1)

a)

I. $Var(Z_v) = C\left(1 - F\left(\frac{L_x}{a_x}, \frac{L_y}{a_y}\right)\right) = 8\left(1 - F\left(\frac{5}{20}, \frac{5}{40}\right)\right) = 8(1 - 0.15) = 6.8\%^2$

II. $Var(Z_v) = C\left(1 - F\left(\frac{L_x}{a_x}, \frac{L_y}{a_y}\right)\right) = 8\left(1 - F\left(\frac{20}{20}, \frac{20}{40}\right)\right) = 8(1 - 0.545) = 3.64\%^2$

III. $Var(Z_v) = C\left(1 - F\left(\frac{L_x}{a_x}, \frac{L_y}{a_y}\right)\right) = 8\left(1 - F\left(\frac{100}{20}, \frac{40}{40}\right)\right) = 8(1 - 0.915) = 0.68\%^2$

b)

I. $Var(Z_v) = C\left(1 - F\left(\frac{L_2}{a_2} = \frac{L_3}{a_3}, \frac{L_1}{a_1}\right)\right) = 13\left(1 - F\left(\frac{5}{30}, \frac{10}{40} = \frac{10}{40}\right)\right) = 13(1 - 0.22) = 10.14\%^2$

II. $Var(Z_v) = C\left(1 - F\left(\frac{L_2}{a_2} = \frac{L_3}{a_3}, \frac{L_1}{a_1}\right)\right) = 13\left(1 - F\left(\frac{120}{40}, \frac{60}{30} = \frac{80}{40}\right)\right) = 13(1 - 0.975) = 0.325\%^2$

III. $Var(Z_v) = C\left(1 - F\left(\frac{L_2}{a_2} = \frac{L_3}{a_3}, \frac{L_1}{a_1}\right)\right) = 13\left(1 - F\left(\frac{80}{40}, \frac{120}{30} = \frac{160}{40}\right)\right) = 13(1 - 0.986) = 0.182\%^2$

2)

a)

I. $D(v|V) = Var(Z_v) - Var(Z_V) = 6.8 - 3.64 = 3.16\%^2$

II. $D(v|V) = Var(Z_v) - Var(Z_V) = 3.64 - 0.68 = 2.96\%^2$

b)

I. $D(v|V) = Var(Z_v) - Var(Z_V) = 10.14 - 0.325 = 9.815\%^2$

II. $D(v|V) = Var(Z_v) - Var(Z_V) = 0.325 - 0.182 = 0.143\%^2$

3)

a)

$$\begin{aligned} D^2(v|V) &= Var(v) - Var(V) \\ &= 5\%^2 \times \left(\mathrm{F}(120/50,50/50) - \mathrm{F}(20/50,10/50)\right) \\ &= 5\%^2 \times (0.83 - 0.24) = 2.95\%^2 \end{aligned}$$

b)

$$\begin{aligned} D^2(v|V) = Var\big(Z(v)\big) - Var\big(Z(V)\big) &= \frac{Var\big(Z(v_1)\big)}{2} - \frac{Var\big(Z(V_1)\big)}{2} \\ &= \frac{1}{2}\left(5\%^2 \times \left(\mathrm{F}(60/50,50/50) - \mathrm{F}(10/50,10/50)\right)\right) \\ &= \frac{1}{2}(5\%^2 \times (0.70 - 0.16)) = 1.35\%^2 \end{aligned}$$

c)

$$D^2(v|V) = 5\%^2 \times \left(\mathrm{F}(120/50{,}50/50) - \mathrm{F}(50/50{,}20/50)\right)$$
$$= 5\%^2 \times (0.83 - 0.52) = 1.55\%^2$$

d)

$$D^2(v|V) = 5\%^2 \times \left(\mathrm{F}(120/50{,}50/50) - \mathrm{F}(120/50{,}50/50)\right)$$
$$= 5\%^2 \times (0.83 - 0.83) = 0\%^2$$

e) La pile-d'homogénéisation de 90kT. Sinon l'utilisation de deux pelles qui est plus efficaces qu'une pile d'homogénéisation de 15kT.

f) Il faut être en mesure de fournir un espace adéquat pour concevoir une pile de 90kT et l'échantilonner adéquatement pour l'envoyer au convoyeur. Beaucoup de gestion.