FICHTNER
Consulting Engineers Limited

Powerfuel Portland Ltd

Portland ERF

Response to AQMAU Query on Schedule 5 Response

The Environment Agency (EA) requested additional information to support the Environmental Permit (EP) determination process for the Portland ERF as part of a Schedule 5 request for further information. A Schedule 5 Response was produced by Fichtner and issued to the EA on 3 December 2021 (ref: S2953-0330-0001JRS). This was supported by a technical note produced by CERC, the developers of the ADMS dispersion model which was used to carry out atmospheric dispersion modelling to support the EP application.

The EA's Air Quality Modelling and Assessment Unit (AQMAU) has asked the following questions following receipt of the Schedule 5 Response:

1. The document submitted to us mentions: "At Portland, strongly stable conditions are very rare, the terrain is of small scale and temperature contrasts between land and sea are small". In my analysis, stable conditions occur 40-55% per year in both ADMS and AERMOD. Would this affect your advice?
2. Despite Tracy being dominated by relatively wide valley conditions with more complex flows, the validation document shows Q-Q plots at elevated receptors (43 and 104 m) with potential underestimations at windward hills. I understand this was due to reversed/complex flows, however, these are reasonably similar heights and windward locations at which potential exceedances/peaks are predicted in AERMOD. Would this shed reasonable doubt on the ADMS model performance in this particular situation? If not, is there any validation study that looks at windward elevated locations where hills are above buoyant tall stacks?

These two questions relate to the technical note produced by CERC. Fichtner has contacted CERC to respond to this query. CERC has provided the following response to each query:

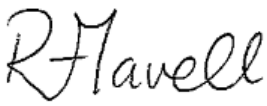
1. Stable conditions are indeed common, but plume impaction is only a potential issue in strongly stable flows. In this context strongly stable means the Froude number U/Nh <1, where h is the height of the hill, and U and N are representative (stack height) wind speeds and buoyancy frequencies. For the most stable Pasquill Stability class G conditions with wind speed 1m/s at 10m, the ADMS met pre-processor gives U/Nh = 3 with N (80m) = 0.0062s^{-1}, U(80m) = 2.25ms^{-1} and h=120m. So even these conditions are nowhere near stable enough to give plume impaction for this hill height (for which U/Nh must be less than 1). This means that direct plume impaction in stable flows really cannot be an issue for a hill of the size of Portland for a stack of height 80m for any conceivable weather conditions. Note however that if the wind direction is from the stack to the hill, material from the plume may nevertheless diffuse down towards the hill surface for a range of stability conditions, a process already accounted for in the model runs.
2. For the Tracy study the elevated receptor results you refer to are from a single location on a tower 1.2km east of the source (so still within the valley) at 43m and 105m above local ground

level. As such they are not indicative of what would happen in close proximity to a hill. In terms of ground level concentrations, the Tracy validation study does not show an underestimate – Figure 5 in the study document.

We trust this response is sufficient to answer AQMAU's queries. However, should you have any further questions please do not hesitate to contact either of the undersigned.

Yours sincerely

FICHTNER Consulting Engineers Limited



Rosalind Flavell
Senior Environmental Consultant

Stephen Othen
Technical Director