

National Exams December 2007

Env-B4, Site Assessment & Remediation

Three Hours Duration

Notes

1. **This is Open Book Exam**
2. **If doubt exists as to the interpretation of any question, you are urged to submit with the answer paper, a clear statement of any assumptions made.**
3. **Any non-communicating calculator is permitted.**
4. **All four questions constitute a complete exam paper total 100 marks.**

Question #1: (25 marks)

1. How to conduct a Phase I Environmental Site Assessment?
2. List three reasons to carry out a Phase I Environmental Site Assessment.
3. What are the Ontario Guidelines and/or Regulations that need to be followed during a Phase II Environmental Site Assessment investigation?
4. What is a Record of Site Conditions?

Question #2: (25 marks)

1. During a Phase II Environmental Site Assessment carried out by ABC Consulting Engineering Limited in an industrial site, 1,000 m³ of silty clay soil was found to be contaminated with Benzene, Toluene, Ethylbenzene and Xylene (BTEX) in the range from 1,000 to 5,000 mg/kg soils. Previous geotechnical investigation at this site indicated that this soil layer is located at a depth of 3.5 m below existing ground surface at the site.
 - a. What type of soil remediation technology would you propose for this site?
 - b. Describe the steps that should be followed to remediate this site for commercial use standards.
 - c. What is the expected time frame that one would expect to achieve the site remediation?

Question #3: (25 marks)

1. If groundwater in a vicinity of a commercial site is contaminated with 200 mg/L of Trichloroethylene (TCE). The groundwater table at this site is 4 m below existing ground surface.
 - a. What pump and treat method would you recommend for this site?
 - b. Design an activated carbon column to handle this source of contamination assuming a pumping rate of 10,000 L/day.
 - c. Can soil vapour extraction be a reasonable technology to remediate this site? and why?
2. Define Henry's Constant and why it is an important parameter in determining soil remediation technology for a particular site?

Question #4: (25 marks)

1. Describe how Bio-piles are used for soil bioremediation?
2. List five organic compounds that can be remediate using soil composting.
3. How soils can be stabilized using solidification technologies?
4. What is the difference between diffusion coefficient and the dispersion coefficient?
5. How to determine the contaminant mobility in the groundwater system?