

Water Treatment Cost Summary

$$wt_c \left[\frac{\text{kg}}{\text{gal}} \right] = \text{coagulant dosage} \left(\frac{\text{mg}}{\text{liter}} \right) \left(\frac{3.785 \text{ liters}}{\text{gallon}} \right) \left(\frac{\text{kg}}{10^6 \text{ mg}} \right) \quad NCF = \text{Roundup} \left[\left(\frac{\text{required daily volume (gpd)}}{5 \times 10^6 \text{ (gpd)}} \right) \times SF \right]$$

$$\text{Cost}_{CF} = NCF \left(\frac{\$25,000}{\text{year}} \right) + \left(wt_c \frac{\text{kg}}{\text{gal}} \right) [\text{required daily volume (gpd)}] \left(\frac{365 \text{ days}}{\text{year}} \right) \left(\frac{\$1}{\text{kg}} \right)$$

$$t_p = \frac{n_t (1.56 \text{ gallons})}{\left(\text{flowrate} \frac{\text{ml}}{\text{minute}} \right) \left(\frac{\text{liter}}{1,000 \text{ ml}} \right) \left(\frac{\text{gallon}}{3.785 \text{ liter}} \right)} \quad Q_{ST} = \frac{75,000 \text{ gallons}}{t_p} \quad Q_{SE} = \frac{Q_{ST} \times \text{filter run time}}{60 \text{ minutes}}$$

$$NS = \text{Roundup} \left[\left(\frac{\text{required daily volume (gpd)}}{Q_{SE} \text{ (gpm)}} \right) \left(\frac{\text{day}}{1,440 \text{ min}} \right) \times SF \right] \quad \text{Cost}_s = NS \left(\frac{\$35,000}{\text{tank}} \right)$$

$$Q_F = \left(\text{flowrate} \frac{\text{ml}}{\text{minute}} \right) \left(\frac{\text{liter}}{1,000 \text{ ml}} \right) \left(\frac{\text{gallon}}{3.785 \text{ liter}} \right) \left(\frac{1}{0.0668 \text{ ft}^2} \right) \quad Q_{FT} = Q_F \left(\frac{\text{gpm}}{\text{ft}^2} \right) \times 1,000 \text{ (ft}^2 \text{)}$$

$$Q_{FE} = \frac{Q_{FT} \text{ (gpm)} \times \text{filter run time}}{60 \text{ minutes}} \quad NF = \text{Roundup} \left[\left(\frac{\text{required daily volume (gpd)}}{Q_{FE} \text{ (gpm)}} \right) \left(\frac{\text{day}}{1,440 \text{ min}} \right) \times SF \right] \quad \text{Cost}_F = NF \left(\frac{\$45,000}{\text{filter}} \right)$$

$$\text{Cost}_{FMA} = \left(\frac{\$9.50}{\text{ft}^3} \right) \left(\frac{\text{thickness (in)}}{12 \text{ inches}} \text{ ft} \right) (1,000 \text{ ft}^2) \left(\frac{NF}{\# \text{ of years}} \right) \quad \text{Cost}_{FMS} = \left(\frac{\$5.90}{\text{ft}^3} \right) \left(\frac{\text{thickness (in)}}{12 \text{ inches}} \text{ ft} \right) (1,000 \text{ ft}^2) \left(\frac{NF}{\# \text{ of years}} \right)$$