

All page numbers relate to PDF document page numbering.

There is a significant potential error in the dispersion modelling that needs to be investigated – if this issue is indeed a true error then the dispersion model underestimates the impact by approximately 25%. On page 29 of the report it is stated that the flare has been modelled at a disposal capacity of 1.24 Nm<sup>3</sup>/s. This is confirmed in Table 3.10 which lists the exhaust gas conditions for the flare. (note the highlighting is mine)

Table 3.10 Exhaust gas conditions

Property		Value
Disposal rate	MMscfd	4.0
	Nm <sup>3</sup> /s	1.24
Exhaust gas temperature <sup>a</sup>	°C	1000 <sup>a</sup>
Exhaust gas flow rate (actual) <sup>b</sup>	m <sup>3</sup> /s	109.1
Flue diameter <sup>a</sup>	m	2.0
Velocity	m/s	34.7
Carbon dioxide release <sup>b</sup>	g/s	2519

a. Based on flare specification<sup>1</sup>.

b. Calculated based on the natural gas composition in Table 3.9.

Pollutant releases are estimated in Table 3.11. Releases are based on emission factors – i.e. the release rates in g/s per Nm<sup>3</sup>/s of gas consumed. (note the highlighting is mine)

Table 3.11 Pollutant releases from flare operations

Emission factor source	US EPA AP42 <sup>a</sup>	EMEP/EEA 2019 <sup>b</sup>
Emission factors		
Total hydrocarbons	0.14 lb/MMBtu	-
Nitrogen oxides (as NO <sub>2</sub> )	0.068 lb/MMBtu	1.4 g/kg gas
Carbon monoxide	0.31 lb/MMBtu	6.3 g/kg gas
Non methane volatile organic compounds	-	1.8 g/kg gas
<b>Release rates (g/s per Nm<sup>3</sup>/s of gas consumed)</b>		
Non methane volatile organic compounds (as carbon)		1.65
Nitrogen oxides	1.48	1.28
Carbon monoxide	6.76	5.77
Sulphur dioxide <sup>c</sup>		0.18
Total hydrocarbons (as carbon)	1.48	-

The text below this table states that the emission factor chosen is that which gives the greatest release rate – it is clear that this is referring to the data from Table 3.11 and hence all the emission factors used in the assessment should be as g/s per Nm<sup>3</sup>/s of gas consumed. Hence as the flare disposal rate is 1.24 Nm<sup>3</sup>/s (from Table 3.10), the chosen emission factors from Table 3.11 will need to be multiplied by 1.24 to give the actual release rates in g/s. However Table 3.12, which lists the pollutant release rates assumed for the assessment (in g/s) does not appear to include this multiplication step and hence the modelled emissions are approximately 25% lower than they should be.

Table 3.12 Flare stack pollutant release rates assumed for assessment

Pollutant		Value
Nitrogen oxides	gNO <sub>2</sub> /s	1.48
Carbon monoxide	gCO/s	6.76
Sulphur dioxide	gSO <sub>2</sub> /s	0.18
Benzene (total volatile organic compounds)	gbenzene/s	1.65

This error appears to be confirmed by reference to Table B.2 in Appendix B which gives the modelled pollutant releases in g/s. (I have highlighted the data for the flare) and does not include for the multiplication step.

Table B.2 Modelled pollutant releases

Plant	Pollutant release rate (g/s)				
	CO	Benzene	NO <sub>2</sub>	PM <sub>10</sub>	SO <sub>2</sub>
A Construction plant	1.087	0.051	0.270	0.005	0.0011
B Lighting towers	0.029	0.0029	0.036	0.031	0.000022
C Welfare unit	0.018	0.002	0.023	0.002	0.000014
D Surface conductor	0.174	0.015	0.184	0.010	0.00021
E Generator	0.340	0.029	0.360	0.019	0.00041
F1 Rig engine 1	1.380	0.187	2.337	0.079	0.0015
F2 Rig engine 2	1.380	0.187	2.337	0.079	0.0015
F3 Rig engine 3	1.380	0.187	2.337	0.079	0.0015
F4 Rig ancillaries	0.250	0.015	0.185	0.015	0.00021
G Workover rig	0.344	0.047	0.583	0.020	0.00041
H Flare	6.761	1.649	1.483	0	0.177
I Oil heater	0.011	0.001	0.046	0.005	0.00034
J Restoration plant	0.445	0.017	0.036	0.002	0.00037
K Crane	0.389	0.021	0.044	0.003	0.00047
HDV	0.022	0.011	0.055	0.002	0.000026
Fugitive	0	0.0369	0	0	0

It is strongly recommended that the authors of the report be requested to examine this issue as the model is potentially underestimating the releases by 25%. The results already show the impact severity to be a moderate impact for benzene levels for nearby residential property and if this potential error is substantiated then this could elevate the impact severity to a substantial impact.

Additional comments on the report include:

- Opening paragraph of the Summary (pdf page Number 5) – this states that the development will take place over a period of up to 3 years – hence this is not a short term operation and gives more weight to objections related to the intrusive nature of the development.
- Pdf page 11 states that fugitive releases of natural gas, principally methane, are considered unlikely to be significant based on information provided by Europa. Hence

this is not an independent assessment. The modelling should take into account alternative sources of information on potential fugitive releases.

- Pdf page 14 - The report notes that the nearest monitoring station for air quality is located around 4km from the site. However the outputs from this monitoring have not been taken into account and instead the report uses archive data from Defra. The report needs to justify why local data has not been considered in the analysis.
- Figure 3.1 (page 20) shows the location of the potentially sensitive receptors that have been assessed. Whilst the Cinder Track has been modelled for the northern part of the area shown, it has not been modelled for the southern section. This is a gap and should be assessed.
- Table 4.2 (page 40) shows the modelled outputs for the assessment of short term impacts at nearby footpaths. The associated text describes these levels as insignificant. However the modelled results have not been assessed using the criteria set out in the relevant Institute of Air Quality Management classification report (which is reference No.9 in the Socotec report). If this criteria (set out in Section 6.39 of the IAQM report) is used, then the impacts would be graded as moderate for Benzene.
- Table 4.4 (page 42) shows the severity impact for volatile organic compounds to be a moderate severity. For consistency with Tables 4.1, 4.2 and 4.3 this should refer to Benzene rather than volatile organic compounds