Appendix 4.6

Justification for Dust Suppression Efficiency

Calculation of Watering Efficiency (for construction site)

With reference to Cowherd et al., "Control of Open Fugitive Dust Sources, EPA-450/3-88-008, U.S. Environmental Protection Agency, Research Triangle Park, NC, percentage of dust mitigation efficiency is calculated from Equation (3-2) :

$$C = 100 - \frac{0.8pdt}{i}$$

where

p = Potential average hourly daytime evaporation rate, mm/hour = 0.25916 [1]
d = Average hourly daytime traffic rate per hour = 45 per hour [2]
I = Application intensity = 1.1 L/sq.m [3]

Note:

[1] p = 0.0049 x 52.8898 inch, where 52.8898inch is equivalent to the total evaoporation of 1343.4mm obtained from Hong Kong Observatory (http://www.weather.gov.hk/cis/normal/1971_2000/normals_e.htm)

[2] Estimated by Engineer

[3] The assumptions provided are for the purpose of assessment predictions and is rounded to one decimal place only.

By applying the Equation (3-2) with the above assumptions,

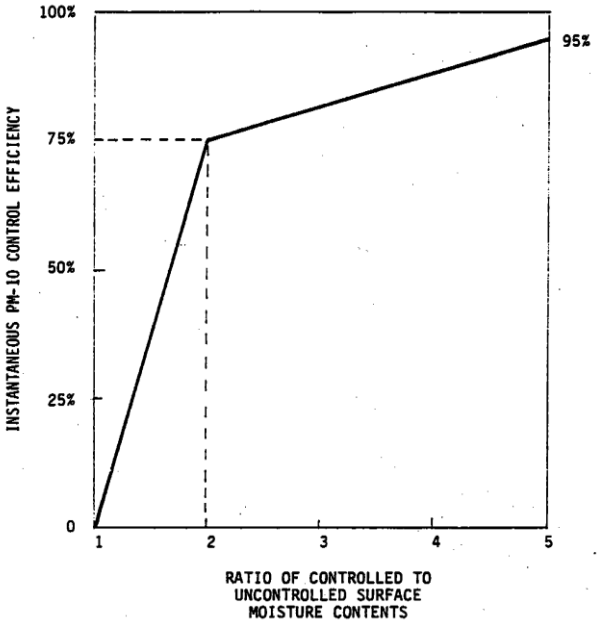
Dust suppression efficiency = 100 – 0.8 x (0.25916 x 45 x t) / 1.1 [t = time between application, hr]

Therefore,

For watering once per hour (i.e. t =1 hour), the estimated dust suppression efficiency is 91.7%.

Calculation of Watering Efficiency (for Stockpile)

With reference to Cowherd et al., "Control of Open Fugitive Dust Sources, EPA-450/3-88-008, U.S. Environmental Protection Agency, Research Triangle Park, NC, percentage of dust mitigation efficiency is calculated from Equation (3-3) and Figure 3-3 :



$$C = 75 \times (M - 1) \quad \text{[for } 1 \le M \le 2\text{]}$$

$$C = 62 + 6.7M \quad \text{[for } 2 \le M \le 5\text{]}$$

where c = Instanteous control efficiency (%)
M = Ratio of controlled to uncontrolled surface moisture contents

According to the Equation (3-3), by increasing the surface moisture content by a ratio of 1.67 would achieve 50% dust suppression efficiency :

Dust suppression efficiency = 75 x (1.67 - 1) = 50%

Watering Intensity

Given

Area of Stockpile	=	16985 m^2
Dry Fill Density	=	1700 kg/m^3

Uncontrolled Surface Moisture Content	=	2	%			
Controlled Surface Moisture Content	=	3.3	%			

Assume

Depth of Water Penetrated into Stockpile	=	0.02	m	see Note [1]

Therefore,

Weight of Uncontrolled Wet Stockpile Surface	=	16985.2 x 1700 x 0.02 / (1 - 0.02)	=	589282	kg
Weight of Controlled Wet Stockpile Surface	=	16985.2 x 1700 x 0.02 / (1 - 0.03)	=	597410	kg
Watering Intensity	=	(597410 - 589282) / 16985.2	=	0.5	$L/m^2/hour$

Note [1] Referenced from the Dennis R. Fitz & Kurt Bumiller (2000) "Evaluation of Watering to Control Dust in High Winds", Journal of the Air & Waste Management Assoication