
Total Vapor Flowrate	kg/s	313,841
	Release Segment 1 Cloud Segment 4	
Cloud Segment Duration	s	42,6169
Pool Vaporization Rate	kg/s	0,112604
Total Vapor Flowrate	kg/s	313,856
	Release Segment 1 Cloud Segment 5	
Cloud Segment Duration	s	73,4
Pool Vaporization Rate	kg/s	0,130563
Total Vapor Flowrate	kg/s	313,874
	Release Segment 1 Cloud Segment 6	
Cloud Segment Duration	s	89,7144
Pool Vaporization Rate	kg/s	0,153377
Total Vapor Flowrate	kg/s	313,897
	Release Segment 1 Cloud Segment 7	
Cloud Segment Duration	s	187,123
Pool Vaporization Rate	kg/s	0,127188
Total Vapor Flowrate	kg/s	0,153377
Maximum Pool Radius	m	3,39049

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

Radiation Level (kW/m2)

DIA

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Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

			Distance (m)
Radiation Level	3	kW/m2	DIA 41,4291
Radiation Level	18,3	kW/m2	32,5337
Radiation Level	36	kW/m2	29,6801
Radiation Level	71,2	kW/m2	28,9222

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

Radiation Level (kW/m2)
DIA



Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

			DIA	Distance (m)
Radiation Level	3	kW/m2	57,2432	
Radiation Level	18,3	kW/m2	36,5694	
Radiation Level	36	kW/m2	31,6997	
Radiation Level	71,2	kW/m2	31,2461	

Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de Ribeirão Preto-Angular-45

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

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 5522 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

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) 59,8 m/s
Droplet Diameter(1) 57,84 um
Duration of Discharge(1) 446 s
Final Temperature(1) 40 degC
Release Rate(1) 314,1 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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

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		0,107682	0,0973866
LFL (10500)	18,75	s		14,4137	154,309
LFL Frac (10500)	18,75	s		14,4137	154,309

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

Early Pool Fire Status	DIA	NOITE
	Hazard	Hazard



Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24'-gasolina c/ bomba-fenda Estação de

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	187,135	208,518
Overpressure	0,1	bar	136,301	162,348
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	175,931	2529,87
Used Flammable Mass				
Overpressure Radius		m	101,158	133,518
Distance to:				
- Ignition Source		m	10	150
- Cloud Front/Centre		m	10	150
- Explosion Centre		m	85,9773	75
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	175,931	67,0372
Used Flammable Mass				
Overpressure Radius		m	50,3232	36,4832
Distance to:				
- Ignition Source		m	10	10
- Cloud Front/Centre		m	10	10
- Explosion Centre		m	85,9773	125,865
			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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		14,4137	154,309
Furthest Extent	10500	ppm		14,4137	154,309
				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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

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Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

		DIA	NOITE
	Release Segment 1		
Release Duration	s	446	446
Liquid Rainout	fraction	0,0103472	0,00871652
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	150,676	155,626
Pool Vaporization Rate	kg/s	0,238868	0,157748
Total Vapor Flowrate	kg/s	311,089	311,52
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	61,755	63,4144
Pool Vaporization Rate	kg/s	0,580256	0,386484
Total Vapor Flowrate	kg/s	311,43	311,749
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	49,2	49,92
Pool Vaporization Rate	kg/s	0,737281	0,49526
Total Vapor Flowrate	kg/s	311,587	311,857
	Release Segment 1 Cloud Segment 4		
Cloud Segment Duration	s	42	42,5625
Pool Vaporization Rate	kg/s	0,856517	0,579196
Total Vapor Flowrate	kg/s	311,706	311,941
	Release Segment 1 Cloud Segment 5		
Cloud Segment Duration	s	72,7294	72,6375
Pool Vaporization Rate	kg/s	0,994992	0,677994
Total Vapor Flowrate	kg/s	311,845	312,04
	Release Segment 1 Cloud Segment 6		
Cloud Segment Duration	s	89,9344	89,725
Pool Vaporization Rate	kg/s	1,17246	0,805293
Total Vapor Flowrate	kg/s	312,022	312,167
	Release Segment 1 Cloud Segment 7		
Cloud Segment Duration	s	2541,96	2661,85
Pool Vaporization Rate	kg/s	0,395189	0,322127
Total Vapor Flowrate	kg/s	1,17246	0,805293
Maximum Pool Radius	m	10,5127	9,90584

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

	DIA	NOITE
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Radiation Level (kW/m2)

NOITE

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Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	120,656	128,289
Radiation Level	18,3	kW/m2	100,657	109,425
Radiation Level	36	kW/m2	95,8515	104,723
Radiation Level	71,2	kW/m2	95,3074	104,03

Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

	Radiation Level (kW/m2)
DIA	NOITE

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Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	138,565	146,632
Radiation Level	18,3	kW/m2	102,599	110,98
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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-fenda Estação de

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Unique Audit Number: 656.516



Study Folder: seda

Phast 6.53.1

Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-Horizontal impingement

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

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 1257 m²
[Type of Bund Surface Concrete]
Bund Height 0,03 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Outdoor Release Direction Horizontal 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) 123,6 m/s
Droplet Diameter(1) 13,54 um
Duration of Discharge(1) 1656 s
Final Temperature(1) 40 degC
Release Rate(1) 40,6 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]

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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) 4950 m3

Geometry

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

SUMMARY REPORT

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Phast 6.53.1



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

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	22,9813	36,8013
LFL (10500)	18,75	s	71,5238	92,9847
LFL Frac (10500)	18,75	s	71,5238	92,9847

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

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	126,542	178,518
Overpressure	0,1	bar	80,5486	111,421
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	159,208	539,44
Used Flammable Mass				
Overpressure Radius		m	97,8457	133,518
Distance to:				
- Ignition Source		m	60	90
- Cloud Front/Centre		m	60	90
- Explosion Centre		m	28,6965	45
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	108,886	539,44
Used Flammable Mass				
Overpressure Radius		m	42,8857	66,4213
Distance to:				
- Ignition Source		m	70	90
- Cloud Front/Centre		m	70	90
- Explosion Centre		m	37,6629	45
			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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- Cloud Front/Centre	m	Not Reachable	Not Reachable
- Explosion Centre	m	0	0

Flash Fire Envelope

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		71,5238	92,9847
Furthest Extent	10500	ppm		71,5238	92,9847
				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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

		DIA	NOITE
Release Segment 1			
Release Duration	s	1656	1656
Liquid Rainout	fraction	0,999921	0,999919
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	62,8056	232,563
Pool Vaporization Rate	kg/s	2,18698	3,91772
Total Vapor Flowrate	kg/s	2,1902	3,92102
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	27,4444	1423,44
Pool Vaporization Rate	kg/s	5,04564	5,11785
Total Vapor Flowrate	kg/s	5,04886	5,12114
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	21,0525	19944
Pool Vaporization Rate	kg/s	6,31278	2,6471
Total Vapor Flowrate	kg/s	6,316	2,6471
Release Segment 1 Cloud Segment 4			
Cloud Segment Duration	s	21488,7	
Pool Vaporization Rate	kg/s	3,06333	
Total Vapor Flowrate	kg/s	3,06656	
Maximum Pool Radius	m	20,0005	20,0005

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

		DIA	NOITE
			Radiation Level (kW/m2)
			NOITE

Radiation Effects: Early Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

			Distance (m)	
			DIA	NOITE
Radiation Level	3	kW/m2	48,8073	48,8073
Radiation Level	18,3	kW/m2	12,394	12,394
Radiation Level	36	kW/m2		
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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

	DIA	Radiation Level (kW/m2)
		NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

			DIA	Distance (m)
			NOITE	
Radiation Level	3	kW/m2	64,7301	64,7301
Radiation Level	18,3	kW/m2	21,0111	21,0111
Radiation Level	36	kW/m2	Not Reached	Not Reached
Radiation Level	71,2	kW/m2	Not Reached	Not Reached

SUMMARY REPORT

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Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Ribeirão Preto-

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Estação de Ribeirão Preto-Vertical

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Estação de Ribeirão

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 1257 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) 123,6 m/s
Droplet Diameter(1) 13,54 um
Duration of Discharge(1) 1656 s
Final Temperature(1) 40 degC
Release Rate(1) 40,6 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

Unique Audit Number: 656.516



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) 4950 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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Estação de Ribeirão

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	0,0362109	0,0328898	
LFL (10500)	18,75	s	0,0482954	0,0413968	
LFL Frac (10500)	18,75	s	0,0482954	0,0413968	

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Estação de Ribeirão

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

			DIA	Distance (m)	
				NOITE	
Furthest Extent	10500	ppm	0,0482954	0,0413968	
Furthest Extent	10500	ppm	0,0482954	0,0413968	

			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: 656.516

Phast 6.53.1



Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Estação de Ribeirão

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Estação de Ribeirão Preto-Angular-45

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Estação de Ribeirão

User-Defined Data

Geometry

East(1) 0 m
North(1) 0 m

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 1257 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

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) 123,6 m/s
Droplet Diameter(1) 13,54 um
Duration of Discharge(1) 1656 s
Final Temperature(1) 40 degC
Release Rate(1) 40,6 kg/s
Pre-Dilution Air Rates(1) 0 kg/s

SUMMARY REPORT

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Study Folder: seda

Phast 6.53.1

Late Ignition Location No ignition location
Mass Inventory of material to Disperse 1E7 kg

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) 4950 m3

Geometry

Geometry shape Point
Coordinates Absolute



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Estação de Ribeirão

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	2,7043	2,20724
LFL (10500)	18,75	s	4,86104	3,94596
LFL Frac (10500)	18,75	s	4,86104	3,94596

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Estação de Ribeirão

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

			DIA	Distance (m)
				NOITE
Furthest Extent	10500	ppm	4,86104	3,94596
Furthest Extent	10500	ppm	4,86104	3,94596

			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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Weather Conditions

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-furo Estação de Ribeirão

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651

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Unique Audit Number: 656.516



Study Folder: seda

Phast 6.53.1

Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de Ribeirão Preto

Base Case

CASE Name: Data

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

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 5971 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) 6,1 m/s
Droplet Diameter(1) 5559 um
Duration of Discharge(1) 300 s
Final Temperature(1) 40 degC
Release Rate(1) 801 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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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) 4950 m3

Geometry

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

SUMMARY REPORT

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Phast 6.53.1



Consequence Results

Distance to Concentration Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

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	32,2806	105,015
LFL (10500)	18,75	s	201,288	230,687
LFL Frac (10500)	18,75	s	201,288	230,687

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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

	DIA	NOITE
Early Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

Study Folder: seda

Unique Audit Number: 656.516

Phast 6.53.1



Explosion Effects: Late Ignition

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24'-gasolina c/ bomba-ruptura Estação de

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	231,982	297,78
Overpressure	0,1	bar	164,886	230,683
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	7716,38	6432,39
Used Flammable Mass				
Overpressure Radius		m	133,518	133,518
Distance to:				
- Ignition Source		m	200	230
- Cloud Front/Centre		m	200	230
- Explosion Centre		m	98,4645	164,262
			Supplementary Data at 0,1 bar	
			DIA	NOITE
Supplied Flammable Mass		kg	7716,38	6432,39
Used Flammable Mass				
Overpressure Radius		m	66,4213	66,4213
Distance to:				
- Ignition Source		m	200	230
- Cloud Front/Centre		m	200	230
- Explosion Centre		m	98,4645	164,262
			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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- Cloud Front/Centre	m	Not Reachable	Not Reachable
- Explosion Centre	m	0	0

Flash Fire Envelope

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

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

				Distance (m)	
				DIA	NOITE
Furthest Extent	10500	ppm		201,288	230,687
Furthest Extent	10500	ppm		201,288	230,687
				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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

	DIA	NOITE
Late Pool Fire Status	Hazard	Hazard

SUMMARY REPORT

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Pool Vaporization Results

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

		DIA	NOITE
	Release Segment 1		
Release Duration	s	300	300
Liquid Rainout	fraction	0,958976	0,980055
	Release Segment 1 Cloud Segment 1		
Cloud Segment Duration	s	69,3056	67,6506
Pool Vaporization Rate	kg/s	14,3251	12,1146
Total Vapor Flowrate	kg/s	47,1853	28,0904
	Release Segment 1 Cloud Segment 2		
Cloud Segment Duration	s	246,489	233,216
Pool Vaporization Rate	kg/s	32,2117	27,8301
Total Vapor Flowrate	kg/s	65,0719	43,8059
	Release Segment 1 Cloud Segment 3		
Cloud Segment Duration	s	21284,2	21299,1
Pool Vaporization Rate	kg/s	10,3989	10,6475
Total Vapor Flowrate	kg/s	32,2117	27,8301
Maximum Pool Radius	m	43,5944	43,5944

Radiation Effects: Early Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

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

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

			DIA	Distance (m) NOITE
Radiation Level	3	kW/m2	118,524	118,579
Radiation Level	18,3	kW/m2	44,7048	44,7605
Radiation Level	36	kW/m2		
Radiation Level	71,2	kW/m2		



Radiation Effects: Late Pool Fire Distance

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

		Radiation Level (kW/m2)
	DIA	NOITE

Radiation Effects: Late Pool Fire Ellipse

Path: \seda\Estação de Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

			DIA	NOITE
			Distance (m)	
Radiation Level	3	kW/m2	118,524	118,579
Radiation Level	18,3	kW/m2	44,7048	44,7605
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 Ribeirão Preto\Ribeirão Preto-REPLAN-24"-gasolina c/ bomba-ruptura Estação de

		DIA	NOITE
Wind Speed	m/s	1,25	1,25
Pasquill Stability		A/B	F
Surface Roughness Length	in	4,62348	4,62348
Surface Roughness Parameter		0,09	0,09
Atmospheric Temperature	degC	23	23
Surface Temperature	degC	28	23
Relative Humidity	fraction	0,651	0,651