**Air Dispersion Modelling Results at VOC Emissions of 10g/Nm3**

The significance of the released emissions was assessed by comparing the Process Contribution (PC) of each hydrocarbon to the relevant air quality standards, where available.

For long-term objectives, the Environment Agency considers the release to be insignificant if the PC is less than 1% of the air quality standard.2 For short-term objectives, including percentiles, the Agency considers the release to be insignificant if the PC is less than 10% of the air quality standard. Where a release is insignificant, the pollutant is screened out and no further assessment of levels of that pollutant undertaken.

Where a release is significant, the Predicted Environmental Concentration (PEC) is calculated by taking the background concentration of the pollutant into account. For these hydrocarbons, the background concentration is assumed to be negligible, and so the PC is equal to the PEC.

All maximum concentrations represent the maximum offsite concentrations; that is, concentrations within the site boundary were excluded.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Butane** |  |  |  |  |  |  |
| **Year** | **EAL** | **EAL Value** | **PC at 2g/nm3** | **PC at 10g/nm3** | **Max PC% of objective** | **Screened Out** |
| 2016 | Long Term | 14500 | 31 | 166 | 1.1% | NO |
| 2017 | 14500 | 35 | 187 | 1.3% | NO |
| 2018 | 14500 | 28 | 150 | 1.0% | YES |
| 2019 | 14500 | 29 | 155 | 1.1% | NO |
| 2020 | 14500 | 27 | 144 | 1.0% | YES |
|  |  |  |  |  |  |  |
| **Butane** |  |  |  |  |  |  |
| **Year** | **EAL** | **EAL Value** | **PC at 2g/nm3** | **PC at 10g/nm3** | **Max PC% of objective** | **Screened Out** |
| 2016 | Short Term | 181000 | 896 | 4792 | 2.6% | YES |
| 2017 | 181000 | 861 | 4605 | 2.5% | YES |
| 2018 | 181000 | 819 | 4381 | 2.4% | YES |
| 2019 | 181000 | 748 | 4001 | 2.2% | YES |
| 2020 | 181000 | 837 | 4477 | 2.5% | YES |
|  |  |  |  |  |  |  |
| **Butene** |  |  |  |  |  |  |
| **Year** | **EAL** | **EAL Value** | **PC at 2g/nm3** | **PC at 10g/nm3** | **Max PC% of objective** | **Screened Out** |
| 2016 | Long Term | 14500 | 13 | 70 | 0.5% | YES |
| 2017 | 14500 | 15 | 80 | 0.6% | YES |
| 2018 | 14500 | 12 | 64 | 0.4% | YES |
| 2019 | 14500 | 12 | 64 | 0.4% | YES |
| 2020 | 14500 | 11 | 59 | 0.4% | YES |
|  |  |  |  |  |  |  |
| **Butene** |  |  |  |  |  |  |
| **Year** | **EAL** | **EAL Value** | **PC at 2g/nm3** | **PC at 10g/nm3** | **Max PC% of objective** | **Screened Out** |
| 2016 | Short Term | 181000 | 372 | 1990 | 1.1% | YES |
| 2017 | 181000 | 357 | 1909 | 1.1% | YES |
| 2018 | 181000 | 340 | 1819 | 1.0% | YES |
| 2019 | 181000 | 310 | 1658 | 0.9% | YES |
| 2020 | 181000 | 347 | 1856 | 1.0% | YES |
|  |  |  |  |  |  |  |
| **Pentane** |  |  |  |  |  |  |
| **Year** | **EAL** | **EAL Value** | **PC at 2g/nm3** | **PC at 10g/nm3** | **Max PC% of objective** | **Screened Out** |
| 2016 | Long Term | 180000 | 35 | 187 | 0.1% | YES |
| 2017 | 180000 | 41 | 219 | 0.1% | YES |
| 2018 | 180000 | 32 | 171 | 0.1% | YES |
| 2019 | 180000 | 33 | 177 | 0.1% | YES |
| 2020 | 180000 | 31 | 166 | 0.1% | YES |
|  |  |  |  |  |  |  |
| **Pentene** |  |  |  |  |  |  |
| **Year** | **EAL** | **EAL Value** | **PC at 2g/nm3** | **PC at 10g/nm3** | **Max PC% of objective** | **Screened Out** |
| 2016 | Long Term | 180000 | 18 | 96 | 0.1% | YES |
| 2017 | 180000 | 21 | 112 | 0.1% | YES |
| 2018 | 180000 | 16 | 86 | 0.0% | YES |
| 2019 | 180000 | 17 | 91 | 0.1% | YES |
| 2020 | 180000 | 16 | 86 | 0.0% | YES |

Maximum annual average offsite butene, pentane and pentene concentrations are screened out, as they are less than 1% of the respective EALs.

Maximum hourly average offsite butane and butene concentrations are screened out, as they are less than 10% of the respective EALs.

There are several years in the results for the maximum annual average offsite butane concentrations which are not screened out as they are above 1% of the respective EAL. In each case they are only very slightly above 1% of the EAL (1.1% or 1.3%). The long term figures are calculated on the basis of a continuous emission, as this was considered to be the most conservative basis.

An alternative model could be completed based on the maximum total annual loading, as advised in an earlier question, of 2,900,000m3/annum and a flowrate of 500m3/hour (which is 50% of the design flow), this would result in a maximum total duration of usage of 241.6 days per annum, equivalent to 66% of the year. This basis is still highly conservative as the maximum loading is significantly above the planned and it assumes an equivalent flow of hydrocarbon in the emissions to air – even though the flowrate to the ship is 50% of the design flow at which the modelled emission flowrate is calculated.

This alternative model would therefore be expected to produce maximum annual offsite butane concentrations which were screened out, as they were less than 1% of the respective EAL.