SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: INTRODUCTION TO SITE REMEDIATION

CODE NO.: ENV 330-4 **SEMESTER:** VI

PROGRAM: ENVIRONMENTAL ENGINEERING TECHNOLOGY

AUTHOR: BRAD KIRK

DATE: FEBRUARY 1997 **PREVIOUS OUTLINE DATED:** NEW

APPROVED: _____ MARCH 26, 1997
DEAN **DATE**

TOTAL CREDITS: 4

PREREQUISITE(S): NONE

LENGTH OF COURSE: 16 WEEKS **TOTAL CREDIT HOURS:** 64 HOURS

INTRODUCTION TO SITE REMEDIATION — COURSE NAME

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I. **COURSE DESCRIPTION:** This course introduces guidelines and techniques for the decommissioning of industrial sites in a safe manner and in compliance with regulations. Methods for treating and monitoring contaminated soils and groundwater will be discussed. Field sampling and laboratory analysis methods are introduced.

II. **LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:** (Generic Skills Learning Outcomes placement on the course outline will be determined and communicated at a later date.)

Upon successful completion of this course the student will demonstrate the ability to:

1) Discuss the National Guidelines for Decommissioning Industrial Sites.

Potential Elements of the Performance:

--- identify relevant Federal and Provincial Legislation
--- describe the stages of decommissioning planning
--- describe the phased approach to site decommissioning
--- discuss the development of cleanup criteria

2) Describe the National Classification System for Contaminated Sites

Potential Elements of the Performance:

--- describe the basic elements of the National Classification System
--- identify the minimum data requirements to classify a site
--- describe the elements of a facility/site description

3) Discuss Health and Safety Procedures for Contaminated Sites

Potential Elements of the Performance:

--- describe special precautions which must be taken for the protection of workers, the public, and the environment

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II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE (Continued)

4) Describe the Movement of Groundwater and Contaminant Flow

Potential Elements of the Performance:

--- describe unconfined and confined aquifers
--- describe the basics of groundwater hydraulics, hydraulics of wells, and the determination of piezometric head distribution
--- describe the sources of groundwater contamination and transport processes

5) Describe Remediation Techniques for Cleaning Contaminated Soils and Groundwater

Potential Elements of the Performance:

--- describe methods of soil treatment, including:
- low temperature thermal desorption;
- bioremediation;
- vapour extraction;
- solvent extraction;
- soil washing;
- soil flushing;
- chemical fixation/stabilization

--- describe methods of in-situ and "pump and treat" groundwater treatment, including:
- air sparging;
- steam sparging;
- air stripping;
- carbon adsorption;
- biological treatment;
- uv/ozone/hydrogen peroxide oxidation

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6) Describe the Basic Considerations in Sampling Contaminated Sites and Analyzing the Samples

Potential Elements of the Performance:

--- describe methods of sampling soils, sediments, surface water and groundwater
--- describe methods of preserving and storing samples
--- describe techniques of evaluating data

III. TOPICS:

1) National Guidelines for Decommissioning Industrial Sites
2) National Classification System for Contaminated Sites
3) Health & Safety Procedures for Contaminated Sites
4) Groundwater & Contaminant Flow
5) Remediation Techniques
6) Research Techniques
7) Case Studies

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

There is no text prescribed for this course. The instructor will give handouts as needed, to supplement material presented in class.

V. EVALUATION PROCESS/GRADING SYSTEM

The final course grade will be based on the aggregate score of a series of tests to be held throughout the semester. Dates for all tests will be announced approximately one week in advance and attendance at all tests is mandatory.

A+	**90 - 100%**	**B**	**70 - 79%**	**R**	**Below 60%**
A	**80 - 89%**	**C**	**60 - 69%**		

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VI. SPECIAL NOTES:

- Special Needs
  If you are a student with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717, 491 so that support services can be arranged for you.

- Retention of Course Outlines
  It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other post-secondary institutions.

- Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.

- Substitute Course Information is available at the Registrar's Office.

VII. PRIOR LEARNING ASSESSMENT

Students who wish to apply for advanced credit in the course should consult the instructor.