CIVE 3331 - ENVIRONMENTAL ENGINEERING
Spring 2003

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Purpose: Exercises related to Lecture # 15. 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.**

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Exercise_015-1

Suppose a bonfire emits CO at the rate of 20g/s on a clear night when the wind is blowing at 2m/s. If the effective stack height is 6 m
   a) what would you expect the ground level CO concentration 400 m downwind to be?
   b) Estimate the maximum ground level concentration.

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Exercise_015-2

A source emits 20 g/s of some pollutant in winds that average 5m/s, on a class C day. Use Fig 7.20 to find the peak concentrations for effective stack heights of 50, 100,and 200 m. Determine if the concentration is proportional to $1/H^2$.

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Exercise_015-3

A point source with effective stack height of 50 m emits 80 g/s of SO_2 on a clear summer day with surface winds of 4 m/s. Winds at 50 m are 5 m/s. An inversion layer starts at an elevation of 250 m.
   a) Estimate the ground level SO_2 concentration at a distance of 4 km downwind.
   b) If there had been no inversion layer, estimate the concentration 4 km downwind.

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Exercise_015-4

A long line of agricultural waste emits 0.3 g/sec of particulate matter on a clear fall afternoon with winds blowing 3 m/s perpendicular to the line. Estimate the ground-level particulate concentration 400 m downwind from the line.

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