CIVE 3331 Environmental Engineering


CIVE 3331 - ENVIRONMENTAL ENGINEERING
Spring 2003

Document Name:  CIVE3331_Exercises_011.doc

Purpose:  Exercises related to Lecture # 11.  These exercises develop skills in selected environmental groundwater quality problems.  Critical thinking is exercised in determination of analogies between lecture examples and the problems in this exercise set.  Direct relationships to various accreditation objectives are highlighted in **Bold** type in the following sections.  The exercises start on the next page.

Relevant ABET EC 2000 Criteria: Criterion 3 Program Outcomes and Assessment

(3-a)    an ability to **apply knowledge of** mathematics**, science,** and engineering.
(3-e)    an ability to identify, formulate, and solve engineering problems.
(3-k)    **an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.**

Relevant CEE Educational Objectives:

(3) Emphasize problem-identification, problem-formulation and **communication skills**, **problem-solving techniques** and the **many facets of engineering design** throughout the curriculum.

(5) **Prepare every student to develop the skills for critical thinking and lifelong learning.**

Relevant CEE Program Outcomes:

ii. **Students should acquire the ability to solve practical civil engineering problems by applying the knowledge of mathematics, science**, **engineering, modern techniques**, **skills and practical tools they gained in their courses.**

CIVE 3331 Environmental Engineering

Exercise_011-1

A reverse osmosis plant desalinates $5 \times 10^6$ liters per day of feedwater with 1500mg/L salt yielding 3 $\times 10^6$ liters/day of product water with 75 mg/L salt.  What is the salt concentration of the brine (reject stream)?

CIVE 3331 Environmental Engineering

Exercise_011-2

A rectangular primary clarifier for a domestic wastewater plant is to be ***designed*** to settle $2000 m^3$/day with an overflow rate of $32 m^3/m^2$/day.  The tank is to be 2.4m deep and 4.0m wide.  How long should it be, and what is the HRT of the tank?

CIVE 3331 Environmental Engineering

Exercise_011-3

A final settling tank for a 2 MGD activated sludge plant is to be **designed** to have an average overflow rate of 800g/d/ft$^2$. The tank must have a minimum detention time of 2.0 hours and to allow proper settling it must be at least 11 feet deep. **Design** a circular tank (specify the depth and diameter) to meet these criteria.

CIVE 3331 Environmental Engineering

CIVE 3331 Environmental Engineering

Exercise_006-6

Document History:

| **Author** | **Action** | **Date** | **Archive File Name** |
|---|---|---|---|
| Theodore G. Cleveland | Created | January 23, 2003 | CIVE3331_Exercises_009.PDF |