

## MODULE SYLLABUS

### M202 - EXTERNAL ENVIRONMENT

**Aim:** To provide an introduction to environmental hazards, risk assessment techniques, principles of control, and environmental management.

On successful completion of this module, the student should be able to:

- describe the main impacts that human activity have on the environment;
- identify monitoring strategies, sampling and analytical technique to emissions to the environment;
- compare and contrast the techniques used for occupational hygiene and environmental measurement and control;
- describe the principles of environmental management and control;
- describe the regulatory framework applicable to environmental management.

**Prior Knowledge:** Candidates for this course are expected to be aware of the general contents of ISO14001:2004 Environmental Management Systems especially the requirements and guidance for use.

**Course Length:** It is envisaged that this course will be conducted over 5 days which includes the examination.

This course will require approximately 32 hours' study time, of which at least 24 hours will be taught (teaching and practical). The additional study time will be required in the candidates' own time.

<b>Content:</b>	<b>Topic</b>	<b>Time Allocation</b>
	<b>1 Human Impacts on the Environment</b>	<b>10%</b>
	<b>2 Regulatory Framework</b>	<b>10%</b>
	<b>3 Environmental Assessment and Monitoring</b>	<b>40%</b>
	<b>4 Environmental Management and Control</b>	<b>40%</b>

**Note:** Reference is made in this syllabus to HSE guidance or other documentation. This may not be the most up-to-date relevant publications from HSE/other sources and is intended as guidance for candidates only.

#### **1 Human Impacts on the Environment (10%)**

##### *1.1 Introduction to Ecological Systems*

##### 1.1.1 Earth's natural cycles

- Energy
- Carbon
- Nitrogen
- Water

##### 1.1.2 Biodiversity

- Definition
- Value of biodiversity
- Threats to biodiversity

## 1.2 Sources of Pollution

- Industry
- Transport
- Population
- Agriculture

## 1.3 Principal Environmental Impacts

Ozone depletion

Global warming

Acid rain

Eutrophication

Photochemical ozone creation

Toxic releases to the environment

- Air
- Water
- Land

Ambient air quality

Resource depletion

## 1.4 Sustainability

### 1.4.1 Definitions of “sustainable development”

- UNECD “Our common future” (1987)
- Agenda 21 (1)
- World Business Council for Sustainable Development

### 1.4.2 Benefits for society and industry

### 1.4.3 The precautionary principle

### 1.4.4 The polluter pays principle

## 2 Regulatory Framework (10%)

### 2.1 Voluntary v Regulatory Approaches

The advantages and disadvantages associated with:

- regulation
- economic instruments
- voluntary schemes

### 2.2 UK Legal Framework

Types of statute

Enforcement

### 2.3 EU

EU institutions and legislative process

Types of instrument

Role of European Environment Agency

### 2.4 International Agreements

Climate change

Ozone depletion

### 2.5 EPA 1990

### 2.6 Environment Act 1995

2.7 *IPPC – Pollution Prevention and Control Act 1999*

2.8 *Waste*

Types of waste

Licensing

Controlled waste

Definition

Duty of care

Special waste

Definition

Procedures for disposal

Landfill Regulations 2002

2.9 *Discharges to Water and Sewers*

Water Resources Act 1991

Water Industry Act 1999

Consents

EU Water Framework Directive 2000/60/EC

2.10 *Contaminated Land*

Requirements of Part IIA of Env. Protection Act 1990

Enforcement

2.11 *Air Quality and Air Emissions*

Environmental Act 1995 Part 4

Clean Air Act 1993

Noise Act 1996

Air Quality Regulations 2000

**3 Environmental Assessment and Monitoring (40%)**

3.1 *Identification and Assessment of Environmental Aspects and Impacts*

Role in environmental management system

Definitions of “environmental aspects” and “environmental impacts”

Key steps in assessment

3.2 *Environmental Impact Assessment*

Circumstances where environmental impact assessments are required:

Major projects associated with:

Town and Country Planning

Water resource projects

Main steps in an EIA

property screening

scoping

impact prediction and evaluation

preparation of Environmental Impact Statement

Consultative process

3.3 *Life Cycle Analysis*

definition and application of LCA

key steps

goal and scope definition

inventory analysis

impact assessment

interpretation

### 3.4 *Measurement Techniques*

#### 3.4.1 Monitoring strategies including compliance monitoring

#### 3.4.2 Air sampling analysis for environmental pollutants

Air sampling techniques for the determination of particulates in the chimneys and ducts.

Air sampling techniques for common gaseous emissions with specific reference to the following:

    Volatile Organic Compounds (VOCs), oxides of nitrogen, oxides of sulphur

    Measuring and correcting for the effects of temperature, pressure, water vapour and oxygen. Concentration conversions

#### 3.4.3 Monitoring of liquid discharges for biological criteria, nutrients and metals - Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Oxygen Demand (TOD) and Mercury

#### 3.4.4 Continuous monitoring techniques

#### 3.4.5 Ambient air quality monitoring

#### 3.4.6 Contaminated land assessment e.g. asbestos, metals, organics, zoonosis

### 3.5 *Modelling Techniques*

circumstances where modelling techniques may be used

overview of the following:

determination of stack heights

Technical Guidance Note (Dispersion) DI

BS5228 – 1997

(prediction of noise dispersion)

### 3.6 *Monitoring Resource Use*

#### 3.6.1 Techniques for evaluating and monitoring use of materials, energy and water

- Energy and waste audits
- Use of records including energy bills
- Metering of energy and water consumption

#### 3.6.2 Calculating and Reporting Releases

- Inventory of Sources and Releases reporting (Environmental Protection Act 1990)
- DETR guidelines on reporting greenhouse gases, waste and water

### 3.7 *Assessing Nuisance*

- Subjective nature of nuisance
- Assessing noise nuisance using BS4142:1997 (4)
- Odour assessment
- Odour units
- Difficulties in assessing nuisance, in particular aspects such as aesthetics

## 4 **Environmental Management and Control (40%)**

### 4.1 *Environmental Management Systems*

- Benefits of environment management systems
- Main features of, and differences between, ISO14000 series and EMAS
- Main features of “Responsible Care!” programmes
- Procedures for accreditation to ISO14001:2004 and EMAS
- Environmental reporting
- Communication with stakeholders

## 4.2 *Preventing Environmental Impacts*

### 4.2.1 Process design and the use of clean technology

- Techniques for reducing emissions at source i.e. elimination, substitution, process design, waste elimination and minimisation, reuse and recycling

### 4.2.2 Use of “best practicable environmental option”

- Definition of BPEO
- Consideration of releases to all environmental media and their interactions

## 4.3 *Controlling Emissions to the Atmosphere*

### 4.3.1 Emission limits

### 4.3.2 Main design features, applicability and operational considerations of

- Fabric filters
- electrostatic precipitators
- cyclones
- wet scrubbers (for particulates and gases)
- carbon filtration
- thermal processes
- condensation techniques

### 4.3.3 Use of ‘masking’ agents for emissions

## 4.4 *Controlling Discharge to Water*

### 4.4.1 Preventing discharges

### 4.4.2 Applicability, main features and operations factors for the following techniques for treating industrial waste waters

- Centrifuging
- Filtration
- Flotation
- Ion-exchange
- Reverse osmosis (membrane technology)
- Screening
- Solvent extraction
- Sedimentation
- Chemical treatment
- Biological treatment

## 4.5 *Waste Management*

- The waste hierarchy
- waste minimisation, re-cycling, re-design of packaging and secondary materials
- energy recovery
- incineration - including: monitoring; suitability
- biological treatments - including: aerobic systems; reed beds; composting; anaerobic digestion
- disposal to landfill site - including: selection of site; transport; monitoring; control of leachate; control of landfill gases

## 4.6 *Remediation Techniques for Contaminated Land*

- The concept that there is a need to establish facts about the contamination (eg. what, how much) and the intended end-use of the land before action
- Options for action
  - No action required
  - Barrier technology
  - Removal from site for treatment/disposal (e.g. incineration, land-fill)

In situ techniques e.g. pumping/vacuum extraction, microbial treatment

Trigger values for evaluation of contaminated land

### References

- (1) Agenda 21. Rio Earth Summit 1992. A global action plan for the 21<sup>st</sup> century
- (2) BS5228:1997 Noise control on construction and open sites
- (3) BS4142:1997 Method of rating industrial noise affecting mixed residential and industrial areas
- (4) ISO14001:2004 Environmental Management Systems. Requirements with guidance for use