CALCULATION OF ODOUR LEVELS

CERC

Odours are typically measured in 'odour units'. Two types of odour unit commonly used are '*ou*' and 'ou_E':

i) The odour unit '*ou*' strength of a release is the number of times the mixture must be diluted, at standard temperature and pressure (288.15 K and 1013 mb), to reach the detection limit of 1 *ou*. *ou* therefore have the form of a ratio. The 1 *ou* contour will show the area where the model predicts the odour threshold will be exceeded. In practice, due to the presence of background odours, users may wish to use a higher level such as 5 *ou* to show where there may be an odour nuisance.

ii) An alternative unit used in odour studies is the odour unit 'ou_E' defined in the European standard (EN 13725:2003[1]). One ou_E is the mass of pollutant that, when evaporated into 1 m^3 of odourless gas at standard conditions, has the same odour nuisance as 1 *ou* of a reference odorant.

The Odours option in ADMS enables the user to input emissions and calculate output in either of these units.

For non-odours calculations, ADMS calculates mass concentrations in g/m^3 from mass emission rates in g/s, g/m/s, $g/m^2/s$ or $g/m^3/s$, for point, line, area and volume sources respectively. For odour calculations, if units of *ou* are used for odour calculations, the user specifies emissions in *ou* and ADMS produces output in *ou*. It is therefore necessary to convert the *ou* release strength to an 'emission rate' in order to obtain output in *ou*. Note that when using units of g, the concentration at the release point in g/m^3 is equal to the mass emission rate in g/s divided by the volume flow rate *V*. Hence the 'emission rate' *Q* for the odour calculation can be calculated as follows:

[1] Title: 'Air quality – determination of odour concentration by dynamic olfactometry'

$$Q = Q_{ou} \times V \times \frac{T_{STP}}{T_R} \qquad (1)$$

where Q_{ou} is the *ou* strength of the release, V is the volume flow rate at actual temperature and pressure (m^3/s), T_R is the release temperature (K) and T_{STP} is the temperature at standard temperature and pressure (288.15 K). Here the temperature ratio is included because the *ou* release strength is defined at standard temperature and pressure, as noted above. Note that modelling in *ou* cannot be done for sources that have no plume rise (since $V = 0$) - this includes all volume sources.

Since ou_E are a mass measure, they can be treated identically to g. The user specifies emissions in ou_E /s, ou_E /m/s, ou_E /m^2/s or ou_E /m^3/s, and results are obtained in ou_E /m^3.

For some pollutants, data giving the odour unit strength for a particular g/s release rate are readily available. However, these data are not available for all pollutants, and are not generally available for mixes of pollutants (note that the odour levels for different pollutants should not be summed, as the effects of different pollutants are not additive). If odour unit strength data are not available for the pollutant(s) to be modelled, it may be necessary to use olfactometry to specify the source strength.