

National Exams December 2008

Env-B4, Site Assessment & Remediation

**Three Hours Duration**

**Notes**

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is an OPEN BOOK EXAM.  
Any non-communicating calculator is permitted.
3. FIVE (5) questions constitute a complete exam paper.
4. Each question is of equal value.
5. Most questions require an answer in essay format. Clarity and organization of the answer are important.

**Question #1: (20 marks)**

1. What is a Record of Site Conditions?
2. How to conduct a Phase I Environmental Site Assessment? When Phase II Environmental Site Assessment would be required?
3. Why financial institutes require Phase I Environmental Site Assessment to be carried out before any transactions?
4. What are the Ontario Guidelines and/or Regulations that need to be followed during a Phase II Environmental Site Assessment investigation?

**Question #2: (20 marks)**

1. List site conditions when pump and treat soil remediation methods would be used in a particular site.
2. List the regulations that are followed during the removal of underground storage tanks.
3. How to determine the contaminant mobility in the groundwater system?
4. List geophysical methods that could be used as screen tools during Phase I Environmental Site Assessment.

**Question #3: (20 marks)**

1. During a Phase II Environmental Site Assessment carried out by XYZ Consulting Engineering Limited at an industrial site, 3,000 m<sup>3</sup> 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 and Total Petroleum Hydrocarbon in the range from 2,000 to 10,000 mg/kg. Previous geotechnical investigation at this site indicated that this soil layer is located at a depth of about 4 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 #4: (20 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 #5: (20 marks)**

1. What are the differences between Bio-piles and soil composting methods 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?