

NAME _____
STUDENT # _____

UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE AND ENGINEERING
FINAL EXAMINATIONS, DECEMBER 2001
Third Year, Program 1e; Fourth Year, Program 6e
EDV360H1 F - ENVIRONMENTAL IMPACT AND RISK ASSESSMENT
Examiner - P. H. Byer

INSTRUCTIONS:

1. This is a closed book examination. No calculators permitted; all calculations are simple.
2. Answer each question in the space provided below it.

(8%) 1. Define any 4 of the following 6 terms as they relate to the course:

a) Chronic -

b) Epidemiology -

c) Relative risk ratio -

d) TDI -

e) Weight of evidence -

f) ADME -

1	/8
2	/5
3	/6
4	/5
5	/4
6	/15
7	/5
8	/30
9	/22

(5%) 2. Briefly explain the purpose of a strategic environmental assessment.

(6%) 3. The Class EA for Municipal Water and Wastewater Projects defines a 5 phase process. Briefly explain the purpose of each of the first three phases.

(5%) 4. What are the basic differences between laws, regulations and guidelines?

(4%) 5. Complete the following: Interactions between impacts or between contaminants can be additive, _____, or _____.

6. Air emissions from a manufacturing plant contain a persistent chemical that can cause cancer. These emissions generally blow in the direction of a farming town which has a population of 1,000. You have been hired to carry out a health risk assessment for this town. The emission rate from the plant is one million m^3 per day with the contaminant at a concentration of 14.0 mg/m^3 . Under average meteorological conditions, the emission is diluted 100 times by the time it reaches a point of impingement in the centre of the town. On average, people inhale 20 m^3 of air per day. The contaminant also falls onto the soil. The slope factor for incremental lifetime risk due to this contaminant has been estimated to be $0.06 (\text{mg/kg-day})^{-1}$ for adults.

You may need to make other assumptions, in which case they must be clearly stated.

(5%) a) List the elements of the exposure pathway of contaminants and describe each of these elements in this particular case.

(5%) b) Estimate the EDI and additional number of cancer cases in the town due to this contaminant.

(5%) c) What are the causes of inaccuracies and uncertainties in this estimate?

(5%) 7. What do NOAEL and LOAEL mean? Show whether they relate to the threshold dose-response relationship or the no threshold relationship using a graph of these relationships.

8. A chemical plant is concerned about the possibility of an accidental release of a toxic gas from a tank into the surrounding community. An accidental release would start only if there is a rupture in the tank wall or a break in the tank valve. If this occurs, an emergency containment system would normally keep the gas from escaping. However, this emergency containment system could fail, resulting in the gas going into the community. A failure in the emergency containment system would occur if a gas monitoring system fails and a back up emergency control system fails. The company has estimated the following annual probabilities, which are independent events:

- | | |
|------------------------------------|------|
| • Rupture in Tank Wall | 0.05 |
| • Break in Tank Valve | 0.02 |
| • Monitoring System Failure | 0.06 |
| • Emergency Control System Failure | 0.01 |

(10%) a) Draw a Fault Tree for this situation, clearly labelling each part of the tree.

(5%) b) Estimate the annual probability of an accidental toxic gas release?

(7%) c) How could this information be used in risk management?

(8%) d) A local residents' group has raised concerns about the possibility of a leak from the chemical plant. A reporter from the local newspaper calls the plant manager to arrange to interview him about this concern. The plant manager prefers to discuss it right away on the phone and tells the reporter:

"We understand that the community is concerned about possible leaks from the plant. However, risks are a fact of everyday life, and we have done a risk analysis that shows that there is really nothing to be concerned about since the risks are extremely low. The plant uses the latest safety equipment and meets all government requirements. We also want to assure everyone that even if there is a toxic gas release, it would not pose an unacceptable risk since the gas concentration would be well below levels that are considered safe by regulatory officials."

In order to avoid risk communication problems, seven "rules" for risk communication have been proposed. Explain how two of these rules have been "broken" in this case.

9. There is a proposal to expand a town's water treatment plant, which is currently operating at capacity. There are several housing developments anticipated in the town, but new homes cannot be built unless there is an increase in water supply.

(9%) a) Show that you understand direct and indirect socioeconomic impacts by drawing a network diagram for the socioeconomic impacts of this project, including at least 3 different direct and 3 different indirect socioeconomic impacts that might result from this proposal. Clearly identify which are direct and which are indirect impacts.

(5%) b) List the 5 steps for carrying out a social impact assessment.

(8%) b) One type of cumulative impact is the frequent, repetition of an impact over time. Explain the other two types. Give a clear, specific example of each of these for a project such as this.

UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE AND ENGINEERING
FINAL EXAMINATION, DECEMBER 18, 2001
ENG182H 1 -- EFFECTIVE TECHNICAL WRITING

Examiners -- D. FLYNN

Exam Type: A

Non-electronic dictionaries are permitted. No other aids are allowed.

The examination is two and a half hours long. Approximate times allowable for each question are given. Be sure to leave time to edit your answers for mistakes. The exam has three parts. All answers must be given in complete and grammatically-correct sentences. Point form is permissible only in the introductory section. Please write double-spaced, on one side of a page only. You may include neat hand-drawn illustrations or graphics if appropriate.

PART A: Comparison-Contrast
25% (approx. 37 minutes)

Compare and contrast the following topics:

- 1) Cars and public transit
- 2) An electric (or gas) oven and a microwave oven
- 3) Hard drives and floppy disks
- 4) A ruler and a protractor
- 5) A knife and a pair of scissors
- 6) A helicopter and an airplane
- 7) A formal report and an informal report

PART B: Instructions
25% (approx. 37 minutes)

Write a set of Instructions, in non-Report form, that provides details on the method of writing a technical report. Start from the earliest part of the process, and carry it through to the actual submission of the finished document to the primary reader. Be careful not to miss the more important steps in the process.

PART C: Short Formal Report
50% (approx. 75 minutes)

Write a short report on one of the two following subjects. Your answer should include all of those formal elements of a report that are appropriate to your handling of the subject (in other words, you will likely not require a list of illustrations or a glossary).

1) A Progress Report that outlines your scholastic activities since the beginning of classes in September. Note your accomplishments, work in progress, and goals to be fulfilled in the second term. Address your Letter of Transmittal to your Tutorial Leader, Department of English, 7 King College Circle, University of Toronto, Toronto, M5S 3K1.

2) Write a Proposal that attempts to persuade those in your place of residence of the desirability of purchasing some piece of electronic equipment (e.g., a new TV, a computer, a stereo, etc.) for the household. Address your Letter of Transmittal to your house mate, roommate, parents, significant other, or anyone else with whom you live.