Stack height determination

Overview

The underlying principle of air pollution control is to minimise the release of pollutants to the atmosphere; and promote sufficient dispersion and dilution of released pollutants within the atmosphere.

The first part of this principle is controlling emissions at source through abatement techniques. The second part is the determination of the optimum release conditions, including stack height determination to ensure that subsequent ground level concentrations of the released pollutants remain within acceptable limits.

The objective of the stack height determination is to establish at what stack height local building wake effects are no longer significant thereby ensuring the adequate dispersion of pollutants. The primary determinant of the stack height is therefore the local building height.

The relevant stack height has been determined by advanced dispersion modelling.

On the basis of the above, the stack height determination considers:

- A unit emission rate of 1 g/s enabling the influence of meteorological conditions to be determined;
- All averaging periods relevant to the air quality assessment; and
- A range of all likely meteorological conditions through the use of five years of hourly sequential meteorological data from a representative measuring station.

Plant emissions characteristics assumed are identical to those reported previously in the main body of this report.

Simulations have been run using ADMS assuming flat terrain to determine what stack height is required to overcome local building wake effects. In each case the model was run assuming stack heights at 4 metre incremental spacing. Results were obtained for all relevant averaging periods to this assessment.

Results are reported for maximum contributions at the worst affected location for all averaging periods relevant to the assessment. This is considered a robust and conservative approach.

Results

The predicted maximum contributions for all averaging periods and stack heights considered are plotted in Figure A.6 for the plant firing on natural gas and Figure A.7 for the plant firing on diesel oil.

The dispersion modelling results indicate that for stack heights below 26 metres local building wake effects are predicted to affect dispersion substantially, as illustrated by the elevated modelled concentrations at the 22 metre stack height. For stack heights above 26 metres, ground level contributions do not reduce materially with increasing stack height. The same is true for both natural gas and diesel oil firing and for all averaging periods.

A stack height of 26 metres is, therefore, recommended for the proposed plant.

Figure A.6: Process Contributions for different stack heights (Natural gas as fuel)

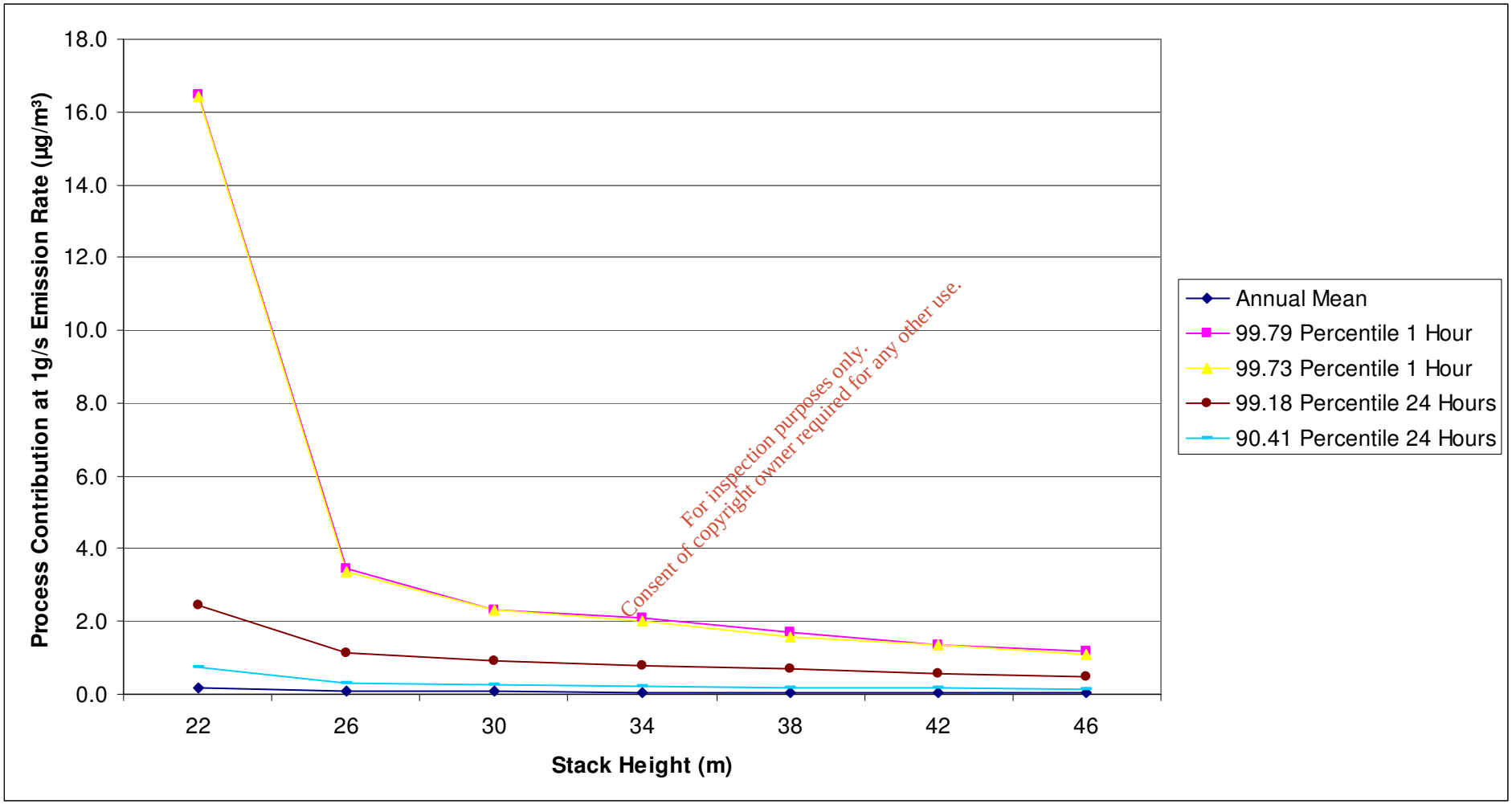

Figure A.7: Process Contributions for different stack heights (Diesel oil as fuel)