CENÁRIO 1A - ROTURA TOTAL PIPELINE BUTANO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: BUTANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Butano
Densidade da substância:	508 kg/m^3
Limite Inferior de Inflamabilidade (LII):	18 000 ppm
Limite Superior de Inflamabilidade (LSI):	150 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline na esteira
Comprimento total da tubagem:	1255 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	821 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1019 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	300 m^3/h = 42,3 kg/s
Tempo de interesse:	3 600 s
Pressão:	12 bar
Temperatura:	15 °C
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Long pipeline*
Tipo de rotura/libertação:	Rotura total de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto B e o Tie-in
Diâmetro da rotura:	254 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 1A - ROTURA TOTAL PIPELINE BUTANO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO

SUBSTÂNCIA: BUTANO

OUTPUT	
Caudal máximo de libertação:	105,3 Kg/s
Tempo de libertação:	967 segundos
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 9 000 ppm (Efeitos letais)	88
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	178
7 kW/m^2 (Efeitos Letais)	162
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	195
7 kW/m^2 (Efeitos Letais)	171
Diâmetro da piscina	50
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	167
0,14 bar (Efeitos Letais)	89

CENÁRIO 1B - ROTURA TOTAL PIPELINE BUTANO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: BUTANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Butano
Densidade da substância:	508 kg/m^3
Limite Inferior de Inflamabilidade (LII):	18 000 ppm
Limite Superior de Inflamabilidade (LSI):	150 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline na esteira
Comprimento total da tubagem:	1255 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	821 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1019 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	300 m^3/h = 42,3 kg/s
Tempo de interesse:	3 600 s
Pressão:	12 bar
Temperatura:	15 °C
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Long pipeline*
Tipo de rotura/libertação:	Rotura total de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	254 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 1B - ROTURA TOTAL PIPELINE BUTANO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: BUTANO

OUTPUT	
Caudal máximo de libertação:	105,3 Kg/s
Tempo de libertação:	246 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 9 000 ppm (Efeitos letais)	63
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	137
7 kW/m^2 (Efeitos Letais)	125
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	127
7 kW/m^2 (Efeitos Letais)	112
Diâmetro da piscina	29
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	120
0,14 bar (Efeitos Letais)	65

CENÁRIO 2A – ROTURA 10% PIPELINE BUTANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: BUTANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Butano
Densidade da substância:	508 kg/m^3
Limite Inferior de Inflamabilidade (LII):	18 000 ppm
Limite Superior de Inflamabilidade (LSI):	150 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1255 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	821 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1019 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	300 m^3/h = 42,3 kg/s
Tempo de interesse:	3 600 s
Pressão:	12 bar
Temperatura:	15 °C
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Long pipeline*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto B e o Tie-in
Diâmetro da rotura:	25,4 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 2A – ROTURA 10% PIPELINE BUTANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO

SUBSTÂNCIA: BUTANO

OUTPUT	
Caudal máximo de libertação:	11,5 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 9 000 ppm (Efeitos letais)	39
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	75
7 kW/m^2 (Efeitos Letais)	68
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	125
7 kW/m^2 (Efeitos Letais)	110
Diâmetro da piscina	28
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	67
0,14 bar (Efeitos Letais)	37

CENÁRIO 2B – ROTURA 10% PIPELINE BUTANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM
SUBSTÂNCIA: BUTANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Butano
Densidade da substância:	508 kg/m^3
Limite Inferior de Inflamabilidade (LII):	18 000 ppm
Limite Superior de Inflamabilidade (LSI):	150 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1255 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	821 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1019 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	300 m^3/h = 42,3 kg/s
Tempo de interesse:	3 600 s
Pressão:	12 bar
Temperatura:	15 °C
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Long pipeline*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	25,4 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 2B – ROTURA 10% PIPELINE BUTANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: BUTANO

OUTPUT	
Caudal máximo de libertação:	11,4 Kg/s
Tempo de libertação:	3600 segundos
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 9 000 ppm (Efeitos letais)	39
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	75
7 kW/m^2 (Efeitos Letais)	68
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	125
7 kW/m^2 (Efeitos Letais)	110
Diâmetro da piscina	28
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	67
0,14 bar (Efeitos Letais)	37

CENÁRIO 4A – ROTURA 10% PIPELINE BUTANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO SUBSTÂNCIA: BUTANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Butano
Densidade da substância:	508 kg/m^3
Limite Inferior de Inflamabilidade (LII):	18 000 ppm
Limite Superior de Inflamabilidade (LSI):	150 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1255 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	821 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1019 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	300 m^3/h = 42,3 kg/s
Tempo de interesse:	3 600 s
Pressão:	12 bar
Temperatura:	15 °C
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Long pipeline*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto B e o Tie-in
Diâmetro da rotura:	25,4 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 4A – ROTURA 10% PIPELINE BUTANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: BUTANO

OUTPUT	
Caudal máximo de libertação:	11,4 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 9 000 ppm (Efeitos letais)	
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	75
7 kW/m^2 (Efeitos Letais)	68
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	124
7 kW/m^2 (Efeitos Letais)	109
Diâmetro da piscina	27
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	
0,14 bar (Efeitos Letais)	

CENÁRIO 4B – ROTURA 10% PIPELINE BUTANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: BUTANO

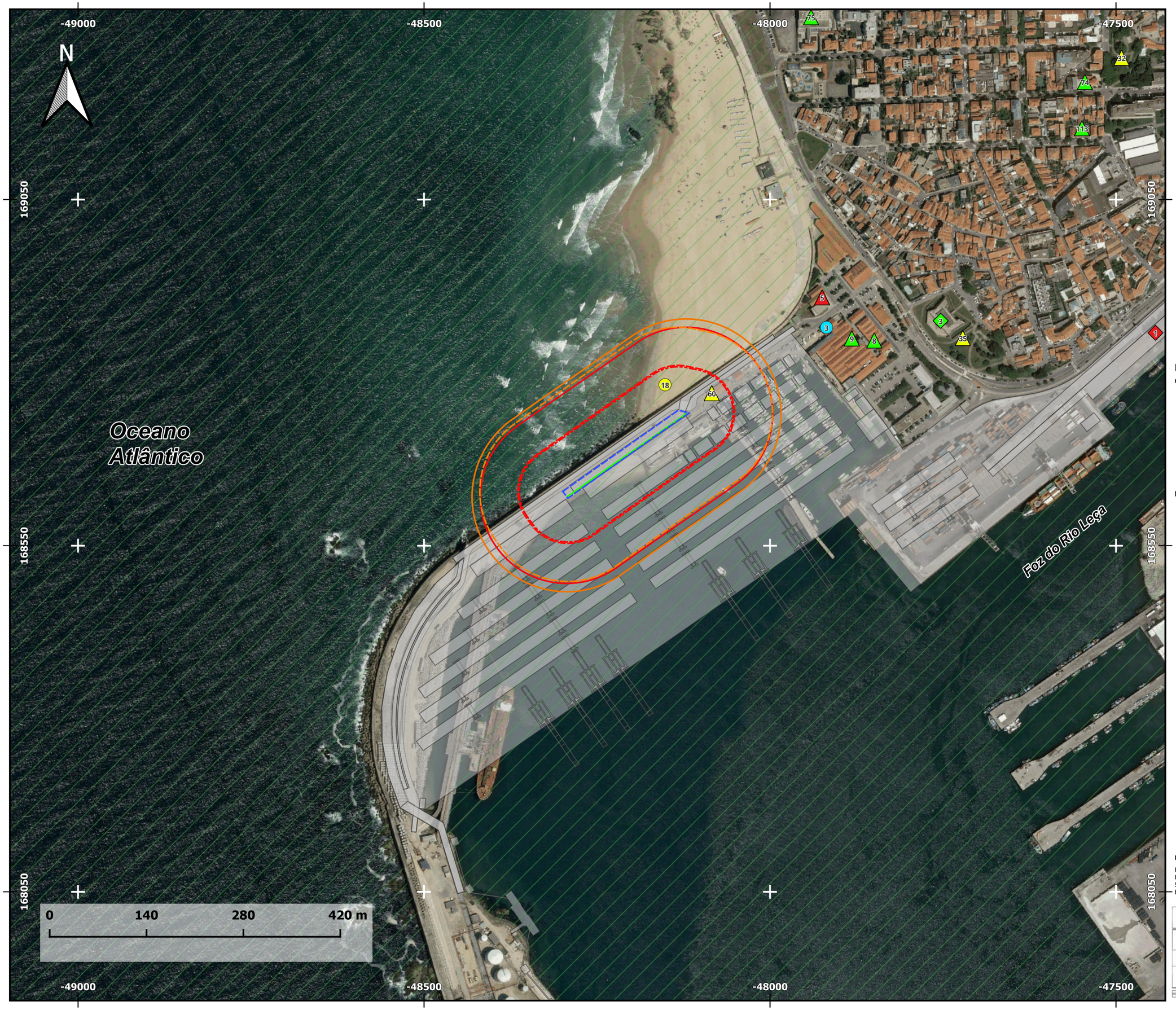
DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Butano
Densidade da substância:	508 kg/m^3
Limite Inferior de Inflamabilidade (LII):	18 000 ppm
Limite Superior de Inflamabilidade (LSI):	150 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1255 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	821 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1019 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	300 m^3/h = 42,3 kg/s
Tempo de interesse:	3 600 s
Pressão:	12 bar
Temperatura:	15 °C
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Long pipeline*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	25,4 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

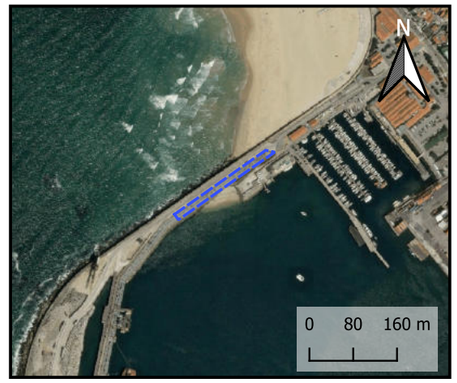
CENÁRIO 4B – ROTURA 10% PIPELINE BUTANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: BUTANO

OUTPUT	
Caudal máximo de libertação:	11,4 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 9 000 ppm (Efeitos letais)	
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	75
7 kW/m^2 (Efeitos Letais)	68
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	124
7 kW/m^2 (Efeitos Letais)	109
Diâmetro da piscina	28
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	
0,14 bar (Efeitos Letais)	





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 1

- Sobrepressão - Efeitos Letais (65 m)
- Sobrepressão - Efeitos Irreversíveis (120 m)
- Radiação Térmica - Efeitos Letais (125 m)
- Radiação Térmica - Efeitos Irreversíveis (137 m)
- 50% LII - Efeitos Letais (63 m)
- Linha de Butano

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

113-Jardim de Infância A Palmeirinha
74-Escola Básica do Corpo Santo
75-Escola Básica da Praia
8-AcademiCV
9-UPTEC Mar

Parques e Equipamentos Desportivos

32-Jardim do Corpo Santo
35-Parque da Capitania do Porto de Leixões
60-Marina de Leça

Espaços Culturais

5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

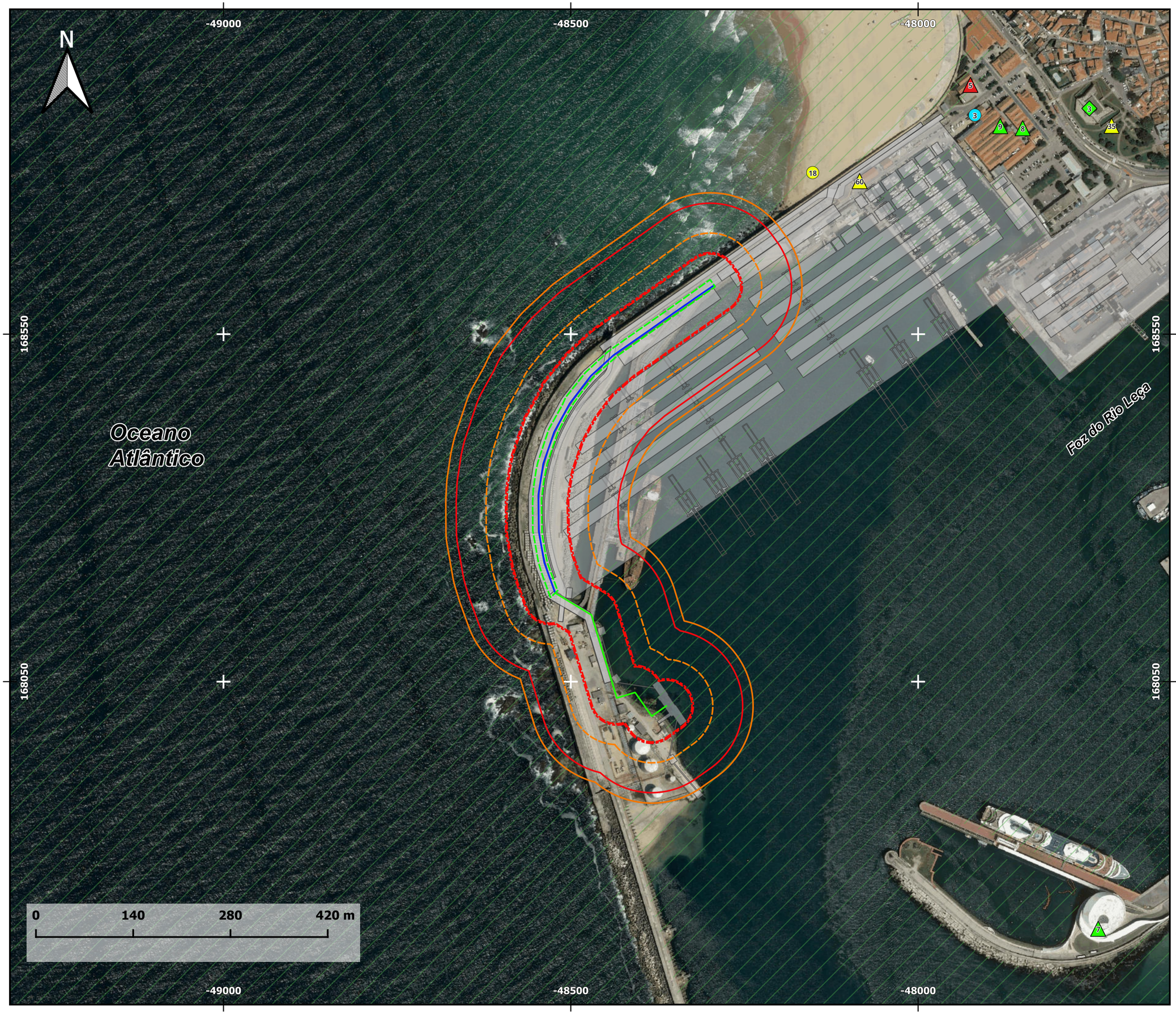
NOTAS RELATIVAS À CARTOGRAFIA:

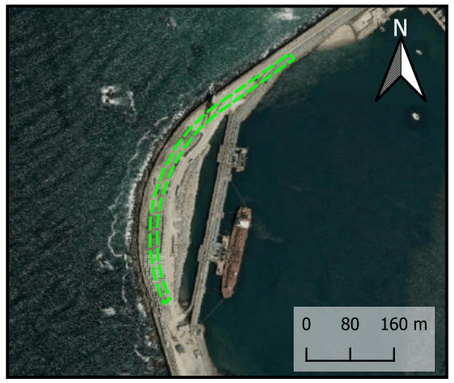
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

CertiTecna Engenharia de Segurança

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 022		ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 1B - Rotura total de Pipeline de Butano entre a Válvula junto ao Tie-In e a Drenagem	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

- Esteira de Tubagens
- **Cenário 2**
  - Sobrepressão - Efeitos Letais - Alcances Totais
  - Sobrepressão - Efeitos Letais - Mar (37 m)
  - Sobrepressão - Efeitos Letais - Terra (37 m)
  - Sobrepressão - Efeitos Irreversíveis - Alcances Totais
  - Sobrepressão - Efeitos Irreversíveis - Mar (67 m)
  - Sobrepressão - Efeitos Irreversíveis - Terra (67 m)
  - Radiação Térmica - Efeitos Letais - Alcances Totais
  - Radiação Térmica - Efeitos Letais - Mar (110 m)
  - Radiação Térmica - Efeitos Letais - Terra (110) m
  - Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
  - Radiação Térmica - Efeitos Irreversíveis - Mar (125 m)
  - Radiação Térmica - Efeitos Irreversíveis - Terra (125 m)
  - 50% LII - Efeitos Letais - Alcances Totais
  - 50% LII - Efeitos Letais - Mar (39 m)
  - 50% LII - Efeitos Letais - Terra (39 m)
  - Linha de Butano - Terra
  - Linha de Butano - Mar

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

- 3-Instituto de Socorro a Naúfragos

Praias

- 18-Praia de Leça

Forças de Segurança

- 3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

- 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research
- 8-AcademiCV
- 9-UPTEC Mar

Parques e Equipamentos Desportivos

- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais

- 5-Auditório Infante Dom Henrique
- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

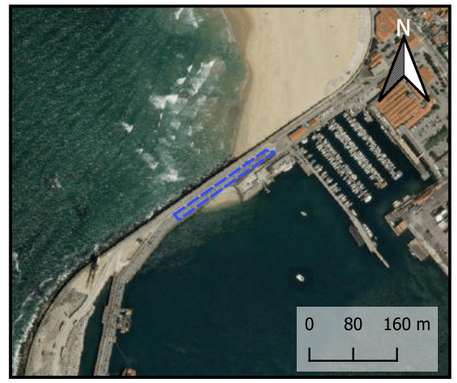
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

CertiTecna Engenharia de Segurança

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 023	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 2A - Rotura 10% de Pipeline de Butano entre o novo Posto B e Válvula junto ao Tie-In	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 2

- Linha de Butano
- Sobrepressão - Efeitos Letais (37 m)
- Sobrepressão - Efeitos Irreversíveis (67 m)
- Radiação Térmica - Efeitos Letais (110 m)
- Radiação Térmica - Efeitos Irreversíveis (125 m)
- 50% LII - Efeitos Letais (39 m)

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

- 3-Instituto de Socorro a Naúfragos

Praias

- 18-Praia de Leça

Interfaces de Transporte

- 1-Estação Fluvial de Passageiros

Forças de Segurança

- 3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

- 113-Jardim de Infância A Palmeirinha
- 74-Escola Básica do Corpo Santo
- 75-Escola Básica da Praia
- 8-AcademiCV
- 9-UPTEC Mar

Parques e Equipamentos Desportivos

- 32-Jardim do Corpo Santo
- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais

- 5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

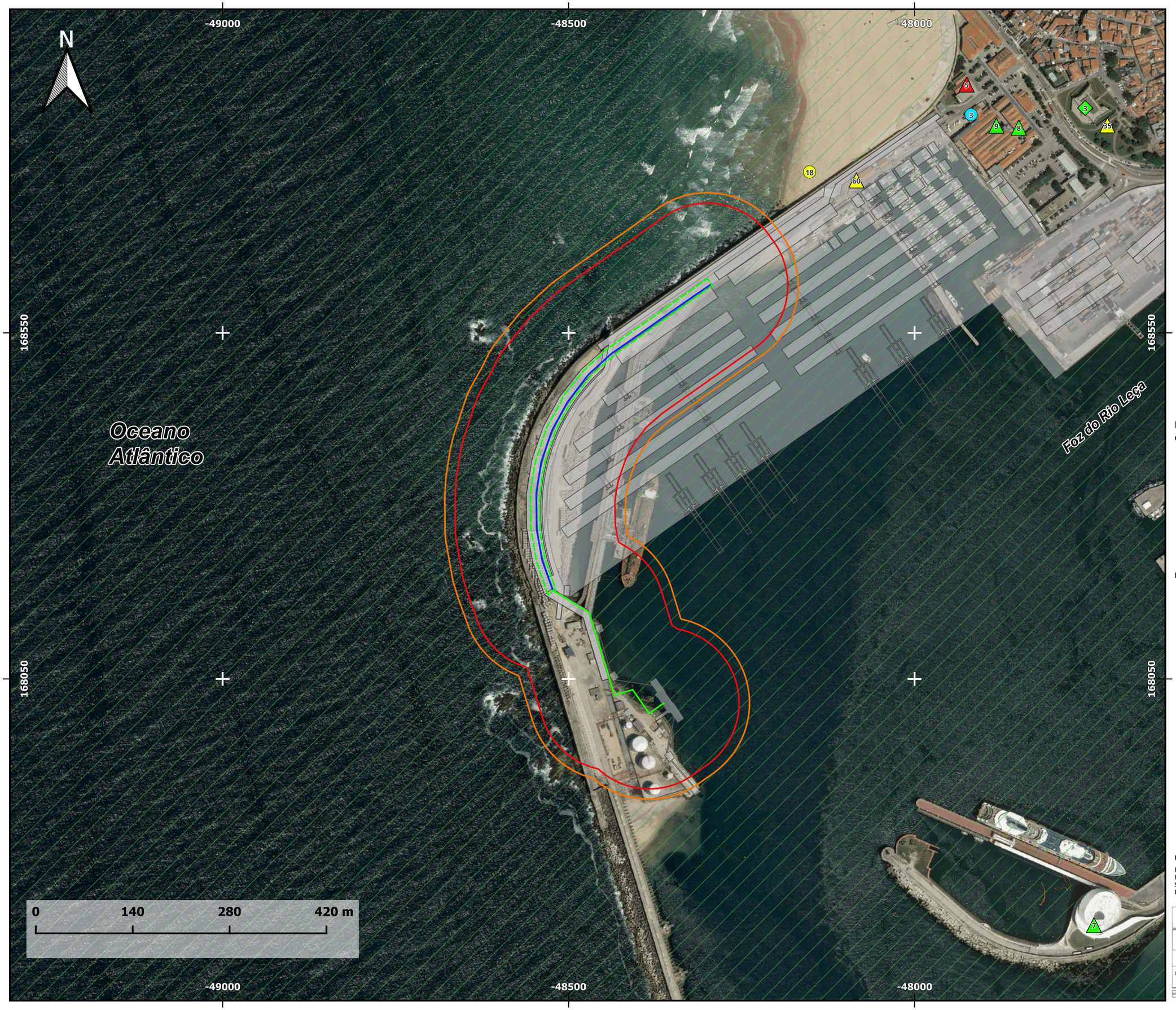
NOTAS RELATIVAS À CARTOGRAFIA:

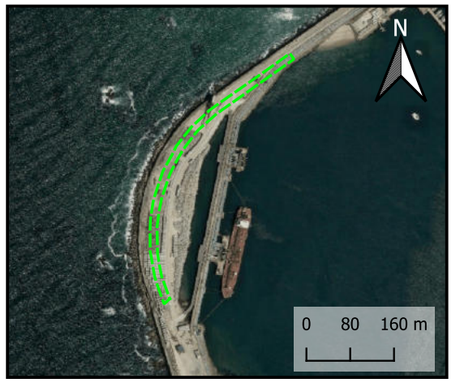
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 024	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 2B - Rotura 10% de Pipeline de Butano entre a Válvula junto ao Tie-In e a Drenagem	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 4

Radiação Térmica - Efeitos Letais - Alcances Totais

Radiação Térmica - Efeitos Letais - Mar (109 m)

Radiação Térmica - Efeitos Letais - Terra (109) m

Radiação Térmica - Efeitos Irreversíveis - Alcances Totais

Radiação Térmica - Efeitos Irreversíveis - Mar (124 m)

Radiação Térmica - Efeitos Irreversíveis - Terra (124 m)

Linha de Butano - Mar

Linha de Butano - Terra

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research

8-AcademiCV

9-UPTEC Mar

Parques e Equipamentos Desportivos

35-Parque da Capitania do Porto de Leixões

60-Marina de Leça

Espaços Culturais

5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

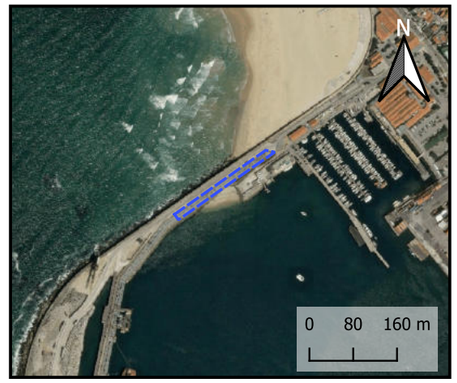
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www.certitecna.pt geral@certitecna.pt

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 025	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 4A - Rotura 10% do diâmetro Nominal de Pipeline de Butano entre o novo Posto B e Válvula junto ao Tie-In com falha da válvula automática.	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 4

Radiação Térmica - Efeitos Letais (109 m)

Radiação Térmica - Efeitos Irreversíveis (124 m)

Linha de Butano

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

113-Jardim de Infância A Palmeirinha

74-Escola Básica do Corpo Santo

75-Escola Básica da Praia

8-AcademiCV

9-UPTEC Mar

Parques e Equipamentos Desportivos

32-Jardim do Corpo Santo

35-Parque da Capitania do Porto de Leixões

60-Marina de Leça

Espaços Culturais

5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

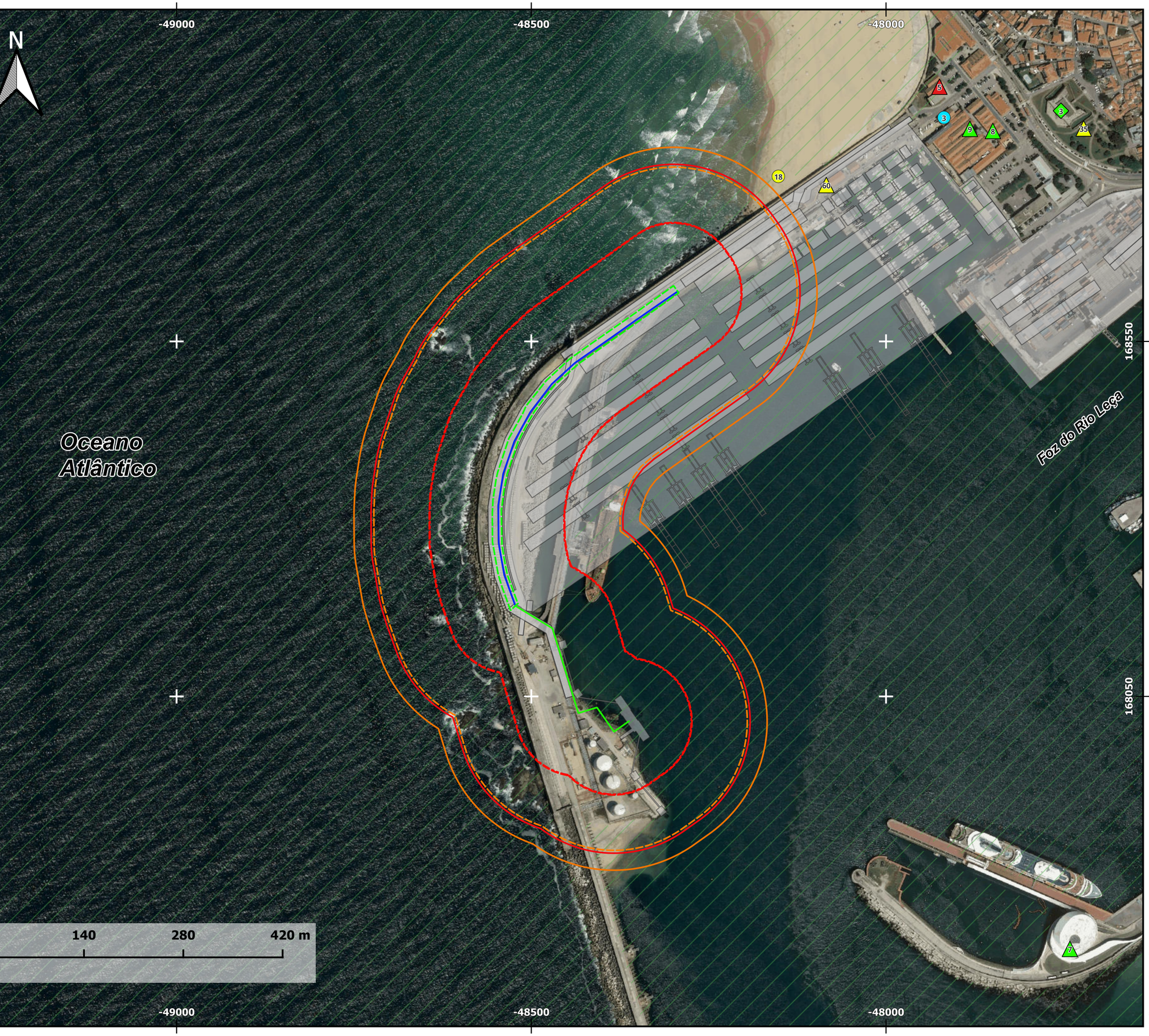
NOTAS RELATIVAS À CARTOGRAFIA:

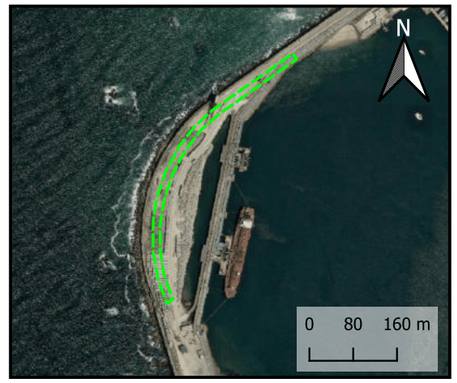
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 026	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 4B - Rotura 10% do diâmetro Nominal de Pipeline de Butano entre a Válvula junto ao Tie-In e a Drenagem com falha da válvula automática.	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 1

- Sobrepressão - Efeitos Letais - Alcances Totais
- Sobrepressão - Efeitos Letais - Mar (89 m)
- Sobrepressão - Efeitos Letais - Terra (89 m)
- Sobrepressão - Efeitos Irreversíveis - Alcances Totais
- Sobrepressão - Efeitos Irreversíveis - Mar (167 m)
- Sobrepressão - Efeitos Irreversíveis - Terra (167 m)
- Radiação Térmica - Efeitos Letais - Alcances Totais
- Radiação Térmica - Efeitos Letais - Mar (171 m)
- Radiação Térmica - Efeitos Letais - Terra (171) m
- Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
- Radiação Térmica - Efeitos Irreversíveis - Mar (195 m)
- Radiação Térmica - Efeitos Irreversíveis - Terra (195 m)
- 50% LII - Efeitos Letais - Alcances Totais
- 50% LII - Efeitos Letais - Mar (88 m)
- 50% LII - Efeitos Letais - Terra (88 m)
- Linha de Butano - Mar
- Linha de Butano - Terra

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

- 3-Instituto de Socorro a Naúfragos

Praias

- 18-Praia de Leça

Forças de Segurança

- 3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

- 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research
- 8-AcademiCV
- 9-UPTEC Mar

Parques e Equipamentos Desportivos

- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais

- 5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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www.certitecna.pt geral@certitecna.pt

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 021	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 1A - Rotura total de Pipeline de Butano entre o novo Posto B e Válvula junto ao Tie-In	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cen 3A e 4A - Falha - Butano

Study

Study
Cen 3A e 4A - Falha - Butano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Long pipeline

Long pipeline

Cen 3A e 4A - Falha - Butano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-BUTANE	
		Material to track	N-BUTANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	15	degC
		Pressure (gauge)	12	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Release location	Elevation	0,1	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Pump data	Pumped inflow	42,3	kg/s
	Breach data	Breach sizing method	Actual size	
Long pipe	Pipe characteristics	Pipe roughness	0,045	mm
		Construction material (enabled in discharge parameters)		
		Pipe wall thickness		mm
	Valves	Number of valves	0	
		Valve type	Closure; Closure; Non return	
		Valve distance from upstream end of pipeline		m
		Valve closing time		s
		Valve excess flow		kg/s
	Small holes method	Small hole size discharge method	Time varying pipeline model	
		Relative size for "small" breach - liquid	0,2	
		Relative size for "small" breach - vapour	0,04	
		Use specified discharge coefficient?	No	
		Discharge coefficient	1	fraction

	Pipeline surrounding characteristics and crater modelling	Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s
		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	-1621,16	m
		North	187,713	m

Cen 3A - Rot Total Posto-Tiein

Location specific breach

Cen 3A e 4A - Falha - Butano\Study\Long pipeline

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	254	mm
		Relative breach aperture (area)	0,5	fraction
	Release location	Distance to break	820	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	No Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 4A - Rot 10% Posto-Tiein

Location specific breach

Cen 3A e 4A - Falha - Butano\Study\Long pipeline

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	25,4	mm
		Relative breach aperture (area)	0,005	fraction
	Release location	Distance to break	820	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	No Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Long pipeline Mar

Long pipeline

Cen 3A e 4A - Falha - Butano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-BUTANE	
		Material to track	N-BUTANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	15	degC
		Pressure (gauge)	12	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Release location	Elevation	0,1	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Pump data	Pumped inflow	42,3	kg/s
	Breach data	Breach sizing method	Actual size	
Long pipe	Pipe characteristics	Pipe roughness	0,045	mm
		Construction material (enabled in discharge parameters)		
		Pipe wall thickness		mm
	Valves	Number of valves	0	
		Valve type	Closure; Closure; Non return	
		Valve distance from upstream end of pipeline		m
		Valve closing time		s
		Valve excess flow		kg/s
	Small holes method	Small hole size discharge method	Time varying pipeline model	
		Relative size for "small" breach - liquid	0,2	
		Relative size for "small" breach - vapour	0,04	
		Use specified discharge coefficient?	No	
		Discharge coefficient	1	fraction

	Pipeline surrounding characteristics and crater modelling	Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s
		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	-1621,16	m
		North	187,713	m

Cen 3A - Rot Total Posto-Tiein

Location specific breach

Cen 3A e 4A - Falha - Butano\Study\Long pipeline Mar

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	254	mm
		Relative breach aperture (area)	0,5	fraction
	Release location	Distance to break	820	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	No Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 4A - Rot 10% Posto-Tiein

Location specific breach

Cen 3A e 4A - Falha - Butano\Study\Long pipeline Mar

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	25,4	mm
		Relative breach aperture (area)	0,005	fraction
	Release location	Distance to break	820	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	No Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cen 3B e 4B - Falha - Butano

Study

Study
Cen 3B e 4B - Falha - Butano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Long pipeline

Long pipeline
Cen 3B e 4B - Falha - Butano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-BUTANE	
		Material to track	N-BUTANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	15	degC
		Pressure (gauge)	12	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Release location	Elevation	0,1	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Pump data	Pumped inflow	42,3	kg/s
	Breach data	Breach sizing method	Actual size	
Long pipe	Pipe characteristics	Pipe roughness	0,045	mm
		Construction material (enabled in discharge parameters)		
		Pipe wall thickness		mm
	Valves	Number of valves	0	
		Valve type	Closure; Closure; Non return	
		Valve distance from upstream end of pipeline		m
		Valve closing time		s
		Valve excess flow		kg/s
	Small holes method	Small hole size discharge method	Time varying pipeline model	
		Relative size for "small" breach - liquid	0,2	
		Relative size for "small" breach - vapour	0,04	
		Use specified discharge coefficient?	No	
		Discharge coefficient	1	fraction

	Pipeline surrounding characteristics and crater modelling	Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s
		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	-1621,16	m
		North	187,713	m

Cen 3B - Rot Total Tiein-Drenagem

Location specific breach

Cen 3B e 4B - Falha - Butano\Study\Long pipeline

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	254	mm
		Relative breach aperture (area)	0,5	fraction
	Release location	Distance to break	1018	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	No Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 4B - Rot 10% tiein-Drenagem

Location specific breach

Cen 3B e 4B - Falha - Butano\Study\Long pipeline

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	25,4	mm
		Relative breach aperture (area)	0,005	fraction
	Release location	Distance to break	1018	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	No Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cen 1A e 2A - Butano

Material: N-BUTANE

Cen 1A e 2A - Butano\Physical Properties System\Materials\N-BUTANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,200164**	
Aerosol class number	**2**	
Critical pressure	**37,96**	bar
Critical temperature	**151,97**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-138,29**	degC
Molecular weight	**58,1222**	
Normal boiling point	**-0,5**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**6,7358E-06**	bar
Triple point temperature	**-138,29**	degC
Carbon hydrogen ratio	**0,4**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**4661**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**3,6238E+07**	**0,8337**	**-0,82274**	**0,39613**	**0**	**-138,29**	**151,97**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,955144**	
Combustion ct	**0,0313087**	
Emissive power length scale	**2,75**	m
Flash point	**-74**	degC
Heat of combustion	**2,65732E+06**	kJ/kmol
Immediate ignition category	**Average**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**18000**	ppm
Luminous/Smoky flame flag	**Luminous**	
Maximum burn rate	**0,12**	kg/m2.s
Maximum surface emissive power	**170**	kW/m2
Pool fire burn rate length	**0,35**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**150000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,027271 8	8,58139	-18,9094	18,8762		-138,29	126,85	1	Constant value above fraction Tc
Liquid viscosity	101	-7,2471	534,82	-0,57469	-4,6625E-27	10	-138,29	146,85	1	Constant value above fraction Tc
Surface tension	106	0,05196	1,2181	0	0	0	-138,29	151,97	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,051094	0,45253	5455,5	1,9798E+06		-0,500006	726,85	1	None (use equation)
Vapour viscosity	102	3,4387E-08	0,94604	0	0		-138,29	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	127	33257,9	47100,6	306,727	98932,4	3782,21	-253,15	1226,85	1	None (use equation)
Liquid heat capacity	100	191030	-1675	12,5	-0,03874	4,6121E-05	-138,29	126,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	66,34	-	-	9,4509	2	-138,29	151,97	1	Vapour

pressure	3	4363,2	7,046	E-06			Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	1,0677	0,27188	425,12	0,28688	-138,29	151,97	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,149	-143	-1,001E+07	-3,03E+18	4,03E+20	-60,57	1226,85	1	None (use equation)

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,065**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cen 1B e 2B - Butano

Material: N-BUTANE

Cen 1B e 2B - Butano\Physical Properties System\Materials\N-BUTANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,200164**	
Aerosol class number	**2**	
Critical pressure	**37,96**	bar
Critical temperature	**151,97**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-138,29**	degC
Molecular weight	**58,1222**	
Normal boiling point	**-0,5**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**6,7358E-06**	bar
Triple point temperature	**-138,29**	degC
Carbon hydrogen ratio	**0,4**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**4661**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**3,6238E+07**	**0,8337**	**-0,82274**	**0,39613**	**0**	**-138,29**	**151,97**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,955144**	
Combustion ct	**0,0313087**	
Emissive power length scale	**2,75**	m
Flash point	**-74**	degC
Heat of combustion	**2,65732E+06**	kJ/kmol
Immediate ignition category	**Average**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**18000**	ppm
Luminous/Smoky flame flag	**Luminous**	
Maximum burn rate	**0,12**	kg/m2.s
Maximum surface emissive power	**170**	kW/m2
Pool fire burn rate length	**0,35**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**150000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,027271 8	8,58139	-18,9094	18,8762		-138,29	126,85	1	Constant value above fraction Tc
Liquid viscosity	101	-7,2471	534,82	-0,57469	-4,6625E-27	10	-138,29	146,85	1	Constant value above fraction Tc
Surface tension	106	0,05196	1,2181	0	0	0	-138,29	151,97	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,051094	0,45253	5455,5	1,9798E+06		-0,500006	726,85	1	None (use equation)
Vapour viscosity	102	3,4387E-08	0,94604	0	0		-138,29	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	127	33257,9	47100,6	306,727	98932,4	3782,21	-253,15	1226,85	1	None (use equation)
Liquid heat capacity	100	191030	-1675	12,5	-0,03874	4,6121E-05	-138,29	126,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	66,34	-	-	9,4509	2	-138,29	151,97	1	Vapour

pressure	3	4363,2	7,046	E-06			Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	1,0677	0,27188	425,12	0,28688	-138,29	151,97	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,149	-143	-1,001E+07	-3,03E+18	4,03E+20	-60,57	1226,85	1	None (use equation)

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,065**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cen 3A e 4A - Falha - Butano

Material: N-BUTANE

Cen 3A e 4A - Falha - Butano\Physical Properties System\Materials\N-BUTANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,200164**	
Aerosol class number	**2**	
Critical pressure	**37,96**	bar
Critical temperature	**151,97**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-138,29**	degC
Molecular weight	**58,1222**	
Normal boiling point	**-0,5**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**6,7358E-06**	bar
Triple point temperature	**-138,29**	degC
Carbon hydrogen ratio	**0,4**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**4661**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**3,6238E+07**	**0,8337**	**-0,82274**	**0,39613**	**0**	**-138,29**	**151,97**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,955144**	
Combustion ct	**0,0313087**	
Emissive power length scale	**2,75**	m
Flash point	**-74**	degC
Heat of combustion	**2,65732E+06**	kJ/kmol
Immediate ignition category	**Average**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**18000**	ppm
Luminous/Smoky flame flag	**Luminous**	
Maximum burn rate	**0,12**	kg/m2.s
Maximum surface emissive power	**170**	kW/m2
Pool fire burn rate length	**0,35**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**150000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,027271 8	8,58139	-18,9094	18,8762		-138,29	126,85	1	Constant value above fraction Tc
Liquid viscosity	101	-7,2471	534,82	-0,57469	-4,6625E-27	10	-138,29	146,85	1	Constant value above fraction Tc
Surface tension	106	0,05196	1,2181	0	0	0	-138,29	151,97	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,051094	0,45253	5455,5	1,9798E+06		-0,500006	726,85	1	None (use equation)
Vapour viscosity	102	3,4387E-08	0,94604	0	0		-138,29	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	127	33257,9	47100,6	306,727	98932,4	3782,21	-253,15	1226,85	1	None (use equation)
Liquid heat capacity	100	191030	-1675	12,5	-0,03874	4,6121E-05	-138,29	126,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	66,34	-6484,6	-5,1265	9,4509	2	-138,29	151,97	1	Vapour

pressure	3	4363,2	7,046	E-06	Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	1,0677	0,27188	425,12	0,28688	-138,29	151,97	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,149	-143	-1,001E+07	-3,03E+18	4,03E+20	-60,57	1226,85	1	None (use equation)

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,065**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cen 3B e 4B - Falha - Butano

Material: N-BUTANE

Cen 3B e 4B - Falha - Butano\Physical Properties System\Materials\N-BUTANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,200164**	
Aerosol class number	**2**	
Critical pressure	**37,96**	bar
Critical temperature	**151,97**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-138,29**	degC
Molecular weight	**58,1222**	
Normal boiling point	**-0,5**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**6,7358E-06**	bar
Triple point temperature	**-138,29**	degC
Carbon hydrogen ratio	**0,4**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**4661**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**3,6238E+07**	**0,8337**	**-0,82274**	**0,39613**	**0**	**-138,29**	**151,97**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,955144**	
Combustion ct	**0,0313087**	
Emissive power length scale	**2,75**	m
Flash point	**-74**	degC
Heat of combustion	**2,65732E+06**	kJ/kmol
Immediate ignition category	**Average**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**18000**	ppm
Luminous/Smoky flame flag	**Luminous**	
Maximum burn rate	**0,12**	kg/m2.s
Maximum surface emissive power	**170**	kW/m2
Pool fire burn rate length	**0,35**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**150000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,027271 8	8,58139	-18,9094	18,8762		-138,29	126,85	1	Constant value above fraction Tc
Liquid viscosity	101	-7,2471	534,82	-0,57469	-4,6625E-27	10	-138,29	146,85	1	Constant value above fraction Tc
Surface tension	106	0,05196	1,2181	0	0	0	-138,29	151,97	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,051094	0,45253	5455,5	1,9798E+06		-0,500006	726,85	1	None (use equation)
Vapour viscosity	102	3,4387E-08	0,94604	0	0		-138,29	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	127	33257,9	47100,6	306,727	98932,4	3782,21	-253,15	1226,85	1	None (use equation)
Liquid heat capacity	100	191030	-1675	12,5	-0,03874	4,6121E-05	-138,29	126,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	66,34	-	-	9,4509	2	-138,29	151,97	1	Vapour

pressure	3	4363,2	7,046	E-06			Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	1,0677	0,27188	425,12	0,28688	-138,29	151,97	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,149	-143	-1,001E+07	-3,03E+18	4,03E+20	-60,57	1226,85	1	None (use equation)

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,065**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cen 1A e 2A - Butano

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Velocity [m/s]	End time of release [s]
Study\Long pipeline	Cen 1A - Rot Total Posto-Tiein	Mais Provável	105,255	-0,532609	0,909555	363,404	39,6457	966,646
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	11,4568	-0,532609	0,91261	256,596	75,3198	3600
Study\Long pipeline Mar	Cen 1A - Rot Total Posto-Tiein	Mais Provável	105,255	-0,532609	0,909555	363,404	39,6457	966,646
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	11,4568	-0,532609	0,91261	256,596	75,3198	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Long pipeline	Cen 1A - Rot Total Posto-Tiein	Mais Provável	21,2395	60,8348	87,2547
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	7,21777	27,2208	38,0685
Study\Long pipeline Mar	Cen 1A - Rot Total Posto-Tiein	Mais Provável	21,2395	60,8348	87,2547
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	7,21777	27,2208	38,0685

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 1A - Rot Total Posto-Tiein	Mais Provável	80,5817	177,446	161,337	138,334
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	35,3546	74,3868	67,8156	58,4452
Study\Long pipeline Mar	Cen 1A - Rot Total Posto-Tiein	Mais Provável	80,5817	177,446	161,337	138,334
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	35,3546	74,3868	67,8156	58,4452

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 1A - Rot Total Posto-Tiein	Mais Provável	29,1864	130,925	115,064	92,6818
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	8,61603	52,5794	46,855	38,4981
Study\Long pipeline Mar	Cen 1A - Rot Total Posto-Tiein	Mais Provável	29,1864	130,925	115,064	92,6818
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	8,61603	52,5794	46,855	38,4981

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 1A - Rot Total Posto-Tiein	Mais Provável	49,3048	194,968	170,699	137,027
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	27,3427	124,457	109,419	88,1495
Study\Long pipeline Mar	Cen 1A - Rot Total Posto-Tiein	Mais Provável	49,3048	194,968	170,699	137,027
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	27,3427	124,457	109,419	88,1495

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Long pipeline	Cen 1A - Rot Total Posto-Tiein	Mais Provável	60,8348	87,2547
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	27,2208	38,0685
Study\Long pipeline Mar	Cen 1A - Rot Total Posto-Tiein	Mais Provável	60,8348	87,2547
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	27,2208	38,0685

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Long pipeline	Cen 1A - Rot Total Posto-Tiein	Mais Provável	86,643	0	350,943
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	37,9667	0	815,528
Study\Long pipeline Mar	Cen 1A - Rot Total Posto-Tiein	Mais Provável	86,643	0	350,943
	Cen 2A - Rot 10% Posto-Tiein	Mais Provável	37,9667	0	815,528

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Long pipeline	Cen 1A - Rot Total Posto-Tiein	Mais Provável	0,05 0,14 0,3	166,3 88,1618 64,7508	272,64 116,363 69,5412
	Cen 2A - Rot 10% Posto-Tiein		0,05 0,14 0,3	66,3062 36,9418 28,144	102,458 43,7292 26,1335
Study\Long pipeline Mar	Cen 1A - Rot Total Posto-Tiein		0,05 0,14 0,3	166,3 88,1618 64,7508	272,64 116,363 69,5412
	Cen 2A - Rot 10% Posto-Tiein		0,05 0,14 0,3	66,3062 36,9418 28,144	102,458 43,7292 26,1335

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Long pipeline	Cen 1A - Rot Total Posto-Tiein	Mais Provável	0,05 0,14 0,3	335,206 335,206 335,206	123,978 123,978 123,978	80 80 80	29,9802 29,9802 29,9802	29,9802 29,9802 29,9802
	Cen 2A - Rot 10% Posto-Tiein		0,05 0,14 0,3	17,7901 17,7901 17,7901	12,0351 12,0351 12,0351	30 30 30	15,0772 15,0772 15,0772	15,0772 15,0772 15,0772
Study\Long pipeline Mar	Cen 1A - Rot Total Posto-Tiein		0,05 0,14 0,3	335,206 335,206 335,206	123,978 123,978 123,978	80 80 80	29,9802 29,9802 29,9802	29,9802 29,9802 29,9802
	Cen 2A - Rot 10% Posto-Tiein		0,05 0,14 0,3	17,7901 17,7901 17,7901	12,0351 12,0351 12,0351	30 30 30	15,0772 15,0772 15,0772	15,0772 15,0772 15,0772

Consequence Summary Report

Workspace: Cen 1B e 2B - Butano

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Velocity [m/s]	End time of release [s]
Study\Long pipeline	Cen 1B - Rot Total Tiein-Drenagem	Mais Provável	105,255	-0,532609	0,909409	365,153	38,7451	245,16
	Cen 2B - Rot 10% tiein-Drenagem	Mais Provável	11,4188	-0,532609	0,91259	256,906	75,1648	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Long pipeline	Cen 1B - Rot Total Tiein-Drenagem	Mais Provável	16,0328	44,2068	62,7696
	Cen 2B - Rot 10% tiein-Drenagem	Mais Provável	7,20981	27,1782	38,0125

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 1B - Rot Total Tiein-Drenagem	Mais Provável	63,62	137,35	124,959	107,249
	Cen 2B - Rot 10% tiein-Drenagem	Mais Provável	35,3153	74,2947	67,7315	58,3724

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 1B - Rot Total Tiein-Drenagem	Mais Provável	20,8073	101,063	89,0379	71,8719
	Cen 2B - Rot 10% tiein-Drenagem	Mais Provável	8,60353	52,5136	46,7964	38,4501

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 1B - Rot Total Tiein-Drenagem	Mais Provável	28,0851	126,658	111,287	89,5678
	Cen 2B - Rot 10% tiein-Drenagem	Mais Provável	27,3246	124,387	109,357	88,0982

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Long pipeline	Cen 1B - Rot Total Tiein-Drenagem	Mais Provável	44,2068	62,7696
	Cen 2B - Rot 10% tiein-Drenagem	Mais Provável	27,1782	38,0125

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Long pipeline	Cen 1B - Rot Total Tiein-Drenagem	Mais Provável	62,5413	0	218,315
	Cen 2B - Rot 10% tiein-Drenagem	Mais Provável	37,9104	0	816,74

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Long pipeline	Cen 1B - Rot Total Tiein-Drenagem	Mais Provável	0,05 0,14 0,3	119,356 64,2887 47,7901	192,14 82,0057 49,0084
	Cen 2B - Rot 10% tiein-Drenagem		0,05 0,14 0,3	66,2219 36,896 28,1097	102,323 43,6718 26,0992

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Long pipeline	Cen 1B - Rot Total Tiein-Drenagem	Mais Provável	0,05 0,14 0,3	117,326 117,326 117,326	46,6226 46,6226 46,6226	60 60 60	23,2859 23,2859 23,2859	23,2859 23,2859 23,2859
	Cen 2B - Rot 10% tiein-Drenagem		0,05 0,14 0,3	17,7202 17,7202 17,7202	12,0733 12,0733 12,0733	30 30 30	15,0601 15,0601 15,0601	15,0601 15,0601 15,0601

Consequence Summary Report

Workspace: Cen 3A e 4A - Falha - Butano

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Velocity [m/s]	End time of release [s]
Study\Long pipeline	Cen 3A - Rot Total Posto-Tiein	Mais Provável	105,255	-0,532609	0,909555	363,419	39,6467	3600,59
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	11,4511	-0,532609	0,912607	257,159	75,0384	3600
Study\Long pipeline Mar	Cen 3A - Rot Total Posto-Tiein	Mais Provável	105,255	-0,532609	0,909555	363,419	39,6467	3600,59
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	11,4511	-0,532609	0,912607	257,159	75,0384	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Long pipeline	Cen 3A - Rot Total Posto-Tiein	Mais Provável	21,224	75,3978	110,046
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	7,20854	27,1479	37,9358
Study\Long pipeline Mar	Cen 3A - Rot Total Posto-Tiein	Mais Provável	21,2246	74,9974	109,094
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	7,20854	27,1479	37,9358

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 3A - Rot Total Posto-Tiein	Mais Provável	80,5797	177,442	161,333	138,33
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	35,2862	74,2263	67,6691	58,3182
Study\Long pipeline Mar	Cen 3A - Rot Total Posto-Tiein	Mais Provável	80,5797	177,442	161,333	138,33
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	35,2862	74,2263	67,6691	58,3182

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 3A - Rot Total Posto-Tiein	Mais Provável	29,1854	130,922	115,061	92,6794
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	8,59441	52,4649	46,7531	38,4145
Study\Long pipeline Mar	Cen 3A - Rot Total Posto-Tiein	Mais Provável	29,1854	130,922	115,061	92,6794
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	8,59441	52,4649	46,7531	38,4145

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 3A - Rot Total Posto-Tiein	Mais Provável	92,1921	312,887	272,808	218,135
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	26,9545	123,109	108,246	87,2124
Study\Long pipeline Mar	Cen 3A - Rot Total Posto-Tiein	Mais Provável	92,1921	315,422	275,344	220,67
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	26,9545	123,109	108,246	87,2124

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Long pipeline	Cen 3A - Rot Total Posto-Tiein	Mais Provável	75,3978	110,046
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	27,1479	37,9358
Study\Long pipeline Mar	Cen 3A - Rot Total Posto-Tiein	Mais Provável	74,9974	109,094
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	27,1479	37,9358

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Long pipeline	Cen 3A - Rot Total Posto-Tiein	Mais Provável	109,257	0	1661,49
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	37,8876	0	795,493
Study\Long pipeline Mar	Cen 3A - Rot Total Posto-Tiein	Mais Provável	108,479	0	1661,49
	Cen 4A - Rot 10% Posto-Tiein	Mais Provável	37,8876	0	795,493

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Long pipeline	Cen 3A - Rot Total Posto-Tiein	Mais Provável	0,05 0,14 0,3	225,904 115,85 82,8763	384,002 163,893 97,9458
	Cen 4A - Rot 10% Posto-Tiein		0,05 0,14 0,3	67,5588 37,7091 28,7659	104,151 44,4519 26,5654
Study\Long pipeline Mar	Cen 3A - Rot Total Posto-Tiein		0,05 0,14 0,3	225,608 115,697 82,7662	383,502 163,679 97,8183
	Cen 4A - Rot 10% Posto-Tiein		0,05 0,14 0,3	67,5588 37,7091 28,7659	104,151 44,4519 26,5654

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Long pipeline	Cen 3A - Rot Total Posto-Tiein	Mais Provável	0,05 0,14 0,3	936,573 936,573 936,573	914,63 914,63 914,63	100 100 100	33,9034 33,9034 33,9034	33,9034 33,9034 33,9034
	Cen 4A - Rot 10% Posto-Tiein		0,05 0,14 0,3	18,6868 18,6868 18,6868	13,766 13,766 13,766	30 30 30	15,4832 15,4832 15,4832	15,4832 15,4832 15,4832
Study\Long pipeline Mar	Cen 3A - Rot Total Posto-Tiein		0,05 0,14 0,3	932,922 932,922 932,922	907,923 907,923 907,923	100 100 100	33,857 33,857 33,857	33,857 33,857 33,857
	Cen 4A - Rot 10% Posto-Tiein		0,05 0,14 0,3	18,6868 18,6868 18,6868	13,766 13,766 13,766	30 30 30	15,4832 15,4832 15,4832	15,4832 15,4832 15,4832

Consequence Summary Report

Workspace: Cen 3B e 4B - Falha - Butano

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Velocity [m/s]	End time of release [s]
Study\Long pipeline	Cen 3B - Rot Total Tiein-Drenagem	Mais Provável	105,255	-0,532609	0,909555	363,415	39,6464	3600,59
	Cen 4B - Rot 10% tiein-Drenagem	Mais Provável	11,413	-0,532609	0,912587	257,467	74,8852	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Long pipeline	Cen 3B - Rot Total Tiein-Drenagem	Mais Provável	21,2123	67,9877	98,3612
	Cen 4B - Rot 10% tiein-Drenagem	Mais Provável	7,21294	27,1037	37,8773

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 3B - Rot Total Tiein-Drenagem	Mais Provável	80,5802	177,443	161,334	138,331
	Cen 4B - Rot 10% tiein-Drenagem	Mais Provável	35,2471	74,1347	67,5855	58,2457

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 3B - Rot Total Tiein-Drenagem	Mais Provável	29,1856	130,923	115,061	92,6801
	Cen 4B - Rot 10% tiein-Drenagem	Mais Provável	8,58201	52,3994	46,6948	38,3667

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Long pipeline	Cen 3B - Rot Total Tiein-Drenagem	Mais Provável	65,6315	237,043	206,495	164,454
	Cen 4B - Rot 10% tiein-Drenagem	Mais Provável	27,0198	123,325	108,433	87,3592

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Long pipeline	Cen 3B - Rot Total Tiein-Drenagem	Mais Provável	67,9877	98,3612
	Cen 4B - Rot 10% tiein-Drenagem	Mais Provável	27,1037	37,8773

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Long pipeline	Cen 3B - Rot Total Tiein-Drenagem	Mais Provável	98,0276	0	931,262
	Cen 4B - Rot 10% tiein-Drenagem	Mais Provável	37,8243	0	796,644

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Long pipeline	Cen 3B - Rot Total Tiein-Drenagem	Mais Provável	0,05 0,14 0,3	196,739 102,122 73,7734	330,138 140,903 84,2069
	Cen 4B - Rot 10% tiein-Drenagem		0,05 0,14 0,3	67,4576 37,6521 28,722	103,997 44,3862 26,5261

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Long pipeline	Cen 3B - Rot Total Tiein-Drenagem	Mais Provável	0,05 0,14 0,3	595,152 595,152 595,152	446,978 446,978 446,978	90 90 90	31,67 31,67 31,67	31,67 31,67 31,67
	Cen 4B - Rot 10% tiein-Drenagem		0,05 0,14 0,3	18,604 18,604 18,604	13,8448 13,8448 13,8448	30 30 30	15,459 15,459 15,459	15,459 15,459 15,459

Input Report

Workspace: Cen 1A e 2A - Butano

Mais Provável

Weather

Cen 1A e 2A - Butano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cen 1B e 2B - Butano

Mais Provável

Weather

Cen 1B e 2B - Butano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cen 3A e 4A - Falha - Butano

Mais Provável

Weather

Cen 3A e 4A - Falha - Butano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cen 3B e 4B - Falha - Butano

Mais Provável

Weather

Cen 3B e 4B - Falha - Butano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cen 1A e 2A - Butano

Vala

Pool substrate and bund

Cen 1A e 2A - Butano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2	m
		Bund area (internal)	7631	m2
		Bund diameter (internal)	98,5702	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Mar

Pool substrate and bund

Cen 1A e 2A - Butano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund fails if overfilled with liquid	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cen 1B e 2B - Butano

Vala

Pool substrate and bund

Cen 1B e 2B - Butano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2,7	m
		Bund area (internal)	3383	m2
		Bund diameter (internal)	65,6306	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cen 3A e 4A - Falha - Butano

Vala

Pool substrate and bund

Cen 3A e 4A - Falha - Butano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2	m
		Bund area (internal)	7631	m2
		Bund diameter (internal)	98,5702	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Mar

Pool substrate and bund

Cen 3A e 4A - Falha - Butano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund fails if overfilled with liquid	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cen 3B e 4B - Falha - Butano

Vala

Pool substrate and bund

Cen 3B e 4B - Falha - Butano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2,7	m
		Bund area (internal)	3383	m2
		Bund diameter (internal)	65,6306	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cen 1A e 2A - Butano

Study

Study
Cen 1A e 2A - Butano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Long pipeline

Long pipeline
Cen 1A e 2A - Butano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-BUTANE	
		Material to track	N-BUTANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	15	degC
		Pressure (gauge)	12	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Release location	Elevation	0,1	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Pump data	Pumped inflow	42,3	kg/s
	Breach data	Breach sizing method	Actual size	
Long pipe	Pipe characteristics	Pipe roughness	0,045	mm
		Construction material (enabled in discharge parameters)		
		Pipe wall thickness		mm
	Valves	Number of valves	3	
		Valve type	Closure; Closure; Non return	
		Valve distance from upstream end of pipeline	0; 821; 1019	m
		Valve closing time	120; 120	s
		Valve excess flow		kg/s
	Small holes method	Small hole size discharge method	Time varying pipeline model	
		Relative size for "small" breach - liquid	0,2	
		Relative size for "small" breach - vapour	0,04	
		Use specified discharge coefficient?	No	
		Discharge coefficient	1	fraction

	Pipeline surrounding characteristics and crater modelling	Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s
		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	-1621,16	m
		North	187,713	m

Cen 1A - Rot Total Posto-Tiein

Location specific breach

Cen 1A e 2A - Butano\Study\Long pipeline

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	254	mm
		Relative breach aperture (area)	0,5	fraction
	Release location	Distance to break	820	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	Full Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 2A - Rot 10% Posto-Tiein

Location specific breach

Cen 1A e 2A - Butano\Study\Long pipeline

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	25,4	mm
		Relative breach aperture (area)	0,005	fraction
	Release location	Distance to break	820	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	Full Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Long pipeline Mar

Long pipeline

Cen 1A e 2A - Butano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-BUTANE	
		Material to track	N-BUTANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	15	degC
		Pressure (gauge)	12	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Release location	Elevation	0,1	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Pump data	Pumped inflow	42,3	kg/s
	Breach data	Breach sizing method	Actual size	
Long pipe	Pipe characteristics	Pipe roughness	0,045	mm
		Construction material (enabled in discharge parameters)		
		Pipe wall thickness		mm
	Valves	Number of valves	3	
		Valve type	Closure; Closure; Non return	
		Valve distance from upstream end of pipeline	0; 821; 1019	m
		Valve closing time	120; 120	s
		Valve excess flow		kg/s
	Small holes method	Small hole size discharge method	Time varying pipeline model	
		Relative size for "small" breach - liquid	0,2	
		Relative size for "small" breach - vapour	0,04	
		Use specified discharge coefficient?	No	
		Discharge coefficient	1	fraction

	Pipeline surrounding characteristics and crater modelling	Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s
		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	-1621,16	m
		North	187,713	m

Cen 1A - Rot Total Posto-Tiein

Location specific breach

Cen 1A e 2A - Butano\Study\Long pipeline Mar

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	254	mm
		Relative breach aperture (area)	0,5	fraction
	Release location	Distance to break	820	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	Full Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 2A - Rot 10% Posto-Tiein

Location specific breach

Cen 1A e 2A - Butano\Study\Long pipeline Mar

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	25,4	mm
		Relative breach aperture (area)	0,005	fraction
	Release location	Distance to break	820	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	Full Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cen 1B e 2B - Butano

Study

Study
Cen 1B e 2B - Butano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Long pipeline

Long pipeline
Cen 1B e 2B - Butano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-BUTANE	
		Material to track	N-BUTANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	15	degC
		Pressure (gauge)	12	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Release location	Elevation	0,1	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Pump data	Pumped inflow	42,3	kg/s
	Breach data	Breach sizing method	Actual size	
Long pipe	Pipe characteristics	Pipe roughness	0,045	mm
		Construction material (enabled in discharge parameters)		
		Pipe wall thickness		mm
	Valves	Number of valves	3	
		Valve type	Closure; Closure; Non return	
		Valve distance from upstream end of pipeline	0; 821; 1019	m
		Valve closing time	120; 120	s
		Valve excess flow		kg/s
	Small holes method	Small hole size discharge method	Time varying pipeline model	
		Relative size for "small" breach - liquid	0,2	
		Relative size for "small" breach - vapour	0,04	
		Use specified discharge coefficient?	No	
		Discharge coefficient	1	fraction

	Pipeline surrounding characteristics and crater modelling	Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s
		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to	Calculate probit	No	

	calculate			
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	-1621,16	m
		North	187,713	m

Cen 1B - Rot Total Tiein-Drenagem

Location specific breach

Cen 1B e 2B - Butano\Study\Long pipeline

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	254	mm
		Relative breach aperture (area)	0,5	fraction
	Release location	Distance to break	1018	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	Full Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 2B - Rot 10% tiein-Drenagem

Location specific breach

Cen 1B e 2B - Butano\Study\Long pipeline

Tab	Group	Field	Value	Units
Scenario	Breach data	Breach sizing method	Actual size	
		Hole diameter	25,4	mm
		Relative breach aperture (area)	0,005	fraction
	Release location	Distance to break	1018	m
		Minimum distance to break	0	m
		Maximum distance to break	1255	m
		Elevation	0,1	m
	Pipe dimensions	Entire pipeline length	1255	m
		Pipe internal diameter	254	mm
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
	Isolation	Isolation	Full Isolation	
	Crater modelling	Accident type for buried sections	Full bore rupture	
		Pipeline surrounding	Above ground	
		Depth of soil cover		m
		Soil cover type	Clay	
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Long pipe	Crater modelling	Fracture length	12	m
Time varying releases	Time averaging	Duration of interest	3600	s
		Method for calculating average rate	Average between 2 times	
		Expected number of average rates		
		Time at which release rate is calculated		s

		First time value for rate between two times	0	s
		Second time value for rate between two times	20	s
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame	1726,85	degC

		temperature		
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

CENÁRIO 6A – ROTURA 10% PIPELINE GASOLINA

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 16" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: GASOLINA

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasolina
Densidade da substância:	775 kg/m^3
Limite Inferior de Inflamabilidade (LII):	14 000 ppm
Limite Superior de Inflamabilidade (LSI):	76 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1829 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-In e Tempo de Isolamento	1394 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1593 metros a 180 s
Diâmetro:	16'' = 406,4 mm
Caudal de operação:	815 m^3/h = 175,5 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto A e o Tie-in
Diâmetro da rotura:	40,64 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 6A – ROTURA 10% PIPELINE GASOLINA

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 16" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO

SUBSTÂNCIA: GASOLINA

OUTPUT	
Caudal máximo de libertação:	32 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	17
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	34
7 kW/m^2 (Efeitos Letais)	31
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	117 (derrame em terra – Vala) 131 (derrame em mar)
7 kW/m^2 (Efeitos Letais)	100 (derrame em terra – Vala) 112 (derrame em mar)
Raio da piscina	99 metros (derrame em terra – Vala) 113 metros (derrame em mar)
Em terra o derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	15
0,14 bar (Efeitos Letais)	11

CENÁRIO 6B – ROTURA 10% PIPELINE GASOLINA

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 16" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: GASOLINA

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasolina
Densidade da substância:	775 kg/m^3
Limite Inferior de Inflamabilidade (LII):	14 000 ppm
Limite Superior de Inflamabilidade (LSI):	76 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1829 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-In e Tempo de Isolamento	1394 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1593 metros a 180 s
Diâmetro:	16'' = 406,4 mm
Caudal de operação:	815 m^3/h = 175,5 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	40,64 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 6B – ROTURA 10% PIPELINE GASOLINA

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 16" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: GASOLINA

OUTPUT	
Caudal máximo de libertação:	32 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	17
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	34
7 kW/m^2 (Efeitos Letais)	31
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	83
7 kW/m^2 (Efeitos Letais)	70
Diâmetro da piscina	66
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	15
0,14 bar (Efeitos Letais)	12

CENÁRIO 8A – ROTURA 10% PIPELINE GASOLINA

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 16" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: GASOLINA

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasolina
Densidade da substância:	775 kg/m^3
Limite Inferior de Inflamabilidade (LII):	14 000 ppm
Limite Superior de Inflamabilidade (LSI):	76 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1829 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-In e Tempo de Isolamento	1394 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1593 metros a 180 s
Diâmetro:	16'' = 406,4 mm
Caudal de operação:	815 m^3/h = 175,5 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto A e o Tie-in
Diâmetro da rotura:	40,64 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 8A – ROTURA 10% PIPELINE GASOLINA

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 16" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO

SUBSTÂNCIA: GASOLINA

OUTPUT	
Caudal máximo de libertação:	32 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	17
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	34
7 kW/m^2 (Efeitos Letais)	31
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	117 (derrame em terra – Vala) 131 (derrame em mar)
7 kW/m^2 (Efeitos Letais)	100 (derrame em terra – Vala) 112 (derrame em mar)
Raio da piscina	99 (derrame em terra – Vala) 113 (derrame em mar)
Em terra o derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	15
0,14 bar (Efeitos Letais)	11

CENÁRIO 8B – ROTURA 10% PIPELINE GASOLINA

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 16" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: GASOLINA

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasolina
Densidade da substância:	775 kg/m^3
Limite Inferior de Inflamabilidade (LII):	14 000 ppm
Limite Superior de Inflamabilidade (LSI):	76 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1829 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-In e Tempo de Isolamento	1394 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1593 metros a 180 s
Diâmetro:	16'' = 406,4 mm
Caudal de operação:	815 m^3/h = 175,5 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	40,64 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 8B – ROTURA 10% PIPELINE GASOLINA

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 16" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: GASOLINA

OUTPUT	
Caudal máximo de libertação:	32 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	17
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	34
7 kW/m^2 (Efeitos Letais)	31
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	83
7 kW/m^2 (Efeitos Letais)	70
Raio da piscina	66
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	15
0,14 bar (Efeitos Letais)	12

CENÁRIO 5A – ROTURA TOTAL PIPELINE GASOLINA

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 16" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO SUBSTÂNCIA: GASOLINA

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasolina
Densidade da substância:	775 kg/m^3
Limite Inferior de Inflamabilidade (LII):	14 000 ppm
Limite Superior de Inflamabilidade (LSI):	76 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline na esteira
Comprimento:	1829 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1394 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1593 metros a 180 s
Diâmetro:	16'' = 406,4 mm
Caudal de operação:	815 m^3/h = 175,5 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Rotura total de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto A e o Tie-in
Diâmetro da rotura:	406,4 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 5A – ROTURA TOTAL PIPELINE GASOLINA

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 16" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: GASOLINA

OUTPUT	
Caudal máximo de libertação:	175,5 Kg/s
Tempo de libertação:	120 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	2
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	4
7 kW/m^2 (Efeitos Letais)	4
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	59 (derrame em terra – Vala) 131 (derrame em mar)
7 kW/m^2 (Efeitos Letais)	51 (derrame em terra – Vala) 112 (derrame em mar)
Diâmetro da piscina	44 (derrame em terra – Vala) 113 (derrame em mar)
Em terra, o derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	-
0,14 bar (Efeitos Letais)	-

CENÁRIO 5B – ROTURA TOTAL PIPELINE GASOLINA

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 16" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM
SUBSTÂNCIA: GASOLINA

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasolina
Densidade da substância:	775 kg/m^3
Limite Inferior de Inflamabilidade (LII):	14 000 ppm
Limite Superior de Inflamabilidade (LSI):	76 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1829 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-In e Tempo de Isolamento	1394 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1593 metros a 180 s
Diâmetro:	16'' = 406,4 mm
Caudal de operação:	815 m^3/h = 175,5 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Rotura total de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	406,4 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

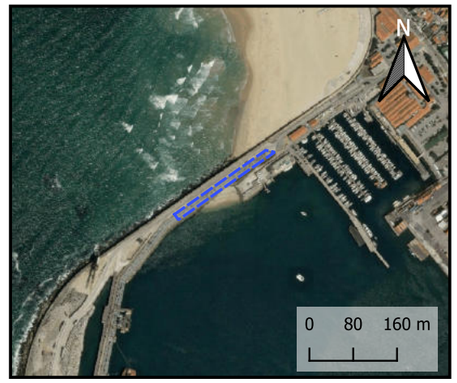
CENÁRIO 5B – ROTURA TOTAL PIPELINE GASOLINA

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 16" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: GASOLINA

OUTPUT	
Caudal máximo de libertação:	175,5 Kg/s
Tempo de libertação:	120 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	2
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	4
7 kW/m^2 (Efeitos Letais)	4
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	59
7 kW/m^2 (Efeitos Letais)	51
Diâmetro da piscina	44
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	-
0,14 bar (Efeitos Letais)	-





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 5

Radiação Térmica - Efeitos Letais (51 m)

Radiação Térmica - Efeitos Irreversíveis (59 m)

50% LII - Efeitos Letais (2 m)

Linha de Gasolina

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

113-Jardim de Infância A Palmeirinha

74-Escola Básica do Corpo Santo

75-Escola Básica da Praia

8-AcademiCV

9-UPTEC Mar

Parques e Equipamentos Desportivos

32-Jardim do Corpo Santo

35-Parque da Capitania do Porto de Leixões

60-Marina de Leça

Espaços Culturais

5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

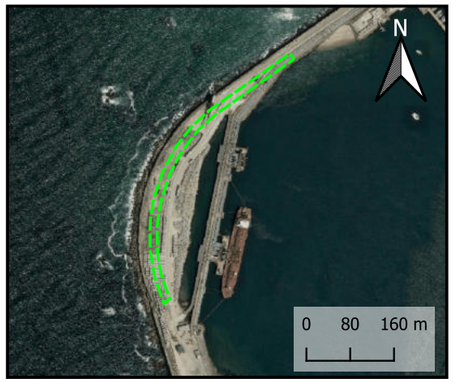
NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 028	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 5B - Rotura total de Pipeline de Gasolina entre a Válvula junto ao Tie-In e a Drenagem	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO



Detalhe. Escala 1:11200

-49000 -48500 -48000

168550 168050 167550

Oceano Atlântico

Foz do Rio Leça

0 140 280 420 m

Legenda:

Cenários

Esteira de Tubagens

Cenário 6

- Sobrepressão - Efeitos Letais - Alcances Totais
- Sobrepressão - Efeitos Letais - Mar (11 m)
- Sobrepressão - Efeitos Letais - Terra (11 m)
- Sobrepressão - Efeitos Irreversíveis - Alcances Totais
- Sobrepressão - Efeitos Irreversíveis - Mar (15 m)
- Sobrepressão - Efeitos Irreversíveis - Terra (15 m)
- Radiação Térmica - Efeitos Letais - Alcances Totais
- Radiação Térmica - Efeitos Letais - Mar (112 m)
- Radiação Térmica - Efeitos Letais - Terra (100) m
- Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
- Radiação Térmica - Efeitos Irreversíveis - Mar (131 m)
- Radiação Térmica - Efeitos Irreversíveis - Terra (117 m)
- 50% LII - Efeitos Letais - Alcances Totais
- 50% LII - Efeitos Letais - Mar (17 m)
- 50% LII - Efeitos Letais - Terra (17 m)
- Linha de Gasolina - Mar
- Linha de Gasolina - Terra

Envolvente

Elementos Sensíveis - Cenários

Estabelecimentos de Ensino

- 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research
- Reserva Ecológica Nacional
- Layout Alternativa A

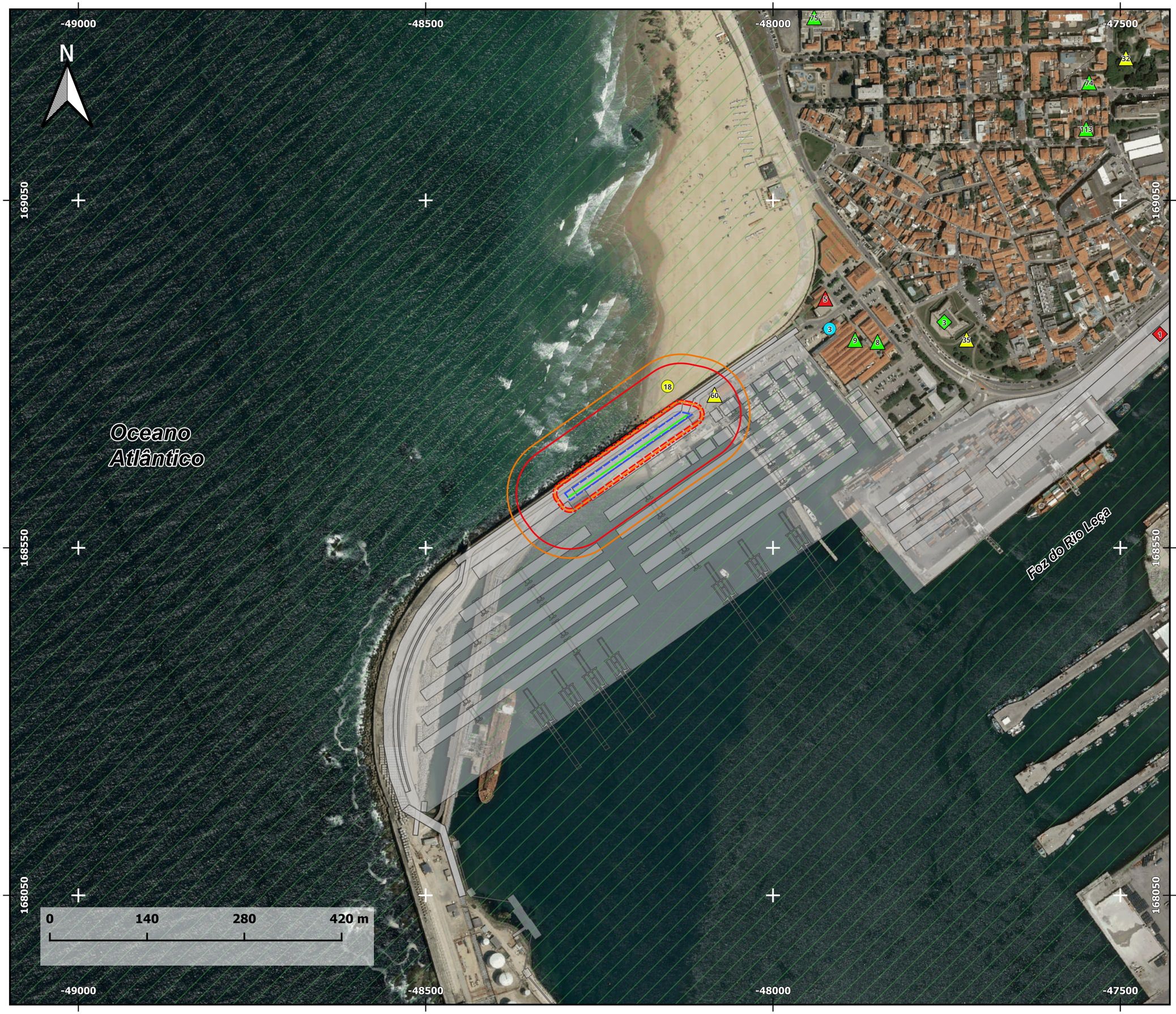
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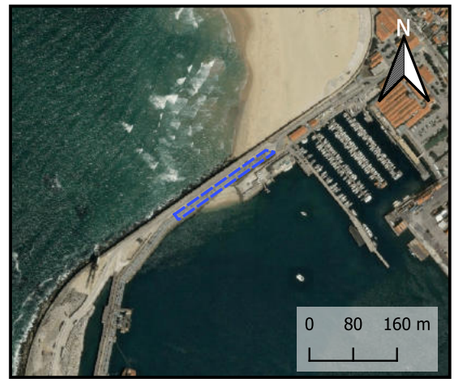
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Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 029	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 6A - Rotura 10% de Pipeline de Gasolina entre o Posto A e Válvula junto ao Tie-In	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA, NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 6

- Sobrepressão - Efeitos Letais (12 m)
- Sobrepressão - Efeitos Irreversíveis (15 m)
- Radiação Térmica - Efeitos Letais (70 m)
- Radiação Térmica - Efeitos Irreversíveis (83 m)
- 50% LII - Efeitos Letais (17 m)
- Linha de Gasolina

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

- 3-Instituto de Socorro a Naúfragos

Praias

- 18-Praia de Leça

Interfaces de Transporte

- 1-Estação Fluvial de Passageiros

Forças de Segurança

- 3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

- 113-Jardim de Infância A Palmeirinha
- 74-Escola Básica do Corpo Santo
- 75-Escola Básica da Praia
- 8-AcademiCV
- 9-UPTEC Mar

Parques e Equipamentos Desportivos

- 32-Jardim do Corpo Santo
- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais

- 5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

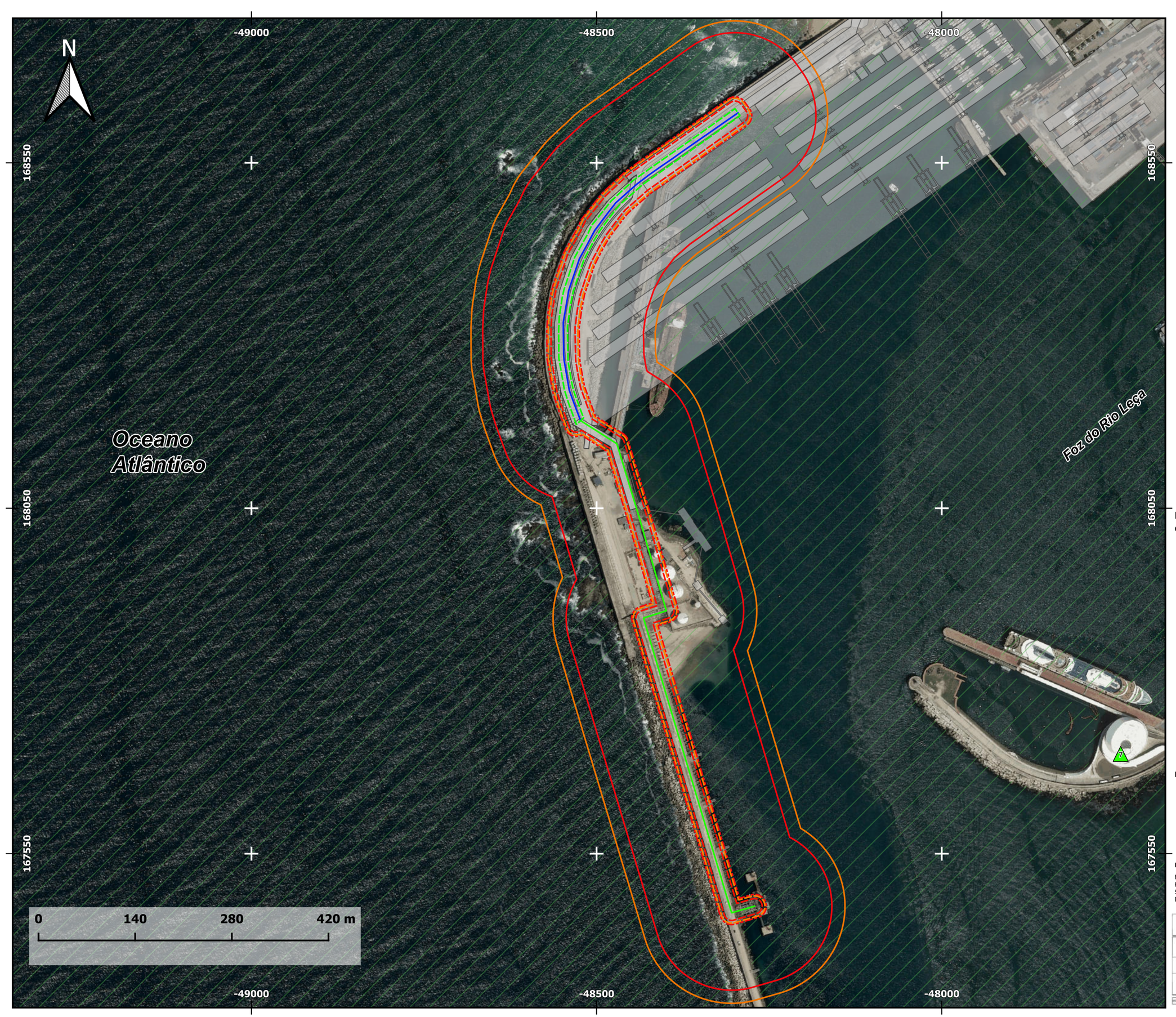
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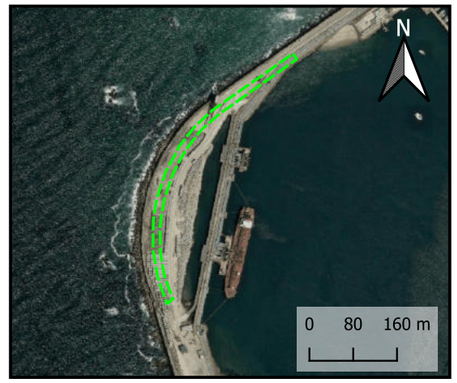
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 030	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 6B - Rotura 10% de Pipeline de Gasolina entre a Válvula junto ao Tie-In e a Drenagem	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

- Esteira de Tubagens

Cenário 8

- Sobrepressão - Efeitos Letais - Alcances Totais
- Sobrepressão - Efeitos Letais - Mar (11 m)
- Sobrepressão - Efeitos Letais - Terra (11 m)
- Sobrepressão - Efeitos Irreversíveis - Alcances Totais
- Sobrepressão - Efeitos Irreversíveis - Mar (15 m)
- Sobrepressão - Efeitos Irreversíveis - Terra (15 m)
- Radiação Térmica - Efeitos Letais - Alcances Totais
- Radiação Térmica - Efeitos Letais - Mar (112 m)
- Radiação Térmica - Efeitos Letais - Terra (100) m
- Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
- Radiação Térmica - Efeitos Irreversíveis - Mar (131 m)
- Radiação Térmica - Efeitos Irreversíveis - Terra (117 m)
- 50% LII - Efeitos Letais - Alcances Totais
- 50% LII - Efeitos Letais - Mar (17 m)
- 50% LII - Efeitos Letais - Terra (17 m)
- Linha de Gasolina - Mar
- Linha de Gasolina - Terra

Envolvente

Elementos Sensíveis - Cenários

Estabelecimentos de Ensino

- 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research
- Reserva Ecológica Nacional
- Layout Alternativa A

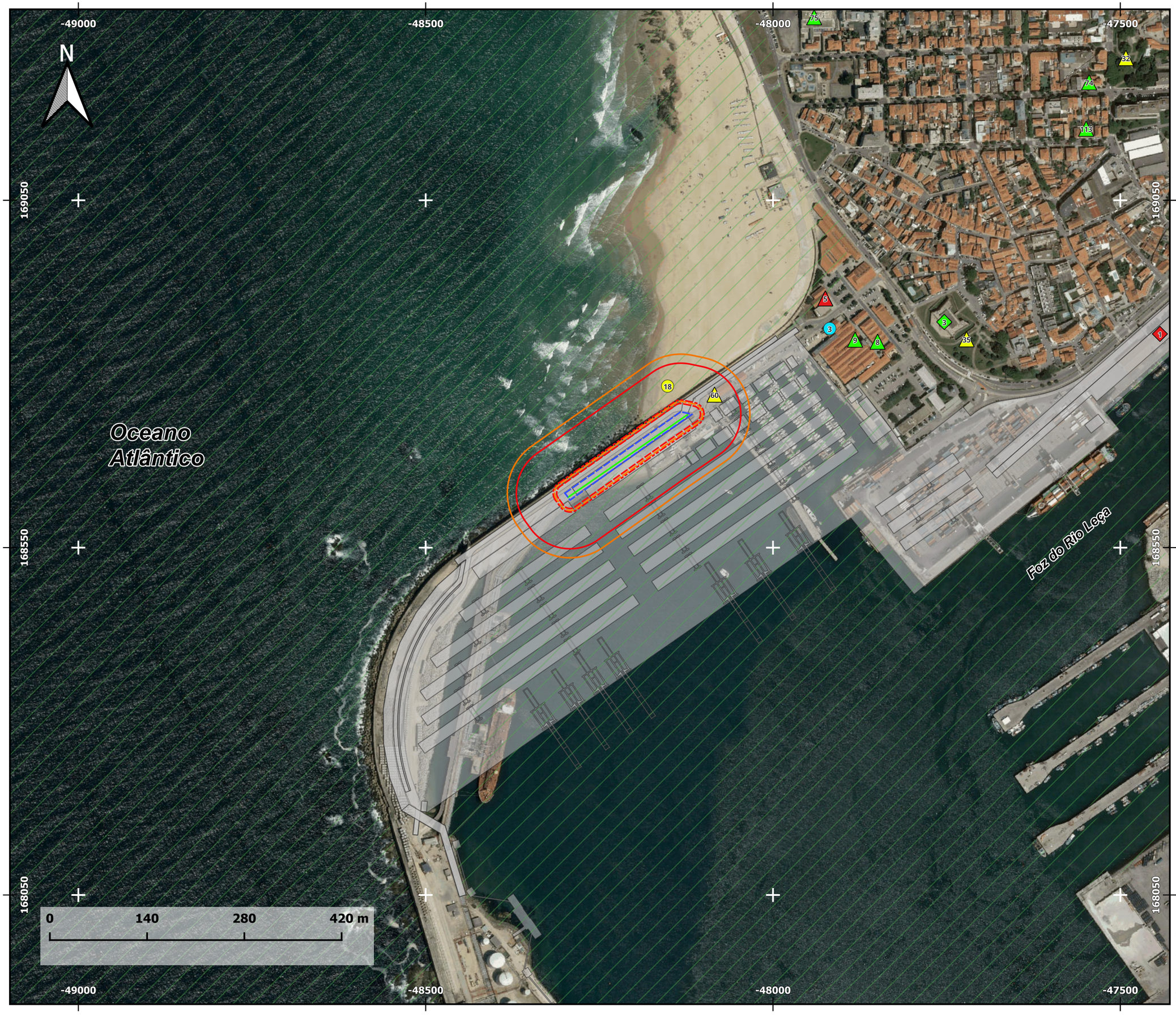
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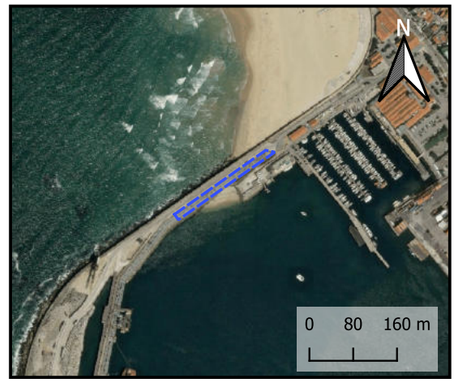
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Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 031	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 8A - Rotura 10% do diâmetro Nominal de Pipeline de Gasolina entre o Posto A e Válvula junto ao Tie-In com falha da válvula automática.	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 8

- Sobrepressão - Efeitos Letais (12 m)
- Sobrepressão - Efeitos Irreversíveis (15 m)
- Radiação Térmica - Efeitos Letais (70 m)
- Radiação Térmica - Efeitos Irreversíveis (83 m)
- 50% LII - Efeitos Letais (17 m)
- Linha de Gasolina

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

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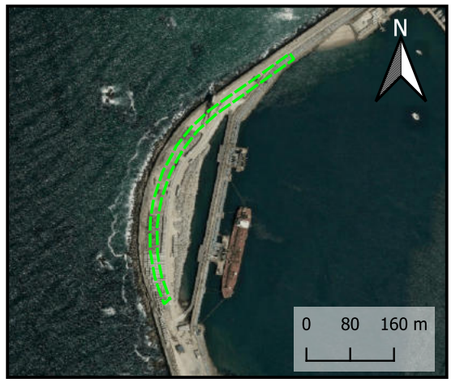
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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 032		ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 8B - Rotura 10% do diâmetro Nominal de Pipeline de Gasolina entre a Válvula junto ao Tie-in e a Drenagem com falha da válvula automática.	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO



Detalhe. Escala 1:11200

-49000 -48500 -48000

168550 168050 167550

Oceano Atlântico

Foz do Rio Leça

7

0 140 280 420 m

Legenda:

Cenários

Esteira de Tubagens

Cenário 5

- Radiação Térmica - Efeitos Letais - Alcances Totais
- Radiação Térmica - Efeitos Letais - Mar (112 m)
- Radiação Térmica - Efeitos Letais - Terra (51) m
- Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
- Radiação Térmica - Efeitos Irreversíveis - Mar (131 m)
- Radiação Térmica - Efeitos Irreversíveis - Terra (59 m)
- 50% LII - Efeitos Letais - Alcances Totais
- 50% LII - Efeitos Letais - Mar (2 m)
- 50% LII - Efeitos Letais - Terra (2 m)
- Linha de Gasolina - Terra
- Linha de Gasolina - Mar

Envolvente

Elementos Sensíveis - Cenários

Estabelecimentos de Ensino

- 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research
- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 027	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 5A - Rotura total de Pipeline de Gasolina entre o Posto A e Válvula junto ao Tie-In	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cenário 5B e 6B - Gasolina

Vala

Pool substrate and bund
Cenário 5B e 6B - Gasolina\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2,7	m
		Bund area (internal)	3383	m2
		Bund diameter (internal)	65,6306	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 7A e 8A - Falha - Gasolina

Vala

Pool substrate and bund
Cenário 7A e 8A - Falha - Gasolina\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2	m
		Bund area (internal)	7631	m2
		Bund diameter (internal)	98,5702	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Mar

Pool substrate and bund

Cenário 7A e 8A - Falha - Gasolina\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 7B e 8B - Falha - Gasolina

Vala

Pool substrate and bund
Cenário 7B e 8B - Falha - Gasolina\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2,7	m
		Bund area (internal)	3383	m2
		Bund diameter (internal)	65,6306	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 5A e 6A - Gasolina

Study

Study
Cenário 5A e 6A - Gasolina

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - PostoA-Tiein

Pressure vessel

Cenário 5A e 6A - Gasolina\Study

Tab	Group	Field	Value	Units
Material	Material	Material	GASOLINE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5059,72	m3
		Material to track	GASOLINE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1394	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5059,72	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5059,72	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 5A - Rot Tot

Short pipe

Cenário 5A e 6A - Gasolina\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	406,4	mm
		Pipe length	1394	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	175,5	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 6A - Rot 10%

Leak

Cenário 5A e 6A - Gasolina\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	40,64	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Pressure vessel - PostoA-Tiein_Mar

Pressure vessel

Cenário 5A e 6A - Gasolina\Study

Tab	Group	Field	Value	Units
Material	Material	Material	GASOLINE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5059,72	m3
		Material to track	GASOLINE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1394	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5059,72	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5059,72	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 5A - Rot Tot

Short pipe

Cenário 5A e 6A - Gasolina\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	406,4	mm
		Pipe length	1394	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	175,5	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 6A - Rot 10%

Leak

Cenário 5A e 6A - Gasolina\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	40,64	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cenário 5B e 6B - Gasolina

Study

Study
Cenário 5B e 6B - Gasolina

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - Tiein-Drenagem

Pressure vessel

Cenário 5B e 6B - Gasolina\Study

Tab	Group	Field	Value	Units
Material	Material	Material	GASOLINE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5059,72	m3
		Material to track	GASOLINE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1593	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	2	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5059,72	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5059,72	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 5B - Rot Tot

Short pipe

Cenário 5B e 6B - Gasolina\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	406,4	mm
		Pipe length	1593	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	175,5	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	2	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 6B - Rot 10%

Leak

Cenário 5B e 6B - Gasolina\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	40,64	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cenário 7A e 8A - Falha - Gasolina

Study

Study

Cenário 7A e 8A - Falha - Gasolina

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - PostoA-Tiein

Pressure vessel

Cenário 7A e 8A - Falha - Gasolina\Study

Tab	Group	Field	Value	Units
Material	Material	Material	GASOLINE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5059,72	m3
		Material to track	GASOLINE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1394	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	

Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5059,72	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5059,72	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	

		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	

		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m
		North	0	m

Cen 7A - Rot Tot

Short pipe

Cenário 7A e 8A - Falha - Gasolina\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	406,4	mm
		Pipe length	1394	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	175,5	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the	Concentrations of interest		ppm

	material to track)			
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction

	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 8A - Rot 10%

Leak

Cenário 7A e 8A - Falha - Gasolina\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	40,64	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	

	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	

		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Pressure vessel - PostoA-Tiein_Mar

Pressure vessel

Cenário 7A e 8A - Falha - Gasolina\Study

Tab	Group	Field	Value	Units
Material	Material	Material	GASOLINE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5059,72	m3
		Material to track	GASOLINE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1394	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	

Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5059,72	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5059,72	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	

		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	

		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m
		North	0	m

Cen 7A - Rot Tot

Short pipe

Cenário 7A e 8A - Falha - Gasolina\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	406,4	mm
		Pipe length	1394	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	175,5	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the	Concentrations of interest		ppm

	material to track)			
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction

	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 8A - Rot 10%

Leak

Cenário 7A e 8A - Falha - Gasolina\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	40,64	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	

	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	

		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cenário 7B e 8B - Falha - Gasolina

Study

Study
Cenário 7B e 8B - Falha - Gasolina

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - Tiein-Drenagem

Pressure vessel

Cenário 7B e 8B - Falha - Gasolina\Study

Tab	Group	Field	Value	Units
Material	Material	Material	GASOLINE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5059,72	m3
		Material to track	GASOLINE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1593	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	2	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5059,72	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5059,72	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 7B - Rot Tot

Short pipe

Cenário 7B e 8B - Falha - Gasolina\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	406,4	mm
		Pipe length	1593	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	175,5	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	2	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 8B - Rot 10%

Leak

Cenário 7B e 8B - Falha - Gasolina\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	40,64	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cenário 5A e 6A - Gasolina

Material: GASOLINE

Cenário 5A e 6A - Gasolina\Physical Properties System\Materials\GASOLINE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,399552**	
Aerosol class number	**2**	
Critical pressure	**24,9**	bar
Critical temperature	**295,55**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-56,77**	degC
Molecular weight	**114,229**	
Normal boiling point	**125,68**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,1083E-05**	bar
Triple point temperature	**-56,77**	degC
Carbon hydrogen ratio	**0,444444**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**20740**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**6,7138E+07**	**1,0769**	**-1,0124**	**0,37075**	**0**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,945312**	

Combustion ct	**0,0165289**	
Emissive power length scale	**8,33**	m
Flash point	**-40**	degC
Heat of combustion	**5,07415E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**14000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,7**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**76000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,047020 5	2,81851	-7,45552	8,45552		-56,77	286,85	1	Constant value above fraction Tc
Liquid viscosity	101	-98,805	3905,5	14,103	-2,5112E-05	2	-62	181,81	1	Constant value above fraction Tc
Surface tension	106	0,052789	1,2323	0	0	0	-56,77	295,55	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-8758	0,8448	-2,7121E+10	0		65,85	726,85	1	None (use equation)
Vapour viscosity	102	3,1191E-08	0,92925	55,092	0		-56,77	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	135540	443100	1635,6	305400	746,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	224830	-186,63	0,95891	0	0	-56,77	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressu	101	96,084	-7900,	-11,00	7,1802E-06	2	-56,77	295,55	1	Vapour Pressure

re		**2**	**3**						**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,5266**	**0,25693**	**568,7**	**0,28571**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,2739**	**-321,44**	**-6,683E+07**	**-1,271E+20**	**1,6103E+22**	**11,23**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**2E-05**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cenário 5B e 6B - Gasolina

Material: GASOLINE

Cenário 5B e 6B - Gasolina\Physical Properties System\Materials\GASOLINE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,399552**	
Aerosol class number	**2**	
Critical pressure	**24,9**	bar
Critical temperature	**295,55**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-56,77**	degC
Molecular weight	**114,229**	
Normal boiling point	**125,68**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,1083E-05**	bar
Triple point temperature	**-56,77**	degC
Carbon hydrogen ratio	**0,444444**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**20740**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**6,7138E+07**	**1,0769**	**-1,0124**	**0,37075**	**0**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,945312**	

Combustion ct	**0,0165289**	
Emissive power length scale	**8,33**	m
Flash point	**-40**	degC
Heat of combustion	**5,07415E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**14000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,7**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**76000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,047020 5	2,81851	-7,45552	8,45552		-56,77	286,85	1	Constant value above fraction Tc
Liquid viscosity	101	-98,805	3905,5	14,103	-2,5112E-05	2	-62	181,81	1	Constant value above fraction Tc
Surface tension	106	0,052789	1,2323	0	0	0	-56,77	295,55	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-8758	0,8448	-2,7121E+10	0		65,85	726,85	1	None (use equation)
Vapour viscosity	102	3,1191E-08	0,92925	55,092	0		-56,77	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	135540	443100	1635,6	305400	746,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	224830	-186,63	0,95891	0	0	-56,77	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressu	101	96,084	-7900,	-11,00	7,1802E-06	2	-56,77	295,55	1	Vapour Pressure

re		**2**	**3**						**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,5266**	**0,25693**	**568,7**	**0,28571**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,2739**	**-321,44**	**-6,683E+07**	**-1,271E+20**	**1,6103E+22**	**11,23**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**2E-05**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cenário 7A e 8A - Falha - Gasolina

Material: GASOLINE

Cenário 7A e 8A - Falha - Gasolina\Physical Properties System\Materials\GASOLINE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,399552**	
Aerosol class number	**2**	
Critical pressure	**24,9**	bar
Critical temperature	**295,55**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-56,77**	degC
Molecular weight	**114,229**	
Normal boiling point	**125,68**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,1083E-05**	bar
Triple point temperature	**-56,77**	degC
Carbon hydrogen ratio	**0,444444**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**20740**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**6,7138E+07**	**1,0769**	**-1,0124**	**0,37075**	**0**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,945312**	

Combustion ct	**0,0165289**	
Emissive power length scale	**8,33**	m
Flash point	**-40**	degC
Heat of combustion	**5,07415E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**14000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,7**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**76000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,047020 5	2,81851	-7,45552	8,45552		-56,77	286,85	1	Constant value above fraction Tc
Liquid viscosity	101	-98,805	3905,5	14,103	-2,5112E-05	2	-62	181,81	1	Constant value above fraction Tc
Surface tension	106	0,052789	1,2323	0	0	0	-56,77	295,55	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-8758	0,8448	-2,7121E+10	0		65,85	726,85	1	None (use equation)
Vapour viscosity	102	3,1191E-08	0,92925	55,092	0		-56,77	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	135540	443100	1635,6	305400	746,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	224830	-186,63	0,95891	0	0	-56,77	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressu	101	96,084	-7900,	-11,00	7,1802E-06	2	-56,77	295,55	1	Vapour Pressure

re		**2**	**3**						**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,5266**	**0,25693**	**568,7**	**0,28571**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,2739**	**-321,44**	**-6,683E+07**	**-1,271E+20**	**1,6103E+22**	**11,23**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**2E-05**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cenário 7B e 8B - Falha - Gasolina

Material: GASOLINE

Cenário 7B e 8B - Falha - Gasolina\Physical Properties System\Materials\GASOLINE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,399552**	
Aerosol class number	**2**	
Critical pressure	**24,9**	bar
Critical temperature	**295,55**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-56,77**	degC
Molecular weight	**114,229**	
Normal boiling point	**125,68**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,1083E-05**	bar
Triple point temperature	**-56,77**	degC
Carbon hydrogen ratio	**0,444444**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**20740**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**6,7138E+07**	**1,0769**	**-1,0124**	**0,37075**	**0**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,945312**	

Combustion ct	**0,0165289**	
Emissive power length scale	**8,33**	m
Flash point	**-40**	degC
Heat of combustion	**5,07415E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**14000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,7**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**76000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,047020 5	2,81851	-7,45552	8,45552		-56,77	286,85	1	Constant value above fraction Tc
Liquid viscosity	101	-98,805	3905,5	14,103	-2,5112E-05	2	-62	181,81	1	Constant value above fraction Tc
Surface tension	106	0,052789	1,2323	0	0	0	-56,77	295,55	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-8758	0,8448	-2,7121E+10	0		65,85	726,85	1	None (use equation)
Vapour viscosity	102	3,1191E-08	0,92925	55,092	0		-56,77	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	135540	443100	1635,6	305400	746,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	224830	-186,63	0,95891	0	0	-56,77	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressu	101	96,084	-7900,	-11,00	7,1802E-06	2	-56,77	295,55	1	Vapour Pressure

re		**2**	**3**						**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,5266**	**0,25693**	**568,7**	**0,28571**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,2739**	**-321,44**	**-6,683E+07**	**-1,271E+20**	**1,6103E+22**	**11,23**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**2E-05**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cenário 5A e 6A - Gasolina

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - PostoA-Tiein	Cen 5A - Rot Tot	Mais Provável	175,5	14,1322	1	10000	0,4064	1,9016	120
	Cen 6A - Rot 10%	Mais Provável	31,8097	13,9048	1	68,8217	0,0314796	57,4302	3600
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 5A - Rot Tot	Mais Provável	175,5	14,1322	1	10000	0,4064	1,9016	120
	Cen 6A - Rot 10%	Mais Provável	31,8097	13,9048	1	68,8217	0,0314796	57,4302	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 5A - Rot Tot	Mais Provável	0,660851	1,26561	1,34935
	Cen 6A - Rot 10%	Mais Provável	11,8028	15,0781	16,8162
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 5A - Rot Tot	Mais Provável	0,733696	1,24735	1,38994
	Cen 6A - Rot 10%	Mais Provável	11,7276	14,9917	16,6861

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 5A - Rot Tot	Mais Provável	2,30243	3,47707	3,2477	2,90303
	Cen 6A - Rot 10%	Mais Provável	15,4	33,0385	30,0467	25,7834
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 5A - Rot Tot	Mais Provável	2,30243	3,47707	3,2477	2,90303
	Cen 6A - Rot 10%	Mais Provável	15,4	33,0385	30,0467	25,7834

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 5A - Rot Tot	Mais Provável	43,3972	58,7951	50,2142	40,1565
	Cen 6A - Rot 10%	Mais Provável	23,1686	49,9997	43,6225	35,1498
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 5A - Rot Tot	Mais Provável	54,9986	71,2671	60,8759	48,6483
	Cen 6A - Rot 10%	Mais Provável	23,1686	49,9997	43,6225	35,1498

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 5A - Rot Tot	Mais Provável	43,3972	58,7951	50,2142	40,1565
	Cen 6A - Rot 10%	Mais Provável	98,5703	116,264	99,374	78,5863
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 5A - Rot Tot	Mais Provável	112,838	130,47	111,612	88,1652
	Cen 6A - Rot 10%	Mais Provável	112,84	130,472	111,614	88,1665

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 5A - Rot Tot	Mais Provável	1,26561	1,34935
	Cen 6A - Rot 10%	Mais Provável	15,0781	16,8162
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 5A - Rot Tot	Mais Provável	1,24735	1,38994
	Cen 6A - Rot 10%	Mais Provável	14,9917	16,6861

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - PostoA-Tiein	Cen 5A - Rot Tot	Mais Provável	0,954919	0,10713	0,984061
	Cen 6A - Rot 10%	Mais Provável	16,405	0	189,229
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 5A - Rot Tot	Mais Provável	1,67063	0	2,9365
	Cen 6A - Rot 10%	Mais Provável	16,029	0,072842	41,4033

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - PostoA-Tiein	Cen 6A - Rot 10%	Mais Provável	0,05 0,14 0,3	14,7547 11,0606 9,9538	12,8894 5,50121 3,28764
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	14,3037 10,7407 9,67319	12,432 5,30599 3,17097

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - PostoA-Tiein	Cen 6A - Rot 10%	Mais Provável	0,05 0,14 0,3	0,0364545 0,0364545 0,0364545	1,11646 1,11646 1,11646	10 10 10	8,30998 8,30998 8,30998	8,30998 8,30998 8,30998
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	0,0327097 0,0327097 0,0327097	1,11583 1,11583 1,11583	10 10 10	8,08771 8,08771 8,08771	8,08771 8,08771 8,08771

Consequence Summary Report

Workspace: Cenário 5B e 6B - Gasolina

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 5B - Rot Tot	Mais Provável	175,5	14,1366	1	10000	0,4064	1,90161	120
	Cen 6B - Rot 10%	Mais Provável	31,8097	13,9048	1	68,8217	0,0314796	57,4302	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 5B - Rot Tot	Mais Provável	0,660769	1,26554	1,3493
	Cen 6B - Rot 10%	Mais Provável	11,8028	15,0779	16,8164

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 5B - Rot Tot	Mais Provável	2,30243	3,47707	3,2477	2,90303
	Cen 6B - Rot 10%	Mais Provável	15,4	33,0385	30,0467	25,7834

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 5B - Rot Tot	Mais Provável	43,4014	58,7995	50,218	40,1595
	Cen 6B - Rot 10%	Mais Provável	23,1686	49,9997	43,6225	35,1498

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 5B - Rot Tot	Mais Provável	43,4014	58,7995	50,218	40,1595
	Cen 6B - Rot 10%	Mais Provável	65,6306	82,067	69,9842	55,7873

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 5B - Rot Tot	Mais Provável	1,26554	1,3493
	Cen 6B - Rot 10%	Mais Provável	15,0779	16,8164

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 5B - Rot Tot	Mais Provável	0,954967	0,10713	0,984061
	Cen 6B - Rot 10%	Mais Provável	16,4037	0,0576334	188,762

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 6B - Rot 10%	Mais Provável	0,05	14,745	12,8791
			0,14	11,0538	5,49681
			0,3	9,94795	3,28501

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 6B - Rot 10%	Mais Provável	0,05	0,0363671	1,11572	10	8,30544	8,30544
			0,14	0,0363671	1,11572	10	8,30544	8,30544
			0,3	0,0363671	1,11572	10	8,30544	8,30544

Consequence Summary Report

Workspace: Cenário 7A e 8A - Falha - Gasolina

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - PostoA-Tiein	Cen 7A - Rot Tot	Mais Provável	175,5	14,1322	1	10000	0,4064	1,9016	3600
	Cen 8A - Rot 10%	Mais Provável	31,8097	13,9048	1	68,8217	0,0314796	57,4302	3600
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 7A - Rot Tot	Mais Provável	175,5	14,1322	1	10000	0,4064	1,9016	3600
	Cen 8A - Rot 10%	Mais Provável	31,8097	13,9048	1	68,8217	0,0314796	57,4302	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 7A - Rot Tot	Mais Provável	0,683586	2,77826	5,71721
	Cen 8A - Rot 10%	Mais Provável	11,8028	15,0781	16,8162
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 7A - Rot Tot	Mais Provável	0,770784	1,28263	4,12901
	Cen 8A - Rot 10%	Mais Provável	11,7276	14,9917	16,6861

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 7A - Rot Tot	Mais Provável	2,30243	3,47707	3,2477	2,90303
	Cen 8A - Rot 10%	Mais Provável	15,4	33,0385	30,0467	25,7834
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 7A - Rot Tot	Mais Provável	2,30243	3,47707	3,2477	2,90303
	Cen 8A - Rot 10%	Mais Provável	15,4	33,0385	30,0467	25,7834

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 7A - Rot Tot	Mais Provável	54,9986	71,2671	60,8759	48,6483
	Cen 8A - Rot 10%	Mais Provável	23,1686	49,9997	43,6225	35,1498
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 7A - Rot Tot	Mais Provável	54,9986	71,2671	60,8759	48,6483
	Cen 8A - Rot 10%	Mais Provável	23,1686	49,9997	43,6225	35,1498

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 7A - Rot Tot	Mais Provável	98,5905	116,284	99,3916	78,6
	Cen 8A - Rot 10%	Mais Provável	98,5703	116,264	99,374	78,5863
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 7A - Rot Tot	Mais Provável	112,842	130,474	111,616	88,1677
	Cen 8A - Rot 10%	Mais Provável	112,84	130,472	111,614	88,1665

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 7A - Rot Tot	Mais Provável	2,77826	5,71721
	Cen 8A - Rot 10%	Mais Provável	15,0781	16,8162
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 7A - Rot Tot	Mais Provável	1,28263	4,12901
	Cen 8A - Rot 10%	Mais Provável	14,9917	16,6861

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - PostoA-Tiein	Cen 7A - Rot Tot	Mais Provável	5,71785	0	3554,16
	Cen 8A - Rot 10%	Mais Provável	16,405	0	189,229
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 7A - Rot Tot	Mais Provável	4,10679	0	2596,01
	Cen 8A - Rot 10%	Mais Provável	16,029	0,072842	41,4033

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - PostoA-Tiein	Cen 8A - Rot 10%	Mais Provável	0,05 0,14 0,3	14,7547 11,0606 9,9538	12,8894 5,50121 3,28764
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	14,3037 10,7407 9,67319	12,432 5,30599 3,17097

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - PostoA-Tiein	Cen 8A - Rot 10%	Mais Provável	0,05 0,14 0,3	0,0364545 0,0364545 0,0364545	1,11646 1,11646 1,11646	10 10 10	8,30998 8,30998 8,30998	8,30998 8,30998 8,30998
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	0,0327097 0,0327097 0,0327097	1,11583 1,11583 1,11583	10 10 10	8,08771 8,08771 8,08771	8,08771 8,08771 8,08771

Consequence Summary Report

Workspace: Cenário 7B e 8B - Falha - Gasolina

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 7B - Rot Tot	Mais Provável	175,5	14,1366	1	10000	0,4064	1,90161	3600
	Cen 8B - Rot 10%	Mais Provável	31,8097	13,9048	1	68,8217	0,0314796	57,4302	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 7B - Rot Tot	Mais Provável	0,769427	1,26456	1,34183
	Cen 8B - Rot 10%	Mais Provável	11,8028	15,0779	16,8164

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 7B - Rot Tot	Mais Provável	2,30243	3,47707	3,2477	2,90303
	Cen 8B - Rot 10%	Mais Provável	15,4	33,0385	30,0467	25,7834

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 7B - Rot Tot	Mais Provável	54,9986	71,267	60,8758	48,6482
	Cen 8B - Rot 10%	Mais Provável	23,1686	49,9997	43,6225	35,1498

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 7B - Rot Tot	Mais Provável	65,6335	82,0702	69,9869	55,7894
	Cen 8B - Rot 10%	Mais Provável	65,6306	82,067	69,9842	55,7873

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 7B - Rot Tot	Mais Provável	1,26456	1,34183
	Cen 8B - Rot 10%	Mais Provável	15,0779	16,8164

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 7B - Rot Tot	Mais Provável	1,24158	0,101277	3551,75
	Cen 8B - Rot 10%	Mais Provável	16,4037	0,0576334	188,762

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 8B - Rot 10%	Mais Provável	0,05	14,745	12,8791
			0,14	11,0538	5,49681
			0,3	9,94795	3,28501

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 8B - Rot 10%	Mais Provável	0,05	0,0363671	1,11572	10	8,30544	8,30544
			0,14	0,0363671	1,11572	10	8,30544	8,30544
			0,3	0,0363671	1,11572	10	8,30544	8,30544

Input Report

Workspace: Cenário 5A e 6A - Gasolina

Mais Provável

Weather

Cenário 5A e 6A - Gasolina\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 5B e 6B - Gasolina

Mais Provável

Weather

Cenário 5B e 6B - Gasolina\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 7A e 8A - Falha - Gasolina

Mais Provável

Weather

Cenário 7A e 8A - Falha - Gasolina\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 7B e 8B - Falha - Gasolina

Mais Provável

Weather

Cenário 7B e 8B - Falha - Gasolina\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 5A e 6A - Gasolina

Vala

Pool substrate and bund
Cenário 5A e 6A - Gasolina\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2	m
		Bund area (internal)	7631	m2
		Bund diameter (internal)	98,5702	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Mar

Pool substrate and bund

Cenário 5A e 6A - Gasolina\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

CENÁRIO 10A – ROTURA 10% PIPELINE GASÓLEO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: GASÓLEO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasóleo
Densidade da substância:	900 kg/m^3
Limite Inferior de Inflamabilidade (LII):	7000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	51 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1799 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1364 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1563 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 298,7 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura 10% de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto A e o Tie-in
Diâmetro da rotura:	50,8 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 10A – ROTURA 10% PIPELINE GASÓLEO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: GASÓLEO

OUTPUT	
Caudal máximo de libertação:	52,3 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 3 500 ppm (Efeitos letais)	18
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	9
7 kW/m^2 (Efeitos Letais)	8
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	111 (derrame em terra – Vala) 125 (derrame em mar)
7 kW/m^2 (Efeitos Letais)	95 (derrame em terra – Vala) 107 (derrame em mar)
Diâmetro da Piscina	99 (derrame em terra – Vala) 113 (derrame em mar)
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	12 (derrame em terra – Vala) 12 (derrame em mar)
0,14 bar (Efeitos Letais)	11 (derrame em terra – Vala) 11 (derrame em mar)

CENÁRIO 10B – ROTURA 10% PIPELINE GASÓLEO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: GASÓLEO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasóleo
Densidade da substância:	900 kg/m^3
Limite Inferior de Inflamabilidade (LII):	7000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	51 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1799 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1364 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1563 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 298,7 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura 10% de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	50,8 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 10B – ROTURA 10% PIPELINE GASÓLEO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: GASÓLEO

OUTPUT	
Caudal máximo de libertação:	52,3 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 3 500 ppm (Efeitos letais)	18
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	9
7 kW/m^2 (Efeitos Letais)	8
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	79
7 kW/m^2 (Efeitos Letais)	67
Diâmetro da Piscina	66
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	12
0,14 bar (Efeitos Letais)	11

CENÁRIO 12A – ROTURA 10% PIPELINE GASÓLEO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: GASÓLEO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasóleo
Densidade da substância:	900 kg/m^3
Limite Inferior de Inflamabilidade (LII):	7000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	51 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1799 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1364 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1563 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 298,7 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura 10% de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto A e o Tie-in
Diâmetro da rotura:	50,8 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 12A – ROTURA 10% PIPELINE GASÓLEO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: GASÓLEO

OUTPUT	
Caudal máximo de libertação:	52,3 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 3 500 ppm (Efeitos letais)	18
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	9
7 kW/m^2 (Efeitos Letais)	8
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	111 (derrame em terra – Vala) 125 (derrame em mar)
7 kW/m^2 (Efeitos Letais)	95 (derrame em terra – Vala) 107 (derrame em mar)
Diâmetro da Piscina	99 (derrame em terra – Vala) 113 (derrame em mar)
Em terra o derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	12 (derrame em terra – Vala) 12 (derrame em mar)
0,14 bar (Efeitos Letais)	11 (derrame em terra – Vala) 11 (derrame em mar)

CENÁRIO 12B – ROTURA 10% PIPELINE GASÓLEO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: GASÓLEO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasóleo
Densidade da substância:	900 kg/m^3
Limite Inferior de Inflamabilidade (LII):	7000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	51 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1799 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1364 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1563 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 298,7 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura 10% de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	50,8 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 12B – ROTURA 10% PIPELINE GASÓLEO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: GASÓLEO

OUTPUT	
Caudal máximo de libertação:	52,3 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 3 500 ppm (Efeitos letais)	18
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	9
7 kW/m^2 (Efeitos Letais)	8
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	79
7 kW/m^2 (Efeitos Letais)	67
Diâmetro da Piscina	66
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	12
0,14 bar (Efeitos Letais)	11

CENÁRIO 9A – ROTURA TOTAL PIPELINE GASÓLEO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: GASÓLEO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasóleo
Densidade da substância:	900 kg/m^3
Limite Inferior de Inflamabilidade (LII):	7000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	51 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1799 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1364 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1563 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 298,7 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Rotura total de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto A e o Tie-in
Diâmetro da rotura:	508 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 9A – ROTURA TOTAL PIPELINE GASÓLEO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: GASÓLEO

OUTPUT	
Caudal máximo de libertação:	298,7 Kg/s
Tempo de libertação:	120
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 3 500 ppm (Efeitos letais)	2
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	1
7 kW/m^2 (Efeitos Letais)	1
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	69 (derrame em terra – Vala) 125 (derrame em mar)
7 kW/m^2 (Efeitos Letais)	59 (derrame em terra – Vala) 107 (derrame em mar)
Diâmetro da Piscina	56 (derrame em terra – Vala) 113 (derrame em mar)
Em terra o derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	-
0,14 bar (Efeitos Letais)	-

CENÁRIO 9B – ROTURA TOTAL PIPELINE GASÓLEO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM SUBSTÂNCIA: GASÓLEO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasóleo
Densidade da substância:	900 kg/m^3
Limite Inferior de Inflamabilidade (LII):	7000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	51 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1799 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-In e Tempo de Isolamento	1364 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1563 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 298,7 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	3833 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Rotura total de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	508 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

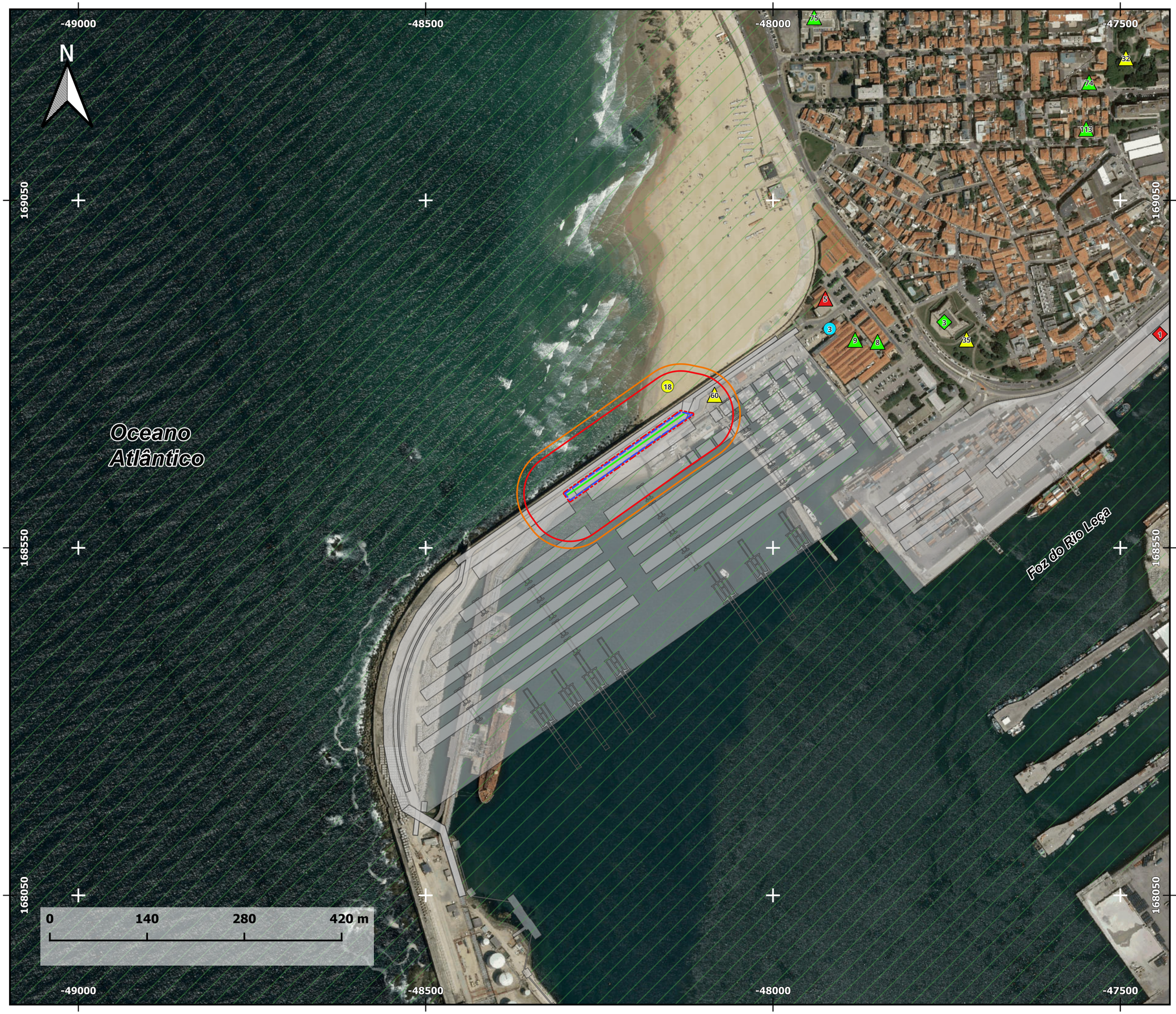
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

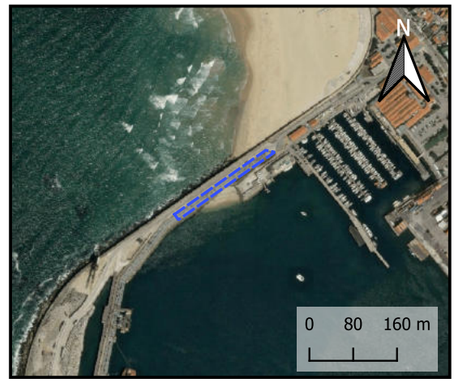
CENÁRIO 9B – ROTURA TOTAL PIPELINE GASÓLEO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: GASÓLEO

OUTPUT	
Caudal máximo de libertação:	298,7 Kg/s
Tempo de libertação:	120
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 3 500 ppm (Efeitos letais)	2
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	1
7 kW/m^2 (Efeitos Letais)	1
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	69
7 kW/m^2 (Efeitos Letais)	59
Diâmetro da Piscina	56
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	-
0,14 bar (Efeitos Letais)	-





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 9

Radiação Térmica - Efeitos Letais (59) m

Radiação Térmica - Efeitos Irreversíveis (69 m)

50% LII - Efeitos Letais (2 m)

Linha de Gasóleo

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

113-Jardim de Infância A Palmeirinha

74-Escola Básica do Corpo Santo

75-Escola Básica da Praia

8-AcademiCV

9-UPTEC Mar

Parques e Equipamentos Desportivos

32-Jardim do Corpo Santo

35-Parque da Capitania do Porto de Leixões

60-Marina de Leça

Espaços Culturais

5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

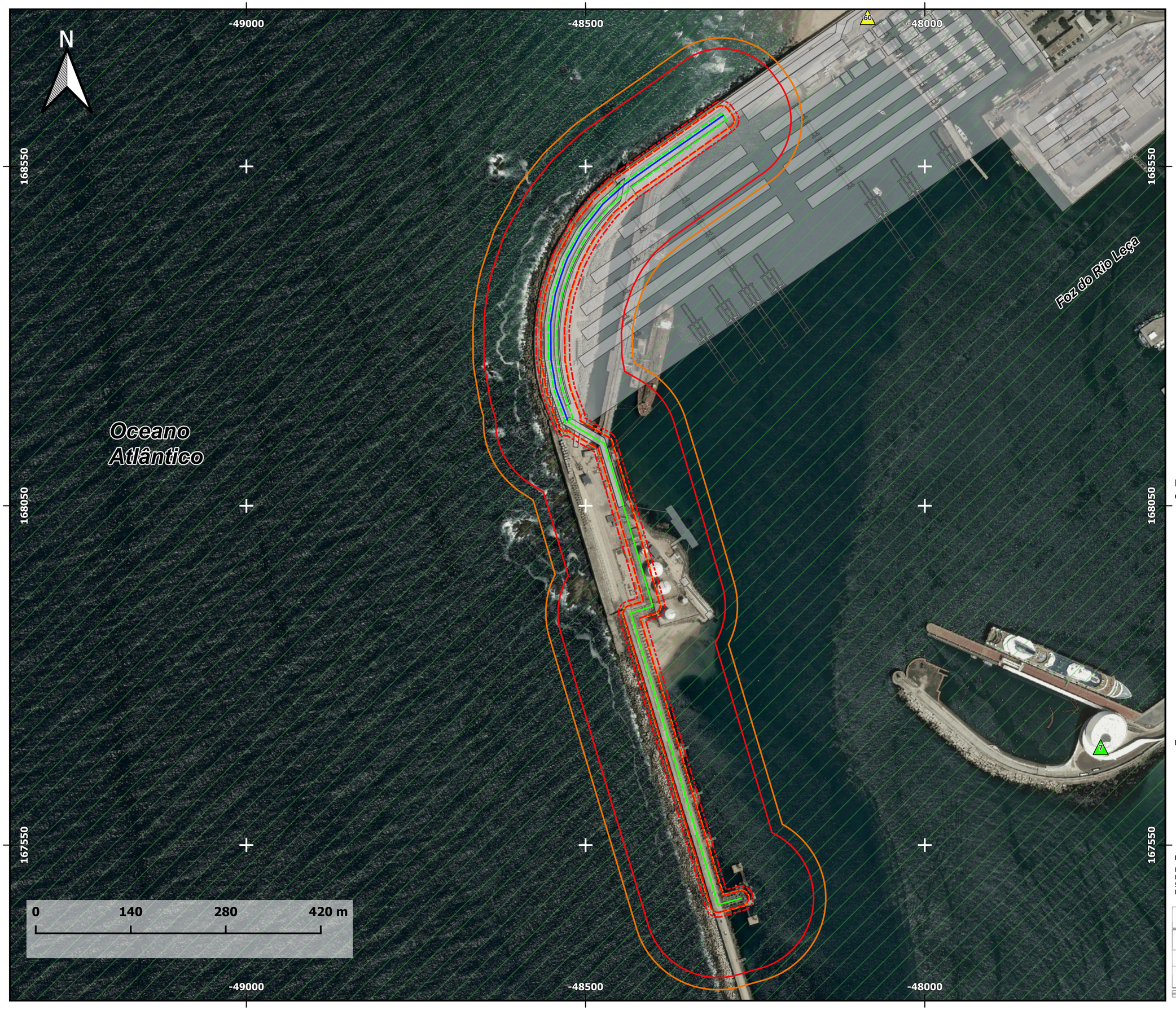
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

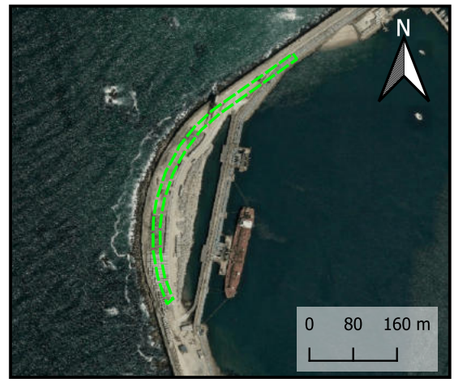
CertiTecna Engenharia de Segurança

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 034	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 9B - Rotura total de Pipeline de Gasóleo entre a Válvula junto ao Tie-In e a Drenagem	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 10

- Sobrepressão - Efeitos Letais - Alcances Totais
- Sobrepressão - Efeitos Letais - Mar (11 m)
- Sobrepressão - Efeitos Letais - Terra (11 m)
- Sobrepressão - Efeitos Irreversíveis - Alcances Totais
- Sobrepressão - Efeitos Irreversíveis - Mar (12 m)
- Sobrepressão - Efeitos Irreversíveis - Terra (12 m)
- Radiação Térmica - Efeitos Letais - Alcances Totais
- Radiação Térmica - Efeitos Letais - Mar (107 m)
- Radiação Térmica - Efeitos Letais - Terra (95) m
- Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
- Radiação Térmica - Efeitos Irreversíveis - Mar (125 m)
- Radiação Térmica - Efeitos Irreversíveis - Terra (111 m)
- 50% LII - Efeitos Letais - Alcances Totais
- 50% LII - Efeitos Letais - Mar (18 m)
- 50% LII - Efeitos Letais - Terra (18 m)
- Linha de Gasóleo - Mar
- Linha de Gasóleo - Terra

Envolvente

Elementos Sensíveis - Cenários

Estabelecimentos de Ensino

7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research

Parques e Equipamentos Desportivos

60-Marina de Leça

Reserva Ecológica Nacional

Layout Alternativa A

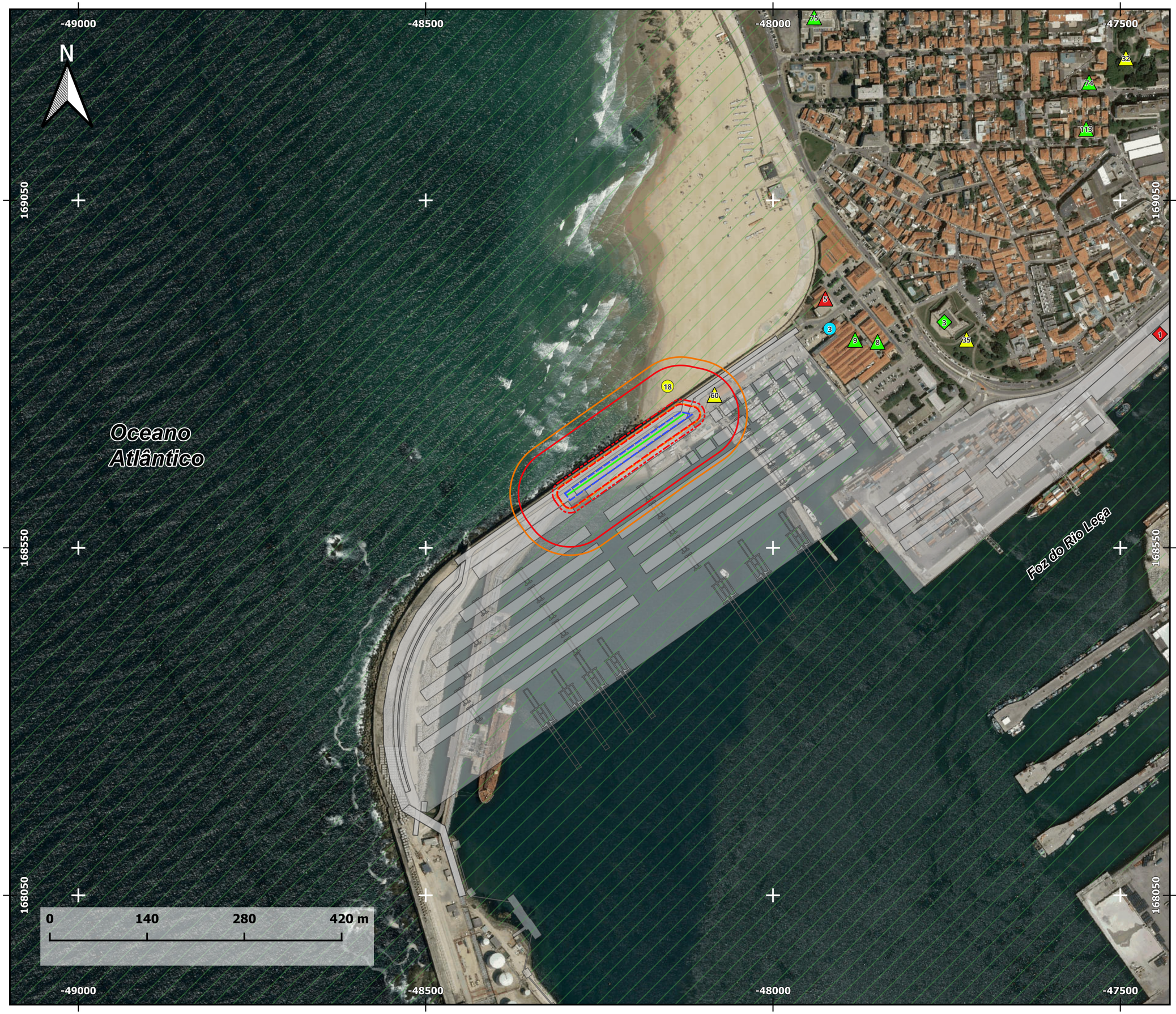
NOTAS RELATIVAS À CARTOGRAFIA:

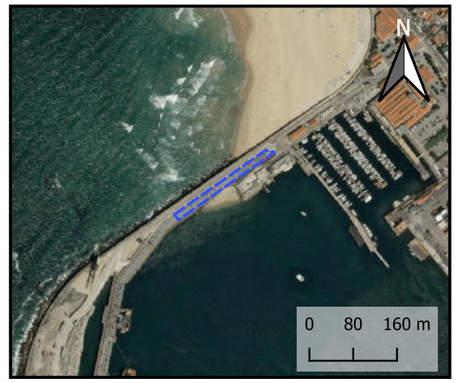
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Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 035	ESCALA: 1:5100
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 10A - Rotura 10% de Pipeline de Gasóleo entre o Posto A e Válvula junto ao Tie-In	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 10

- Sobrepressão - Efeitos Letais (12 m)
- Sobrepressão - Efeitos Irreversíveis (15 m)
- Radiação Térmica - Efeitos Letais (70 m)
- Radiação Térmica - Efeitos Irreversíveis (83 m)
- 50% LII - Efeitos Letais (17 m)
- Linha de Gasóleo - B

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

- 113-Jardim de Infância A Palmeirinha
- 74-Escola Básica do Corpo Santo
- 75-Escola Básica da Praia
- 8-AcademiCV
- 9-UPTEC Mar

Parques e Equipamentos Desportivos

- 32-Jardim do Corpo Santo
- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais

5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

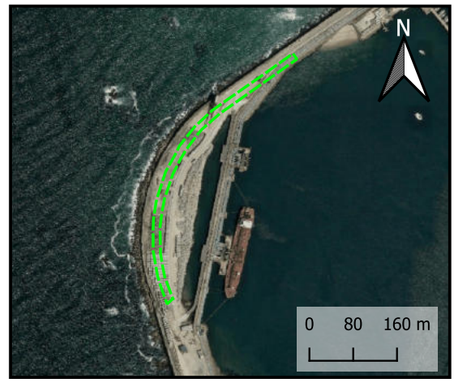
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Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 036		ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 10B - Rotura 10% de Pipeline de Gasóleo entre a Válvula junto ao Tie-In e a Drenagem	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO



Detalhe. Escala 1:11200

-49000 -48500 -48000

168550 167550

Oceano Atlântico

Foz do Rio Leça

60

7

0 140 280 420 m

Legenda:

Cenários

- Esteira de Tubagens

Cenário 12

- Sobrepressão - Efeitos Letais - Alcances Totais
- Sobrepressão - Efeitos Letais - Mar (11 m)
- Sobrepressão - Efeitos Letais - Terra (11 m)
- Sobrepressão - Efeitos Irreversíveis - Alcances Totais
- Sobrepressão - Efeitos Irreversíveis - Mar (12 m)
- Sobrepressão - Efeitos Irreversíveis - Terra (12 m)
- Radiação Térmica - Efeitos Letais - Alcances Totais
- Radiação Térmica - Efeitos Letais - Mar (107 m)
- Radiação Térmica - Efeitos Letais - Terra (95) m
- Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
- Radiação Térmica - Efeitos Irreversíveis - Mar (125 m)
- Radiação Térmica - Efeitos Irreversíveis - Terra (111 m)
- 50% LII - Efeitos Letais - Alcances Totais
- 50% LII - Efeitos Letais - Mar (18 m)
- 50% LII - Efeitos Letais - Terra (18 m)
- Linha de Gasóleo - Mar
- Linha de Gasóleo - Terra

Envolvente

Elementos Sensíveis - Cenários

Estabelecimentos de Ensino

- 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research

Parques e Equipamentos Desportivos

- 60-Marina de Leça
- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

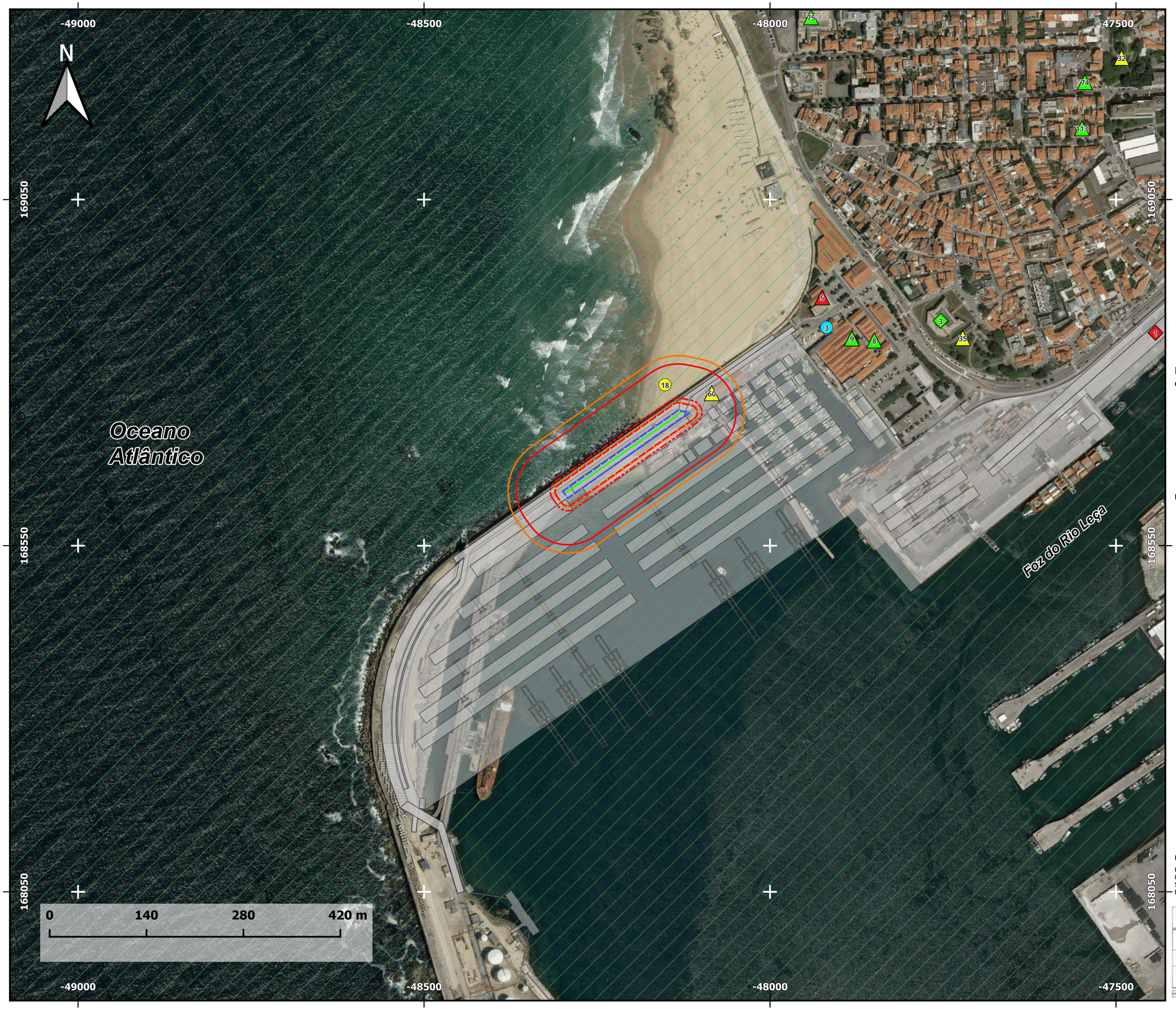
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Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

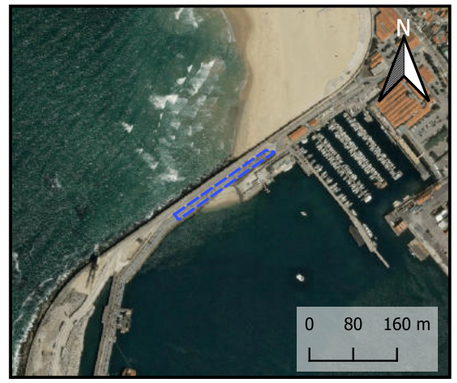
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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 038	ESCALA: 1:5100
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 12A - Rotura 10% do diâmetro Nominal de Pipeline de Gasóleo entre o Posto A e Válvula junto ao Tie-In com falha da válvula automática.	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 12

- Sobrepressão - Efeitos Letais (12 m)
- Sobrepressão - Efeitos Irreversíveis (15 m)
- Radiação Térmica - Efeitos Letais (70 m)
- Radiação Térmica - Efeitos Irreversíveis (83 m)
- 50% LII - Efeitos Letais (17 m)
- Linha de Gasóleo

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

- 113-Jardim de Infância A Palmeirinha
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- 75-Escola Básica da Praia
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- 9-UPTEC Mar

Parques e Equipamentos Desportivos

- 32-Jardim do Corpo Santo
- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais

5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

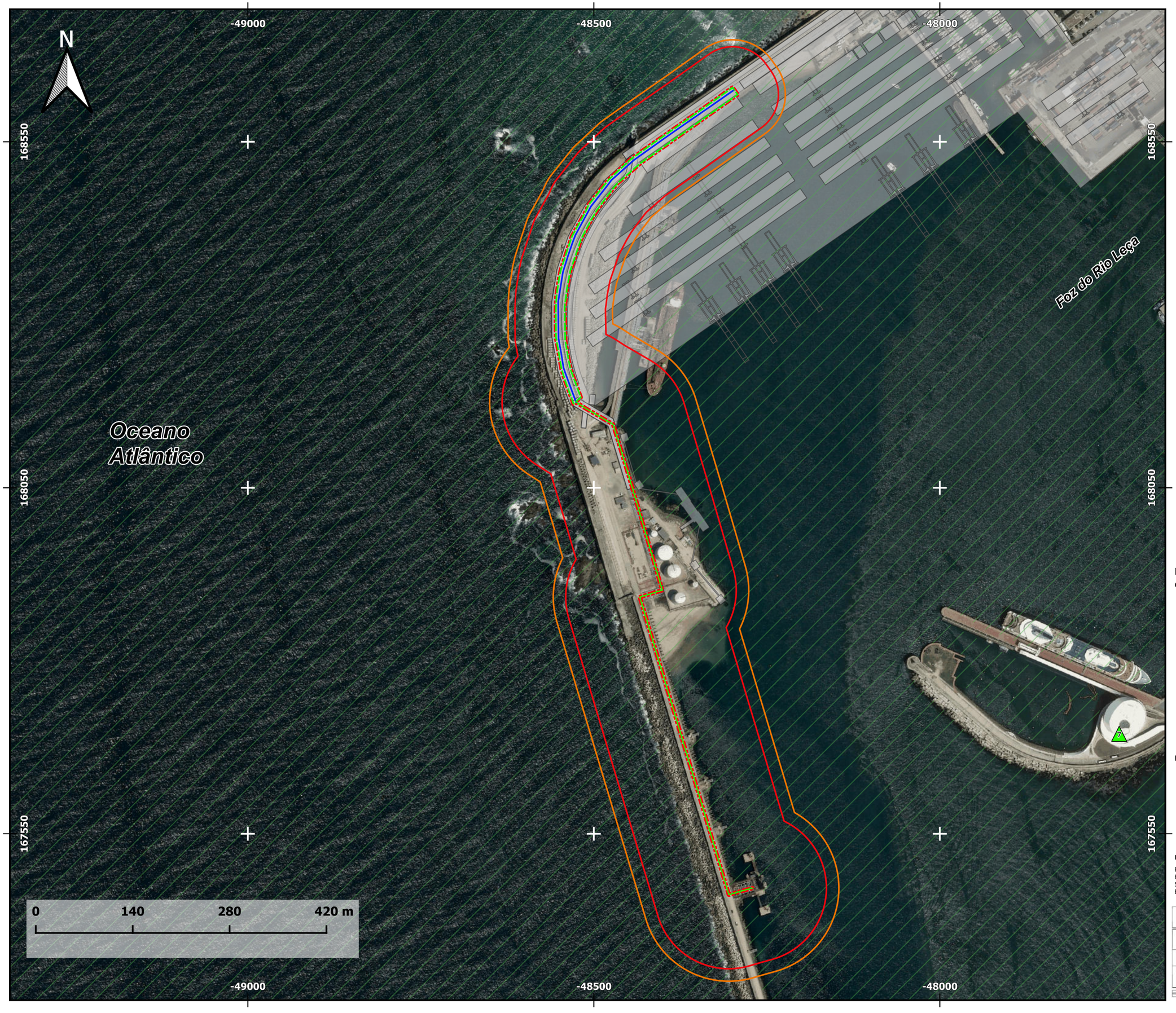
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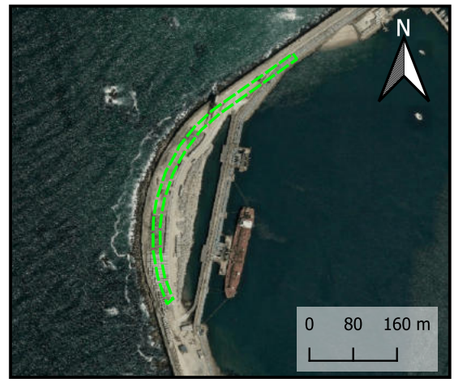
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Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 039	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 12B - Rotura 10% do diâmetro Nominal de Pipeline de Gasóleo entre a Válvula junto ao Tie-In e a Drenagem com falha da válvula automática.	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA, NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

- Esteira de Tubagens
- **Cenário 9**
  - Radiação Térmica - Efeitos Letais - Alcances Totais
  - Radiação Térmica - Efeitos Letais - Mar (107 m)
  - Radiação Térmica - Efeitos Letais - Terra (59) m
  - Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
  - Radiação Térmica - Efeitos Irreversíveis - Mar (125 m)
  - Radiação Térmica - Efeitos Irreversíveis - Terra (69 m)
  - 50% LII - Efeitos Letais - Alcances Totais
  - 50% LII - Efeitos Letais - Mar (2 m)
  - 50% LII - Efeitos Letais - Terra (2 m)
  - Linha de Gasóleo - Terra
  - Linha de Gasóleo - Mar

Envolvente

- **Elementos Sensíveis - Cenários**
  - **Estabelecimentos de Ensino**
    - 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research
  - Reserva Ecológica Nacional
  - Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 033	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 9A - Rotura total de Pipeline de Gasóleo entre o Posto A e Válvula junto ao Tie-In	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cen 9B e 10B - Gasoleo

Study

Study
Cen 9B e 10B - Gasoleo

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - Tiein-Drenagem

Pressure vessel
Cen 9B e 10B - Gasoleo\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL (LGO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4829,79	m3
		Material to track	DIESEL (LGO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1563	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	2	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4829,79	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4829,79	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 9B - Rot Tot

Short pipe

Cen 9B e 10B - Gasoleo\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1563	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	298,7	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	2	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 10B - Rot 10%

Leak

Cen 9B e 10B - Gasoleo\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cenário 11A e 12A - Falha - Gasoleo

Study

Study
Cenário 11A e 12A - Falha - Gasoleo

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - PostoA-Tiein

Pressure vessel

Cenário 11A e 12A - Falha - Gasoleo\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL (LGO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4829,79	m3
		Material to track	DIESEL (LGO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1364	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4829,79	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4829,79	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 11A - Rot Tot

Short pipe

Cenário 11A e 12A - Falha - Gasoleo\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1364	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	298,7	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 12A - Rot 10%

Leak

Cenário 11A e 12A - Falha - Gasoleo\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Pressure vessel - PostoA-Tiein_Mar

Pressure vessel

Cenário 11A e 12A - Falha - Gasoleo\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL (LGO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4829,79	m3
		Material to track	DIESEL (LGO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1364	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4829,79	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4829,79	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 11A - Rot Tot

Short pipe

Cenário 11A e 12A - Falha - Gasoleo\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1364	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	298,7	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 12A - Rot 10%

Leak

Cenário 11A e 12A - Falha - Gasoleo\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cenário 11B e 12B - Falha - Gasoleo

Study

Study
Cenário 11B e 12B - Falha - Gasoleo

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - Tiein-Drenagem

Pressure vessel

Cenário 11B e 12B - Falha - Gasoleo\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL (LGO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4829,79	m3
		Material to track	DIESEL (LGO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1563	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	2	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4829,79	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4829,79	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 11B - Rot Tot

Short pipe

Cenário 11B e 12B - Falha - Gasoleo\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1563	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	298,7	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	2	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 12B - Rot 10%

Leak

Cenário 11B e 12B - Falha - Gasoleo\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cen 9A e 10A - Gasoleo

Material: DIESEL (LGO)

Cen 9A e 10A - Gasoleo\Physical Properties System\Materials\DIESEL (LGO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,530316**	
Aerosol class number	**2**	
Critical pressure	**19,5**	bar
Critical temperature	**365,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-25,579**	degC
Molecular weight	**156,308**	
Normal boiling point	**195,928**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**4,08414E-06**	bar
Triple point temperature	**-25,579**	degC
Carbon hydrogen ratio	**0,458333**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**22180**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,0136E+08**	**1,5084**	**-1,473**	**0,44521**	**0**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,942476**	

Combustion ct	**0,012207**	
Emissive power length scale	**8,33**	m
Flash point	**65,9**	degC
Heat of combustion	**6,9036E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**7000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**51000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,0385074	3,96718	-10,9016	11,9016		-25,58	336,85	1	Constant value above fraction Tc
Liquid viscosity	101	52,176	-4951,9	-8,5676	570980	-2	-25,58	238,05	1	Constant value above fraction Tc
Surface tension	106	0,055493	1,3189	0	0	0	-25,58	365,85	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,038012	0,68615	34663	8,7219E+06		195,93	726,85	1	None (use equation)
Vapour viscosity	102	3,594E-08	0,9052	125	0		-25,58	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	195290	609980	1708,7	413020	775,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	293980	-114,98	0,96936	0	0	-25,58	160,27	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressur	101	131	-1114	-15,85	8,1871E-06	2	-25,58	365,85	1	Vapour Pressure

e		**3**	**5**							**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,36703**	**0,24876**	**639**	**0,28571**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,583**	**-727,3**	**-8,294E+07**	**-2,964E+21**	**7,749E+23**	**45,85**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cen 9B e 10B - Gasoleo

Material: DIESEL (LGO)

Cen 9B e 10B - Gasoleo\Physical Properties System\Materials\DIESEL (LGO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,530316**	
Aerosol class number	**2**	
Critical pressure	**19,5**	bar
Critical temperature	**365,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-25,579**	degC
Molecular weight	**156,308**	
Normal boiling point	**195,928**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**4,08414E-06**	bar
Triple point temperature	**-25,579**	degC
Carbon hydrogen ratio	**0,458333**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**22180**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,0136E+08**	**1,5084**	**-1,473**	**0,44521**	**0**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,942476**	

Combustion ct	**0,012207**	
Emissive power length scale	**8,33**	m
Flash point	**65,9**	degC
Heat of combustion	**6,9036E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**7000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**51000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,038507 4	3,96718	-10,9016	11,9016		-25,58	336,85	1	Constant value above fraction Tc
Liquid viscosity	101	52,176	-4951,9	-8,5676	570980	-2	-25,58	238,05	1	Constant value above fraction Tc
Surface tension	106	0,055493	1,3189	0	0	0	-25,58	365,85	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,038012	0,68615	34663	8,7219E+06		195,93	726,85	1	None (use equation)
Vapour viscosity	102	3,594E-08	0,9052	125	0		-25,58	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	195290	609980	1708,7	413020	775,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	293980	-114,98	0,96936	0	0	-25,58	160,27	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressur	101	131	-1114	-15,85	8,1871E-06	2	-25,58	365,85	1	Vapour Pressure

e		**3**	**5**							**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,36703**	**0,24876**	**639**	**0,28571**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,583**	**-727,3**	**-8,294E+07**	**-2,964E+21**	**7,749E+23**	**45,85**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cenário 11A e 12A - Falha - Gasoleo

Material: DIESEL (LGO)

Cenário 11A e 12A - Falha - Gasoleo\Physical Properties System\Materials\DIESEL (LGO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,530316**	
Aerosol class number	**2**	
Critical pressure	**19,5**	bar
Critical temperature	**365,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-25,579**	degC
Molecular weight	**156,308**	
Normal boiling point	**195,928**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**4,08414E-06**	bar
Triple point temperature	**-25,579**	degC
Carbon hydrogen ratio	**0,458333**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**22180**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,0136E+08**	**1,5084**	**-1,473**	**0,44521**	**0**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,942476**	

Combustion ct	**0,012207**	
Emissive power length scale	**8,33**	m
Flash point	**65,9**	degC
Heat of combustion	**6,9036E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**7000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**51000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

										]	
Liquid thermal conductivity	123	0,0385074	3,96718	-10,9016	11,9016		-25,58	336,85	1		Constant value above fraction Tc
Liquid viscosity	101	52,176	-4951,9	-8,5676	570980	-2	-25,58	238,05	1		Constant value above fraction Tc
Surface tension	106	0,055493	1,3189	0	0	0	-25,58	365,85	1		Constant value above fraction Tc
Vapour thermal conductivity	102	0,038012	0,68615	34663	8,7219E+06		195,93	726,85	1		None (use equation)
Vapour viscosity	102	3,594E-08	0,9052	125	0		-25,58	726,85	1		None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	195290	609980	1708,7	413020	775,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	293980	-114,98	0,96936	0	0	-25,58	160,27	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressur	101	131	-1114	-15,85	8,1871E-06	2	-25,58	365,85	1	Vapour Pressure

e		**3**	**5**							**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,36703**	**0,24876**	**639**	**0,28571**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,583**	**-727,3**	**-8,294E+07**	**-2,964E+21**	**7,749E+23**	**45,85**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cenário 11B e 12B - Falha - Gasoleo

Material: DIESEL (LGO)

Cenário 11B e 12B - Falha - Gasoleo\Physical Properties System\Materials\DIESEL (LGO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,530316**	
Aerosol class number	**2**	
Critical pressure	**19,5**	bar
Critical temperature	**365,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-25,579**	degC
Molecular weight	**156,308**	
Normal boiling point	**195,928**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**4,08414E-06**	bar
Triple point temperature	**-25,579**	degC
Carbon hydrogen ratio	**0,458333**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**22180**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,0136E+08**	**1,5084**	**-1,473**	**0,44521**	**0**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,942476**	

Combustion ct	**0,012207**	
Emissive power length scale	**8,33**	m
Flash point	**65,9**	degC
Heat of combustion	**6,9036E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**7000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**51000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,038507 4	3,96718	-10,9016	11,9016		-25,58	336,85	1	Constant value above fraction Tc
Liquid viscosity	101	52,176	-4951,9	-8,5676	570980	-2	-25,58	238,05	1	Constant value above fraction Tc
Surface tension	106	0,055493	1,3189	0	0	0	-25,58	365,85	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,038012	0,68615	34663	8,7219E+06		195,93	726,85	1	None (use equation)
Vapour viscosity	102	3,594E-08	0,9052	125	0		-25,58	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	195290	609980	1708,7	413020	775,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	293980	-114,98	0,96936	0	0	-25,58	160,27	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressur	101	131	-1114	-15,85	8,1871E-06	2	-25,58	365,85	1	Vapour Pressure

e		**3**	**5**							**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,36703**	**0,24876**	**639**	**0,28571**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,583**	**-727,3**	**-8,294E+07**	**-2,964E+21**	**7,749E+23**	**45,85**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cen 9A e 10A - Gasoleo

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - PostoA-Tiein	Cen 9A - Rot Tot	Mais Provável	298,7	14,1313	1	10000	0,508	1,97723	120
	Cen 10A - Rot 10%	Mais Provável	52,3706	13,9571	1	77,3908	0,0393495	57,7678	3600
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 9A - Rot Tot	Mais Provável	298,7	14,1313	1	10000	0,508	1,97723	120
	Cen 10A - Rot 10%	Mais Provável	52,3706	13,9571	1	77,3908	0,0393495	57,7678	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 9A - Rot Tot	Mais Provável	1,19702	1,41232	1,47533
	Cen 10A - Rot 10%	Mais Provável	13,516	16,656	17,5251
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 9A - Rot Tot	Mais Provável	1,19702	1,41232	1,47533
	Cen 10A - Rot 10%	Mais Provável	13,516	16,656	17,5251

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 9A - Rot Tot	Mais Provável	0,512416	0,70455	0,65393	0,57415
	Cen 10A - Rot 10%	Mais Provável	3,95211	8,02787	7,31928	6,30118
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 9A - Rot Tot	Mais Provável	0,512416	0,70455	0,65393	0,57415
	Cen 10A - Rot 10%	Mais Provável	3,95211	8,02787	7,31928	6,30118

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 9A - Rot Tot	Mais Provável	55,5998	68,7275	58,2555	45,3395
	Cen 10A - Rot 10%	Mais Provável	34,6771	58,5588	50,9516	41,5704
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 9A - Rot Tot	Mais Provável	82,8423	96,1728	81,9338	63,5601
	Cen 10A - Rot 10%	Mais Provável	34,6771	58,5588	50,9516	41,5704

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 9A - Rot Tot	Mais Provável	55,5998	68,7275	58,2555	45,3395
	Cen 10A - Rot 10%	Mais Provável	98,5731	110,674	94,3467	73,1486
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 9A - Rot Tot	Mais Provável	112,844	124,172	106,013	82,274
	Cen 10A - Rot 10%	Mais Provável	112,849	124,177	106,017	82,277

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 9A - Rot Tot	Mais Provável	1,41232	1,47533
	Cen 10A - Rot 10%	Mais Provável	16,656	17,5251
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 9A - Rot Tot	Mais Provável	1,41232	1,47533
	Cen 10A - Rot 10%	Mais Provável	16,656	17,5251

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - PostoA-Tiein	Cen 9A - Rot Tot	Mais Provável	1,52634	0	32,9899
	Cen 10A - Rot 10%	Mais Provável	17,0256	0,0569103	3548,96
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 9A - Rot Tot	Mais Provável	1,52634	0	60,1751
	Cen 10A - Rot 10%	Mais Provável	17,0256	0,0569103	3548,96

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - PostoA-Tiein	Cen 10A - Rot 10%	Mais Provável	0,05 0,14 0,3	11,3292 10,1736 9,82739	4,03214 1,72092 1,02846
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	11,3292 10,1736 9,82739	4,03214 1,72092 1,02846

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - PostoA-Tiein	Cen 10A - Rot 10%	Mais Provável	0,05 0,14 0,3	0,00112242 0,00112242 0,00112242	1,91797 1,91797 1,91797	10 10 10	9,31316 9,31316 9,31316	9,31316 9,31316 9,31316
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	0,00112242 0,00112242 0,00112242	1,91797 1,91797 1,91797	10 10 10	9,31316 9,31316 9,31316	9,31316 9,31316 9,31316

Consequence Summary Report

Workspace: Cen 9B e 10B - Gasoleo

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 9B - Rot Tot	Mais Provável	298,7	14,1356	1	10000	0,508	1,97724	120
	Cen 10B - Rot 10%	Mais Provável	52,3706	13,9571	1	77,3908	0,0393495	57,7678	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 9B - Rot Tot	Mais Provável	1,19717	1,41247	1,47547
	Cen 10B - Rot 10%	Mais Provável	13,516	16,6559	17,5253

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 9B - Rot Tot	Mais Provável	0,512416	0,70455	0,65393	0,57415
	Cen 10B - Rot 10%	Mais Provável	3,95211	8,02787	7,31928	6,30118

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 9B - Rot Tot	Mais Provável	55,5754	68,7025	58,2341	45,3229
	Cen 10B - Rot 10%	Mais Provável	34,6771	58,5588	50,9516	41,5704

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 9B - Rot Tot	Mais Provável	55,5754	68,7025	58,2341	45,3229
	Cen 10B - Rot 10%	Mais Provável	65,6557	78,2355	66,3426	51,5638

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 9B - Rot Tot	Mais Provável	1,41247	1,47547
	Cen 10B - Rot 10%	Mais Provável	16,6559	17,5253

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 9B - Rot Tot	Mais Provável	1,52633	0	32,9899
	Cen 10B - Rot 10%	Mais Provável	17,0255	0,0569103	3548,96

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 10B - Rot 10%	Mais Provável	0,05	11,3292	4,03214
			0,14	10,1736	1,72092
			0,3	9,82739	1,02846

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 10B - Rot 10%	Mais Provável	0,05	0,00112242	1,91797	10	9,31316	9,31316
			0,14	0,00112242	1,91797	10	9,31316	9,31316
			0,3	0,00112242	1,91797	10	9,31316	9,31316

Consequence Summary Report

Workspace: Cenário 11A e 12A - Falha - Gasoleo

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - PostoA-Tiein	Cen 11A - Rot Tot	Mais Provável	298,7	14,1313	1	10000	0,508	1,97723	3600
	Cen 12A - Rot 10%	Mais Provável	52,3706	13,9571	1	77,3908	0,0393495	57,7678	3600
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 11A - Rot Tot	Mais Provável	298,7	14,1313	1	10000	0,508	1,97723	3600
	Cen 12A - Rot 10%	Mais Provável	52,3706	13,9571	1	77,3908	0,0393495	57,7678	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 11A - Rot Tot	Mais Provável	1,19704	1,41232	1,47533
	Cen 12A - Rot 10%	Mais Provável	13,516	16,656	17,5251
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 11A - Rot Tot	Mais Provável	1,19704	1,41232	1,47533
	Cen 12A - Rot 10%	Mais Provável	13,516	16,656	17,5251

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 11A - Rot Tot	Mais Provável	0,512416	0,70455	0,65393	0,57415
	Cen 12A - Rot 10%	Mais Provável	3,95211	8,02787	7,31928	6,30118
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 11A - Rot Tot	Mais Provável	0,512416	0,70455	0,65393	0,57415
	Cen 12A - Rot 10%	Mais Provável	3,95211	8,02787	7,31928	6,30118

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 11A - Rot Tot	Mais Provável	82,8423	96,1728	81,9338	63,5601
	Cen 12A - Rot 10%	Mais Provável	34,6771	58,5588	50,9516	41,5704
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 11A - Rot Tot	Mais Provável	82,8423	96,1728	81,9338	63,5601
	Cen 12A - Rot 10%	Mais Provável	34,6771	58,5588	50,9516	41,5704

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 11A - Rot Tot	Mais Provável	98,5733	110,675	94,3469	73,1488
	Cen 12A - Rot 10%	Mais Provável	98,5731	110,674	94,3467	73,1486
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 11A - Rot Tot	Mais Provável	112,853	124,181	106,02	82,2798
	Cen 12A - Rot 10%	Mais Provável	112,849	124,177	106,017	82,277

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 11A - Rot Tot	Mais Provável	1,41232	1,47533
	Cen 12A - Rot 10%	Mais Provável	16,656	17,5251
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 11A - Rot Tot	Mais Provável	1,41232	1,47533
	Cen 12A - Rot 10%	Mais Provável	16,656	17,5251

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - PostoA-Tiein	Cen 11A - Rot Tot	Mais Provável	1,52634	0	71,4966
	Cen 12A - Rot 10%	Mais Provável	17,0256	0,0569103	3548,96
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 11A - Rot Tot	Mais Provável	1,52634	0	71,4966
	Cen 12A - Rot 10%	Mais Provável	17,0256	0,0569103	3548,96

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - PostoA-Tiein	Cen 12A - Rot 10%	Mais Provável	0,05 0,14 0,3	11,3292 10,1736 9,82739	4,03214 1,72092 1,02846
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	11,3292 10,1736 9,82739	4,03214 1,72092 1,02846

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - PostoA-Tiein	Cen 12A - Rot 10%	Mais Provável	0,05 0,14 0,3	0,00112242 0,00112242 0,00112242	1,91797 1,91797 1,91797	10 10 10	9,31316 9,31316 9,31316	9,31316 9,31316 9,31316
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	0,00112242 0,00112242 0,00112242	1,91797 1,91797 1,91797	10 10 10	9,31316 9,31316 9,31316	9,31316 9,31316 9,31316

Consequence Summary Report

Workspace: Cenário 11B e 12B - Falha - Gasoleo

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 11B - Rot Tot	Mais Provável	298,7	14,1356	1	10000	0,508	1,97724	3600
	Cen 12B - Rot 10%	Mais Provável	52,3706	13,9571	1	77,3908	0,0393495	57,7678	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 11B - Rot Tot	Mais Provável	1,19717	1,41246	1,47547
	Cen 12B - Rot 10%	Mais Provável	13,516	16,6559	17,5253

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 11B - Rot Tot	Mais Provável	0,512416	0,70455	0,65393	0,57415
	Cen 12B - Rot 10%	Mais Provável	3,95211	8,02787	7,31928	6,30118

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 11B - Rot Tot	Mais Provável	65,6316	78,211	66,3216	51,5476
	Cen 12B - Rot 10%	Mais Provável	34,6771	58,5588	50,9516	41,5704

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 11B - Rot Tot	Mais Provável	65,6316	78,211	66,3216	51,5476
	Cen 12B - Rot 10%	Mais Provável	65,6557	78,2355	66,3426	51,5638

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 11B - Rot Tot	Mais Provável	1,41246	1,47547
	Cen 12B - Rot 10%	Mais Provável	16,6559	17,5253

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 11B - Rot Tot	Mais Provável	1,52633	0	3548,92
	Cen 12B - Rot 10%	Mais Provável	17,0255	0,0569103	3548,96

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 12B - Rot 10%	Mais Provável	0,05	11,3292	4,03214
			0,14	10,1736	1,72092
			0,3	9,82739	1,02846

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 12B - Rot 10%	Mais Provável	0,05	0,00112242	1,91797	10	9,31316	9,31316
			0,14	0,00112242	1,91797	10	9,31316	9,31316
			0,3	0,00112242	1,91797	10	9,31316	9,31316

Input Report

Workspace: Cen 9A e 10A - Gasoleo

Mais Provável

Weather

Cen 9A e 10A - Gasoleo\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cen 9B e 10B - Gasoleo

Mais Provável

Weather

Cen 9B e 10B - Gasoleo\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 11A e 12A - Falha - Gasoleo

Mais Provável

Weather

Cenário 11A e 12A - Falha - Gasoleo\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 11B e 12B - Falha - Gasoleo

Mais Provável

Weather

Cenário 11B e 12B - Falha - Gasoleo\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cen 9A e 10A - Gasoleo

Vala

Pool substrate and bund

Cen 9A e 10A - Gasoleo\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2	m
		Bund area (internal)	7631	m2
		Bund diameter (internal)	98,5702	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cen 9B e 10B - Gasoleo

Vala

Pool substrate and bund

Cen 9B e 10B - Gasoleo\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2,7	m
		Bund area (internal)	3383	m2
		Bund diameter (internal)	65,6306	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 11A e 12A - Falha - Gasoleo

Vala

Pool substrate and bund
Cenário 11A e 12A - Falha - Gasoleo\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2	m
		Bund area (internal)	7631	m2
		Bund diameter (internal)	98,5702	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Mar

Pool substrate and bund

Cenário 11A e 12A - Falha - Gasoleo\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 11B e 12B - Falha - Gasoleo

Vala

Pool substrate and bund
Cenário 11B e 12B - Falha - Gasoleo\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2,7	m
		Bund area (internal)	3383	m2
		Bund diameter (internal)	65,6306	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cen 9A e 10A - Gasoleo

Study

Study
Cen 9A e 10A - Gasoleo

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - PostoA-Tiein

Pressure vessel

Cen 9A e 10A - Gasoleo\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL (LGO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4829,79	m3
		Material to track	DIESEL (LGO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1364	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4829,79	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4829,79	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 9A - Rot Tot

Short pipe

Cen 9A e 10A - Gasoleo\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1364	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	298,7	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 10A - Rot 10%

Leak

Cen 9A e 10A - Gasoleo\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Pressure vessel - PostoA-Tiein_Mar

Pressure vessel

Cen 9A e 10A - Gasoleo\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL (LGO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4829,79	m3
		Material to track	DIESEL (LGO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1364	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4829,79	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4829,79	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 9A - Rot Tot

Short pipe

Cen 9A e 10A - Gasoleo\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1364	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	298,7	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 10A - Rot 10%

Leak

Cen 9A e 10A - Gasoleo\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

CENÁRIO 14A – ROTURA 10% PIPELINE FUEL

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: FUEL

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Fuel
Densidade da substância:	1010 kg/m^3
Limite Inferior de Inflamabilidade (LII):	5 000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	45 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1817 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1382 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1581 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 312,2 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	70 °C
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura 10% de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto A e o Tie-in
Diâmetro da rotura:	50,8 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 14A – ROTURA 10% PIPELINE FUEL

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO

SUBSTÂNCIA: FUEL

OUTPUT	
Caudal máximo de libertação:	53 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 2 500 ppm (Efeitos letais)	18
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	11
7 kW/m^2 (Efeitos Letais)	10
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	107 (derrame em terra – Vala) 120 (derrame em mar)
7 kW/m^2 (Efeitos Letais)	92 (derrame em terra – Vala) 103 (derrame em mar)
Diâmetro da Piscina	99 (derrame em terra – Vala) 113 (derrame em mar)
Em terra o derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	13
0,14 bar (Efeitos Letais)	11

CENÁRIO 14B – ROTURA 10% PIPELINE FUEL

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: FUEL

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Fuel
Densidade da substância:	1010 kg/m^3
Limite Inferior de Inflamabilidade (LII):	5 000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	45 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1817 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1382 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1581 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 312,2 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	70 °C
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura 10% de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	50,8 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 14B – ROTURA 10% PIPELINE FUEL

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: FUEL

OUTPUT	
Caudal máximo de libertação:	53 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 2 500 ppm (Efeitos letais)	18
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	11
7 kW/m^2 (Efeitos Letais)	10
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	76
7 kW/m^2 (Efeitos Letais)	65
Diâmetro da Piscina	66
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	13
0,14 bar (Efeitos Letais)	11

CENÁRIO 16A – ROTURA 10% PIPELINE FUEL

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: FUEL

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Fuel
Densidade da substância:	1010 kg/m^3
Limite Inferior de Inflamabilidade (LII):	5 000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	45 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1817 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1382 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1581 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 312,2 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	70 °C
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura 10% de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto A e o Tie-in
Diâmetro da rotura:	50,8 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 16A – ROTURA 10% PIPELINE FUEL

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO

SUBSTÂNCIA: FUEL

OUTPUT	
Caudal máximo de libertação:	53 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 2 500 ppm (Efeitos letais)	18
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	11
7 kW/m^2 (Efeitos Letais)	10
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	106 (derrame em terra – Vala) 120 (derrame em mar)
7 kW/m^2 (Efeitos Letais)	92 (derrame em terra – Vala) 103 (derrame em mar)
Diâmetro da Piscina	99 (derrame em terra – Vala) 113 (derrame em mar)
Em terra o derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	13
0,14 bar (Efeitos Letais)	11

CENÁRIO 16B – ROTURA 10% PIPELINE FUEL

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: FUEL

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Fuel
Densidade da substância:	1010 kg/m^3
Limite Inferior de Inflamabilidade (LII):	5 000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	45 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1817 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1382 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1581 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 312,2 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	70 °C
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura 10% de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	50,8 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 16B – ROTURA 10% PIPELINE FUEL

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 20" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: FUEL

OUTPUT	
Caudal máximo de libertação:	53 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 2 500 ppm (Efeitos letais)	18
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	11
7 kW/m^2 (Efeitos Letais)	10
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	76
7 kW/m^2 (Efeitos Letais)	65
Diâmetro da Piscina	66
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	13
0,14 bar (Efeitos Letais)	11

CENÁRIO 13A – ROTURA TOTAL PIPELINE FUEL

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: FUEL

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Fuel
Densidade da substância:	1010 kg/m^3
Limite Inferior de Inflamabilidade (LII):	5 000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	45 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1817 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1382 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1581 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 312,2 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	70 °C
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Rotura total de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto A e o Tie-in
Diâmetro da rotura:	508 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 13A – ROTURA TOTAL PIPELINE FUEL

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O POSTO A E AS NOVAS VÁLVULAS DE CORTE RÁPIDO

SUBSTÂNCIA: FUEL

OUTPUT	
Caudal máximo de libertação:	312,2 Kg/s
Tempo de libertação:	120 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 2 500 ppm (Efeitos letais)	2
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	1
7 kW/m^2 (Efeitos Letais)	1
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	68 (derrame em terra – Vala) 120 (derrame em mar)
7 kW/m^2 (Efeitos Letais)	57 (derrame em terra – Vala) 103 (derrame em mar)
Diâmetro da Piscina	57 (derrame em terra – Vala) 113 (derrame em mar)
Em terra o derrame fica na sua totalidade contido no interior da bacia de retenção.	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	-
0,14 bar (Efeitos Letais)	-

CENÁRIO 13B – ROTURA TOTAL PIPELINE FUEL

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: FUEL

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Fuel
Densidade da substância:	1010 kg/m^3
Limite Inferior de Inflamabilidade (LII):	5 000 (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	45 000 (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1817 m
Válvula no Posto A e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie In e Tempo de Isolamento	1382 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1581 metros a 180 s
Diâmetro:	20'' = 508 mm
Caudal de operação:	1250 m^3/h = 312,2 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	70 °C
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Rotura total de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	508 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

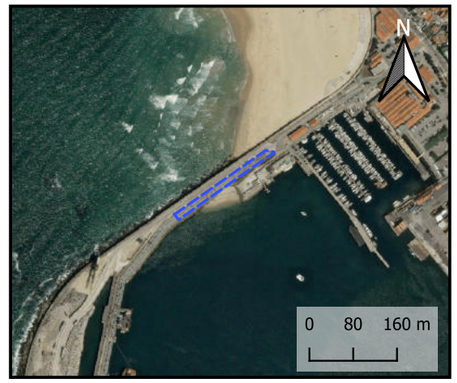
CENÁRIO 13B – ROTURA TOTAL PIPELINE FUEL

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 20" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: FUEL

OUTPUT	
Caudal máximo de libertação:	312,2 Kg/s
Tempo de libertação:	120 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 2 500 ppm (Efeitos letais)	2
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	1
7 kW/m^2 (Efeitos Letais)	1
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	68
7 kW/m^2 (Efeitos Letais)	57
Diâmetro da Piscina	56
O derrame fica na sua totalidade contido no interior da bacia de retenção.	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	-
0,14 bar (Efeitos Letais)	-





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 13

Radiação Térmica - Efeitos Letais (57 m)

Radiação Térmica - Efeitos Irreversíveis (68 m)

50% LII - Efeitos Letais (2 m)

Linha de Fuel

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

113-Jardim de Infância A Palmeirinha

74-Escola Básica do Corpo Santo

75-Escola Básica da Praia

8-AcademiCV

9-UPTEC Mar

Parques e Equipamentos Desportivos

32-Jardim do Corpo Santo

35-Parque da Capitania do Porto de Leixões

60-Marina de Leça

Espaços Culturais

5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

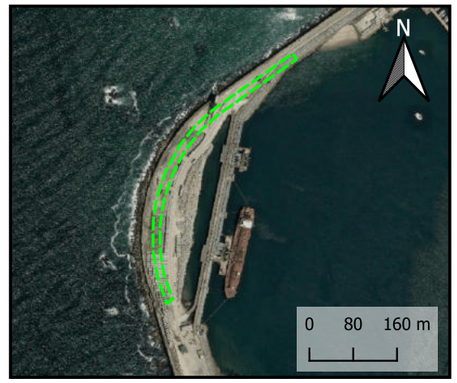
NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 041	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 13B - Rotura total de Pipeline de Fuel entre a Válvula junto ao Tie-In e a Drenagem	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO



Detalhe. Escala 1:11200

-49000 -48500 -48000

168550 168050 167550

Oceano Atlântico

Foz do Rio Leça

60

7

0 140 280 420 m

Legenda:

Cenários

- Esteira de Tubagens
- **Cenário 14**
  - Sobrepressão - Efeitos Letais - Alcances Totais
  - Sobrepressão - Efeitos Letais - Mar (11 m)
  - Sobrepressão - Efeitos Letais - Terra (11 m)
  - Sobrepressão - Efeitos Irreversíveis - Alcances Totais
  - Sobrepressão - Efeitos Irreversíveis - Mar (13 m)
  - Sobrepressão - Efeitos Irreversíveis - Terra (13 m)
  - Radiação Térmica - Efeitos Letais - Alcances Totais
  - Radiação Térmica - Efeitos Letais - Mar (103 m)
  - Radiação Térmica - Efeitos Letais - Terra (92) m
  - Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
  - Radiação Térmica - Efeitos Irreversíveis - Mar (120 m)
  - Radiação Térmica - Efeitos Irreversíveis - Terra (107 m)
  - 50% LII - Efeitos Letais - Alcances Totais
  - 50% LII - Efeitos Letais - Mar (18 m)
  - 50% LII - Efeitos Letais - Terra (18 m)
  - Linha de Fuel - Terra
  - Linha de Fuel - Mar

Envolvente

- **Elementos Sensíveis - Cenários**
  - **Estabelecimentos de Ensino**
    - 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research
  - **Parques e Equipamentos Desportivos**
    - 60-Marina de Leça
  - Reserva Ecológica Nacional
  - Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

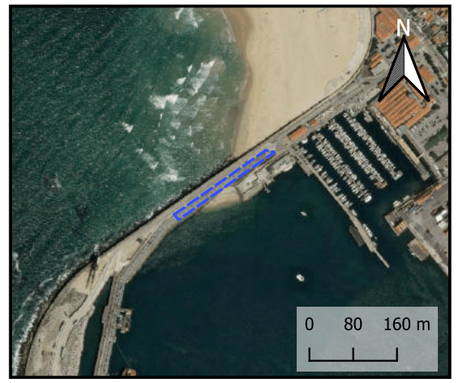
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Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 042		ESCALA: 1:5100
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 14A - Rotura total de Pipeline de Fuel entre o Posto A e Válvula junto ao Tie-In	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 14

- Sobrepressão - Efeitos Letais (11 m)
- Sobrepressão - Efeitos Irreversíveis (13 m)
- Radiação Térmica - Efeitos Letais (65 m)
- Radiação Térmica - Efeitos Irreversíveis (76 m)
- 50% LII - Efeitos Letais (18 m)
- Linha de Fuel

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

- 3-Instituto de Socorro a Naúfragos

Praias

- 18-Praia de Leça

Interfaces de Transporte

- 1-Estação Fluvial de Passageiros

Forças de Segurança

- 3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

- 113-Jardim de Infância A Palmeirinha
- 74-Escola Básica do Corpo Santo
- 75-Escola Básica da Praia
- 8-AcademiCV
- 9-UPTEC Mar

Parques e Equipamentos Desportivos

- 32-Jardim do Corpo Santo
- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais

- 5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

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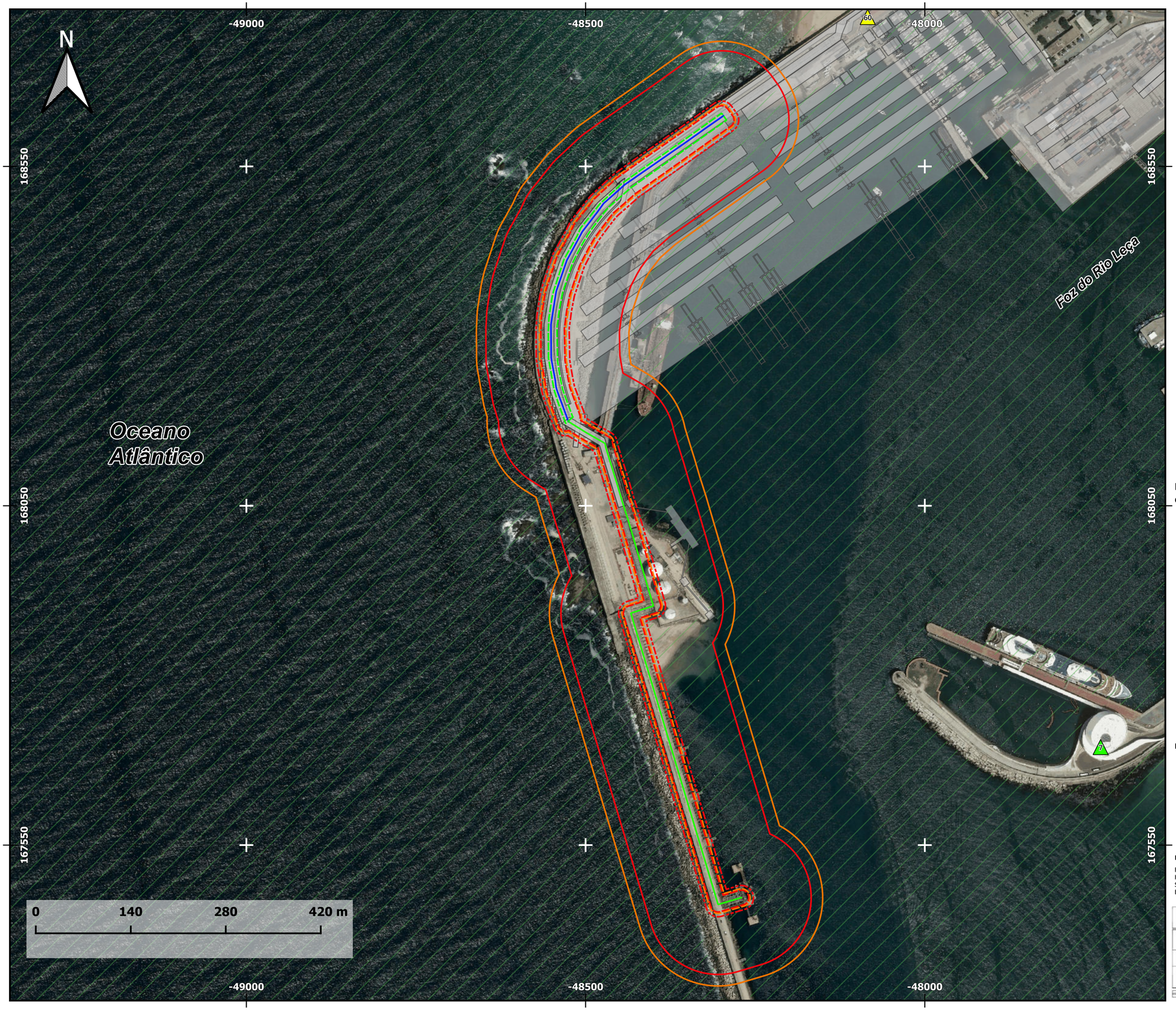
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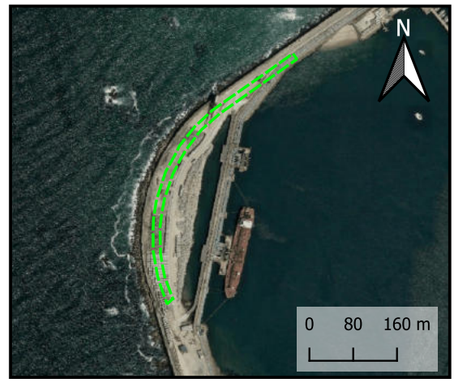
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Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 043	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025
DESIGNAÇÃO: Cenário 14B - Rotura 10% de Pipeline de Fuel entre a Válvula junto ao Tie-In e a Drenagem	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:
		FORMATO: A3

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

- Esteira de Tubagens

Cenário 16

- Sobrepressão - Efeitos Letais - Alcances Totais
- Sobrepressão - Efeitos Letais - Mar (11 m)
- Sobrepressão - Efeitos Letais - Terra (11 m)
- Sobrepressão - Efeitos Irreversíveis - Alcances Totais
- Sobrepressão - Efeitos Irreversíveis - Mar (13 m)
- Sobrepressão - Efeitos Irreversíveis - Terra (13 m)
- Radiação Térmica - Efeitos Letais - Alcances Totais
- Radiação Térmica - Efeitos Letais - Mar (103 m)
- Radiação Térmica - Efeitos Letais - Terra (92 m)
- Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
- Radiação Térmica - Efeitos Irreversíveis - Mar (120 m)
- Radiação Térmica - Efeitos Irreversíveis - Terra (106 m)
- 50% LII - Efeitos Letais - Alcances Totais
- 50% LII - Efeitos Letais - Mar (18 m)
- 50% LII - Efeitos Letais - Terra (18 m)
- Linha de Fuel - Terra
- Linha de Fuel - Mar

Envolvente

Elementos Sensíveis - Cenários

Estabelecimentos de Ensino

- 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research

Parques e Equipamentos Desportivos

- 60-Marina de Leça
- Reserva Ecológica Nacional
- Layout Alternativa A

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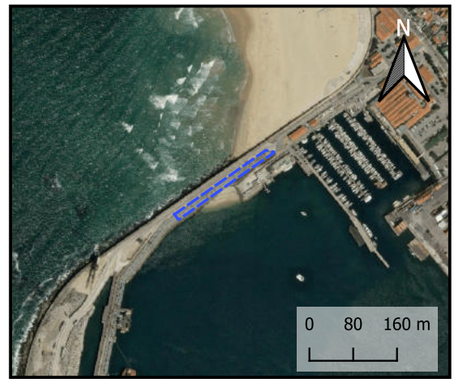
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Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 044	ESCALA: 1:5100
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 16A - Rotura 10% do diâmetro Nominal de Pipeline de Fuel entre o Posto A e Válvula junto ao Tie-In com falha da válvula automática.	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 16

- Sobrepressão - Efeitos Letais (11 m)
- Sobrepressão - Efeitos Irreversíveis (13 m)
- Radiação Térmica - Efeitos Letais (65 m)
- Radiação Térmica - Efeitos Irreversíveis (76 m)
- 50% LII - Efeitos Letais (18 m)
- Linha de Fuel

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

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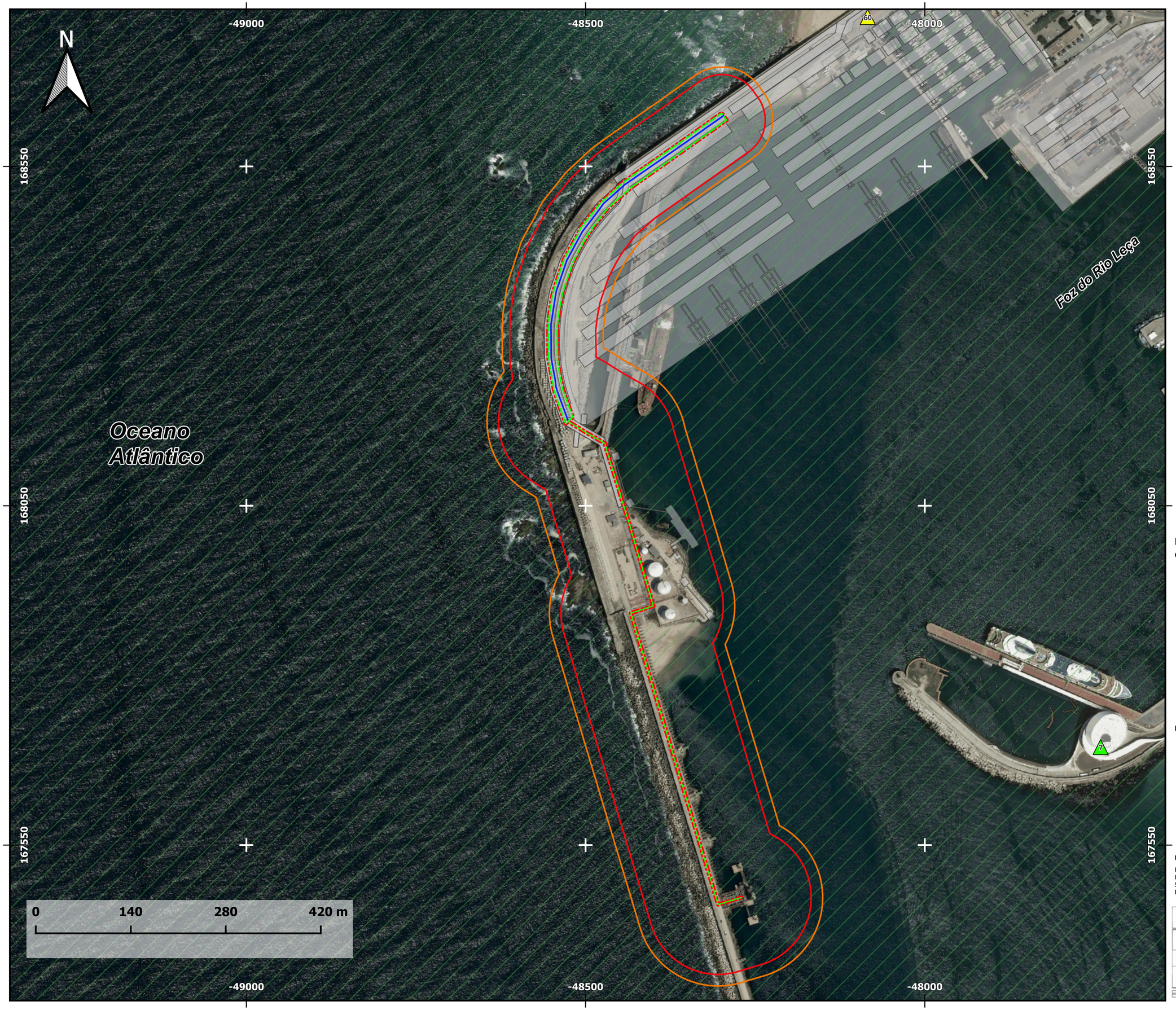
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Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

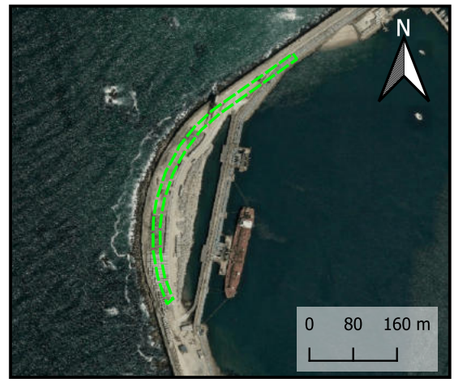
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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 045		ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 16B - Rotura 10% do diâmetro Nominal de Pipeline de Fuel entre a Válvula junto ao Tie-In e a Drenagem com falha da válvula automática.	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

- Esteira de Tubagens
- **Cenário 13**
  - Radiação Térmica - Efeitos Letais - Alcances Totais
  - Radiação Térmica - Efeitos Letais - Mar (103 m)
  - Radiação Térmica - Efeitos Letais - Terra (57) m
  - Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
  - Radiação Térmica - Efeitos Irreversíveis - Mar (120 m)
  - Radiação Térmica - Efeitos Irreversíveis - Terra (68 m)
  - 50% LII - Efeitos Letais - Alcances Totais
  - 50% LII - Efeitos Letais - Mar (2 m)
  - 50% LII - Efeitos Letais - Terra (2 m)
  - Linha de Fuel - Mar
  - Linha de Fuel - Terra

Envolvente

- **Elementos Sensíveis - Cenários**
  - **Estabelecimentos de Ensino**
    - 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research
  - **Parques e Equipamentos Desportivos**
    - 60-Marina de Leça
  - Reserva Ecológica Nacional
  - Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 040		ESCALA: 1:5100
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 13A - Rotura total de Pipeline de Fuel entre o Posto A e Válvula junto ao Tie-In	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cen 13A e 14A - Fuel

Study

Study
Cen 13A e 14A - Fuel

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - PostoA-Tiein

Pressure vessel

Cen 13A e 14A - Fuel\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL FUEL OIL (HFO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4943,78	m3
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	70	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1382	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4943,78	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4943,78	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 13A - Rot Tot

Short pipe

Cen 13A e 14A - Fuel\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1382	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	312,2	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 14A - Rot 10%

Leak

Cen 13A e 14A - Fuel\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Pressure vessel - PostoA-Tiein_Mar

Pressure vessel

Cen 13A e 14A - Fuel\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL FUEL OIL (HFO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4943,78	m3
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	70	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1382	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4943,78	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4943,78	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 13A - Rot Tot

Short pipe

Cen 13A e 14A - Fuel\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1382	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	312,2	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 14A - Rot 10%

Leak

Cen 13A e 14A - Fuel\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cen 13B e 14B - Fuel

Study

Study
Cen 13B e 14B - Fuel

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - Tiein-Drenagem

Pressure vessel
Cen 13B e 14B - Fuel\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL FUEL OIL (HFO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4943,78	m3
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	70	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1581	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	2	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4943,78	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4943,78	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 13B - Rot Tot

Short pipe

Cen 13B e 14B - Fuel\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1581	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	312,2	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	2	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 14B - Rot 10%

Leak

Cen 13B e 14B - Fuel\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cenário 15A e 16A - Falha - Fuel

Study

Study
Cenário 15A e 16A - Falha - Fuel

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - PostoA-Tiein

Pressure vessel

Cenário 15A e 16A - Falha - Fuel\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL FUEL OIL (HFO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4943,78	m3
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	70	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1382	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4943,78	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4943,78	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 15A - Rot Tot

Short pipe

Cenário 15A e 16A - Falha - Fuel\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1382	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	312,2	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 16A - Rot 10%

Leak

Cenário 15A e 16A - Falha - Fuel\Study\Pressure vessel - PostoA-Tiein

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Pressure vessel - PostoA-Tiein_Mar

Pressure vessel

Cenário 15A e 16A - Falha - Fuel\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL FUEL OIL (HFO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4943,78	m3
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	70	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1382	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4943,78	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4943,78	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 15A - Rot Tot

Short pipe

Cenário 15A e 16A - Falha - Fuel\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1382	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	312,2	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 16A - Rot 10%

Leak

Cenário 15A e 16A - Falha - Fuel\Study\Pressure vessel - PostoA-Tiein_Mar

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cenário 15B e 16B - Falha - Fuel

Study

Study

Cenário 15B e 16B - Falha - Fuel

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - Tiein-Drenagem

Pressure vessel
Cenário 15B e 16B - Falha - Fuel\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL FUEL OIL (HFO)	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	4943,78	m3
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	70	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1581	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	2	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	

Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	4943,78	m3
		Tank vapour volume	0	m3
		Tank liquid volume	4943,78	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	

		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	

		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m
		North	0	m

Cen 15B - Rot Tot

Short pipe

Cenário 15B e 16B - Falha - Fuel\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	508	mm
		Pipe length	1581	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	312,2	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	2	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the	Concentrations of interest		ppm

	material to track)			
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction

	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 16B - Rot 10%

Leak

Cenário 15B e 16B - Falha - Fuel\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	50,8	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	

	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	

		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cen 13A e 14A - Fuel

Material: DIESEL FUEL OIL (HFO)

Cen 13A e 14A - Fuel\Physical Properties System\Materials\DIESEL FUEL OIL (HFO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,643017**	
Aerosol class number	**2**	
Critical pressure	**15,7**	bar
Critical temperature	**419,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**5,86**	degC
Molecular weight	**198,388**	
Normal boiling point	**253,577**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,52685E-06**	bar
Triple point temperature	**5,86**	degC
Carbon hydrogen ratio	**0,466667**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**45070**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,2007E+08**	**1,445**	**-1,3846**	**0,42836**	**0**	**5,86001**	**419,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,940823**	

Combustion ct	**0,0096768**	
Emissive power length scale	**8,33**	m
Flash point	**109,3**	degC
Heat of combustion	**8,73282E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**5000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**45000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,044112	2,99248	-7,97743	8,97743		5,86001	376,85	1	Constant value above fraction Tc
Liquid viscosity	101	-136,73	6421,3	19,493	-2,297E-05	2	4,49999	281,25	1	Constant value above fraction Tc
Surface tension	106	0,056276	1,3631	0	0	0	5,86001	419,85	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-163,62	0,9193	-1,0876E+09	0		253,58	726,85	1	None (use equation)
Vapour viscosity	102	5,1567E-09	1,1561	0	0		5,86001	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	230820	786780	1682,3	544860	743,1	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	353140	29,13	0,86116	0	0	5,86001	253,58	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressu	101	140,47	-1323	-16,85	6,5877E-06	2	5,86001	419,85	1	Vapour Pressure

re		**1**	**9**							**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,27248**	**0,24007**	**693**	**0,28571**	**5,86001**	**419,85**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,48209**	**-501,32**	**-2,8594E+08**	**-2,572E+21**	**4,5523E+23**	**73,35**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cen 13B e 14B - Fuel

Material: DIESEL FUEL OIL (HFO)

Cen 13B e 14B - Fuel\Physical Properties System\Materials\DIESEL FUEL OIL (HFO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,643017**	
Aerosol class number	**2**	
Critical pressure	**15,7**	bar
Critical temperature	**419,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**5,86**	degC
Molecular weight	**198,388**	
Normal boiling point	**253,577**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,52685E-06**	bar
Triple point temperature	**5,86**	degC
Carbon hydrogen ratio	**0,466667**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**45070**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,2007E+08**	**1,445**	**-1,3846**	**0,42836**	**0**	**5,86001**	**419,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,940823**	

Combustion ct	**0,0096768**	
Emissive power length scale	**8,33**	m
Flash point	**109,3**	degC
Heat of combustion	**8,73282E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**5000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**45000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,044112	2,99248	-7,97743	8,97743		5,86001	376,85	1	Constant value above fraction Tc
Liquid viscosity	101	-136,73	6421,3	19,493	-2,297E-05	2	4,49999	281,25	1	Constant value above fraction Tc
Surface tension	106	0,056276	1,3631	0	0	0	5,86001	419,85	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-163,62	0,9193	-1,0876E+09	0		253,58	726,85	1	None (use equation)
Vapour viscosity	102	5,1567E-09	1,1561	0	0		5,86001	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	230820	786780	1682,3	544860	743,1	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	353140	29,13	0,86116	0	0	5,86001	253,58	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressu	101	140,47	-1323	-16,85	6,5877E-06	2	5,86001	419,85	1	Vapour Pressure

re		**1**	**9**							**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,27248**	**0,24007**	**693**	**0,28571**	**5,86001**	**419,85**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,48209**	**-501,32**	**-2,8594E+08**	**-2,572E+21**	**4,5523E+23**	**73,35**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cenário 15A e 16A - Falha - Fuel

Material: DIESEL FUEL OIL (HFO)

Cenário 15A e 16A - Falha - Fuel\Physical Properties System\Materials\DIESEL FUEL OIL (HFO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,643017**	
Aerosol class number	**2**	
Critical pressure	**15,7**	bar
Critical temperature	**419,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**5,86**	degC
Molecular weight	**198,388**	
Normal boiling point	**253,577**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,52685E-06**	bar
Triple point temperature	**5,86**	degC
Carbon hydrogen ratio	**0,466667**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**45070**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,2007E+08**	**1,445**	**-1,3846**	**0,42836**	**0**	**5,86001**	**419,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,940823**	

Combustion ct	**0,0096768**	
Emissive power length scale	**8,33**	m
Flash point	**109,3**	degC
Heat of combustion	**8,73282E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**5000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**45000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,044112	2,99248	-7,97743	8,97743		5,86001	376,85	1	Constant value above fraction Tc
Liquid viscosity	101	-136,73	6421,3	19,493	-2,297E-05	2	4,49999	281,25	1	Constant value above fraction Tc
Surface tension	106	0,056276	1,3631	0	0	0	5,86001	419,85	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-163,62	0,9193	-1,0876E+09	0		253,58	726,85	1	None (use equation)
Vapour viscosity	102	5,1567E-09	1,1561	0	0		5,86001	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	230820	786780	1682,3	544860	743,1	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	353140	29,13	0,86116	0	0	5,86001	253,58	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressu	101	140,47	-1323	-16,85	6,5877E-06	2	5,86001	419,85	1	Vapour Pressure

re		**1**	**9**							**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,27248**	**0,24007**	**693**	**0,28571**	**5,86001**	**419,85**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,48209**	**-501,32**	**-2,8594E+08**	**-2,572E+21**	**4,5523E+23**	**73,35**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cenário 15B e 16B - Falha - Fuel

Material: DIESEL FUEL OIL (HFO)

Cenário 15B e 16B - Falha - Fuel\Physical Properties System\Materials\DIESEL FUEL OIL (HFO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,643017**	
Aerosol class number	**2**	
Critical pressure	**15,7**	bar
Critical temperature	**419,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**5,86**	degC
Molecular weight	**198,388**	
Normal boiling point	**253,577**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,52685E-06**	bar
Triple point temperature	**5,86**	degC
Carbon hydrogen ratio	**0,466667**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**45070**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,2007E+08**	**1,445**	**-1,3846**	**0,42836**	**0**	**5,86001**	**419,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,940823**	

Combustion ct	**0,0096768**	
Emissive power length scale	**8,33**	m
Flash point	**109,3**	degC
Heat of combustion	**8,73282E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**5000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**45000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,044112	2,99248	-7,97743	8,97743		5,86001	376,85	1	Constant value above fraction Tc
Liquid viscosity	101	-136,73	6421,3	19,493	-2,297E-05	2	4,49999	281,25	1	Constant value above fraction Tc
Surface tension	106	0,056276	1,3631	0	0	0	5,86001	419,85	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-163,62	0,9193	-1,0876E+09	0		253,58	726,85	1	None (use equation)
Vapour viscosity	102	5,1567E-09	1,1561	0	0		5,86001	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	230820	786780	1682,3	544860	743,1	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	353140	29,13	0,86116	0	0	5,86001	253,58	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressu	101	140,47	-1323	-16,85	6,5877E-06	2	5,86001	419,85	1	Vapour Pressure

re		**1**	**9**							**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,27248**	**0,24007**	**693**	**0,28571**	**5,86001**	**419,85**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,48209**	**-501,32**	**-2,8594E+08**	**-2,572E+21**	**4,5523E+23**	**73,35**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cen 13A e 14A - Fuel

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - PostoA-Tiein	Cen 13A - Rot Tot	Mais Provável	312,2	70,0331	1	10000	0,508	2,11537	120
	Cen 14A - Rot 10%	Mais Provável	52,9882	69,8339	1	63,3441	0,0393495	59,8271	3600
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 13A - Rot Tot	Mais Provável	312,2	70,0331	1	10000	0,508	2,11537	120
	Cen 14A - Rot 10%	Mais Provável	52,9882	69,8339	1	63,3441	0,0393495	59,8271	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 13A - Rot Tot	Mais Provável	1,10204	1,10204	1,10204
	Cen 14A - Rot 10%	Mais Provável	13,3594	16,8976	17,7691
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 13A - Rot Tot	Mais Provável	1,10204	1,10204	1,10204
	Cen 14A - Rot 10%	Mais Provável	13,3594	16,8976	17,7691

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 13A - Rot Tot	Mais Provável	0,228164	0,245213	0,206631	Not reached at height of interest
	Cen 14A - Rot 10%	Mais Provável	4,86383	10,4405	9,4867	8,13801
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 13A - Rot Tot	Mais Provável	0,228164	0,245213	0,206631	Not reached at height of interest
	Cen 14A - Rot 10%	Mais Provável	4,86383	10,4405	9,4867	8,13801

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 13A - Rot Tot	Mais Provável	56,1104	67,0341	56,9763	43,5145
	Cen 14A - Rot 10%	Mais Provável	38,6792	60,7855	53,077	42,6814
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 13A - Rot Tot	Mais Provável	93,9412	103,395	88,4533	67,8336
	Cen 14A - Rot 10%	Mais Provável	38,6792	60,7855	53,077	42,6814

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 13A - Rot Tot	Mais Provável	56,1104	67,0341	56,9763	43,5145
	Cen 14A - Rot 10%	Mais Provável	98,5783	106,901	91,3889	70,0178
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 13A - Rot Tot	Mais Provável	112,838	119,921	102,689	78,8759
	Cen 14A - Rot 10%	Mais Provável	112,846	119,929	102,696	78,8808

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 13A - Rot Tot	Mais Provável	1,10204	1,10204
	Cen 14A - Rot 10%	Mais Provável	16,8976	17,7691
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 13A - Rot Tot	Mais Provável	1,10204	1,10204
	Cen 14A - Rot 10%	Mais Provável	16,8976	17,7691

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - PostoA-Tiein	Cen 13A - Rot Tot	Mais Provável	1,48169	0	0,799738
	Cen 14A - Rot 10%	Mais Provável	17,1418	0,0666193	3548,97
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 13A - Rot Tot	Mais Provável	1,48169	0	0,799738
	Cen 14A - Rot 10%	Mais Provável	17,1418	0,0666193	23,8451

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - PostoA-Tiein	Cen 14A - Rot 10%	Mais Provável	0,05 0,14 0,3	12,1088 10,4458 9,94758	5,80254 2,47653 1,48003
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	12,1088 10,4458 9,94758	5,80254 2,47653 1,48003

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - PostoA-Tiein	Cen 14A - Rot 10%	Mais Provável	0,05 0,14 0,3	0,00335629 0,00335629 0,00335629	1,91797 1,91797 1,91797	10 10 10	9,20756 9,20756 9,20756	9,20756 9,20756 9,20756
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	0,00335629 0,00335629 0,00335629	1,91797 1,91797 1,91797	10 10 10	9,20756 9,20756 9,20756	9,20756 9,20756 9,20756

Consequence Summary Report

Workspace: Cen 13B e 14B - Fuel

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 13B - Rot Tot	Mais Provável	312,2	70,0376	1	10000	0,508	2,11538	120
	Cen 14B - Rot 10%	Mais Provável	52,9882	69,8339	1	63,3441	0,0393495	59,8271	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 13B - Rot Tot	Mais Provável	1,10204	1,10204	1,10204
	Cen 14B - Rot 10%	Mais Provável	13,3594	16,8976	17,7691

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 13B - Rot Tot	Mais Provável	0,228164	0,245214	0,206631	Not reached at height of interest
	Cen 14B - Rot 10%	Mais Provável	4,86383	10,4405	9,4867	8,13801

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 13B - Rot Tot	Mais Provável	56,1104	67,0341	56,9763	43,5145
	Cen 14B - Rot 10%	Mais Provável	38,6792	60,7855	53,077	42,6814

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 13B - Rot Tot	Mais Provável	56,1104	67,0341	56,9763	43,5145
	Cen 14B - Rot 10%	Mais Provável	65,634	75,6083	64,2833	49,1056

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 13B - Rot Tot	Mais Provável	1,10204	1,10204
	Cen 14B - Rot 10%	Mais Provável	16,8976	17,7691

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 13B - Rot Tot	Mais Provável	1,48169	0	0,799738
	Cen 14B - Rot 10%	Mais Provável	17,1418	0,0666193	3548,97

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 14B - Rot 10%	Mais Provável	0,05	12,1088	5,80254
			0,14	10,4458	2,47653
			0,3	9,94758	1,48003

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 14B - Rot 10%	Mais Provável	0,05	0,00335629	1,91797	10	9,20756	9,20756
			0,14	0,00335629	1,91797	10	9,20756	9,20756
			0,3	0,00335629	1,91797	10	9,20756	9,20756

Consequence Summary Report

Workspace: Cenário 15A e 16A - Falha - Fuel

Study: Study

Summary Basis

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The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - PostoA-Tiein	Cen 15A - Rot Tot	Mais Provável	312,2	70,0331	1	10000	0,508	2,11537	3600
	Cen 16A - Rot 10%	Mais Provável	52,9882	69,8339	1	63,3441	0,0393495	59,8271	3600
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 15A - Rot Tot	Mais Provável	312,2	70,0331	1	10000	0,508	2,11537	3600
	Cen 16A - Rot 10%	Mais Provável	52,9882	69,8339	1	63,3441	0,0393495	59,8271	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 15A - Rot Tot	Mais Provável	1,24168	1,47182	1,53223
	Cen 16A - Rot 10%	Mais Provável	13,3594	16,8976	17,7691
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 15A - Rot Tot	Mais Provável	1,24168	1,47182	1,53223
	Cen 16A - Rot 10%	Mais Provável	13,3594	16,8976	17,7691

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 15A - Rot Tot	Mais Provável	0,228164	0,245213	0,206631	Not reached at height of interest
	Cen 16A - Rot 10%	Mais Provável	4,86383	10,4405	9,4867	8,13801
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 15A - Rot Tot	Mais Provável	0,228164	0,245213	0,206631	Not reached at height of interest
	Cen 16A - Rot 10%	Mais Provável	4,86383	10,4405	9,4867	8,13801

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 15A - Rot Tot	Mais Provável	93,9412	103,395	88,4533	67,8336
	Cen 16A - Rot 10%	Mais Provável	38,6792	60,7855	53,077	42,6814
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 15A - Rot Tot	Mais Provável	93,9412	103,395	88,4533	67,8336
	Cen 16A - Rot 10%	Mais Provável	38,6792	60,7855	53,077	42,6814

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - PostoA-Tiein	Cen 15A - Rot Tot	Mais Provável	98,573	106,896	91,3847	70,0145
	Cen 16A - Rot 10%	Mais Provável	98,5783	106,901	91,3889	70,0178
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 15A - Rot Tot	Mais Provável	112,84	119,923	102,691	78,8769
	Cen 16A - Rot 10%	Mais Provável	112,846	119,929	102,696	78,8808

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - PostoA-Tiein	Cen 15A - Rot Tot	Mais Provável	1,47182	1,53223
	Cen 16A - Rot 10%	Mais Provável	16,8976	17,7691
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 15A - Rot Tot	Mais Provável	1,47182	1,53223
	Cen 16A - Rot 10%	Mais Provável	16,8976	17,7691

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - PostoA-Tiein	Cen 15A - Rot Tot	Mais Provável	1,48169	0	1,91796
	Cen 16A - Rot 10%	Mais Provável	17,1418	0,0666193	3548,97
Study\Pressure vessel - PostoA-Tiein_Mar	Cen 15A - Rot Tot	Mais Provável	1,48169	0	1,91796
	Cen 16A - Rot 10%	Mais Provável	17,1418	0,0666193	23,8451

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - PostoA-Tiein	Cen 16A - Rot 10%	Mais Provável	0,05 0,14 0,3	12,1088 10,4458 9,94758	5,80254 2,47653 1,48003
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	12,1088 10,4458 9,94758	5,80254 2,47653 1,48003

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - PostoA-Tiein	Cen 16A - Rot 10%	Mais Provável	0,05 0,14 0,3	0,00335629 0,00335629 0,00335629	1,91797 1,91797 1,91797	10 10 10	9,20756 9,20756 9,20756	9,20756 9,20756 9,20756
Study\Pressure vessel - PostoA-Tiein_Mar			0,05 0,14 0,3	0,00335629 0,00335629 0,00335629	1,91797 1,91797 1,91797	10 10 10	9,20756 9,20756 9,20756	9,20756 9,20756 9,20756

Consequence Summary Report

Workspace: Cenário 15B e 16B - Falha - Fuel

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 15B - Rot Tot	Mais Provável	312,2	70,0376	1	10000	0,508	2,11538	3600
	Cen 16B - Rot 10%	Mais Provável	52,9882	69,8339	1	63,3441	0,0393495	59,8271	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 15B - Rot Tot	Mais Provável	1,2417	1,47183	1,53224
	Cen 16B - Rot 10%	Mais Provável	13,3594	16,8976	17,7691

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 15B - Rot Tot	Mais Provável	0,228164	0,245214	0,206631	Not reached at height of interest
	Cen 16B - Rot 10%	Mais Provável	4,86383	10,4405	9,4867	8,13801

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 15B - Rot Tot	Mais Provável	65,6325	75,6069	64,282	49,1047
	Cen 16B - Rot 10%	Mais Provável	38,6792	60,7855	53,077	42,6814

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 15B - Rot Tot	Mais Provável	65,6325	75,6069	64,282	49,1047
	Cen 16B - Rot 10%	Mais Provável	65,634	75,6083	64,2833	49,1056

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 15B - Rot Tot	Mais Provável	1,47183	1,53224
	Cen 16B - Rot 10%	Mais Provável	16,8976	17,7691

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 15B - Rot Tot	Mais Provável	1,48169	0	1,91796
	Cen 16B - Rot 10%	Mais Provável	17,1418	0,0666193	3548,97

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 16B - Rot 10%	Mais Provável	0,05	12,1088	5,80254
			0,14	10,4458	2,47653
			0,3	9,94758	1,48003

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 16B - Rot 10%	Mais Provável	0,05	0,00335629	1,91797	10	9,20756	9,20756
			0,14	0,00335629	1,91797	10	9,20756	9,20756
			0,3	0,00335629	1,91797	10	9,20756	9,20756

Input Report

Workspace: Cen 13A e 14A - Fuel

Mais Provável

Weather

Cen 13A e 14A - Fuel\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cen 13B e 14B - Fuel

Mais Provável

Weather

Cen 13B e 14B - Fuel\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 15A e 16A - Falha - Fuel

Mais Provável

Weather

Cenário 15A e 16A - Falha - Fuel\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 15B e 16B - Falha - Fuel

Mais Provável

Weather

Cenário 15B e 16B - Falha - Fuel\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cen 13A e 14A - Fuel

Vala

Pool substrate and bund

Cen 13A e 14A - Fuel\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2	m
		Bund area (internal)	7631	m2
		Bund diameter (internal)	98,5702	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Mar

Pool substrate and bund

Cen 13A e 14A - Fuel\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cen 13B e 14B - Fuel

Vala

Pool substrate and bund

Cen 13B e 14B - Fuel\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2,7	m
		Bund area (internal)	3383	m2
		Bund diameter (internal)	65,6306	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 15A e 16A - Falha - Fuel

Vala

Pool substrate and bund
Cenário 15A e 16A - Falha - Fuel\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2	m
		Bund area (internal)	7631	m2
		Bund diameter (internal)	98,5702	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Mar

Pool substrate and bund

Cenário 15A e 16A - Falha - Fuel\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 15B e 16B - Falha - Fuel

Vala

Pool substrate and bund
Cenário 15B e 16B - Falha - Fuel\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2,7	m
		Bund area (internal)	3383	m2
		Bund diameter (internal)	65,6306	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

CENÁRIO 17B – ROTURA TOTAL PIPELINE HEXANO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM
SUBSTÂNCIA: HEXANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Hexano
Densidade da substância:	680 kg/m^3
Limite Inferior de Inflamabilidade (LII):	12 000 ppm
Limite Superior de Inflamabilidade (LSI):	83 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1277 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	842 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1041 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	600 m^3/h = 113,3 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Rotura total de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Galeria
Diâmetro da rotura:	254 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 17B – ROTURA TOTAL PIPELINE HEXANO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: HEXANO

OUTPUT	
Caudal máximo de libertação:	113,3 Kg/s
Tempo de libertação:	120 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 6 000 ppm (Efeitos letais)	16
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	16
7 kW/m^2 (Efeitos Letais)	15
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	54
7 kW/m^2 (Efeitos Letais)	47
Diâmetro da piscina	36
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	25
0,14 bar (Efeitos Letais)	13

CENÁRIO 18A – ROTURA 10% PIPELINE HEXANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: HEXANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Hexano
Densidade da substância:	680 kg/m^3
Limite Inferior de Inflamabilidade (LII):	12 000 ppm
Limite Superior de Inflamabilidade (LSI):	83 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1277 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	842 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1041 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	600 m^3/h = 113,3 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto B e o Tie-in
Diâmetro da rotura:	25,4 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 18A – ROTURA 10% PIPELINE HEXANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: HEXANO

OUTPUT	
Caudal máximo de libertação:	11,8 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	34
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	56
7 kW/m^2 (Efeitos Letais)	51
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	78
7 kW/m^2 (Efeitos Letais)	69
Diâmetro da piscina	51
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	58
0,14 bar (Efeitos Letais)	31

CENÁRIO 18B – ROTURA 10% PIPELINE HEXANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: HEXANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Hexano
Densidade da substância:	680 kg/m^3
Limite Inferior de Inflamabilidade (LII):	12 000 ppm
Limite Superior de Inflamabilidade (LSI):	83 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1277 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	842 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1041 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	600 m^3/h = 113,3 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	25,4 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 18B – ROTURA 10% PIPELINE HEXANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: HEXANO

OUTPUT	
Caudal máximo de libertação:	11,7 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	34
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	56
7 kW/m^2 (Efeitos Letais)	51
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	77
7 kW/m^2 (Efeitos Letais)	68
Diâmetro da piscina	52
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	58
0,14 bar (Efeitos Letais)	31

CENÁRIO 20A – ROTURA 10% PIPELINE HEXANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: HEXANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Hexano
Densidade da substância:	680 kg/m^3
Limite Inferior de Inflamabilidade (LII):	12 000 ppm
Limite Superior de Inflamabilidade (LSI):	83 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1277 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	842 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1041 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	600 m^3/h = 113,3 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto B e o Tie-in
Diâmetro da rotura:	25,4 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 20A – ROTURA 10% PIPELINE HEXANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: HEXANO

OUTPUT	
Caudal máximo de libertação:	11,7 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	34
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	56
7 kW/m^2 (Efeitos Letais)	51
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	78
7 kW/m^2 (Efeitos Letais)	69
Diâmetro da piscina	52
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	58
0,14 bar (Efeitos Letais)	31

CENÁRIO 20B – ROTURA 10% PIPELINE HEXANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: HEXANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Hexano
Densidade da substância:	680 kg/m^3
Limite Inferior de Inflamabilidade (LII):	12 000 ppm
Limite Superior de Inflamabilidade (LSI):	83 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1277 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	842 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1041 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	600 m^3/h = 113,3 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	3383 m^2
Altura da bacia de retenção:	2,7 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Rotura parcial de tubagem / Libertação contínua
Local da Rotura:	Entre o Tie-in e a Drenagem
Diâmetro da rotura:	25,4 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 20B – ROTURA 10% PIPELINE HEXANO

ROTURA PARCIAL DE TUBAGEM PIPELINE ESTEIRA 10" COM FALHA DA VÁLVULA AUTOMÁTICA ENTRE AS NOVAS VÁLVULAS DE CORTE RÁPIDO E A DRENAGEM

SUBSTÂNCIA: HEXANO

OUTPUT	
Caudal máximo de libertação:	11,7 Kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	34
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	56
7 kW/m^2 (Efeitos Letais)	51
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	77
7 kW/m^2 (Efeitos Letais)	68
Diâmetro da piscina	52
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	58
0,14 bar (Efeitos Letais)	31

CENÁRIO 17A – ROTURA TOTAL PIPELINE HEXANO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO SUBSTÂNCIA: HEXANO

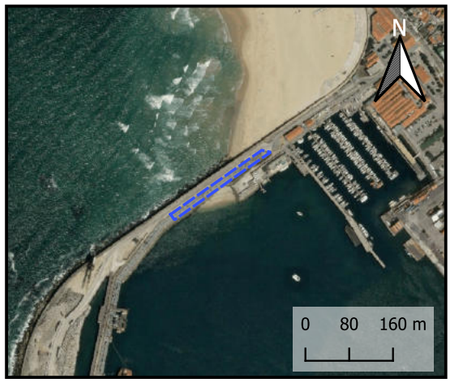
DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Hexano
Densidade da substância:	680 kg/m^3
Limite Inferior de Inflamabilidade (LII):	12 000 ppm
Limite Superior de Inflamabilidade (LSI):	83 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Pipeline
Comprimento:	1277 m
Válvula no Novo Posto B e Tempo de Isolamento	0 metros a 120 s
Válvula junto ao novo Tie-in e Tempo de Isolamento	842 metros a 120 s
Válvula na Drenagem e Tempo de Isolamento	1041 metros a 180 s
Diâmetro:	10'' = 254 mm
Caudal de operação:	600 m^3/h = 113,3 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	7631 m^2
Altura da bacia de retenção:	2 m
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Rotura total de tubagem / Libertação contínua
Local da Rotura:	Entre o Posto B e o Tie-in
Diâmetro da rotura:	254 mm
Altura de libertação relativamente ao solo:	0,1 m
Tipo de terreno:	Terra ou Mar
Direção da rotura:	Horizontal
Rugosidade do terreno:	2 m – Paredes da Vala

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 17A – ROTURA TOTAL PIPELINE HEXANO

ROTURA TOTAL DE TUBAGEM PIPELINE ESTEIRA 10" COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA ENTRE O NOVO POSTO B E AS NOVAS VÁLVULAS DE CORTE RÁPIDO
SUBSTÂNCIA: HEXANO

OUTPUT	
Caudal máximo de libertação:	113,3 Kg/s
Tempo de libertação:	120
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 6 000 ppm (Efeitos letais)	16
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	16
7 kW/m^2 (Efeitos Letais)	15
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	54
7 kW/m^2 (Efeitos Letais)	47
Diâmetro da piscina	36
O derrame fica na sua totalidade contido no interior da bacia de retenção	
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	25
0,14 bar (Efeitos Letais)	13



Detalhe. Escala 1:11200

-49000 -48500 -48000 -47500

169050 168550 168050

Oceano Atlântico

Foz do Rio Leça

0 140 280 420 m

Legenda:

Cenários

Esteira de Tubagens

Cenário 17

- Sobrepressão - Efeitos Letais (13 m)
- Sobrepressão - Efeitos Irreversíveis (25 m)
- Radiação Térmica - Efeitos Letais (47 m)
- Radiação Térmica - Efeitos Irreversíveis (54 m)
- 50% LII - Efeitos Letais (16 m)
- Linha de Hexano

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

113-Jardim de Infância A Palmeirinha

74-Escola Básica do Corpo Santo

75-Escola Básica da Praia

8-AcademiCV

9-UPTEC Mar

Parques e Equipamentos Desportivos

32-Jardim do Corpo Santo

35-Parque da Capitania do Porto de Leixões

60-Marina de Leça

Espaços Culturais

5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

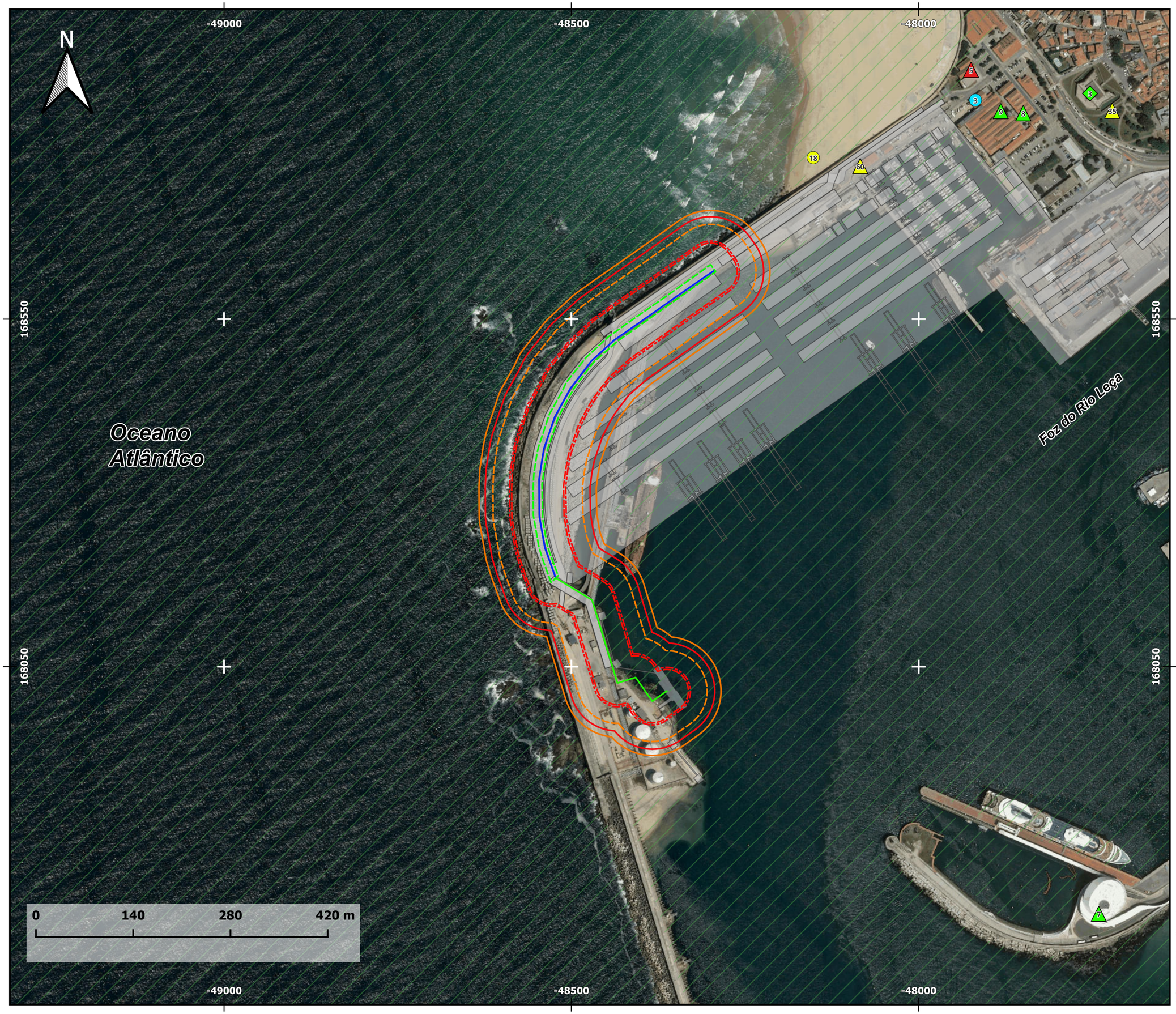
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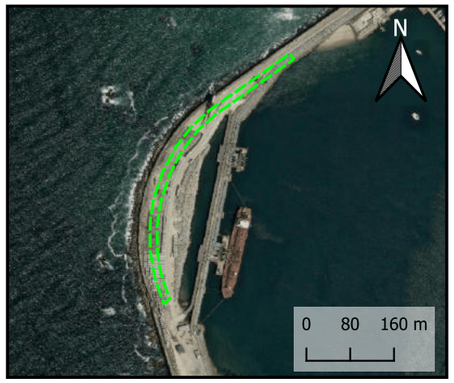
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 047	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025
DESIGNAÇÃO: Cenário 17B - Rotura total de Pipeline de Hexano entre a Válvula junto ao Tie-In e a Drenagem	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:	FORMATO: A3

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

- Esteira de Tubagens
- **Cenário 18**
  - Sobrepressão - Efeitos Letais - Alcances Totais
  - Sobrepressão - Efeitos Letais - Mar (31 m)
  - Sobrepressão - Efeitos Letais - Terra (31 m)
  - Sobrepressão - Efeitos Irreversíveis - Alcances Totais
  - Sobrepressão - Efeitos Irreversíveis - Mar (58 m)
  - Sobrepressão - Efeitos Irreversíveis - Terra (58 m)
  - Radiação Térmica - Efeitos Letais - Alcances Totais
  - Radiação Térmica - Efeitos Letais - Mar (69 m)
  - Radiação Térmica - Efeitos Letais - Terra (69) m
  - Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
  - Radiação Térmica - Efeitos Irreversíveis - Mar (78 m)
  - Radiação Térmica - Efeitos Irreversíveis - Terra (78 m)
  - 50% LII - Efeitos Letais - Alcances Totais
  - 50% LII - Efeitos Letais - Mar (34 m)
  - 50% LII - Efeitos Letais - Terra (34 m)
  - Linha de Hexano - Terra
  - Linha de Hexano - Mar

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

- 3-Instituto de Socorro a Naúfragos

Praias

- 18-Praia de Leça

Forças de Segurança

- 3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

- 7-CIIMAR - Interdisciplinary Centre of Marine and Environmental Research
- 8-AcademiCV
- 9-UPTEC Mar

Parques e Equipamentos Desportivos

- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais

- 5-Auditório Infante Dom Henrique

- Reserva Ecológica Nacional
- Layout Alternativa A

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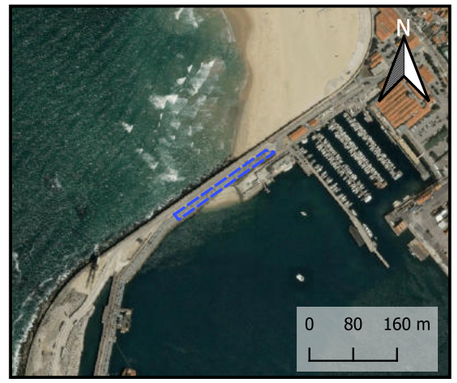
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 048		ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 18A -Rotura 10% de Pipeline de Hexano entre o novo Posto B e Válvula junto ao Tie-In	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA, NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

- Esteira de Tubagens
- **Cenário 18**
  - Sobrepressão - Efeitos Letais (31 m)
  - Sobrepressão - Efeitos Irreversíveis (58 m)
  - Radiação Térmica - Efeitos Letais (68 m)
  - Radiação Térmica - Efeitos Irreversíveis (77 m)
  - 50% LII - Efeitos Letais (34 m)
  - Linha de Hexano

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro
- 3-Instituto de Socorro a Naúfragos

Praias
- 18-Praia de Leça

Interfaces de Transporte
- 1-Estação Fluvial de Passageiros

Forças de Segurança
- 3-Capitania do Porto de Leixões

Estabelecimentos de Ensino
- 113-Jardim de Infância A Palmeirinha
- 74-Escola Básica do Corpo Santo
- 75-Escola Básica da Praia
- 8-AcademiCV
- 9-UPTEC Mar

Parques e Equipamentos Desportivos
- 32-Jardim do Corpo Santo
- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais
- 5-Auditório Infante Dom Henrique

- Reserva Ecológica Nacional
- Layout Alternativa A

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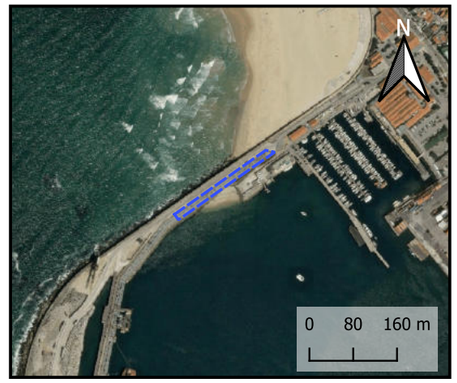
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 049	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 · DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 18B - Rotura 10% de Pipeline de Hexano entre a Válvula junto ao Tie-In e a Drenagem	TÉCNICO RESPONSÁVEL: Ana Dias · VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 20

- Sobrepressão - Efeitos Letais (31 m)
- Sobrepressão - Efeitos Irreversíveis (58 m)
- Radiação Térmica - Efeitos Letais (68 m)
- Radiação Térmica - Efeitos Irreversíveis (77 m)
- 50% LII - Efeitos Letais (34 m)
- Linha de Hexano

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Interfaces de Transporte

1-Estação Fluvial de Passageiros

Forças de Segurança

3-Capitania do Porto de Leixões

Estabelecimentos de Ensino

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- 75-Escola Básica da Praia
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- 9-UPTEC Mar

Parques e Equipamentos Desportivos

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- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais

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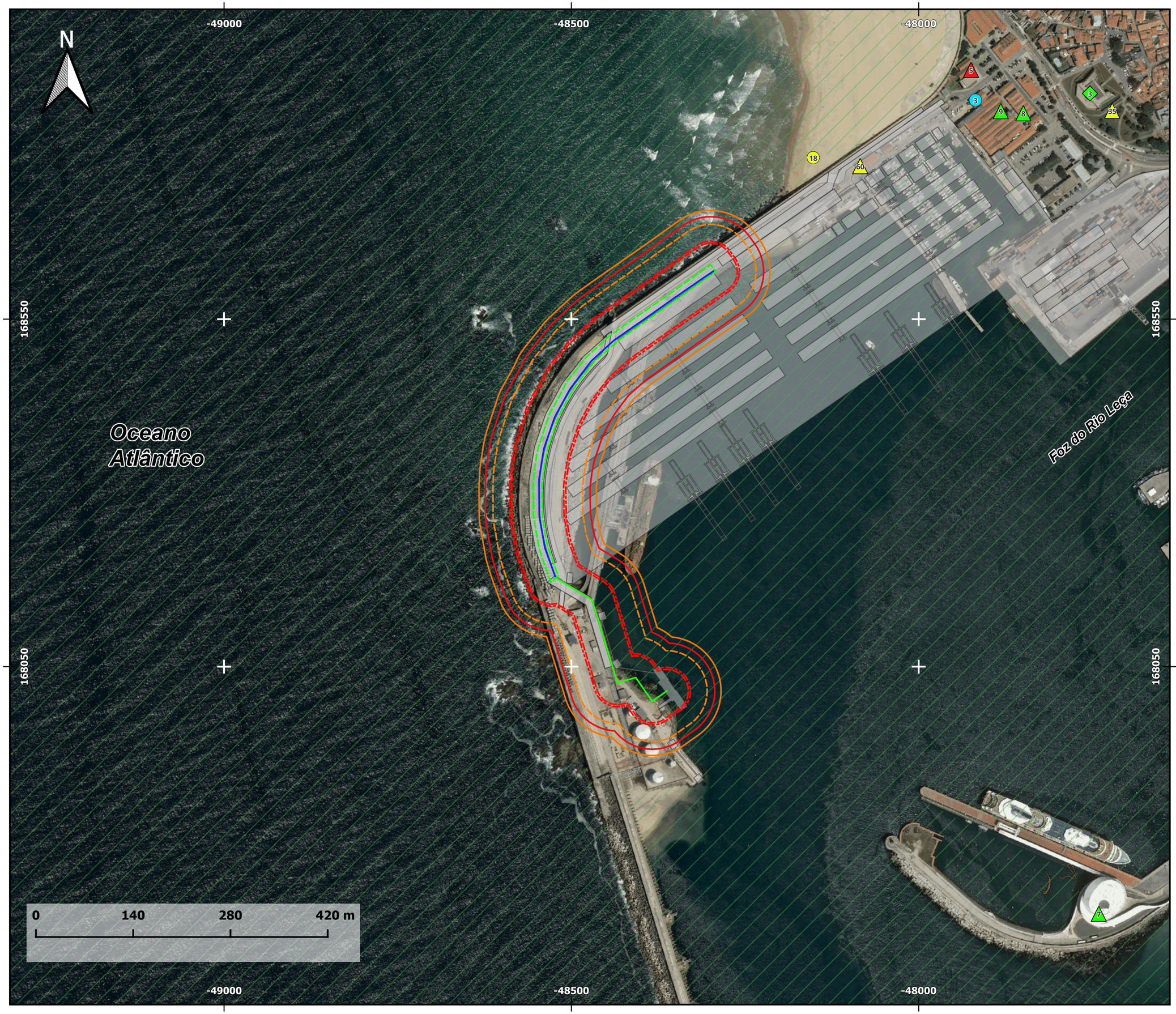
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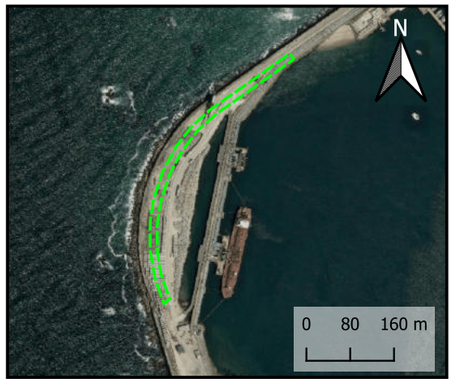
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 051	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 20B - Rotura 10% do diâmetro Nominal de Pipeline de Hexano entre a Válvula junto ao Tie-In e a Drenagem com falha da válvula automática.	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 20

Sobrepressão - Efeitos Letais - Alcances Totais
Sobrepressão - Efeitos Letais - Mar (31 m)
Sobrepressão - Efeitos Letais - Terra (31 m)
Sobrepressão - Efeitos Irreversíveis - Alcances Totais
Sobrepressão - Efeitos Irreversíveis - Mar (58 m)
Sobrepressão - Efeitos Irreversíveis - Terra (58 m)
Radiação Térmica - Efeitos Letais - Alcances Totais
Radiação Térmica - Efeitos Letais - Mar (69 m)
Radiação Térmica - Efeitos Letais - Terra (69) m
Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
Radiação Térmica - Efeitos Irreversíveis - Mar (78 m)
Radiação Térmica - Efeitos Irreversíveis - Terra (78 m)
50% LII - Efeitos Letais - Alcances Totais
50% LII - Efeitos Letais - Mar (34 m)
50% LII - Efeitos Letais - Terra (34 m)
Linha de Hexano - Mar
Linha de Hexano - Terra

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

3-Instituto de Socorro a Naúfragos

Praias

18-Praia de Leça

Forças de Segurança

3-Capitania do Porto de Leixões

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Reserva Ecológica Nacional
Layout Alternativa A

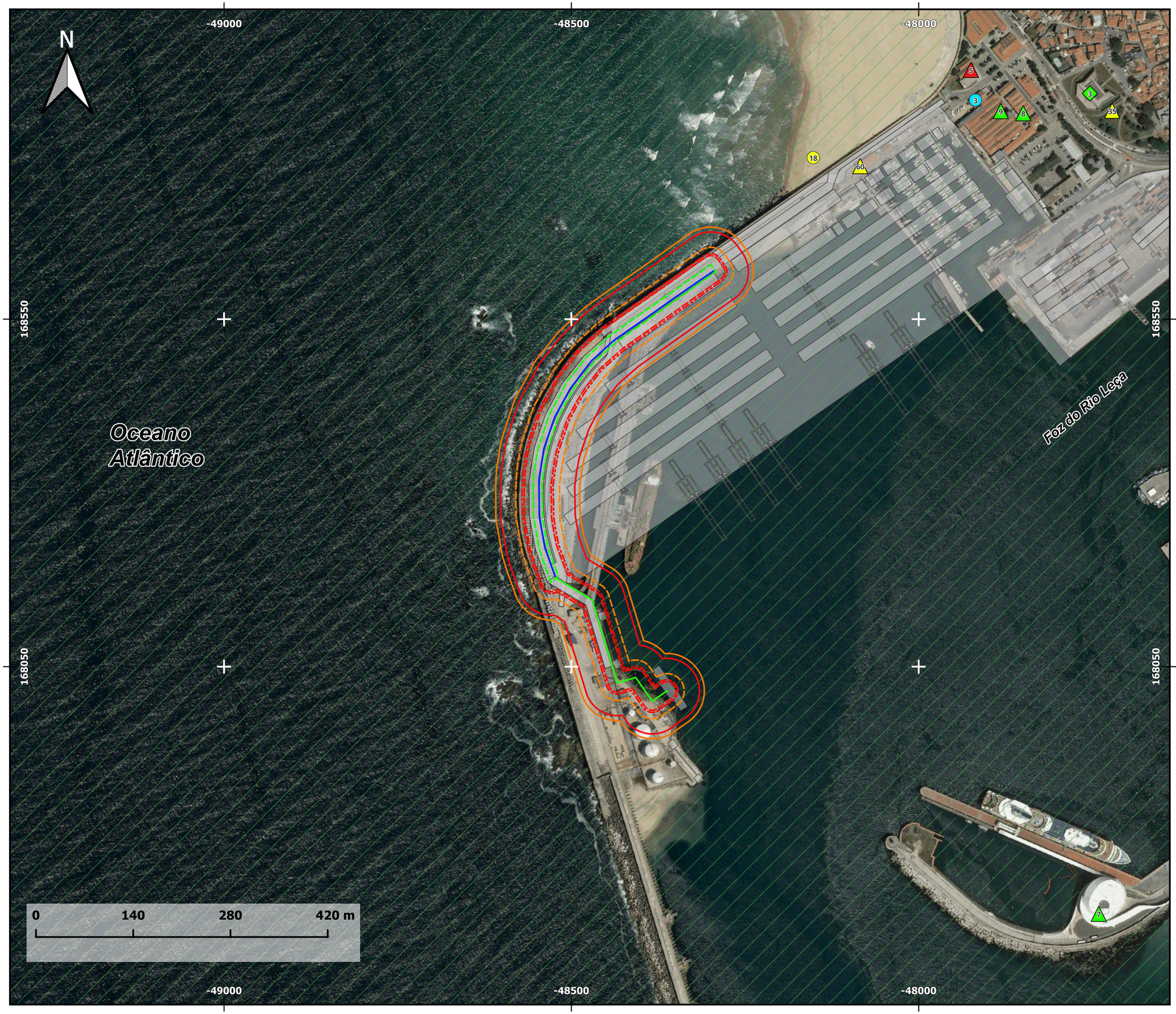
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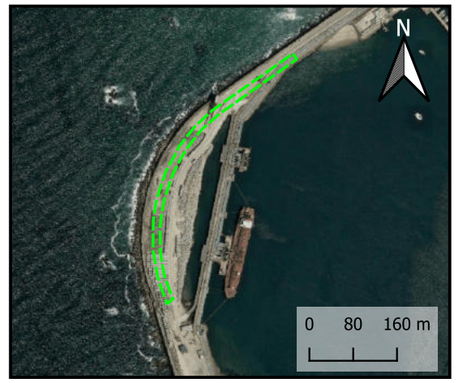
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Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 050	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 20A -Rotura 10% do diâmetro Nominal de Pipeline de Hexano entre o novo Posto B e Válvula junto ao Tie-In com falha da válvula automática.	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA, NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:11200

Legenda:

Cenários

Esteira de Tubagens

Cenário 17

- Linha de Hexano - Mar
- Linha de Hexano - Terra
- Sobrepressão - Efeitos Letais - Alcances Totais
- Sobrepressão - Efeitos Letais - Mar (13 m)
- Sobrepressão - Efeitos Letais - Terra (13 m)
- Sobrepressão - Efeitos Irreversíveis - Alcances Totais
- Sobrepressão - Efeitos Irreversíveis - Mar (25 m)
- Sobrepressão - Efeitos Irreversíveis - Terra (25 m)
- Radiação Térmica - Efeitos Letais - Alcances Totais
- Radiação Térmica - Efeitos Letais - Mar (47 m)
- Radiação Térmica - Efeitos Letais - Terra (47) m
- Radiação Térmica - Efeitos Irreversíveis - Alcances Totais
- Radiação Térmica - Efeitos Irreversíveis - Mar (54 m)
- Radiação Térmica - Efeitos Irreversíveis - Terra (54 m)
- 50% LII - Efeitos Letais - Alcances Totais
- 50% LII - Efeitos Letais - Mar (16 m)
- 50% LII - Efeitos Letais - Terra (16 m)

Envolvente

Elementos Sensíveis - Cenários

Forças de Socorro

- 3-Instituto de Socorro a Naúfragos

Praias

- 18-Praia de Leça

Forças de Segurança

- 3-Capitania do Porto de Leixões

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- 9-UPTEC Mar

Parques e Equipamentos Desportivos

- 35-Parque da Capitania do Porto de Leixões
- 60-Marina de Leça

Espaços Culturais

- 5-Auditório Infante Dom Henrique

Reserva Ecológica Nacional

Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

CertiTecna Engenharia de Segurança

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 046	ESCALA: 1:5000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 17A -Rotura total de Pipeline de Hexano entre o novo Posto B e Válvula junto ao Tie-In	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cenário 19A e 20A - Falha - Hexano

Vala

Pool substrate and bund
Cenário 19A e 20A - Falha - Hexano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2	m
		Bund area (internal)	7631	m2
		Bund diameter (internal)	98,5702	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Mar

Pool substrate and bund

Cenário 19A e 20A - Falha - Hexano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 19B e 20B - Falha - Hexano

Vala

Pool substrate and bund
Cenário 19B e 20B - Falha - Hexano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2,7	m
		Bund area (internal)	3383	m2
		Bund diameter (internal)	65,6306	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 17A e 18A - Hexano

Study

Study
Cenário 17A e 18A - Hexano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - Posto B-Tiein

Pressure vessel

Cenário 17A e 18A - Hexano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-HEXANE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5407,74	m3
		Material to track	N-HEXANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1276	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5407,74	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5407,74	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 17A - Rot Tot

Short pipe

Cenário 17A e 18A - Hexano\Study\Pressure vessel - Posto B-Tiein

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	1276	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	113,3	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 18A - Rot 10%

Leak

Cenário 17A e 18A - Hexano\Study\Pressure vessel - Posto B-Tiein

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Pressure vessel - Posto B-Tiein Mar

Pressure vessel

Cenário 17A e 18A - Hexano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-HEXANE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5407,74	m3
		Material to track	N-HEXANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1276	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5407,74	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5407,74	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 17A - Rot Tot

Short pipe

Cenário 17A e 18A - Hexano\Study\Pressure vessel - Posto B-Tiein Mar

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	1276	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	113,3	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	1	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 18A - Rot 10%

Leak

Cenário 17A e 18A - Hexano\Study\Pressure vessel - Posto B-Tiein Mar

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cenário 17B e 18B - Hexano

Study

Study
Cenário 17B e 18B - Hexano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - Tiein-Drenagem

Pressure vessel

Cenário 17B e 18B - Hexano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-HEXANE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5407,74	m3
		Material to track	N-HEXANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1041	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	2	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5407,74	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5407,74	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 17B - Rot Tot

Short pipe

Cenário 17B e 18B - Hexano\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	1276	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	113,3	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	2	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 18B - Rot 10%

Leak

Cenário 17B e 18B - Hexano\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cenário 19A e 20A - Falha - Hexano

Study

Study

Cenário 19A e 20A - Falha - Hexano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - Posto B-Tiein

Pressure vessel

Cenário 19A e 20A - Falha - Hexano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-HEXANE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5407,74	m3
		Material to track	N-HEXANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1276	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of	Allow phase change (equilibrium)	

		orifice?		
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying	Modelling of time-varying	Vacuum relief valve	Operating	

releases	leaks and line ruptures			
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5407,74	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5407,74	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying	Blowdown?	Fails	

	releases			
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	

		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	

		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model	Horizontal	Use standard method	

	data	options		
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m
		North	0	m

Cen 19A - Rot Tot

Short pipe

Cenário 19A e 20A - Falha - Hexano\Study\Pressure vessel - Posto B-Tiein

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	1276	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	113,3	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	

	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of		m

		interest		
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2

		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard	

			method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 20A - Rot 10%

Leak

Cenário 19A e 20A - Falha - Hexano\Study\Pressure vessel - Posto B-Tiein

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion	Concentrations of interest		ppm

	scope (N.B Based on the material to track)			
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	

		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	

		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Pressure vessel - Posto B-Tiein Mar

Pressure vessel

Cenário 19A e 20A - Falha - Hexano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-HEXANE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5407,74	m3
		Material to track	N-HEXANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1276	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of	Allow phase change (equilibrium)	

		orifice?		
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying	Modelling of time-varying	Vacuum relief valve	Operating	

releases	leaks and line ruptures			
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5407,74	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5407,74	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying	Blowdown?	Fails	

	releases			
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	

		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	

		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model	Horizontal	Use standard method	

	data	options		
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m
		North	0	m

Cen 19A - Rot Tot

Short pipe

Cenário 19A e 20A - Falha - Hexano\Study\Pressure vessel - Posto B-Tiein Mar

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	1276	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	113,3	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	

	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	1	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of		m

		interest		
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2

		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard	

			method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 20A - Rot 10%

Leak

Cenário 19A e 20A - Falha - Hexano\Study\Pressure vessel - Posto B-Tiein Mar

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion	Concentrations of interest		ppm

	scope (N.B Based on the material to track)			
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	

		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	

		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Input Report

Workspace: Cenário 19B e 20B - Falha - Hexano

Study

Study
Cenário 19B e 20B - Falha - Hexano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Vala
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel - Tiein-Drenagem

Pressure vessel

Cenário 19B e 20B - Falha - Hexano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-HEXANE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5407,74	m3
		Material to track	N-HEXANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	1041	m
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	2	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5407,74	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5407,74	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 19B - Rot Tot

Short pipe

Cenário 19B e 20B - Falha - Hexano\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	1276	m
	Hole	Orifice diameter		mm
	Release location	Elevation	0,1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	113,3	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	2	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 20B - Rot 10%

Leak

Cenário 19B e 20B - Falha - Hexano\Study\Pressure vessel - Tiein-Drenagem

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	0,1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Allow phase change (equilibrium)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Vala	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid	Use explosion mass	Yes	

	method	modification factor		
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cenário 17A e 18A - Hexano

Material: N-HEXANE

Cenário 17A e 18A - Hexano\Physical Properties System\Materials\N-HEXANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,301261**	
Aerosol class number	**2**	
Critical pressure	**30,25**	bar
Critical temperature	**234,45**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-95,32**	degC
Molecular weight	**86,1754**	
Normal boiling point	**68,73**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**9,01695E-06**	bar
Triple point temperature	**-95,32**	degC
Carbon hydrogen ratio	**0,428571**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**13080**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**4,3848E+07**	**0,34057**	**0,063282**	**-0,017037**	**0**	**-95,32**	**234,45**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,948686**	
Combustion ct	**0,0216357**	
Emissive power length scale	**8,33**	m
Flash point	**-23**	degC
Heat of combustion	**3,8551E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**12000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,5**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**83000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,0533439	1,32615	-3,74913	5,69816		-95,32	176,85	1	Constant value above fraction Tc
Liquid viscosity	101	-56,569	2140,5	7,5175	-1,7676E-05	2	-98,5	132,93	1	Constant value above fraction Tc
Surface tension	106	0,055003	1,2674	0	0	0	-95,32	234,45	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-650,5	0,8053	-1,4121E+09	0		65,94	726,85	1	None (use equation)
Vapour viscosity	102	1,7514E-07	0,70737	157,14	0		-95,32	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	104400	352300	1694,6	236900	761,6	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	172120	-183,78	0,88734	0	0	-95,32	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	104,6	-	-	1,2381	2	-95,32	234,45	1	Vapour

pressure	5	6995,5	12,702	E-05		Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	0,70824	0,26411	507,6	0,27537	-95,32	234,45	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,197	-200	-3,71E+07	1,67E+19	-6,18E+21	-19,45	1226,85	1	None (use equation)

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)
Hexamer	101	0	-	0	0	0	-273,15	-273,15	1	None (use

coefficients			**0**							**equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,0511**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cenário 17B e 18B - Hexano

Material: N-HEXANE

Cenário 17B e 18B - Hexano\Physical Properties System\Materials\N-HEXANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,301261**	
Aerosol class number	**2**	
Critical pressure	**30,25**	bar
Critical temperature	**234,45**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-95,32**	degC
Molecular weight	**86,1754**	
Normal boiling point	**68,73**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**9,01695E-06**	bar
Triple point temperature	**-95,32**	degC
Carbon hydrogen ratio	**0,428571**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**13080**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**4,3848E+07**	**0,34057**	**0,063282**	**-0,017037**	**0**	**-95,32**	**234,45**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,948686**	
Combustion ct	**0,0216357**	
Emissive power length scale	**8,33**	m
Flash point	**-23**	degC
Heat of combustion	**3,8551E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**12000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,5**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**83000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,0533439	1,32615	-3,74913	5,69816		-95,32	176,85	1	Constant value above fraction Tc
Liquid viscosity	101	-56,569	2140,5	7,5175	-1,7676E-05	2	-98,5	132,93	1	Constant value above fraction Tc
Surface tension	106	0,055003	1,2674	0	0	0	-95,32	234,45	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-650,5	0,8053	-1,4121E+09	0		65,94	726,85	1	None (use equation)
Vapour viscosity	102	1,7514E-07	0,70737	157,14	0		-95,32	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	104400	352300	1694,6	236900	761,6	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	172120	-183,78	0,88734	0	0	-95,32	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	104,6	-	-	1,2381	2	-95,32	234,45	1	Vapour

pressure	5	6995,5	12,702	E-05		Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	0,70824	0,26411	507,6	0,27537	-95,32	234,45	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,197	-200	-3,71E+07	1,67E+19	-6,18E+21	-19,45	1226,85	1	None (use equation)

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)
Hexamer	101	0	-	0	0	0	-273,15	-273,15	1	None (use

coefficients			**0**							**equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,0511**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cenário 19A e 20A - Falha - Hexano

Material: N-HEXANE

Cenário 19A e 20A - Falha - Hexano\Physical Properties System\Materials\N-HEXANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,301261**	
Aerosol class number	**2**	
Critical pressure	**30,25**	bar
Critical temperature	**234,45**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-95,32**	degC
Molecular weight	**86,1754**	
Normal boiling point	**68,73**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**9,01695E-06**	bar
Triple point temperature	**-95,32**	degC
Carbon hydrogen ratio	**0,428571**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**13080**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**4,3848E+07**	**0,34057**	**0,063282**	**-0,017037**	**0**	**-95,32**	**234,45**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,948686**	
Combustion ct	**0,0216357**	
Emissive power length scale	**8,33**	m
Flash point	**-23**	degC
Heat of combustion	**3,8551E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**12000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,5**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**83000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,0533439	1,32615	-3,74913	5,69816		-95,32	176,85	1	Constant value above fraction Tc
Liquid viscosity	101	-56,569	2140,5	7,5175	-1,7676E-05	2	-98,5	132,93	1	Constant value above fraction Tc
Surface tension	106	0,055003	1,2674	0	0	0	-95,32	234,45	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-650,5	0,8053	-1,4121E+09	0		65,94	726,85	1	None (use equation)
Vapour viscosity	102	1,7514E-07	0,70737	157,14	0		-95,32	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	104400	352300	1694,6	236900	761,6	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	172120	-183,78	0,88734	0	0	-95,32	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	104,6	-	-	1,2381	2	-95,32	234,45	1	Vapour

pressure	5	6995,5	12,702	E-05		Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	0,70824	0,26411	507,6	0,27537	-95,32	234,45	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,197	-200	-3,71E+07	1,67E+19	-6,18E+21	-19,45	1226,85	1	None (use equation)

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)
Hexamer	101	0	-	0	0	0	-273,15	-273,15	1	None (use

coefficients			**0**							**equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,0511**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Materials Report

Workspace: Cenário 19B e 20B - Falha - Hexano

Material: N-HEXANE

Cenário 19B e 20B - Falha - Hexano\Physical Properties System\Materials\N-HEXANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,301261**	
Aerosol class number	**2**	
Critical pressure	**30,25**	bar
Critical temperature	**234,45**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-95,32**	degC
Molecular weight	**86,1754**	
Normal boiling point	**68,73**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**9,01695E-06**	bar
Triple point temperature	**-95,32**	degC
Carbon hydrogen ratio	**0,428571**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**13080**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**4,3848E+07**	**0,34057**	**0,063282**	**-0,017037**	**0**	**-95,32**	**234,45**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,948686**	
Combustion ct	**0,0216357**	
Emissive power length scale	**8,33**	m
Flash point	**-23**	degC
Heat of combustion	**3,8551E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**12000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,5**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**83000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,0533439	1,32615	-3,74913	5,69816		-95,32	176,85	1	Constant value above fraction Tc
Liquid viscosity	101	-56,569	2140,5	7,5175	-1,7676E-05	2	-98,5	132,93	1	Constant value above fraction Tc
Surface tension	106	0,055003	1,2674	0	0	0	-95,32	234,45	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-650,5	0,8053	-1,4121E+09	0		65,94	726,85	1	None (use equation)
Vapour viscosity	102	1,7514E-07	0,70737	157,14	0		-95,32	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	104400	352300	1694,6	236900	761,6	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	172120	-183,78	0,88734	0	0	-95,32	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	104,6	-	-	1,2381	2	-95,32	234,45	1	Vapour

pressure	5	6995,55	12,702	E-05	Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	0,70824	0,26411	507,6	0,27537	-95,32	234,45	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,197	-200	-3,71E+07	1,67E+19	-6,18E+21	-19,45	1226,85	1	None (use equation)

Association

Constants

Acid association flag	Not Modelled	
Enthalpy interpolation range	0	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)
Hexamer	101	0	-	0	0	0	-273,15	-273,15	1	None (use

coefficients			**0**							**equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,0511**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cenário 17A e 18A - Hexano

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - Posto B-Tiein	Cen 17A - Rot Tot	Mais Provável	113,3	14,2271	1	10000	0,254	3,35938	120
	Cen 18A - Rot 10%	Mais Provável	11,7342	13,8317	1	58,2191	0,0196748	57,9569	3600
Study\Pressure vessel - Posto B-Tiein Mar	Cen 17A - Rot Tot	Mais Provável	113,3	14,2271	1	10000	0,254	3,35938	120
	Cen 18A - Rot 10%	Mais Provável	11,7342	13,8317	1	58,2191	0,0196748	57,9569	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - Posto B-Tiein	Cen 17A - Rot Tot	Mais Provável	1,50127	8,94632	15,7239
	Cen 18A - Rot 10%	Mais Provável	9,61781	21,6345	33,2152
Study\Pressure vessel - Posto B-Tiein Mar	Cen 17A - Rot Tot	Mais Provável	1,50127	8,94632	15,7239
	Cen 18A - Rot 10%	Mais Provável	9,61781	21,6345	33,2152

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Posto B-Tiein	Cen 17A - Rot Tot	Mais Provável	9,29362	15,6097	14,4575	12,7865
	Cen 18A - Rot 10%	Mais Provável	25,9218	55,7298	50,7006	43,534
Study\Pressure vessel - Posto B-Tiein Mar	Cen 17A - Rot Tot	Mais Provável	9,29362	15,6097	14,4575	12,7865
	Cen 18A - Rot 10%	Mais Provável	25,9218	55,7298	50,7006	43,534

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Posto B-Tiein	Cen 17A - Rot Tot	Mais Provável	35,7982	53,75	46,8443	38,0495
	Cen 18A - Rot 10%	Mais Provável	11,4281	41,3061	37,0346	28,413
Study\Pressure vessel - Posto B-Tiein Mar	Cen 17A - Rot Tot	Mais Provável	35,7982	53,75	46,8443	38,0495
	Cen 18A - Rot 10%	Mais Provável	11,4281	41,3061	37,0346	28,413

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Posto B-Tiein	Cen 17A - Rot Tot	Mais Provável	35,7982	53,75	46,8443	38,0495
	Cen 18A - Rot 10%	Mais Provável	51,0328	77,8469	68,6737	57,332
Study\Pressure vessel - Posto B-Tiein Mar	Cen 17A - Rot Tot	Mais Provável	35,7982	53,75	46,8443	38,0495
	Cen 18A - Rot 10%	Mais Provável	51,0328	77,8469	68,6737	57,332

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - Posto B-Tiein	Cen 17A - Rot Tot	Mais Provável	8,94632	15,7239
	Cen 18A - Rot 10%	Mais Provável	21,6345	33,2152
Study\Pressure vessel - Posto B-Tiein Mar	Cen 17A - Rot Tot	Mais Provável	8,94632	15,7239
	Cen 18A - Rot 10%	Mais Provável	21,6345	33,2152

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - Posto B-Tiein	Cen 17A - Rot Tot	Mais Provável	15,6121	0	124,306
	Cen 18A - Rot 10%	Mais Provável	33,1651	0	3560,47
Study\Pressure vessel - Posto B-Tiein Mar	Cen 17A - Rot Tot	Mais Provável	15,6121	0	124,306
	Cen 18A - Rot 10%	Mais Provável	33,1651	0	3560,47

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - Posto B-Tiein	Cen 17A - Rot Tot	Mais Provável	0,05 0,14 0,3	24,2492 12,6438 9,16672	40,4936 17,2827 10,3285
	Cen 18A - Rot 10%		0,05 0,14 0,3	57,0174 30,9017 23,0771	91,1229 38,8914 23,2423
Study\Pressure vessel - Posto B-Tiein Mar	Cen 17A - Rot Tot		0,05 0,14 0,3	24,2492 12,6438 9,16672	40,4936 17,2827 10,3285
	Cen 18A - Rot 10%		0,05 0,14 0,3	57,0174 30,9017 23,0771	91,1229 38,8914 23,2423

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - Posto B-Tiein	Cen 17A - Rot Tot	Mais Provável	0,05 0,14 0,3	1,1224 1,1224 1,1224	49,4112 49,4112 49,4112	10 10 10	4,00246 4,00246 4,00246	4,00246 4,00246 4,00246
	Cen 18A - Rot 10%		0,05 0,14 0,3	12,7901 12,7901 12,7901	2332,72 2332,72 2332,72	30 30 30	11,456 11,456 11,456	11,456 11,456 11,456
Study\Pressure vessel - Posto B-Tiein Mar	Cen 17A - Rot Tot		0,05 0,14 0,3	1,1224 1,1224 1,1224	49,4112 49,4112 49,4112	10 10 10	4,00246 4,00246 4,00246	4,00246 4,00246 4,00246
	Cen 18A - Rot 10%		0,05 0,14 0,3	12,7901 12,7901 12,7901	2332,72 2332,72 2332,72	30 30 30	11,456 11,456 11,456	11,456 11,456 11,456

Consequence Summary Report

Workspace: Cenário 17B e 18B - Hexano

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 17B - Rot Tot	Mais Provável	113,3	14,2271	1	10000	0,254	3,35938	120
	Cen 18B - Rot 10%	Mais Provável	11,7342	13,8317	1	58,2191	0,0196748	57,9569	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 17B - Rot Tot	Mais Provável	1,50127	8,94632	15,7239
	Cen 18B - Rot 10%	Mais Provável	9,61781	22,0567	33,8437

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 17B - Rot Tot	Mais Provável	9,29362	15,6097	14,4575	12,7865
	Cen 18B - Rot 10%	Mais Provável	25,9218	55,7298	50,7006	43,534

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 17B - Rot Tot	Mais Provável	35,7982	53,75	46,8443	38,0495
	Cen 18B - Rot 10%	Mais Provável	11,4281	41,3061	37,0346	28,413

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 17B - Rot Tot	Mais Provável	35,7982	53,75	46,8443	38,0495
	Cen 18B - Rot 10%	Mais Provável	51,0328	76,9724	67,7992	56,4575

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 17B - Rot Tot	Mais Provável	8,94632	15,7239
	Cen 18B - Rot 10%	Mais Provável	22,0567	33,8437

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 17B - Rot Tot	Mais Provável	15,6121	0	124,306
	Cen 18B - Rot 10%	Mais Provável	33,7325	0	3560,48

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 17B - Rot Tot	Mais Provável	0,05 0,14 0,3	24,2492 12,6438 9,16672	40,4936 17,2827 10,3285
	Cen 18B - Rot 10%		0,05 0,14 0,3	57,0173 30,9016 23,0771	91,1227 38,8913 23,2423

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 17B - Rot Tot	Mais Provável	0,05 0,14 0,3	1,1224 1,1224 1,1224	49,4112 49,4112 49,4112	10 10 10	4,00246 4,00246 4,00246	4,00246 4,00246 4,00246
	Cen 18B - Rot 10%		0,05 0,14 0,3	12,79 12,79 12,79	2332,7 2332,7 2332,7	30 30 30	11,456 11,456 11,456	11,456 11,456 11,456

Consequence Summary Report

Workspace: Cenário 19A e 20A - Falha - Hexano

Study: Study

Summary Basis

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The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - Posto B-Tiein	Cen 19A - Rot Tot	Mais Provável	113,3	14,2271	1	10000	0,254	3,35938	3600
	Cen 20A - Rot 10%	Mais Provável	11,7342	13,8317	1	58,2191	0,0196748	57,9569	3600
Study\Pressure vessel - Posto B-Tiein Mar	Cen 19A - Rot Tot	Mais Provável	113,3	14,2271	1	10000	0,254	3,35938	3600
	Cen 20A - Rot 10%	Mais Provável	11,7342	13,8317	1	58,2191	0,0196748	57,9569	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - Posto B-Tiein	Cen 19A - Rot Tot	Mais Provável	1,34572	16,6614	35,2163
	Cen 20A - Rot 10%	Mais Provável	9,61781	21,6345	33,2152
Study\Pressure vessel - Posto B-Tiein Mar	Cen 19A - Rot Tot	Mais Provável	1,34868	16,6421	37,4714
	Cen 20A - Rot 10%	Mais Provável	9,61781	21,6345	33,2152

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Posto B-Tiein	Cen 19A - Rot Tot	Mais Provável	9,29362	15,6097	14,4575	12,7865
	Cen 20A - Rot 10%	Mais Provável	25,9218	55,7298	50,7006	43,534
Study\Pressure vessel - Posto B-Tiein Mar	Cen 19A - Rot Tot	Mais Provável	9,29362	15,6097	14,4575	12,7865
	Cen 20A - Rot 10%	Mais Provável	25,9218	55,7298	50,7006	43,534

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Posto B-Tiein	Cen 19A - Rot Tot	Mais Provável	38,9386	57,1488	49,8545	40,5568
	Cen 20A - Rot 10%	Mais Provável	11,4281	41,3061	37,0346	28,413
Study\Pressure vessel - Posto B-Tiein Mar	Cen 19A - Rot Tot	Mais Provável	38,9386	57,1488	49,8545	40,5568
	Cen 20A - Rot 10%	Mais Provável	11,4281	41,3061	37,0346	28,413

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Posto B-Tiein	Cen 19A - Rot Tot	Mais Provável	98,6048	122,113	105,402	84,8893
	Cen 20A - Rot 10%	Mais Provável	51,0328	77,8469	68,6737	57,332
Study\Pressure vessel - Posto B-Tiein Mar	Cen 19A - Rot Tot	Mais Provável	112,85	136,984	118,192	95,0016
	Cen 20A - Rot 10%	Mais Provável	51,0328	77,8469	68,6737	57,332

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - Posto B-Tiein	Cen 19A - Rot Tot	Mais Provável	16,6614	35,2163
	Cen 20A - Rot 10%	Mais Provável	21,6345	33,2152
Study\Pressure vessel - Posto B-Tiein Mar	Cen 19A - Rot Tot	Mais Provável	16,6421	37,4714
	Cen 20A - Rot 10%	Mais Provável	21,6345	33,2152

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - Posto B-Tiein	Cen 19A - Rot Tot	Mais Provável	34,4991	0	1800,81
	Cen 20A - Rot 10%	Mais Provável	33,1651	0	3560,47
Study\Pressure vessel - Posto B-Tiein Mar	Cen 19A - Rot Tot	Mais Provável	37,1955	0	1802,75
	Cen 20A - Rot 10%	Mais Provável	33,1651	0	3560,47

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - Posto B-Tiein	Cen 19A - Rot Tot	Mais Provável	0,05 0,14 0,3	61,5313 30,7435 21,5192	107,424 45,8489 27,4003
	Cen 20A - Rot 10%		0,05 0,14 0,3	57,0174 30,9017 23,0771	91,1229 38,8914 23,2423
Study\Pressure vessel - Posto B-Tiein Mar	Cen 19A - Rot Tot		0,05 0,14 0,3	62,9399 31,5652 22,165	109,472 46,723 27,9227
	Cen 20A - Rot 10%		0,05 0,14 0,3	57,0174 30,9017 23,0771	91,1229 38,8914 23,2423

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - Posto B-Tiein	Cen 19A - Rot Tot	Mais Provável	0,05 0,14 0,3	20,9556 20,9556 20,9556	745,744 745,744 745,744	30 30 30	7,81911 7,81911 7,81911	7,81911 7,81911 7,81911
	Cen 20A - Rot 10%		0,05 0,14 0,3	12,7901 12,7901 12,7901	2332,72 2332,72 2332,72	30 30 30	11,456 11,456 11,456	11,456 11,456 11,456
Study\Pressure vessel - Posto B-Tiein Mar	Cen 19A - Rot Tot		0,05 0,14 0,3	22,1771 22,1771 22,1771	764,701 764,701 764,701	30 30 30	8,2037 8,2037 8,2037	8,2037 8,2037 8,2037
	Cen 20A - Rot 10%		0,05 0,14 0,3	12,7901 12,7901 12,7901	2332,72 2332,72 2332,72	30 30 30	11,456 11,456 11,456	11,456 11,456 11,456

Consequence Summary Report

Workspace: Cenário 19B e 20B - Falha - Hexano

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 19B - Rot Tot	Mais Provável	113,3	14,2271	1	10000	0,254	3,35938	3600
	Cen 20B - Rot 10%	Mais Provável	11,7342	13,8317	1	58,2191	0,0196748	57,9569	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 19B - Rot Tot	Mais Provável	1,34435	14,8562	27,2331
	Cen 20B - Rot 10%	Mais Provável	9,61781	22,0567	33,8437

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 19B - Rot Tot	Mais Provável	9,29362	15,6097	14,4575	12,7865
	Cen 20B - Rot 10%	Mais Provável	25,9218	55,7298	50,7006	43,534

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 19B - Rot Tot	Mais Provável	38,9386	57,1488	49,8545	40,5568
	Cen 20B - Rot 10%	Mais Provável	11,4281	41,3061	37,0346	28,413

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 19B - Rot Tot	Mais Provável	65,6306	86,2402	74,8972	60,6868
	Cen 20B - Rot 10%	Mais Provável	51,0328	76,9724	67,7992	56,4575

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 19B - Rot Tot	Mais Provável	14,8562	27,2331
	Cen 20B - Rot 10%	Mais Provável	22,0567	33,8437

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel - Tiein-Drenagem	Cen 19B - Rot Tot	Mais Provável	27,0116	0	850,118
	Cen 20B - Rot 10%	Mais Provável	33,7325	0	3560,48

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 19B - Rot Tot	Mais Provável	0,05 0,14 0,3	49,1082 24,8794 17,6202	84,5388 36,0813 21,563
	Cen 20B - Rot 10%		0,05 0,14 0,3	57,0173 30,9016 23,0771	91,1227 38,8913 23,2423

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel - Tiein-Drenagem	Cen 19B - Rot Tot	Mais Provável	0,05 0,14 0,3	10,2132 10,2132 10,2132	373,859 373,859 373,859	20 20 20	6,83874 6,83874 6,83874	6,83874 6,83874 6,83874
	Cen 20B - Rot 10%		0,05 0,14 0,3	12,79 12,79 12,79	2332,7 2332,7 2332,7	30 30 30	11,456 11,456 11,456	11,456 11,456 11,456

Input Report

Workspace: Cenário 17A e 18A - Hexano

Mais Provável

Weather

Cenário 17A e 18A - Hexano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 17B e 18B - Hexano

Mais Provável

Weather

Cenário 17B e 18B - Hexano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 19A e 20A - Falha - Hexano

Mais Provável

Weather

Cenário 19A e 20A - Falha - Hexano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 19B e 20B - Falha - Hexano

Mais Provável

Weather

Cenário 19B e 20B - Falha - Hexano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 17A e 18A - Hexano

Vala

Pool substrate and bund
Cenário 17A e 18A - Hexano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2	m
		Bund area (internal)	7631	m2
		Bund diameter (internal)	98,5702	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Mar

Pool substrate and bund

Cenário 17A e 18A - Hexano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 17B e 18B - Hexano

Vala

Pool substrate and bund
Cenário 17B e 18B - Hexano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	2,7	m
		Bund area (internal)	3383	m2
		Bund diameter (internal)	65,6306	m
	Whether the bund can overflow	Bund failure modeling	Rainout always inside bund (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Dry soil	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

CENÁRIO 21 – ROTURA TOTAL
BRAÇO DE CARGA BUTANO

ROTURA TOTAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA;
SUBSTÂNCIA: BUTANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Butano
Densidade da substância:	508 kg/m^3
Limite Inferior de Inflamabilidade (LII):	18 000 ppm
Limite Superior de Inflamabilidade (LSI):	150 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	26 m
Diâmetro:	6'' = 152,4 mm
Caudal de operação:	300 m^3/h = 42,3 kg/s
Tempo de interesse:	3600 s
Pressão:	12 bar
Temperatura:	15°C
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	152,4 mm
Tempo de libertação máximo: Nota: Este cenário foi realizado para um tempo de libertação de 120 s, o qual se fundamenta na existência de isolamento automático dos braços de carga.	120 s
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 21 – ROTURA TOTAL
BRAÇO DE CARGA BUTANO

ROTURA TOTAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA;
SUBSTÂNCIA: BUTANO

OUTPUT	
Caudal máximo de libertação:	42,3 kg/s
Tempo de libertação:	120 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 9 000 ppm (Efeitos letais)	417
NR – Not Reached	
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	142
7 kW/m^2 (Efeitos Letais)	130
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	220
7 kW/m^2 (Efeitos Letais)	195
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	240
0,14 bar (Efeitos Letais)	157

CENÁRIO 22 – ROTURA 10% BRAÇO DE CARGA BUTANO

ROTURA PARCIAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: BUTANO

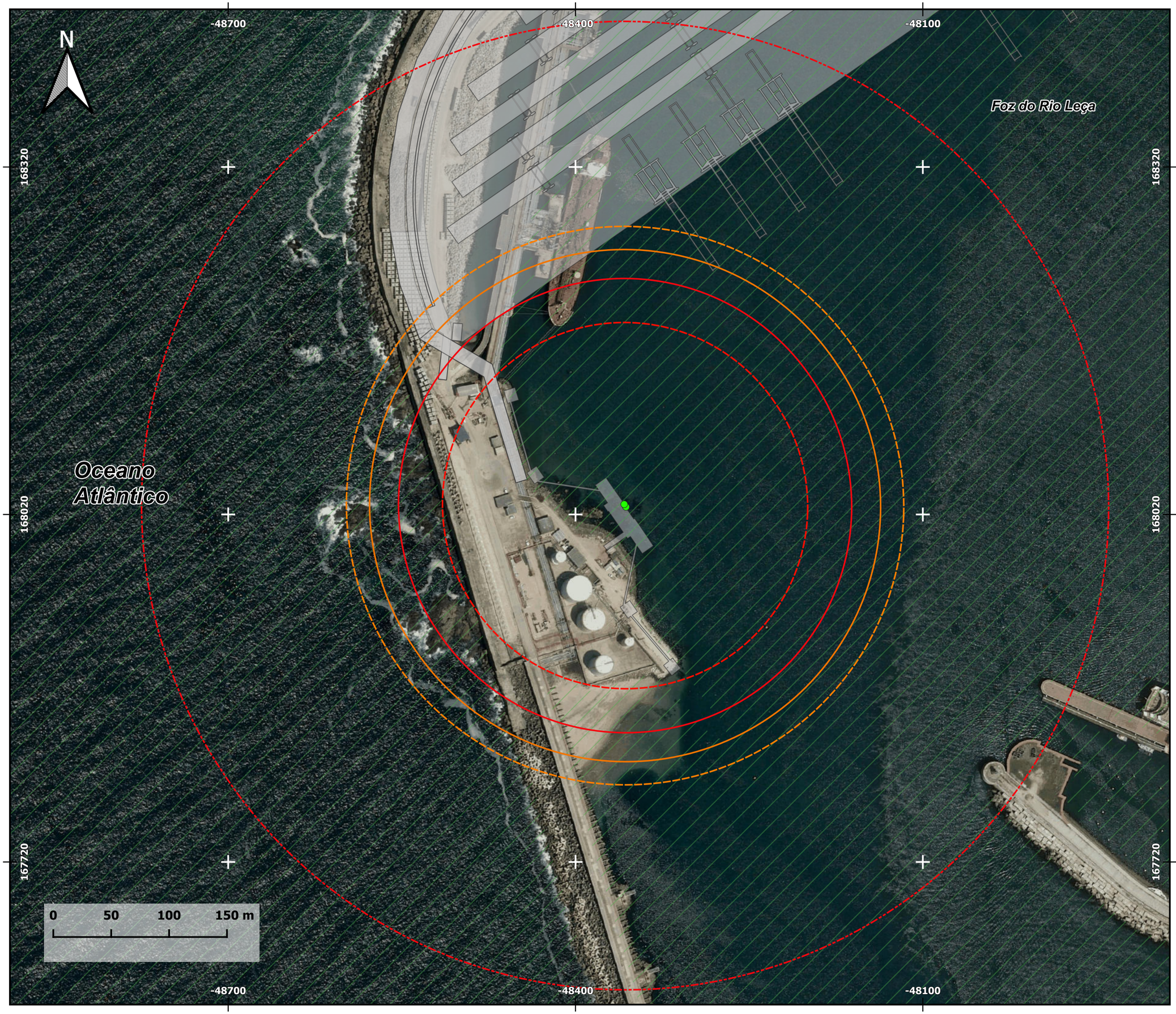
DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Butano
Densidade da substância:	508 kg/m^3
Limite Inferior de Inflamabilidade (LII):	18 000 ppm
Limite Superior de Inflamabilidade (LSI):	150 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	26 m
Diâmetro:	6'' = 152,4 mm
Caudal de operação:	300 m^3/h = 42,3 kg/s
Tempo de interesse:	3600 s
Pressão:	12 bar
Temperatura:	15°C
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	15,24 mm
Tempo de libertação máximo: Nota: Este cenário foi realizado para um tempo de libertação de 120 s, o qual se fundamenta na existência de isolamento automático dos braços de carga.	120 s
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

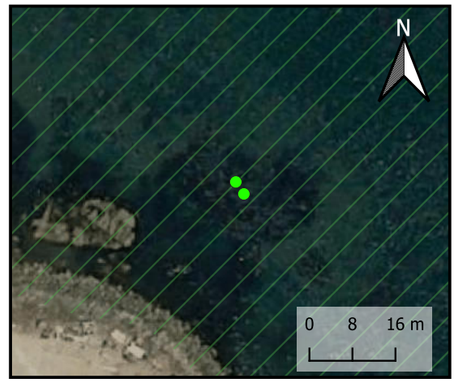
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 22 – ROTURA 10% BRAÇO DE CARGA BUTANO

ROTURA PARCIAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: BUTANO

OUTPUT	
Caudal máximo de libertação:	11,9 kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 9 000 ppm (Efeitos letais)	157
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	77
7 kW/m^2 (Efeitos Letais)	70
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	91
7 kW/m^2 (Efeitos Letais)	83
Diâmetro da Piscina	10
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	98
0,14 bar (Efeitos Letais)	62





Detalhe. Escala 1:1140

Legenda:

Cenários

Cenário 21

- Sobrepressão - Efeitos Letais (157 m)
- Sobrepressão - Efeitos Irreversíveis (240 m)
- Radiação Térmica - Efeitos Letais (195 m)
- Radiação Térmica - Efeitos Irreversíveis (220 m)
- 50% LII - Efeitos Letais (417 m)
- Braços de Carga - Butano

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

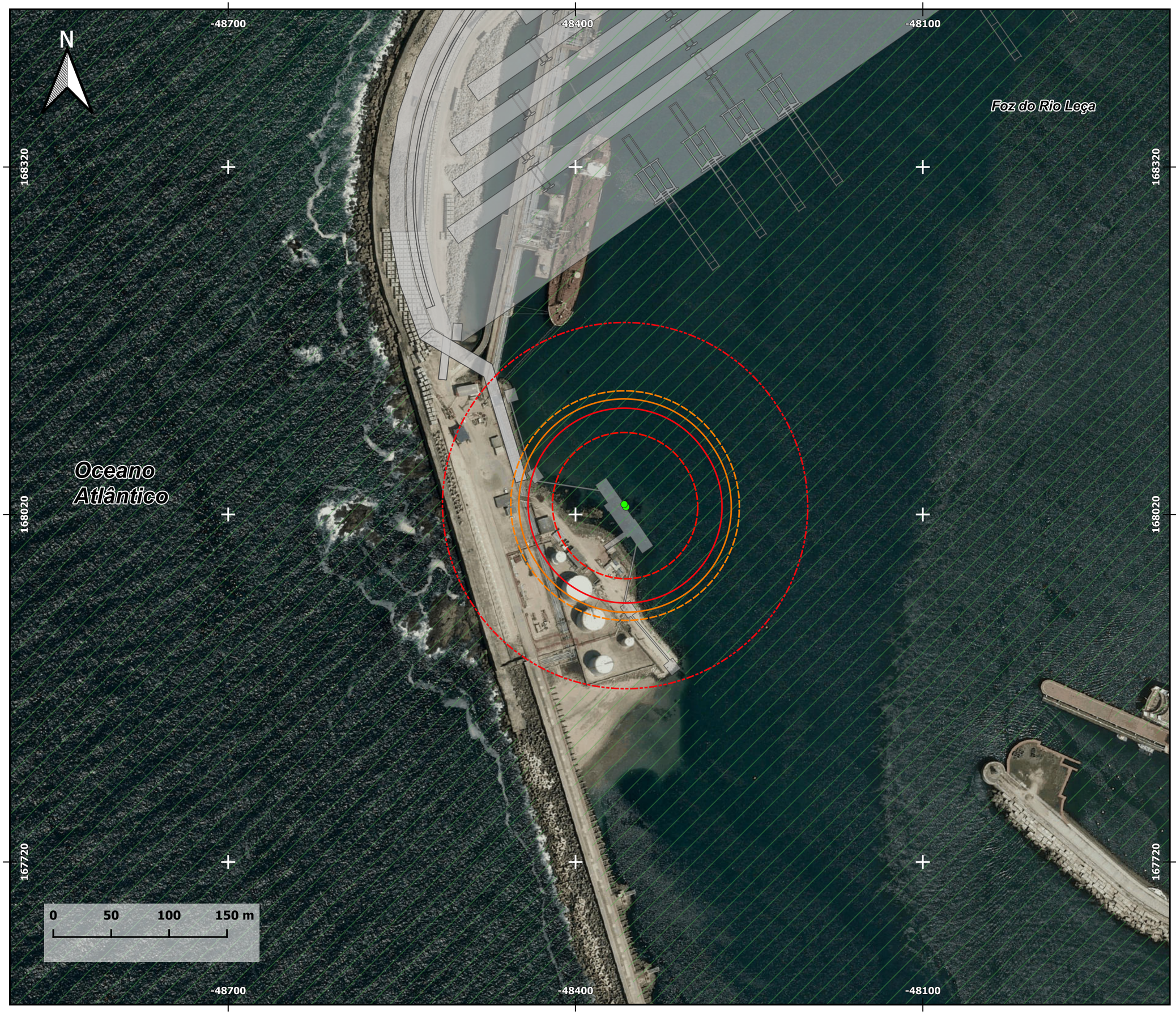
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

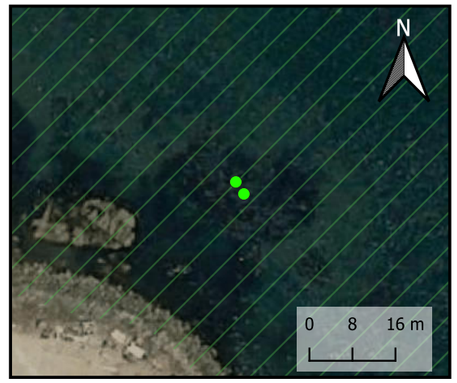
CertiTecna Engenharia de Segurança

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www.certitecna.pt · geral@certitecna.pt

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 052	ESCALA: 1:3000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 · DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 21 - Rotura total de braço de carga de butano	TÉCNICO RESPONSÁVEL: Ana Dias · VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, S.A., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:1140

Legenda:

Cenários

Cenário 22

- Sobrepressão - Efeitos Letais (62 m)
- Sobrepressão - Efeitos Irreversíveis (98 m)
- Radiação Térmica - Efeitos Letais (83 m)
- Radiação Térmica - Efeitos Irreversíveis (91 m)
- 50% LII - Efeitos Letais (157 m)
- Braços de Carga - Butano

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

CertiTecna Engenharia de Segurança

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 053	ESCALA: 1:3000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 22 - Rotura 10% de Braço de Carga de Butano	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Materials Report

Workspace: Cenário 21 e 22 Braço Butano

Material: N-BUTANE

Cenário 21 e 22 Braço Butano\Physical Properties System\Materials\N-BUTANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,200164**	
Aerosol class number	**2**	
Critical pressure	**37,96**	bar
Critical temperature	**151,97**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-138,29**	degC
Molecular weight	**58,1222**	
Normal boiling point	**-0,5**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**6,7358E-06**	bar
Triple point temperature	**-138,29**	degC
Carbon hydrogen ratio	**0,4**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**4661**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**3,6238E+07**	**0,8337**	**-0,82274**	**0,39613**	**0**	**-138,29**	**151,97**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,955144**	
Combustion ct	**0,0313087**	
Emissive power length scale	**2,75**	m
Flash point	**-74**	degC
Heat of combustion	**2,65732E+06**	kJ/kmol
Immediate ignition category	**Average**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**18000**	ppm
Luminous/Smoky flame flag	**Luminous**	
Maximum burn rate	**0,12**	kg/m2.s
Maximum surface emissive power	**170**	kW/m2
Pool fire burn rate length	**0,35**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**150000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,027271 8	8,58139	-18,9094	18,8762		-138,29	126,85	1	Constant value above fraction Tc
Liquid viscosity	101	-7,2471	534,82	-0,57469	-4,6625E-27	10	-138,29	146,85	1	Constant value above fraction Tc
Surface tension	106	0,05196	1,2181	0	0	0	-138,29	151,97	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,051094	0,45253	5455,5	1,9798E+06		-0,500006	726,85	1	None (use equation)
Vapour viscosity	102	3,4387E-08	0,94604	0	0		-138,29	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	127	33257,9	47100,6	306,727	98932,4	3782,21	-253,15	1226,85	1	None (use equation)
Liquid heat capacity	100	191030	-1675	12,5	-0,03874	4,6121E-05	-138,29	126,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	66,34	-	-	9,4509	2	-138,29	151,97	1	Vapour

pressure	3	4363,2	7,046	E-06			Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	1,0677	0,27188	425,12	0,28688	-138,29	151,97	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,149	-143	-1,001E+07	-3,03E+18	4,03E+20	-60,57	1226,85	1	None (use equation)

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,065**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cenário 21 e 22 Braço Butano

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel	Cen 21 - Rot Tot	Mais Provável	42,3	-0,532609	0,907112	246,394	0,20021	48,3978	120
	Cen 22 - Rot 10%	Mais Provável	11,8146	-0,532609	0,912084	252,863	0,0807137	78,9267	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel	Cen 21 - Rot Tot	Mais Provável	16,101	193,532	416,236
	Cen 22 - Rot 10%	Mais Provável	Not reached at height of interest	74,1532	157,106

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 21 - Rot Tot	Mais Provável	65,1405	141,994	129,165	110,854
	Cen 22 - Rot 10%	Mais Provável	36,2505	76,6638	69,8991	60,2534

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 21 - Rot Tot	Mais Provável	8,01477	82,1266	74,6184	64,0523
	Cen 22 - Rot 10%	Mais Provável	2,37008	42,6648	40,4084	34,7271

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 21 - Rot Tot	Mais Provável	36,6543	219,683	194,999	158,07
	Cen 22 - Rot 10%	Mais Provável	9,30215	90,8812	82,3309	70,3784

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel	Cen 21 - Rot Tot	Mais Provável	193,532	416,236
	Cen 22 - Rot 10%	Mais Provável	74,1532	157,106

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel	Cen 21 - Rot Tot	Mais Provável	373,513	0	165,389
	Cen 22 - Rot 10%	Mais Provável	161,108	0	2411,99

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel	Cen 21 - Rot Tot	Mais Provável	0,05 0,14 0,3	240,929 156,109 130,872	315,813 125,437 74,9641
	Cen 22 - Rot 10%		0,05 0,14 0,3	98,8397 61,259 49,9995	131,126 55,9648 33,4458

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel	Cen 21 - Rot Tot	Mais Provável	0,05 0,14 0,3	520,991 419,898 419,898	114,003 128,982 128,982	320 330 330	83,0228 93,3905 93,3905	83,0228 93,3905 93,3905
	Cen 22 - Rot 10%		0,05 0,14 0,3	37,2914 37,2914 37,2914	2355,69 2355,69 2355,69	160 160 160	33,2766 33,2766 33,2766	33,2766 33,2766 33,2766

Input Report

Workspace: Cenário 21 e 22 Braço Butano

Mais Provável

Weather

Cenário 21 e 22 Braço Butano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 21 e 22 Braço Butano

Mar

Pool substrate and bund
Cenário 21 e 22 Braço Butano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 21 e 22 Braço Butano

Study

Study
Cenário 21 e 22 Braço Butano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Mar
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel

Pressure vessel
Cenário 21 e 22 Braço Butano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-BUTANE	
		Specify volume inventory?	No	
		Mass inventory	1,08E+06	kg
		Volume inventory	1846,29	m3
		Material to track	N-BUTANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	15	degC
		Pressure (gauge)	12	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	30	m
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	1846,29	m3
		Tank vapour volume	0	m3
		Tank liquid volume	1846,29	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	No	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	

		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	

		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m
		North	0	m

Cen 21 - Rot Tot

Short pipe

Cenário 21 e 22 Braço Butano\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	152,4	mm
		Pipe length	30	m
	Hole	Orifice diameter		mm
	Release location	Elevation	1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Control valve	
		Input option	Fixed flow rate	
		Fixed flow rate	42,3	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	0	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 22 - Rot 10%

Leak

Cenário 21 e 22 Braço Butano\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m

	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	

		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

CENÁRIO 24 – ROTURA 10% BRAÇO DE CARGA BUTANO

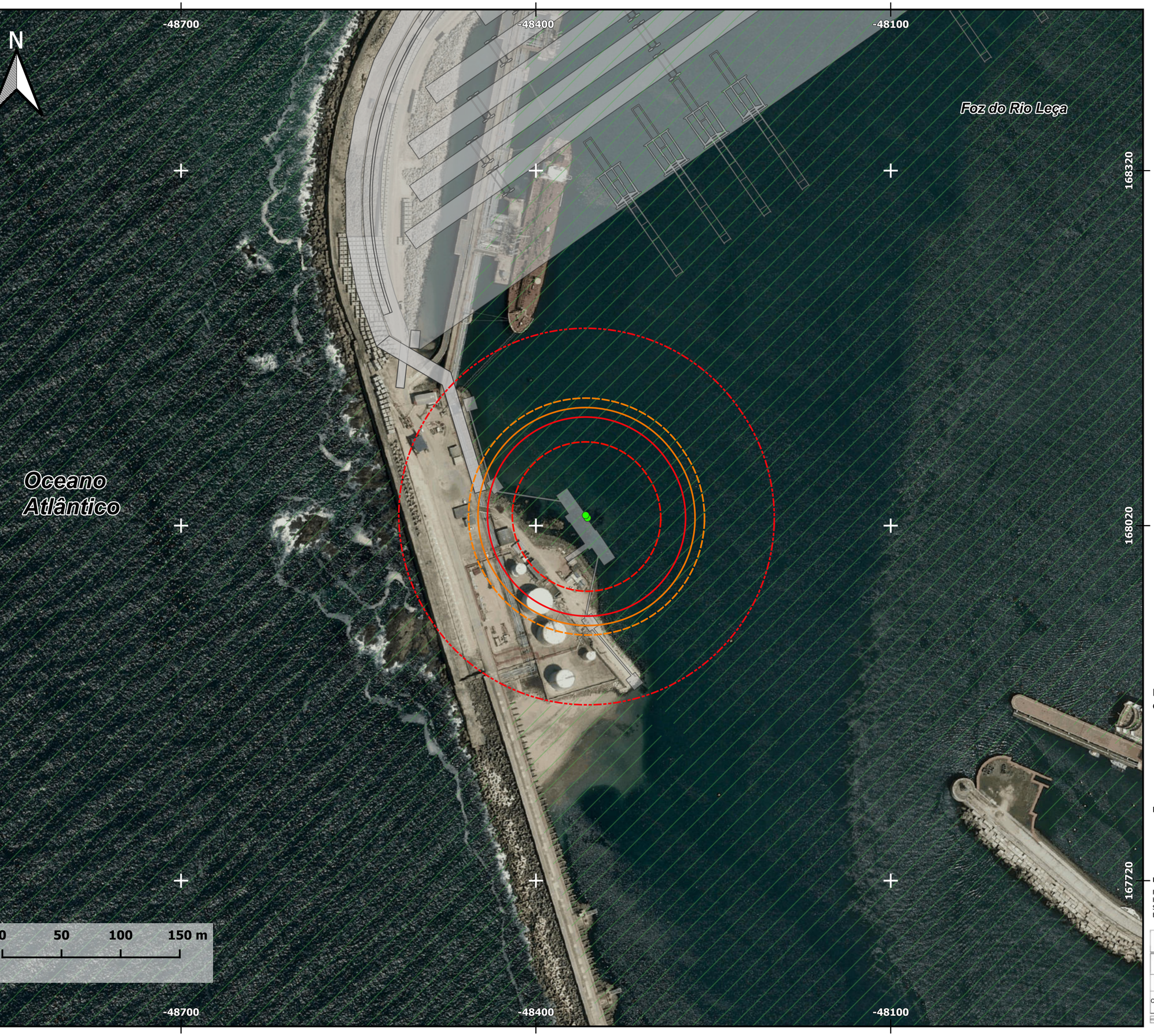
ROTURA PARCIAL DE BRAÇO DE CARGA COM FALHA DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: BUTANO

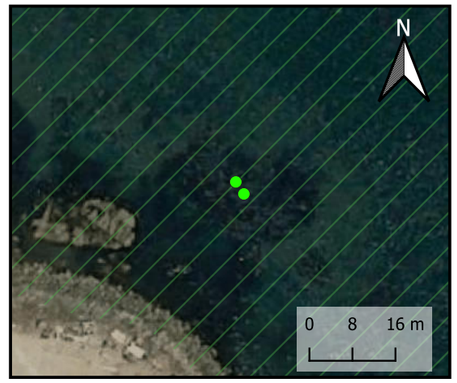
DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Butano
Densidade da substância:	508 kg/m^3
Limite Inferior de Inflamabilidade (LII):	18 000 ppm
Limite Superior de Inflamabilidade (LSI):	150 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	26 m
Diâmetro:	6'' = 152,4 mm
Caudal de operação:	300 m^3/h = 42,3 kg/s
Tempo de interesse:	3600 s
Pressão:	12 bar
Temperatura:	15°C
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	15,24 mm
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 24 – ROTURA 10% BRAÇO DE CARGA BUTANO

ROTURA PARCIAL DE BRAÇO DE CARGA COM FALHA DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: BUTANO

OUTPUT	
Caudal máximo de libertação:	11,9 kg/s
Tempo de libertação:	3 600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 9 000 ppm (Efeitos letais)	158
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	77
7 kW/m^2 (Efeitos Letais)	70
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	91
7 kW/m^2 (Efeitos Letais)	83
Diâmetro da Piscina	10
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	99
0,14 bar (Efeitos Letais)	62





Detalhe. Escala 1:1140

Legenda:

Cenários

Cenário 24

- Sobrepressão - Efeitos Letais (62 m)
- Sobrepressão - Efeitos Irreversíveis (99 m)
- Radiação Térmica - Efeitos Letais (83 m)
- Radiação Térmica - Efeitos Irreversíveis (91 m)
- 50% LII - Efeitos Letais (158 m)
- Braços de Carga - Butano

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

CertiTecna Engenharia de Segurança

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 054	ESCALA: 1:3000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 24 - Rotura 10% de Braço de Carga de Butano com falha da válvula automática	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cenário 23 e 24 Falha Braço Butano

Study

Study

Cenário 23 e 24 Falha Braço Butano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Mar
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel

Pressure vessel
Cenário 23 e 24 Falha Braço Butano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-BUTANE	
		Specify volume inventory?	No	
		Mass inventory	1,08E+06	kg
		Volume inventory	1846,29	m3
		Material to track	N-BUTANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	15	degC
		Pressure (gauge)	12	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	30	m
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	

Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	1846,29	m3
		Tank vapour volume	0	m3
		Tank liquid volume	1846,29	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	No	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	

Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	

		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m
		North	0	m

Cen 23 - Rot Tot

Short pipe

Cenário 23 e 24 Falha Braço Butano\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	152,4	mm
		Pipe length	30	m
	Hole	Orifice diameter		mm
	Release location	Elevation	1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Control valve	
		Input option	Fixed flow rate	
		Fixed flow rate	42,3	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the	Concentrations of interest		ppm

	material to track)			
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction

	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 24 - Rot 10%

Leak

Cenário 23 e 24 Falha Braço Butano\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-BUTANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	

	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	

		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cenário 23 e 24 Falha Braço Butano

Material: N-BUTANE

Cenário 23 e 24 Falha Braço Butano\Physical Properties System\Materials\N-BUTANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,200164**	
Aerosol class number	**2**	
Critical pressure	**37,96**	bar
Critical temperature	**151,97**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-138,29**	degC
Molecular weight	**58,1222**	
Normal boiling point	**-0,5**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**6,7358E-06**	bar
Triple point temperature	**-138,29**	degC
Carbon hydrogen ratio	**0,4**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**4661**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**3,6238E+07**	**0,8337**	**-0,82274**	**0,39613**	**0**	**-138,29**	**151,97**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,955144**	
Combustion ct	**0,0313087**	
Emissive power length scale	**2,75**	m
Flash point	**-74**	degC
Heat of combustion	**2,65732E+06**	kJ/kmol
Immediate ignition category	**Average**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**18000**	ppm
Luminous/Smoky flame flag	**Luminous**	
Maximum burn rate	**0,12**	kg/m2.s
Maximum surface emissive power	**170**	kW/m2
Pool fire burn rate length	**0,35**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**150000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,027271 8	8,58139	-18,9094	18,8762		-138,29	126,85	1	Constant value above fraction Tc
Liquid viscosity	101	-7,2471	534,82	-0,57469	-4,6625E-27	10	-138,29	146,85	1	Constant value above fraction Tc
Surface tension	106	0,05196	1,2181	0	0	0	-138,29	151,97	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,051094	0,45253	5455,5	1,9798E+06		-0,500006	726,85	1	None (use equation)
Vapour viscosity	102	3,4387E-08	0,94604	0	0		-138,29	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	127	33257,9	47100,6	306,727	98932,4	3782,21	-253,15	1226,85	1	None (use equation)
Liquid heat capacity	100	191030	-1675	12,5	-0,03874	4,6121E-05	-138,29	126,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	66,34	-	-	9,4509	2	-138,29	151,97	1	Vapour

pressure	3	4363,2	7,046	E-06			Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	1,0677	0,27188	425,12	0,28688	-138,29	151,97	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,149	-143	-1,001E+07	-3,03E+18	4,03E+20	-60,57	1226,85	1	None (use equation)

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,065**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cenário 23 e 24 Falha Braço Butano

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel	Cen 23 - Rot Tot	Mais Provável	42,3	-0,532609	0,907112	246,394	0,20021	48,3978	3600
	Cen 24 - Rot 10%	Mais Provável	11,8146	-0,532609	0,912084	252,863	0,0807137	78,9267	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel	Cen 23 - Rot Tot	Mais Provável	Not reached at height of interest	175,161	380,467
	Cen 24 - Rot 10%	Mais Provável	Not reached at height of interest	74,1532	157,106

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 23 - Rot Tot	Mais Provável	65,1405	141,994	129,165	110,854
	Cen 24 - Rot 10%	Mais Provável	36,2505	76,6638	69,8991	60,2534

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 23 - Rot Tot	Mais Provável	8,01477	82,1266	74,6184	64,0523
	Cen 24 - Rot 10%	Mais Provável	2,37008	42,6648	40,4084	34,7271

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 23 - Rot Tot	Mais Provável	36,6543	219,683	194,999	158,07
	Cen 24 - Rot 10%	Mais Provável	9,30215	90,8812	82,3309	70,3784

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel	Cen 23 - Rot Tot	Mais Provável	175,161	380,467
	Cen 24 - Rot 10%	Mais Provável	74,1532	157,106

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel	Cen 23 - Rot Tot	Mais Provável	378,226	0	3448,17
	Cen 24 - Rot 10%	Mais Provável	161,108	0	2411,99

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel	Cen 23 - Rot Tot	Mais Provável	0,05 0,14 0,3	224,485 140,415 115,226	293,337 125,197 74,8204
	Cen 24 - Rot 10%		0,05 0,14 0,3	98,8397 61,259 49,9995	131,126 55,9648 33,4458

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel	Cen 23 - Rot Tot	Mais Provável	0,05 0,14 0,3	417,488 417,488 417,488	722,204 722,204 722,204	370 370 370	77,8161 77,8161 77,8161	77,8161 77,8161 77,8161
	Cen 24 - Rot 10%		0,05 0,14 0,3	37,2914 37,2914 37,2914	2355,69 2355,69 2355,69	160 160 160	33,2766 33,2766 33,2766	33,2766 33,2766 33,2766

Input Report

Workspace: Cenário 23 e 24 Falha Braço Butano

Mais Provável

Weather

Cenário 23 e 24 Falha Braço Butano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 23 e 24 Falha Braço Butano

Mar

Pool substrate and bund
Cenário 23 e 24 Falha Braço Butano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

CENÁRIO 25 – ROTURA TOTAL BRAÇO DE CARGA GASOLINA

ROTURA TOTAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: GASOLINA

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasolina
Densidade da substância:	775 kg/m^3
Limite Inferior de Inflamabilidade (LII):	14 000 ppm
Limite Superior de Inflamabilidade (LSI):	76 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	30 m
Diâmetro:	10'' = 254 mm
Caudal de operação:	815 m^3/h = 175,5 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	254 mm
Tempo de libertação máximo: Nota: Este cenário foi realizado para um tempo de libertação de 120 s, o qual se fundamenta na existência de isolamento automático dos braços de carga.	120 s
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 25 – ROTURA TOTAL BRAÇO DE CARGA GASOLINA

ROTURA TOTAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA;
SUBSTÂNCIA: GASOLINA

OUTPUT	
Caudal máximo de libertação:	175,5 kg/s
Tempo de libertação:	120 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	7
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	11
7 kW/m^2 (Efeitos Letais)	10
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	131
7 kW/m^2 (Efeitos Letais)	112
Diâmetro da Piscina	113
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	-
0,14 bar (Efeitos Letais)	-

CENÁRIO 26 – ROTURA 10% BRAÇO DE CARGA GASOLINA

ROTURA PARCIAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: GASOLINA

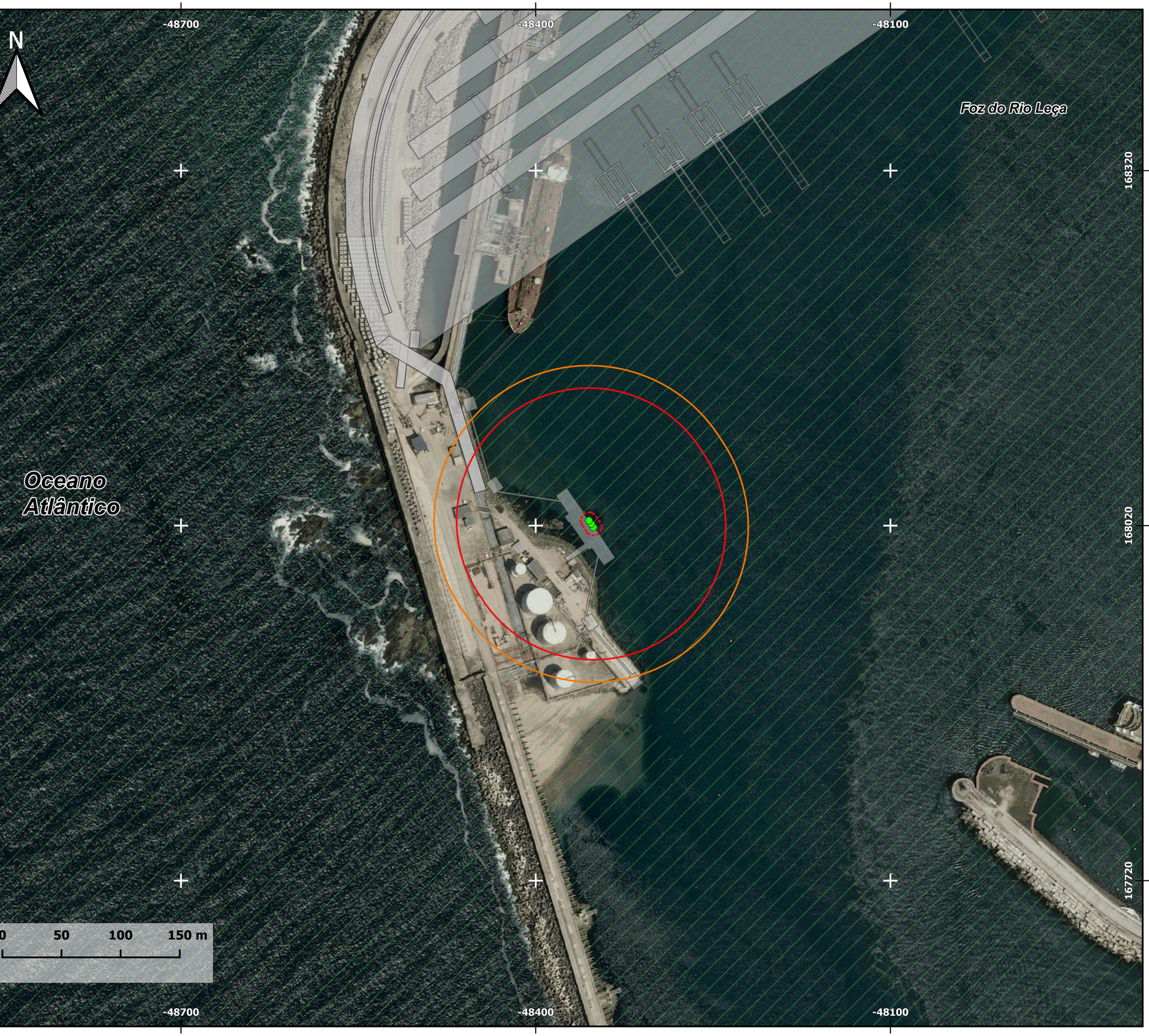
DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasolina
Densidade da substância:	775 kg/m^3
Limite Inferior de Inflamabilidade (LII):	14 000 ppm
Limite Superior de Inflamabilidade (LSI):	76 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	30 m
Diâmetro:	10'' = 254 mm
Caudal de operação:	815 m^3/h = 175,5 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	25,4 mm
Tempo de libertação máximo: Nota: Este cenário foi realizado para um tempo de libertação de 120 s, o qual se fundamenta na existência de isolamento automático dos braços de carga.	120 s
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

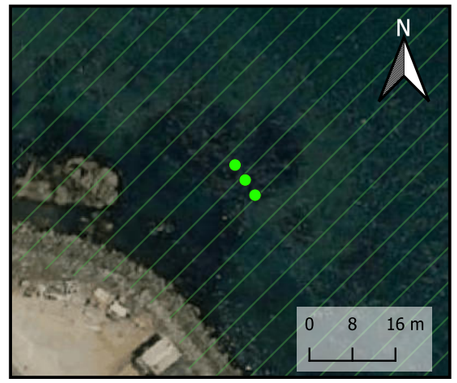
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 26 – ROTURA 10% BRAÇO DE CARGA GASOLINA

ROTURA PARCIAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: GASOLINA

OUTPUT	
Caudal máximo de libertação:	12,4 kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 7 000 ppm (Efeitos letais)	39
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	69
7 kW/m^2 (Efeitos Letais)	63
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	131
7 kW/m^2 (Efeitos Letais)	112
Diâmetro da Piscina	113
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	67
0,14 bar (Efeitos Letais)	43





Detalhe. Escala 1:1140

Legenda:

Cenários

Cenário 25

- Radiação Térmica - Efeitos Letais (112 m)
- Radiação Térmica - Efeitos Irreversíveis (131 m)
- 50% LII - Efeitos Letais (7 m)
- Braços de Carga - Gasolina e Gasóleo

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

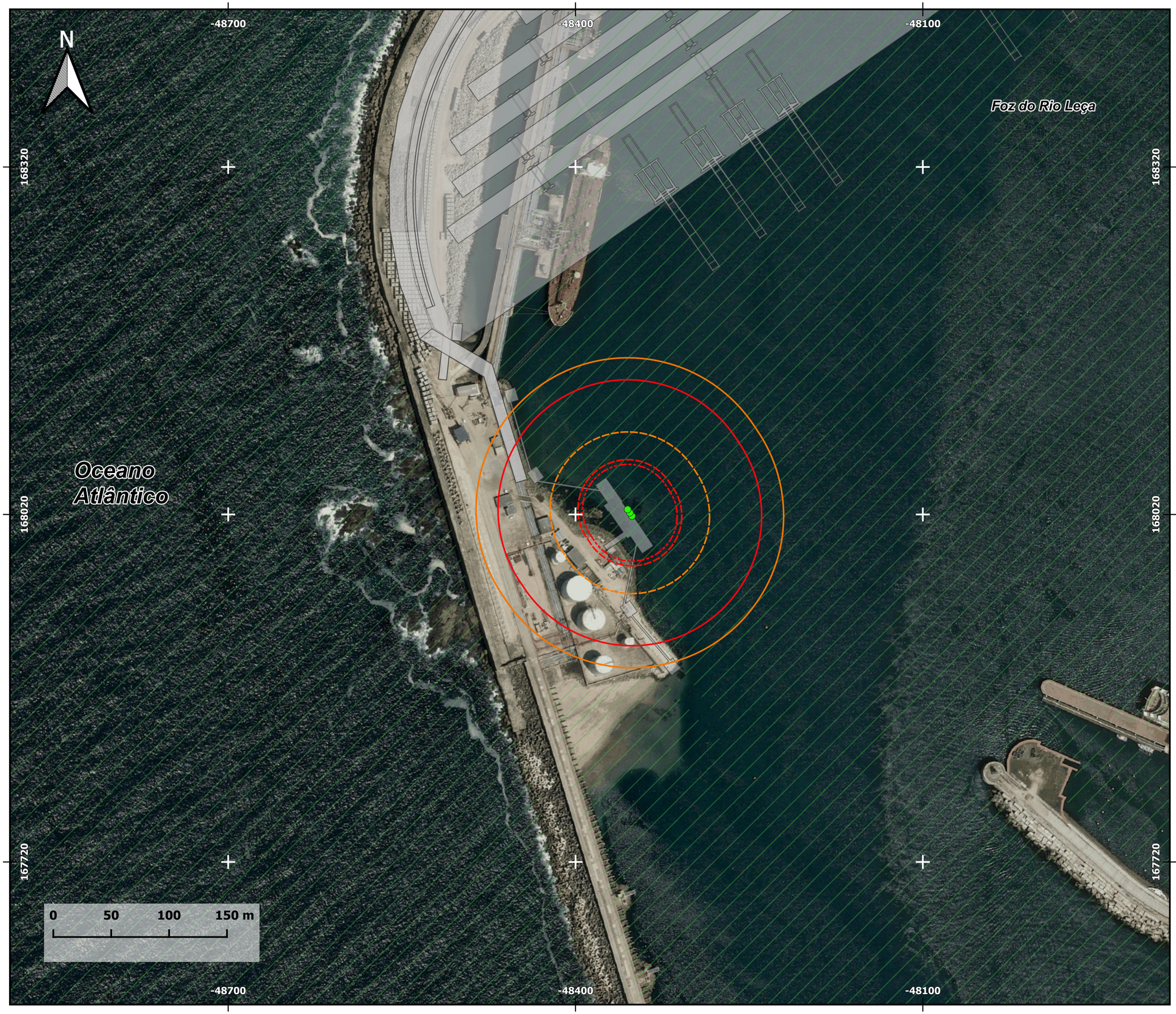
NOTAS RELATIVAS À CARTOGRAFIA:

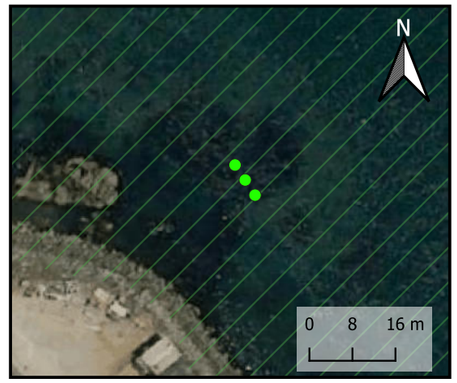
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

CertiTecna Engenharia de Segurança

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 055	ESCALA: 1:3000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 25 - Rotura total de Braço de Carga de Gasolina	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:1140

Legenda:

Cenários

Cenário 26

- Sobrepressão - Efeitos Letais (43 m)
- Sobrepressão - Efeitos Irreversíveis (67 m)
- Radiação Térmica - Efeitos Letais (112 m)
- Radiação Térmica - Efeitos Irreversíveis (131 m)
- 50% LII - Efeitos Letais (39 m)
- Braços de Carga - Gasolina e Gasóleo

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

CertiTecna Engenharia de Segurança

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www.certitecna.pt geral@certitecna.pt

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 056	ESCALA: 1:3000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 26 - Rotura 10% de Braço de Carga de Gasolina	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cenário 25 e 26_Braço de Carga_Gasolina

Study

Study
Cenário 25 e 26_Braço de Carga_Gasolina

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Mar
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel

Pressure vessel
Cenário 25 e 26_Braço de Carga_Gasolina\Study

Tab	Group	Field	Value	Units
Material	Material	Material	GASOLINE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5059,72	m3
		Material to track	GASOLINE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	30	m
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5059,72	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5059,72	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 25 - Rot Tot

Short pipe

Cenário 25 e 26_Braço de Carga_Gasolina\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	30	m
	Hole	Orifice diameter		mm
	Release location	Elevation	1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	175,5	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	0	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 26 - Rot 10%

Leak

Cenário 25 e 26_Braço de Carga_Gasolina\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m

	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	

		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cenário 25 e 26_Braço de Carga_Gasolina

Material: GASOLINE

Cenário 25 e 26_Braço de Carga_Gasolina\Physical Properties System\Materials\GASOLINE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,399552**	
Aerosol class number	**2**	
Critical pressure	**24,9**	bar
Critical temperature	**295,55**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-56,77**	degC
Molecular weight	**114,229**	
Normal boiling point	**125,68**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,1083E-05**	bar
Triple point temperature	**-56,77**	degC
Carbon hydrogen ratio	**0,444444**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**20740**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**6,7138E+07**	**1,0769**	**-1,0124**	**0,37075**	**0**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,945312**	

Combustion ct	**0,0165289**	
Emissive power length scale	**8,33**	m
Flash point	**14**	degC
Heat of combustion	**5,07415E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**14000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,7**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**76000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,047020 5	2,81851	-7,45552	8,45552		-56,77	286,85	1	Constant value above fraction Tc
Liquid viscosity	101	-98,805	3905,5	14,103	-2,5112E-05	2	-62	181,81	1	Constant value above fraction Tc
Surface tension	106	0,052789	1,2323	0	0	0	-56,77	295,55	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-8758	0,8448	-2,7121E+10	0		65,85	726,85	1	None (use equation)
Vapour viscosity	102	3,1191E-08	0,92925	55,092	0		-56,77	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	135540	443100	1635,6	305400	746,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	224830	-186,63	0,95891	0	0	-56,77	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressu	101	96,084	-7900,	-11,00	7,1802E-06	2	-56,77	295,55	1	Vapour Pressure

re		**2**	**3**						**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,5266**	**0,25693**	**568,7**	**0,28571**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,2739**	**-321,44**	**-6,683E+07**	**-1,271E+20**	**1,6103E+22**	**11,23**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**2E-05**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cenário 25 e 26_Braço de Carga_Gasolina

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel	Cen 25 - Rot Tot	Mais Provável	175,5	14,1165	1	9569,72	0,254	4,86802	120
	Cen 26 - Rot 10%	Mais Provável	12,4257	13,9049	1	68,8216	0,0196748	57,4302	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel	Cen 25 - Rot Tot	Mais Provável	3,15752	3,36513	6,10664
	Cen 26 - Rot 10%	Mais Provável	Not reached at height of interest	35,1683	38,2665

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 25 - Rot Tot	Mais Provável	5,9707	10,3569	9,56926	8,41902
	Cen 26 - Rot 10%	Mais Provável	30,2627	68,6764	62,3361	53,3308

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 25 - Rot Tot	Mais Provável	54,9927	73,4898	63,1273	50,7705
	Cen 26 - Rot 10%	Mais Provável	12,5467	67,109	63,073	54,8902

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 25 - Rot Tot	Mais Provável	112,839	130,486	111,661	88,2427
	Cen 26 - Rot 10%	Mais Provável	112,882	130,529	111,698	88,2718

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel	Cen 25 - Rot Tot	Mais Provável	3,36513	6,10664
	Cen 26 - Rot 10%	Mais Provável	35,1683	38,2665

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel	Cen 25 - Rot Tot	Mais Provável	5,78837	0	29,745
	Cen 26 - Rot 10%	Mais Provável	40,15	0,192189	11,1604

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel	Cen 26 - Rot 10%	Mais Provável	0,05	66,6444	83,4483
			0,14	42,7282	35,6158
			0,3	35,5627	21,2848

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel	Cen 26 - Rot 10%	Mais Provável	0,05	9,89251	8,90435	40	24,9203	24,9203
			0,14	9,89251	8,90435	40	24,9203	24,9203
			0,3	9,89251	8,90435	40	24,9203	24,9203

Input Report

Workspace: Cenário 25 e 26_Braço de Carga_Gasolina

Mais Provável

Weather

Cenário 25 e 26_Braço de Carga_Gasolina\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 25 e 26_Braço de Carga_Gasolina

Mar

Pool substrate and bund

Cenário 25 e 26_Braço de Carga_Gasolina\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

CENÁRIO 28 – ROTURA 10% BRAÇO DE CARGA GASOLINA

ROTURA PARCIAL DE BRAÇO DE CARGA COM FALHA DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: GASOLINA

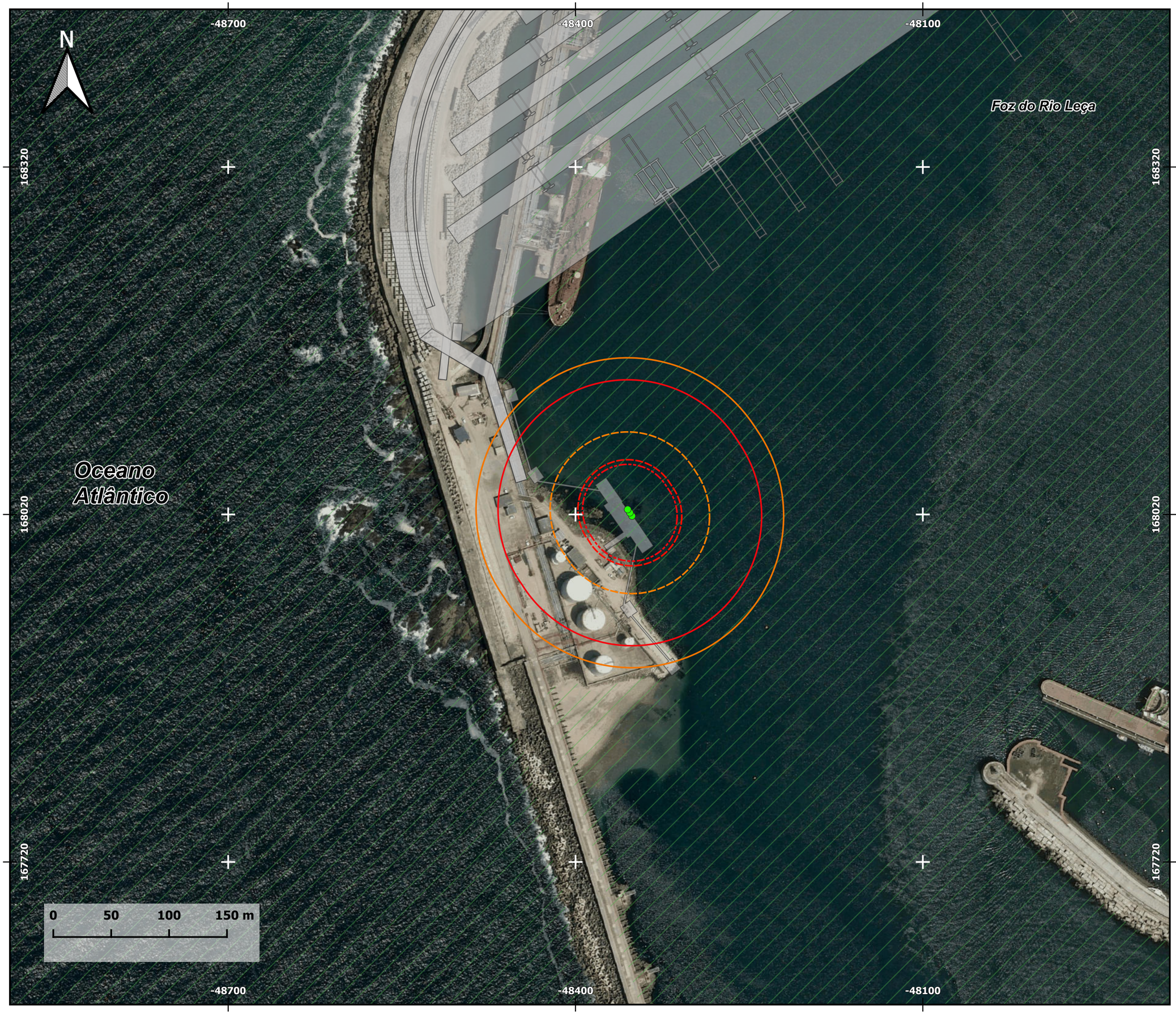
DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasolina
Densidade da substância:	775 kg/m^3
Limite Inferior de Inflamabilidade (LII):	14 000 ppm
Limite Superior de Inflamabilidade (LSI):	76 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	30 m
Diâmetro:	10'' = 254 mm
Caudal de operação:	815 m^3/h = 175,5 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	25,4 mm
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

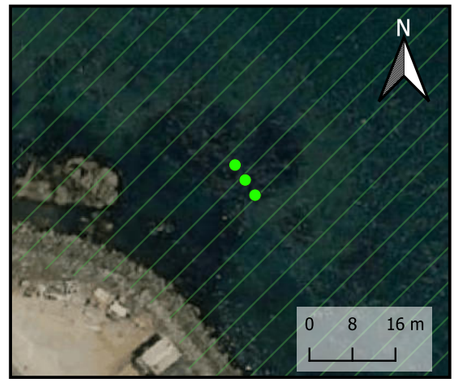
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 28 – ROTURA 10% BRAÇO DE CARGA GASOLINA

ROTURA PARCIAL DE BRAÇO DE CARGA COM FALHA DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: GASOLINA

OUTPUT	
Caudal máximo de libertação:	12,4 kg/s
Tempo de libertação:	3 600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 25 000 ppm (Efeitos letais)	39
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	69
7 kW/m^2 (Efeitos Letais)	63
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	131
7 kW/m^2 (Efeitos Letais)	112
Diâmetro da Piscina	113
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	67
0,14 bar (Efeitos Letais)	43





Detalhe. Escala 1:1140

Legenda:

Cenários

Cenário 28

- Sobrepressão - Efeitos Letais (43 m)
- Sobrepressão - Efeitos Irreversíveis (67 m)
- Radiação Térmica - Efeitos Letais (112 m)
- Radiação Térmica - Efeitos Irreversíveis (131 m)
- 50% LII - Efeitos Letais (39 m)
- Braços de Carga - Gasolina e Gasóleo

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

CertiTecna Engenharia de Segurança

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 057	ESCALA: 1:3000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 28 - Rotura 10% de Braço de Carga de Gasolina com falha da válvula automática	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cenário 27 e 28_Falha Braço de Carga_Gasolina

Mar

Pool substrate and bund

Cenário 27 e 28_Falha Braço de Carga_Gasolina\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 27 e 28_Falha Braço de Carga_Gasolina

Study

Study
Cenário 27 e 28_Falha Braço de Carga_Gasolina

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Mar
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel

Pressure vessel
Cenário 27 e 28_Falha Braço de Carga_Gasolina\Study

Tab	Group	Field	Value	Units
Material	Material	Material	GASOLINE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5059,72	m3
		Material to track	GASOLINE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	30	m
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5059,72	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5059,72	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 27 - Rot Tot

Short pipe

Cenário 27 e 28_Falha Braço de Carga_Gasolina\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	30	m
	Hole	Orifice diameter		mm
	Release location	Elevation	1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	175,5	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	0	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 28 - Rot 10%

Leak

Cenário 27 e 28_Falha Braço de Carga_Gasolina\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	GASOLINE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m

	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	

		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cenário 27 e 28_Falha Braço de Carga_Gasolina

Material: GASOLINE

Cenário 27 e 28_Falha Braço de Carga_Gasolina\Physical Properties System\Materials\GASOLINE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,399552**	
Aerosol class number	**2**	
Critical pressure	**24,9**	bar
Critical temperature	**295,55**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-56,77**	degC
Molecular weight	**114,229**	
Normal boiling point	**125,68**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,1083E-05**	bar
Triple point temperature	**-56,77**	degC
Carbon hydrogen ratio	**0,444444**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**20740**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**6,7138E+07**	**1,0769**	**-1,0124**	**0,37075**	**0**	**-56,77**	**295,55**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,945312**	
Combustion ct	**0,0165289**	
Emissive power length scale	**8,33**	m
Flash point	**14**	degC
Heat of combustion	**5,07415E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**14000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,7**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**76000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,047020 5	2,81851	-7,45552	8,45552		-56,77	286,85	1	Constant value above fraction Tc
Liquid viscosity	101	-98,805	3905,5	14,103	-2,5112E-05	2	-62	181,81	1	Constant value above fraction Tc
Surface tension	106	0,052789	1,2323	0	0	0	-56,77	295,55	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-8758	0,8448	-2,7121E+10	0		65,85	726,85	1	None (use equation)
Vapour viscosity	102	3,1191E-08	0,92925	55,092	0		-56,77	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	135540	443100	1635,6	305400	746,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	224830	-186,63	0,95891	0	0	-56,77	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	96,08	-	-	7,1802	2	-56,77	295,55	1	Vapour

pressure	4	7900,2	11,003	E-06			Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	0,5266	0,25693	568,7	0,28571	-56,77	295,55	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,2739	-321,44	-6,683E+07	-1,271E+20	1,6103E+22	11,23	1226,85	1	None (use equation)

Association

Constants

Acid association flag	Not Modelled	
Enthalpy interpolation range	0	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer	101	0	-	0	0	0	-273,15	-273,15	1	None (use

coefficients			**0**							**equation)**
Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**2E-05**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cenário 27 e 28_Falha Braço de Carga_Gasolina

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel	Cen 27 - Rot Tot	Mais Provável	175,5	14,1165	1	9569,72	0,254	4,86802	3600
	Cen 28 - Rot 10%	Mais Provável	12,4257	13,9049	1	68,8216	0,0196748	57,4302	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel	Cen 27 - Rot Tot	Mais Provável	3,15762	3,3653	6,10814
	Cen 28 - Rot 10%	Mais Provável	Not reached at height of interest	35,1683	38,2665

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 27 - Rot Tot	Mais Provável	5,9707	10,3569	9,56926	8,41902
	Cen 28 - Rot 10%	Mais Provável	30,2627	68,6764	62,3361	53,3308

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 27 - Rot Tot	Mais Provável	54,9927	73,4898	63,1273	50,7705
	Cen 28 - Rot 10%	Mais Provável	12,5467	67,109	63,073	54,8902

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 27 - Rot Tot	Mais Provável	112,84	130,487	111,662	88,2437
	Cen 28 - Rot 10%	Mais Provável	112,882	130,529	111,698	88,2718

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel	Cen 27 - Rot Tot	Mais Provável	3,3653	6,10814
	Cen 28 - Rot 10%	Mais Provável	35,1683	38,2665

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel	Cen 27 - Rot Tot	Mais Provável	6,0522	0	41,389
	Cen 28 - Rot 10%	Mais Provável	40,15	0,192189	11,1604

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel	Cen 28 - Rot 10%	Mais Provável	0,05	66,6444	83,4483
			0,14	42,7282	35,6158
			0,3	35,5627	21,2848

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel	Cen 28 - Rot 10%	Mais Provável	0,05	9,89251	8,90435	40	24,9203	24,9203
			0,14	9,89251	8,90435	40	24,9203	24,9203
			0,3	9,89251	8,90435	40	24,9203	24,9203

Input Report

Workspace: Cenário 27 e 28_Falha Braço de Carga_Gasolina

Mais Provável

Weather

Cenário 27 e 28_Falha Braço de Carga_Gasolina\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion	14,1	degC

		calculations		
		Surface temperature for pool calculations	14,1	degC

CENÁRIO 29 – ROTURA TOTAL BRAÇO DE CARGA GASÓLEO

ROTURA TOTAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: GASÓLEO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasóleo
Densidade da substância:	900 kg/m^3
Limite Inferior de Inflamabilidade (LII):	7 000 ppm (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	51 000 ppm (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	30 m
Diâmetro:	10'' = 254 mm
Caudal de operação:	1250 m^3/h = 298,7 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	254 mm
Tempo de libertação máximo: Nota: Este cenário foi realizado para um tempo de libertação de 120 s, o qual se fundamenta na existência de isolamento automático dos braços de carga.	120 s
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 29 – ROTURA TOTAL BRAÇO DE CARGA GASÓLEO

ROTURA TOTAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA;
SUBSTÂNCIA: GASÓLEO

OUTPUT	
Caudal máximo de libertação:	298,7 kg/s
Tempo de libertação:	120 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 3 500 ppm (Efeitos letais)	5
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	3
7 kW/m^2 (Efeitos Letais)	3
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	125
7 kW/m^2 (Efeitos Letais)	107
Diâmetro da Piscina	113
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	--
0,14 bar (Efeitos Letais)	--

CENÁRIO 30 – ROTURA 10% BRAÇO DE CARGA GASÓLEO

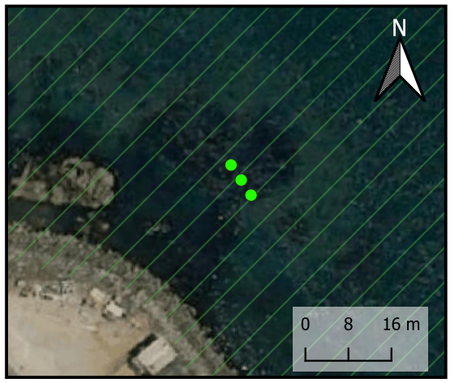
ROTURA PARCIAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: GASÓLEO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasóleo
Densidade da substância:	900 kg/m^3
Limite Inferior de Inflamabilidade (LII):	7 000 ppm (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	51 000 ppm (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	30 m
Diâmetro:	10'' = 254 mm
Caudal de operação:	1250 m^3/h = 298,7 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	25,4 mm
Tempo de libertação máximo: Nota: Este cenário foi realizado para um tempo de libertação de 120 s, o qual se fundamenta na existência de isolamento automático dos braços de carga.	120 s
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 30 – ROTURA 10% BRAÇO DE CARGA GASÓLEO

ROTURA PARCIAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: GASÓLEO

OUTPUT	
Caudal máximo de libertação:	13,1 kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 3 500 ppm (Efeitos letais)	36
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	17
7 kW/m^2 (Efeitos Letais)	15
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	125
7 kW/m^2 (Efeitos Letais)	107
Diâmetro da Piscina	113
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	35
0,14 bar (Efeitos Letais)	28



Detalhe. Escala 1:1140

Legenda:

Cenários

Cenário 29

- Radiação Térmica - Efeitos Letais (107 m)
- Radiação Térmica - Efeitos Irreversíveis (125 m)
- 50% LII - Efeitos Letais (5 m)
- Braços de Carga - Gasolina e Gasóleo

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

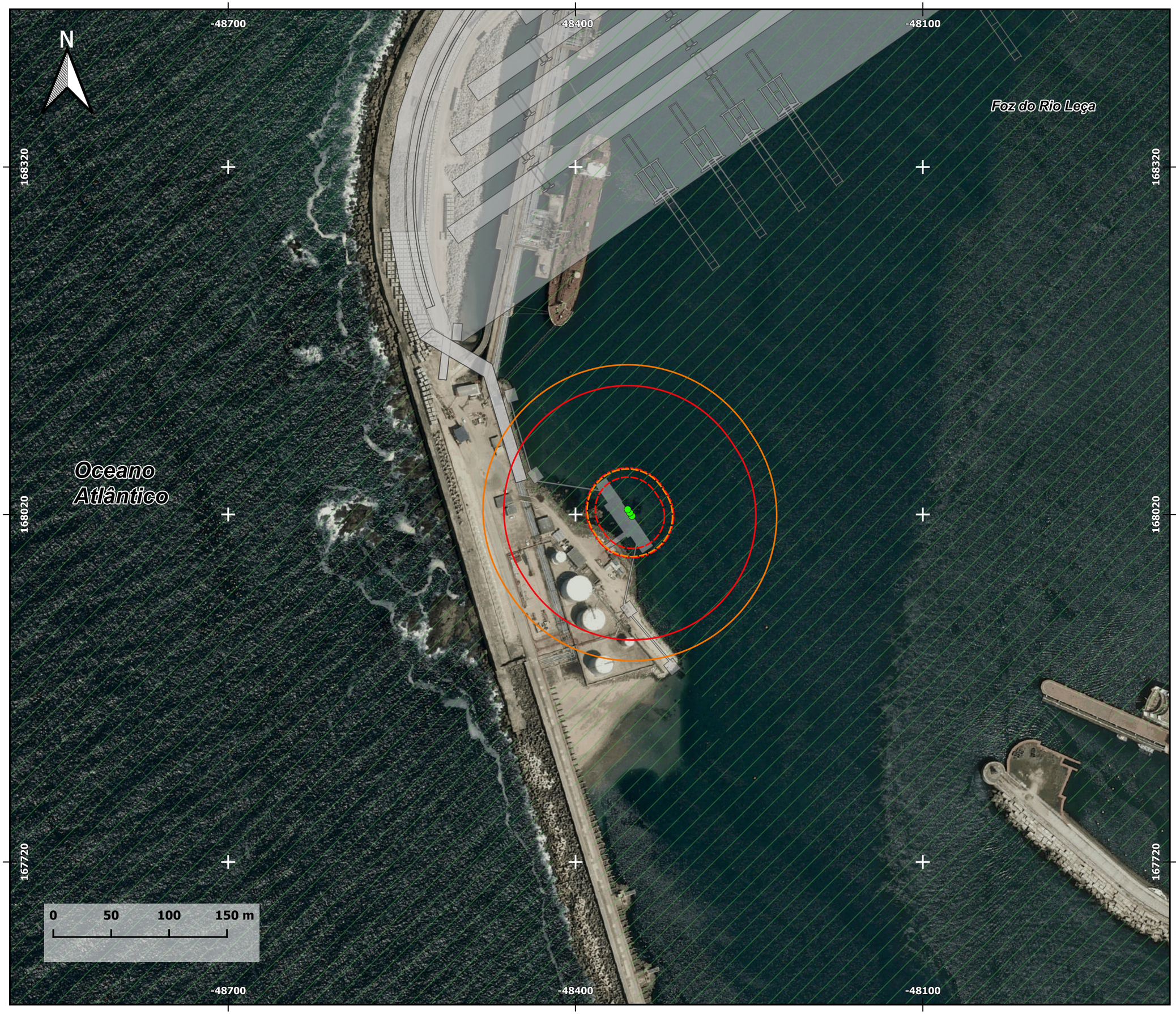
NOTAS RELATIVAS À CARTOGRAFIA:

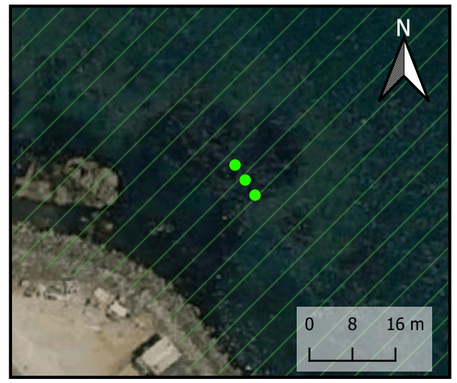
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 058	ESCALA: 1:3000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 29 - Rotura total de Braço de Carga de Gasóleo	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:1140

Legenda:

Cenários

Cenário 30

- Sobrepressão - Efeitos Letais (28 m)
- Sobrepressão - Efeitos Irreversíveis (35 m)
- Radiação Térmica - Efeitos Letais (107 m)
- Radiação Térmica - Efeitos Irreversíveis (125 m)
- 50% LII - Efeitos Letais (36 m)
- Braços de Carga - Gasolina e Gasóleo

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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www.certitecna.pt geral@certitecna.pt

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 059	ESCALA: 1:3000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 30 - Rotura 10% de Braço de Carga de Gasóleo	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, S.A., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cenário 29 e 30 Gasoleo_Braço de Carga

Study

Study
Cenário 29 e 30 Gasoleo_Braço de Carga

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Mar
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel

Pressure vessel
Cenário 29 e 30 Gasoleo_Braço de Carga\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL (LGO)	
		Specify volume inventory?	No	
		Mass inventory	4,5E+06	kg
		Volume inventory	6037,24	m3
		Material to track	DIESEL (LGO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	30	m
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	6037,24	m3
		Tank vapour volume	0	m3
		Tank liquid volume	6037,24	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 29 - Rot Tot

Short pipe

Cenário 29 e 30 Gasoleo_Braço de Carga\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	30	m
	Hole	Orifice diameter		mm
	Release location	Elevation	1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	298,7	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	0	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 30 - Rot 10%

Leak

Cenário 29 e 30 Gasoleo_Braço de Carga\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m

	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	

		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cenário 29 e 30 Gasoleo_Braço de Carga

Material: DIESEL (LGO)

Cenário 29 e 30 Gasoleo_Braço de Carga\Physical Properties System\Materials\DIESEL (LGO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,530316**	
Aerosol class number	**2**	
Critical pressure	**19,5**	bar
Critical temperature	**365,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-25,579**	degC
Molecular weight	**156,308**	
Normal boiling point	**195,928**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**4,08414E-06**	bar
Triple point temperature	**-25,579**	degC
Carbon hydrogen ratio	**0,458333**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**22180**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,0136E+08**	**1,5084**	**-1,473**	**0,44521**	**0**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,942476**	

Combustion ct	**0,012207**	
Emissive power length scale	**8,33**	m
Flash point	**65,9**	degC
Heat of combustion	**6,9036E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**7000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**51000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction	Supercritical extrapolation

									]	
Liquid thermal conductivity	123	0,038507 4	3,96718	-10,9016	11,9016		-25,58	336,85	1	Constant value above fraction Tc
Liquid viscosity	101	52,176	-4951,9	-8,5676	570980	-2	-25,58	238,05	1	Constant value above fraction Tc
Surface tension	106	0,055493	1,3189	0	0	0	-25,58	365,85	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,038012	0,68615	34663	8,7219E+06		195,93	726,85	1	None (use equation)
Vapour viscosity	102	3,594E-08	0,9052	125	0		-25,58	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	195290	609980	1708,7	413020	775,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	293980	-114,98	0,96936	0	0	-25,58	160,27	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour pressur	101	131	-1114	-15,85	8,1871E-06	2	-25,58	365,85	1	Vapour Pressure

e		**3**	**5**							**Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,36703**	**0,24876**	**639**	**0,28571**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,583**	**-727,3**	**-8,294E+07**	**-2,964E+21**	**7,749E+23**	**45,85**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cenário 29 e 30 Gasoleo_Braço de Carga

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel	Cen 29 - Rot Tot	Mais Provável	298,7	14,1513	1	4125,67	0,254	7,90906	120
	Cen 30 - Rot 10%	Mais Provável	13,0926	13,957	1	77,3908	0,0196748	57,7678	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel	Cen 29 - Rot Tot	Mais Provável	4,65566	4,89268	4,96344
	Cen 30 - Rot 10%	Mais Provável	Not reached at height of interest	34,336	35,6429

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 29 - Rot Tot	Mais Provável	1,85663	2,76542	2,42336	1,70652
	Cen 30 - Rot 10%	Mais Provável	7,41829	16,058	14,5933	12,5308

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 29 - Rot Tot	Mais Provável	82,8419	99,6339	85,417	67,0443
	Cen 30 - Rot 10%	Mais Provável	17,2497	67,4409	62,9223	53,8929

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 29 - Rot Tot	Mais Provável	112,839	124,174	106,039	82,3332
	Cen 30 - Rot 10%	Mais Provável	112,849	124,183	106,047	82,3392

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel	Cen 29 - Rot Tot	Mais Provável	4,89268	4,96344
	Cen 30 - Rot 10%	Mais Provável	34,336	35,6429

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel	Cen 29 - Rot Tot	Mais Provável	4,17686	0,0471132	118,747
	Cen 30 - Rot 10%	Mais Provável	34,4754	0,324423	23,8508

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel	Cen 30 - Rot 10%	Mais Provável	0,05	34,9157	26,3509
			0,14	27,3635	11,2466
			0,3	25,1008	6,72122

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel	Cen 30 - Rot 10%	Mais Provável	0,05	0,313283	1,91819	10	21,7402	21,7402
			0,14	0,313283	1,91819	10	21,7402	21,7402
			0,3	0,313283	1,91819	10	21,7402	21,7402

Input Report

Workspace: Cenário 29 e 30 Gasoleo_Braço de Carga

Mais Provável

Weather

Cenário 29 e 30 Gasoleo_Braço de Carga\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 29 e 30 Gasoleo_Braço de Carga

Mar

Pool substrate and bund

Cenário 29 e 30 Gasoleo_Braço de Carga\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

CENÁRIO 32 – ROTURA 10% BRAÇO DE CARGA GASÓLEO

ROTURA PARCIAL DE BRAÇO DE CARGA COM FALHA DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: GASÓLEO

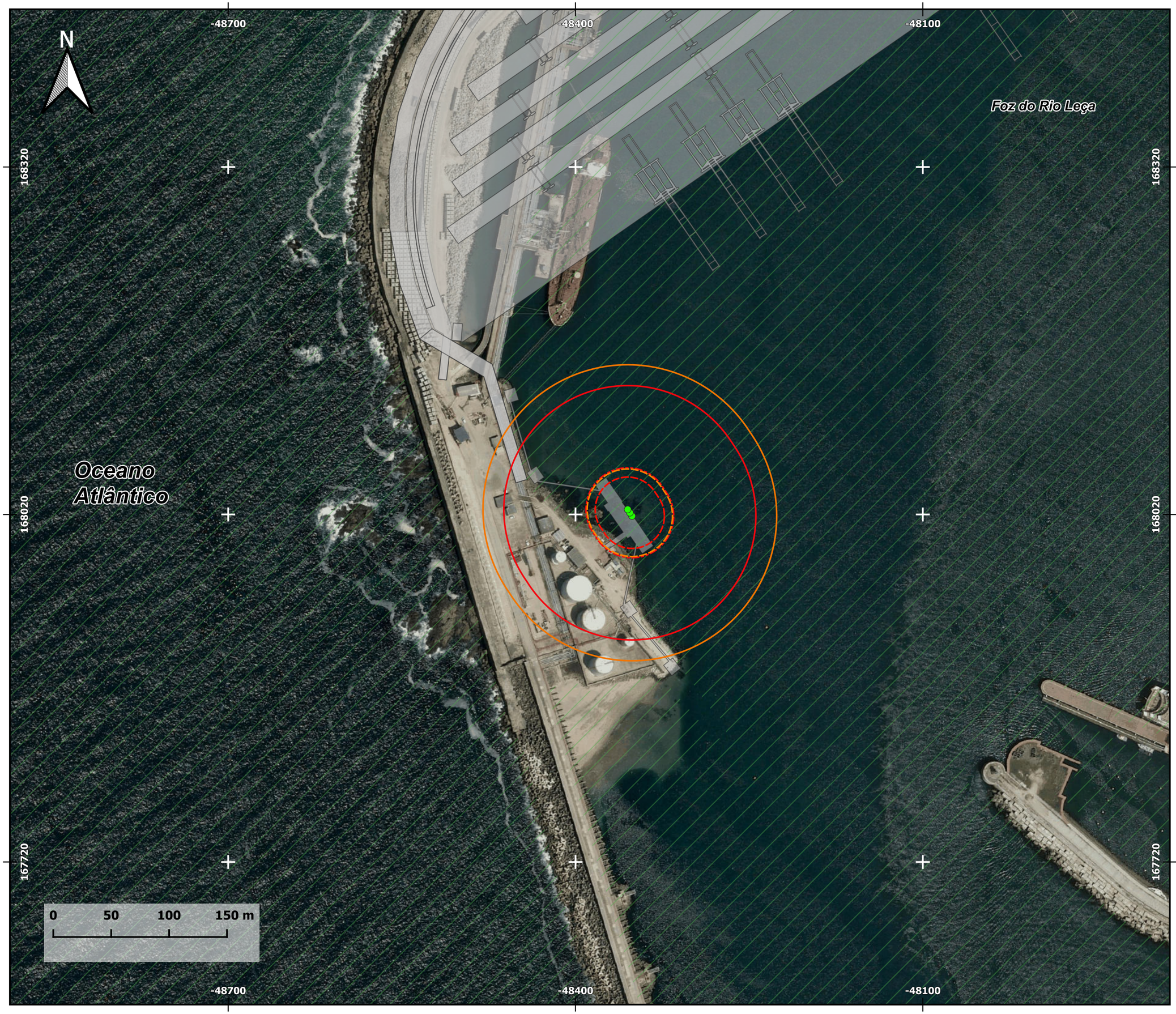
DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Gasóleo
Densidade da substância:	900 kg/m^3
Limite Inferior de Inflamabilidade (LII):	7 000 ppm (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	51 000 ppm (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	30 m
Diâmetro:	10'' = 254 mm
Caudal de operação:	1250 m^3/h = 298,7 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	25,4 mm
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

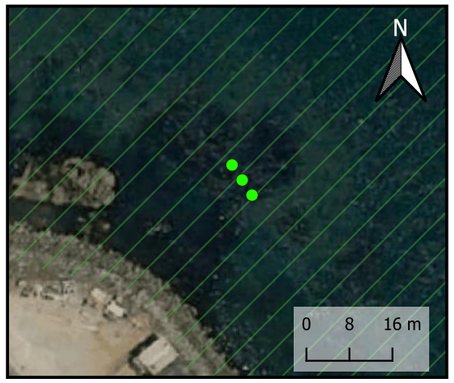
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 32 – ROTURA 10% BRAÇO DE CARGA GASÓLEO

ROTURA PARCIAL DE BRAÇO DE CARGA COM FALHA DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: GASÓLEO

OUTPUT	
Caudal máximo de libertação:	13,1 kg/s
Tempo de libertação:	3 600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 3 500 ppm (Efeitos letais)	36
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	17
7 kW/m^2 (Efeitos Letais)	15
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	125
7 kW/m^2 (Efeitos Letais)	107
Diâmetro da Piscina	113
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	35
0,14 bar (Efeitos Letais)	28





Detalhe. Escala 1:1140

Legenda:

Cenários

Cenário 32

- Sobrepressão - Efeitos Letais (28 m)
- Sobrepressão - Efeitos Irreversíveis (35 m)
- Radiação Térmica - Efeitos Letais (107 m)
- Radiação Térmica - Efeitos Irreversíveis (125 m)
- 50% LII - Efeitos Letais (36 m)
- Braços de Carga - Gasolina e Gasóleo

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 060	ESCALA: 1:3000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 32 - Rotura 10% de Braço de Carga de Gasóleo com falha da válvula automática	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, S.A., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cenário 31 e 32 Falha Gasoleo_Braço de Carga

Study

Study

Cenário 31 e 32 Falha Gasoleo_Braço de Carga

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Mar
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel

Pressure vessel

Cenário 31 e 32 Falha Gasoleo_Braço de Carga\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL (LGO)	
		Specify volume inventory?	No	
		Mass inventory	4,5E+06	kg
		Volume inventory	6037,24	m3
		Material to track	DIESEL (LGO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	30	m
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	6037,24	m3
		Tank vapour volume	0	m3
		Tank liquid volume	6037,24	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Fails	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 31 - Rot Tot

Short pipe

Cenário 31 e 32 Falha Gasoleo_Braço de Carga\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	30	m
	Hole	Orifice diameter		mm
	Release location	Elevation	1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	298,7	kg/s
		Pump head		m
		Active isolation valve	No	
		Valve closing time		s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	0	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 32 - Rot 10%

Leak

Cenário 31 e 32 Falha Gasoleo_Braço de Carga\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL (LGO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m

	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	

		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cenário 31 e 32 Falha Gasoleo_Braço de Carga

Material: DIESEL (LGO)

Cenário 31 e 32 Falha Gasoleo_Braço de Carga\Physical Properties System\Materials\DIESEL (LGO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,530316**	
Aerosol class number	**2**	
Critical pressure	**19,5**	bar
Critical temperature	**365,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-25,579**	degC
Molecular weight	**156,308**	
Normal boiling point	**195,928**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**4,08414E-06**	bar
Triple point temperature	**-25,579**	degC
Carbon hydrogen ratio	**0,458333**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**22180**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,0136E+08**	**1,5084**	**-1,473**	**0,44521**	**0**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,942476**	
Combustion ct	**0,012207**	
Emissive power length scale	**8,33**	m
Flash point	**65,9**	degC
Heat of combustion	**6,9036E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**7000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**51000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature	Maximum temperat	Fraction of critical temperat	Supercritical extrapola

							[degC]	ure [degC]	ure [fraction]	tion
Liquid thermal conductivity	123	0,0385074	3,96718	-10,9016	11,9016		-25,58	336,85	1	Constant value above fraction Tc
Liquid viscosity	101	52,176	-4951,9	-8,5676	570980	-2	-25,58	238,05	1	Constant value above fraction Tc
Surface tension	106	0,055493	1,3189	0	0	0	-25,58	365,85	1	Constant value above fraction Tc
Vapour thermal conductivity	102	0,038012	0,68615	34663	8,7219E+06		195,93	726,85	1	None (use equation)
Vapour viscosity	102	3,594E-08	0,9052	125	0		-25,58	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	195290	609980	1708,7	413020	775,4	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	293980	-114,98	0,96936	0	0	-25,58	160,27	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation

Vapour pressure	**101**	**131**	**-11143**	**-15,855**	**8,1871E-06**	**2**	**-25,58**	**365,85**	**1**	**Vapour Pressure Extrapolation**

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	**105**	**0,36703**	**0,24876**	**639**	**0,28571**	**-25,58**	**365,85**	**1**	**Constant value above fraction Tc**

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	**104**	**0,583**	**-727,3**	**-8,294E+07**	**-2,964E+21**	**7,749E+23**	**45,85**	**1226,85**	**1**	**None (use equation)**

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation

Dimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cenário 31 e 32 Falha Gasoleo_Braço de Carga

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel	Cen 31 - Rot Tot	Mais Provável	298,7	14,1513	1	4125,67	0,254	7,90906	3600
	Cen 32 - Rot 10%	Mais Provável	13,0926	13,957	1	77,3908	0,0196748	57,7678	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel	Cen 31 - Rot Tot	Mais Provável	4,65567	4,89269	4,96343
	Cen 32 - Rot 10%	Mais Provável	Not reached at height of interest	34,336	35,6429

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 31 - Rot Tot	Mais Provável	1,85663	2,76542	2,42336	1,70652
	Cen 32 - Rot 10%	Mais Provável	7,41829	16,058	14,5933	12,5308

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 31 - Rot Tot	Mais Provável	82,8419	99,6339	85,417	67,0443
	Cen 32 - Rot 10%	Mais Provável	17,2497	67,4409	62,9223	53,8929

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 31 - Rot Tot	Mais Provável	112,838	124,173	106,038	82,3323
	Cen 32 - Rot 10%	Mais Provável	112,849	124,183	106,047	82,3392

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel	Cen 31 - Rot Tot	Mais Provável	4,89269	4,96343
	Cen 32 - Rot 10%	Mais Provável	34,336	35,6429

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel	Cen 31 - Rot Tot	Mais Provável	4,17686	0,0471132	3549,03
	Cen 32 - Rot 10%	Mais Provável	34,4754	0,324423	23,8508

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel	Cen 32 - Rot 10%	Mais Provável	0,05	34,9157	26,3509
			0,14	27,3635	11,2466
			0,3	25,1008	6,72122

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel	Cen 32 - Rot 10%	Mais Provável	0,05	0,313283	1,91819	10	21,7402	21,7402
			0,14	0,313283	1,91819	10	21,7402	21,7402
			0,3	0,313283	1,91819	10	21,7402	21,7402

Input Report

Workspace: Cenário 31 e 32 Falha Gasoleo_Braço de Carga

Mais Provável

Weather

Cenário 31 e 32 Falha Gasoleo_Braço de Carga\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion	14,1	degC

		calculations		
		Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 31 e 32 Falha Gasoleo_Braço de Carga

Mar

Pool substrate and bund

Cenário 31 e 32 Falha Gasoleo_Braço de Carga\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

CENÁRIO 33 – ROTURA TOTAL BRAÇO DE CARGA FUELÓLEO

ROTURA TOTAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA;
SUBSTÂNCIA: FUELÓLEO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Fuel
Densidade da substância:	1010 kg/m^3
Limite Inferior de Inflamabilidade (LII):	5 000 ppm (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	45 000 ppm (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	30 m
Diâmetro:	12'' = 304,8 mm
Caudal de operação:	1250 m^3/h = 312,2 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	70 °C
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	304,8 mm
Tempo de libertação máximo: Nota: Este cenário foi realizado para um tempo de libertação de 120 s, o qual se fundamenta na existência de isolamento automático dos braços de carga.	120 s
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 33 – ROTURA TOTAL BRAÇO DE CARGA FUELÓLEO

ROTURA TOTAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA;
SUBSTÂNCIA: FUELÓLEO

OUTPUT	
Caudal máximo de libertação:	312,2 kg/s
Tempo de libertação:	120 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 2 500 ppm (Efeitos letais)	4
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	5
7 kW/m^2 (Efeitos Letais)	4
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	102
7 kW/m^2 (Efeitos Letais)	88
Diâmetro da Piscina	90
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	-
0,14 bar (Efeitos Letais)	-

CENÁRIO 34 – ROTURA 10% BRAÇO DE CARGA FUELÓLEO

ROTURA PARCIAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: FUELÓLEO

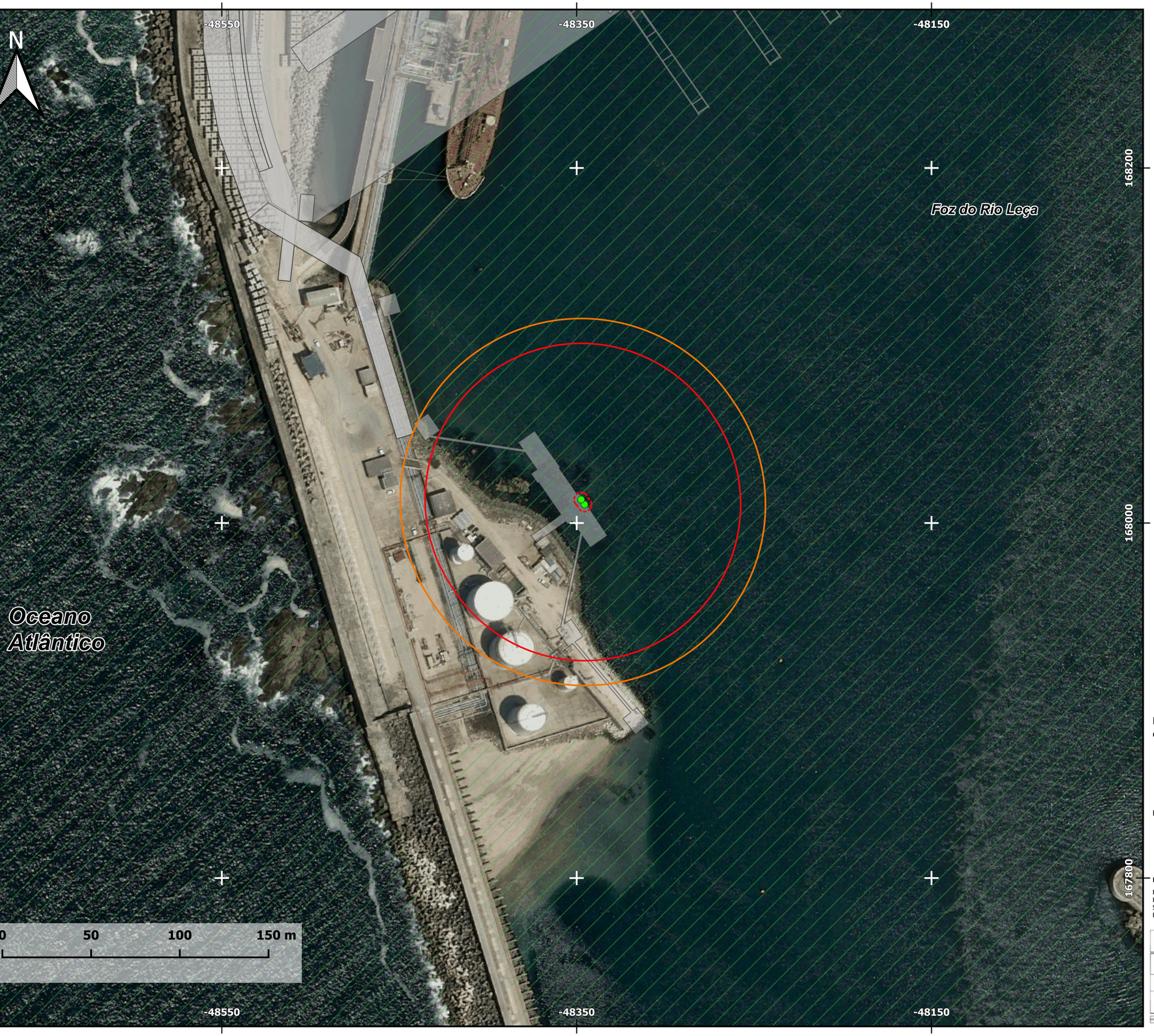
DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Fuel
Densidade da substância:	1010 kg/m^3
Limite Inferior de Inflamabilidade (LII):	5 000 ppm (retirado do Phast)
Limite Superior de Inflamabilidade (LSI):	45 000 ppm (retirado do Phast)
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	30 m
Diâmetro:	12'' = 304,8 mm
Caudal de operação:	1250 m^3/h = 312,2 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	70 °C
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	30,48 mm
Tempo de libertação máximo: Nota: Este cenário foi realizado para um tempo de libertação de 120 s, o qual se fundamenta na existência de isolamento automático dos braços de carga.	120 s
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

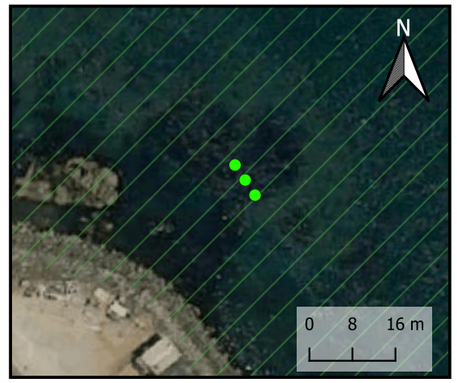
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 34 – ROTURA 10% BRAÇO DE CARGA FUELÓLEO

ROTURA PARCIAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: FUELÓLEO

OUTPUT	
Caudal máximo de libertação:	19,1 kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 2 500 ppm (Efeitos letais)	48
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	7
7 kW/m^2 (Efeitos Letais)	6
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	120
7 kW/m^2 (Efeitos Letais)	103
Diâmetro da Piscina	113
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	35
0,14 bar (Efeitos Letais)	29





Detalhe. Escala 1:1140

Legenda:

Cenários

Cenário 33

- Radiação Térmica - Efeitos Letais (88 m)
- Radiação Térmica - Efeitos Irreversíveis (102 m)
- 50% LII - Efeitos Letais (4 m)
- Braços de Carga - Fuel

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

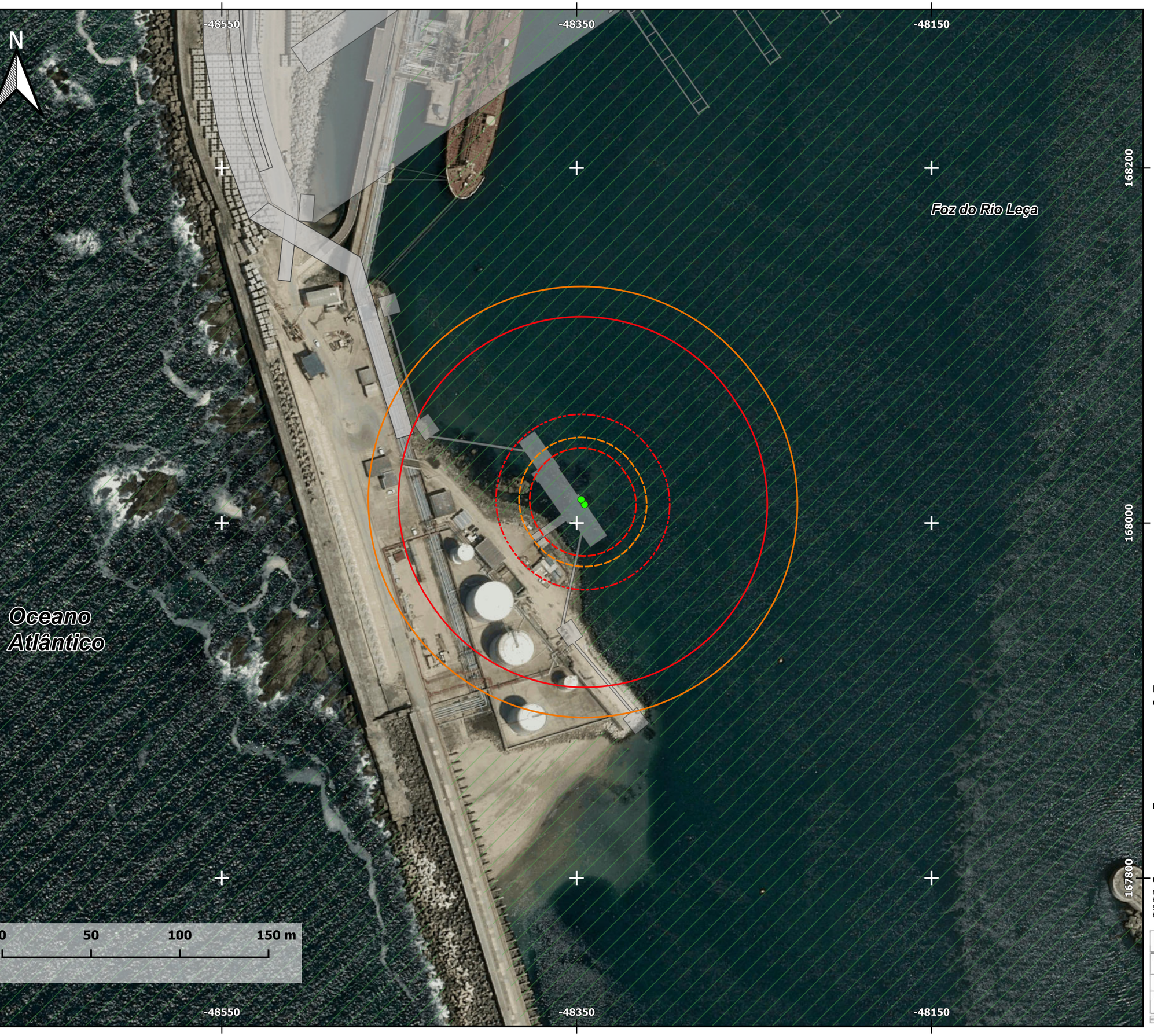
NOTAS RELATIVAS À CARTOGRAFIA:

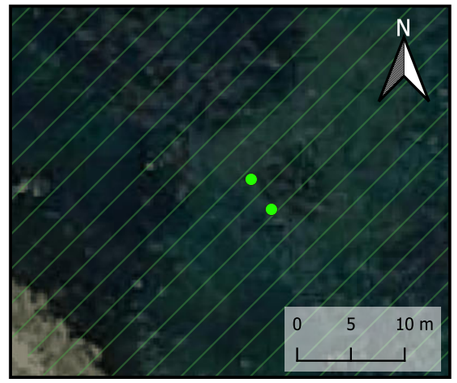
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 061	ESCALA: 1:2000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 / DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 33 - Rotura total de Braço de Carga de Fuel	TÉCNICO RESPONSÁVEL: Ana Dias / VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, S.A., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:570

Legenda:

Cenários

Cenário 34

- Sobrepressão - Efeitos Letais (29 m)
- Sobrepressão - Efeitos Irreversíveis (35 m)
- Radiação Térmica - Efeitos Letais (103 m)
- Radiação Térmica - Efeitos Irreversíveis (120 m)
- 50% LII - Efeitos Letais (48 m)
- Braços de Carga - Fuel

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

CertiTecna Engenharia de Segurança

CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 062		ESCALA: 1:2000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 34 - Rotura 10% de Braço de Carga de Fuel	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Materials Report

Workspace: Cenário 33 e 34 Fuel_Braço de Carga

Material: DIESEL FUEL OIL (HFO)

Cenário 33 e 34 Fuel_Braço de Carga\Physical Properties System\Materials\DIESEL FUEL OIL (HFO)

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,643017**	
Aerosol class number	**2**	
Critical pressure	**15,7**	bar
Critical temperature	**419,85**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**5,86**	degC
Molecular weight	**198,388**	
Normal boiling point	**253,577**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**2,52685E-06**	bar
Triple point temperature	**5,86**	degC
Carbon hydrogen ratio	**0,466667**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**45070**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**1,2007E+08**	**1,445**	**-1,3846**	**0,42836**	**0**	**5,86001**	**419,85**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,940823**	
Combustion ct	**0,0096768**	
Emissive power length scale	**8,33**	m
Flash point	**109,3**	degC
Heat of combustion	**8,73282E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**5000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,1**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**45000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,044112	2,99248	-7,97743	8,97743		5,86001	376,85	1	Constant value above fraction Tc
Liquid viscosity	101	-136,73	6421,3	19,493	-2,297E-05	2	4,49999	281,25	1	Constant value above fraction Tc
Surface tension	106	0,056276	1,3631	0	0	0	5,86001	419,85	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-163,62	0,9193	-1,0876E+09	0		253,58	726,85	1	None (use equation)
Vapour viscosity	102	5,1567E-09	1,1561	0	0		5,86001	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	230820	786780	1682,3	544860	743,1	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	353140	29,13	0,86116	0	0	5,86001	253,58	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	140,4	-	-	6,5877	2	5,86001	419,85	1	Vapour

pressure	7	13231	16,859	E-06			Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	0,27248	0,24007	693	0,28571	5,86001	419,85	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,48209	-501,32	-2,8594E+08	-2,572E+21	4,5523E+23	73,35	1226,85	1	None (use equation)

Association

Constants

Acid association flag	Not Modelled	
Enthalpy interpolation range	0	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer	101	0	-	0	0	0	-273,15	-273,15	1	None (use

coefficients			**0**							**equation)**
Hexamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,035**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cenário 33 e 34 Fuel_Braço de Carga

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel	Cen 33 - Rot Tot	Mais Provável	312,2	70,0235	1	6561,81	0,3048	5,87596	120
	Cen 34 - Rot 10%	Mais Provável	19,0758	69,8339	1	63,3441	0,0236097	59,8271	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel	Cen 33 - Rot Tot	Mais Provável	3,63719	3,83977	3,89984
	Cen 34 - Rot 10%	Mais Provável	Not reached at height of interest	45,7203	47,3949

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 33 - Rot Tot	Mais Provável	2,57591	4,26673	3,8775	3,26167
	Cen 34 - Rot 10%	Mais Provável	3,11712	6,49313	5,8806	4,97412

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 33 - Rot Tot	Mais Provável	89,4009	101,645	87,2839	67,4916
	Cen 34 - Rot 10%	Mais Provável	23,2077	81,2441	76,0214	66,6787

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 33 - Rot Tot	Mais Provável	89,4009	101,645	87,2839	67,4916
	Cen 34 - Rot 10%	Mais Provável	112,848	119,934	102,718	78,9359

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel	Cen 33 - Rot Tot	Mais Provável	3,83977	3,89984
	Cen 34 - Rot 10%	Mais Provável	45,7203	47,3949

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel	Cen 33 - Rot Tot	Mais Provável	3,55842	0	118,793
	Cen 34 - Rot 10%	Mais Provável	47,0878	0,317144	7,51655

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel	Cen 34 - Rot 10%	Mais Provável	0,05	34,0347	19,4248
			0,14	28,4675	8,29052
			0,3	26,7996	4,95459

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel	Cen 34 - Rot 10%	Mais Provável	0,05	0,125913	4,52302	40	24,3223	24,3223
			0,14	0,125913	4,52302	40	24,3223	24,3223
			0,3	0,125913	4,52302	40	24,3223	24,3223

Input Report

Workspace: Cenário 33 e 34 Fuel_Braço de Carga

Mais Provável

Weather

Cenário 33 e 34 Fuel_Braço de Carga\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 33 e 34 Fuel_Braço de Carga

Mar

Pool substrate and bund
Cenário 33 e 34 Fuel_Braço de Carga\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK

Input Report

Workspace: Cenário 33 e 34 Fuel_Braço de Carga

Study

Study
Cenário 33 e 34 Fuel_Braço de Carga

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Mar
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel

Pressure vessel
Cenário 33 e 34 Fuel_Braço de Carga\Study

Tab	Group	Field	Value	Units
Material	Material	Material	DIESEL FUEL OIL (HFO)	
		Specify volume inventory?	No	
		Mass inventory	4,5E+06	kg
		Volume inventory	6179,72	m3
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Specified condition	Pressure/temperature	
		Temperature	70	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	30	m
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m

		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	6179,72	m3
		Tank vapour volume	0	m3
		Tank liquid volume	6179,72	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for time-varying releases	Blowdown?	Fails	
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for		

		concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	

		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m

		North	0	m

Cen 33 - Rot Tot

Short pipe

Cenário 33 e 34 Fuel_Braço de Carga\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	304,8	mm
		Pipe length	30	m
	Hole	Orifice diameter		mm
	Release location	Elevation	1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	312,2	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off	0	/m

		valves		
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 34 - Rot 10%

Leak

Cenário 33 e 34 Fuel_Braço de Carga\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	30,48	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	DIESEL FUEL OIL (HFO)	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m

	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	

		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

CENÁRIO 37 – ROTURA TOTAL BRAÇO DE CARGA HEXANO

ROTURA TOTAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: HEXANO

DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Hexano
Densidade da substância:	680 kg/m^3
Limite Inferior de Inflamabilidade (LII):	12 000 ppm
Limite Superior de Inflamabilidade (LSI):	83 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	30 m
Diâmetro:	10'' = 254 mm
Caudal de operação:	600 m^3/h = 113,3 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Line Rupture*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	254 mm
Tempo de libertação máximo: Nota: Este cenário foi realizado para um tempo de libertação de 120 s, o qual se fundamenta na existência de isolamento automático dos braços de carga.	120 s
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 °C
Humidade Relativa	82 %

CENÁRIO 37 – ROTURA TOTAL BRAÇO DE CARGA HEXANO

ROTURA TOTAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA;
SUBSTÂNCIA: HEXANO

OUTPUT	
Caudal máximo de libertação:	113,3 kg/s
Tempo de libertação:	120 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 6 000 ppm (Efeitos letais)	104
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	25
7 kW/m^2 (Efeitos Letais)	23
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	138
7 kW/m^2 (Efeitos Letais)	119
Diâmetro da Piscina	113
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	102
0,14 bar (Efeitos Letais)	64

CENÁRIO 38 – ROTURA 10% BRAÇO DE CARGA HEXANO

ROTURA PARCIAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA; SUBSTÂNCIA: HEXANO

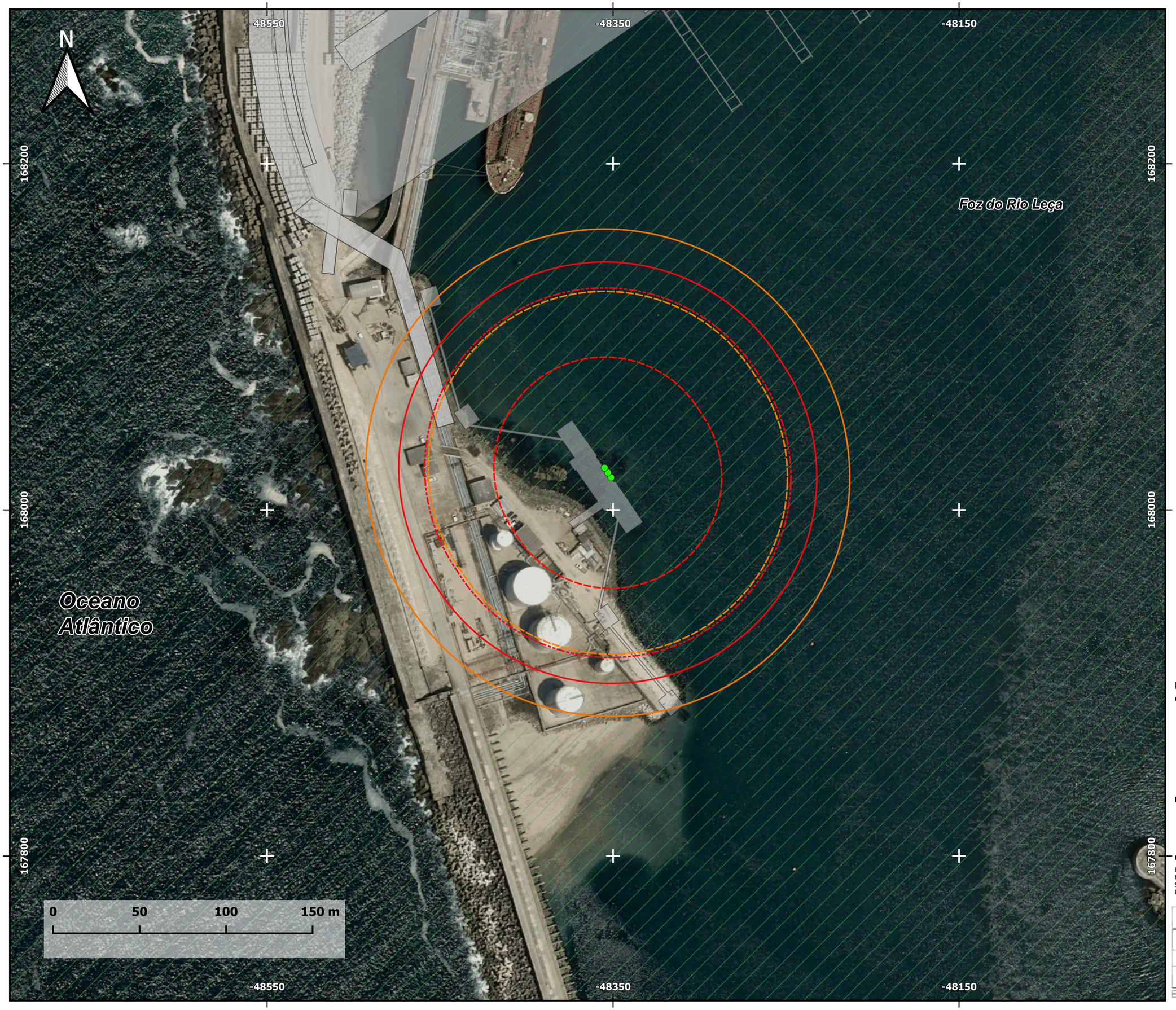
DADOS	
SUBSTÂNCIA	
Identificação da Substância:	Hexano
Densidade da substância:	680 kg/m^3
Limite Inferior de Inflamabilidade (LII):	12 000 ppm
Limite Superior de Inflamabilidade (LSI):	83 000 ppm
EQUIPAMENTOS E CONDIÇÕES PROCESSUAIS UTILIZADAS	
Equipamentos envolvidos:	Braço de Carga
Comprimento Braço de Carga:	30 m
Diâmetro:	10'' = 254 mm
Caudal de operação:	600 m^3/h = 113,3 kg/s
Tempo de interesse:	3600 s
Pressão:	10 bar
Temperatura:	Tamb
Área da bacia de retenção:	--
Altura da bacia de retenção:	--
CONDIÇÕES TÉCNICAS UTILIZADAS NO CENÁRIO:	
Evento (PHAST)	*Leak*
Tipo de rotura/libertação:	Libertação contínua
Diâmetro da rotura:	25,4 mm
Tempo de libertação máximo: Nota: Este cenário foi realizado para um tempo de libertação de 120 s, o qual se fundamenta na existência de isolamento automático dos braços de carga.	120 s
Altura de libertação relativamente ao solo:	1 m
Direção da rotura:	Horizontal
Rugosidade do terreno:	0,2 mm – *Open water*

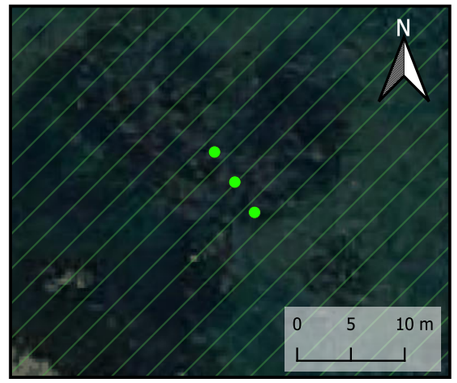
CONDIÇÕES ATMOSFÉRICAS UTILIZADAS:	
Velocidade do Vento	14,2 Km/h = 3,94 m/s
Classe de estabilidade	D
Temperatura	14,1 ^{o}C
Humidade Relativa	82 %

CENÁRIO 38 – ROTURA 10% BRAÇO DE CARGA HEXANO

ROTURA PARCIAL DE BRAÇO DE CARGA COM ATUAÇÃO DA VÁLVULA AUTOMÁTICA;
SUBSTÂNCIA: HEXANO

OUTPUT	
Caudal máximo de libertação:	11,7 kg/s
Tempo de libertação:	3600 s
EFEITOS	
50% LIMITE INFERIOR DE INFLAMABILIDADE - DISTÂNCIA DA FONTE EM METROS	
DISPERSÃO DE NUVEM	
50 % LII – 6 000 ppm (Efeitos letais)	185
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
JATO DE FOGO	
5 kW/m^2 (Efeitos Irreversíveis)	77
7 kW/m^2 (Efeitos Letais)	70
RADIAÇÃO TÉRMICA - DISTÂNCIA DA FONTE EM METROS	
INCÊNDIO EM PISCINA	
5 kW/m^2 (Efeitos Irreversíveis)	-
7 kW/m^2 (Efeitos Letais)	-
Diâmetro da Piscina	-
SOBREPRESSÃO - DISTÂNCIA DA FONTE EM METROS	
EXPLOSÃO DA NUVEM	
0,05 bar (Efeitos Irreversíveis)	116
0,14 bar (Efeitos Letais)	74





Detalhe. Escala 1:570

Legenda:

Cenários

Cenário 37

- Sobrepressão - Efeitos Letais (64 m)
- Sobrepressão - Efeitos Irreversíveis (102 m)
- Radiação Térmica - Efeitos Letais (119 m)
- Radiação Térmica - Efeitos Irreversíveis (138 m)
- 50% LII - Efeitos Letais (104 m)
- Braços de Carga - Hexano

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

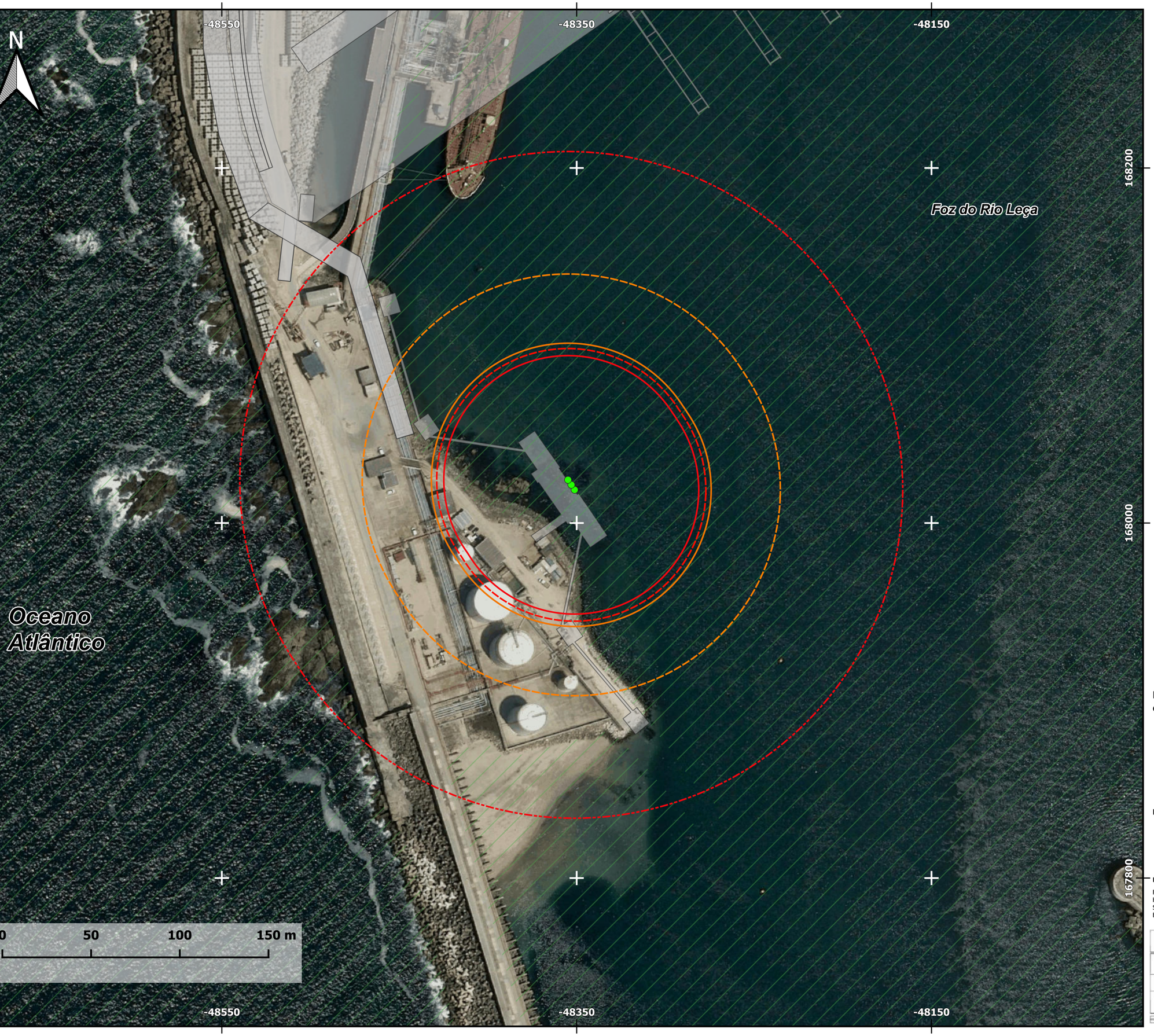
Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

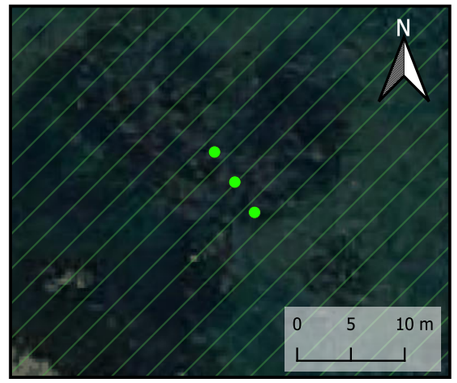
CertiTecna Engenharia de Segurança

Avenida Engenheiro Arantes e Oliveira, nº 3 - 1º DP | (R) 1900-221 Lisboa · Tel 218 148 011
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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 063	ESCALA: 1:2000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01 · DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 37 - Rotura total de Braço de Carga de Hexano	TÉCNICO RESPONSÁVEL: Ana Dias · VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO





Detalhe. Escala 1:570

Legenda:

Cenários

Cenário 38

- Sobrepressão - Efeitos Letais (74 m)
- Sobrepressão - Efeitos Irreversíveis (116 m)
- Radiação Térmica - Efeitos Letais (70 m)
- Radiação Térmica - Efeitos Irreversíveis (77 m)
- 50% LII - Efeitos Letais (185 m)
- Braços de Carga - Hexano

Envolvente

Elementos Sensíveis - Cenários

- Reserva Ecológica Nacional
- Layout Alternativa A

NOTAS RELATIVAS À CARTOGRAFIA:

Fontes dos Dados Cartográficos Considerados: Reserva Ecológica Nacional, Cursos de Água e Hidrografia - CCDR Norte; Restantes elementos - OSM;
Sistema de Coordenadas : EPSG 3763 - ETRS 89/Portugal TM 06
Elipsoide de Referência: GRS 1980

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CLIENTE: Administração dos Portos Douro - Leixões - Viana	DESENHO Nº: 00937 01 064		ESCALA: 1:2000
TRABALHO: Avaliação de Compatibilidade de Localização	VERSÃO: 01	DATA: 10/2025	FORMATO: A3
DESIGNAÇÃO: Cenário 38 - Rotura 10% de Braço de Carga de Hexano	TÉCNICO RESPONSÁVEL: Ana Dias	VERIFICOU:	

ESTE DESENHO É PROPRIEDADE INTELECTUAL DA CERTITECNA, SA., NÃO PODENDO SER REPRODUZIDO OU USADO SEM AUTORIZAÇÃO EXPRESSA DOS AUTORES PARA FINS DIFERENTES DO PRESENTE PROJETO

Input Report

Workspace: Cenário 37 e 38 Braço Hexano

Study

Study

Cenário 37 e 38 Braço Hexano

Tab	Group	Field	Value
Context of calculations	Selection of context	Weathers to use for this study	Weather folder
		Parameters to use for this study	Parameter set
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land
		Type of pool substrate and bunds	Mar
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected
		Building type (downwind building type)	Buildings\Building type

Pressure vessel

Pressure vessel
Cenário 37 e 38 Braço Hexano\Study

Tab	Group	Field	Value	Units
Material	Material	Material	N-HEXANE	
		Specify volume inventory?	No	
		Mass inventory	3,6E+06	kg
		Volume inventory	5407,74	m3
		Material to track	N-HEXANE	
	Phase	Specified condition	Pressure/temperature	
		Temperature	14,1	degC
		Pressure (gauge)	10	bar
		Fluid state	Liquid	
		Liquid mole fraction	1	fraction
Scenario	Pipe dimensions	Pipe length	30	m
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of	0	/m

		junctions in pipe		
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	5407,74	m3
		Tank vapour volume	0	m3
		Tank liquid volume	5407,74	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0,1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	Yes	
Safety systems	Isolation for time-varying releases	Isolation?	Successful	
		Time to isolation	120	s
		Inventory from neighbouring vessel to be added upon isolation failure	0	kg
	Blowdown for	Blowdown?	Fails	

	time-varying releases			
		Time to blowdown actuation	120	s
		Blowdown diameter		mm
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	Roof/lee	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m

	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s

	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s
Geometry	Geometry	East	0	m
		North	0	m

Cen 37 - Rot Tot

Short pipe

Cenário 37 e 38 Braço Hexano\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Scenario	Scenario type	Line rupture	
	Pipe dimensions	Pipe internal diameter	254	mm
		Pipe length	30	m
	Hole	Orifice diameter		mm
	Release location	Elevation	1	m
		Tank head	0	m
	Flow control and isolation	Flow controller	Pump (liquid release)	
		Input option	Fixed flow rate	
		Fixed flow rate	113,3	kg/s
		Pump head		m
		Active isolation valve	Yes	
		Valve closing time	120	s
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0,045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of	0	/m

		junctions in pipe		
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	

		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive	Calculate SEP	

		power		
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Cen 38 - Rot 10%

Leak

Cenário 37 e 38 Braço Hexano\Study\Pressure vessel

Tab	Group	Field	Value	Units
Scenario	Hole	Orifice diameter	25,4	mm
		Use specified discharge coefficient?	No	
		Discharge coefficient		fraction
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Horizontal	
		Outdoor release angle	0	deg
Material	Material	Material characteristics	Flammable only	
		Material to track	N-HEXANE	
	Phase	Phase to be released	Liquid	
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - continuous	Do not force correlation	
Dispersion	User-defined dispersion scope (N.B Based on the material to track)	Concentrations of interest		ppm
		Distances of interest		m
		Averaging time for concentrations and distances of interest		
		Specify user-defined averaging time	No	
		User defined averaging time		s
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	

		Type of pool substrate and bunds	Mar	
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726,85	degC
Jet fire	Jet fire method	Selection for jet fire method	Automatic selection / DNV recommended	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2

		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	30	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	5; 7; 12,5	kW/m2
		Probit levels	2,73; 3,72; 7,5	
		Dose levels	1,27E+06; 5,8E+06; 2,51E+07	
		Lethality levels	0,01; 0,1; 0,99	fraction
	Parameters	Radiative fraction for general fires	0,4	fraction
		Pool fire maximum exposure duration	30	s

Materials Report

Workspace: Cenário 37 e 38 Braço Hexano

Material: N-HEXANE

Cenário 37 e 38 Braço Hexano\Physical Properties System\Materials\N-HEXANE

Property method template	**PhastMC**
DIPPR version	**2000**

General

Constants

Acentric factor	**0,301261**	
Aerosol class number	**2**	
Critical pressure	**30,25**	bar
Critical temperature	**234,45**	degC
Flammable/Toxic flag	**Flammable**	
Melting point	**-95,32**	degC
Molecular weight	**86,1754**	
Normal boiling point	**68,73**	degC
Reactivity with atmosphere	**Not Strongly Reactive**	
SRK alpha calculation flag	**Soave**	
Triple point pressure	**9,01695E-06**	bar
Triple point temperature	**-95,32**	degC
Carbon hydrogen ratio	**0,428571**	
Solid Phase Modelling Enabled (CO2 Only)	**No**	
Enthalpy of Fusion at Melting Point	**13080**	kJ/kg

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Heat of vapourisation	**106**	**4,3848E+07**	**0,34057**	**0,063282**	**-0,017037**	**0**	**-95,32**	**234,45**	**1**	**Constant value above fraction Tc**

Flammable

Constants

Combustion at	**0,948686**	
Combustion ct	**0,0216357**	
Emissive power length scale	**8,33**	m
Flash point	**-23**	degC
Heat of combustion	**3,8551E+06**	kJ/kmol
Immediate ignition category	**Unknown**	
Laminar burning velocity	**0,52**	m/s
Lower flammability limit	**12000**	ppm
Luminous/Smoky flame flag	**Smoky**	
Maximum burn rate	**0**	kg/m2.s
Maximum surface emissive power	**140**	kW/m2
Pool fire burn rate length	**0,5**	m
TNT explosion efficiency	**0**	%
Upper flammability limit	**83000**	ppm

Toxic

Constants

Dangerous dose 2		
Dangerous dose 3		
Dangerous dose 4		
Dangerous dose 5		
Dangerous dose 6		
Dangerous toxic load Note: Units are concentration in ppm and time in minutes		
ERPG 1	**0**	ppm
ERPG 2	**0**	ppm
ERPG 3	**0**	ppm
Toxic dose threshold N	**0**	
IDLH concentration		ppm
STEL concentration		ppm
Toxic property A	**0**	
Toxic property B	**0**	
Toxic property N	**0**	

Transport

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature	Fraction of critical temperature	Supercritical extrapolation

								[degC]	[fraction]	
Liquid thermal conductivity	123	0,0533439	1,32615	-3,74913	5,69816		-95,32	176,85	1	Constant value above fraction Tc
Liquid viscosity	101	-56,569	2140,5	7,5175	-1,7676E-05	2	-98,5	132,93	1	Constant value above fraction Tc
Surface tension	106	0,055003	1,2674	0	0	0	-95,32	234,45	1	Constant value above fraction Tc
Vapour thermal conductivity	102	-650,5	0,8053	-1,4121E+09	0		65,94	726,85	1	None (use equation)
Vapour viscosity	102	1,7514E-07	0,70737	157,14	0		-95,32	726,85	1	None (use equation)

Heat capacity

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Ideal gas heat capacity	107	104400	352300	1694,6	236900	761,6	-73,15	1226,85	1	None (use equation)
Liquid heat capacity	100	172120	-183,78	0,88734	0	0	-95,32	186,85	1	None (use equation)

Vapour pressure

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Vapour	101	104,6	-	-	1,2381	2	-95,32	234,45	1	Vapour

pressure	5	6995,5	12,702	E-05		Pressure Extrapolation

Density

Coefficients

Name	Equation	A	B	C	D	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Saturated liquid density	105	0,70824	0,26411	507,6	0,27537	-95,32	234,45	1	Constant value above fraction Tc

Virial

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Second virial equation coefficient	104	0,197	-200	-3,71E+07	1,67E+19	-6,18E+21	-19,45	1226,85	1	None (use equation)

Association

Constants

Acid association flag	**Not Modelled**	
Enthalpy interpolation range	**0**	delC

Coefficients

Name	Equation	A	B	C	D	E	Minimum temperature [degC]	Maximum temperature [degC]	Fraction of critical temperature [fraction]	Supercritical extrapolation
Dimer coefficients	101	0	-0	0	0	0	-273,15	-273,15	1	None (use equation)
Hexamer	101	0	-	0	0	0	-273,15	-273,15	1	None (use

coefficients			**0**							**equation)**
Octamer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**
Trimer coefficients	**101**	**0**	**-0**	**0**	**0**	**0**	**-273,15**	**-273,15**	**1**	**None (use equation)**

Water

Constants

Heat of solution	**0**	kJ/kg
Liquid water enthalpy coefficient A	**0**	
Liquid water enthalpy coefficient B	**0**	
Liquid water enthalpy coefficient C	**0**	
Liquid water enthalpy coefficient D	**0**	
Liquid water surface tension	**0,0511**	N/m
Reaction with water model	**None**	
Solubility in water	**0**	
Water heat transfer coefficient	**500**	W/m2.degK

Consequence Summary Report

Workspace: Cenário 37 e 38 Braço Hexano

Study: Study

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.
The report is context sensitive, and filters up to the study level. You will need to generate multiple summary reports if you have multiple studies in your workspace.
The results in this report are from the non-CFD calculations only.

Discharge Results (after atmospheric expansion)

Path	Scenario	Weather	Peak Flowrate [kg/s]	Temperature [degC]	Liquid mass fraction in material [fraction]	Droplet diameter [um]	Expanded diameter [m]	Velocity [m/s]	End time of release [s]
Study\Pressure vessel	Cen 37 - Rot Tot	Mais Provável	113,3	14,1063	1	10000	0,254	3,35884	120
	Cen 38 - Rot 10%	Mais Provável	11,7342	13,8317	1	58,2191	0,0196748	57,9569	3600

Dispersion Results

Input dispersion parameters

Core averaging time	18,75	s
Flammable averaging time	18,75	s
Toxic averaging time	600	s
Height of interest	0	m

Distance downwind to flammable concentrations

Path	Scenario	Weather	Distance to UFL [m]	Distance to LFL [m]	Distance to LFL fraction [m]
Study\Pressure vessel	Cen 37 - Rot Tot	Mais Provável	5,94693	85,833	103,993
	Cen 38 - Rot 10%	Mais Provável	Not reached at height of interest	90,3138	184,28

Jet Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Flame length [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 37 - Rot Tot	Mais Provável	13,8899	24,3257	22,4928	19,8498
	Cen 38 - Rot 10%	Mais Provável	34,5165	76,0428	69,1295	59,2848

Early Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 37 - Rot Tot	Mais Provável	38,9102	58,2224	50,9013	41,7583

Late Pool Fire Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Pool diameter [m]	Distance downwind to intensity level 1 (5 kW/m2) [m]	Distance downwind to intensity level 2 (7 kW/m2) [m]	Distance downwind to intensity level 3 (12,5 kW/m2) [m]
Study\Pressure vessel	Cen 37 - Rot Tot	Mais Provável	112,841	137,008	118,254	95,0929

Flash Fire Results

Distance downwind to defined concentrations

The reported LFL and LFL fraction are defined in the respective material property

Path	Scenario	Weather	Distance downwind to LFL [m]	Distance downwind to LFL Fraction [m]
Study\Pressure vessel	Cen 37 - Rot Tot	Mais Provável	85,833	103,993
	Cen 38 - Rot 10%	Mais Provável	90,3138	184,28

Maximum distance to LFL fraction at any height

Path	Scenario	Weather	Max flash fire distance [m]	Height of the max flash fire distance [m]	Time [s]
Study\Pressure vessel	Cen 37 - Rot Tot	Mais Provável	106,397	0	126,299
	Cen 38 - Rot 10%	Mais Provável	183,848	0	71,7974

Explosion Results

Explosion scenarios for worst-case maximum downwind distance to defined overpressures.

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Overpressure level [bar]	Maximum distance [m]	Diameter [m]
Study\Pressure vessel	Cen 37 - Rot Tot	Mais Provável	0,05 0,14 0,3	101,018 63,4368 52,177	131,129 55,9662 33,4466
	Cen 38 - Rot 10%		0,05 0,14 0,3	115,497 73,4404 60,8399	146,744 62,6304 37,4293

Supplementary data for worst-case explosion scenarios

Path	Scenario	Weather	Overpressure level [bar]	Explosion flammable mass [kg]	Ignition time [s]	Ignition source [m]	Cloud centre [m]	Explosion centre [m]
Study\Pressure vessel	Cen 37 - Rot Tot	Mais Provável	0,05 0,14 0,3	38,1144 38,1144 38,1144	77,8207 77,8207 77,8207	100 100 100	35,4538 35,4538 35,4538	35,4538 35,4538 35,4538
	Cen 38 - Rot 10%		0,05 0,14 0,3	53,4156 53,4156 53,4156	68,0765 68,0765 68,0765	180 180 180	42,1252 42,1252 42,1252	42,1252 42,1252 42,1252

Input Report

Workspace: Cenário 37 e 38 Braço Hexano

Mais Provável

Weather

Cenário 37 e 38 Braço Hexano\Weather folder

Tab	Group	Field	Value	Units
Weather	Weather conditions	Wind speed	3,94	m/s
		Pasquill stability	D neutral - little sun and high wind or overcast/windy night	
Atmospheric parameters	General atmospheric parameters	Atmospheric temperature	14,1	degC
		Relative humidity	0,82	fraction
		Solar radiation flux	0,5	kW/m2
	Mixing layer height vs. Pasquill stability	Mixing layer height for Pasquill stability A	1300	m
		Mixing layer height for Pasquill stability A/B	1080	m
		Mixing layer height for Pasquill stability B	920	m
		Mixing layer height for Pasquill stability B/C	880	m
		Mixing layer height for Pasquill stability C	840	m
		Mixing layer height for Pasquill stability C/D	820	m
		Mixing layer height for Pasquill stability D	800	m
		Mixing layer height for Pasquill stability E	400	m
		Mixing layer height for Pasquill stability F	100	m
		Mixing layer height for Pasquill stability G	100	m
	Building data	Building exchange rate	4	/hr
		Tail time	1800	s
Substrate data	Surface temperature	Surface temperature for dispersion calculations	14,1	degC

Surface temperature for pool calculations	14,1	degC

Input Report

Workspace: Cenário 37 e 38 Braço Hexano

Mar

Pool substrate and bund
Cenário 37 e 38 Braço Hexano\Pool substrates and bunds

Tab	Group	Field	Value	Units
Bund properties	Bund defined	Specify a bund	Yes	
	Dimensions	Bund height	0	m
		Bund area (internal)	10000	m2
		Bund diameter (internal)	112,838	m
	Whether the bund can overflow	Bund failure modeling	Bund cannot fail (liquid overfill not possible)	
		Bund area multiplier for catastrophic rupture	1,5	
Surface for pools	Type of surface for pools	Type of surface for pools	Deep open water	
	User defined surface properties	Pool minimum thickness	5	mm
		Surface thermal diffusivity	9,48E-07	m2/s
		Surface roughness factor	2,634	
		Surface thermal conductivity	0,00221	kJ/m.s.degK