

The Management of Environmental Risks in the Workplace

Unit NEC1 Management and control of environmental hazards

Sample pages from

- E3 Environmental impact assessments
- E4 Control of emissions to air
- E6 Control of waste and land use
- E9 Planning for and dealing with environmental emergencies

Positive and negative effects on the ecosystem

ECOSYSTEM

An ecosystem consists of a defined area, and in particular it refers to a community of interrelated species.

Eugene Odum, a founder of ecology, stated: "Any unit that includes all of the organisms (i.e: the "community") in a given area interacting with the physical environment so that a flow of energy leads to clearly defined trophic structure, biotic diversity, and material cycles (i.e. exchange of materials between living and nonliving parts) within the system is an ecosystem."

Positive effects

Positive aspects which impact are concerned with the effects humans have on the mechanisms and processes that underpin ecosystem function. Consideration will have to be given to the effects on the biodiversity balance and to include the effects of one subspecies on another.

For example, the reintroduction of otters into some UK waterways has improved the management of river fauna and trees and improved river quality (restoration of biodiversity). Another important factor in maintaining biodiversity is to preserve seeds of plants close to extinction to enable their use in the future.



Figure 3-12: Coral reef. Source: Richard Ling.

Negative effects

Negative effects can either be acute or chronic. Acute effects include human health effects such as asthma, acid rain damaging water and marine and plant life. In extreme cases acute poisoning can result in rapid death of animals and plants. Chronic effects include the emissions of greenhouse gases causing global warming. Vegetation can also be affected by absorption through leaves or, after deposition on the soil, by their roots. Bioaccumulation of toxins in the plants may then harm animals that feed on the plants.

3.3 - Nature and key sources of environmental information

Internal to the organisation

AUDIT AND INVESTIGATION REPORTS

Audits are concerned with assessing systems and management controls. Whereas inspections are concerned with hazard identification in the workplace, auditing relates to the confirmation of controls and, where they are not sufficient, the putting into place of remedial action. The primary purpose of written information is to communicate. The writer should, therefore, always bear the reader in mind when producing the text. The use of plain English must be encouraged; this is particularly important for safety related material. One useful vehicle for conveying information is the report. One simple structure is as follows:

- Introduction and background.
- Summary.
- Main body of the report.
- Recommendations.
- Conclusions.

Introduction and background

This section includes the title page which should clearly identify the writer and the document. It should contain a brief explanation of the subject described in the document title and the reason for the document. It should consider the aim of the report and inform the reader of the problems it intends to address.

Summary

Most reports benefit from a summary, which seeks to provide the reader with an overview of the strengths and weaknesses of the subject being reported on. It should be sufficient to motivate the reader to read the rest of the report with an idea of what it is going to cover.

Main body of the report

This section deals with details, facts and findings. The style should be kept simple and to the point, avoiding the use of jargon or embellishment. Inaccuracy, inadequate and poor presentation can distract the reader and lessen the impact.

Recommendations

These should flow logically from the main body of the report. Recommendations should consist of a plain statement of action without repeating the arguments of the preceding section. In short, in simple reports the recommendation may follow each of the findings and therefore appear in the main body of the report.

It is not normally considered as a pollutant, although it does have an effect upon stratospheric ozone concentrations and there is concern that use of nitrogenous fertilisers may be increasing atmospheric levels of nitrous oxide. The main concerns are nitric oxide NO and nitrogen dioxide, NO₂, which together is called NO_x. The major source of NO_x is in high temperature combustion processes, where atmospheric nitrogen is 'fixed' with oxygen. Airborne oxides of nitrogen will produce acids which will contribute to the phenomenon known as "acid rain", like sulphur dioxide.

The Air Quality Standards Regulations (AQSR) 2010 place a duty on Local Authorities to maintain levels of sulphur dioxide and nitrogen dioxide below set air quality limit values. The air quality objectives and policy options for improving air quality are set out in the UK Air Quality Strategy. The first strategy was adopted in 1997, with the most recent version published in 2007.



Figure 4-6: Lightning over Pentagon City, Virginia USA. Source: Posdiff.

HALOGENS AND THEIR COMPOUNDS

Chlorofluro carbons (CFC's) are a family of inert, relatively non toxic gases. They have been mainly used in the developed countries as propellants in aerosol cans, as refrigerant gases, solvent cleaners and for blowing foam plastics much used in the packaging associated with "fast food" retailing.

When discovered by Thomas Midgley Jr. in 1930 CFC's were hailed as a wonder chemical, non flammable, non toxic, non corrosive, stable and with thermodynamic properties.

CFC's comprise methyl chloroform and carbon tetrachloride. Prior to industrialisation, the natural atmospheric level of CFC's was 2 ppb. By 1988 the figure had risen to 3 ppb and was sufficient to cause destruction of the atmospheric ozone layer above the Antarctic resulting in the penetration to ground level of higher energy ultraviolet radiation, which is particularly damaging to plankton, and animal life forms.

METALS AND THEIR COMPOUNDS

Combustion processes are the most important sources of heavy metals such as lead. Lead poisoning is well-known, but also potentially poisonous are mercury, thallium, arsenic, antimony, bismuth.

Particularly, sources include power generation, smelting, welding, incineration and the internal combustion engine. Other heavy metals include beryllium, chromium nickel and zinc.

VOLATILE ORGANIC COMPOUNDS (VOC)

The major sources of hydrocarbons in air are the evaporation of solvents and fuels, and the partial combustion of fuels may result in a **Photochemical Smog**.

This modern form of air pollution is caused by the reaction of precursors such as oxides of nitrogen (NO_x), volatile organic compounds, and ozone.

Other industrial organic compounds include Acetic Acid, Acetone, Acetaldehyde, Citric Acid, Cyclohexanol, Dimethyl Formamide, Formic Acid, Formaldehyde, Glycol, n-Methyl Pyrrolidone, Methanol, Ethanol, Propanol, Tetrahydrofuran, Toluene Di-isocyanate. The reactions are catalysed by sunlight to form peroxy acetyl nitrates (PANs) which are harmful to plant and animal life.



Figure 4-7: Characteristic coloration for smog in California in the beige cloud bank behind Golden Gate Bridge is due to the NO_x in the photochemical smog. Source: Aaron Logan.



Figure 6-7: Product labels.

Source: Stocksigns.

Packaging waste

In 2007 the UK disposed of an estimated 10.5 million tonnes of packaging waste, of which around 59% (source: National Packaging Waste Database (NPWD)) was recovered and recycled. This is a significant achievement when compared to the fact that only 27% of packaging waste was recovered in 1998 (Source publication: e-Digest of Environmental Statistics, March 2006).

The Producer Responsibility Obligations (Packaging Waste) Regulations (PROR) 2007 (as amended) ("the packaging Regulations") and the Essential Requirements Regulations implement EC Directive 94/62/EC on Packaging and Packaging Waste have together led to decreases in the amount of packaging used around products. The Packaging Regulations originally entered into force in 1997 and have changed the attitude that many manufacturers and distributors previously had regarding the disposal nature of packaging.

The definitions included in these regulations are:

- **'Packaging'** - all products made of any materials of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from the producer to the user or the consumer, including non-returnable items.
- **'Packaging waste'** - any packaging or packaging material covered by the definition of waste in Article 1 of Directive 75/442 EEC which is reproduced in Part I of Schedule 3 of the Regulations.

THE PRODUCER RESPONSIBILITY OBLIGATIONS

The regime is unusual in that it has been developed largely as an industry initiative in response to the EU Directive, whilst following the Government's waste strategy. It is based on the concept of a shared approach for packaging waste, with responsibility for meeting the Directive's targets divided proportionally between the four main sectors in the packaging chain. This apportionment of obligation ('class percentages') is as follows:

- | | | | |
|---|-----|----------------------|-----|
| ■ Packaging raw material manufacturing. | 6% | ■ Packaging/filling. | 36% |
| ■ Converting. | 11% | ■ Selling. | 47% |

The Producer Responsibility Obligations Regulations are intended to encourage the minimisation of packaging and packaging waste, incentivise re-use and increase the recovery and recycling of packaging waste.

The regulations include imported packaging, but exported and re-used packaging is exempt. Each company's obligation is calculated by multiplying its annual packaging tonnage by the relevant stage percentage obligation (above) and by the national targets for that year. Recovery includes burning to recover useful energy; recycling means re-processing back to material fit for the original or some other useful purpose.

The packaging regulations place an obligation on certain businesses who meet both of the following two threshold tests:

- 1) They handle more than 50 tonnes of packaging a year.
- 2) They have a turnover in excess of £2 million per annum.

The amount each business has to recover is determined by three factors:

- The amount of packaging the business handles.
- The business recovery and recycling targets for the year.
- The activity the business carries out on packaging.

The Regulations provide for producers to be exempt for example, registered Charities, if they are members of a scheme, approved by and registered with the Environment Agency; otherwise the producer must be registered with the Environment Agency. The reprocessors issue Packaging Waste Recovery Notes to members of the scheme to certify that the member's packaging obligations have been met.

THE ESSENTIAL REQUIREMENTS

The Department for Business, Enterprise and Regulatory Reform (BERR) manage the Packaging (Essential Requirements) Regulations: these regulations place a duty on producers of packaging to ensure that the packaging used around products is kept to the minimum amount necessary without breaching required levels for safety and hygiene and consumer acceptance.

Source: www.defra.gov.uk.

9.1 - Emergency planning to protect the environment

Emergency plans are required as part of an Environmental Management System such as ISO 14001 and the EU Eco-Management and Audit Scheme (EMAS). There is also a legal requirement under Control of Major Accident Hazards Regulations (COMAH) 1999 and some Integrated Pollution Prevention Controls (IPPC) or Environmental permits. In addition there are sound ethical and practical reasons that deliver business benefits. A good plan should help prevent reputational damage and loss of business. The plan helps meet the need for prompt action to protect people and the environment in the event of an incident and should reduce the risk of water pollution due to fire or other catastrophe if appropriate action is initiated. The rapid application of the plan minimises prosecution and remedial costs.

General duty not to pollute

Many industrial and commercial sites have the potential to cause significant environmental harm which could threaten water supplies, public health and wild life in the event of an environmental incident for example fire, explosion or spillage. These include sites that:

- Store, use or process toxic and/or polluting substances such as chemicals, oils, food or beverages.
- Contain hazardous materials such as asbestos within the fabric of the building.
- Contain or store materials which would give rise to hazardous products in the event of a fire, for example toxic, smoke from burning plastic.

Causes of environmental incidents on sites include:

- Delivery and use of materials.
- Overfilling containment vessels.
- Plant or equipment failure.
- Containment failure.
- Fires, explosions or failure to contain fire fighting water.
- Incompatible materials coming in contact.
- Uncontrolled reactions.
- Discharge of partially-treated or raw effluent.
- Vandalism.
- Flooding of part or the entire site.
- Wrong connections of sewers and pipes.

Any of these incidents could affect:

- Drainage systems, surface waters, aquatic ecosystems, groundwater and soil.
- Air quality by producing toxic fumes and airborne pollutants which may damage human health, wild and domestic animals and ecosystems.
- Thermal radiation which can harm people and the environment.

The impacts may be immediate and long lasting; organisations are often responsible for the costs of cleanup. This can be expensive particularly contaminated groundwater. There may be additional costs too associated with the Environment Agency incident response and/or fines or costs through the criminal and/or civil courts. The company's business reputation may suffer.

Source: Environment Agency PPG21.

Part of Environmental Management System

The need for emergency planning to protect the environment is an essential part of the Environmental Management System to comply with BSEN ISO 14001:2004. A summary of the main clauses of ISO 14001 relevant to this element are given in **figure ref 9-1**.

Subject	Procedural Requirements/elements	Standard Reference
Resources, Roles, Responsibility and Authority	Defined and made available to ensure effective environmental management	4.4.1 Annex A.4.1
Training and Competence	Establish and maintain procedures to ensure all persons performing tasks on behalf of the organisation that may have the potential to cause an environmental aspect are competent Training needs shall be identified and met and records shall be maintained	4.4.2 Annex A.4.2
Documentation	Describe core elements of EMS and provide link to related documents	4.4.4 Annex A.4.4
Document Control	To control, locate and update various documents required by the standard	4.4.5 Annex A.4.5
Emergency Procedures	To identify risk, ability to respond, environmental impacts of emergencies and revision of procedures as necessary	4.4.7 Annex A.4.7

Figure 9-1: The main clauses of ISO 14001.

Source: BSEN ISO 14001:2004.