

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6



Terminal LLX



Gasolina

01.HA1

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\01.HA1

User-Defined Data

Material

Material Identifier	N-HEXANE (Imported Study Gasolina)
Type of Vessel	Unpressurized (at atmospheric pressure)
Pressure Specification	Pressure not used
Temperature	25 degC
Mass Inventory	5.314E4 kg

Scenario

Scenario Type	Line rupture
Phase to be Released	Liquid
Building Wake Effect	None
Specify Pump Head	No pump head supplied
Tank Head	2.7 m
Number of Excess Flow Valves	0
Number of Non-Return Valves	0
Number of Shut-Off Valves	0

Pipe

Internal Diameter	152.4 mm
Line length	1 m

Location

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

Bund

Status of Bund	Bund present
Bund Area	976 m2
[Type of Bund Surface	Concrete]
Bund Height	0.1 m
[Bund Failure Modeling	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Direction	Horizontal

Flammable

Jet Fire Method	Cone Model
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Dispersion

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Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	5.314E4 kg

Fireball Parameters

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

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0.05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D
System	Absolute
East(1)	1145 m
North(1)	1134 m

Path: \Terminal LLX\Gasolina\01.HA1

Discharge Data

User-Defined Quantities

Material	EXANE (Imported Study Gasolina)
Temperature	25,00 degC
Pressure	1,01 bar
Inventory	53.138,12 kg
Scenario	Line rupture
Fixed Duration	n/a s

Calculated Quantities

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Diurno

Mass Flow of Air (Vent from Vapor Space Only)	n/a
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Average Values for Segment Number 1

Liquid Fraction	1,00 fraction
Final Temperature	25,01 degC
Final Velocity	4,62 m/s
Droplet Diameter	592,52 um
Continuous Release Data:	
Mass Flowrate	5.52568E+001 kg/s
Release Duration	961,66 s
Orifice Velocity	4,62 m/s
Exit Pressure	1,01 bar
Exit Temperature	25,01 degC
Discharge Coefficient	1,00

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Expanded Radius	0,08 m
Weather:	Gasolina\Estação Automatica MPX (from Global Weathers)\Noturno
Mass Flow of Air (Vent from Vapor Space Only)	n/a
Average Values for Segment Number	1
Liquid Fraction	1,00 fraction
FinalTemperature	25,01 degC
Final Velocity	4,62 m/s
Droplet Diameter	592,52 um
Continuous Release Data:	
Mass Flowrate	5.52568E+001 kg/s
Release Duration	961,66 s
Orifice Velocity	4,62 m/s
Exit Pressure	1,01 bar
Exit Temperature	25,01 degC
Discharge Coefficient	1,00
Expanded Radius	0,08 m

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Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\01.HA1

			Diurno	Noturno
Release Segment 1				
Release Duration	s		961.658	961.658
Liquid Rainout	fraction		0.967859	0.98354
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		51.84	50.7656
Pool Vaporization Rate	kg/s		1.68003	1.25359
Total Vapor Flowrate	kg/s		3.45602	2.16314
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		18.72	18.54
Pool Vaporization Rate	kg/s		4.53333	3.34533
Total Vapor Flowrate	kg/s		6.30932	4.25488
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		3529.44	3530.69
Pool Vaporization Rate	kg/s		3.59836	2.93962
Total Vapor Flowrate	kg/s		5.37435	3.84917
Maximum Pool Radius	m		17.6258	17.6258

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\01.HA1

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL (76800)	18.75	s		6.83623	9.21892
LFL (10500)	18.75	s		26.8137	28.7343
LFL Frac (10500)	18.75	s		26.8137	28.7343
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL (76800)	18.75	s		0	0
LFL (10500)	18.75	s		0	0
LFL Frac (10500)	18.75	s		0	0

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\01.HA1

Jet fire method used: Cone model - DNV recommended

		Diurno	Noturno
Jet Fire Status		Truncated	Truncated
Flame Direction		Horizontal	Horizontal

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Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\01.HA1

This table gives the distances to the specified radiation levels
for each jet fire listed in the above hazard table

				Distance (m)
				Diurno
				Noturno
Radiation Level	5	kW/m2	57.9469	47.1903
Radiation Level	18.18	kW/m2	44.3055	36.6492
Radiation Level	100	kW/m2	34.0396	27.349

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\01.HA1

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\01.HA1

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\01.HA1

				Distance (m)
				Diurno
				Noturno
Radiation Level	5	kW/m2	50.2991	44.39
Radiation Level	18.18	kW/m2	15.9917	16.1578
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\01.HA1

	Radiation Level (kW/m2)
Diurno	Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\01.HA1

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

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Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\01.HA1

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	57.3188	49.955
Radiation Level	18.18	kW/m2	20.6347	20.5655
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\01.HA1

		Radiation Level (kW/m2)	
		Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\01.HA1

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	10500	ppm	26.8137	28.7343
Furthest Extent	10500	ppm	26.8137	28.7343
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

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Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\01.HA1

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	44.5978	53.1496
Overpressure	0.1	bar	36.9188	43.5725
Overpressure	0.45	bar	20.5656	23.1771

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		17.1656	33.2999
Used Flammable Mass	kg		17.1656	33.2999
Overpressure Radius	m		34.5978	43.1496
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		17.1656	33.2999
Used Flammable Mass	kg		17.1656	33.2999
Overpressure Radius	m		26.9188	33.5725
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		17.1656	33.2999
Used Flammable Mass	kg		17.1656	33.2999
Overpressure Radius	m		10.5656	13.1771
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10

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Weather Conditions

Path: \Terminal LLX\Gasolina\01.HA1

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

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Study Folder: Terminal LLX

Phast 6.6

02.HA3

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\02.HA3

User-Defined Data

Material

Material Identifier N-HEXANE (Imported Study Gasolina)

Scenario

Building Wake Effect None

Vessel/Tank

Release Type Continuous

Location

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

Bund

Status of Bund Bund present
Bund Area 976 m2
[Type of Bund Surface Concrete]
Bund Height 0.1 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Location of release Open air release
Outdoor Release Direction Horizontal

Flammable

Jet Fire Method Cone Model

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 1.82 m/s
Droplet Diameter(1) 100 um
Duration of Discharge(1) 600 s
Final Temperature(1) 25 degC
Release Rate(1) 21.86 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 5.314E4 kg
Model Risk Effects for Vertical Jet Fires Do not model vertical jet fires

Fireball Parameters

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

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Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0.05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D
System	Absolute
East(1)	1145 m
North(1)	1134 m

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Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\02.HA3

		Diurno	Noturno
Release Segment 1			
Release Duration	s	600	600
Liquid Rainout	fraction	0.943672	0.979482
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	77.0006	71.8256
Pool Vaporization Rate	kg/s	1.20632	0.913986
Total Vapor Flowrate	kg/s	2.43765	1.36251
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	33.2494	30.69
Pool Vaporization Rate	kg/s	2.83774	2.15445
Total Vapor Flowrate	kg/s	4.06907	2.60297
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	26.64	24.61
Pool Vaporization Rate	kg/s	3.56547	2.71314
Total Vapor Flowrate	kg/s	4.7968	3.16167
Release Segment 1 Cloud Segment 4			
Cloud Segment Duration	s	23.1325	21.105
Pool Vaporization Rate	kg/s	4.12674	3.149
Total Vapor Flowrate	kg/s	5.35806	3.59753
Release Segment 1 Cloud Segment 5			
Cloud Segment Duration	s	18.8681	17.535
Pool Vaporization Rate	kg/s	4.57385	3.50151
Total Vapor Flowrate	kg/s	5.80518	3.95004
Release Segment 1 Cloud Segment 6			
Cloud Segment Duration	s	3421.11	3434.23
Pool Vaporization Rate	kg/s	3.02036	2.58145
Total Vapor Flowrate	kg/s	4.25169	3.02998
Maximum Pool Radius	m	17.6258	17.6258

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Distance to Concentration Results

Path: \Terminal LLX\Gasolina\02.HA3

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL	(76800)	18.75	s	4.73075	6.81557
LFL	(10500)	18.75	s	22.7018	23.952
LFL Frac	(10500)	18.75	s	22.7018	23.952
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(76800)	18.75	s	0	0
LFL	(10500)	18.75	s	0	0
LFL Frac	(10500)	18.75	s	0	0

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\02.HA3

Jet fire method used: Cone model - DNV recommended

		Diurno	Noturno
Jet Fire Status		Truncated	Truncated
Flame Direction		Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\02.HA3

This table gives the distances to the specified radiation levels
for each jet fire listed in the above hazard table

		Distance (m)	
		Diurno	Noturno
Radiation Level	5 kW/m2	48.5763	34.3314
Radiation Level	18.18 kW/m2	37.9033	27.2864
Radiation Level	100 kW/m2	29.8449	21.5396

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\02.HA3

		Radiation Level (kW/m2)	
		Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\02.HA3

		Diurno	Noturno
Early Pool Fire Status		Hazard	Hazard

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Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\02.HA3

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	41.6298	37.9639
Radiation Level	18.18	kW/m2	13.4508	12.3812
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\02.HA3

		Radiation Level (kW/m2)	
		Diurno	Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\02.HA3

		Diurno	Noturno
Late Pool Fire Status		Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\02.HA3

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	56.1718	48.811
Radiation Level	18.18	kW/m2	19.4876	19.4215
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\02.HA3

		Radiation Level (kW/m2)	
		Diurno	Noturno

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Flash Fire Envelope

Path: \Terminal LLX\Gasolina\02.HA3

All flammable results are reported at the cloud centreline height

				Distance (m)	
				Diurno	Noturno
Furthest Extent	10500	ppm		22.7018	23.952
Furthest Extent	10500	ppm		22.7018	23.952
				Heights (m) for above distances	
				Diurno	Noturno
Furthest Extent	10500	ppm		0	0
Furthest Extent	10500	ppm		0	0

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Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\02.HA3

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	39.9871	56.518
Overpressure	0.1	bar	33.3314	46.3144
Overpressure	0.45	bar	19.1575	24.585

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		11.1768	40.271
Used Flammable Mass	kg		11.1768	40.271
Overpressure Radius	m		29.9871	45.972
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10.546

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		11.1768	40.271
Used Flammable Mass	kg		11.1768	40.271
Overpressure Radius	m		23.3314	35.7684
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10.546

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		11.1768	40.271
Used Flammable Mass	kg		11.1768	40.271
Overpressure Radius	m		9.15754	14.039
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10.546

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Weather Conditions

Path: \Terminal LLX\Gasolina\02.HA3

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

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03.HA5

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\03.HA5

User-Defined Data

Material

Material Identifier N-HEXANE (Imported Study Gasolina)

Scenario

Building Wake Effect None

Vessel/Tank

Release Type Continuous

Location

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

Bund

Status of Bund Bund present
Bund Area 1800 m2
[Type of Bund Surface Concrete]
Bund Height 0.1 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Location of release Open air release
Outdoor Release Direction Horizontal

Flammable

Jet Fire Method Cone Model

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 1.82 m/s
Droplet Diameter(1) 100 um
Duration of Discharge(1) 600 s
Final Temperature(1) 25 degC
Release Rate(1) 21.86 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 5.314E4 kg
Model Risk Effects for Vertical Jet Fires Do not model vertical jet fires

Fireball Parameters

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

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Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0.05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D
System	Absolute
East(1)	1134 m
North(1)	1163 m

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Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\03.HA5

		Diurno	Noturno
Release Segment 1			
Release Duration	s	600	600
Liquid Rainout	fraction	0.943672	0.979482
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	111.303	101.003
Pool Vaporization Rate	kg/s	1.71314	1.26781
Total Vapor Flowrate	kg/s	2.94446	1.71634
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	49.9875	44.8031
Pool Vaporization Rate	kg/s	3.85246	2.87681
Total Vapor Flowrate	kg/s	5.08378	3.32534
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	39.6406	35.77
Pool Vaporization Rate	kg/s	4.81016	3.61922
Total Vapor Flowrate	kg/s	6.04149	4.06775
Release Segment 1 Cloud Segment 4			
Cloud Segment Duration	s	34.6919	30.855
Pool Vaporization Rate	kg/s	5.53141	4.19051
Total Vapor Flowrate	kg/s	6.76273	4.63904
Release Segment 1 Cloud Segment 5			
Cloud Segment Duration	s	61.0781	53.2594
Pool Vaporization Rate	kg/s	6.37699	4.86355
Total Vapor Flowrate	kg/s	7.60831	5.31208
Release Segment 1 Cloud Segment 6			
Cloud Segment Duration	s	74.825	65.55
Pool Vaporization Rate	kg/s	7.45373	5.74241
Total Vapor Flowrate	kg/s	8.68505	6.19093
Release Segment 1 Cloud Segment 7			
Cloud Segment Duration	s	3228.47	3268.76
Pool Vaporization Rate	kg/s	3.13182	3.19829
Total Vapor Flowrate	kg/s	4.36314	3.64682
Maximum Pool Radius	m	23.9365	23.9365

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Distance to Concentration Results

Path: \Terminal LLX\Gasolina\03.HA5

The height for user defined concentrations is the user defined height 1 m

All toxic results are reported at the toxic effect height 1 m

All flammable results are reported at the cloud centreline height

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL	(76800)	18.75	s	4.63331	8.18007
LFL	(10500)	18.75	s	24.2165	28.7425
LFL Frac	(10500)	18.75	s	24.2165	28.7425
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(76800)	18.75	s	0	0
LFL	(10500)	18.75	s	0	0
LFL Frac	(10500)	18.75	s	0	0

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\03.HA5

Jet fire method used: Cone model - DNV recommended

		Diurno	Noturno
Jet Fire Status		Truncated	Truncated
Flame Direction		Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\03.HA5

This table gives the distances to the specified radiation levels
for each jet fire listed in the above hazard table

				Distance (m)	
				Diurno	Noturno
Radiation Level	5	kW/m2		48.5763	34.3314
Radiation Level	18.18	kW/m2		37.9033	27.2864
Radiation Level	100	kW/m2		29.8449	21.5396

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\03.HA5

		Radiation Level (kW/m2)	
		Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\03.HA5

		Diurno	Noturno
Early Pool Fire Status		Hazard	Hazard

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\03.HA5

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	41.6298	37.9639
Radiation Level	18.18	kW/m2	13.4508	12.3812
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\03.HA5

		Radiation Level (kW/m2)	
		Diurno	Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\03.HA5

		Diurno	Noturno
Late Pool Fire Status		Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\03.HA5

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	67.767	59.0586
Radiation Level	18.18	kW/m2	25.7983	25.7322
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\03.HA5

		Radiation Level (kW/m2)	
		Diurno	Noturno

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Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\03.HA5

All flammable results are reported at the cloud centreline height

				Distance (m)	
				Diurno	Noturno
Furthest Extent	10500	ppm		24.2165	28.7425
Furthest Extent	10500	ppm		24.2165	28.7425
				Heights (m) for above distances	
				Diurno	Noturno
Furthest Extent	10500	ppm		0	0
Furthest Extent	10500	ppm		0	0

SUMMARY REPORT

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Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\03.HA5

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	42.1497	61.3445
Overpressure	0.1	bar	35.014	49.9485
Overpressure	0.45	bar	19.8179	25.6797

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		13.7734	56.104
Used Flammable Mass	kg		13.7734	56.104
Overpressure Radius	m		32.1497	51.3445
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		13.7734	56.104
Used Flammable Mass	kg		13.7734	56.104
Overpressure Radius	m		25.014	39.9485
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		13.7734	56.104
Used Flammable Mass	kg		13.7734	56.104
Overpressure Radius	m		9.81793	15.6797
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\03.HA5

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

04.HA7

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\04.HA7

User-Defined Data

Material

Material Identifier N-HEXANE (Imported Study Gasolina)

Scenario

Building Wake Effect None

Vessel/Tank

Release Type Continuous

Location

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

Bund

Status of Bund Bund present
Bund Area 2140 m2
[Type of Bund Surface Concrete]
[Bund Height 1.5 m]
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Location of release Open air release
Outdoor Release Direction Horizontal

Flammable

Jet Fire Method Cone Model

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 1.82 m/s
Droplet Diameter(1) 100 um
Duration of Discharge(1) 600 s
Final Temperature(1) 25 degC
Release Rate(1) 21.86 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 5.314E4 kg
Model Risk Effects for Vertical Jet Fires Do not model vertical jet fires

Fireball Parameters

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

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0.05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D
System	Absolute
East(1)	1250 m
North(1)	1158 m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\04.HA7

		Diurno	Noturno
Release Segment 1			
Release Duration	s	600	600
Liquid Rainout	fraction	0.943672	0.979482
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	136.89	122.656
Pool Vaporization Rate	kg/s	2.06169	1.51266
Total Vapor Flowrate	kg/s	3.29302	1.96119
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	61.92	54.9
Pool Vaporization Rate	kg/s	4.53345	3.37339
Total Vapor Flowrate	kg/s	5.76477	3.82192
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	50.0406	44.4544
Pool Vaporization Rate	kg/s	5.63211	4.2354
Total Vapor Flowrate	kg/s	6.86343	4.68392
Release Segment 1 Cloud Segment 4			
Cloud Segment Duration	s	43.5594	38.0056
Pool Vaporization Rate	kg/s	6.45469	4.89521
Total Vapor Flowrate	kg/s	7.68602	5.34374
Release Segment 1 Cloud Segment 5			
Cloud Segment Duration	s	76.23	65.7869
Pool Vaporization Rate	kg/s	7.39983	5.66334
Total Vapor Flowrate	kg/s	8.63116	6.11187
Release Segment 1 Cloud Segment 6			
Cloud Segment Duration	s	96.8406	82.2375
Pool Vaporization Rate	kg/s	8.6046	6.66532
Total Vapor Flowrate	kg/s	9.83593	7.11385
Release Segment 1 Cloud Segment 7			
Cloud Segment Duration	s	3134.52	3191.96
Pool Vaporization Rate	kg/s	2.98741	3.16444
Total Vapor Flowrate	kg/s	4.21874	3.61297
Maximum Pool Radius	m	26.0995	26.0995

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\04.HA7

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL	(76800)	18.75	s	4.55627	8.81981
LFL	(10500)	18.75	s	24.5287	30.774
LFL Frac	(10500)	18.75	s	24.5287	30.774
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(76800)	18.75	s	0	0
LFL	(10500)	18.75	s	0	0
LFL Frac	(10500)	18.75	s	0	0

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\04.HA7

Jet fire method used: Cone model - DNV recommended

		Diurno	Noturno
Jet Fire Status		Truncated	Truncated
Flame Direction		Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\04.HA7

This table gives the distances to the specified radiation levels
for each jet fire listed in the above hazard table

				Distance (m)	
				Diurno	Noturno
Radiation Level	5	kW/m2		48.5763	34.3314
Radiation Level	18.18	kW/m2		37.9033	27.2864
Radiation Level	100	kW/m2		29.8449	21.5396

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\04.HA7

		Radiation Level (kW/m2)	
		Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\04.HA7

		Diurno	Noturno
Early Pool Fire Status		Hazard	Hazard

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\04.HA7

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	41.6298	37.9639
Radiation Level	18.18	kW/m2	13.4508	12.3812
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\04.HA7

		Radiation Level (kW/m2)
		Diurno
		Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\04.HA7

		Diurno	Noturno
Late Pool Fire Status		Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\04.HA7

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	72.0764	62.8802
Radiation Level	18.18	kW/m2	27.9613	27.8951
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\04.HA7

		Radiation Level (kW/m2)
		Diurno
		Noturno

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\04.HA7

All flammable results are reported at the cloud centreline height

				Distance (m)	
				Diurno	Noturno
Furthest Extent	10500	ppm		24.5287	30.774
Furthest Extent	10500	ppm		24.5287	30.774
				Heights (m) for above distances	
				Diurno	Noturno
Furthest Extent	10500	ppm		0	0
Furthest Extent	10500	ppm		0	0

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\04.HA7

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	43.3937	88.8532
Overpressure	0.1	bar	35.9819	72.4666
Overpressure	0.45	bar	20.1978	37.5698

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		15.435	166.803
Used Flammable Mass	kg		15.435	166.803
Overpressure Radius	m		33.3937	73.8296
Distance to:				
- Ignition Source	m		20	30
- Cloud Front/Centre	m		20	30
- Explosion Centre	m		10	15.0236

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		15.435	166.803
Used Flammable Mass	kg		15.435	166.803
Overpressure Radius	m		25.9819	57.443
Distance to:				
- Ignition Source	m		20	30
- Cloud Front/Centre	m		20	30
- Explosion Centre	m		10	15.0236

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		15.435	166.803
Used Flammable Mass	kg		15.435	166.803
Overpressure Radius	m		10.1978	22.5462
Distance to:				
- Ignition Source	m		20	30
- Cloud Front/Centre	m		20	30
- Explosion Centre	m		10	15.0236

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\04.HA7

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

05.HA9

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\05.HA9

User-Defined Data

Material

Material Identifier	N-HEXANE (Imported Study Gasolina)
Type of Vessel	Unpressurized (at atmospheric pressure)
Pressure Specification	Pressure not used
Temperature	25 degC
Volume Inventory	40.5 m3

Scenario

Scenario Type	Catastrophic rupture
Phase to be Released	Liquid
Building Wake Effect	None
Tank Head	2.25 m

Location

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

Bund

Status of Bund	Bund present
Bund Area	976 m2
[Type of Bund Surface	Concrete]
Bund Height	0.1 m
[Bund Failure Modeling	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
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Flammable

Jet Fire Method	Cone Model
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Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	2.657E4 kg
Use Burst Pressure	No - Use release pressure for fireball

Fireball Parameters

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

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]

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Study Folder: Terminal LLX

Phast 6.6

[Set averaging time equal to exposure time Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation 0.05 fraction]
[Cut-off concentration for exposure time calculations 0 fraction]

Geometry

Shape Point
Dimension 2D
System Absolute
East(1) 1145 m
North(1) 1134 m

Path: \Terminal LLX\Gasolina\05.HA9

Discharge Data

User-Defined Quantities

Material EXANE (Imported Study Gasolina)
Temperature 25,00 degC
Pressure 1,01 bar
Inventory 26.569,06 kg
Scenario Catastrophic rupture
Fixed Duration n/a s

Calculated Quantities

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Diurno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
FinalTemperature 25,00 degC
Final Velocity 1,62 m/s
Droplet Diameter 10.000,00 um

Continuous Release Data:

Mass Flowrate n/a kg/s
Release Duration n/a s
Orifice Velocity n/a m/s
Exit Pressure n/a bar
Exit Temperature n/a degC
Discharge Coefficient n/a
Expanded Radius n/a m

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Noturno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
FinalTemperature 25,00 degC
Final Velocity 1,62 m/s
Droplet Diameter 10.000,00 um

Continuous Release Data:

Mass Flowrate n/a kg/s

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Study Folder: Terminal LLX

Phast 6.6

Release Duration	n/a s
Orifice Velocity	n/a m/s
Exit Pressure	n/a bar
Exit Temperature	n/a degC
Discharge Coefficient	n/a
Expanded Radius	n/a m

SUMMARY REPORT

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Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\05.HA9

N.B. Pool vaporization segments begin when the cloud has left the pool

		Diurno	Noturno
Liquid Rainout	fraction	0.996429	0.996389
Initial Vapor Cloud	kg	94.8768	95.9516
Time Pool Left Behind	s	23.8782	80.6782

Cloud Segment 1

Cloud Segment Duration	s	3600	3600
Pool Vaporization Rate	kg/s	3.49173	2.76284

Maximum Pool Radius	m	17.6258	17.6258
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Distance to Concentration Results

Path: \Terminal LLX\Gasolina\05.HA9

The height for user defined concentrations is the user defined height 1 m

All toxic results are reported at the toxic effect height 1 m

All flammable results are reported at the cloud centreline height

Concentration(ppm)	Averaging Time		Diurno	Noturno
UFL (76800)	18.75	s	7.45494	8.7737
LFL (10500)	18.75	s	32.1951	30.7025
LFL Frac (10500)	18.75	s	32.1951	30.7025

Concentration(ppm)	Averaging Time		Diurno	Heights (m) for above distances
UFL (76800)	18.75	s	0	Noturno
LFL (10500)	18.75	s	0	0
LFL Frac (10500)	18.75	s	0	0

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\05.HA9

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\05.HA9

			Diurno	Distance (m)
Radiation Level	5	kW/m2	55.8999	Noturno
Radiation Level	18.18	kW/m2	19.2158	48.3909
Radiation Level	100	kW/m2	Not Reached	19.0014
				Not Reached

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Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\05.HA9

	Radiation Level (kW/m2)
Diurno	Noturno

Fireball Hazard

Path: \Terminal LLX\Gasolina\05.HA9

	Diurno	Noturno
Fireball Flame Status	No Hazard	No Hazard

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\05.HA9

All flammable results are reported at the cloud centreline height

			Diurno	Distance (m) Noturno
Furthest Extent	10500	ppm	32.1951	30.7025
Furthest Extent	10500	ppm	32.1951	30.7025

			Diurno	Heights (m) for above distances Noturno
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

Explosion Effects: Early Explosion

Path: \Terminal LLX\Gasolina\05.HA9

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

			Diurno	Noturno
Supplied Flammable Mass		kg	26569.1	26569.1

			Distance (m) at Overpressure Levels Diurno	Noturno
Overpressure	0.069	bar	No Hazard	No Hazard
Overpressure	0.1	bar	No Hazard	No Hazard
Overpressure	0.45	bar	No Hazard	No Hazard

			Used Mass (kg) at Overpressure Levels Diurno	Noturno
Overpressure	0.069	bar	0	0
Overpressure	0.1	bar	0	0
Overpressure	0.45	bar	0	0

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\05.HA9

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	61.3749	61.6078
Overpressure	0.1	bar	49.6005	49.534
Overpressure	0.45	bar	28.6788	23.822

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		76.5689	66.7208
Used Flammable Mass	kg		76.5689	66.7208
Overpressure Radius	m		56.9526	54.398
Distance to:				
- Ignition Source	m		20	30
- Cloud Front/Centre	m		4.42237	7.20978
- Explosion Centre	m		4.42237	7.20978

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		35.9453	66.7208
Used Flammable Mass	kg		35.9453	66.7208
Overpressure Radius	m		34.4389	42.3243
Distance to:				
- Ignition Source	m		30	30
- Cloud Front/Centre	m		15.1616	7.20978
- Explosion Centre	m		15.1616	7.20978

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		35.9453	66.7208
Used Flammable Mass	kg		35.9453	66.7208
Overpressure Radius	m		13.5172	16.6122
Distance to:				
- Ignition Source	m		30	30
- Cloud Front/Centre	m		15.1616	7.20978
- Explosion Centre	m		15.1616	7.20978

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\05.HA9

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

06.HA10

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\06.HA10

User-Defined Data

Material

Material Identifier	N-HEXANE (Imported Study Gasolina)
Type of Vessel	Unpressurized (at atmospheric pressure)
Pressure Specification	Pressure not used
Temperature	25 degC
Volume Inventory	40.5 m3

Scenario

Scenario Type	Leak
Phase to be Released	Liquid
Hole Diameter	10 mm
Building Wake Effect	None
Tank Head	2.25 m

Location

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

Bund

Status of Bund	Bund present
Bund Area	976 m2
[Type of Bund Surface	Concrete]
Bund Height	0.1 m
[Bund Failure Modeling	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Direction	Horizontal

Flammable

Jet Fire Method	Cone Model
-----------------	------------

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	2.657E4 kg

Fireball Parameters

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

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

[Tail Time 1800 s]
[Set averaging time equal to exposure time Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation 0.05 fraction]
[Cut-off concentration for exposure time calculations 0 fraction]

Geometry

Shape Point
Dimension 2D
System Absolute
East(1) 1145 m
North(1) 1134 m

Path: \Terminal LLX\Gasolina\06.HA10

Discharge Data

User-Defined Quantities

Material EXANE (Imported Study Gasolina)
Temperature 25,00 degC
Pressure 1,01 bar
Inventory 26.569,06 kg
Scenario Leak
Fixed Duration n/a s

Calculated Quantities

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Diurno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
Final Temperature 25,00 degC
Final Velocity 7,03 m/s
Droplet Diameter 605,90 um

Continuous Release Data:

Mass Flowrate 2.17182E-001 kg/s
Release Duration 3.600,00 s
Orifice Velocity 7,03 m/s
Exit Pressure 1,01 bar
Exit Temperature 25,00 degC
Discharge Coefficient 0,60
Expanded Radius 0,00 m

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Noturno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
Final Temperature 25,00 degC
Final Velocity 7,03 m/s
Droplet Diameter 605,90 um

Continuous Release Data:

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Mass Flowrate	2.17182E-001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	7,03 m/s
Exit Pressure	1,01 bar
Exit Temperature	25,00 degC
Discharge Coefficient	0,60
Expanded Radius	0,00 m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\06.HA10

			Diurno	Noturno
Release Segment 1				
Release Duration	s		3600	3600
Liquid Rainout	fraction		0.788041	0.813691
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		623.751	765.906
Pool Vaporization Rate	kg/s		0.0702546	0.0654363
Total Vapor Flowrate	kg/s		0.116288	0.105899
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		337.249	403.734
Pool Vaporization Rate	kg/s		0.130048	0.124241
Total Vapor Flowrate	kg/s		0.176082	0.164704
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		2639	2430.36
Pool Vaporization Rate	kg/s		0.165594	0.164463
Total Vapor Flowrate	kg/s		0.211628	0.204926
Maximum Pool Radius	m		2.97919	3.62309

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\06.HA10

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL (76800)	18.75	s		1.84457	2.18714
LFL (10500)	18.75	s		5.41525	9.12375
LFL Frac (10500)	18.75	s		5.41525	9.12375
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL (76800)	18.75	s		0.712984	0.429106
LFL (10500)	18.75	s		0.258141	0
LFL Frac (10500)	18.75	s		0.258141	0

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\06.HA10

Jet fire method used: Cone model - DNV recommended

		Diurno	Noturno
Jet Fire Status		Truncated	Truncated
Flame Direction		Horizontal	Horizontal

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\06.HA10

This table gives the distances to the specified radiation levels
for each jet fire listed in the above hazard table

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	11.2903	11.6585
Radiation Level	18.18	kW/m2	8.58911	8.98679
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\06.HA10

		Radiation Level (kW/m2)
		Diurno
		Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\06.HA10

		Diurno	Noturno
Early Pool Fire Status		Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\06.HA10

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	12.2871	11.6571
Radiation Level	18.18	kW/m2	8.60279	7.5952
Radiation Level	100	kW/m2	4.23972	3.89052

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\06.HA10

		Radiation Level (kW/m2)
		Diurno
		Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\06.HA10

		Diurno	Noturno
Late Pool Fire Status		Hazard	Hazard

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\06.HA10

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	27.6187	28.7081
Radiation Level	18.18	kW/m2	15.4414	13.842
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\06.HA10

		Radiation Level (kW/m2)	
		Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\06.HA10

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	10500	ppm	5.41525	9.12375
Furthest Extent	10500	ppm	5.41525	9.12375
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	10500	ppm	0.258141	0
Furthest Extent	10500	ppm	0.258141	0

Weather Conditions

Path: \Terminal LLX\Gasolina\06.HA10

			Diurno	Noturno
Wind Speed	m/s		3.916	2.329
Pasquill Stability			D	F
Surface Roughness Length	mm		950.891	950.891
Surface Roughness Parameter			0.17	0.17
Atmospheric Temperature	degC		25.287	21.695
Surface Temperature	degC		25.287	21.695
Relative Humidity	fraction		0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

07.HA12

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\07.HA12

User-Defined Data

Material

Material Identifier	N-HEXANE (Imported Study Gasolina)
Type of Vessel	Unpressurized (at atmospheric pressure)
Pressure Specification	Pressure not used
Temperature	25 degC
Volume Inventory	81 m3

Scenario

Scenario Type	Catastrophic rupture
Phase to be Released	Liquid
Building Wake Effect	None
Tank Head	2.7 m

Location

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

Bund

Status of Bund	Bund present
Bund Area	976 m2
[Type of Bund Surface	Concrete]
Bund Height	0.1 m
[Bund Failure Modeling	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
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Flammable

Jet Fire Method	Cone Model
-----------------	------------

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	5.314E4 kg
Use Burst Pressure	No - Use release pressure for fireball

Fireball Parameters

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

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

[Set averaging time equal to exposure time Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation 0.05 fraction]
[Cut-off concentration for exposure time calculations 0 fraction]

Geometry

Shape Point
Dimension 2D
System Absolute
East(1) 1145 m
North(1) 1134 m

Path: \Terminal LLX\Gasolina\07.HA12

Discharge Data

User-Defined Quantities

Material EXANE (Imported Study Gasolina)
Temperature 25,00 degC
Pressure 1,01 bar
Inventory 53.138,12 kg
Scenario Catastrophic rupture
Fixed Duration n/a s

Calculated Quantities

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Diurno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
FinalTemperature 25,00 degC
Final Velocity 1,77 m/s
Droplet Diameter 10.000,00 um

Continuous Release Data:

Mass Flowrate n/a kg/s
Release Duration n/a s
Orifice Velocity n/a m/s
Exit Pressure n/a bar
Exit Temperature n/a degC
Discharge Coefficient n/a
Expanded Radius n/a m

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Noturno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
FinalTemperature 25,00 degC
Final Velocity 1,77 m/s
Droplet Diameter 10.000,00 um

Continuous Release Data:

Mass Flowrate n/a kg/s

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Release Duration	n/a s
Orifice Velocity	n/a m/s
Exit Pressure	n/a bar
Exit Temperature	n/a degC
Discharge Coefficient	n/a
Expanded Radius	n/a m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\07.HA12

N.B. Pool vaporization segments begin when the cloud has left the pool

		Diurno	Noturno
Liquid Rainout	fraction	0.995861	0.995816
Initial Vapor Cloud	kg	219.93	222.344
Time Pool Left Behind	s	27.4348	83.8348

Cloud Segment 1

Cloud Segment Duration	s	3600	3600
Pool Vaporization Rate	kg/s	3.82065	3.02054

Maximum Pool Radius	m	17.6258	17.6258
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Distance to Concentration Results

Path: \Terminal LLX\Gasolina\07.HA12

The height for user defined concentrations is the user defined height 1 m

All toxic results are reported at the toxic effect height 1 m

All flammable results are reported at the cloud centreline height

Concentration(ppm)	Averaging Time		Diurno	Noturno
UFL (76800)	18.75	s	10.3033	11.9444
LFL (10500)	18.75	s	39.7444	39.1113
LFL Frac (10500)	18.75	s	39.7444	39.1113

Concentration(ppm)	Averaging Time		Diurno	Heights (m) for above distances
UFL (76800)	18.75	s	0	Noturno
LFL (10500)	18.75	s	0	0
LFL Frac (10500)	18.75	s	0	0

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\07.HA12

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\07.HA12

			Diurno	Distance (m)
Radiation Level	5	kW/m2	56.1954	Noturno
Radiation Level	18.18	kW/m2	19.5113	48.5951
Radiation Level	100	kW/m2	Not Reached	19.2056
				Not Reached

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\07.HA12

	Radiation Level (kW/m2)
Diurno	Noturno

Fireball Hazard

Path: \Terminal LLX\Gasolina\07.HA12

	Diurno	Noturno
Fireball Flame Status	No Hazard	No Hazard

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\07.HA12

All flammable results are reported at the cloud centreline height

			Diurno	Distance (m) Noturno
Furthest Extent	10500	ppm	39.7444	39.1113
Furthest Extent	10500	ppm	39.7444	39.1113

			Diurno	Heights (m) for above distances Noturno
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

Explosion Effects: Early Explosion

Path: \Terminal LLX\Gasolina\07.HA12

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

			Diurno	Noturno
Supplied Flammable Mass		kg	53138.1	53138.1

			Distance (m) at Overpressure Levels Diurno	Noturno
Overpressure	0.069	bar	No Hazard	No Hazard
Overpressure	0.1	bar	No Hazard	No Hazard
Overpressure	0.45	bar	No Hazard	No Hazard

			Used Mass (kg) at Overpressure Levels Diurno	Noturno
Overpressure	0.069	bar	0	0
Overpressure	0.1	bar	0	0
Overpressure	0.45	bar	0	0

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\07.HA12

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	79.7989	78.8333
Overpressure	0.1	bar	63.8183	62.0055
Overpressure	0.45	bar	29.7864	26.1691

Supplementary Data at 0.069 bar

			Diurno	Noturno
Supplied Flammable Mass	kg		154.707	180.643
Used Flammable Mass	kg		154.707	180.643
Overpressure Radius	m		72	75.8175
Distance to:				
- Ignition Source	m		30	30
- Cloud Front/Centre	m		7.79887	3.0158
- Explosion Centre	m		7.79887	3.0158

Supplementary Data at 0.1 bar

			Diurno	Noturno
Supplied Flammable Mass	kg		154.707	180.643
Used Flammable Mass	kg		154.707	180.643
Overpressure Radius	m		56.0195	58.9897
Distance to:				
- Ignition Source	m		30	30
- Cloud Front/Centre	m		7.79887	3.0158
- Explosion Centre	m		7.79887	3.0158

Supplementary Data at 0.45 bar

			Diurno	Noturno
Supplied Flammable Mass	kg		154.707	180.643
Used Flammable Mass	kg		154.707	180.643
Overpressure Radius	m		21.9875	23.1533
Distance to:				
- Ignition Source	m		30	30
- Cloud Front/Centre	m		7.79887	3.0158
- Explosion Centre	m		7.79887	3.0158

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\07.HA12

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

08.HA13

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\08.HA13

User-Defined Data

Material

Material Identifier	N-HEXANE (Imported Study Gasolina)
Type of Vessel	Unpressurized (at atmospheric pressure)
Pressure Specification	Pressure not used
Temperature	25 degC
Volume Inventory	81 m3

Scenario

Scenario Type	Leak
Phase to be Released	Liquid
Hole Diameter	10 mm
Building Wake Effect	None
Tank Head	2.7 m

Location

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

Bund

Status of Bund	Bund present
Bund Area	976 m2
[Type of Bund Surface	Concrete]
Bund Height	0.1 m
[Bund Failure Modeling	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Direction	Horizontal

Flammable

Jet Fire Method	Cone Model
-----------------	------------

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	5.314E4 kg

Fireball Parameters

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

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

[Tail Time 1800 s]
[Set averaging time equal to exposure time Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation 0.05 fraction]
[Cut-off concentration for exposure time calculations 0 fraction]

Geometry

Shape Point
Dimension 2D
System Absolute
East(1) 1145 m
North(1) 1134 m

Path: \Terminal LLX\Gasolina\08.HA13

Discharge Data

User-Defined Quantities

Material EXANE (Imported Study Gasolina)
Temperature 25,00 degC
Pressure 1,01 bar
Inventory 53.138,12 kg
Scenario Leak
Fixed Duration n/a s

Calculated Quantities

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Diurno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
Final Temperature 24,99 degC
Final Velocity 7,70 m/s
Droplet Diameter 592,52 um

Continuous Release Data:

Mass Flowrate 2.37912E-001 kg/s
Release Duration 3.600,00 s
Orifice Velocity 7,70 m/s
Exit Pressure 1,01 bar
Exit Temperature 24,99 degC
Discharge Coefficient 0,60
Expanded Radius 0,00 m

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Noturno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
Final Temperature 24,99 degC
Final Velocity 7,70 m/s
Droplet Diameter 592,52 um

Continuous Release Data:

SUMMARY REPORT

Study Folder: Terminal LLX

Unique Audit Number: 193.279

Phast 6.6



Mass Flowrate	2.37912E-001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	7,70 m/s
Exit Pressure	1,01 bar
Exit Temperature	24,99 degC
Discharge Coefficient	0,60
Expanded Radius	0,00 m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\08.HA13

			Diurno	Noturno
Release Segment 1				
Release Duration	s		3600	3600
Liquid Rainout	fraction		0.78403	0.807313
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		677.301	767.29
Pool Vaporization Rate	kg/s		0.0802056	0.070653
Total Vapor Flowrate	kg/s		0.131587	0.116495
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		372.459	404.061
Pool Vaporization Rate	kg/s		0.145808	0.134338
Total Vapor Flowrate	kg/s		0.197189	0.18018
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		2550.24	2428.65
Pool Vaporization Rate	kg/s		0.18113	0.17821
Total Vapor Flowrate	kg/s		0.232512	0.224052
Maximum Pool Radius	m		3.13144	3.80383

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\08.HA13

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL (76800)	18.75	s		1.94784	2.36181
LFL (10500)	18.75	s		5.93203	9.77706
LFL Frac (10500)	18.75	s		5.93203	9.77706
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL (76800)	18.75	s		0.723337	0.423269
LFL (10500)	18.75	s		0.242168	0
LFL Frac (10500)	18.75	s		0.242168	0

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\08.HA13

Jet fire method used: Cone model - DNV recommended

		Diurno	Noturno
Jet Fire Status		Truncated	Truncated
Flame Direction		Horizontal	Horizontal

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\08.HA13

This table gives the distances to the specified radiation levels
for each jet fire listed in the above hazard table

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	11.8628	12.3151
Radiation Level	18.18	kW/m2	9.0242	9.494
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\08.HA13

		Radiation Level (kW/m2)	
		Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\08.HA13

		Diurno	Noturno
Early Pool Fire Status		Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\08.HA13

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	12.6277	12.2714
Radiation Level	18.18	kW/m2	8.80417	8.06219
Radiation Level	100	kW/m2	4.27795	4.22915

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\08.HA13

		Radiation Level (kW/m2)	
		Diurno	Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\08.HA13

		Diurno	Noturno
Late Pool Fire Status		Hazard	Hazard

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\08.HA13

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	28.322	29.6932
Radiation Level	18.18	kW/m2	15.5949	14.1904
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\08.HA13

		Radiation Level (kW/m2)	
		Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\08.HA13

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	10500	ppm	5.93203	9.77706
Furthest Extent	10500	ppm	5.93203	9.77706
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	10500	ppm	0.242168	0
Furthest Extent	10500	ppm	0.242168	0

Weather Conditions

Path: \Terminal LLX\Gasolina\08.HA13

			Diurno	Noturno
Wind Speed	m/s		3.916	2.329
Pasquill Stability			D	F
Surface Roughness Length	mm		950.891	950.891
Surface Roughness Parameter			0.17	0.17
Atmospheric Temperature	degC		25.287	21.695
Surface Temperature	degC		25.287	21.695
Relative Humidity	fraction		0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

09.HA15 e HA24

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

User-Defined Data

Material

Material Identifier N-HEXANE (Imported Study Gasolina)

Scenario

Building Wake Effect None

Vessel/Tank

Release Type Continuous

Location

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

Bund

Status of Bund Bund present
Bund Area 1600 m2
[Type of Bund Surface Concrete]
Bund Height 0.1 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Location of release Open air release
Outdoor Release Direction Horizontal

Flammable

Jet Fire Method Cone Model

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 2.28 m/s
Droplet Diameter(1) 100 um
Duration of Discharge(1) 600 s
Final Temperature(1) 25 degC
Release Rate(1) 109.3 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 2.952E6 kg
Model Risk Effects for Vertical Jet Fires Do not model vertical jet fires

Fireball Parameters

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

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0.05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D
System	Absolute
East(1)	1176 m
North(1)	1039 m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

			Diurno	Noturno
Release Segment 1				
Release Duration	s		600	600
Liquid Rainout	fraction		0.979264	0.992551
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		50.7656	50.0556
Pool Vaporization Rate	kg/s		2.6477	1.98775
Total Vapor Flowrate	kg/s		4.91493	2.80224
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		18.1244	18.0069
Pool Vaporization Rate	kg/s		7.40984	5.48215
Total Vapor Flowrate	kg/s		9.67707	6.29664
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		3531.11	3531.94
Pool Vaporization Rate	kg/s		5.75202	4.66114
Total Vapor Flowrate	kg/s		8.01926	5.47563
Maximum Pool Radius	m		22.5676	22.5676

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL	(76800)	18.75	s	6.68176	9.66888
LFL	(10500)	18.75	s	29.1036	31.2701
LFL Frac	(10500)	18.75	s	29.1036	31.2701
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(76800)	18.75	s	0	0
LFL	(10500)	18.75	s	0	0
LFL Frac	(10500)	18.75	s	0	0

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

Jet fire method used: Cone model - DNV recommended

	Diurno	Noturno
Jet Fire Status	Truncated	Truncated
Flame Direction	Horizontal	Horizontal

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

This table gives the distances to the specified radiation levels
for each jet fire listed in the above hazard table

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	63.6737	44.7385
Radiation Level	18.18	kW/m2	49.3021	35.2756
Radiation Level	100	kW/m2	38.6122	27.1432

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

		Radiation Level (kW/m2)
		Diurno
		Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

		Diurno	Noturno
Early Pool Fire Status		Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	57.6504	50.5695
Radiation Level	18.18	kW/m2	20.4576	20.6719
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

		Radiation Level (kW/m2)
		Diurno
		Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

		Diurno	Noturno
Late Pool Fire Status		Hazard	Hazard

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	65.3243	56.8879
Radiation Level	18.18	kW/m2	24.6551	24.5607
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

		Radiation Level (kW/m2)	
		Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	10500	ppm	29.1036	31.2701
Furthest Extent	10500	ppm	29.1036	31.2701
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	49.7595	83.4371
Overpressure	0.1	bar	40.9348	68.0375
Overpressure	0.45	bar	22.1418	35.2427

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		26.0517	138.441
Used Flammable Mass	kg		26.0517	138.441
Overpressure Radius	m		39.7595	69.3827
Distance to:				
- Ignition Source	m		20	30
- Cloud Front/Centre	m		20	30
- Explosion Centre	m		10	14.0545

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		26.0517	138.441
Used Flammable Mass	kg		26.0517	138.441
Overpressure Radius	m		30.9348	53.983
Distance to:				
- Ignition Source	m		20	30
- Cloud Front/Centre	m		20	30
- Explosion Centre	m		10	14.0545

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		26.0517	138.441
Used Flammable Mass	kg		26.0517	138.441
Overpressure Radius	m		12.1418	21.1882
Distance to:				
- Ignition Source	m		20	30
- Cloud Front/Centre	m		20	30
- Explosion Centre	m		10	14.0545

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\09.HA15 e HA24

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

10.HA17

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\10.HA17

User-Defined Data

Material

Material Identifier N-HEXANE (Imported Study Gasolina)

Scenario

Building Wake Effect None

Vessel/Tank

Release Type Continuous

Location

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

Bund

Status of Bund Bund present
Bund Area 2140 m2
[Type of Bund Surface Concrete]
[Bund Height 1.5 m]
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Location of release Open air release
Outdoor Release Direction Horizontal

Flammable

Jet Fire Method Cone Model

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 1.9 m/s
Droplet Diameter(1) 100 um
Duration of Discharge(1) 600 s
Final Temperature(1) 25 degC
Release Rate(1) 91.11 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 2.952E6 kg
Model Risk Effects for Vertical Jet Fires Do not model vertical jet fires

Fireball Parameters

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

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0.05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D
System	Absolute
East(1)	1250 m
North(1)	1158 m

SUMMARY REPORT

Unique Audit Number:

193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\10.HA17

			Diurno	Noturno
Release Segment 1				
Release Duration	s		600	600
Liquid Rainout	fraction		0.97704	0.992047
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		59.6756	58.1406
Pool Vaporization Rate	kg/s		2.88269	2.13292
Total Vapor Flowrate	kg/s		4.9746	2.85752
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		21.775	21.515
Pool Vaporization Rate	kg/s		7.8925	5.78096
Total Vapor Flowrate	kg/s		9.98441	6.50557
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		16.065	15.895
Pool Vaporization Rate	kg/s		10.2892	7.5619
Total Vapor Flowrate	kg/s		12.3811	8.2865
Release Segment 1 Cloud Segment 4				
Cloud Segment Duration	s		3502.48	3504.45
Pool Vaporization Rate	kg/s		7.26852	5.85425
Total Vapor Flowrate	kg/s		9.36042	6.57886
Maximum Pool Radius	m		26.0995	26.0995

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\10.HA17

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL	(76800)	18.75	s	6.02538	16.7132
LFL	(10500)	18.75	s	29.599	41.0612
LFL Frac	(10500)	18.75	s	29.599	41.0612
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(76800)	18.75	s	0	0
LFL	(10500)	18.75	s	0	0
LFL Frac	(10500)	18.75	s	0	0

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\10.HA17

Jet fire method used: Cone model - DNV recommended

	Diurno	Noturno
Jet Fire Status	Truncated	Truncated
Flame Direction	Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\10.HA17

This table gives the distances to the specified radiation levels for each jet fire listed in the above hazard table

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	61.3062	42.3864
Radiation Level	18.18	kW/m2	47.6341	33.5708
Radiation Level	100	kW/m2	37.4401	25.9324

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\10.HA17

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\10.HA17

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\10.HA17

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	54.7504	48.0073
Radiation Level	18.18	kW/m2	18.617	18.8621
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\10.HA17

	Radiation Level (kW/m2)
Diurno	Noturno

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\10.HA17

Late Pool Fire Status	Diurno	Noturno
	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\10.HA17

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	72.0818	62.9004
Radiation Level	18.18	kW/m2	27.9667	27.9153
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\10.HA17

	Radiation Level (kW/m2)	
	Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\10.HA17

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	10500	ppm	29.599	41.0612
Furthest Extent	10500	ppm	29.599	41.0612
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\10.HA17

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	50.1544	96.6175
Overpressure	0.1	bar	41.2421	79.5228
Overpressure	0.45	bar	22.2624	43.1182

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		26.8357	189.373
Used Flammable Mass	kg		26.8357	189.373
Overpressure Radius	m		40.1544	77.0197
Distance to:				
- Ignition Source	m		20	40
- Cloud Front/Centre	m		20	40
- Explosion Centre	m		10	19.5977

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		26.8357	189.373
Used Flammable Mass	kg		26.8357	189.373
Overpressure Radius	m		31.2421	59.9251
Distance to:				
- Ignition Source	m		20	40
- Cloud Front/Centre	m		20	40
- Explosion Centre	m		10	19.5977

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		26.8357	189.373
Used Flammable Mass	kg		26.8357	189.373
Overpressure Radius	m		12.2624	23.5204
Distance to:				
- Ignition Source	m		20	40
- Cloud Front/Centre	m		20	40
- Explosion Centre	m		10	19.5977

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\10.HA17

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

11.HA22

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\11.HA22

User-Defined Data

Material

Material Identifier	N-HEXANE (Imported Study Gasolina)
Type of Vessel	Unpressurized (at atmospheric pressure)
Pressure Specification	Pressure not used
Temperature	25 degC
Volume Inventory	4500 m3

Scenario

Scenario Type	Line rupture
Phase to be Released	Liquid
Building Wake Effect	None
Specify Pump Head	No pump head supplied
Tank Head	14.4 m
Number of Excess Flow Valves	0
Number of Non-Return Valves	0
Number of Shut-Off Valves	0

Pipe

Internal Diameter	304.8 mm
Line length	1 m

Location

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

Bund

Status of Bund	Bund present
Bund Area	2140 m2
[Type of Bund Surface	Concrete]
[Bund Height	1.5 m]
[Bund Failure Modeling	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Direction	Horizontal

Flammable

Jet Fire Method	Cone Model
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Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	2.952E6 kg

Fireball Parameters

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

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

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0.05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D
System	Absolute
East(1)	1250 m
North(1)	1158 m

Path: \Terminal LLX\Gasolina\11.HA22

Discharge Data

User-Defined Quantities

Material	EXANE (Imported Study Gasolina)
Temperature	25,00 degC
Pressure	1,01 bar
Inventory	2.952.118,00 kg
Scenario	Line rupture
Fixed Duration	n/a s

Calculated Quantities

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Diurno

Mass Flow of Air (Vent from Vapor Space Only)	n/a
---	-----

Average Values for Segment Number 1

Liquid Fraction	1,00 fraction
Final Temperature	25,04 degC
Final Velocity	10,66 m/s
Droplet Diameter	469,65 um

Continuous Release Data:

Mass Flowrate	5.10439E+002 kg/s
Release Duration	3.600,00 s
Orifice Velocity	10,66 m/s
Exit Pressure	1,01 bar
Exit Temperature	25,04 degC
Discharge Coefficient	1,00
Expanded Radius	0,15 m

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Noturno

Mass Flow of Air (Vent from Vapor Space Only)	n/a
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Study Folder: **Terminal LLX**

Phast 6.6



Date: 12/04/2011 75 of 110 Time: 16:28:53

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\11.HA22

		Diurno	Noturno
Release Segment 1			
Release Duration	s	3600	3600
Liquid Rainout	fraction	0.983172	0.988178
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	41.9256	41.6025
Pool Vaporization Rate	kg/s	4.87753	3.59052
Total Vapor Flowrate	kg/s	13.4674	9.62513
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	3558.07	3558.4
Pool Vaporization Rate	kg/s	10.2487	7.90931
Total Vapor Flowrate	kg/s	18.8385	13.9439
Maximum Pool Radius	m	26.0995	26.0995

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\11.HA22

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL	(76800)	18.75	s	18.56	23.5897
LFL	(10500)	18.75	s	53.54	57.7533
LFL Frac	(10500)	18.75	s	53.54	57.7533
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(76800)	18.75	s	0	0
LFL	(10500)	18.75	s	0	0
LFL Frac	(10500)	18.75	s	0	0

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\11.HA22

Jet fire method used: Cone model - DNV recommended

	Diurno	Noturno
Jet Fire Status	Truncated	Truncated
Flame Direction	Horizontal	Horizontal

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\11.HA22

This table gives the distances to the specified radiation levels
for each jet fire listed in the above hazard table

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	116.997	107.851
Radiation Level	18.18	kW/m2	87.1046	81.7029
Radiation Level	100	kW/m2	64.9728	60.3764

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\11.HA22

		Radiation Level (kW/m2)
		Diurno
		Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\11.HA22

		Diurno	Noturno
Early Pool Fire Status		Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\11.HA22

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	77.0204	67.6736
Radiation Level	18.18	kW/m2	32.9053	32.6885
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\11.HA22

		Radiation Level (kW/m2)
		Diurno
		Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\11.HA22

		Diurno	Noturno
Late Pool Fire Status		Hazard	Hazard

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\11.HA22

				Distance (m)
				Diurno
				Noturno
Radiation Level	5	kW/m2	77.0204	67.6736
Radiation Level	18.18	kW/m2	32.9053	32.6885
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\11.HA22

		Radiation Level (kW/m2)
		Diurno
		Noturno

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\11.HA22

All flammable results are reported at the cloud centreline height

				Distance (m)
				Diurno
				Noturno
Furthest Extent	10500	ppm	53.54	57.7533
Furthest Extent	10500	ppm	53.54	57.7533
				Heights (m) for above distances
				Diurno
				Noturno
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\11.HA22

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	94.0545	123.381
Overpressure	0.1	bar	78.7278	101.972
Overpressure	0.45	bar	46.088	56.3793

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		136.486	371.982
Used Flammable Mass	kg		136.486	371.982
Overpressure Radius	m		69.0545	96.4576
Distance to:				
- Ignition Source	m		50	50
- Cloud Front/Centre	m		50	50
- Explosion Centre	m		25	26.9229

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		136.486	371.982
Used Flammable Mass	kg		136.486	371.982
Overpressure Radius	m		53.7278	75.0487
Distance to:				
- Ignition Source	m		50	50
- Cloud Front/Centre	m		50	50
- Explosion Centre	m		25	26.9229

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		136.486	371.982
Used Flammable Mass	kg		136.486	371.982
Overpressure Radius	m		21.088	29.4564
Distance to:				
- Ignition Source	m		50	50
- Cloud Front/Centre	m		50	50
- Explosion Centre	m		25	26.9229

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\11.HA22

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

12.HA26

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\12.HA26

User-Defined Data

Material

Material Identifier N-HEXANE (Imported Study Gasolina)

Scenario

Building Wake Effect None

Vessel/Tank

Release Type Continuous

Location

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

Bund

Status of Bund Bund present
Bund Area 1800 m2
[Type of Bund Surface Concrete]
Bund Height 0.1 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Location of release Open air release
Outdoor Release Direction Horizontal

Flammable

Jet Fire Method Cone Model

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 1.32 m/s
Droplet Diameter(1) 100 um
Duration of Discharge(1) 600 s
Final Temperature(1) 25 degC
Release Rate(1) 43.73 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 2.952E6 kg
Model Risk Effects for Vertical Jet Fires Do not model vertical jet fires

Fireball Parameters

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

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0.05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D
System	Absolute
East(1)	1134 m
North(1)	1163 m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\12.HA26

		Diurno	Noturno
Release Segment 1			
Release Duration	s	600	600
Liquid Rainout	fraction	0.961737	0.988082
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	72.25	75.69
Pool Vaporization Rate	kg/s	2.07344	1.72328
Total Vapor Flowrate	kg/s	3.74669	2.24444
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	28.2506	30.4
Pool Vaporization Rate	kg/s	5.31997	4.35602
Total Vapor Flowrate	kg/s	6.99323	4.87718
Release Segment 1 Cloud Segment 3			
Cloud Segment Duration	s	22.155	23.87
Pool Vaporization Rate	kg/s	6.73417	5.55164
Total Vapor Flowrate	kg/s	8.40743	6.07279
Release Segment 1 Cloud Segment 4			
Cloud Segment Duration	s	19.55	19.4906
Pool Vaporization Rate	kg/s	7.69506	6.35834
Total Vapor Flowrate	kg/s	9.36832	6.8795
Release Segment 1 Cloud Segment 5			
Cloud Segment Duration	s	16.5544	3450.55
Pool Vaporization Rate	kg/s	8.4822	4.72422
Total Vapor Flowrate	kg/s	10.1555	5.24538
Release Segment 1 Cloud Segment 6			
Cloud Segment Duration	s	3441.24	
Pool Vaporization Rate	kg/s	5.81064	
Total Vapor Flowrate	kg/s	7.4839	4.72422
Maximum Pool Radius	m	23.9365	23.9365

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\12.HA26

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL	(76800)	18.75	s	4.99793	13.6082
LFL	(10500)	18.75	s	26.3102	36.4203
LFL Frac	(10500)	18.75	s	26.3102	36.4203
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(76800)	18.75	s	0	0
LFL	(10500)	18.75	s	0	0
LFL Frac	(10500)	18.75	s	0	0

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\12.HA26

Jet fire method used: Cone model - DNV recommended

		Diurno	Noturno
Jet Fire Status		Truncated	Truncated
Flame Direction		Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\12.HA26

This table gives the distances to the specified radiation levels
for each jet fire listed in the above hazard table

				Distance (m)	
				Diurno	Noturno
Radiation Level	5	kW/m2		55.4277	36.5296
Radiation Level	18.18	kW/m2		43.3329	29.1767
Radiation Level	100	kW/m2		34.2275	23.0803

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\12.HA26

		Radiation Level (kW/m2)	
		Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\12.HA26

		Diurno	Noturno
Early Pool Fire Status		Hazard	Hazard

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\12.HA26

				Distance (m)
				Diurno
				Noturno
Radiation Level	5	kW/m2	46.8535	41.5206
Radiation Level	18.18	kW/m2	13.1303	13.355
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\12.HA26

		Radiation Level (kW/m2)
		Diurno
		Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\12.HA26

		Diurno	Noturno
Late Pool Fire Status		Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\12.HA26

				Distance (m)
				Diurno
				Noturno
Radiation Level	5	kW/m2	67.5225	58.8319
Radiation Level	18.18	kW/m2	25.5538	25.5055
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\12.HA26

		Radiation Level (kW/m2)
		Diurno
		Noturno

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\12.HA26

All flammable results are reported at the cloud centreline height

				Distance (m)	
				Diurno	Noturno
Furthest Extent	10500	ppm		26.3102	36.4203
Furthest Extent	10500	ppm		26.3102	36.4203
				Heights (m) for above distances	
				Diurno	Noturno
Furthest Extent	10500	ppm		0	0
Furthest Extent	10500	ppm		0	0

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\12.HA26

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	45.8737	80.0779
Overpressure	0.1	bar	37.9115	66.2138
Overpressure	0.45	bar	20.9552	36.689

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		19.1355	101.021
Used Flammable Mass	kg		19.1355	101.021
Overpressure Radius	m		35.8737	62.4644
Distance to:				
- Ignition Source	m		20	30
- Cloud Front/Centre	m		20	30
- Explosion Centre	m		10	17.6134

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		19.1355	101.021
Used Flammable Mass	kg		19.1355	101.021
Overpressure Radius	m		27.9115	48.6003
Distance to:				
- Ignition Source	m		20	30
- Cloud Front/Centre	m		20	30
- Explosion Centre	m		10	17.6134

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		19.1355	101.021
Used Flammable Mass	kg		19.1355	101.021
Overpressure Radius	m		10.9552	19.0755
Distance to:				
- Ignition Source	m		20	30
- Cloud Front/Centre	m		20	30
- Explosion Centre	m		10	17.6134

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\12.HA26

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

13.HA28 e HA30

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

User-Defined Data

Material

Material Identifier N-HEXANE (Imported Study Gasolina)

Scenario

Building Wake Effect None

Vessel/Tank

Release Type Continuous

Location

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

Bund

Status of Bund Bund present
Bund Area 976 m2
[Type of Bund Surface Concrete]
Bund Height 0.1 m
[Bund Failure Modeling Bund cannot fail]

Indoor/Outdoor

Location of release Open air release
Outdoor Release Direction Horizontal

Flammable

Jet Fire Method Cone Model

Dispersion

Number of Release Segments 1
Fluid Phase(1) Liquid
Discharge Velocity(1) 1.32 m/s
Droplet Diameter(1) 100 um
Duration of Discharge(1) 600 s
Final Temperature(1) 25 degC
Release Rate(1) 43.73 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 2.952E6 kg
Model Risk Effects for Vertical Jet Fires Do not model vertical jet fires

Fireball Parameters

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

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]
[Set averaging time equal to exposure time	Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation	0.05 fraction]
[Cut-off concentration for exposure time calculations	0 fraction]

Geometry

Shape	Point
Dimension	2D
System	Absolute
East(1)	1145 m
North(1)	1134 m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

			Diurno	Noturno
Release Segment 1				
Release Duration	s		600	600
Liquid Rainout	fraction		0.961737	0.988082
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		61.2306	59.29
Pool Vaporization Rate	kg/s		1.71054	1.30818
Total Vapor Flowrate	kg/s		3.38379	1.82934
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		22.95	22.6125
Pool Vaporization Rate	kg/s		4.47035	3.37712
Total Vapor Flowrate	kg/s		6.1436	3.89828
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		3515.82	3518.1
Pool Vaporization Rate	kg/s		3.35636	2.73397
Total Vapor Flowrate	kg/s		5.02962	3.25513
Maximum Pool Radius	m		17.6258	17.6258

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL (76800)	18.75	s		5.07173	10.5033
LFL (10500)	18.75	s		24.4364	27.4672
LFL Frac (10500)	18.75	s		24.4364	27.4672
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL (76800)	18.75	s		0	0
LFL (10500)	18.75	s		0	0
LFL Frac (10500)	18.75	s		0	0

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

Jet fire method used: Cone model - DNV recommended

		Diurno	Noturno
Jet Fire Status		Truncated	Truncated
Flame Direction		Horizontal	Horizontal

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

This table gives the distances to the specified radiation levels
for each jet fire listed in the above hazard table

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	55.4277	36.5296
Radiation Level	18.18	kW/m2	43.3329	29.1767
Radiation Level	100	kW/m2	34.2275	23.0803

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

		Radiation Level (kW/m2)
		Diurno
		Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

		Diurno	Noturno
Early Pool Fire Status		Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	46.8535	41.5206
Radiation Level	18.18	kW/m2	13.1303	13.355
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

		Radiation Level (kW/m2)
		Diurno
		Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

		Diurno	Noturno
Late Pool Fire Status		Hazard	Hazard

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	55.9273	48.5843
Radiation Level	18.18	kW/m2	19.2431	19.1948
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

		Radiation Level (kW/m2)	
		Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	10500	ppm	24.4364	27.4672
Furthest Extent	10500	ppm	24.4364	27.4672
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	44.6718	49.3212
Overpressure	0.1	bar	36.9763	40.5938
Overpressure	0.45	bar	20.5881	22.008

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		17.2759	25.1995
Used Flammable Mass	kg		17.2759	25.1995
Overpressure Radius	m		34.6718	39.3212
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		17.2759	25.1995
Used Flammable Mass	kg		17.2759	25.1995
Overpressure Radius	m		26.9763	30.5938
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		17.2759	25.1995
Used Flammable Mass	kg		17.2759	25.1995
Overpressure Radius	m		10.5881	12.008
Distance to:				
- Ignition Source	m		20	20
- Cloud Front/Centre	m		20	20
- Explosion Centre	m		10	10

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\13.HA28 e HA30

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

14.HA32

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\14.HA32

User-Defined Data

Material

Material Identifier	N-HEXANE (Imported Study Gasolina)
Type of Vessel	Unpressurized (at atmospheric pressure)
Pressure Specification	Pressure not used
Temperature	25 degC
Volume Inventory	4500 m3

Scenario

Scenario Type	Catastrophic rupture
Phase to be Released	Liquid
Building Wake Effect	None
Tank Head	14.4 m

Location

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

Bund

Status of Bund	Bund present
Bund Area	2140 m2
[Type of Bund Surface	Concrete]
[Bund Height	1.5 m]
[Bund Failure Modeling	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
---------------------	------------------

Flammable

Jet Fire Method	Cone Model
-----------------	------------

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	2.952E6 kg
Use Burst Pressure	No - Use release pressure for fireball

Fireball Parameters

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

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]
[Tail Time	1800 s]

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

[Set averaging time equal to exposure time Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation 0.05 fraction]
[Cut-off concentration for exposure time calculations 0 fraction]

Geometry

Shape Point
Dimension 2D
System Absolute
East(1) 1250 m
North(1) 1158 m

Path: \Terminal LLX\Gasolina\14.HA32

Discharge Data

User-Defined Quantities

Material EXANE (Imported Study Gasolina)
Temperature 25,00 degC
Pressure 1,01 bar
Inventory 2.952.118,00 kg
Scenario Catastrophic rupture
Fixed Duration n/a s

Calculated Quantities

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Diurno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
FinalTemperature 24,99 degC
Final Velocity 4,09 m/s
Droplet Diameter 10.000,00 um

Continuous Release Data:

Mass Flowrate n/a kg/s
Release Duration n/a s
Orifice Velocity n/a m/s
Exit Pressure n/a bar
Exit Temperature n/a degC
Discharge Coefficient n/a
Expanded Radius n/a m

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Noturno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
FinalTemperature 24,99 degC
Final Velocity 4,09 m/s
Droplet Diameter 10.000,00 um

Continuous Release Data:

Mass Flowrate n/a kg/s

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Release Duration	n/a s
Orifice Velocity	n/a m/s
Exit Pressure	n/a bar
Exit Temperature	n/a degC
Discharge Coefficient	n/a
Expanded Radius	n/a m

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Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\14.HA32

N.B. Pool vaporization segments begin when the cloud has left the pool

		Diurno	Noturno
Liquid Rainout	fraction	0.9849	0.983976
Initial Vapor Cloud	kg	44575.9	47306
Time Pool Left Behind	s	89.4474	339.047

Cloud Segment 1

Cloud Segment Duration	s	3600	3600
Pool Vaporization Rate	kg/s	10.7178	7.9352
Maximum Pool Radius	m	26.0995	26.0995

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\14.HA32

The height for user defined concentrations is the user defined height 1 m

All toxic results are reported at the toxic effect height 1 m

All flammable results are reported at the cloud centreline height

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL	(76800)	18.75	s	81.2344	91.0899
LFL	(10500)	18.75	s	285.87	323.142
LFL Frac	(10500)	18.75	s	285.87	323.142
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(76800)	18.75	s	0	0
LFL	(10500)	18.75	s	0	0
LFL Frac	(10500)	18.75	s	0	0

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\14.HA32

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\14.HA32

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	85.7705	75.1314
Radiation Level	18.18	kW/m2	41.6554	40.1464
Radiation Level	100	kW/m2	Not Reached	Not Reached

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Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\14.HA32

	Radiation Level (kW/m2)
Diurno	Noturno

Fireball Hazard

Path: \Terminal LLX\Gasolina\14.HA32

	Diurno	Noturno
Fireball Flame Status	No Hazard	No Hazard

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\14.HA32

All flammable results are reported at the cloud centreline height

			Diurno	Distance (m) Noturno
Furthest Extent	10500	ppm	285.87	323.142
Furthest Extent	10500	ppm	285.87	323.142

			Diurno	Heights (m) for above distances Noturno
Furthest Extent	10500	ppm	0	0
Furthest Extent	10500	ppm	0	0

Explosion Effects: Early Explosion

Path: \Terminal LLX\Gasolina\14.HA32

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

			Diurno	Noturno
Supplied Flammable Mass		kg	2.95212e+006	2.95212e+006

			Distance (m) at Overpressure Levels Diurno	Noturno
Overpressure	0.069	bar	No Hazard	No Hazard
Overpressure	0.1	bar	No Hazard	No Hazard
Overpressure	0.45	bar	No Hazard	No Hazard

			Used Mass (kg) at Overpressure Levels Diurno	Noturno
Overpressure	0.069	bar	0	0
Overpressure	0.1	bar	0	0
Overpressure	0.45	bar	0	0

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Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\14.HA32

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	485.059	489.136
Overpressure	0.1	bar	394.963	392.018
Overpressure	0.45	bar	227.541	195.043

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		30345.6	35404.7
Used Flammable Mass	kg		30345.6	35404.7
Overpressure Radius	m		418.338	440.402
Distance to:				
- Ignition Source	m		230	270
- Cloud Front/Centre	m		66.7209	48.7335
- Explosion Centre	m		66.7209	48.7335

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		24789.2	33708.3
Used Flammable Mass	kg		24789.2	33708.3
Overpressure Radius	m		304.268	337.091
Distance to:				
- Ignition Source	m		260	290
- Cloud Front/Centre	m		90.6951	54.9264
- Explosion Centre	m		90.6951	54.9264

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		16289.9	27303.2
Used Flammable Mass	kg		16289.9	27303.2
Overpressure Radius	m		103.827	123.332
Distance to:				
- Ignition Source	m		280	320
- Cloud Front/Centre	m		123.714	71.71
- Explosion Centre	m		123.714	71.71

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Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\14.HA32

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719

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Study Folder: Terminal LLX

Phast 6.6

15.HA33

Base Case

CASE Name: Data

Path: \Terminal LLX\Gasolina\15.HA33

User-Defined Data

Material

Material Identifier	N-HEXANE (Imported Study Gasolina)
Type of Vessel	Unpressurized (at atmospheric pressure)
Pressure Specification	Pressure not used
Temperature	25 degC
Volume Inventory	4500 m3

Scenario

Scenario Type	Leak
Phase to be Released	Liquid
Hole Diameter	10 mm
Building Wake Effect	None
Tank Head	14.4 m

Location

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

Bund

Status of Bund	Bund present
Bund Area	2140 m2
[Type of Bund Surface	Concrete]
[Bund Height	1.5 m]
[Bund Failure Modeling	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Direction	Horizontal

Flammable

Jet Fire Method	Cone Model
-----------------	------------

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	2.952E6 kg

Fireball Parameters

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

Toxic Parameters

[Wind Dependent Exchange Rate	Case Specified]
[Building Exchange Rate	4 /hr]

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Study Folder: Terminal LLX

Phast 6.6

[Tail Time 1800 s]
[Set averaging time equal to exposure time Use a fixed averaging time]
[Cut-off fraction of toxic load for exposure time calculation 0.05 fraction]
[Cut-off concentration for exposure time calculations 0 fraction]

Geometry

Shape Point
Dimension 2D
System Absolute
East(1) 1250 m
North(1) 1158 m

Path: \Terminal LLX\Gasolina\15.HA33

Discharge Data

User-Defined Quantities

Material EXANE (Imported Study Gasolina)
Temperature 25,00 degC
Pressure 1,01 bar
Inventory 2.952.118,00 kg
Scenario Leak
Fixed Duration n/a s

Calculated Quantities

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Diurno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
Final Temperature 24,97 degC
Final Velocity 17,77 m/s
Droplet Diameter 469,65 um

Continuous Release Data:

Mass Flowrate 5.49432E-001 kg/s
Release Duration 3.600,00 s
Orifice Velocity 17,77 m/s
Exit Pressure 1,01 bar
Exit Temperature 24,97 degC
Discharge Coefficient 0,60
Expanded Radius 0,00 m

Weather: Gasolina\Estação Automatica MPX (from Global Weathers)\Noturno

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 1,00 fraction
Final Temperature 24,97 degC
Final Velocity 17,77 m/s
Droplet Diameter 469,65 um

Continuous Release Data:

SUMMARY REPORT

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Phast 6.6



Mass Flowrate	5.49432E-001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	17,77 m/s
Exit Pressure	1,01 bar
Exit Temperature	24,97 degC
Discharge Coefficient	0,60
Expanded Radius	0,00 m

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Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Gasolina\15.HA33

			Diurno	Noturno
Release Segment 1				
Release Duration	s		3600	3600
Liquid Rainout	fraction		0.727417	0.752756
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		648.976	786.803
Pool Vaporization Rate	kg/s		0.155189	0.143506
Total Vapor Flowrate	kg/s		0.304955	0.27935
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		346.427	405.173
Pool Vaporization Rate	kg/s		0.290759	0.278946
Total Vapor Flowrate	kg/s		0.440525	0.41479
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		2604.6	1280.6
Pool Vaporization Rate	kg/s		0.37928	0.353458
Total Vapor Flowrate	kg/s		0.529046	0.489302
Release Segment 1 Cloud Segment 4				
Cloud Segment Duration	s			1127.42
Pool Vaporization Rate	kg/s			0.397329
Total Vapor Flowrate	kg/s			0.533173
Maximum Pool Radius	m		4.91162	5.90258

Distance to Concentration Results

Path: \Terminal LLX\Gasolina\15.HA33

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

Concentration(ppm)		Averaging Time		Distance (m)	
				Diurno	Noturno
UFL (76800)	18.75	s		3.07853	3.58451
LFL (10500)	18.75	s		10.8674	15.6979
LFL Frac (10500)	18.75	s		10.8674	15.6979
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL (76800)	18.75	s		0.822066	0.694356
LFL (10500)	18.75	s		0.118308	0
LFL Frac (10500)	18.75	s		0.118308	0

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Study Folder: Terminal LLX

Phast 6.6

Jet Fire Hazard

Path: \Terminal LLX\Gasolina\15.HA33

Jet fire method used: Cone model - DNV recommended

	Diurno	Noturno
Jet Fire Status	Truncated	Truncated
Flame Direction	Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Gasolina\15.HA33

This table gives the distances to the specified radiation levels for each jet fire listed in the above hazard table

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	18.9487	19.625
Radiation Level	18.18	kW/m2	14.2657	15.0114
Radiation Level	100	kW/m2	10.8684	Not Reached

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Gasolina\15.HA33

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Gasolina\15.HA33

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\15.HA33

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	17.505	16.7891
Radiation Level	18.18	kW/m2	12.2548	11.04
Radiation Level	100	kW/m2	6.19179	5.95847

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Gasolina\15.HA33

	Radiation Level (kW/m2)
Diurno	Noturno

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Study Folder: Terminal LLX

Phast 6.6

Late Pool Fire Hazard

Path: \Terminal LLX\Gasolina\15.HA33

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Gasolina\15.HA33

			Diurno	Noturno
				Distance (m)
Radiation Level	5	kW/m2	36.9312	36.992
Radiation Level	18.18	kW/m2	17.7451	15.7585
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Gasolina\15.HA33

	Diurno	Radiation Level (kW/m2)
		Noturno

Flash Fire Envelope

Path: \Terminal LLX\Gasolina\15.HA33

All flammable results are reported at the cloud centreline height

			Diurno	Noturno
				Distance (m)
Furthest Extent	10500	ppm	10.8674	15.6979
Furthest Extent	10500	ppm	10.8674	15.6979
				Heights (m) for above distances
			Diurno	Noturno
Furthest Extent	10500	ppm	0.118308	0
Furthest Extent	10500	ppm	0.118308	0

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Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Gasolina\15.HA33

Explosion Model Used : TNT

Explosion Location Criterion: Cloud Center

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Diurno	Noturno
Overpressure	0.069	bar	16.1823	16.2938
Overpressure	0.1	bar	13.7004	13.7871
Overpressure	0.45	bar	8.4149	8.44894

Supplementary Data at 0.069 bar

			Diurno	Noturno
Supplied Flammable Mass	kg		0.579566	0.597086
Used Flammable Mass	kg		0.579566	0.597086
Overpressure Radius	m		11.1823	11.2938
Distance to:				
- Ignition Source	m		10	10
- Cloud Front/Centre	m		10	10
- Explosion Centre	m		5.00003	5

Supplementary Data at 0.1 bar

			Diurno	Noturno
Supplied Flammable Mass	kg		0.579566	0.597086
Used Flammable Mass	kg		0.579566	0.597086
Overpressure Radius	m		8.70035	8.78715
Distance to:				
- Ignition Source	m		10	10
- Cloud Front/Centre	m		10	10
- Explosion Centre	m		5.00003	5

Supplementary Data at 0.45 bar

			Diurno	Noturno
Supplied Flammable Mass	kg		0.579566	0.597086
Used Flammable Mass	kg		0.579566	0.597086
Overpressure Radius	m		3.41487	3.44894
Distance to:				
- Ignition Source	m		10	10
- Cloud Front/Centre	m		10	10
- Explosion Centre	m		5.00003	5

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Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Gasolina\15.HA33

		Diurno	Noturno
Wind Speed	m/s	3.916	2.329
Pasquill Stability		D	F
Surface Roughness Length	mm	950.891	950.891
Surface Roughness Parameter		0.17	0.17
Atmospheric Temperature	degC	25.287	21.695
Surface Temperature	degC	25.287	21.695
Relative Humidity	fraction	0.69625	0.84719