Explanation of Sample Problem
Instantaneous Emission of an Air Pollutant

Problem Statement:
For the following data (that would be measured on site) manually calculate the downwind concentration profile for a distance of 10 km:

For varying Y, Z = 4
For varying Z, Y = 1.5

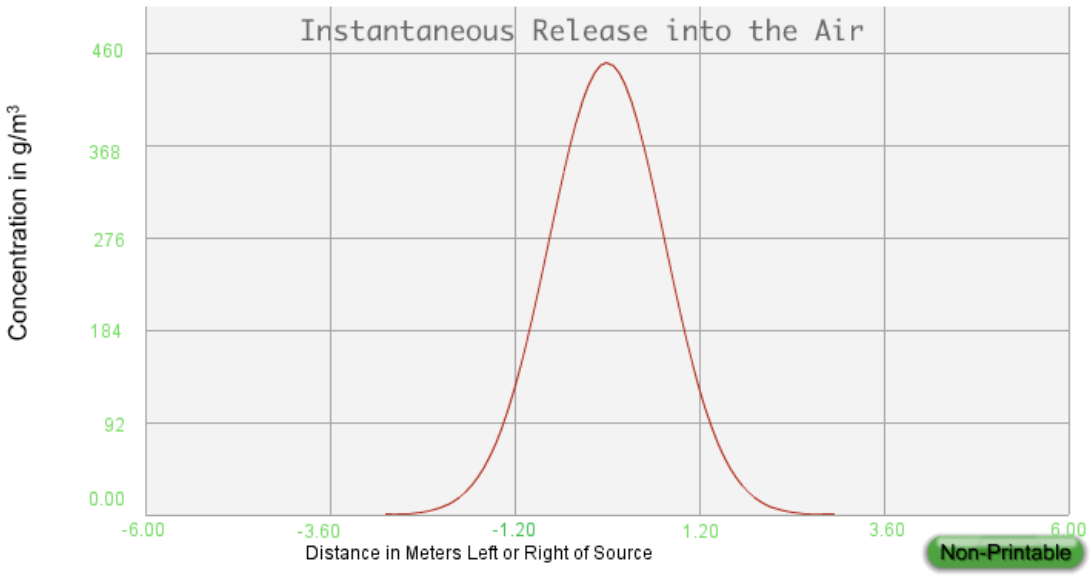
Height of pollutant release is 30.0 m
Wind speed is 4.0 m/sec
Total source mass is 2000g

Answer:
The given wind speed results in an atmospheric stability of condition D.

Using the equations for dispersion or the figures, the horizontal dispersion is 0.7517m and the vertical dispersion is 0.4990m.

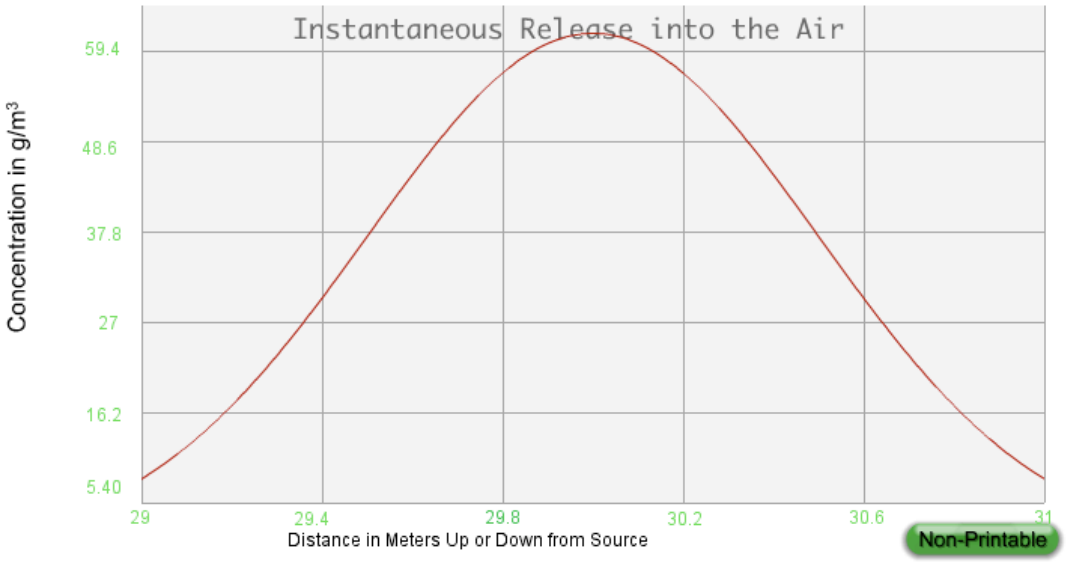
$$C(x,y,z,t) = \frac{Q_m}{(2\pi)^{3/2}\sigma_x\sigma_y\sigma_z} \exp\left[-\frac{1}{2}\left(\frac{y}{\sigma_y}\right)^2\right] \exp\left[-\frac{1}{2}\left(\frac{z - H_r}{\sigma_z}\right)^2\right] + \exp\left[-\frac{1}{2}\left(\frac{z + H_r}{\sigma_z}\right)^2\right] \quad \text{Eqn 3}$$

Using the equation above, a z of 30m, and a y of 1.5m, the concentration profile (in g/m^3 versus m) for the plus and minus y direction is shown below



X = 10	km	Q_m = 2000	g/Sec	∂_x = 0.7517	m
Z = 30	m	$\bar{u}$ = 4	m/Sec		
T = 2.5	Sec	H_r = 30	m	∂_z = 0.4990	m

The concentration profile for the z (height) directions is shown below



X = 10	km	Q_m = 2000	g/Sec	∂_x = 0.7517	m
Y = 1.5	m	$\bar{u}$ = 4	m/Sec		
T = 2.5	Sec	H_r = 30	m	∂_z = 0.4990	m