

IMPORTANT INFORMATION



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NEBOSH SPECIALIST DIPLOMA IN ENVIRONMENTAL MANAGEMENT

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INTRODUCTION

This Supplement has been prepared to update, amend and augment your study material following recent changes in legislation. You should read this Supplement carefully, in conjunction with your existing study material.

ALL MODULES

Replacement of IPC by IPPC

Your course material has frequently drawn your attention to the forthcoming final replacement of IPC by the IPPC regime. You should note that this will take place on **30th October 2007**, by which date all businesses will have been transferred to the new regime.

We summarised the similarities between PPC and IPC and the main differences between them in the following units:

- Unit B1, section entitled **The Environmental Protection Pollution Prevention and Control Regulations 2000**.
- Unit C2, section entitled **The Pollution Prevention and Control Regulations 2000**.

You may also find it helpful to refer to the following link:

http://www.netregs.gov.uk/netregs/275207/276364/1465903/?version=1&lang=_e

MODULE A

Unit A1: Principles of Environmental Risk Management

Defining the Environment

In **ISO 14001:2004**, one of the best-known and most commonly-used environmental management system standards, environment is defined as:

"surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation. NOTE Surroundings in this context extend from within an organisation to the global system."

As well as the general definitions, it is worthwhile getting the general feel for environmental statistics; see www.defra.gov.uk/environment/statistics/index.htm for more information.

Environmental Aspects and Impacts

ISO 14001 defines an environmental aspect as:

"element of an organisation's activities or products or services that can interact with the environment."

And an environmental impact as:

"Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects."

Global, Regional and Local Pollution Effects

Effect of Human Activities

Official figures for UK greenhouse gas emissions, which include the final figures for 2005, can be found on the DEFRA website at:

<http://www.defra.gov.uk/news/2007/070131b.htm>.

Wastes from Consumer Products

Recent legislation (the **Waste Electrical and Electronic Equipment Regulations 2006**) places obligations on producers, distributors, etc. of electronic equipment to ensure that equipment is designed to minimise environmental harm, and that waste equipment is collected for reuse, recovery or recycling. The aim is to minimise the amount of waste going to landfill.

Data and Information to Aid the Evaluation of Environmental Risk

www.greenfacts.org is an excellent site for general environmental information. It provides a glossary of key terms, and more detailed digests on environmental matters of current concern.

Revision Question 10

It is important to know where you can source environmental data. How could you obtain copies of this?

Control Strategies for Environmental Risks

Government Strategies

WEEE, RoHS (the **Restriction of Hazardous Substances Directive**) and **EuroBAT** are all examples of 'Extended Producer Responsibility' legislation, the underlying principle being to require producers to take financial and general responsibility for the environmental impact of products they place on the market, particularly when these products become waste.

Technical Factors

Sensitive Sites

Relevant websites are: www.naturalengland.org.uk, www.jncc.gov.uk, www.ramsar.org and www.ukbap.org.uk.

Suggested Answers to Revision Questions

Question 1

Environment means all our surroundings and includes land, air and water.

ISO 14001 identifies the environment as "surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation... Surroundings in this context extend from within an organisation to the global system."

Question 3

Aspect is defined in ISO 14001 as "element of an organisation's activities or products or services that can interact with the environment".

Impact is defined in ISO 14001 as "any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects".

Question 10

Environmental data can be accessed via the UK Department for Environment, Food and Rural Affairs (DEFRA). Legislation can be accessed via OPSI. Meteorological information relevant to air quality monitoring can be obtained from the Meteorological Office. Air quality data can also be obtained from many local authorities.

UNIT A2: ENVIRONMENTAL RISK EVALUATION

Environmental Monitoring

There are some specific pieces of legislation, which require monitoring on a prescribed basis, e.g. the **Control of Lead at Work Regulations 2002**, the **Control of Asbestos Regulations 2006**, the **Ionising Radiations Regulations 1999**, and the **Control of Substances Hazardous to Health Regulations 2002 as amended 2003**, all incorporate monitoring and/or health surveillance.

Environmental Modelling

References

Jackson, L.J., Trebitz, A.S., Cottingham, K.L. (2000). "An Introduction to the Practice of Ecological Modelling", *BioScience* 50: (8) 694-706.

http://www.fish.washington.edu/people/naiman/contemporary/papers/jackson_2000_bioscience.pdf.

Zhang, X., Drake, N.A., and Wainwright, J. 2003. "Scaling Issues in Environmental Modelling", in Wainwright, J. and Mulligan, M. (eds.), *Environmental Modelling: Finding Simplicity in Complexity*, John Wiley and Sons, Chichester.

Singleton, P., *Water Modelling*. Scottish Environment Protection Agency (SEPA) document ref. DLM/ COPA/ MOD2. January 2002.

Air modelling example from the Hadley Centre for Climate Prediction and Research, UK Meteorological Office www.metoffice.gov.uk.

Life Cycle Analysis

The following International Standards apply to LCA:

- ISO 14040:2006 *Environmental Management - Life Cycle Assessment – Principles and Framework*
- ISO 14044:2006 *Environmental Management - Life Cycle Assessment – Requirements and Guidelines*
- ISO 14031:1999 *Environmental Management - Environmental Performance Evaluation - Guidelines*

Principles of Environmental Toxicity and Ecotoxicity Testing

Risks from Chemical Substances

Evaluation of the risks from all chemicals is now largely covered by the **European Regulation (EC 1907/2006) on Registration, Evaluation, Authorisation and Restriction of Chemicals** (abbreviated to **REACH**). **REACH** also deals with other things such as the requirement to provide safety data sheets, previously covered by other legislation.

For a general introduction to **REACH**, download the free reference guide and light-hearted podcast from the resource centre on the RRC website.

Because it is a very far-reaching piece of legislation, **REACH** is being phased in over a long transition period. In particular, **REACH** does not yet deal with so-called "new substances". New substances are defined as those that are not already listed in the European Inventory of Existing Commercial Chemical Substances (EINECS). On 1st June 2008, these will be brought within the scope of **REACH**; until then such substances are covered, in the UK at least, by the **Notification of New Substances Regulations 1993 (as amended)**, abbreviated to "**NONS**". **NONS** is the UK implementation of part of the **EU Dangerous Substances Directive (67/548/EEC)**. **NONS** requires that new substances undergo a range of physico-chemical, toxicological and ecotoxicological tests before they can be placed on the market.

Requirements for New Substances (under NONS)

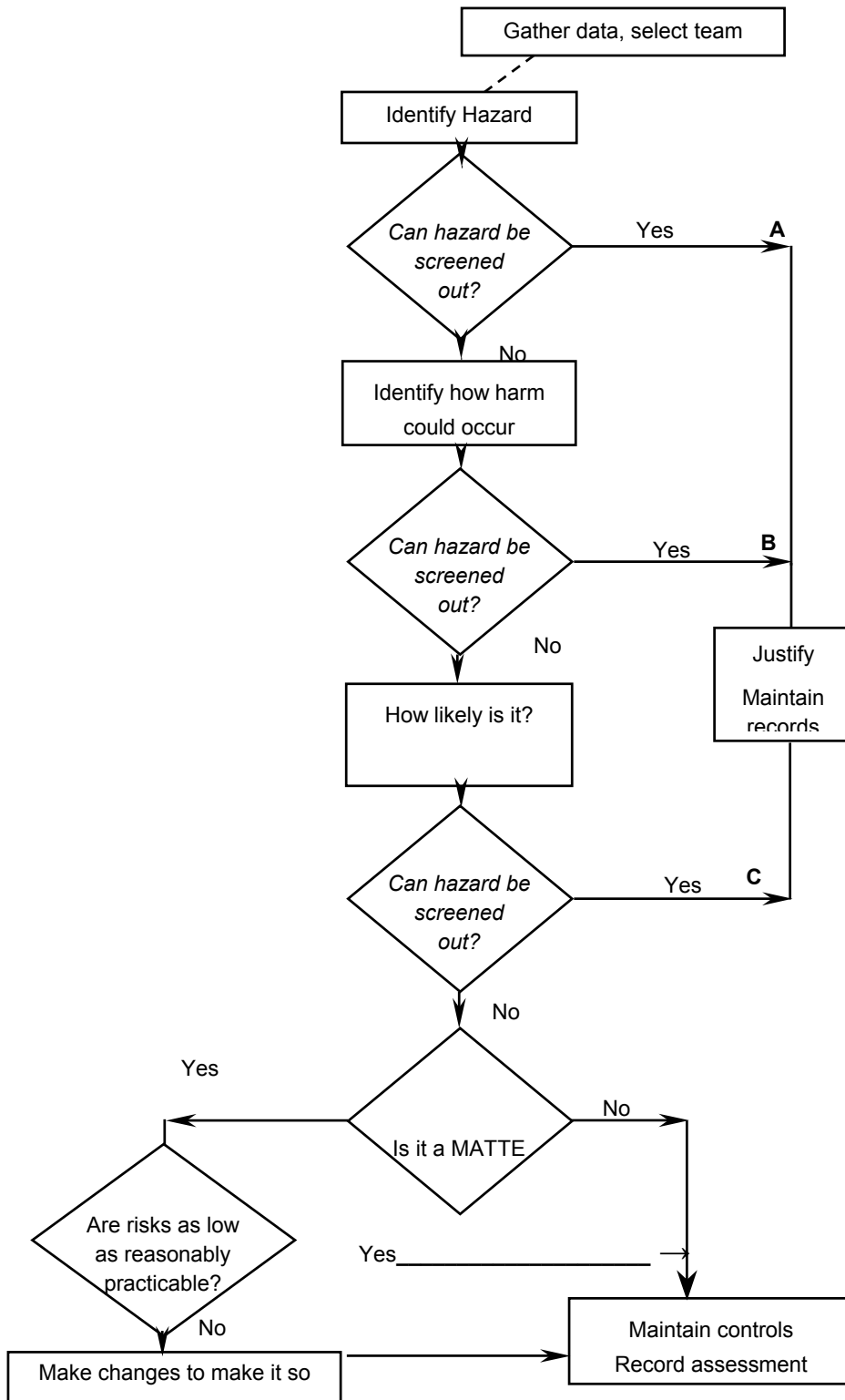
The substance is categorised into the following:

- A substance of no immediate concern.
- A substance of concern, but no immediate need for further information.
- A substance of concern where further information is needed immediately.
- A substance of concern where an immediate recommendation for risk reduction is required.

The risk management procedure includes the consideration of the physico-chemical and toxic effects on human health and effects on the wider environment. For human health, the assessment is based on the identification of the **No Observed Adverse Effect Level (NOAEL)** or the **Lowest Observed Adverse Effect Level (LOAEL)**. The predicted concentration is compared with the possible levels of exposure to the substance.

Control of Major Accident Hazards Regulations 1999

MATTEs



ERA Aspects of COMAH Safety Reports

Control of Substances Hazardous to Health Regulations 2002

Under the Regulations, **substances** are defined as:

- Substances or preparations (i.e. mixtures of substances) classified under the **Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP)**. **CHIP**, amongst other things, requires suppliers to communicate chemical hazards to users through the use of appropriate warning labels.
- Substances that have defined exposure limits; see the HSE publication: *Occupational Exposure Limits* (EH40).
- Biological agents (as in the sewage industry, or healthcare), if they are directly connected to work.
- Dust, where the levels exceed the specified levels in **COSHH**.
- Any other substance which comprises a health risk.

Suggested Answers to Revision Questions

Question 2

A voluntary environmental impact assessment may be submitted by a company where it is part of the company's policy to do so, or to add to the Planning Authority's understanding of a project.

Question 7

An LCA may comprise a constituent component in an environmental management system. Its use is explained in three ISO Standards: 14040, 14044 and 14031.

UNIT A3: CONTROL STRATEGIES FOR ENVIRONMENTAL RISK

Risk Control

Fiscal Strategies

A further example of fiscal strategies in action is the Producer Responsibility legislation, such as on packaging material and waste electrical and electronic equipment (see later in this Supplement).

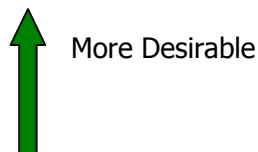
Effects of Government Policy on Control Strategies

It is Government policy to encourage waste reduction and recycling. There is a hierarchy of controls; reduce, reuse, recover and dispose introduced as part of a **waste strategy** under Section 92 of the **Environment Act 1995**. For this reason, **Recycling and Recovery** targets were imposed under the **Producer Responsibility Obligations (Packaging Waste) Regulations 1997, amended 2005**. Similar targets were imposed under the **Waste Electrical and Electronic Equipment Regulations 2006**. This means that companies are required by law to recycle to a certain degree, and produce documentary evidence that they have done so.

Waste Hierarchy

The **Waste Hierarchy** is used as a waste management risk reduction strategy; the **Environment Act 1995** uses the following:

- Reduce.
- Reuse.
- Recover/Recycle Option.
- Responsibly Dispose.



Monitoring, Measurement and Review

Other Standards in the ISO 14000 Series

ISO 14001 is only one of several standards dealing with environmental management. However, it is the only one to which an organisation can be certified.

The standards include:

Standard	Application
ISO 14001 <i>Environmental Management Systems – Requirements with guidance for use</i>	Requirements for an EMS to which organisations can gain third party certification.
ISO 14004 <i>Environmental Management Systems – General guidelines on principles, systems and support techniques</i>	Additional guidance to organisations on design, development and maintenance of an EMS.
ISO 14015 <i>Environmental Management - Environmental Assessment of Sites and Organisations</i>	Provides guidance on how to estimate business consequences of the environmental condition and risks on a site.

EU Eco-Management and Audit Scheme (EMAS)

Other ISO 14000 Standards

There are other standards that cover a variety of environmental issues, which are listed within the range of the 14000 series.

Although not from the same series, the Standard ISO 19011:2002 is a guideline for quality and/or environmental management system auditing.

Standard	Status
ISO 14020 <i>Environmental Labels and Declarations – General Principles</i>	Published 2000
ISO 14021 <i>Environmental Labels and Declarations – Self-Declared Environmental Claims – Type II Environmental Labelling</i>	Published 1999
ISO 14024 <i>Environmental Labels and Declarations – Type I Environmental Labelling – Principles and Procedures</i>	Published 1999

ISO 14031 <i>Environmental Management - Environmental Performance Evaluation - Guidelines</i>	Published 1999
ISO 14040 <i>Environmental Management - Life Cycle Assessment – Principles and Framework</i>	Published 2006
ISO 14044 <i>Environmental Management – Life Cycle Assessment – Requirements and Guidelines</i>	Published 2006
ISO/TR 14047 <i>Environmental Management - Life Cycle Impact Assessment – Examples of Application</i>	Published 2003
ISO 14049 <i>Environmental Management - Life Cycle Assessment – Examples</i>	Published 2000
ISO 14050 <i>Environmental Management – Vocabulary</i>	Published 2002
ISO 14063 <i>Environmental Management - Environmental Communication – Guidelines and Examples</i>	Published 2006

Emergency Planning

Disposal of Fire Water

Fire water is discussed in Pollution Prevention Guideline 18, *Control of Spillages and Fire-Fighting Run-Off*.

UNIT A4: MONITORING, REVIEW AND AUDIT

Environmental Audit

Types of Audit

There are **three** basic types of audit:

- **First Party Audit**

The company carries out the audit on itself; e.g. the Internal Audit for ISO 14001, Clause 4.5.5.

- **Second Party Audit**

The company carries out an audit on a second party; e.g. Supplier Audit for ISO 9001.

- **Third Party Audit**

The company is audited by an external third party; e.g. External Certification Audit for ISO 14001, or an Environmental Due Diligence Audit carried out as part of an acquisition.

Single-Issue Audits

The Environmental Technology Best-Practice Programme (ETBPP) is now known as Envirowise. The website address is <http://www.envirowise.gov.uk>.

MODULE B

UNIT B1: ENVIRONMENTAL LEGISLATIVE FRAMEWORK AND METHODS OF ENFORCEMENT

Enforcement Bodies

District Council and Environmental Health Department

They are also responsible for administering Part B processes.

Nature Conservancy Councils

Since the beginning of October 2006, English Nature, the environment activities of the Rural Development Service and the Countryside Agency's Landscape, Access and Recreation division have been united in a single body called **Natural England**.

"Natural England will be a new and exciting organisation with the responsibility to conserve and enhance the value and beauty of England's natural environment and promote access, recreation and public well-being for the benefit of today's and future generations." (Source: Natural England website.)

UNIT B3: DEVELOPMENTS IN ENVIRONMENTAL LEGISLATION

Land Pollution – Industrial Developments

Recent Developments

Recent legislation (**RoHS** – see later in this Supplement) has limited the quantities of hazardous substances allowed to be used in electronic equipment, with an ultimate aim of protecting the environment.

Influence of the European Union on UK Law

There are now 27 members of the European Community, Bulgaria and Romania having joined in 2007. There are now approximately 494 million inhabitants in the European Community.

Community Institutions

European Court of Justice

The European Court of Justice now comprises 27 judges.

Future Developments

Implementation in the UK of **EU Directive 2004/35/EC** on Environmental Liability has been delayed. Two public consultations on options for implementing the Directive were proposed and the first of these has taken place. The second is expected to commence in Autumn 2007.

APPENDIX

Examples of the Principal EC Directives and Decisions relating to the Environment

Waste

2002/96/EC Waste Electrical and Electronic Equipment (WEEE)

UNIT C1: SOLID AND LIQUID WASTES

Producer Responsibility

Directive 2002/96/EC of 27th January 2003 on Waste Electrical and Electronic Equipment (WEEE)

The above directive has been implemented in the UK through the **Waste Electrical and Electronic Equipment Regulations 2006 (S.I. 2006 No. 3289)**. The Regulations have a phased implementation from 2nd January 2007. They are an example of 'Extended Producer Responsibility' which is implemented by a number of European Directives, the underlying principle being to require producers to take financial responsibility for the environmental impact of products they place on the market, particularly when these products become waste. The objectives of the **WEEE Directive** are ideally the prevention of WEEE, and in addition the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. (Reuse of WEEE as whole appliances is favoured over treatment, recycling and recovery.) The directive also seeks to improve the environmental performance of all operators involved in the life cycle of EEE. Ultimately the aim is to minimise the quantity of such items ending up in landfill. The target is for member states to collect 4 kg per person per year, on average.

There are ten categories of WEEE, defined in Schedule 1 of the Regulations:

1. Large household appliances.
2. Small household appliances.
3. IT and telecommunications equipment.
4. Consumer equipment.
5. Lighting equipment.
6. Electrical and electronic tools.
7. Toys, leisure and sports equipment.
8. Medical devices.
9. Monitoring and control equipment.
10. Automatic dispensers.

The **WEEE Regulations** apply to electrical and electronic equipment in the above categories with a voltage of up to 1,000 volts AC or up to 1,500 volts DC.

Schedule 2 of the **WEEE Regulations** provides a list of products falling within these categories. For example, Category 2 (small household appliances) includes items such as:

- Vacuum cleaners.
- Carpet sweepers.
- Irons.
- Toasters.
- Fryers.
- Electric knives.
- Clocks, watches.
- Scales.

Producers

The main element of WEEE is that all **producers** who put electrical and electronic equipment (EEE) on the market in the UK in a compliance period will be responsible for financing the costs of collection, treatment, recovery and environmentally sound disposal of WEEE from private households that is deposited at Designated Collection Facilities, and also WEEE that arises from users other than private households. This obligation will be met through the producer joining an approved Producer Compliance Scheme (PCS), which gets the producer registered, and paying the appropriate annual fee. Each year the producer must provide a declaration of compliance, together with supporting evidence, to the appropriate authority. The appropriate authority is the EA in England and Wales, SEPA in Scotland and the Environment and Heritage Service in Northern Ireland.

The producer must mark all EEE that he puts on the market after August 2005 with a crossed-out wheelie bin symbol, a producer identification mark, and a date mark. He must also provide information on reuse and environmentally sound treatment for each new type of EEE he puts on the market; this information is of particular value to waste treatment facilities. In particular, information on how to safely locate and remove the substances and components listed in Annex II to the **WEEE Directive** should be provided. Producers who design, manufacture or commission EEE are encouraged to improve their designs to facilitate dismantling and recovery, and in particular the reuse and recycling of WEEE and its components and materials.

The producer must keep records showing the amount of EEE he has put on the market during any compliance period in each of the categories in Schedule 1, broken down by that for use by private households, and for users other than private households. This information is supplied to the PCS, and it is on the basis of this information that his annual charge is calculated. Records must be kept for four years. Producers of household WEEE will be notified, via their PCS, of their financial obligations at the end of each compliance period. The financial obligations will be calculated according to the level of sales each producer makes during a compliance period (i.e. how much product is placed on the market) and the levels of household WEEE arising at Designated Collection Facilities or returned to producers via in-store, take-back facilities offered by distributors.

Distributors

There are also obligations on **distributors** of WEEE, i.e. retailers or wholesalers of new EEE. Their main obligation is to provide a take-back service to householders, enabling them to return

their WEEE free of charge. This obligation must be discharged either through in-store take-back, or participation in the National Distributor Take-Back Scheme, or an alternative free take-back system. Equipment must be accepted on a like for like basis, i.e. old for new, and distributors are expected to take a common sense view of what constitutes like for like.

Distributors must make a range of information available to users of EEE in private households:

- The requirements on the UK (and all EU member states) to minimise disposal of WEEE as unsorted municipal waste, and to achieve a high level of collection of WEEE for treatment, recovery and environmentally sound disposal.
- The collection and take-back systems available to them.
- Their role in contributing to the reuse, recycling and other forms of recovery of WEEE.
- The potential effects on the environment and human health as a result of the presence of harmful substances in WEEE
- The meaning of the crossed-out wheelee bin symbol.

Consumers

The **WEEE Regulations** do not place obligations on **consumers** who use EEE and discard EEE as waste, but they encourage consumers to play their part in the separate collection of WEEE when it is discarded as waste. The key objective is that WEEE puts in place the means for household consumers to discard their EEE separately from other streams of household waste. Consumers will have the ability to deposit WEEE in specific areas at civic amenity sites across the UK. Retailers must provide information about the options and collection facilities available, and where they offer in-store take-back, they must accept old equipment on a like for like basis when new equivalent equipment is purchased. However, the **WEEE Regulations** do not provide entitlement to free collection of WEEE from a consumer's home.

Collection and Treatment

Local authorities are encouraged to register their civic amenity sites as 'Designated Collection Facilities' (DCFs). WEEE will be collected free from DCFs.

Users of non-household EEE may have an obligation to finance the treatment of such equipment when it is discarded as waste.

Approved Authorised Treatment Facilities (AATFs) and Approved Exporters will be established to deal with separately collected household and non-household WEEE and WEEE collected on behalf of PCSs. They will provide evidence that the WEEE has been treated to the requirements of the Regulations. AATFs will generally have a waste management licence or PPC permit. A **Reprocessor** is a facility that carries out recovery and recycling, and holds a waste management licence or registered exemption. Reprocessors will work with AATFs and PCSs to ensure that treated WEEE is subsequently recycled and/or recovered to the target levels set out in the **WEEE Regulations**.

As well as record-keeping, the **operator of a PCS** has a responsibility for ensuring that targets for recovery of equipment, and reuse and recycling of components, are met for each of the categories of equipment in Schedule 1.

The first compliance period runs from 1st July 2007 to 31st December 2007. Each subsequent compliance period will run from 1st January to 31st December each year. Producers must join a

suitable scheme before its commencement, and settlement and declaration of compliance takes place following the end of each compliance period.

Recovery targets are set out in the **WEEE Directive** and these are implemented through the **WEEE Regulations**. For example, for WEEE in Category 1 (large household appliances), the target is at least 80% recovery by average weight per appliance; and component, material and substance reuse and recycling of at least 75% by average weight per appliance. This means that producers will have to obtain evidence of recovery of at least 80% by weight of Category 1 equipment entering an AATF, 75% of which must be achieved through reuse and recycling. The remaining 5% can be achieved through energy recovery, recycling or reuse. For example, if 100 tonnes of WEEE from Category 1 is delivered to an AATF, 75 tonnes of material derived from Category 1 WEEE would need to be reused or delivered to reprocessors for recycling, and a further 5 tonnes would need to be delivered to reprocessors for recovery or recycling to achieve the 80% (80 tonnes) target.

Directive 2002/95/EC of 27th January 2003 on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

The above directive has been implemented in the UK through the **Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2005 (S.I. 2005 No. 2748)**. The objective of the directive is to contribute to the protection of human health, and the environmentally sound recovery and disposal of waste electrical and electronic equipment. The **RoHS Regulations** came into force on 1st July 2006.

The Regulations apply to equipment in the following categories, which are the same as eight of the ten categories in the **WEEE Regulations**:

- Large household appliances.
- Small household appliances.
- IT and telecommunications equipment.
- Consumer equipment.
- Lighting equipment.
- Electrical and electronic tools.
- Toys, leisure and sports equipment.
- Automatic dispensers.

New EEE put on the market after 1st July 2006 must not contain more than the permissible maximum concentration values of hazardous substances as defined in Regulation 2. These are:

- 0.1% by weight in homogeneous materials for **lead**.
- 0.1% by weight in homogeneous materials for **hexavalent chromium**.
- 0.1% by weight in homogeneous materials for **mercury**.
- 0.1% by weight in homogeneous materials for **polybrominated biphenyls**.
- 0.1% by weight in homogeneous materials for **polybrominated diphenyl ethers**.
- 0.01% by weight in homogeneous materials for **cadmium**.

The producer is required to prepare technical documentation showing that EEE which he has put on the market complies with the **RoHS Regulations**.

There are a number of specific applications set out in Schedule 2 of the Regulations, which are exempt from the requirements. For example:

- Mercury in compact fluorescent lamps not exceeding 5mg per lamp.
- Lead in the glass of cathode ray tubes, electronic components and fluorescent tubes.

Useful guidance on WEEE and RoHS is as follows, although for specific detail in a work context the Regulations themselves should be consulted:

- Department for Business, Enterprise and Regulatory Reform, *WEEE Regulations – Government Guidance Notes*, August 2007 (URN 07/1303).
- Department for Business, Enterprise and Regulatory Reform, *RoHS Regulations – Government Guidance Notes*, July 2007 (URN 07/1234).

Summary

WEEE, RoHS and EuroBAT are examples of 'Extended Producer Responsibility' legislation, where the onus is placed on producers to take action to minimise the environmental effects of products they place on the market, particularly when these products are sent for waste.

Waste Minimisation

Producer Responsibility has now been extended to cover other items, such as Electrical and Electronic Equipment (EEE and RoHS), and batteries (EuroBAT).

UNIT C2: GASEOUS AND PARTICULATE RELEASES TO ATMOSPHERE

Air Quality Standards and Prescribed Substances

Air Quality Limit Values Regulations 2003

The Regulations are to be found at [www.opsi.gov.uk/legislation/UK Statutory Instruments/2003:2121](http://www.opsi.gov.uk/legislation/UK%20Statutory%20Instruments/2003:2121), for full details of the limit values required.

Control Strategies and Measures

Climate Change Levy

This came into effect on 1st April 2001 and applies to energy used in the non-domestic sector (industry, commerce and the public sector). The aim of the levy is to encourage these sectors to improve energy efficiency and reduce emissions of greenhouse gases.

Introduction

The Climate Change Levy is a tax on the use of energy in industry, commerce and the public sector, with offsetting cuts in employers' National Insurance Contributions (NICs) and additional support for energy-efficiency schemes and renewable sources of energy. The levy forms a key part of the Government's overall **Climate Change Programme**.

The basic design of the levy follows the recommendations made in Lord Marshall's report, *Economic Instruments and the Business Use of Energy*, published in October 1998.

The levy is designed to play a major role in helping the UK meet its targets for reducing greenhouse gas emissions. It entails no increase in the tax burden on industry as a whole and no

net gain for the public finances. The intention is to promote energy efficiency, encourage employment opportunities and stimulate investment in new technologies.

Renewable Energy Sources

The UK Government has compiled a list of 12 sources of renewable energy eligible for exemption under the Climate Change Levy. These are:

- Wind energy.
- Small-scale hydro power.
- Tidal power.
- Wave energy.
- Photovoltaics (PV).
- Photoconversion.
- Geothermal hot rocks.
- Geothermal aquifers.
- Municipal and industrial wastes.
- Landfill gas.
- Agriculture and forestry waste.
- Energy crops.

By strict definition, renewable energy is obtained from continuous repetitive currents of energy in the natural environment, used at the rate they are replenished. Some of the 12 sources are not naturally renewable. All renewable energy technologies have implications - ecological, social and economic - that vary with geographical location and scale.

Peak generation from renewable sources such as wind, wave and tidal power may only occur under ideal conditions, and supply may also be intermittent. Fuel cells, which are already a more efficient means of generating electricity from natural gas than conventional combustion techniques, offer a flexible two-way generation and storage mechanism. They may be important in a renewables-based energy economy.

The energy-intensive sectors have agreed consumption reduction targets to be met up to 2010, and if successful will gain a discount from the Climate Change Levy. Companies outside these agreements can gain significant reductions in their energy bill (and Climate Change Levy) by 'cost-effective', energy-efficiency measures. Government reviews, e.g. the Marshall Report into the use of economic instruments, and numerous NGO assessments have shown that measures to reduce CO₂ emissions and defeat climate change must include both the supply and demand sides of energy in industry.

Tax Measures

Renewable energy sources are surprisingly cost-effective. It can be argued that landfill gas and energy from waste are already directly competitive with conventional generation. Wind power, on the right site, has been shown to be viable with electricity selling for less than 2.5p/kWh. The Climate Change Levy assists this competitiveness and ensures that energy from unsustainable sources is penalised. The Government target of achieving 10% of UK electricity from renewables by 2010 is, however, challenging.

The UK has a legally binding target to reduce greenhouse gas emissions by 12.5% by 2010. In addition, the Government is committed to cutting CO₂ emissions by 20% in the same period. The centrepiece of the green measures in the 1999 Budget was the announcement of the Climate Change Levy on business to meet these targets. The Treasury estimated that the levy would raise £1.75 billion. It was considered that this level of tax would be enough to push energy efficiency back up the agenda of many companies.

UNIT C5: HAZARDOUS SUBSTANCES

Legislation Applying to Supply, Storage, Use and Transport of Hazardous Substances

Regulations Relating to the Packaging and Supply of Chemicals

There are two main reasons for the hazardous classification of chemicals – the supply and use of the chemicals and their transport. Both of these aspects are regulated. There are two EU Directives relating to the classification of chemicals: the **Dangerous Substances Directive (67/548/ EEC)** and the **Dangerous Preparations Directive (88/379/EEC)**. The UK regulations which implement the relevant parts of these two Directives are the **Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3)**.

The purpose of **CHIP3** is to protect the environment and human health from the effects of chemicals. It does this by requirements to ensure that chemicals are packaged safely (**supply requirements**); suppliers are required to identify the hazards associated with the chemicals (a process known as classification) and provide information on them to the people to whom they are supplied, chiefly through hazard warning labels.

Material Safety Data Sheets

In addition to the above requirements under **CHIP3**, dangerous substances and preparations supplied to users must be accompanied by a **Material Safety Data Sheet**. This requirement is now held within the **EU Regulation (EC 1907/2006) on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)**, but was previously contained within **CHIP3**.

Road Transport of Hazardous Goods

The main legislation we are concerned with is the **Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2007**.

These regulations are very complicated. In essence they reference the detailed requirements of international agreements on transport by road and rail (ADR and RID, respectively). However, they also allow some national derogations (such as "HAZCHEM" plates) where transport is wholly within Great Britain. It is important that environmental managers have an understanding of these regulations as they may be involved in the consigning of hazardous waste and may also have to deal with chemical deliveries. However, the regulations have a greater emphasis on health and safety.

Principal Requirements of the Regulations

Carrying goods by any mode of transport involves the risk of accidents; if the goods are dangerous, then the results of any accident such as the spillage of the chemical, or the effects of

the chemical such as fire, explosion or burns from chemicals such as acids, or environmental damage are also likely to be serious, particularly when large quantities are involved.

The regulations require many things. Though there are exemptions (e.g. for small load sizes) and derogations depending on the particular circumstances, the main general requirements are identified below (some of which we will look at in more detail later):

- Training of all personnel involved in the carriage of dangerous goods (some must have special vocational training, e.g. drivers and dangerous goods safety advisors).
- Obligation on all those involved to comply with general and special safety measures.
- Appointment of dangerous goods safety advisors (who, amongst other things, provide specialist advice on the transport of dangerous goods).
- Reporting of carriage-related accidents/incidents.
- Adoption of general security provisions, i.e. measures/precautions to minimise theft/misuse of dangerous goods.
- Classification of dangerous goods intended for transport. This is the process of deciding the category of danger in which goods should be placed (by reference to standard test methods and test criteria). Once classified, the goods must be allocated an appropriate UN number and name/description from the "dangerous goods list".
- Goods must be packaged in certified types of packaging (these have rigorous construction and testing requirements so that they are robust enough to minimise leakage during transport). Some goods are also permitted in large quantities such as in tanks or in bulk.
- Packages must be marked and labelled. Vehicles, tanks, etc. must also be placarded, marked and labelled accordingly.
- Requirement for vehicles to carry documents, fire-fighting equipment, etc.
- Rules for vehicle crew to follow, e.g. no smoking, no opening of packages, vehicle supervision, etc.

Classification of Dangerous Goods

For transport purposes, "dangerous goods" are substances or articles which can be classified into the following groups (all of which have certain test criteria for classification purposes):

1. Explosive substances and articles.
2. Gases.
3. Flammable liquids.
 - 4.1 Flammable solids, self-reactive substances and solid desensitised explosives.
 - 4.2 Substances liable to spontaneous combustion.
 - 4.3 Substances which, in contact with water, emit flammable gases.
- 5.1 Oxidising substances.
- 5.2 Organic peroxides.
- 6.1 Toxic substances.
- 6.2 Infectious substances.
7. Radioactive material.

8. Corrosive substances.
9. Miscellaneous dangerous substances and articles.

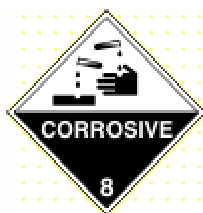
The number to the left of each description is termed the "UN Class" (UN here being the abbreviation for the United Nations).

Dangerous Goods List

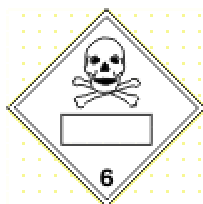
The "dangerous goods list" (referred to above) is a table within ADR containing a whole host of information. Once you have selected the appropriate UN number in the list, the various columns reference other places in the main text which tell you additional things such as packing group (a broad indicator of danger level), appropriate labelling, allowable packaging, whether transportation in tanks is allowed and whether any special provisions must be observed.

Labels

Some examples of dangerous goods labelling are shown below:



Danger Sign (Corrosive)



Danger Sign (Toxic)

Transport Documentation

The transport document must accompany the consignment. In general, the transport document must contain the following information (most of which can be obtained directly from the appropriate entries in the dangerous goods list):

- Proper shipping name (for waste this is preceded by the key word "WASTE").
- Label information (i.e. the numbers of the UN class labels required).
- UN number.
- Packing group.
- Number and description of the packages (if applicable).
- Total mass or volume of each item of dangerous goods (i.e. each distinct UN number).
- Names and addresses of consignor and consignee.
- Any other information to enable the goods to be safely carried.

This information must be passed to the driver of a road vehicle.

In addition to the transport document, the driver must be given "instructions in writing". This is commonly called a TREMCARD. It is designed to communicate to the driver what action to take in an emergency.

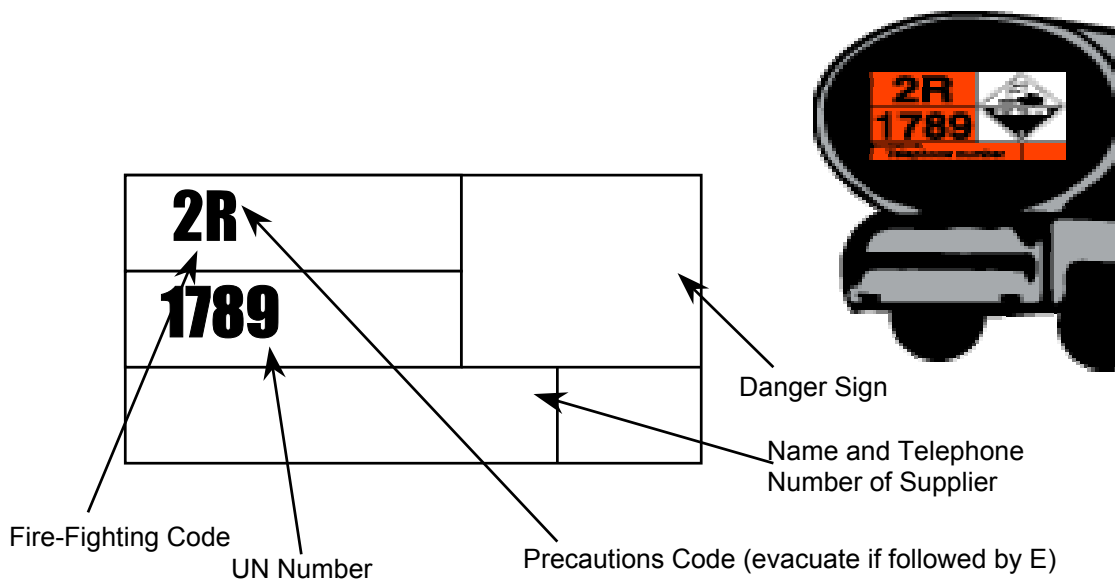
Marking and Placarding of Vehicles

Any vehicle carrying dangerous goods must display a reflective orange panel at the front of the vehicle and also at the rear as a minimum. Some types of vehicle (such as tank vehicles) require additional orange panels, incorporating the emergency action code (which gives fire-fighting and precautions advice in Great Britain).

In some cases (such as tank vehicles), placards (larger versions of the labels shown earlier) must also be displayed and also an emergency telephone number.

Alternatively, when required, all the information can be displayed as a combined hazard warning panel showing the following:

- UN number.
- Emergency action code (which gives fire-fighting and precautions advice).
- Placard (i.e. danger sign and any subsidiary hazard sign (if necessary)).
- Telephone number where specialist advice about the goods can be obtained.



Hazard Warning Label

UNIT C6: DEVELOPMENT AND LAND USE

European Sites

National Parks

Responsibility for designating National Parks lies with Natural England.

Areas of Outstanding Natural Beauty

Natural England and the Countryside Council for Wales (CCW) are responsible for designating AONBs and advising Government on policies for their protection.

Details of each AONB can be found on the websites of Natural England and the CCW.