

EVE 290
Introduction to Environmental Engineering
Fall 2010
Homework #18

1. The settling velocity of a particle is 0.002 m/s, and the overflow rate (u_t^*) of a settling tank is 0.008 m/s.
 - a. What percentage of the particles does the tank capture?
 - b. If the particles are flocculated so that their settling rate is 0.05 m/s, what fraction of the particles is captured?
 - c. If the particles are not changed, and another tank is constructed to run in series with the original, will all of the particles be captured?

2. A settling tank is 20 m long, 10 m deep, and 10 m wide. The flow rate to the tank is 10 m³/minute. The particles to be removed all have a settling velocity of 0.1 m/min.
 - a. What is the hydraulic retention time?
 - b. Will all the particles be removed?

3. The settling basins for a 50 MGD wastewater treatment plant are operated in parallel with flow split evenly to 10 settling tanks, each of which is 3 m deep, 25 m wide, and 32 m long.
 - a. What is the expected theoretical percentage removal for particles of 0.1 mm diameter that settle at 1×10^{-2} m/s?
 - b. What theoretical percentage removal is expected for particles of 0.01 mm diameter that settle at 1×10^{-4} m/s?