

Math Problem #2: A polluted lake

Name: Date:

A barge sunk in the middle of a lake releasing a ton of a very stable and highly soluble contaminant. Answer the questions below assuming:

- the lake is well stirred (thorough mixing of the contaminant),
 - its surface area is 0.3 km^2 ,
 - its average depth is 12.1 feet,
 - its average outflow rate is 2.91 Acre Feet/hour,
 - there is no other input of contaminant after t_0 , and
 - the lake's volume is in steady state
- a) What is the concentration of the contaminant at t_0 ? (Give your answer in ug/l)
 - b) What were your assumptions in calculating this value?
 - c) Should the concentration of contaminant increase or decrease through time after t_0 ?
 - d) Develop the complete equation that will model the temporal change in contaminant concentration (Show your work; hint: use calculus).
 - e) Using this equation, determine when will the concentration of the contaminant reach EPA's maximum allowable level of 10ppb. (Give your answer in days)