7.20 H=50m, overcast so Class D, A at 1.2km, B at 1.4km.

a. Fig 7.50, Class D, H=50m, max concentration at 1km. Since concentration is decreasi past 1 km, the higher level of pollution will be at site "A".

b. Clear sky, wind < 5m/s: Class is now A,B or C. At 50m, Class A,B, or C, Fig 7.50 shows us that the maximum point moves closer to the stack.

c. It will still be house at site "A."

7.21 Bonfire, 20g/s CO, wind 2 m/s, H=6m, distance = 400m:

Table 7.8, clear night, stability classification = F

$$C(x,0)=\frac{Q}{\pi u\sigma_y\sigma_z}\exp\left(-\frac{H^2}{2\sigma_z^2}\right) \quad (7.46)$$

a. At 400m, $\sigma_y = 15m$, $\sigma_z = 7m$

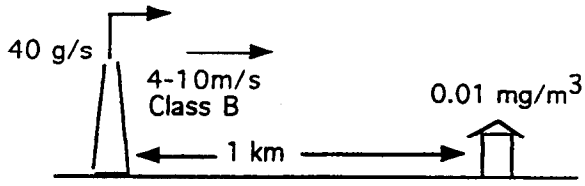
$$C=\frac{20x10^6\mu g/s}{\pi\, 2m/s\ x15m\ x\ 7m}\exp\left(-\frac{6^2}{2x7^2}\right)=21x10^3\mu g/m^3=21mg/m^3$$

b. At the maximum point, Fig. 7.50

$$\left(\frac{Cu_H}{Q}\right)_{max}\approx 3.8x10^{-3}/m^2$$

$$C_{max}=\frac{Q}{u_H}\left(\frac{Cu_H}{Q}\right)_{max}=\frac{20x10^3mg/s}{2m/s}x\frac{3.8x10^{-3}}{m^2}=38\approx 40mg/m^3$$

7.32 Paper mill emitting H_2S, 1km away want 0.1 x odor threshold:



Class B, at 1 km, (Table 7.10) $\sigma_y = 156m$, $\sigma_z = 110m$

$$C(x,0)=\frac{Q}{\pi u\sigma_y\sigma_z}\exp\left(-\frac{H^2}{2\sigma_z^2}\right)$$

$$0.01x10^{-3}\,g/m^3 = \frac{40g/s}{\pi u\ m/s\ x156m\ x\ 110m}\exp\left(-\frac{H^2}{2x110^2}\right)$$

rearranging: $e^{H^2/24,200} = \frac{40}{\pi u\ 156\ x\ 110\ x\ 0.01x10^{-3}} = \frac{74.2}{u}$

or, $H = \left[24,200\ \ln\left(\frac{74.2}{u}\right)\right]^{0.5}$

so, at each end of the wind speed range we can find the height needed:

$$H_{u=4} = \left[24,200\ \ln\left(\frac{74.2}{4}\right)\right]^{0.5} = 265m$$

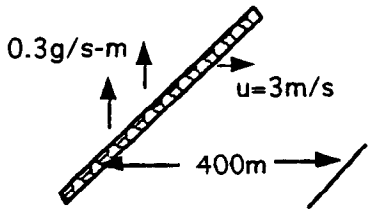
$$H_{u=10} = \left[24,200\ \ln\left(\frac{74.2}{10}\right)\right]^{0.5} = 220m$$

says to be conservative use H=265m

If the town extends beyond 1 km, from Fig 7.50 at H=265, Class B, $X_{max} \approx 1.8km$

Therefore, with the peak occurring beyond the 1 km house, the concentration will rise for buildings located > 1km away. YES

7.35 Agricultural burn



Clear fall afternoon, winds 3 m/s, so stability class "C" (Table 7.8),

and $\sigma_z = 26m$ (Table 7.10). Using (7.54),

$$C(0.4km) = \frac{2q}{\sqrt{2\pi}\ u\sigma_z} = \frac{2x300mg/m-s}{\sqrt{2\pi}\ x\ 3m/s\ x\ 26m} = 3.0mg/m^3$$