



|                   |                                  |
|-------------------|----------------------------------|
| Site name:        | EX DISCARICA FOSSO GRANDE        |
| Sub-area name:    | PE 210021 SORGENTE A S9 REV ARTA |
| Date:             | -                                |
| Type of analysis: | Baseline Risks (Forward Mode)    |
| Type of analysis: | Clean up levels (Backward Mode)  |
| Notes:            | -                                |

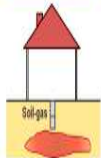
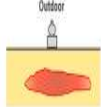
## Conceptual Site Model

| Source          |                | Exposure pathway                  | Receptor |             |
|-----------------|----------------|-----------------------------------|----------|-------------|
| Surface soil    | Direct Contact | Soil Ingestion and Dermal Contact | On-Site  | No Off-site |
|                 |                | Outdoor Vapor Inhalation          | On-Site  | Off-Site    |
|                 | Volatilization | Indoor Vapor Inhalation           | On-Site  | No Off-site |
|                 |                | Outdoor Particulates Inhalation   | On-Site  | Off-Site    |
|                 |                | Indoor Particulates Inhalation    | On-Site  | No Off-site |
|                 | Leaching       | Leaching to Groundwater           | POC = 0  | POC > 0     |
|                 |                |                                   |          |             |
| Subsurface soil | Volatilization | Outdoor Vapor Inhalation          | On-Site  | Off-Site    |
|                 |                | Indoor Vapor Inhalation           | On-Site  | No Off-site |
|                 | Leaching       | Leaching to Groundwater           | POC = 0  | POC > 0     |
|                 |                |                                   |          |             |
| Groundwater     | Volatilization | Outdoor Vapor Inhalation          | On-Site  | Off-Site    |
|                 |                | Indoor Vapor Inhalation           | On-Site  | Off-Site    |
|                 | Direct         | Groundwater Contamination         | POC = 0  | POC > 0     |

Receptors on-site: Adults and Children (Adjusted)

Receptors off-site: Adults and Children (Adjusted)

## Integrative characterization

| Type of survey                  |                                                                                     | Type of receptor   |
|---------------------------------|-------------------------------------------------------------------------------------|--------------------|
| Soil-gas survey (outdoor)       |    | On-site receptors  |
|                                 |                                                                                     | Off-site receptors |
| Subslab Soil-gas survey         |    | On-site receptors  |
|                                 |                                                                                     | No Off-Site        |
| Flux-Chamber survey             |    | On-site receptors  |
|                                 |                                                                                     | Off-site receptors |
| Outdoor Air survey              |   | On-site receptors  |
|                                 |                                                                                     | Off-site receptors |
| Indoor Air survey               |  | On-site receptors  |
|                                 |                                                                                     | No Off-Site        |
| Leaching test (Surface soil)    |  | POC = 0            |
|                                 |                                                                                     | POC > 0            |
| Leaching test (Subsurface soil) |  | POC = 0            |
|                                 |                                                                                     | POC > 0            |

## Model Options

| Description                                                                           | Value                               |
|---------------------------------------------------------------------------------------|-------------------------------------|
| Account for surface source depletion due to volatilization                            | ✓                                   |
| Account for subsurface source depletion due to volatilization                         | ✓                                   |
| Account for vapor attenuation when surface source below ground level                  | ✗                                   |
| Lower value between volatilization factor from surface and subsurface soil            | ✓                                   |
| Off-Site Outdoor Volatilization from groundwater                                      | Atmospheric transport (ADF)         |
| Consider biodegradation during volatilization                                         | ✓                                   |
| Account for surface source depletion due to leaching to groundwater                   | ✗                                   |
| Account for subsurface source depletion due to leaching to groundwater                | ✗                                   |
| Account for the attenuation during leaching to groundwater from surface soil (SAM)    | ✓                                   |
| Account for the attenuation during leaching to groundwater from subsurface soil (SAM) | ✓                                   |
| Consider biodegradation during leaching to groundwater                                | ✗                                   |
| Groundwater dispersion                                                                | Dispersion in all directions (DAF1) |
| Check on the groundwater mixing zone height                                           | ✓                                   |
| Biodegradation during groundwater transport                                           | ✓                                   |
| Consider Csat for Risk or SSTL assessment                                             | ✗                                   |
| Consider Csat only for SSTL assessment                                                | ✓                                   |
| In the mass balance for source depletion account for NAPL (if present)                | ✗                                   |
| Accounts for ADAF                                                                     | ✓                                   |
| RfD vs RfC                                                                            | RfC                                 |
| Account for the bioaccessible fraction for the soil ingestion route                   | ✗                                   |
| Target Risk                                                                           |                                     |
| Individual                                                                            | 0.000001                            |
| Cumulative                                                                            | 0.00001                             |
| Target Hazard Index                                                                   |                                     |
| Individual                                                                            | 1                                   |
| Cumulative                                                                            | 1                                   |

Source Conc.

| Contaminant           | Surface soil | Subsurface soil | Groundwater | Leaching from surface soil | Leaching from subsurface soil | Outdoor soil-gas | Indoor soil-gas | Flux Chamber | Outdoor air | Indoor air |
|-----------------------|--------------|-----------------|-------------|----------------------------|-------------------------------|------------------|-----------------|--------------|-------------|------------|
| -                     | mg/kg        | mg/kg           | µg/L        | µg/L                       | µg/L                          | mg/m³            | mg/m³           | mg/m³        | mg/m³       | mg/m³      |
| Aluminum              |              |                 | 3.55e+3     | -                          | -                             | -                | -               | -            | -           |            |
| Antimony              |              |                 | 2.30e+1     | -                          | -                             | -                | -               | -            | -           |            |
| Arsenic               |              |                 | 5.40e+1     | -                          | -                             | -                | -               | -            | -           |            |
| Chromium (total)      |              |                 | 1.79e+3     | -                          | -                             | -                | -               | -            | -           |            |
| Iron                  |              |                 | 2.28e+4     | -                          | -                             | -                | -               | -            | -           |            |
| Nickel                |              |                 | 2.97e+2     | -                          | -                             | -                | -               | -            | -           |            |
| Lead                  |              |                 | 7.30e+1     | -                          | -                             | -                | -               | -            | -           |            |
| Manganese             |              |                 | 4.75e+2     | -                          | -                             | -                | -               | -            | -           |            |
| Boron                 |              |                 | 3.45e+4     | -                          | -                             | -                | -               | -            | -           |            |
| Nitrite               |              |                 | 8.13e+2     | -                          | -                             | -                | -               | -            | -           |            |
| Toluene               |              |                 | 6.00e+1     | -                          | -                             | -                | -               | -            | -           |            |
| p-Xylene              |              |                 | 2.10e+1     | -                          | -                             | -                | -               | -            | -           |            |
| Benzo(a)pyrene        |              |                 | 2.50e+2     | -                          | -                             | -                | -               | -            | -           |            |
| Benzo(g,h,i)perylene  |              |                 | 1.30e+2     | -                          | -                             | -                | -               | -            | -           |            |
| Vinyl Chloride        |              |                 | 1.48e+1     | -                          | -                             | -                | -               | -            | -           |            |
| Dichloropropane (1,2) |              |                 | 4.15e+0     | -                          | -                             | -                | -               | -            | -           |            |
| Aliphatics C9-C12     |              |                 | 1.32e+3     | -                          | -                             | -                | -               | -            | -           |            |
| Aliphatics C19-C36    |              |                 | 6.11e+3     | -                          | -                             | -                | -               | -            | -           |            |
| Cadmium               |              |                 | 1.13e+1     | -                          | -                             | -                | -               | -            | -           |            |
| Selenium              |              |                 | 4.20e+1     | -                          | -                             | -                | -               | -            | -           |            |

# Exposure Factors - On Site

| Exposure                              |        |          | On Site     |           |        |         |            |
|---------------------------------------|--------|----------|-------------|-----------|--------|---------|------------|
| Scenario                              |        |          | Residential |           |        |         | Industrial |
| Exposure Parameters                   | Symbol | UM       | Children    | Teenagers | Adults | Seniors | Worker     |
| General Factors                       |        |          |             |           |        |         |            |
| Body Weight                           | BW     | kg       | 15          | 15        | 70     | 70      | 70         |
| Averaging time for carcinogens        | AT     | y        | 70          |           |        |         |            |
| Exposure duration                     | ED     | y        | 6           | 10        | 24     | 5       | 25         |
| Exposure Frequency                    | EF     | d/y      | 350         | 350       | 350    | 350     | 250        |
| Accidental Soil Ingestion             |        |          |             |           |        |         |            |
| Ingested Soil Fraction                | FI     | -        | 1           | 1         | 1      | 1       | 1          |
| Soil Ingestion Rate                   | IR     | mg/d     | 200         | 200       | 100    | 100     | 50         |
| Dermal Contact                        |        |          |             |           |        |         |            |
| Skin Surface Area                     | SA     | cm²      | 2800        | 2800      | 5700   | 5700    | 3300       |
| Soil Dermal adherence factor          | AF     | mg/cm²/d | 0.2         | 0.2       | 0.07   | 0.07    | 0.2        |
| Outdoor Vapors and Dust inhalation    |        |          |             |           |        |         |            |
| Outdoor Daily Frequency (c)           | EFgo   | h/d      | 24          | 0.5       | 24     | 1.9     | 8          |
| Outdoor Vapor Inhalation rate (a);(b) | Bo     | m³/h     | 0.7         | 0.7       | 0.9    | 0.9     | 2.5        |
| Particulate Outdoor fraction          | Fsd    | -        | 1           | 1         | 1      | 1       | 1          |
| Indoor Vapors and Dust inhalation     |        |          |             |           |        |         |            |
| Indoor Daily Frequency                | EFgi   | h/d      | 24          | 19.6      | 24     | 22.4    | 8          |
| Indoor Vapor Inhalation rate (b)      | Bi     | m³/h     | 0.7         | 0.7       | 0.9    | 0.9     | 0.9        |
| Particulate indoor fraction           | Fi     | -        | 1           | 1         | 1      | 1       | 1          |
| Water Ingestion                       |        |          |             |           |        |         |            |
| Water Rate Ingestion                  | IRw    | L/d      | 1           | 1         | 2      | 2       | 1          |

## Exposure Factors - Off Site

| Exposure                              |        |      | Off Site    |           |        |         |            |
|---------------------------------------|--------|------|-------------|-----------|--------|---------|------------|
| Scenario                              |        |      | Residential |           |        |         | Industrial |
| Exposure Parameters                   | Symbol | UM   | Children    | Teenagers | Adults | Seniors | Worker     |
| General Factors                       |        |      |             |           |        |         |            |
| Body Weight                           | BW     | kg   | 15          | 15        | 70     | 70      | 70         |
| Averaging time for carcinogens        | AT     | y    | 70          |           |        |         |            |
| Exposure duration                     | ED     | y    | 6           | 10        | 24     | 5       | 25         |
| Exposure Frequency                    | EF     | d/y  | 350         | 350       | 350    | 350     | 250        |
| Outdoor Vapors and Dust inhalation    |        |      |             |           |        |         |            |
| Outdoor Daily Frequency (c)           | EFgo   | h/d  | 24          | 0.5       | 24     | 1.9     | 8          |
| Outdoor Vapor Inhalation rate (a);(b) | Bo     | m³/h | 0.7         | 0.7       | 0.9    | 0.9     | 2.5        |
| Particulate Outdoor fraction          | Fsd    | -    | 1           | 1         | 1      | 1       | 1          |
| Indoor Vapors inhalation              |        |      |             |           |        |         |            |
| Indoor Daily Frequency                | EFgi   | h/d  | 24          | 19.6      | 24     | 22.4    | 8          |
| Indoor Vapor Inhalation rate (b)      | Bi     | m³/h | 0.7         | 0.7       | 0.9    | 0.9     | 0.9        |
| Water Ingestion                       |        |      |             |           |        |         |            |
| Water Rate Ingestion                  | IRw    | L/d  | 1           | 1         | 2      | 2       | 1          |

## Site Parameters - Source Geometry

| Description                                                 |                  | Value   |               |    |       |
|-------------------------------------------------------------|------------------|---------|---------------|----|-------|
| Parameter                                                   | Symbol           | Default | Site-Specific | UM | check |
| Source Geometry                                             |                  |         |               |    |       |
| Same dimension for all sources                              |                  |         |               |    |       |
| Width of source area parallel to groundwater flow direction | W                | 45      | 290           | m  | ✓     |
| Width of source area orthogonal to groundwater flow         | Sw               | 45      | 163           | m  | ✓     |
| Ambient air mixing zone height                              | $\partial_{air}$ | 2       | 2             | m  | ✓     |
| Width of source area parallel to wind direction             | W'               | 45      | 163           | m  | ✓     |
| Width of source area orthogonal to wind direction           | Sw'              | 45      | 290           | m  | ✓     |
| Surface soil                                                |                  |         |               |    |       |
| Depth to surface soil source                                | Ls,SS            | 0       | 0             | m  | ✓     |
| Thickness of unsaturated surface soil source                | d                | 1       | 1             | m  | ✓     |
| Subsurface soil                                             |                  |         |               |    |       |
| Depth to subsurface soil source                             | Ls,SP            | 1       | 1             | m  | ✓     |
| Thickness of unsaturated subsurface soil source             | ds               | 2       | 2             | m  | ✓     |
| Depth to groundwater                                        | Lgw              | 3       | 2.71          | m  | ✓     |

## Site Parameters - Vadose Zone

| Description                                         |                  | Value      |               |                   |          |
|-----------------------------------------------------|------------------|------------|---------------|-------------------|----------|
| Parameter                                           | Symbol           | Default    | Site-Specific | UM                | check    |
| Vadose Zone                                         |                  |            |               |                   |          |
| Soil texture representative of the unsaturated soil |                  |            | Sandy Loam    |                   |          |
| Effective porosity in the unsaturated zone          | $\theta_e$       | Literature | 0.345         | -                 | ✓        |
| Volumetric water content in the soil                | $\theta_w$       | Literature | 0.194         | -                 | ✓        |
| Volumetric air content in the soil                  | $\theta_a$       | Literature | 0.151         | -                 | ✓        |
| Volumetric water content in the capillary fringe    | $\theta_{w,cap}$ | Literature | 0.288         | -                 | ✓        |
| Volumetric air content in the capillary fringe      | $\theta_{a,cap}$ | Literature | 0.057         | -                 | ✓        |
| Capillary fringe thickness                          | $h_{cap}$        | Literature | 0.25          | m                 | ✓        |
| Wetting front suction (matric potential)            | $h_{cr}$         | Literature | -0.0848       | m                 | ✓        |
| Hydraulic conductivity in the vadose zone           | $K_{sat}$        | Literature | 1.23e-5       | m                 | ✓        |
| Ponding depth                                       | $H_w$            | 0.25       | 0.25          | m                 | ✓        |
| Soil bulk density                                   | $\rho_s$         | 1.7        | 1.7           | g/cm <sup>3</sup> | ✓        |
| Soil pH                                             | pH               | 6.8        | 8             | -                 | ✓        |
| Organic Carbon Fraction - surface soil              | $f_{oc,SS}$      | 0.01       | 0.01          | g/g               | ✓        |
| Organic Carbon Fraction - subsurface soil           | $f_{oc,SP}$      | 0.01       | 0.01          | g/g               | ✓        |
| Residual void fraction in the soil (for Cres)       | $S_r$            | 0.04       | 0.04          | m                 | ✓        |
| Unsaturated zone thickness                          | $h_v$            | Calculated | 2.460         | m                 | ✓        |
| Soil Infiltration Rate automatically calculated     |                  |            |               |                   |          |
| Annuale Rainfall Rate                               | P                | 129        | 41.4          | cm/y              | ✓        |
| Outdoor areal fraction of cracks                    | $\eta_{out}$     | 1          | 1             | cm/y              | ✓        |
| Soil Infiltration Rate                              | $i_{ef}$         | Calculated | 3.08          | cm/y              | ✓        |
| Groundwater mixing zone thickness                   | $\delta_{gw}$    | Calculated | 5.00          | m                 | no check |
| Leachate dilution factor                            | LDF              | Calculated | 14.92         | -                 | no check |

## Site Parameters - Saturated Zone

| Description                                             |                     | Value      |               |     |       |
|---------------------------------------------------------|---------------------|------------|---------------|-----|-------|
| Parameter                                               | Symbol              | Default    | Site-Specific | UM  | check |
| Saturated Zone                                          |                     |            |               |     |       |
| Soil texture representative of the saturated soil       |                     |            | Site-specific |     |       |
| Hydraulic conductivity in groundwater                   | Ksat                | Literature | 7.90e-5       | m/s | ✓     |
| Effective porosity in the saturated zone                | θ <sub>e,sat</sub>  | Literature | 0.353         | -   | ✓     |
| Groundwater thickness                                   | da                  | 2          | 5             | m   | ✓     |
| Hydraulic gradient                                      | i                   | 0.01       | 0.01          | m/m | ✓     |
| Darcy's velocity                                        | v <sub>gw</sub>     | Calculated | 7.90e-7       | m/s | ✓     |
| Effective groundwater velocity                          | v <sub>e</sub>      | Calculated | 2.24e-6       | -   | ✓     |
| Organic Carbon Fraction - saturated zone                | f <sub>oc,sat</sub> | 0.001      | 0.001         | g/g | ✓     |
| Residual void fraction in the saturated soil (for Cres) | S <sub>r</sub>      | 0.04       | 0.04          | g/g | ✓     |
| Distance of the point of compliance in groundwater      | POC                 | 100        | 200           | m   | ✓     |
| Longitudinal dispersivity                               | ax                  | Calculated | 20.00         | m   | ✓     |
| Transversal dispersivity                                | ay                  | Calculated | 6.67          | m   | ✓     |
| Vertical dispersivity                                   | az                  | Calculated | 1.00          | m   | ✓     |

## Site Parameters - Outdoor

| Description                            |            | Value   |               |                     |       |
|----------------------------------------|------------|---------|---------------|---------------------|-------|
| Parameter                              | Symbol     | Default | Site-Specific | UM                  | check |
| Outdoor                                |            |         |               |                     |       |
| Wind speed                             | Uair       | 2.25    | 1.44          | m/s                 | ✓     |
| Particulate emission rate              | Pe         | 6.9e-14 | 6.9e-14       | g/cm/s <sup>2</sup> | ✓     |
| Distance to outdoor air receptor - ADF | POC ADF    | 100     | 8             | m                   | ✓     |
| Atmospheric Stability Class            |            |         | Site-specific |                     |       |
| Transversal air dispersion coefficient | $\sigma_y$ | 10      | 10            | m                   | ✓     |
| Vertical air dispersion coefficient    | $\sigma_z$ | 10      | 10            | m                   | ✓     |
| Aerobic depth below ground surface     | La Outdoor | 1       | 1             | m                   | ✓     |

## Site Parameters - Indoor

| Description                                   |                    | Value      |               |                     |          |
|-----------------------------------------------|--------------------|------------|---------------|---------------------|----------|
| Parameter                                     | Symbol             | Default    | Site-Specific | UM                  | check    |
| Indoor                                        |                    |            |               |                     |          |
| Depth to base of enclosed space foundation    | Z crack            | 0.15       | 0.15          | m                   | ✓        |
| Thickness foundations                         | L crack            | 0.15       | 0.15          | m                   | ✓        |
| Areal fraction of cracks in foundations/walls | $\eta$             | 0.01       | 0.01          | m                   | ✓        |
| Enclosed space volume/infiltration area ratio | Lb                 | 2          | 2             | m                   | ✓        |
| Volumetric water content in the foundations   | $\theta_{w,crack}$ | 0.12       | 0.12          | -                   | ✓        |
| Volumetric air content in the foundations     | $\theta_{a,crack}$ | 0.26       | 0.26          | -                   | ✓        |
| Enclosed-space air exchange rate              | ER                 | 0.00014    | 0.00014       | 1/s                 | ✓        |
| Differential outdoor/indoor air pressure      | $\Delta p$         | 0          | 0             | g/cm/s <sup>2</sup> | no check |
| Area of building foundation                   | Ab                 | 70         | 70            | m <sup>2</sup>      | ✓        |
| Soil vapor permeability*                      | Kv                 | 1e-12      | 1e-12         | m <sup>2</sup>      | ✓        |
| Enclosed space foundation perimeter           | x crack            | 34         | 34            | m                   | ✓        |
| Vapor Viscosity                               | $\mu_{air}$        | 0.000181   | 0.000181      | g/cm/s              | ✓        |
| Soil to building air flowrate                 | Qs                 | Calculated | 0.00e+0       | L/min               | ✓        |
| Aerobic depth below foundations               | La Indoor          | 1          | 1             | m                   | ✓        |

## Site Parameters - Indoor (off-site)

| Description                                   |                    | Value      |               |                     |          |
|-----------------------------------------------|--------------------|------------|---------------|---------------------|----------|
| Parameter                                     | Symbol             | Default    | Site-Specific | UM                  | check    |
| Indoor (off-site)                             |                    |            |               |                     |          |
| Depth to base of enclosed space foundation    | Z crack            | 0.15       | 0.15          | m                   | ✓        |
| Thickness foundations                         | L crack            | 0.15       | 0.15          | m                   | ✓        |
| Areal fraction of cracks in foundations/walls | $\eta$             | 0.01       | 0.01          | m                   | ✓        |
| Enclosed space volume/infiltration area ratio | Lb                 | 2          | 2             | m                   | ✓        |
| Volumetric water content in the foundations   | $\theta_{w,crack}$ | 0.12       | 0.12          | -                   | ✓        |
| Volumetric air content in the foundations     | $\theta_{a,crack}$ | 0.26       | 0.26          | -                   | ✓        |
| Enclosed-space air exchange rate              | ER                 | 0.00014    | 0.00014       | 1/s                 | ✓        |
| Differential outdoor/indoor air pressure      | $\Delta p$         | 0          | 0             | g/cm/s <sup>2</sup> | no check |
| Soil vapor permeability*                      | Kv                 | 1e-12      | 1e-12         | m <sup>2</sup>      | ✓        |
| Enclosed space foundation perimeter           | x crack            | 34         | 34            | m                   | ✓        |
| Soil to building air flowrate                 | Qs                 | Calculated | 0.00e+0       | L/min               | ✓        |
| Vapor Viscosity                               | $\mu_{air}$        | 0.000181   | 0.000181      | g/cm/s              | ✓        |

Selected contaminants - Physico-chemical parameters (Loaded DB file: Default Database (ISS-INAIL, 2018))

| Contaminant           | Vol   | Sol       | H          | Kd   | Kd(pH)  | Koc       | Koc(pH) | Dair   | Dw         | ρ     |
|-----------------------|-------|-----------|------------|------|---------|-----------|---------|--------|------------|-------|
| -                     | -     | mg/L      | -          | L/kg | L/kg    | L/kg      | L/kg    | cm²/s  | cm²/s      | kg/L  |
| Aluminum              | PM    |           |            | 1500 |         |           |         |        |            | 2.7   |
| Antimony              | PM    |           |            | 45   |         |           |         |        |            |       |
| Arsenic               | PM    |           |            |      | 31      |           |         |        |            |       |
| Chromium (total)      | PM    |           |            |      | 4300000 |           |         |        |            |       |
| Iron                  | PM    |           |            | 25   |         |           |         |        |            | 7.87  |
| Nickel                | PM    |           |            |      | 1900    |           |         |        |            |       |
| Lead                  | PM    |           |            | 900  |         |           |         |        |            |       |
| Manganese             | PM    |           |            | 65   |         |           |         |        |            | 7.3   |
| Boron                 | PM    |           |            | 3    |         |           |         |        |            | 2.34  |
| Nitrite               | PM    |           |            |      |         |           |         |        |            |       |
| Toluene               | VOC*  | 526       | 0.271      |      |         | 234       |         | 0.0778 | 0.0000092  | 0.862 |
| p-Xylene              | VOC*  | 162       | 0.282      |      |         | 375       |         | 0.0682 | 0.00000842 | 0.857 |
| Benzo(a)pyrene        | POM   | 0.00162   | 0.0000187  |      |         | 587000    |         |        |            |       |
| Benzo(g,h,i)perylene  | POM   | 0.00026   | 0.00000582 |      |         | 1580000   |         |        |            |       |
| Vinyl Chloride        | VVOC* | 8800      | 1.14       |      |         | 21.7      |         | 0.107  | 0.000012   | 0.911 |
| Dichloropropane (1,2) | VOC*  | 2800      | 0.115      |      |         | 60.7      |         | 0.0733 | 0.00000973 | 1.16  |
| Aliphatics C9-C12     | VOC*  | 0.01      | 69         |      |         | 680000    |         | 0.07   | 0.000005   |       |
| Aliphatics C19-C36    | POM   | 0.0000015 | 110        |      |         | 398000000 |         |        |            |       |
| Cadmium               | PM    |           |            |      | 4300    |           |         |        |            |       |
| Selenium              | PM    |           |            |      | 2.2     |           |         |        |            |       |

Selected contaminants - Toxicological parameters (Loaded DB file: Default Database (ISS-INAIL, 2018))

| Contaminant           | ADAFc | ADAFa | SFing       | SFinal      | IUR       | RfDing    | RfDinal   | RfC      | ABS   |
|-----------------------|-------|-------|-------------|-------------|-----------|-----------|-----------|----------|-------|
|                       | -     | -     | (mg/kg/d)-1 | (mg/kg/d)-1 | (µg/m³)-1 | (mg/kg/d) | (mg/kg/d) | (µg/m³)  | -     |
| Aluminum              |       |       |             |             |           | 1         |           | 0.005    | 0.01  |
| Antimony              |       |       |             |             |           | 0.0004    |           | 0.0002   | 0.01  |
| Arsenic               |       |       | 1.5         |             | 0.0043    | 0.0003    |           | 0.000015 | 0.03  |
| Chromium (total)      |       |       |             |             |           | 1.5       |           | 0.00014  | 0.01  |
| Iron                  |       |       |             |             |           | 0.7       |           |          | 0.01  |
| Nickel                |       |       |             |             | 0.00026   | 0.02      |           | 0.00009  | 0.01  |
| Lead                  |       |       | 0.0085      |             | 0.000012  | 0.0035    |           |          | 0.01  |
| Manganese             |       |       |             |             |           | 0.14      |           | 0.00005  | 0.01  |
| Boron                 |       |       |             |             |           | 0.2       |           | 0.02     | 0.01  |
| Nitrite               |       |       |             |             |           | 0.1       |           |          | 0.01  |
| Toluene               |       |       |             |             |           | 0.08      |           | 5        | 0.1   |
| p-Xylene              |       |       |             |             |           | 0.2       |           | 0.1      | 0.01  |
| Benzo(a)pyrene        | 5     | 5     | 1           |             | 0.0006    | 0.0003    |           | 0.000002 | 0.13  |
| Benzo(g,h,i)perylene  |       |       |             |             |           | 0.03      |           | 0.003    | 0.13  |
| Vinyl Chloride        | 2     | 2     | 0.72        |             | 0.0000044 | 0.003     |           | 0.1      | 0.1   |
| Dichloropropane (1,2) |       |       | 0.037       |             | 0.0000037 | 0.04      |           | 0.004    | 0.1   |
| Aliphatics C9-C12     |       |       |             |             |           | 0.1       |           | 0.2      | 0.1   |
| Aliphatics C19-C36    |       |       |             |             |           | 2         |           | 0.2      | 0.1   |
| Cadmium               |       |       |             |             | 0.0018    | 0.0005    |           | 0.00001  | 0.001 |
| Selenium              |       |       |             |             |           | 0.005     |           | 0.02     | 0.01  |

Selected contaminants - Screening Values (Loaded DB file: Default Database (ISS-INAIL, 2018))

| Contaminant           | PRG Soil Residential | PRG Soil Industrial | PRG Groundwater |
|-----------------------|----------------------|---------------------|-----------------|
|                       | mg/kg                | mg/kg               | mg/L            |
| Aluminum              |                      |                     | 0.2             |
| Antimony              | 10                   | 30                  | 0.005           |
| Arsenic               | 20                   | 50                  | 0.01            |
| Chromium (total)      | 150                  | 800                 | 0.05            |
| Iron                  |                      |                     | 0.2             |
| Nickel                | 120                  | 500                 | 0.02            |
| Lead                  | 100                  | 1000                | 0.01            |
| Manganese             |                      |                     | 0.05            |
| Boron                 |                      |                     | 1               |
| Nitrite               |                      |                     | 0.5             |
| Toluene               | 0.5                  | 50                  | 0.015           |
| p-Xylene              | 0.5                  | 50                  | 0.01            |
| Benzo(a)pyrene        | 0.1                  | 10                  | 0.00001         |
| Benzo(g,h,i)perylene  | 0.1                  | 10                  | 0.00001         |
| Vinyl Chloride        | 0.01                 | 0.1                 | 0.0005          |
| Dichloropropane (1,2) | 0.3                  | 5                   | 0.00015         |
| Aliphatics C9-C12     | 10                   | 250                 | 0.35            |
| Aliphatics C19-C36    | 50                   | 750                 | 0.35            |
| Cadmium               | 2                    | 15                  | 0.005           |
| Selenium              | 3                    | 15                  | 0.01            |

Selected contaminants - Biodegradation constant (Loaded DB file: Default Database (ISS-INAIL, 2018))

| Contaminant           | First-order biodegradation constant<br>(groundwater) | First-order biodegradation constant<br>(leaching) | First-order biodegradation constant<br>(vapors) |
|-----------------------|------------------------------------------------------|---------------------------------------------------|-------------------------------------------------|
|                       | 1/d                                                  | 1/d                                               | 1/d                                             |
| Aluminum              |                                                      |                                                   |                                                 |
| Antimony              |                                                      |                                                   |                                                 |
| Arsenic               |                                                      |                                                   |                                                 |
| Chromium (total)      |                                                      |                                                   |                                                 |
| Iron                  |                                                      |                                                   |                                                 |
| Nickel                |                                                      |                                                   |                                                 |
| Lead                  |                                                      |                                                   |                                                 |
| Manganese             |                                                      |                                                   |                                                 |
| Boron                 |                                                      |                                                   |                                                 |
| Nitrite               |                                                      |                                                   |                                                 |
| Toluene               |                                                      |                                                   |                                                 |
| p-Xylene              |                                                      |                                                   |                                                 |
| Benzo(a)pyrene        |                                                      |                                                   |                                                 |
| Benzo(g,h,i)perylene  |                                                      |                                                   |                                                 |
| Vinyl Chloride        |                                                      |                                                   |                                                 |
| Dichloropropane (1,2) |                                                      |                                                   |                                                 |
| Aliphatics C9-C12     |                                                      |                                                   |                                                 |
| Aliphatics C19-C36    |                                                      |                                                   |                                                 |
| Cadmium               |                                                      |                                                   |                                                 |
| Selenium              |                                                      |                                                   |                                                 |

# Risk from Groundwater

| Contaminant                                | CRS     | f | CRS/f   | Sol     | R (HH)   | HI (HH) | Rgw (GW) |
|--------------------------------------------|---------|---|---------|---------|----------|---------|----------|
| -                                          | µg/L    | - | µg/L    | µg/L    | -        | -       | -        |
| Aluminum                                   | 3.55e+3 |   | 3.55e+3 | -       | -        | -       | 1.78e+1  |
| Antimony                                   | 2.30e+1 |   | 2.30e+1 | -       | -        | -       | 4.60e+0  |
| Arsenic                                    | 5.40e+1 |   | 5.40e+1 | -       | -        | -       | 5.40e+0  |
| Chromium (total)                           | 1.79e+3 |   | 1.79e+3 | -       | -        | -       | 3.58e+1  |
| Iron                                       | 2.28e+4 |   | 2.28e+4 | -       | -        | -       | 1.14e+2  |
| Nickel                                     | 2.97e+2 |   | 2.97e+2 | -       | -        | -       | 1.48e+1  |
| Lead                                       | 7.30e+1 |   | 7.30e+1 | -       | -        | -       | 7.30e+0  |
| Manganese                                  | 4.75e+2 |   | 4.75e+2 | -       | -        | -       | 9.50e+0  |
| Boron                                      | 3.45e+4 |   | 3.45e+4 | -       | -        | -       | 3.45e+1  |
| Nitrite                                    | 8.13e+2 |   | 8.13e+2 | -       | -        | -       | 1.63e+0  |
| Toluene                                    | 6.00e+1 |   | 6.00e+1 | 5.26e+5 | -        | 2.56e-6 | 4.00e+0  |
| p-Xylene                                   | 2.10e+1 |   | 2.10e+1 | 1.62e+5 | -        | 4.09e-5 | 2.10e+0  |
| Benzo(a)pyrene                             | 2.50e+2 |   | 2.50e+2 | 1.62e+0 | -        | -       | 2.50e+4  |
| Benzo(g,h,i)perylene                       | 1.30e+2 |   | 1.30e+2 | 2.60e-1 | -        | -       | 1.30e+4  |
| Vinyl Chloride                             | 1.48e+1 |   | 1.48e+1 | 8.80e+6 | 3.93e-8  | 1.74e-4 | 2.96e+1  |
| Dichloropropane (1,2)                      | 4.15e+0 |   | 4.15e+0 | 2.80e+6 | 6.17e-10 | 9.73e-5 | 2.77e+1  |
| Aliphatics C9-C12                          | 1.32e+3 |   | 1.32e+3 | 1.00e+1 | -        | 3.02e-1 | 3.77e+0  |
| Aliphatics C19-C36                         | 6.11e+3 |   | 6.11e+3 | 1.50e-3 | -        | -       | 1.75e+1  |
| Cadmium                                    | 1.13e+1 |   | 1.13e+1 | -       | -        | -       | 2.26e+0  |
| Selenium                                   | 4.20e+1 |   | 4.20e+1 | -       | -        | -       | 4.20e+0  |
| Cumulative Outdoor Risk (On-site)          |         |   |         |         | 4.00e-8  | 3.03e-1 |          |
| Cumulative Indoor Risk (On-site)           |         |   |         |         | -        | -       |          |
| Cumulative Risk water ingestion (On-site)  |         |   |         |         | -        | -       |          |
| Cumulative Outdoor Risk (Off-site)         |         |   |         |         | 4.00e-8  | 3.03e-1 |          |
| Cumulative Indoor Risk (Off-site)          |         |   |         |         | -        | -       |          |
| Cumulative Risk water ingestion (Off-site) |         |   |         |         | -        | -       |          |

## SSTL for Groundwater

| Contaminant           | CRS     | Sol     | PRG     | SSTL (HH) | SSTL (GW) | SSTL    |
|-----------------------|---------|---------|---------|-----------|-----------|---------|
| -                     | µg/L    | µg/L    | µg/L    | µg/L      | µg/L      | µg/L    |
| Aluminum              | 3.55e+3 | -       | 2.00e+2 | -         | 2.00e+2   | 2.00e+2 |
| Antimony              | 2.30e+1 | -       | 5.00e+0 | -         | 5.00e+0   | 5.00e+0 |
| Arsenic               | 5.40e+1 | -       | 1.00e+1 | -         | 1.00e+1   | 1.00e+1 |
| Chromium (total)      | 1.79e+3 | -       | 5.00e+1 | -         | 5.00e+1   | 5.00e+1 |
| Iron                  | 2.28e+4 | -       | 2.00e+2 | -         | 2.00e+2   | 2.00e+2 |
| Nickel                | 2.97e+2 | -       | 2.00e+1 | -         | 2.00e+1   | 2.00e+1 |
| Lead                  | 7.30e+1 | -       | 1.00e+1 | -         | 1.00e+1   | 1.00e+1 |
| Manganese             | 4.75e+2 | -       | 5.00e+1 | -         | 5.00e+1   | 5.00e+1 |
| Boron                 | 3.45e+4 | -       | 1.00e+3 | -         | 1.00e+3   | 1.00e+3 |
| Nitrite               | 8.13e+2 | -       | 5.00e+2 | -         | 5.00e+2   | 5.00e+2 |
| Toluene               | 6.00e+1 | 5.26e+5 | 1.50e+1 | > Sol     | 1.50e+1   | 1.50e+1 |
| p-Xylene              | 2.10e+1 | 1.62e+5 | 1.00e+1 | > Sol     | 1.00e+1   | 1.00e+1 |
| Benzo(a)pyrene        | 2.50e+2 | 1.62e+0 | 1.00e-2 | -         | 1.00e-2   | 1.00e-2 |
| Benzo(g,h,i)perylene  | 1.30e+2 | 2.60e-1 | 1.00e-2 | -         | 1.00e-2   | 1.00e-2 |
| Vinyl Chloride        | 1.48e+1 | 8.80e+6 | 5.00e-1 | 3.76e+2   | 5.00e-1   | 5.00e-1 |
| Dichloropropane (1,2) | 4.15e+0 | 2.80e+6 | 1.50e-1 | 6.73e+3   | 1.50e-1   | 1.50e-1 |
| Aliphatics C9-C12     | 1.32e+3 | 1.00e+1 | 3.50e+2 | > Sol     | 3.50e+2   | 3.50e+2 |
| Aliphatics C19-C36    | 6.11e+3 | 1.50e-3 | 3.50e+2 | -         | 3.50e+2   | 3.50e+2 |
| Cadmium               | 1.13e+1 | -       | 5.00e+0 | -         | 5.00e+0   | 5.00e+0 |
| Selenium              | 4.20e+1 | -       | 1.00e+1 | -         | 1.00e+1   | 1.00e+1 |

SSTL Hydrocarbons (MADEP) for Surface Soil

| Contaminant        | CRS   | Fraction |      |     | C <sub>sat</sub> | SSTL (HH) | SSTL/fr (HH) |         |       | SSTL (GW) | SSTL/fr (GW) |         |       |
|--------------------|-------|----------|------|-----|------------------|-----------|--------------|---------|-------|-----------|--------------|---------|-------|
|                    |       | C<12     | C>12 | TOT |                  |           | C<12         | C>12    | TOT   |           | C<12         | C>12    | TOT   |
| -                  | mg/kg | -        | -    | -   | mg/kg            | mg/kg     | mg/kg        | mg/kg   | mg/kg | mg/kg     | mg/kg        | mg/kg   | mg/kg |
| Aliphatics C9-C12  |       | -        | -    | -   | 6.81e+1          | -         | -            | -       | -     | -         | -            | -       | -     |
| Aliphatics C19-C36 |       | -        | -    | -   | 5.97e+0          | -         | -            | -       | -     | -         | -            | -       | -     |
| Critical Fraction  |       |          |      |     |                  | SSTL (HH) | -            | 1.00e+6 | -     | SSTL (GW) | -            | 1.00e+6 | -     |

SSTL Hydrocarbons (MADEP) for Subsurface Soil

| Contaminant        | CRS   | Fraction |      |     | C <sub>sat</sub> | SSTL (HH) | SSTL/fr (HH) |       |       | SSTL (GW) | SSTL/fr (GW) |       |       |
|--------------------|-------|----------|------|-----|------------------|-----------|--------------|-------|-------|-----------|--------------|-------|-------|
|                    |       | C<12     | C>12 | TOT |                  |           | C<12         | C>12  | TOT   |           | C<12         | C>12  | TOT   |
| -                  | mg/kg | -        | -    | -   | mg/kg            | mg/kg     | mg/kg        | mg/kg | mg/kg | mg/kg     | mg/kg        | mg/kg | mg/kg |
| Aliphatics C9-C12  |       | -        | -    | -   | 6.81e+1          | -         | -            | -     | -     | -         | -            | -     | -     |
| Aliphatics C19-C36 |       | -        | -    | -   | 5.97e+0          | -         | -            | -     | -     | -         | -            | -     | -     |
| Critical Fraction  |       |          |      |     |                  | SSTL (HH) | -            | -     | -     | SSTL (GW) | -            | -     | -     |

## Cumulative SSTL - Groundwater

| Contaminant                                | CRS     | SSTLind | f | SSTLcum | Sol     | R (HH)   | HI (HH) | Rgw (GW) |
|--------------------------------------------|---------|---------|---|---------|---------|----------|---------|----------|
| -                                          | µg/L    | µg/L    | - | µg/L    | µg/L    | -        | -       | -        |
| Aluminum                                   | 3.55e+3 | 2.00e+2 |   | 2.00e+2 | -       | -        | -       | 1.00e+0  |
| Antimony                                   | 2.30e+1 | 5.00e+0 |   | 5.00e+0 | -       | -        | -       | 1.00e+0  |
| Arsenic                                    | 5.40e+1 | 1.00e+1 |   | 1.00e+1 | -       | -        | -       | 1.00e+0  |
| Chromium (total)                           | 1.79e+3 | 5.00e+1 |   | 5.00e+1 | -       | -        | -       | 1.00e+0  |
| Iron                                       | 2.28e+4 | 2.00e+2 |   | 2.00e+2 | -       | -        | -       | 1.00e+0  |
| Nickel                                     | 2.97e+2 | 2.00e+1 |   | 2.00e+1 | -       | -        | -       | 1.00e+0  |
| Lead                                       | 7.30e+1 | 1.00e+1 |   | 1.00e+1 | -       | -        | -       | 1.00e+0  |
| Manganese                                  | 4.75e+2 | 5.00e+1 |   | 5.00e+1 | -       | -        | -       | 1.00e+0  |
| Boron                                      | 3.45e+4 | 1.00e+3 |   | 1.00e+3 | -       | -        | -       | 1.00e+0  |
| Nitrite                                    | 8.13e+2 | 5.00e+2 |   | 5.00e+2 | -       | -        | -       | 1.00e+0  |
| Toluene                                    | 6.00e+1 | 1.50e+1 |   | 1.50e+1 | 5.26e+5 | -        | 6.41e-7 | 1.00e+0  |
| p-Xylene                                   | 2.10e+1 | 1.00e+1 |   | 1.00e+1 | 1.62e+5 | -        | 1.95e-5 | 1.00e+0  |
| Benzo(a)pyrene                             | 2.50e+2 | 1.00e-2 |   | 1.00e-2 | 1.62e+0 | -        | -       | 1.00e+0  |
| Benzo(g,h,i)perylene                       | 1.30e+2 | 1.00e-2 |   | 1.00e-2 | 2.60e-1 | -        | -       | 1.00e+0  |
| Vinyl Chloride                             | 1.48e+1 | 5.00e-1 |   | 5.00e-1 | 8.80e+6 | 1.33e-9  | 5.87e-6 | 1.00e+0  |
| Dichloropropane (1,2)                      | 4.15e+0 | 1.50e-1 |   | 1.50e-1 | 2.80e+6 | 2.23e-11 | 3.52e-6 | 1.00e+0  |
| Aliphatics C9-C12                          | 1.32e+3 | 3.50e+2 |   | 3.50e+2 | 1.00e+1 | -        | 2.29e-3 | 1.00e+0  |
| Aliphatics C19-C36                         | 6.11e+3 | 3.50e+2 |   | 3.50e+2 | 1.50e-3 | -        | -       | 1.00e+0  |
| Cadmium                                    | 1.13e+1 | 5.00e+0 |   | 5.00e+0 | -       | -        | -       | 1.00e+0  |
| Selenium                                   | 4.20e+1 | 1.00e+1 |   | 1.00e+1 | -       | -        | -       | 1.00e+0  |
| Cumulative Outdoor Risk (On-site)          |         |         |   |         |         | 1.35e-9  | 2.32e-3 |          |
| Cumulative Indoor Risk (On-site)           |         |         |   |         |         | -        | -       |          |
| Cumulative Risk water ingestion (On-site)  |         |         |   |         |         | -        | -       |          |
| Cumulative Outdoor Risk (Off-site)         |         |         |   |         |         | 1.35e-9  | 2.32e-3 |          |
| Cumulative Indoor Risk (Off-site)          |         |         |   |         |         | -        | -       |          |
| Cumulative Risk water ingestion (Off-site) |         |         |   |         |         | -        | -       |          |

SSTL Hydrocarbons (MADEP) for Groundwater

| Contaminant        | CRS     | Fraction |      |      | Sol     | SSTL<br>(HH) | SSTL/fr (HH) |      |      | SSTL<br>(GW) | SSTL/fr (GW) |         |         |
|--------------------|---------|----------|------|------|---------|--------------|--------------|------|------|--------------|--------------|---------|---------|
|                    |         | C<12     | C>12 | TOT  |         |              | C<12         | C>12 | TOT  |              | C<12         | C>12    | TOT     |
| -                  | µg/L    | -        | -    | -    | µg/L    | µg/L         | µg/L         | µg/L | µg/L | µg/L         | µg/L         | µg/L    | µg/L    |
| Aliphatics C9-C12  | 1.32e+3 | 1.00     | -    | 0.18 | 1.00e+1 | -            | -            | -    | -    | 3.50e+2      | 3.50e+2      | -       | 1.97e+3 |
| Aliphatics C19-C36 | 6.11e+3 | -        | 1.00 | 0.82 | 1.50e-3 | -            | -            | -    | -    | 3.50e+2      | -            | 3.50e+2 | 4.26e+2 |
| Critical Fraction  |         |          |      |      |         | SSTL<br>(HH) | -            | -    | -    | SSTL<br>(GW) | 3.50e+2      | 3.50e+2 | 4.26e+2 |