LSN 20 Sedimentation

CEEG 340–Introduction to Environmental Engineering

Instructor: Deborah Sills; **9 October, 2019**

Sedimentation

Adapted from Davis and Cornwell. The town of San Jose has an existing horizontal-flow sedimentation tank with an overflow rate of 17 $\frac{m^3}{d \times m^2}$. The plant operator wants to remove particles that have settling velocities of 0.1 mm/s, 0.2 mm/s, and 1 mm/s. What percentage of removal should be expected for each particle size in an ideal sedimentation tank.

GIVEN: $OFR = \frac{17\ m^3}{day \cdot m^2}$; $v_s = 0.1\ mm/s, 0.2\ mm/s, 1\ mm/s$

FIND: % REMOVAL FOR EACH v_s

STEP 1: CONVERT UNITS OF OFR TO mm/s

$$OFR = \frac{17\ m^3}{day \cdot m^2} \times \frac{10^3\ mm}{m} \times \frac{1\ day}{86{,}400\ s} = 0.2\ mm/s$$

$$v_{crit} = OFR = 0.2\ mm/s$$

(1) $v_s = 1\ mm/s > 0.2\ mm/s\ (v_{crit})$ — 100% OF PARTICLES REMOVED

(2) $v_s = 0.2\ mm/s = 0.2\ mm/s\ (v_{crit})$ — 100% OF PARTICLES REMOVED

(3) $v_s = 0.1\ mm/s < 0.2\ mm/s\ (v_{crit})$

$$\% \text{ REMOVAL} = \frac{v_s}{v_{crit}} \times 100\% = \frac{0.1}{0.2} \times 100\% = 50\%$$

50% OF PARTICLES REMOVED