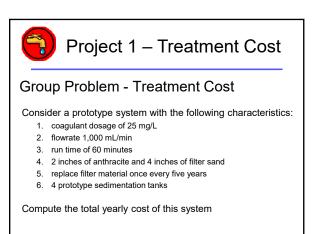
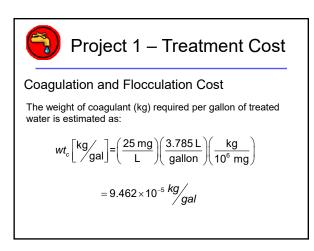
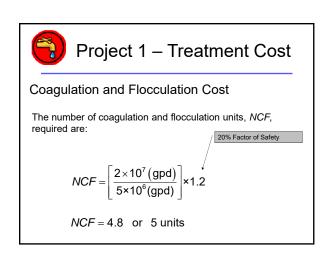
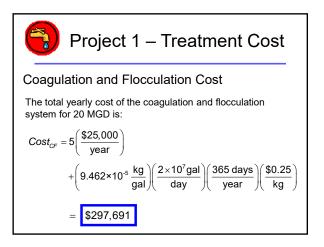
## Project 1 – Treatment Cost

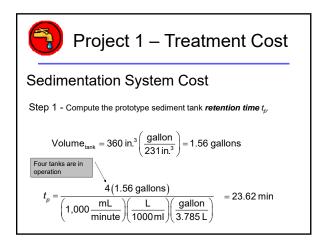
- The objective of this project is to utilize, within given constraints, a prototype water filter system to design a full-scale system.
- The effectiveness of the filter design will be evaluated by the yearly operational and maintenance costs.





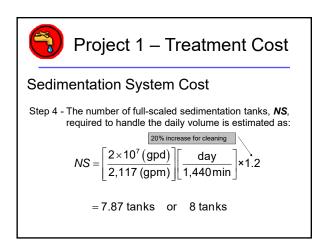


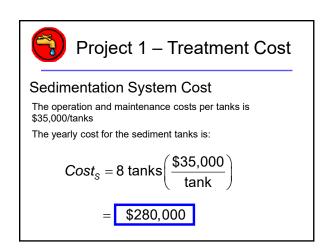




Project 1 – Treatment Cost  
Sedimentation System Cost  
Step 2 - The full-scale *treatment flowrate* 
$$Q_{sr}$$
 (gpm) per  
sedimentation tank is:  
 $Q_{ST} = \frac{75,000 \text{ gallons}}{23.62 \text{ min}} = 3,175 \text{ gpm}$ 

Project 1 – Treatment Cost
Sedimentation System Cost
Step 3 - The <i>effective flowrate</i> <b>Q</b> <sub>SE</sub> (gpm) in a sedimentation tank is:
$Q_{SE} = 3,175 \text{ gpm} \left( \frac{60 \text{ minutes}}{90 \text{ minutes}} \right) = 2,117 \text{ gpm}$





Project 1 – Treatment Cost  
Filtration System Cost  
Step 1 - Convert the average flowrate through the prototype  
filter (the 3.5 inch diameter prototype filter has an  
area of 0.0668 ft.<sup>2</sup>) into a prototype filter loading  
rate 
$$Q_F$$
 (gpm/ft.<sup>2</sup>).  
 $Q_F = \left(\frac{1,000 \text{ mL}}{\text{minute}}\right) \left(\frac{L}{1,000 \text{ mL}}\right) \left(\frac{\text{gallon}}{3.785 \text{ L}}\right) \left(\frac{1}{0.0668 \text{ ft.}^2}\right)$   
= 3.955 gpm / ft.<sup>2</sup>

Project 1 – Treatment Cost  
Filtration System Cost  
Step 2 - The full-scale *treatment flowrate* 
$$Q_{rr}$$
 is:  
 $Q_{FT} = 3.955 \left(\frac{\text{gpm}}{\text{ft.}^2}\right) 1,000 \text{ ft.}^2$   
= 3,955 gpm

