

# Input Report

## Workspace: 72341-2FSRURegas

### FSRU in rigassificazione

Study

72341-2FSRURegas

| Tab                        | Group                       | Field                                  | Value           | Units |
|----------------------------|-----------------------------|----------------------------------------|-----------------|-------|
| Context of calculations    | Selection of context        | Weathers to use for this study         | Weather folder  |       |
|                            |                             | Parameters to use for this study       | Parameter set   |       |
|                            |                             | Obstructions to use for this study     |                 |       |
| Bund, building and terrain | Terrain and bund definition | Type of terrain for dispersion         | Default terrain |       |
|                            |                             | Type of pool substrate and bunds       | No bund         |       |
| Toxic parameters           | Indoor toxic calculations   | Specify the downwind building type     | Unselected      |       |
|                            |                             | Building type (downwind building type) |                 |       |
| Dispersion                 | Distances of interest       | Distances of interest                  |                 | m     |

## 7R Linee mandata pompe LNG Feed e collettore GNL

Pressure vessel

72341-2FSRURegas\FSRU in rigassificazione

| Tab      | Group    | Field                     | Value        | Units |
|----------|----------|---------------------------|--------------|-------|
| Material | Material | Material                  | GAS NATURALE |       |
|          |          | Specify volume inventory? | Yes          |       |
|          |          | Mass inventory            | 13095,7      | kg    |

Audit Number: 34593

Date: 07/07/2022 Time: 08:36

Page 1 of 10

|                      |                            |                                            |                                                       |          |
|----------------------|----------------------------|--------------------------------------------|-------------------------------------------------------|----------|
|                      |                            | Volume inventory                           | 30                                                    | m3       |
|                      |                            | Material to track                          | GAS NATURALE                                          |          |
|                      | Phase                      | Specified condition                        | Pressure/temperature                                  |          |
|                      |                            | Temperature                                | -160                                                  | degC     |
|                      |                            | Pressure (gauge)                           | 9                                                     | bar      |
|                      |                            | Fluid state                                | Liquid                                                |          |
|                      |                            | Liquid mole fraction                       | 1                                                     | fraction |
| Scenario             | Pipe dimensions            | Pipe length                                |                                                       | 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             | Frequency of                               | 0                                                     | /m       |

|                       |                                                   |                                        |           |     |
|-----------------------|---------------------------------------------------|----------------------------------------|-----------|-----|
|                       | valves                                            | excess flow valves                     |           |     |
|                       |                                                   | 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                            | 30        | m3  |
|                       |                                                   | Tank vapour volume                     | 0         | m3  |
|                       |                                                   | Tank liquid volume                     | 30        | m3  |
|                       |                                                   | Tank liquid level                      | 0         | m   |
|                       |                                                   | Maximum vapour release height          | 0         | m   |
|                       |                                                   | Minimum mass inventory                 | 0,1       | kg  |
|                       |                                                   | Maximum mass inventory                 | 1E+09     | kg  |
|                       | Safety system modelling for time-varying          | Safety system modelling (isolation and | No        |     |

|                            |                                                  |                                              |                                |     |
|----------------------------|--------------------------------------------------|----------------------------------------------|--------------------------------|-----|
|                            | releases                                         | blowdown)                                    |                                |     |
| Dispersion                 | Dispersion scope                                 | Concentration of interest                    |                                | ppm |
|                            |                                                  | Averaging time for concentration of interest |                                |     |
|                            |                                                  | Specify user-defined averaging time          | No                             |     |
|                            |                                                  | User defined averaging time                  |                                | s   |
|                            | Distances of interest                            | Distances of interest                        |                                | m   |
|                            | Averaging time for reports                       | ERPG [1 hr]                                  | No                             |     |
|                            |                                                  | IDLH [30 mins]                               | No                             |     |
|                            |                                                  | STEL [15 mins]                               | No                             |     |
| Bund, building and terrain | Terrain and bund definition                      | Type of terrain for dispersion               | Default terrain                |     |
|                            |                                                  | Type of pool substrate and bunds             | No bund                        |     |
|                            | Building definition                              | Release building                             |                                |     |
|                            |                                                  | In-building release?                         | Outdoor                        |     |
|                            |                                                  | Building wake effect                         | None                           |     |
|                            |                                                  | 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                       | 4; 12,5; 37,5               | kW/m2    |
|          |                           | Probit levels                          | 2,73; 3,72; 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     | 20                          | s        |
|          | Calculation method        | Fireball model                         | Martinsen time varying      |          |
|          |                           | TNO model flame temperature            | 1726,85                     | degC     |
| Jet fire | Jet fire method           | Jet fire method                        | Cone model                  |          |
|          | Result types to calculate | Calculate probit                       | No                          |          |
|          |                           | Calculate dose                         | No                          |          |

|           |                           |                                               |                             |          |
|-----------|---------------------------|-----------------------------------------------|-----------------------------|----------|
|           |                           | Calculate lethality                           | No                          |          |
|           | Radiation levels          | Number of input radiation levels              | 5                           |          |
|           |                           | Intensity levels                              | 3; 5; 7; 12,5; 37,5         | kW/m2    |
|           |                           | Probit levels                                 | 2,73; 3,72; 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            | 20                          | 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              | 5                           |          |
|           |                           | Intensity levels                              | 3; 5; 7; 12,5; 37,5         | kW/m2    |
|           |                           | Probit levels                                 | 2,73; 3,72; 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  | 20              | s        |
| Geometry | Geometry   | East                                 | 0               | m        |
|          |            | North                                | 0               | m        |

## 70mm

Leak

72341-2FSRURegas\FSRU in rigassificazione\7R Linee mandata pompe LNG Feed e collettore GNL

| Tab                  | Group            | Field                                | Value           | Units    |
|----------------------|------------------|--------------------------------------|-----------------|----------|
| Scenario             | Hole             | Orifice diameter                     | 70              | mm       |
|                      |                  | Use specified discharge coefficient? | Yes             |          |
|                      |                  | Discharge coefficient                | 0,62            | fraction |
|                      | Release location | Elevation                            | 12,5            | m        |
|                      |                  | Tank head                            | 0               | m        |
|                      | Direction        | Outdoor release direction            | Horizontal      |          |
|                      |                  | Outdoor release angle                | 0               | deg      |
| Material             | Material         | Material characteristics             | Flammable only  |          |
|                      |                  | Material to track                    | GAS NATURALE    |          |
|                      |                  | Type of risk effects to model        | Flammable only  |          |
|                      | Phase            | Phase to be released                 | Liquid          |          |
| Discharge parameters | Model settings   | Atmospheric expansion method         | DNV recommended |          |

|                               |                                | Phase change<br>upstream of orifice?               | Disallow liquid phase<br>change only<br>(metastable liquid) |     |
|-------------------------------|--------------------------------|----------------------------------------------------|-------------------------------------------------------------|-----|
|                               | Droplet break-<br>up mechanism | Droplet break-up<br>mechanism -<br>continuous      | Do not force<br>correlation                                 |     |
| Dispersion                    | Dispersion<br>scope            | Concentration of<br>interest                       |                                                             | ppm |
|                               |                                | Averaging time for<br>concentration of<br>interest |                                                             |     |
|                               |                                | Specify user-defined<br>averaging time             | No                                                          |     |
|                               |                                | User defined<br>averaging time                     |                                                             | s   |
|                               | Distances of<br>interest       | Distances of interest                              |                                                             | m   |
|                               | Averaging time<br>for reports  | ERPG [1 hr]                                        | No                                                          |     |
|                               |                                | IDLH [30 mins]                                     | No                                                          |     |
|                               |                                | STEL [15 mins]                                     | No                                                          |     |
| Bund, building<br>and terrain | Terrain and<br>bund definition | Type of terrain for<br>dispersion                  | Default terrain                                             |     |
|                               |                                | Type of pool<br>substrate and bunds                | No bund                                                     |     |
| Explosion<br>parameters       | Explosion<br>method            | Explosion method                                   | Multi-Energy:<br>Uniform confined                           |     |
|                               | Ignition                       | Supply late ignition<br>location                   | No ignition location                                        |     |
|                               |                                | Location of late<br>ignition                       |                                                             | m   |
|                               | Vapour liquid<br>method        | Use explosion mass<br>modification factor          | Yes                                                         |     |
|                               |                                | Explosion mass<br>modification factor              | 3                                                           |     |
| Fireball                      | Result types to<br>calculate   | Calculate probit                                   | No                                                          |     |
|                               |                                | Calculate dose                                     | No                                                          |     |



|          |                           |                                    |                             |          |
|----------|---------------------------|------------------------------------|-----------------------------|----------|
|          |                           | Calculate lethality                | No                          |          |
|          | Radiation levels          | Number of input radiation levels   | 3                           |          |
|          |                           | Intensity levels                   | 4; 12,5; 37,5               | kW/m2    |
|          |                           | Probit levels                      | 2,73; 3,72; 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 | 20                          | s        |
|          | Calculation method        | Fireball model                     | Martinsen time varying      |          |
|          |                           | TNO model flame temperature        | 1726,85                     | degC     |
| Jet fire | Jet fire method           | Jet fire method                    | Cone model                  |          |
|          | Result types to calculate | Calculate probit                   | No                          |          |
|          |                           | Calculate dose                     | No                          |          |
|          |                           | Calculate lethality                | No                          |          |
|          | Radiation levels          | Number of input radiation levels   | 5                           |          |
|          |                           | Intensity levels                   | 3; 5; 7; 12,5; 37,5         | kW/m2    |
|          |                           | Probit levels                      | 2,73; 3,72; 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 | 20                          | s        |
|          | Cone model data           | Correlation                        | Recommended                 |          |
|          |                           | Horizontal options                 | Use standard method         |          |
|          |                           | Flame-shape adjustment if          | Yes                         |          |

|           |                           |                                               |                             |          |
|-----------|---------------------------|-----------------------------------------------|-----------------------------|----------|
|           |                           | grounded                                      |                             |          |
|           | 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              | 5                           |          |
|           |                           | Intensity levels                              | 3; 5; 7; 12,5; 37,5         | kW/m2    |
|           |                           | Probit levels                                 | 2,73; 3,72; 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           | 20                          | s        |