Assignment 10 CE 523 Sludge dewatering Due Friday April 22

1. A 10 mgd lime softening plant precipitates 250 mg/L of CaCO3 from water. This is withdrawn from the settling tanks at 1.5% solids and then dewatered in a belt press to 40% solids on a mass/mass basis. Calculate:

a) daily volumes of settler underflow withdrawn

b) daily volumes and masses of dewatered sludge

c) daily volumes and masses of sludge if 0.1% polymer addition (mass:mass solids) results in 50% solids in the sludge

d) maximum allowable cost of polymer if subsequent disposal costs $8/m3 at any density.

2. Repeat Example 22-1 for the month December.

3. Example 22.3 in AWWA describes thickener sizing set of tests and calculations to size a thickener. After having gone through these calculations, do the following. If the supernatant is allowed to achieve any value and that this is taken care of by recycling to the wastewater treatment plant, determine how we could make the thickener smaller if we were to accept a solids concentration of 1.75%. Assume that the points Cu and FL represent 2% solids and a flux of 4 lb.ft -2d-1 and that the curve in Figure 22-12 is proportionally correct.

4. Repeat Example 22.4 for the situation where the possible levels of dewatering and drying are 10% and 15%, respectively.

5. A new model centrifuge needs to be considered for and application like in Example 22.5. This centrifuge runs at 3200 rpm and the radius to pool is 26 cm and the bowl radius is 40 cm.

Calculate the treatment rate with the new system. Also compare the two alternatives in terms of a g-value.