

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6



Terminal LLX



Querosene

16.HA36

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\16.HA36

User-Defined Data

Material

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

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
-----------------	------------

Dispersion

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	5.885E4 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\Querosene\16.HA36

Discharge Data

User-Defined Quantities

Material	CANE (Imported Study Querosene)
Temperature	25,00 degC
Pressure	1,01 bar
Inventory	58.853,40 kg
Scenario	Line rupture
Fixed Duration	n/a s

Calculated Quantities

Weather: Querosene\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	25,01 degC
Final Velocity	4,80 m/s
Droplet Diameter	592,52 um
Continuous Release Data:	
Mass Flowrate	6.36792E+001 kg/s
Release Duration	924,22 s
Orifice Velocity	4,80 m/s
Exit Pressure	1,01 bar
Exit Temperature	25,01 degC
Discharge Coefficient	1,00

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Expanded Radius	0,08 m
Weather:	Querosene\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	4,80 m/s
Droplet Diameter	592,52 um
Continuous Release Data:	
Mass Flowrate	6.36792E+001 kg/s
Release Duration	924,22 s
Orifice Velocity	4,80 m/s
Exit Pressure	1,01 bar
Exit Temperature	25,01 degC
Discharge Coefficient	1,00
Expanded Radius	0,08 m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Querosene\16.HA36

			Diurno	Noturno
Release Segment 1				
Release Duration	s		924.217	924.217
Liquid Rainout	fraction		0.999598	0.999815
Maximum Pool Radius	m		17.6258	17.6258

Distance to Concentration Results

Path: \Terminal LLX\Querosene\16.HA36

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 (54000)	18.75	s		2.18048	2.07294
LFL (7000)	18.75	s		2.19098	2.0764
LFL Frac (7000)	18.75	s		2.19098	2.0764
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL (54000)	18.75	s		0.0792979	0.103743
LFL (7000)	18.75	s		0.0738816	0.101436
LFL Frac (7000)	18.75	s		0.0738816	0.101436

Jet Fire Hazard

Path: \Terminal LLX\Querosene\16.HA36

Jet fire method used: Cone model - DNV recommended

			Diurno	Noturno
Jet Fire Status			Hazard	Hazard
Flame Direction			Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\16.HA36

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		8.1035	6.14908
Radiation Level	18.18	kW/m2		6.00062	4.38671
Radiation Level	100	kW/m2		Not Reached	Not Reached

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\16.HA36

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\16.HA36

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\16.HA36

			Diurno	Distance (m)
				Noturno
Radiation Level	5	kW/m2	53.6608	47.9125
Radiation Level	18.18	kW/m2	20.818	20.7026
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\16.HA36

	Radiation Level (kW/m2)
Diurno	Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Querosene\16.HA36

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\16.HA36

			Diurno	Distance (m)
				Noturno
Radiation Level	5	kW/m2	53.6608	47.9125
Radiation Level	18.18	kW/m2	20.818	20.7026
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\16.HA36

	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\Querosene\16.HA36

All flammable results are reported at the cloud centreline height

				Distance (m)	
				Diurno	Noturno
Furthest Extent	7000	ppm		2.19098	2.0764
Furthest Extent	7000	ppm		2.19098	2.0764
				Heights (m) for above distances	
				Diurno	Noturno
Furthest Extent	7000	ppm		0.0738816	0.101436
Furthest Extent	7000	ppm		0.0738816	0.101436

Weather Conditions

Path: \Terminal LLX\Querosene\16.HA36

			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

17.HA38

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\17.HA38

User-Defined Data

Material

Material Identifier n-DECANE (Imported Study Querosene)

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) 24.22 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 5.885E4 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\Querosene\17.HA38

			Diurno	Noturno
Release Segment 1				
Release Duration	s		600	600
Liquid Rainout	fraction		0.99893	0.999786
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		577.201	586.851
Pool Vaporization Rate	kg/s		0.0778061	0.0508948
Total Vapor Flowrate	kg/s		0.103724	0.0560794
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		446.549	448.13
Pool Vaporization Rate	kg/s		0.100926	0.0665509
Total Vapor Flowrate	kg/s		0.126844	0.0717356
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		733.706	745.609
Pool Vaporization Rate	kg/s		0.122534	0.080066
Total Vapor Flowrate	kg/s		0.100926	0.0665509
Release Segment 1 Cloud Segment 4				
Cloud Segment Duration	s		1842.54	
Pool Vaporization Rate	kg/s		0.146094	
Total Vapor Flowrate	kg/s		0.122534	0.080066
Maximum Pool Radius	m		17.6258	17.6258

Distance to Concentration Results

Path: \Terminal LLX\Querosene\17.HA38

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 (54000)	18.75	s		0.865271	0.788017
LFL (7000)	18.75	s		2.57815	5.58048
LFL Frac (7000)	18.75	s		2.57815	5.58048
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL (54000)	18.75	s		0.003379	0.0867386
LFL (7000)	18.75	s		0	0
LFL Frac (7000)	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\Querosene\17.HA38

Jet fire method used: Cone model - DNV recommended

	Diurno	Noturno
Jet Fire Status	Hazard	Hazard
Flame Direction	Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\17.HA38

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	8.1425	4.12825
Radiation Level	18.18	kW/m2	6.1426	2.71264
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\17.HA38

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\17.HA38

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\17.HA38

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	41.6489	37.9844
Radiation Level	18.18	kW/m2	13.1249	12.9494
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\17.HA38

	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\Querosene\17.HA38

Late Pool Fire Status	Diurno	Noturno
	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\17.HA38

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	52.3366	46.6245
Radiation Level	18.18	kW/m2	19.4938	19.4146
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\17.HA38

	Radiation Level (kW/m2)	
	Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Querosene\17.HA38

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	7000	ppm	2.57815	5.58048
Furthest Extent	7000	ppm	2.57815	5.58048
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	7000	ppm	0	0
Furthest Extent	7000	ppm	0	0

Weather Conditions

Path: \Terminal LLX\Querosene\17.HA38

			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

18.HA40

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\18.HA40

User-Defined Data

Material

Material Identifier n-DECANE (Imported Study Querosene)

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) 24.22 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 5.885E4 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\Querosene\18.HA40

			Diurno	Noturno
Release Segment 1				
Release Duration	s		600	600
Liquid Rainout	fraction		0.99893	0.999786
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		632.272	651.276
Pool Vaporization Rate	kg/s		0.134463	0.0868661
Total Vapor Flowrate	kg/s		0.160381	0.0920507
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		414	424.314
Pool Vaporization Rate	kg/s		0.205721	0.133485
Total Vapor Flowrate	kg/s		0.134463	0.0868661
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		2553.73	1044.76
Pool Vaporization Rate	kg/s		0.266077	0.162993
Total Vapor Flowrate	kg/s		0.205721	0.133485
Release Segment 1 Cloud Segment 4				
Cloud Segment Duration	s			1479.65
Pool Vaporization Rate	kg/s			0.190598
Total Vapor Flowrate	kg/s		0.266077	0.162993
Maximum Pool Radius	m		23.9365	23.9365

Distance to Concentration Results

Path: \Terminal LLX\Querosene\18.HA40

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 (54000)	18.75	s		0.865428	0.78816
LFL (7000)	18.75	s		3.2056	6.36663
LFL Frac (7000)	18.75	s		3.2056	6.36663
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL (54000)	18.75	s		0.00318236	0.0864112
LFL (7000)	18.75	s		0	0
LFL Frac (7000)	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\Querosene\18.HA40

Jet fire method used: Cone model - DNV recommended

	Diurno	Noturno
Jet Fire Status	Hazard	Hazard
Flame Direction	Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\18.HA40

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	8.1425	4.12825
Radiation Level	18.18	kW/m2	6.1426	2.71264
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\18.HA40

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\18.HA40

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\18.HA40

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	41.6489	37.9844
Radiation Level	18.18	kW/m2	13.1249	12.9494
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\18.HA40

	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\Querosene\18.HA40

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\18.HA40

			Diurno	Noturno
				Distance (m)
Radiation Level	5	kW/m2	64.0396	56.9434
Radiation Level	18.18	kW/m2	25.8045	25.7253
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\18.HA40

	Diurno	Noturno
		Radiation Level (kW/m2)

Flash Fire Envelope

Path: \Terminal LLX\Querosene\18.HA40

All flammable results are reported at the cloud centreline height

			Diurno	Noturno
				Distance (m)
Furthest Extent	7000	ppm	3.2056	6.36663
Furthest Extent	7000	ppm	3.2056	6.36663
				Heights (m) for above distances
			Diurno	Noturno
Furthest Extent	7000	ppm	0	0
Furthest Extent	7000	ppm	0	0

Weather Conditions

Path: \Terminal LLX\Querosene\18.HA40

		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

19.HA42

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\19.HA42

User-Defined Data

Material

Material Identifier n-DECANE (Imported Study Querosene)

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) 24.22 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 5.885E4 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)	1205 m
North(1)	1145 m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Querosene\19.HA42

			Diurno	Noturno
Release Segment 1				
Release Duration	s		600	600
Liquid Rainout	fraction		0.99893	0.999786
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		652.553	674.451
Pool Vaporization Rate	kg/s		0.154611	0.0997481
Total Vapor Flowrate	kg/s		0.180529	0.104933
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		403.447	415.95
Pool Vaporization Rate	kg/s		0.25009	0.161717
Total Vapor Flowrate	kg/s		0.154611	0.0997481
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		2544	1034.56
Pool Vaporization Rate	kg/s		0.316916	0.195314
Total Vapor Flowrate	kg/s		0.25009	0.161717
Release Segment 1 Cloud Segment 4				
Cloud Segment Duration	s			1475.04
Pool Vaporization Rate	kg/s			0.226831
Total Vapor Flowrate	kg/s		0.316916	0.195314
Maximum Pool Radius	m		26.0995	26.0995

Distance to Concentration Results

Path: \Terminal LLX\Querosene\19.HA42

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	(54000)	18.75	s	0.865522	0.788251
LFL	(7000)	18.75	s	3.40879	6.75347
LFL Frac	(7000)	18.75	s	3.40879	6.75347
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(54000)	18.75	s	0.00306397	0.0862033
LFL	(7000)	18.75	s	0	0
LFL Frac	(7000)	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\Querosene\19.HA42

Jet fire method used: Cone model - DNV recommended

	Diurno	Noturno
Jet Fire Status	Hazard	Hazard
Flame Direction	Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\19.HA42

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	8.1425	4.12825
Radiation Level	18.18	kW/m2	6.1426	2.71264
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\19.HA42

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\19.HA42

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\19.HA42

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	41.6489	37.9844
Radiation Level	18.18	kW/m2	13.1249	12.9494
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\19.HA42

	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\Querosene\19.HA42

Late Pool Fire Status	Diurno	Noturno
	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\19.HA42

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	68.2166	60.693
Radiation Level	18.18	kW/m2	27.9675	27.8882
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\19.HA42

	Radiation Level (kW/m2)	
	Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Querosene\19.HA42

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	7000	ppm	3.40879	6.75347
Furthest Extent	7000	ppm	3.40879	6.75347
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	7000	ppm	0	0
Furthest Extent	7000	ppm	0	0

Weather Conditions

Path: \Terminal LLX\Querosene\19.HA42

			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

20.HA44

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\20.HA44

User-Defined Data

Material

Material Identifier	n-DECANE (Imported Study Querosene)
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
---------------------	------------------

Flammable

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

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	2.943E4 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\Querosene\20.HA44

Discharge Data

User-Defined Quantities

Material CANE (Imported Study Querosene)
Temperature 25,00 degC
Pressure 1,01 bar
Inventory 29.426,70 kg
Scenario Catastrophic rupture
Fixed Duration n/a s

Calculated Quantities

Weather: Querosene\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 2,04 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: Querosene\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 2,04 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\Querosene\20.HA44

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

		Diurno	Noturno
Liquid Rainout	fraction	0.999935	0.999935
Initial Vapor Cloud	kg	1.89898	
Time Pool Left Behind	s	16.0842	
Cloud Segment 1			
Cloud Segment Duration	s	534.766	
Pool Vaporization Rate	kg/s	0.0765136	
Cloud Segment 2			
Cloud Segment Duration	s	438.674	
Pool Vaporization Rate	kg/s	0.0934762	
Cloud Segment 3			
Cloud Segment Duration	s	757.12	
Pool Vaporization Rate	kg/s	0.108258	
Cloud Segment 4			
Cloud Segment Duration	s	1869.44	
Pool Vaporization Rate	kg/s	0.131111	
Maximum Pool Radius	m	17.6258	17.6258

Distance to Concentration Results

Path: \Terminal LLX\Querosene\20.HA44

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	(54000)	18.75	s		4.69468	4.505
LFL	(7000)	18.75	s		4.73861	4.54907
LFL Frac	(7000)	18.75	s		4.73861	4.54907
Concentration(ppm)		Averaging Time			Heights (m) for above distances	
					Diurno	Noturno
UFL	(54000)	18.75	s		0.806227	0.80587
LFL	(7000)	18.75	s		0.806227	0.80587
LFL Frac	(7000)	18.75	s		0.806227	0.80587

Late Pool Fire Hazard

Path: \Terminal LLX\Querosene\20.HA44

	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\Querosene\20.HA44

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	52.1511	46.2705
Radiation Level	18.18	kW/m2	19.3083	19.0606
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\20.HA44

		Radiation Level (kW/m2)	
		Diurno	Noturno

Fireball Hazard

Path: \Terminal LLX\Querosene\20.HA44

		Diurno	Noturno
Fireball Flame Status		No Hazard	No Hazard

Flash Fire Envelope

Path: \Terminal LLX\Querosene\20.HA44

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	7000	ppm	4.73861	4.54907
Furthest Extent	7000	ppm	4.73861	4.54907
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	7000	ppm	0.806227	0.80587
Furthest Extent	7000	ppm	0.806227	0.80587

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Early Explosion

Path: \Terminal LLX\Querosene\20.HA44

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

			Diurno	Noturno
Supplied Flammable Mass			29426.7	29426.7
			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

Weather Conditions

Path: \Terminal LLX\Querosene\20.HA44

		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

21.HA45

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\21.HA45

User-Defined Data

Material

Material Identifier	n-DECANE (Imported Study Querosene)
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	2.943E4 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\Querosene\21.HA45

Discharge Data

User-Defined Quantities

Material	CANE (Imported Study Querosene)
Temperature	25,00 degC
Pressure	1,01 bar
Inventory	29.426,70 kg
Scenario	Leak
Fixed Duration	n/a s

Calculated Quantities

Weather: Querosene\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	7,31 m/s
Droplet Diameter	605,90 um

Continuous Release Data:

Mass Flowrate	2.50286E-001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	7,31 m/s
Exit Pressure	1,01 bar
Exit Temperature	25,00 degC
Discharge Coefficient	0,60
Expanded Radius	0,00 m

Weather: Querosene\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	7,31 m/s
Droplet Diameter	605,90 um

Continuous Release Data:

SUMMARY REPORT

Study Folder: Terminal LLX

Unique Audit Number: 193.279

Phast 6.6



Mass Flowrate	2.50286E-001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	7,31 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\Querosene\21.HA45

			Diurno	Noturno
Release Segment 1				
Release Duration	s		3600	3600
Liquid Rainout	fraction		0.993392	0.99462
Maximum Pool Radius	m		8.64198	8.731

Distance to Concentration Results

Path: \Terminal LLX\Querosene\21.HA45

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 (54000)	18.75	s		1.88155	2.11677
LFL (7000)	18.75	s		2.42495	2.38857
LFL Frac (7000)	18.75	s		2.42495	2.38857
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL (54000)	18.75	s		0.711593	0.500135
LFL (7000)	18.75	s		0.579226	0.357951
LFL Frac (7000)	18.75	s		0.579226	0.357951

Jet Fire Hazard

Path: \Terminal LLX\Querosene\21.HA45

Jet fire method used: Cone model - DNV recommended

			Diurno	Noturno
Jet Fire Status			Hazard	Hazard
Flame Direction			Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\21.HA45

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	1.7774	1.49705
Radiation Level	18.18	kW/m2	Not Reached	Not Reached
Radiation Level	100	kW/m2	Not Reached	Not Reached

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\21.HA45

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\21.HA45

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\21.HA45

			Diurno	Distance (m)
				Noturno
Radiation Level	5	kW/m2	13.7379	13.3472
Radiation Level	18.18	kW/m2	9.558	8.87202
Radiation Level	100	kW/m2	4.62702	4.55913

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\21.HA45

	Radiation Level (kW/m2)
Diurno	Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Querosene\21.HA45

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\21.HA45

			Diurno	Distance (m)
				Noturno
Radiation Level	5	kW/m2	39.1852	36.5017
Radiation Level	18.18	kW/m2	14.8231	13.933
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\21.HA45

	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\Querosene\21.HA45

All flammable results are reported at the cloud centreline height

				Distance (m)	
				Diurno	Noturno
Furthest Extent	7000	ppm		2.42495	2.38857
Furthest Extent	7000	ppm		2.42495	2.38857
				Heights (m) for above distances	
				Diurno	Noturno
Furthest Extent	7000	ppm		0.579226	0.357951
Furthest Extent	7000	ppm		0.579226	0.357951

Weather Conditions

Path: \Terminal LLX\Querosene\21.HA45

			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

22.HA47

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\22.HA47

User-Defined Data

Material

Material Identifier	n-DECANE (Imported Study Querosene)
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
---------------------	------------------

Flammable

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

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	5.885E4 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\Querosene\22.HA47

Discharge Data

User-Defined Quantities

Material CANE (Imported Study Querosene)
Temperature 25,00 degC
Pressure 1,01 bar
Inventory 58.853,40 kg
Scenario Catastrophic rupture
Fixed Duration n/a s

Calculated Quantities

Weather: Querosene\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 2,26 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: Querosene\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 2,26 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\Querosene\22.HA47

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

		Diurno	Noturno
Liquid Rainout	fraction	0.999923	0.999923
Initial Vapor Cloud	kg	4.50681	
Time Pool Left Behind	s	16.5187	
Cloud Segment 1			
Cloud Segment Duration	s	491.731	
Pool Vaporization Rate	kg/s	0.0694483	
Cloud Segment 2			
Cloud Segment Duration	s	829.592	
Pool Vaporization Rate	kg/s	0.0824056	
Cloud Segment 3			
Cloud Segment Duration	s	1382.68	
Pool Vaporization Rate	kg/s	0.098969	
Cloud Segment 4			
Cloud Segment Duration	s	896	
Pool Vaporization Rate	kg/s	0.113374	
Maximum Pool Radius	m	17.6258	17.6258

Distance to Concentration Results

Path: \Terminal LLX\Querosene\22.HA47

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	(54000)	18.75	s		7.99946	7.69557
LFL	(7000)	18.75	s		8.07412	7.77044
LFL Frac	(7000)	18.75	s		8.07412	7.77044
Concentration(ppm)		Averaging Time			Diurno	Heights (m) for above distances
UFL	(54000)	18.75	s		0.807042	0.806456
LFL	(7000)	18.75	s		0.807042	0.806456
LFL Frac	(7000)	18.75	s		0.807042	0.806456

Late Pool Fire Hazard

Path: \Terminal LLX\Querosene\22.HA47

	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\Querosene\22.HA47

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	52.5152	46.5211
Radiation Level	18.18	kW/m2	19.6724	19.3112
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\22.HA47

		Radiation Level (kW/m2)	
		Diurno	Noturno

Fireball Hazard

Path: \Terminal LLX\Querosene\22.HA47

		Diurno	Noturno
Fireball Flame Status		No Hazard	No Hazard

Flash Fire Envelope

Path: \Terminal LLX\Querosene\22.HA47

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	7000	ppm	8.07412	7.77044
Furthest Extent	7000	ppm	8.07412	7.77044
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	7000	ppm	0.807042	0.806456
Furthest Extent	7000	ppm	0.807042	0.806456

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Early Explosion

Path: \Terminal LLX\Querosene\22.HA47

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

			Diurno	Noturno
Supplied Flammable Mass			58853.4	58853.4
			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

Weather Conditions

Path: \Terminal LLX\Querosene\22.HA47

			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

23.HA48

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\23.HA48

User-Defined Data

Material

Material Identifier	n-DECANE (Imported Study Querosene)
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	5.885E4 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\Querosene\23.HA48

Discharge Data

User-Defined Quantities

Material	CANE (Imported Study Querosene)
Temperature	25,00 degC
Pressure	1,01 bar
Inventory	58.853,40 kg
Scenario	Leak
Fixed Duration	n/a s

Calculated Quantities

Weather: Querosene\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	8,01 m/s
Droplet Diameter	592,52 um

Continuous Release Data:

Mass Flowrate	2.74175E-001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	8,01 m/s
Exit Pressure	1,01 bar
Exit Temperature	25,00 degC
Discharge Coefficient	0,60
Expanded Radius	0,00 m

Weather: Querosene\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	8,01 m/s
Droplet Diameter	592,52 um

Continuous Release Data:

SUMMARY REPORT

Study Folder: **Terminal LLX**

193.279



Phast 6.6

Mass Flowrate	2.74175E-001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	8,01 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\Querosene\23.HA48

Release Segment 1			Diurno	Noturno
Release Duration	s		3600	3600
Liquid Rainout	fraction		0.993114	0.994424
Maximum Pool Radius	m		9.04451	9.13786

Distance to Concentration Results

Path: \Terminal LLX\Querosene\23.HA48

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	(54000)	18.75	s	1.97935	2.16729
LFL	(7000)	18.75	s	2.44383	2.42185
LFL Frac	(7000)	18.75	s	2.44383	2.42185
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(54000)	18.75	s	0.724537	0.557849
LFL	(7000)	18.75	s	0.614753	0.443691
LFL Frac	(7000)	18.75	s	0.614753	0.443691

Jet Fire Hazard

Path: \Terminal LLX\Querosene\23.HA48

Jet fire method used: Cone model - DNV recommended

		Diurno	Noturno
Jet Fire Status		Hazard	Hazard
Flame Direction		Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\23.HA48

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	1.98445	1.6609
Radiation Level	18.18	kW/m2	Not Reached	Not Reached
Radiation Level	100	kW/m2	Not Reached	Not Reached

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\23.HA48

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\23.HA48

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\23.HA48

			Diurno	Distance (m)
				Noturno
Radiation Level	5	kW/m2	14.1351	13.7496
Radiation Level	18.18	kW/m2	9.79901	9.10704
Radiation Level	100	kW/m2	4.68611	4.64231

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\23.HA48

	Radiation Level (kW/m2)
Diurno	Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Querosene\23.HA48

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\23.HA48

			Diurno	Distance (m)
				Noturno
Radiation Level	5	kW/m2	39.9141	37.0897
Radiation Level	18.18	kW/m2	14.8164	13.9532
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\23.HA48

	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\Querosene\23.HA48

All flammable results are reported at the cloud centreline height

				Distance (m)	
				Diurno	Noturno
Furthest Extent	7000	ppm		2.44383	2.42185
Furthest Extent	7000	ppm		2.44383	2.42185
				Heights (m) for above distances	
				Diurno	Noturno
Furthest Extent	7000	ppm		0.614753	0.443691
Furthest Extent	7000	ppm		0.614753	0.443691

Weather Conditions

Path: \Terminal LLX\Querosene\23.HA48

			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

24.HA50 e HA59

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\24.HA50 e HA59

User-Defined Data

Material

Material Identifier n-DECANE (Imported Study Querosene)

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) 121.1 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 3.27E6 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\Querosene\24.HA50 e HA59

			Diurno	Noturno
Release Segment 1				
Release Duration	s		600	600
Liquid Rainout	fraction		0.999721	0.999925
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		489.516	495.063
Pool Vaporization Rate	kg/s		0.122319	0.0774159
Total Vapor Flowrate	kg/s		0.15614	0.086508
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		838.837	842.418
Pool Vaporization Rate	kg/s		0.14281	0.0911666
Total Vapor Flowrate	kg/s		0.176631	0.100259
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		1378	1060.82
Pool Vaporization Rate	kg/s		0.173909	0.108579
Total Vapor Flowrate	kg/s		0.14281	0.0911666
Release Segment 1 Cloud Segment 4				
Cloud Segment Duration	s		893.649	1201.7
Pool Vaporization Rate	kg/s		0.199687	0.12678
Total Vapor Flowrate	kg/s		0.173909	0.108579
Maximum Pool Radius	m		22.5676	22.5676

Distance to Concentration Results

Path: \Terminal LLX\Querosene\24.HA50 e HA59

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	(54000)	18.75	s	1.01856	0.971274
LFL	(7000)	18.75	s	2.66428	6.66891
LFL Frac	(7000)	18.75	s	2.66428	6.66891
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(54000)	18.75	s	0.0614486	0.11671
LFL	(7000)	18.75	s	0	0
LFL Frac	(7000)	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\Querosene\24.HA50 e HA59

Jet fire method used: Cone model - DNV recommended

	Diurno	Noturno
Jet Fire Status	Hazard	Hazard
Flame Direction	Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\24.HA50 e HA59

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	9.2085	5.43732
Radiation Level	18.18	kW/m2	6.99328	3.71336
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\24.HA50 e HA59

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\24.HA50 e HA59

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\24.HA50 e HA59

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	61.5718	54.7876
Radiation Level	18.18	kW/m2	24.5883	24.539
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\24.HA50 e HA59

	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\Querosene\24.HA50 e HA59

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\24.HA50 e HA59

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	61.5718	54.7876
Radiation Level	18.18	kW/m2	24.5883	24.539
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\24.HA50 e HA59

	Radiation Level (kW/m2)	
	Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Querosene\24.HA50 e HA59

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	7000	ppm	2.66428	6.66891
Furthest Extent	7000	ppm	2.66428	6.66891
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	7000	ppm	0	0
Furthest Extent	7000	ppm	0	0

Weather Conditions

Path: \Terminal LLX\Querosene\24.HA50 e HA59

			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

25.HA52

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\25.HA52

User-Defined Data

Material

Material Identifier n-DECANE (Imported Study Querosene)

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) 100.9 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 3.27E6 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)	1205 m
North(1)	1145 m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Querosene\25.HA52

			Diurno	Noturno
Release Segment 1				
Release Duration	s		600	600
Liquid Rainout	fraction		0.999773	0.999918
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		541.726	539.401
Pool Vaporization Rate	kg/s		0.156526	0.103952
Total Vapor Flowrate	kg/s		0.179422	0.112182
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		458.165	452.599
Pool Vaporization Rate	kg/s		0.185366	0.124181
Total Vapor Flowrate	kg/s		0.208262	0.132412
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		765.96	769.651
Pool Vaporization Rate	kg/s		0.222346	0.145927
Total Vapor Flowrate	kg/s		0.185366	0.124181
Release Segment 1 Cloud Segment 4				
Cloud Segment Duration	s		1563.19	1279.62
Pool Vaporization Rate	kg/s		0.272495	0.175882
Total Vapor Flowrate	kg/s		0.222346	0.145927
Release Segment 1 Cloud Segment 5				
Cloud Segment Duration	s		270.96	558.727
Pool Vaporization Rate	kg/s		0.301725	0.198037
Total Vapor Flowrate	kg/s		0.272495	0.175882
Maximum Pool Radius	m		26.0995	26.0995

Distance to Concentration Results

Path: \Terminal LLX\Querosene\25.HA52

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	(54000)	18.75	s	0.829116	0.813401
LFL	(7000)	18.75	s	2.60684	7.53623
LFL Frac	(7000)	18.75	s	2.60684	7.53623
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(54000)	18.75	s	0.0940223	0.10912
LFL	(7000)	18.75	s	0	0
LFL Frac	(7000)	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\Querosene\25.HA52

Jet fire method used: Cone model - DNV recommended

	Diurno	Noturno
Jet Fire Status	Hazard	Hazard
Flame Direction	Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\25.HA52

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	7.68151	5.18466
Radiation Level	18.18	kW/m2	5.77337	3.56625
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\25.HA52

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\25.HA52

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\25.HA52

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	61.4754	54.9939
Radiation Level	18.18	kW/m2	24.4471	24.5958
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\25.HA52

	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\Querosene\25.HA52

Late Pool Fire Status	Diurno	Noturno
	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\25.HA52

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	68.1786	60.7177
Radiation Level	18.18	kW/m2	27.9295	27.913
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\25.HA52

	Radiation Level (kW/m2)	
	Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Querosene\25.HA52

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	7000	ppm	2.60684	7.53623
Furthest Extent	7000	ppm	2.60684	7.53623
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	7000	ppm	0	0
Furthest Extent	7000	ppm	0	0

Weather Conditions

Path: \Terminal LLX\Querosene\25.HA52

			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

26.HA57

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\26.HA57

User-Defined Data

Material

Material Identifier	n-DECANE (Imported Study Querosene)
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
-----------------	------------

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	3.27E6 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)	1205 m
North(1)	1145 m

Path: \Terminal LLX\Querosene\26.HA57

Discharge Data

User-Defined Quantities

Material	CANE (Imported Study Querosene)
Temperature	25,00 degC
Pressure	1,01 bar
Inventory	3.269.633,25 kg
Scenario	Line rupture
Fixed Duration	n/a s

Calculated Quantities

Weather: Querosene\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	25,06 degC
Final Velocity	11,10 m/s
Droplet Diameter	469,65 um
Continuous Release Data:	
Mass Flowrate	5.88233E+002 kg/s
Release Duration	3.600,00 s
Orifice Velocity	11,10 m/s
Exit Pressure	1,01 bar
Exit Temperature	25,06 degC
Discharge Coefficient	1,00
Expanded Radius	0,15 m

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

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

SUMMARY REPORT

Study Folder: Terminal LLX

Unique Audit Number: 193.279

Phast 6.6



Average Values for Segment Number		1
Liquid Fraction		1,00 fraction
FinalTemperature		25,06 degC
Final Velocity		11,10 m/s
Droplet Diameter		469,65 um
Continuous Release Data:		
Mass Flowrate		5.88233E+002 kg/s
Release Duration		3.600,00 s
Orifice Velocity		11,10 m/s
Exit Pressure		1,01 bar
Exit Temperature		25,06 degC
Discharge Coefficient		1,00
Expanded Radius		0,15 m

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Consequence Results

Pool Vaporization Results

Path: \Terminal LLX\Querosene\26.HA57

		Diurno	Noturno
Release Segment 1			
Release Duration	s	3600	3600
Liquid Rainout	fraction	0.999819	0.99986
Release Segment 1 Cloud Segment 1			
Cloud Segment Duration	s	42.5756	51.4806
Pool Vaporization Rate	kg/s	0.0637407	0.0548013
Total Vapor Flowrate	kg/s	0.17049	0.137102
Release Segment 1 Cloud Segment 2			
Cloud Segment Duration	s	3557.42	3548.52
Pool Vaporization Rate	kg/s	0.140777	0.101796
Total Vapor Flowrate	kg/s	0.247527	0.184097
Maximum Pool Radius	m	26.0995	26.0995

Distance to Concentration Results

Path: \Terminal LLX\Querosene\26.HA57

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 (54000)	18.75	s		5.60659	5.87699
LFL (7000)	18.75	s		5.6403	5.89772
LFL Frac (7000)	18.75	s		5.6403	5.89772
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL (54000)	18.75	s		0.201383	0.143469
LFL (7000)	18.75	s		0.199229	0.14248
LFL Frac (7000)	18.75	s		0.199229	0.14248

Jet Fire Hazard

Path: \Terminal LLX\Querosene\26.HA57

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\Querosene\26.HA57

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	15.551	14.9847
Radiation Level	18.18	kW/m2	11.6444	11.3872
Radiation Level	100	kW/m2	9.00699	Not Reached

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\26.HA57

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\26.HA57

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\26.HA57

				Distance (m)
				Diurno
				Noturno
Radiation Level	5	kW/m2	72.991	65.8033
Radiation Level	18.18	kW/m2	32.7419	32.9986
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\26.HA57

	Radiation Level (kW/m2)
Diurno	Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Querosene\26.HA57

	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\Querosene\26.HA57

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	72.991	65.8033
Radiation Level	18.18	kW/m2	32.7419	32.9986
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\26.HA57

		Radiation Level (kW/m2)	
		Diurno	Noturno

Flash Fire Envelope

Path: \Terminal LLX\Querosene\26.HA57

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	7000	ppm	5.6403	5.89772
Furthest Extent	7000	ppm	5.6403	5.89772
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	7000	ppm	0.199229	0.14248
Furthest Extent	7000	ppm	0.199229	0.14248

Weather Conditions

Path: \Terminal LLX\Querosene\26.HA57

			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

27.HA61

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\27.HA61

User-Defined Data

Material

Material Identifier n-DECANE (Imported Study Querosene)

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) 48.44 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 3.27E6 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\Querosene\27.HA61

			Diurno	Noturno
Release Segment 1				
Release Duration	s		600	600
Liquid Rainout	fraction		0.999514	0.999875
Release Segment 1 Cloud Segment 1				
Cloud Segment Duration	s		578.403	584.431
Pool Vaporization Rate	kg/s		0.138343	0.0904615
Total Vapor Flowrate	kg/s		0.161874	0.0965091
Release Segment 1 Cloud Segment 2				
Cloud Segment Duration	s		450.153	452.159
Pool Vaporization Rate	kg/s		0.17813	0.117327
Total Vapor Flowrate	kg/s		0.20166	0.123374
Release Segment 1 Cloud Segment 3				
Cloud Segment Duration	s		739.397	750.336
Pool Vaporization Rate	kg/s		0.216737	0.141292
Total Vapor Flowrate	kg/s		0.17813	0.117327
Release Segment 1 Cloud Segment 4				
Cloud Segment Duration	s		1832.05	1545
Pool Vaporization Rate	kg/s		0.261162	0.171988
Total Vapor Flowrate	kg/s		0.216737	0.141292
Release Segment 1 Cloud Segment 5				
Cloud Segment Duration	s			268.074
Pool Vaporization Rate	kg/s			0.189546
Total Vapor Flowrate	kg/s		0.261162	0.171988
Maximum Pool Radius	m		23.9365	23.9365

Distance to Concentration Results

Path: \Terminal LLX\Querosene\27.HA61

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	(54000)	18.75	s	0.592191	0.566457
LFL	(7000)	18.75	s	2.82178	6.74335
LFL Frac	(7000)	18.75	s	2.82178	6.74335
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(54000)	18.75	s	0.0645274	0.106698
LFL	(7000)	18.75	s	0	0
LFL Frac	(7000)	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\Querosene\27.HA61

Jet fire method used: Cone model - DNV recommended

	Diurno	Noturno
Jet Fire Status	Hazard	Hazard
Flame Direction	Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\27.HA61

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	7.7988	4.47822
Radiation Level	18.18	kW/m2	5.88936	3.05311
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\27.HA61

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\27.HA61

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\27.HA61

			Distance (m)	
			Diurno	Noturno
Radiation Level	5	kW/m2	48.7164	43.7208
Radiation Level	18.18	kW/m2	17.261	17.3528
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\27.HA61

	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\Querosene\27.HA61

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\27.HA61

			Diurno	Noturno
				Distance (m)
Radiation Level	5	kW/m2	63.7645	56.7232
Radiation Level	18.18	kW/m2	25.5294	25.5052
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\27.HA61

	Diurno	Radiation Level (kW/m2)
		Noturno

Flash Fire Envelope

Path: \Terminal LLX\Querosene\27.HA61

All flammable results are reported at the cloud centreline height

			Diurno	Noturno
				Distance (m)
Furthest Extent	7000	ppm	2.82178	6.74335
Furthest Extent	7000	ppm	2.82178	6.74335
				Heights (m) for above distances
				Noturno
Furthest Extent	7000	ppm	0	0
Furthest Extent	7000	ppm	0	0

Weather Conditions

Path: \Terminal LLX\Querosene\27.HA61

		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

28.HA63 e HA65

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\28.HA63 e HA65

User-Defined Data

Material

Material Identifier n-DECANE (Imported Study Querosene)

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) 48.44 kg/s
Pre-Dilution Air Rates(1) 0 kg/s
Late Ignition Location No ignition location
Mass Inventory of material to Disperse 3.27E6 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\Querosene\28.HA63 e HA65

Release Segment 1			Diurno	Noturno
Release Duration	s		600	600
Liquid Rainout	fraction		0.999514	0.999875
Maximum Pool Radius	m		17.6258	17.6258

Distance to Concentration Results

Path: \Terminal LLX\Querosene\28.HA63 e HA65

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	(54000)	18.75	s	0.591975	0.562907
LFL	(7000)	18.75	s	0.592784	0.568058
LFL Frac	(7000)	18.75	s	0.592784	0.568058
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(54000)	18.75	s	0.0651256	0.116913
LFL	(7000)	18.75	s	0.0628836	0.102089
LFL Frac	(7000)	18.75	s	0.0628836	0.102089

Jet Fire Hazard

Path: \Terminal LLX\Querosene\28.HA63 e HA65

Jet fire method used: Cone model - DNV recommended

		Diurno	Noturno
Jet Fire Status		Hazard	Hazard
Flame Direction		Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\28.HA63 e HA65

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	7.7988	4.47822
Radiation Level	18.18	kW/m2	5.88936	3.05311
Radiation Level	100	kW/m2	Not Reached	Not Reached

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\28.HA63 e HA65

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\28.HA63 e HA65

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\28.HA63 e HA65

			Diurno	Distance (m)
Radiation Level	5	kW/m2	48.7164	Noturno
Radiation Level	18.18	kW/m2	17.261	43.7208
Radiation Level	100	kW/m2		17.3528

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\28.HA63 e HA65

	Radiation Level (kW/m2)
Diurno	Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Querosene\28.HA63 e HA65

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\28.HA63 e HA65

			Diurno	Distance (m)
Radiation Level	5	kW/m2	52.0615	Noturno
Radiation Level	18.18	kW/m2	19.2187	46.4044
Radiation Level	100	kW/m2	Not Reached	19.1945
				Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\28.HA63 e HA65

	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\Querosene\28.HA63 e HA65

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	7000	ppm	0.592784	0.568058
Furthest Extent	7000	ppm	0.592784	0.568058
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	7000	ppm	0.0628836	0.102089
Furthest Extent	7000	ppm	0.0628836	0.102089

Weather Conditions

Path: \Terminal LLX\Querosene\28.HA63 e HA65

		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

29.HA67

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\29.HA67

User-Defined Data

Material

Material Identifier	n-DECANE (Imported Study Querosene)
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	3.27E6 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) 1205 m
North(1) 1145 m

Path: \Terminal LLX\Querosene\29.HA67

Discharge Data

User-Defined Quantities

Material CANE (Imported Study Querosene)
Temperature 25,00 degC
Pressure 1,01 bar
Inventory 3.269.633,25 kg
Scenario Catastrophic rupture
Fixed Duration n/a s

Calculated Quantities

Weather: Querosene\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 5,41 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: Querosene\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 5,41 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\Querosene\29.HA67

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

		Diurno	Noturno
Liquid Rainout	fraction	0.99965	0.999209
Initial Vapor Cloud	kg	1145.68	2585.93
Time Pool Left Behind	s	36.6767	183.877

Cloud Segment 1

Cloud Segment Duration	s	3600	3600
Pool Vaporization Rate	kg/s	0.13388	0.100917

Maximum Pool Radius	m	26.0995	26.0995
---------------------	---	---------	---------

Distance to Concentration Results

Path: \Terminal LLX\Querosene\29.HA67

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 (54000)	18.75	s	51.8681	53.6694
LFL (7000)	18.75	s	52.2351	54.0808
LFL Frac (7000)	18.75	s	52.2351	54.0808

Concentration(ppm)	Averaging Time		Diurno	Heights (m) for above distances
UFL (54000)	18.75	s	1	Noturno
LFL (7000)	18.75	s	1	0.813089
LFL Frac (7000)	18.75	s	1	0.813089

Late Pool Fire Hazard

Path: \Terminal LLX\Querosene\29.HA67

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\29.HA67

			Diurno	Distance (m)
Radiation Level	5	kW/m2	84.6827	Noturno
Radiation Level	18.18	kW/m2	44.4336	74.7995
Radiation Level	100	kW/m2	Not Reached	41.9948

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\29.HA67

	Radiation Level (kW/m2)
Diurno	Noturno

Fireball Hazard

Path: \Terminal LLX\Querosene\29.HA67

	Diurno	Noturno
Fireball Flame Status	No Hazard	No Hazard

Flash Fire Envelope

Path: \Terminal LLX\Querosene\29.HA67

All flammable results are reported at the cloud centreline height

			Diurno	Distance (m)
				Noturno
Furthest Extent	7000	ppm	52.2351	54.0808
Furthest Extent	7000	ppm	52.2351	54.0808

			Diurno	Heights (m) for above distances
				Noturno
Furthest Extent	7000	ppm	1	0.813089
Furthest Extent	7000	ppm	1	0.813089

Explosion Effects: Early Explosion

Path: \Terminal LLX\Querosene\29.HA67

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

			Diurno	Noturno
Supplied Flammable Mass		kg	3.26963e+006	3.26963e+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

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Explosion Effects: Late Ignition

Path: \Terminal LLX\Querosene\29.HA67

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	68.4636	68.3385
Overpressure	0.1	bar	56.7854	56.255
Overpressure	0.45	bar	31.9157	30.5222

			Supplementary Data at 0.069 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		61.0552	67.6351
Used Flammable Mass	kg		61.0552	67.6351
Overpressure Radius	m		52.6159	54.4419
Distance to:				
- Ignition Source	m		50	50
- Cloud Front/Centre	m		15.8478	13.8966
- Explosion Centre	m		15.8478	13.8966

			Supplementary Data at 0.1 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		61.0552	67.6351
Used Flammable Mass	kg		61.0552	67.6351
Overpressure Radius	m		40.9377	42.3584
Distance to:				
- Ignition Source	m		50	50
- Cloud Front/Centre	m		15.8478	13.8966
- Explosion Centre	m		15.8478	13.8966

			Supplementary Data at 0.45 bar	
			Diurno	Noturno
Supplied Flammable Mass	kg		61.0552	67.6351
Used Flammable Mass	kg		61.0552	67.6351
Overpressure Radius	m		16.0679	16.6256
Distance to:				
- Ignition Source	m		50	50
- Cloud Front/Centre	m		15.8478	13.8966
- Explosion Centre	m		15.8478	13.8966

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Weather Conditions

Path: \Terminal LLX\Querosene\29.HA67

		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

30.HA68

Base Case

CASE Name: Data

Path: \Terminal LLX\Querosene\30.HA68

User-Defined Data

Material

Material Identifier	n-DECANE (Imported Study Querosene)
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	3.27E6 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) 1205 m
North(1) 1145 m

Path: \Terminal LLX\Querosene\30.HA68

Discharge Data

User-Defined Quantities

Material CANE (Imported Study Querosene)
Temperature 25,00 degC
Pressure 1,01 bar
Inventory 3.269.633,25 kg
Scenario Leak
Fixed Duration n/a s

Calculated Quantities

Weather: Querosene\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 24,98 degC
Final Velocity 18,49 m/s
Droplet Diameter 469,65 um

Continuous Release Data:

Mass Flowrate 6.33169E-001 kg/s
Release Duration 3.600,00 s
Orifice Velocity 18,49 m/s
Exit Pressure 1,01 bar
Exit Temperature 24,98 degC
Discharge Coefficient 0,60
Expanded Radius 0,00 m

Weather: Querosene\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 24,98 degC
Final Velocity 18,49 m/s
Droplet Diameter 469,65 um

Continuous Release Data:

SUMMARY REPORT

Study Folder: Terminal LLX

Unique Audit Number: 193.279

Phast 6.6



Mass Flowrate	6.33169E-001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	18,49 m/s
Exit Pressure	1,01 bar
Exit Temperature	24,98 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\Querosene\30.HA68

			Diurno	Noturno
Release Segment 1				
Release Duration	s		3600	3600
Liquid Rainout	fraction		0.989591	0.991278
Maximum Pool Radius	m		13.7279	13.8705

Distance to Concentration Results

Path: \Terminal LLX\Querosene\30.HA68

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	(54000)	18.75	s	3.12275	3.47118
LFL	(7000)	18.75	s	4.13709	4.31247
LFL Frac	(7000)	18.75	s	4.13709	4.31247
Concentration(ppm)		Averaging Time		Heights (m) for above distances	
				Diurno	Noturno
UFL	(54000)	18.75	s	0.830473	0.736981
LFL	(7000)	18.75	s	0.695221	0.558952
LFL Frac	(7000)	18.75	s	0.695221	0.558952

Jet Fire Hazard

Path: \Terminal LLX\Querosene\30.HA68

Jet fire method used: Cone model - DNV recommended

			Diurno	Noturno
Jet Fire Status			Hazard	Hazard
Flame Direction			Horizontal	Horizontal

Radiation Effects: Jet Fire Ellipse

Path: \Terminal LLX\Querosene\30.HA68

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		3.9852	3.93125
Radiation Level	18.18	kW/m2		2.35263	2.4297
Radiation Level	100	kW/m2		Not Reached	Not Reached

SUMMARY REPORT

Unique Audit Number: 193.279



Study Folder: Terminal LLX

Phast 6.6

Radiation Effects: Jet Fire Distance

Path: \Terminal LLX\Querosene\30.HA68

	Radiation Level (kW/m2)
Diurno	Noturno

Early Pool Fire Hazard

Path: \Terminal LLX\Querosene\30.HA68

	Diurno	Noturno
Early Pool Fire Status	Hazard	Hazard

Radiation Effects: Early Pool Fire Ellipse

Path: \Terminal LLX\Querosene\30.HA68

			Diurno	Distance (m)
				Noturno
Radiation Level	5	kW/m2	19.8161	19.4952
Radiation Level	18.18	kW/m2	13.8238	13.088
Radiation Level	100	kW/m2		

Radiation Effects: Early Pool Fire Distance

Path: \Terminal LLX\Querosene\30.HA68

	Radiation Level (kW/m2)
Diurno	Noturno

Late Pool Fire Hazard

Path: \Terminal LLX\Querosene\30.HA68

	Diurno	Noturno
Late Pool Fire Status	Hazard	Hazard

Radiation Effects: Late Pool Fire Ellipse

Path: \Terminal LLX\Querosene\30.HA68

			Diurno	Distance (m)
				Noturno
Radiation Level	5	kW/m2	49.1652	45.0024
Radiation Level	18.18	kW/m2	18.9257	19.3027
Radiation Level	100	kW/m2	Not Reached	Not Reached

Radiation Effects: Late Pool Fire Distance

Path: \Terminal LLX\Querosene\30.HA68

	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\Querosene\30.HA68

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Diurno	Noturno
Furthest Extent	7000	ppm	4.13709	4.31247
Furthest Extent	7000	ppm	4.13709	4.31247
			Heights (m) for above distances	
			Diurno	Noturno
Furthest Extent	7000	ppm	0.695221	0.558952
Furthest Extent	7000	ppm	0.695221	0.558952

Weather Conditions

Path: \Terminal LLX\Querosene\30.HA68

		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