A waste stabilization pond with surface area of 4×10^5 m^2 is used to provide rural waste water treatment. The effluent flow rate Q is 3 m^{3}s^{-1} and a central baffle is used to elongate the flow path. See first figure.

a) A conservative tracer was introduced instantaneously at the entrance (x=0), and the measured concentration at the outlet (x = L) is described in the second figure. Estimate the amount of dye that was introduced, the average depth of the pond, and the Peclet number.

b) BOD (biochemical oxygen demand) is removed in the pond according to first order kinetics with k = 0.3 day $^{-1}$. Estimate the ratio of the outlet to the inlet BOD concentration, C_L/C_{in}, assuming continuous, steady state pond operation.

X=0

X=L