# NEBOSH Diploma Courses - Sample Material

## NEBOSH National Diploma
## NEBOSH International Diploma

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## Contents

NEBOSH National Diploma Unit A

# Element A6: Organisational Factors



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# Contents

## Learning Outcomes

On completion of this element, you should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular you should be able to:

- Explain the internal and external influences on health and safety in an organisation.
- Outline the organisation as a system, the different types of organisation, their characteristics and relationship to individuals within them.
- Identify the various categories of third parties in a workplace - the relevant legislative requirements, responsibilities and controls.
- Explain the role, influences on and procedures for formal and informal consultation with employees in the workplace.
- Outline the development of a health and safety management information system, the relevant legal requirements, and the data it should contain.
- Explain health and safety culture and climate.
- Outline the factors which can both positively and negatively affect health and safety culture.



### Hints and Tips

If you find part of the course difficult to understand, leave it for a day or two and work on something else, then come back to the section you are having problems with. Contact your tutor for help if you are still unsure about the topic when you come back to it.

# Internal and External Influences

## Key Information

- The key internal influences on health and safety are:
  - Finance.
  - Production targets.
  - Trade unions.
  - Organisational goals and culture.
- The key external influences are:
  - Legislation.
  - Parliament and the HSE.
  - Enforcement agencies.
  - Courts and tribunals.
  - Contracts.
  - Clients and contractors.
  - Trade unions.
  - Insurance companies.
  - Public opinion.

## Internal Influences on Health and Safety Within an Organisation

### Finance

Setting up and running a company requires considerable financial investment. Once established, the company needs to generate more income than it spends on running costs, i.e. cost of premises, plant, wages, insurance, etc. To do this the company will set annual budgets specifying the amount of money available to each department to support its running costs and setting production targets to be achieved. When budgets are being reduced to economise, some health and safety requirements will often be 'short circuited'. The person responsible for health and safety must argue for sufficient funds to support health and safety requirements. Lack of funding will inevitably lead to a reduction in the resources necessary to effectively administer health and safety. Health and safety costs might seem to be minimal and easily absorbed in departmental administration costs. Such an arrangement could lead to financial disaster and costly prosecutions for non-compliance.

### Production Targets

Achieving production goals can put intense pressures on workers leading to stress and an increase in incidents and accidents in the workplace. It is recognised that increased competition, longer hours, increased workloads, new technology and new work patterns are significant occupational stressors. Industrial psychology also requires that in a 'conveyor-type' operation, the speed of the belt should be geared to the capacity of the slowest operator. The pressures on management to achieve production targets/increase production can be translated into action on the shop-floor in a number of ways:

- Make the workforce work longer hours.
- Increase the size of the existing workforce.
- Pay incentive bonuses to increase the daily rate of production.
- Reduce the quality of the goods by using inferior materials.

Apart from increasing the size of the workforce, these measures encourage workers to 'cut corners'. For example:

- Longer hours can lead to tiredness and less attention to safety factors.
- Bonuses for increased production can lead to disregard for any safe systems of work which slow down the speed at which the worker can operate.
- Increased production targets may create anxiety in the slower worker, especially if part of a team, and can lead to short-cuts being taken in an effort to keep up with colleagues.

- Reducing quality may require new systems of work, leading to stress.

All of these can lead to unsafe acts which may have considerable effect on the company's health, safety and accident record.

### Trade Unions

Trade union safety representatives are involved as members of safety committees and as such are actively involved in improving health and safety in the workplace. They have a dual role in that they can be involved in the formulation of policy in certain companies, but they also have a policing role in that they can monitor management's performance. They carry out the following functions:

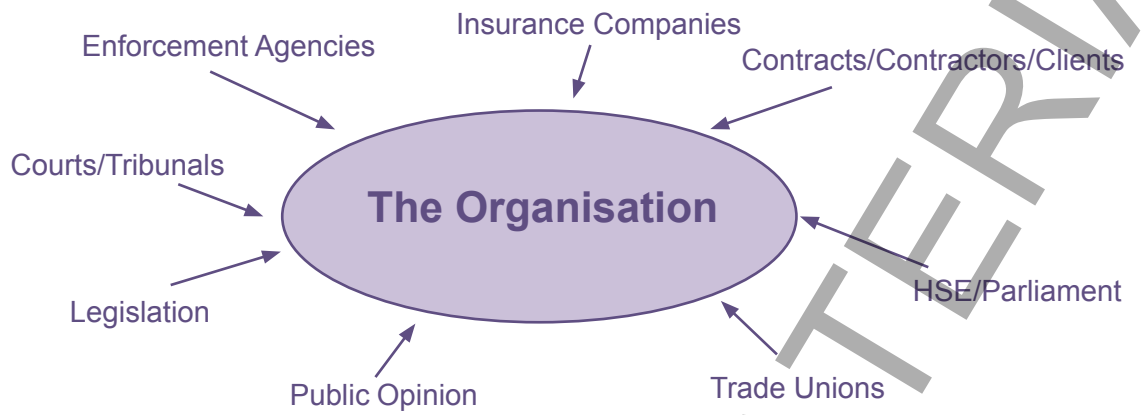
- Investigating potential hazards and dangerous occurrences.
- Examining the cause of accidents.
- Investigating health and safety complaints from employees they represent.
- Making representations to the employer on complaints, hazards and accidents.
- Carrying out inspections of the workplace.
- Consulting with HSE inspectors on behalf of the employees they represent.
- Receiving certain information from the HSE inspector.

Employee representation has been widened to include employees who are not members of a trade union. These employees will be represented by 'elected representatives of safety'. Safety representatives are protected by legislation from victimisation by employers.

### Organisational Goals and Culture

The goals and culture of the organisation strongly characterise the company. Some organisations rate safety highly and treat it seriously, not only in what they claim to do (their safety policy), but also in what actually happens in practice. Safety culture can be simply described as "the way we do things". If you have worked for several different organisations you will probably recognise different cultures in terms of what they accept and tolerate. We will look at this topic in more detail later in this element.

## External Influences on Health and Safety Within an Organisation




*External Influences on the Organisation*

### Legislation

Any company ignores legislation at its peril. Changes in legislation are well-publicised in the appropriate publications and any health and safety adviser should ensure that he/she is aware of any pending changes and their effect on the company.

### Parliament/HSE

Of all the influences on a company probably the most important is that of legislation. The laws passed by governments will have a direct effect on any company and changes in procedures to accommodate legislative changes may be necessary.

The HSE can create change by publishing Approved Codes of Practice which recommend good practice. While these do not have the force of law, companies must show that they have adopted a standard at least equal to that published in the Code.

### Enforcement Agencies

The enforcement agencies can influence health and safety within companies by:

- Providing advice.
- Serving Improvement and Prohibition Notices.
- Prosecution.

### Tribunals/Courts

Employment tribunals may have a direct effect on health and safety through their decisions, such as dismissing an appeal against an Improvement Notice.

In a criminal prosecution the court establishes whether the defendant is guilty or not guilty. The defendant may be an individual or the company itself. If the prosecution is successful the organisation will in most cases be fined.

In civil cases for personal injury the organisation may be sued, which may result in compensation being paid to the injured party.

### Contracts/Contractors/Clients

The nature of contracts and relationships with contractors may have profound effects on the health and safety of a particular contract. Where a contractor feels that he is making a loss on a particular project, there may be a strong temptation to cut corners and perhaps compromise on health and safety. Where a client takes a direct interest in the progress of a contract and in achieving good standards of health and safety, the standards on site are positively improved. There is a need for effective vetting of contractors' own company health and safety competence before hiring their services.

### Trade Unions

Trade unions are active nationally in promoting standards of health and safety in many ways:

- Supporting their members' legal actions and setting precedents and standards.
- Acting through lobby and pressure groups to influence legislation.
- Carrying out and sponsoring research.
- Publicising health and safety matters and court decisions.
- Providing courses on health and safety subjects.

### Insurance Companies

Insurance companies directly influence other companies by means of the requirement for employers' liability insurance. Should a company suffer an unusually high accident rate then the insurance company can either increase their insurance premiums or insist that the company adopt risk reduction measures. Insurance

companies now often carry out their own inspections of workplace risks and so are able to set certain minimum standards.

Insurance companies may also affect companies by means of their policy towards claims, i.e. because of the high cost of litigation cases tend to be settled out of court, rather than pursued in court.

### Public Opinion

Ultimately, public opinion can have a powerful effect on legislators, which may result in legislation being passed or prosecution taking place. Pressure groups may lobby Parliament and influence the government to change the law. Following a series of major rail crashes in the late 1990s, survivors and relatives formed a group to try to force the government to improve safety standards on the railways and to hold the railway companies more accountable.



## Revision Questions

1. List some of the internal influences on an organisation in respect of health and safety at work.

2. List some external bodies which can influence health and safety standards of organisations, identifying the means by which each body exerts its influence.

(Suggested Answers are at the end of Unit A.)

# Types of Organisations

## Key Information

- An organisation may be considered to be a system that has interacting components forming a whole.
- Within an organisation there are both formal and informal structures.
- Conflict may arise as a result of individual goals not being consistent with those of the organisation.

## Concept of the Organisation as a System

### Jargon Buster

System

A system is a regularly interacting or interdependent group of items forming a united whole.

(Note: This is one of several definitions which can be applied to systems.)

The systems approach to management is a way of thinking in which the organisation is viewed as an integrated complex of interdependent parts which are capable of sensitive and accurate interaction among themselves and within their environment.

### Characteristics of Systems

Common characteristics of systems are that:

- Every system is part of a still larger system and, itself, encompasses many subsystems ('circles within circles').
- Every system has a specific purpose to which all its parts are designed to contribute.
- A system is complex - any change in one variable will effect change in others.
- Equilibrium: a system strives to maintain balance between the various pressures affecting it, internal and external. Some systems experience more pressures to change than others, giving rise to stable and unstable systems.

Initial reaction to pressure is often what is called **dynamic conservatism** - the organisation fights like mad to stay just as it is! However, sooner or later homeostasis takes place (activities which serve to stabilise and vitalise the organisation as a whole in an evolving state of dynamic equilibrium).

## Organisational Structures and Functions

### General Perspective

An organisation is a group of persons who interact with each other in an effort to achieve certain goals or objectives. At a very basic level, the shop-floor employee goes to work to earn money - as does his union representative, foreman, manager and managing director. The earning of money, then, is a specific goal common to everyone in that particular enterprise. There will be many other shared goals and objectives as well as many goals which are not shared, which lead to conflict, and which may eventually have a bearing on the success or failure of the organisation. A work organisation, then, is an organisation which has been established for a specific purpose and within which work is carried out on a regular basis by paid employees. Examples of such are: businesses, hospitals, educational institutions, government departments, etc.

### Formal and Informal Structures

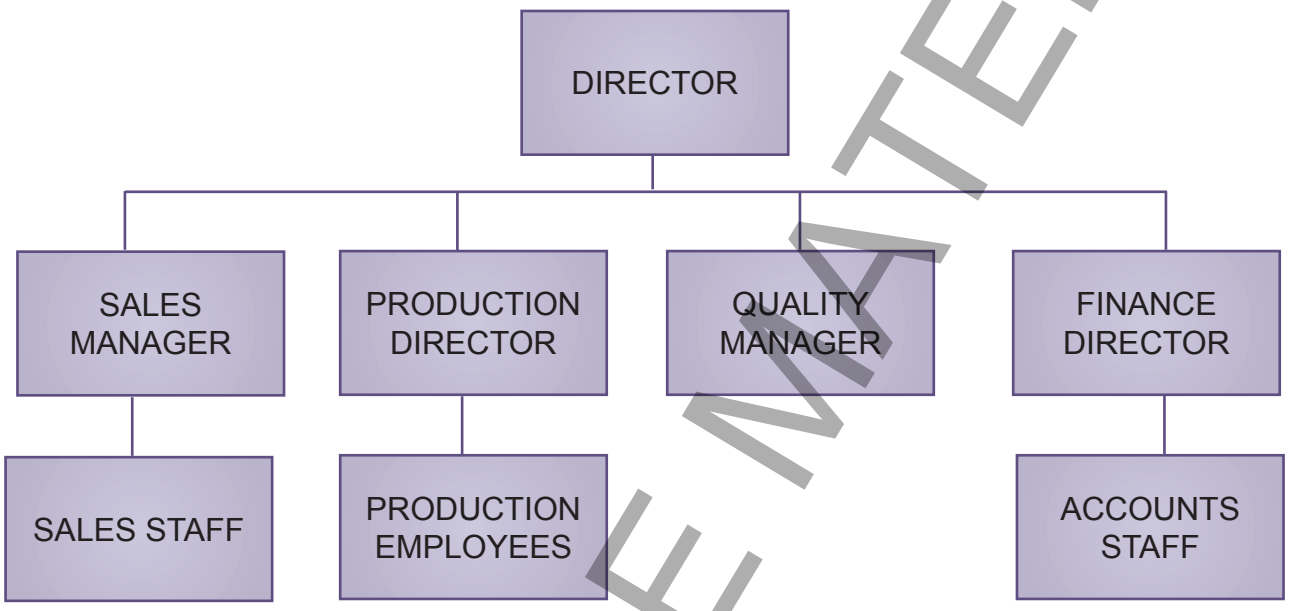
All organisations have a formal and informal structure. Within each organisation there is a formal allocation of work roles and the administrative procedures necessary to control and integrate work activities.

However, organisations also have an informal arrangement or power structure based on the behaviour of workers - how they behave towards each other and how they react to management instructions. The foreman or supervisor will have specific instructions from management aimed at achieving certain goals or production targets. In many cases, he 'adjusts' those instructions in accordance with his personal relationships with individual, or groups of, workers. This takes us some way towards being able to make a distinction between formal and informal organisations. There is a blurring at the edges between the two - a cross-over point where the distinction between the formal and informal at the actual point of action becomes obscured and is the subject of a great deal of sociological argument and discussion. For our purposes, we can describe or explain them in the following way.

- **Formal Organisational Structure**

  Most organisations describe their structure in the form of an organogram. This shows the reporting relationships from the chief executive of the company down to the staff carrying out the most basic tasks.

  The following figure illustrates a typical formal structure for a small company.



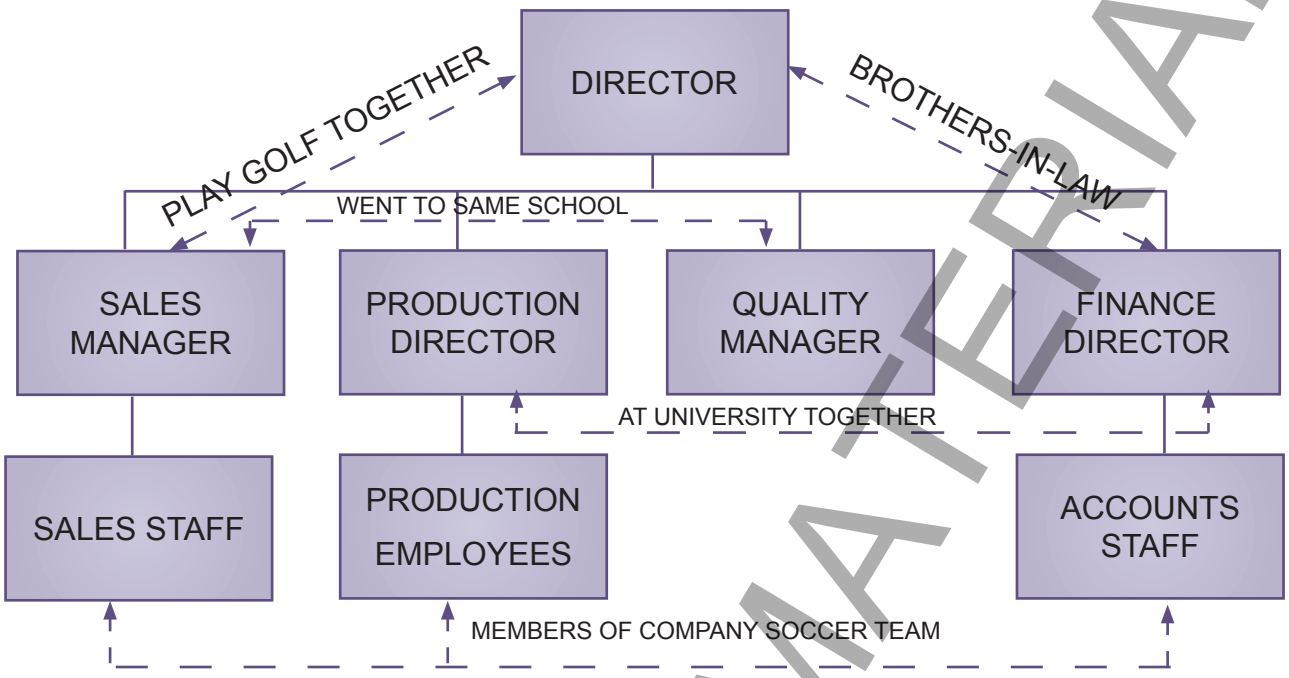

*Formal Structure*

In theory, every person within the structure has a well-defined role with clear lines of reporting and clear instructions as to standards of performance. These roles are clearly understood by others in the organisation so that everyone acts together to achieve the organisational objectives.

- **Informal Organisational Structure**

  An organisational chart cannot identify all the interactions which occur between staff. Invariably, it will be the quality of personal relationships which determines how communications flow within a company and 'how things get done'.

  In most organisations, the formal structure represents the model for interaction, but in reality the informal relationship is significant in understanding how organisations work. The informal structure cannot **replace** the formal structure, but works **within it**. It can influence relationships and effectiveness in both positive and negative ways. An understanding of it is an invaluable aid to good management. Take another look at the **Formal Structure** figure and then compare it with the **Informal Structure** figure that follows. Look at the superimposed informal structure shown by the dotted lines.




*Informal Structure*

An awareness of these informal relationships would obviously influence how communications are made. The effective manager will use such knowledge to break down resistance to new measures (including health and safety).

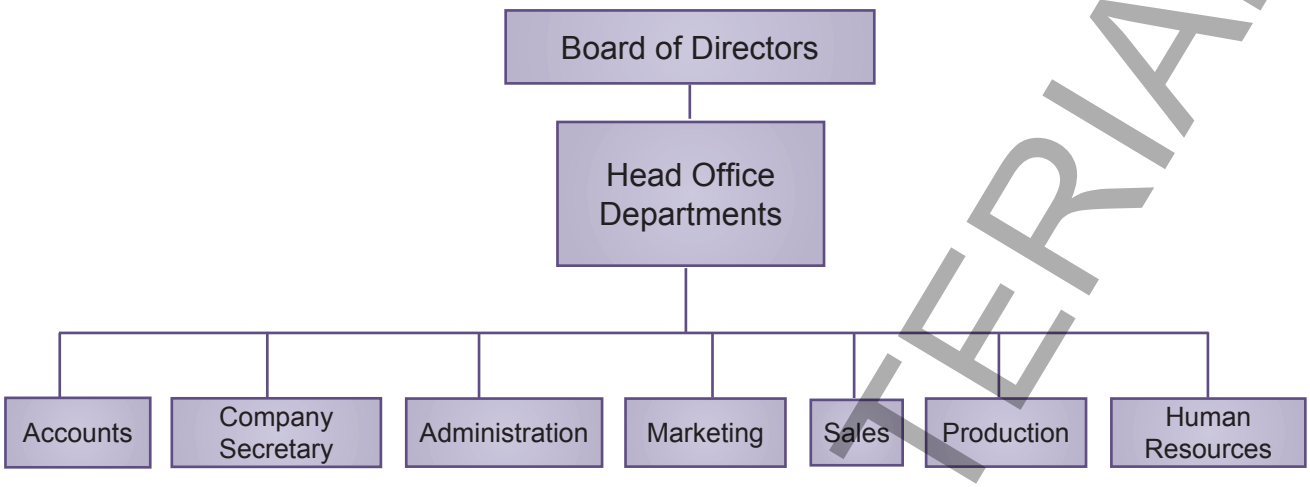
A simple way of making a distinction between formal and informal organisation structure is:

- **Formal** - represented by the company organisation chart, the distribution of legitimate authority, written management rules and procedures, job descriptions, etc.
- **Informal** - represented by individual and group behaviour.

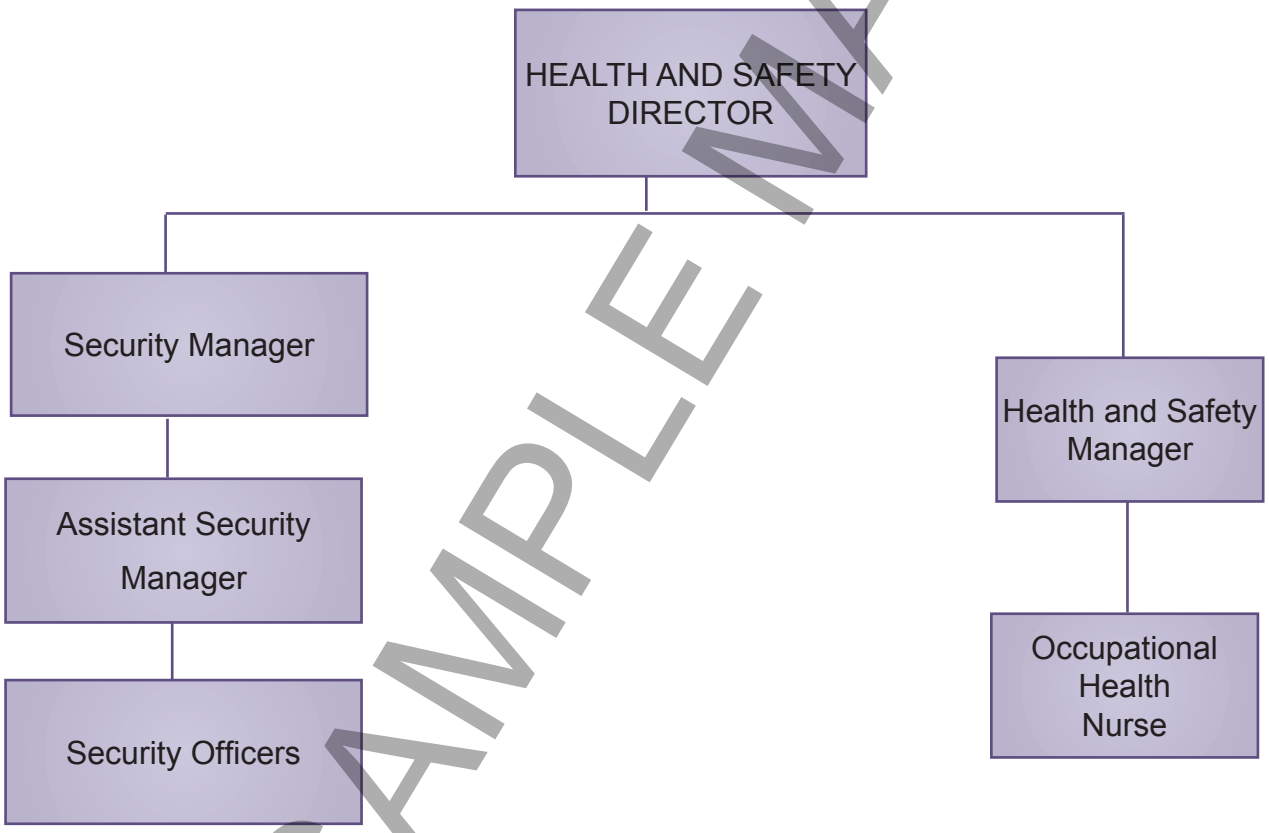
## Organisation Charts

The structure of an organisation is determined by its general activities - its size, location, business interests, customer base, etc. and by the way in which its employees are organised.

The organisational pyramid (Formal Structure) illustrated earlier is probably the principal model for most organisations with management at its apex and the workforce at its base. Within this model each separate department has its own pyramid with its own power structure and departmental goals. If the organisation is very large then considerable problems involving communication, efficiency, effectiveness, etc. may occur. The following figures show two typical pyramids.




*Typical Company Pyramid*




*Typical Departmental Pyramid*

By looking at these structures you can see the formal levels of authority and responsibility within the organisation or department. Basically, authority or control runs from top to bottom. However, there are other important management/employee relationships such as line management, staff, and functional relationships.

### Role of Management

**Jargon Buster**

Manage and management

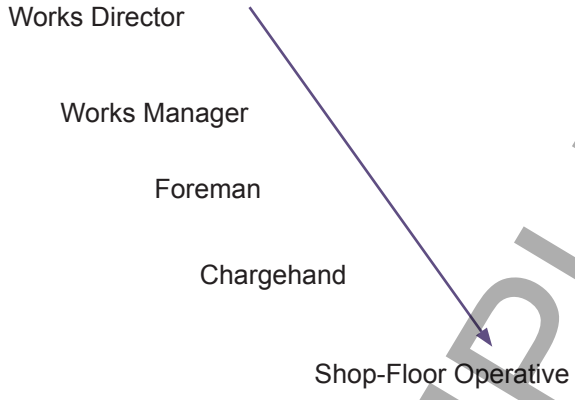
The Oxford Dictionary defines to **manage** as "to organise, regulate and be in charge of a business...", and **management** as "those engaged in these functions".

Management will lead through issued instructions, policies and procedures, and supervision to ensure that these are being adhered to.

There is normally a line of responsibility with different functions at each level.

### Line Management

Look at the following figure:




*A Typical Line Management Function*

Here you can see a direct line of authority from the Works Director to the Shop-Floor Operative.

### Staff Relationship

The managing director's secretary reports to the MD and carries out instructions by passing the MD's wishes to other directors and senior heads of department, but there is no 'line' relationship between the secretary and those departments. There is no instruction from the secretary, as her/his authority stems from the MD. A health and safety consultant reporting directly to an MD is not in a position to 'instruct' heads of departments to carry out health and safety policies or instructions. Again, his/her authority stems from the MD and, in practice, he/she would advise heads of department of any changes in policy agreed with and authorised by the MD.

### Functional Relationship

In many larger organisations, certain members of staff have a company-wide remit to carry out activities 'across the board'. Human resources departments often implement company appraisal plans which affect every department; internal auditors visit all departments to carry out their work; and quality control inspectors and health and safety managers have a company-wide role in order to inspect and check procedures. In such circumstances, any defects discovered would normally be dealt with by reporting them to the departmental head rather than dealing directly with any individual within the department.

The various hierarchies and line, staff and functional relationships can create huge problems for any organisation. Office 'politics' and protocols often obstruct communication, which is one of the keys to efficient management.

### Small Businesses

These are organisations with up to 50 employees. A feature of such organisations is the necessity (certainly in those with few employees) for the employees to adopt several roles. Small businesses are far less likely to have a dedicated health and safety professional than a large organisation; the role is often taken on by an employee who combines the responsibility with other tasks.

## Organisational Goals and Those of the Individual: Potential Conflict

**Jargon Buster**

Goal

In this context, a goal can be defined as "an object of effort or ambition".

To be successful and progress, both an organisation and individuals have to have goals. For the organisation, the goal may be an objective to be the "best in their field" or to be the "largest" or to be renowned for "outstanding quality". For the organisation to achieve these goals the employees need to have their own goals and objectives to work towards the organisational goal. However, the individual may have other goals which may or may not impact on the organisation. For example, an individual may hope to be promoted, which would probably mean that they will work very hard to achieve their goals/objectives within the organisation as this should help them to achieve their own personal goal of promotion. Another individual, however, may want to work less hours or have more time with their family, and this may impact negatively on their willingness to put in extra hours which may be required for the organisation to achieve its goal.

## Integration of Goals of the Organisation with the Needs of the Individual

In setting and achieving health and safety targets, the organisation should consider the needs of the individual. Where health and safety tasks are delegated, at all levels from senior managers to shop-floor workers the **responsible** individual(s) should be clearly identified and stated. This gives ownership to the individual concerned, and is an important factor in getting the individual to 'buy in' to the organisation's goals.

Many organisations give responsibility without the relevant **authority** to carry out the tasks. This can be a mistake as, without authority, the individual can feel frustrated at being unable to carry out the tasks. This leads to a feeling of futility and results in tasks being done poorly or not at all. Where authority is given to enable the individual to carry out tasks, this can result in an increase in self-esteem and every chance that the tasks will be performed well.

The limits of responsibility and authority should be clearly defined so that individuals know the extent of what they can and cannot do.

With responsibility comes **accountability**, and this must be made clear to all individuals given health and safety responsibilities. One important issue when giving responsibility is to ensure that the individual is capable of accepting it.



### Revision Question

3. What is the difference between a formal and informal organisational structure?

(Suggested Answers are at the end of Unit A.)

# Third Party Control

## Key Information

- The main third parties (i.e. non-employees) that need to be considered are contractors, visitors (e.g. customers), trespassers and members of the public.
- Key duties are owed to third parties under the **Health and Safety at Work, etc. Act 1974 (HSWA)** (Sections 3 and 4) and the **Management of Health and Safety at Work Regulations 1999 (MHSWR)** (Regulations 10, 11 and 12). These duties include the need for the provision of adequate health and safety information.
- When using contractors certain procedures need to be adopted:
  - Planning - including risk assessment.
  - Selection - competent contractor.
  - During contract – ensure contractor is inducted and is aware of local procedures.
  - Check performance.
  - Review procedures.

## Identification of Third Parties

A third party is defined as: "someone other than the principals who are involved in a transaction". In this case, it means anyone other than the employer, employee or owner who may be affected by the safety of a workplace.

## Jargon Buster

### Contractor

*"One who is engaged to perform a certain task without direction from the person employing him."*

The definition of "self-employed" in **Section 53, HSWA** is:

*"An individual who works for gain or reward otherwise than under a contract of employment whether or not he himself employs others."*

### Visitors and trespassers

- **Visitors** are third parties who visit premises and could be visitors:
  - With explicit or implied invitation (e.g. customer entering a shop).
  - Without invitation but with consent (e.g. cold-call door-to-door salesman).
- **Trespassers** are individuals who are not invited and whose presence is objected to.

### Members of the public

Members of the public are not employees or contractors but may become visitors or trespassers if they enter the premises.

## Criminal Law Duties Owed to Third Parties

**HSWA** and **MHSWR** are of particular importance in connection with third party duties.

Because of the wide-ranging general nature of the measures contained in regulations such as **MHSWR**, there is an inevitable duplication or overlapping of many existing regulations. Where this occurs, compliance with the duty in the more specific regulations is enough to comply with the corresponding duty in **MHSWR**. The **Control of Substances Hazardous to Health Regulations (COSHH)**, for example, require an assessment to be made of risks arising from exposure to hazardous substances. There is no need to repeat this under **MHSWR**.

### Health and Safety at Work, etc. Act 1974

#### General Duties of Employers to Their Employees (Section 2)

> *"(1) It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees."*

Section 2 (1) outlines the general duty owed by an employer to his or her employees.

You might ask why this is relevant to our discussion of duties owed to third parties. If an employer did not take reasonable steps to look after the health and safety of third parties and in this case in particular contractors, then by not doing so the actions of contractors might compromise the health and safety of his employees.

#### Duties to Persons Other Than Their Employees (Section 3)

> *"(1) It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risk to their health or safety.*
>
> *(2) It shall be the duty of every self-employed person to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that he and other persons (not being his employees) who may be affected thereby are not thereby exposed to risks to their health or safety.*
>
> *(3) In such cases as may be prescribed, it shall be the duty of every employer and every self-employed person, in the prescribed circumstances and in the prescribed manner, to give to persons (not being his employees) who may be affected by the way in which he conducts his undertaking the prescribed information about such aspects of the way in which he conducts his undertaking as might affect their health and safety."*

In other words, the duty imposed on an employer and the self-employed is to conduct their business to ensure so far as is reasonably practicable that any third party (i.e. non-employee) is not subject to any risk to their health and safety.

Section 3(3) refers to "prescribed cases"; the reference is to health and safety regulations.

#### Duties of Persons Concerned with Premises to Persons Other Than Their Employees (Section 4)

> *"(1) This section has effect for imposing on persons duties in relation to those who:*
>
> *(a) are not their employees; but*
>
> *(b) use non-domestic premises made available to them as a place of work or as a place where they may use plant or substances provided for their use there,*
>
> *and applies to premises so made available and other non-domestic premises used in connection with them.*
>
> *(2) It shall be the duty of each person who has, to any extent, control of premises to which this section applies or of the means of access thereto or egress therefrom or of any plant or substance in such premises to take such measures as it is reasonable for a person in his position to take to ensure, so far as is reasonably practicable, that the premises, all means of access thereto or egress therefrom available for use by persons using the premises, and any plant or substance in the premises or, as the case may be, provided for use there, is or are safe and without risks to health.*
>
> *(3) Where a person has, by virtue of any contract or tenancy, an obligation of any extent in relation to:*
>
> *(a) the maintenance or repair of any premises to which this section applies or any means of access thereto or egress therefrom; or*
>
> *(b) the safety of or absence of risks to health arising from plant or substances in any such premises;*
>
> *that person shall be treated, for the purposes of subsection (2) above, as being a person who has control of the matters to which his obligation extends.*
>
> *(4) Any reference in this section to a person having control of any premises or matter is a reference to a person having control of the premises or matter in connection with the carrying on by him of a trade, business or other undertaking (whether for profit or not)."*

Section 4 imposes a duty not on the employer but on those who have **control** of premises or the activities that take place within them. In most cases the person in control is the employer; however, in the case of a **landlord** who may lease out the premises for work

activities it is feasible the landlord is not an employer.

## Management of Health and Safety at Work Regulations 1999

These Regulations place duties on employers similar to those under **HSWA** (here we will deal with Regulations 11 and 12).

### Co-operation and Co-ordination (Regulation 11)

*"(1) Where two or more employers share a workplace (whether on a temporary or a permanent basis) each such employer shall -*

*(a) co-operate with the other employers concerned so far as is necessary to enable them to comply with the requirements and prohibitions imposed upon them by or under the relevant statutory provisions;*

*(b) (taking into account the nature of his activities) take all reasonable steps to co-ordinate the measures he takes to comply with the requirements and prohibitions imposed upon him by or under the relevant statutory provisions with the measures the other employers concerned are taking to comply with the requirements and prohibitions imposed upon them by that legislation; and*

*(c) take all reasonable steps to inform the other employers concerned of the risks to their employees' health and safety arising out of or in connection with the conduct by him of his undertaking."*

Where two or more employers share a workplace there is a duty to co-operate and co-ordinate measures relating to all statutory duties. Where a main employer controls the work site, he should inform other employers of the site-wide arrangements and invite a sharing (reciprocation) of health and safety procedures, hazards and risks for the benefit of all persons on the site. Where there is no controlling employer, the employers concerned should appoint a health and safety co-ordinator.

### Persons Working in Host Employers' Undertakings (Regulation 12)

*"(1) Every employer and every self-employed person shall ensure that the employer of any employees from an outside undertaking who are working in his undertaking is provided with comprehensible information on -*

*(a) the risks to those employees' health and safety arising out of or in connection with the conduct by that first-mentioned employer or by that self-employed person of his undertaking; and*

*(b) the measures taken by that first-mentioned employer or by that self-employed person in compliance with the requirements and prohibitions imposed upon him by or under the relevant statutory provisions in so far as the said requirements and prohibitions relate to those employees.*

*(2) Paragraph (1) shall apply to a self-employed person who is working in the undertaking of an employer or a self-employed person as it applies to employees from an outside undertaking who are working therein; and the reference in that paragraph to the employer of any employees from an outside undertaking who are working in the undertaking of an employer or a self-employed person and the references in the said paragraph to employees from an outside undertaking who are working in the undertaking of an employer or a self-employed person shall be construed accordingly.*

*(3) Every employer shall ensure that any person working in his undertaking who is not his employee and every self-employed person (not being an employer) shall ensure that any person working in his undertaking is provided with appropriate instructions and comprehensible information regarding any risks to that person's health and safety which arise out of the conduct by that employer or self-employed person of his undertaking.*

*(4) Every employer shall -*

*(a) ensure that the employer of any employees from an outside undertaking who are working in his undertaking is provided with sufficient information to enable that second-mentioned employer to identify any person nominated by that first mentioned employer in accordance with regulation 8(1)(b) to implement evacuation procedures as far as those employees are concerned; and*

*(b) take all reasonable steps to ensure that any employees from an outside undertaking who are working in his undertaking receive sufficient information to enable them to identify any person nominated by him in accordance with regulation 8(1)(b) to implement evacuation procedures as far as they are concerned."*

This Regulation applies where employees of employer A carry out work in the undertakings of employer B.

Employees of employer A could be working for employer B under a service contract for cleaning, repair, maintenance, etc. or employees in temporary employment could be working under A's control.

The important principle is the fact that persons who visit another employer's premises to carry out work must be provided with appropriate information and instructions regarding relevant risks to their health and safety.

## More...

Remember that you will find it helpful to refer to RRC's online *Health and Safety Law and Case Law Guide* while you are studying this course.

To access this learning resource log in to RRC's support website at:

http://www.rrc.co.uk

## Internal Rules and Procedures Concerned with the Selection, Appointment and Control of Contractors

To ensure that a chosen contractor is capable of doing the work required safely, you need to introduce procedures that will identify and cover key points. The following lists suggest an approach that covers all aspects of contractor hire (after HSE Guidance HSG159: *Managing Contractors*).

### The Planning Stage

- Define the task(s) that the contractor is required to carry out.
- Identify foreseeable hazards and assess the risks from those hazards.
- Introduce suitable control measures to eliminate or reduce those risks.
- Lay down health and safety conditions specific to the tasks.
- Involve the potential contractors in discussions concerning the health and safety requirements.

### Choosing a Contractor

- Determine what technical and safety competence is required by the contractor.
- Ask the contractor to supply evidence of that competence.
- Supply information regarding the job and the site, including site rules and emergency procedures.
- Ask the contractor to provide a safety method statement outlining how they will carry out the job safely.

### Contractors Working on Site

- Introduce a signing in and out procedure.
- Ensure the contractor provides a named site contact.
- Carry out site induction training for all contractor employees.
- Where necessary, control activities by using a permit-to-work system.

### Checking on Performance

- Are contractors working to agreed safety standards?
- Have there been any incidents and were they reported?
- Have there been any changes of circumstance, e.g. change of personnel?

*A client's project manager monitors the work of a contractor*

### Review

- Regularly review the procedures to ensure currency and effectiveness.

Always remember that contractor work can impact on employees and vice versa. The passing on of information regarding work that may affect others is a vital part of safe working with contractors.

## Responsibilities for Control of Risk Associated with Contractors and Visitors

At this point, it is worthwhile reviewing the different duties placed on the following:

- **Employers**
  - **Section 3, HSWA** - duty to protect third parties.
  - **MHSWR** - require risk assessments to be carried out and control measures to be implemented.
- **Persons in Charge of Premises**
  - **Section 4, HSWA** - to ensure the safety of all persons using the premises and any plant or substance in the premises.

## More...

You can find further information on contractor management in the HSE publication *Use of Contractors – a joint responsibility*, INDG 368, that you can download from:

http://www.hse.gov.uk

## Provision of Information Relating to Hazards/Risks to Third Parties

The provision of information to third parties relating to hazards and risks is important.

- **Contractors**

  We have already looked at the provision of information to contractors. To recap: **HSWA** and **MHSWR** put a duty on the employer or client to provide sufficient information to the contractor to ensure their safety.

- **Visitors**

  It is usual to give visitors to the workplace written information on emergency procedures, often in the form of a small card or on a visitors' slip. Think about where the visitor is going and what the purpose of their visit is. It may be necessary to supplement the general information with other, more specific, information relating to their particular situation.

- **General Public**

  Information to the general public will include such things as notices and warnings on perimeter fences, gates, etc. Road works and other activities that impact on the general public, as well as requiring prominent signage, may be publicised in local newspapers and pre-work notices erected at the site.


*Warning signs to the general public*

## Revision Questions

4. Briefly explain the differences between the duties owed under Sections 3 and 4 of the **Health and Safety at Work, Etc. Act 1974**.

5. What do the **Management of Health and Safety at Work Regulations 1999** require of employers who share a workplace?

(Suggested Answers are at the end of Unit A.)

# Consultation with Employees

## Key Information

- Consultation with employees contributes to a good safety culture.
- Formal consultation may be required under the **Safety Representatives and Safety Committees Regulations 1977** (for organisations with recognised unions) or the **Health and Safety (Consultation with Employees) Regulations 1996** (for organisations without union representation).
- Informal consultation includes:
  - Discussion groups.
  - Safety circles.
  - Departmental meetings.
- Consultation may be adversely affected by:
  - Peer group pressure.
  - Tokenism.
  - Conflicts of interest.

## Role and Benefits of Consultation Within the Workplace

Two of the key organisational requirements for developing and maintaining a positive health and safety culture are co-operation and communication (see later) and both of these involve consultation.

In this respect, you should note some of the observations of the Robens Committee Report (which led to **HSWA**):

### The Involvement of Work People

*"59 We have stressed that the promotion of safety and health at work is first and foremost a matter of efficient management. But it is not a management prerogative. In this context more than most, real progress is impossible without the full co-operation and commitment of all employees."*

### A Statutory Requirement to Consult

*"68 It is generally accepted that there is no credible way of measuring the value of consultative and participatory arrangements in terms of their direct effect upon day-to-day safety performance. Nevertheless, most of the employers, inspectors, trade unionists and others with whom we discussed the subject are in no doubt about the importance of bringing work people more directly into the actual work of self-inspection and self-regulation by the individual firm."*

*"70 We recommend, therefore, that there should be a statutory duty on every employer to consult with his employees or their representatives at the workplace on measures for promoting safety and health at work and to provide arrangements for the participation of employees in the development of such measures."*

The key **benefits** from consultation are:

- Better employment relations between workers and employers.
- Workers feel more involved and are more likely to co-operate with their employer.
- It creates a safer and less stressful environment which contributes to a good safety culture.

## Formal Consultation

The two sets of regulations concerned with consultation principles are the:

- **Safety Representatives and Safety Committees Regulations 1977 (SRSCR)**; and the
- **Health and Safety (Consultation with Employees) Regulations 1996 (HSCER)**.

### Trade-Union Appointed Safety Representatives

Under Section 2(4) of **HSWA**, safety representatives may be appointed, under the **SRSCR** made by the Secretary of State, by recognised trade unions. These regulations are accompanied by an Approved Code of Practice and Guidance Notes (L146).

The representatives are chosen from the employees. They are usually selected from persons who have at least two years' experience with their employer or in similar

employment, but this is not mandatory. The employer must give the representative time off with pay for the purpose of carrying out his/her functions as a safety representative, and for training.

A duty lies on the employer under Section 2(6) of **HSWA** to consult the representative(s):

> *"with a view to the making and maintenance of arrangements which will enable him and his employees to co-operate effectively in promoting and developing measures to ensure the health and safety at work of the employees, and in checking the effectiveness of such measures."*

Note that this requirement is not optional; the duty is an **absolute** one.

Safety representatives have "functions" rather than "duties". This means they cannot be prosecuted for not specifically complying with a function. So, apart from the general duty placed on him or her as an employee, no safety representative is legally responsible for accepting (or not objecting to) the course of action taken by his or her employer, nor are representatives in any danger of criminal proceedings being taken against them should they not carry out any of their functions. However, note that such protection is only afforded to a representative while acting within his jurisdiction.

## Topic Focus

**Safety Representatives – Functions and Rights**

- **Functions**

  The main function of a safety representative is to represent the employees in consultations with the employer. Other functions include:

  - Investigate potential hazards and dangerous occurrences and examine the causes of accidents at the workplace.
  - Investigate health, safety or welfare complaints by an employee he or she represents.
  - Make representations to the employer on matters arising out of the above.
  - Carry out inspections.
  - Represent employees in consultations with HSE inspectors.
  - Receive information from inspectors.
  - Attend safety committee meetings.

- **Rights/Entitlements**

  These include:

  - Time off with pay to carry out functions.
  - Time off with pay for necessary training to carry out functions.
  - To be consulted in good time by the employer on:
    - Introduction of measures that would substantially affect the health and safety of employees.
    - Arrangements for getting a competent person to help the employer comply with health and safety requirements.
    - Information to be given to employees on workplace risks and preventive measures.
    - Planning and organising of health and safety training.
    - Health and safety consequences of new technology planned to be brought into the workplace.
  - Access to documents and other information (see later).

**Note**:

Representatives do not have powers to stop either work or machinery; they may only advise on such matters.

A safety representative may be appointed only by a recognised, independent trade union if he is to receive the legal rights given under the **SRSCR**. To be an **independent** trade union, it must be on the list held by the Certification Officer and have applied for, and received, the Certificate of Independence from him.

### Carrying Out Inspections

A safety representative is entitled to inspect the workplace, or part of it, on **three** occasions:

- If they have not inspected it within the previous three months.
- Where there has been substantial change in the conditions of work.
- After a notifiable accident, dangerous occurrence or notifiable illness, as specified in the **Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR)**.

The safety representatives should notify the employer of their intention to carry out an inspection, where it is reasonably practicable. The employer shall provide such facilities and assistance, including facilities for independent investigation and private discussion, as the safety representatives may reasonably require.

### Entitlement to Information

On reasonable notice being given, the employer must allow the safety representatives to inspect and take copies of any document relevant to the workplace or to the employees whom they represent and which the employer is required to keep by virtue of any relevant statutory provision. (Remember that relevant statutory provisions are listed in the Schedules to **HSWA**.)

Safety representatives are entitled to receive information, under **Regulation 7(2)** of **SRSCR**, from employers. The employer must make available information, within his knowledge, which is necessary to enable the safety representative to perform his function. However, the employer need not disclose information which:

- Is against the interests of national security.
- Would contravene a prohibition imposed by, or under, an enactment.
- Relates specifically to an individual, unless the individual consents to its disclosure.
- Other than for its effects on health and safety, would cause substantial injury to the undertaking.
- Has been obtained by the employer for the purposes of bringing, or defending, any legal proceedings.

Safety representatives are also entitled to receive information from inspectors under **Section 28(8)** of **HSWA**. However, the inspector must not give information which he judges to be irrelevant to the health and safety of the employees. In addition, the inspector must give a copy to the employer of any information given to the safety representative.

This is, of course, only a brief outline of the Regulations, but it is sufficient for examination purposes.

### Enforcement of Rights

A safety representative may complain to an Employment Tribunal that the employer has:

- Not allowed him time off for the purpose of carrying out his functions or receiving training.
- Failed to pay him for his time off.

### Safety Committees

A duty is placed on the employer, under **SRSCR**, when so requested in writing by at least two union appointed safety representatives, to establish a safety committee within three months following the request. Again, consultation with those representatives who made the request shall be made by the employer. Representatives of trade unions will also have to be consulted.

- **Functions**

  The function of the safety committee is identified in Section 2(7) of **HSWA** - to keep under review the measures taken to ensure the health and safety at work of the employees, and such other functions as may be prescribed. There are no other legal requirements concerning the committee's function.

- **Composition/Membership**

  The composition of the committee is a matter for the employer, although he or she must have at least one safety representative on it and display a notice listing its membership. Membership of the safety committee should be decided following consultations between representatives of the trade unions and the management. Safety representatives are **not** appointed by this committee.

  It is essential that a proper balance is achieved in the structure of the safety committee; it should have both management and shop-floor representatives on it. It may be useful to elect ex officio members, e.g. the medical officer or one of his staff, the works engineer, the production manager and the safety practitioner.

  The aim is to keep membership of the committee reasonably compact and to ensure a mechanism exists for the consideration and implementation of recommendations by senior management. Although not having executive power, the committee has a strong advisory role to play in the management and resolution of an organisation's health and safety problems.

The committee should meet on a regular basis, circulate an agenda in advance, and keep proper minutes which record what action is to be taken and by whom.

## More...

The Approved Code of Practice and Guidance Notes (L146), *Consulting Workers on Health and Safety*, contains useful information on safety committees which you can refer to at:

http://www.hse.gov.uk

### Formal Consultation Directly with Employees

The **Health and Safety (Consultation with Employees) Regulations 1996 (HSCER)** extend consultation to non-union representatives of employee safety, i.e. non-union workplaces where the **SRSCR** do not apply.

#### Consultation

Employers should consult employees:

- Directly, and/or
- Through employee representatives **elected** by a group of employees.

Where consultation is through such employee representatives, the employer must inform the employees of the names of those representatives, and the group of employees they represent. Employees must also be told when the employer discontinues consultation with those employee representatives.

**Discontinuation** may occur when:

- The employee representatives have informed the employer that they no longer intend to represent their group of employees in health and safety consultations.
- The employee representatives no longer work in the group of employees they represent.
- The period of election has elapsed without the employee representatives being re-elected.
- Employee representatives have become incapacitated from performing the duties required under the **HSCER**.

Employees and their representatives must be informed by the employer if he or she decides to change from consulting with the employee representatives to consulting with the **employees** directly.

*Consultation with workers*

## Topic Focus

**Representatives (Non-Union) of Employee Safety – Functions and Rights**

- **Functions**

  These include:

  - Making representations to the employer on potential hazards and dangerous occurrences which could affect the employees he or she represents.
  - Making representations to the employer on general health and safety matters (particularly in relation to the matters on which employers are obliged to consult) which may affect the health and safety of the employees they represent.
  - Representing their group of employees in consultations with enforcing authority inspectors.

- **Rights/Entitlements**

  These include:

  - Time off with pay for functions.
  - Time off with pay for training.
  - To be consulted by the employer on the following:
    - Introduction of any measure substantially affecting the health and safety of the employees concerned.
    - The appointment of persons nominated to provide health and safety assistance, and assist in emergency procedures (as required by Regulations 6 and 7 of **MHSWR**).

(Continued)

## Topic Focus

- Any health and safety information the employer is required to provide to the employees or the safety representatives by or under any relevant statutory provision.
- The planning and organisation of any health and safety training the employer is required to provide by or under any relevant statutory provision.
- The health and safety consequences of the introduction (including the planning thereof) of new technologies into the workplace.

– To be provided with information from the employer:
  - As is necessary for full and active participation and carrying out of functions, e.g. on risks, preventive measures, etc.
  - From **RIDDOR** reports (applies only to cases where representatives elected).

### Provision of Information

Where consultation is direct, employers must provide all information the employees will require in order to participate fully in the consultations. The same applies to employee representatives, who must be given all necessary information to enable them to perform their functions and participate in consultation. These employee representatives must also be provided with information associated with the records to be kept under **RIDDOR** where the information relates to the workplace of the employees they represent (but not to individual employees).

The employer is not obliged to disclose information that:

- Does not relate to health and safety.
- Is against the interests of national security.
- Would contravene any prohibition imposed under any legislation.
- Relates specifically to an individual (unless that individual has given his or her consent).
- Would damage the employer's undertaking, or the undertaking of another person where that other person supplied the information.
- Has been obtained by the employer for the purpose of any legal proceedings.

### Enforcement

As for trade-union appointed safety representatives, enforcement is handled through the enforcement agency and tribunals for such things as refusal to grant time off with pay for training, etc.

## More...

You can download *Consulting employees on health and safety: A brief guide to the law* (INDG232) from:

http://www.hse.gov.uk

## Informal Consultation

Having looked at the formal processes of consultation you might think that there is no need for informal consultation. Yet when you look at formal and informal organisations, in many ways the informal route is often more effective in getting things done. Note that the **1996 HSCER** allow employers to consult employees "directly" without the need to go through union or employee representative channels but give little indication as to how this should be done. Direct consultation would involve a certain amount of bureaucratic procedure to ensure communication and feedback with every member of staff and would still therefore be considered a formal arrangement. How, then, does informal consultation take place?

Opportunities for personal contact occur almost daily in the various meetings which take place between management and employee - workplace inspections, toolbox talks, induction training, safety audits, even staff appraisals. Individuals will often express genuine personal feelings in a one-to-one situation when free from peer group pressure, in a more open manner than in a group.

- **Discussion Groups**

  These consist of a group of individuals coming together to discuss issues of mutual interest. In the workplace, groups may be formed, often from volunteers, to deal with a number of issues both work and non-work related. They may be given certain remits, such as safety and quality.

- **Safety Circles**

  These are small groups of employees - not safety representatives or members of safety committees - who meet informally to discuss safety problems in their immediate working environment. The idea is based on the 'quality circles' concept and allows the

sharing of ideas and the suggestion of solutions. Any insurmountable problem would be referred to the safety representative or safety committee.

- **Employee Discussions**

  These are discussions, formal or otherwise, by groups of employees.

- **Departmental Meetings**

  These meetings are normally attended by shop-floor representatives, supervisory and management staff who meet frequently, often once a week, to discuss general matters affecting their department such as: shift patterns, maintenance and breakdown procedures, and production targets. It is difficult to discuss any of these without impinging on health and safety requirements and, although perhaps not a major objective of such meetings, health and safety policies and arrangements would come under examination. Any health and safety problems identified would probably be referred to senior management through the safety representative or safety committee.

*Informal consultation can take the form of departmental meetings*

## Behavioural Aspects Associated with Consultation

In any social group, conflict may arise between two or more people, interest groups, genders, ethnic or racial groups, etc. - workplaces are no exception. Safety committee member 'A' serves on the committee to represent his department or perhaps a particular group of workers with common skills. Similarly, committee member 'B' represents **his** department members. A and B, although sharing a common membership of the safety committee, may well be pursuing different objectives. They may both be seeking improved health and safety arrangements for their members but may be in competition for the allocation of limited resources to their particular project.

- **Peer Group Pressures**

  A safety representative serving on a safety committee may feel that he has to question and criticise any suggestion put forward by a management representative on the committee. Remember that the safety representative is a worker's representative and not part of the management team, neither is he necessarily "a competent person". His perception of health and safety problems may be different from that of management and not constrained by budgeting considerations. His role is mainly a policing one in which he monitors the safety performance of management and, because of peer group pressure, he may see himself in a conflicting, rather than co-operative, role.

- **Danger of Tokenism**

  One of the dangers associated with consultation is tokenism - where management go through the consultation process but the views expressed by employees are apparently ignored. Clearly during the consultation process there is no obligation on the employer to make changes suggested by employees (unless there is a legal requirement) and this may be for perfectly legitimate reasons. However, the employer should respond to information gained during the consultation process and explain what action will be taken and why some proposals may not be implemented, otherwise there may be resentment and apathy towards the process.

- **Potential Areas of Conflict**

  The safety representative may sometimes view himself as an expert on health and safety matters. Conflict may arise between the safety representative and the first line supervisor where the safety representative may have advised his members (wrongly) not to carry out a particular management instruction. This is not to say that conflict always arises as a result of worker attitude towards management. The converse is equally true, with management taking the view that their opinions are correct simply because they are management and think they know better. Consultation about problems where the views of all the participants are considered should lead to effective decisions.

## Revision Questions

6. Outline the functions of a safety representative as appointed under the **Safety Representatives and Safety Committees Regulations 1977**.
7. On what matters should an employer consult with employees in a non-union workplace?
8. What is a safety circle?

(Suggested Answers are at the end of Unit A.)

# Development of a Health and Safety Information System

## Key Information

- A broad range of both internal and external information is needed for an effective health and safety management information system. This includes:
  - Loss event data.
  - Cost data.
  - Suppliers' data.
  - Results of audits and inspections.
- **Section 2** of **HSWA** requires adequate information to be provided to employees to ensure health and safety.
- Health and safety regulations detail more specific requirements for the provision of information.

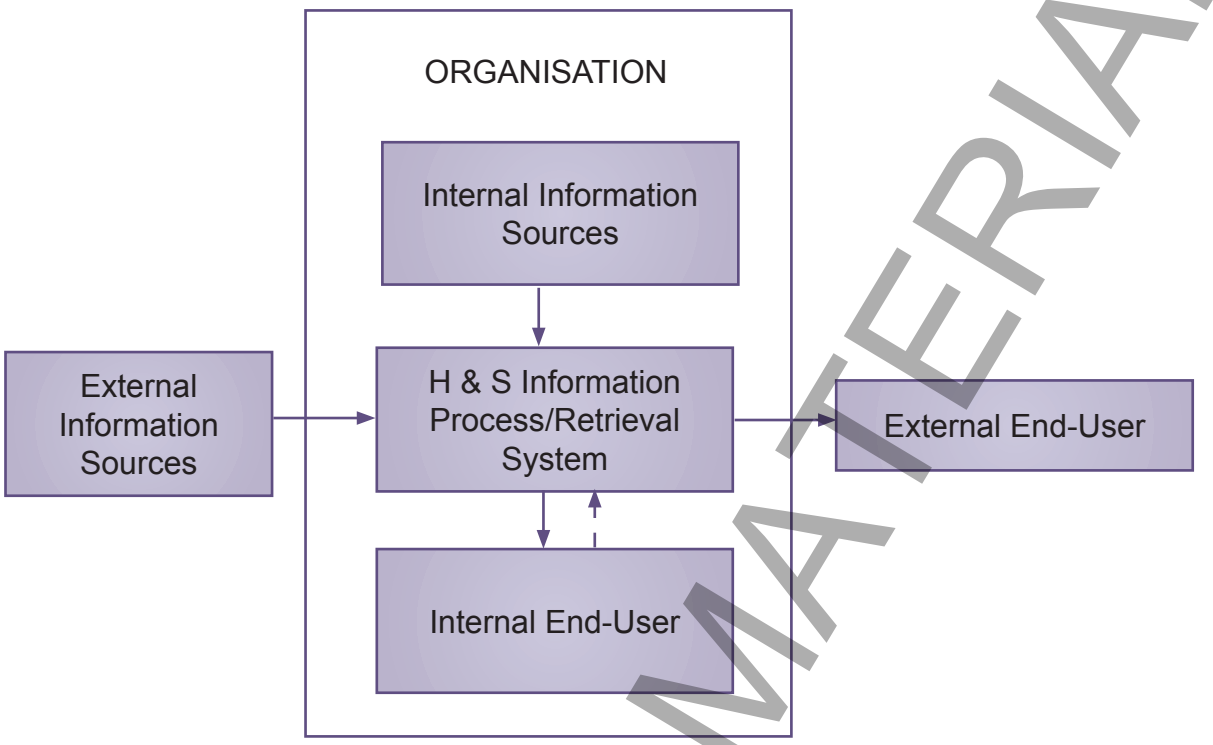
## Health and Safety Management Information Systems Within the Workplace

**MHSWR** emphasises that health and safety information must be relevant and capable of being understood, with the information provided in a number of languages if necessary. An enormous amount of information is generated from a number of sources and has to be passed on to a variety of end-users. It also has to be made available for reference purposes by management and for inspection purposes by HSE inspectors, safety representatives, and other interested parties. There is an obvious need for a management information system in the workplace. The basis of sound information management is:

- The collection of information from external sources.
- The documentation of policy, organisation statements, performance standards, rules and procedures (including risk assessments, audit, inspection, test results, and accident statistics, etc.).
- Provision of systems for cascading information.
- Use of posters, bulletins, newspapers, etc.

The starting point in the development of the system is to appoint someone with the professional competence to manage it. In many organisations this might be an existing manager or a dedicated safety professional. Whoever he/she is, the safety manager must keep up to date with developments in legislation and current practice through membership of a professional association(s) and arrange for the collection and systematic documentation of relevant developments in health and safety. He/she should subscribe to a number of professional publications and attend courses and seminars to maintain "continuing professional development" status. He/she will also be responsible for the collection and documentation of internal health and safety information, the safety policy, risk assessments, test results, accident reports and statistics, and health surveillance. The safety practitioner must be able to interpret legislation, manufacturers' instructions and a variety of other technical or semi-legal documents and translate them into "relevant and comprehensible" information as required by **MHSWR**. The information collected, both externally and internally, must then be used as a management tool for the efficient running of the organisation.

The following figure illustrates how external and internal health and safety materials are combined, processed and turned into user-friendly information for use by company employees and contractors, visitors, customers, etc.




*Internal and External Health and Safety Materials*

## Types of Data Within a Health and Safety Management Information System

### Topic Focus

| EXTERNAL INFORMATION SOURCES | INTERNAL INFORMATION SOURCES |
|---|---|
| Legislation including:<br>EU Directives<br>UK Acts and Regulations<br>Approved Codes of Practice<br>HSE Guidance Notes<br>British Standards<br>Manufacturers' instructions<br>HSE leaflets and publications<br>Safety organisations such as: IOSH, RoSPA, etc.<br>Industrial bodies | H and S policy document<br>Compliance data<br>Cost data<br>Risk assessments (**MHSWR, COSHH**, etc.)<br>Monitoring results:<br>Noise<br>Dust<br>Lighting<br>Atmospheric, etc.<br>Job descriptions<br>Job safety analyses<br>Results of inspections/audits<br>Accident and ill-health reports/statistics<br>Training records<br>Management system performance data |

Such health and safety information can be assimilated into the organisation and held centrally. The appropriate material can then be redistributed throughout the organisation or to those departments which have a specific requirement. Information can be filed manually or stored electronically for ease of retrieval and copying.

## Legal Requirements and Practical Arrangements for Providing Health and Safety Information

**Section 2** of **HSWA** is the origin of the information principle from which all subsequent statutory information requirements stem, and, to remind you:

Section 2:

> *"(1) It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees..."*
>
> *"(2) (c) The provision of such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety at work of his employees;..."*
>
> *"(3) ...It shall be the duty of every employer to prepare... a written statement of his general policy....., and to bring the statement and any revisions of it to the notice of all his employees."*

There is little point in having a safe system of work, safe machinery and safe management policies unless management or the employer provides the workforce, contractors and visitors with the necessary information to continue to operate safely in the working environment. There are many statutory obligations concerned with the provision of safety information; not all are concerned with the employer's duties. The provision of information is a complex problem and as it has featured in examinations it is worth looking at in some detail. It is best for us to look at it in terms of specific legislation: who must provide it, for what purpose, and to whom it is to be conveyed.

**Section 3** of **HSWA** (in respect of non-employees) does not explicitly mention the provision of information, but case law has established that the duty under Section 3 requires, where reasonably practicable, adequate information to be provided (see Element A9).

### Table of Statutory Regulations

The following table consists of the key relevant statutory regulations that relate to information requirements. You will find many other examples of regulations which contain information requirements relating to specific categories of hazard in Units B and C.

Key Statutory Regulations for Health and Safety Information

| Regulation | Duty placed upon: | To supply information to: |
|---|---|---|
| **Health and Safety at Work, etc. Act 1974** | Employers | **Employees**: Adequate, so far as is reasonably practicable, to ensure their health and safety at work. |
| | Employers | **Employees**: If five or more employed, to prepare written safety policy and to bring it, and any revision of it, to the notice of employees. |
| | Employers | **Safety representatives**: To consult with safety representatives concerning arrangements allowing effective co-operation over measures ensuring health and safety at the workplace. |
| | Employers and the self-employed | **Non-employees**: To provide information to non-employees in cases which have yet to be prescribed. |
| | Persons in control of premises | **Non-employees**: To supply information to non-employees concerning safe access and egress to and from premises. |
| | HSE inspector | **Employees**: Must disclose information to employees or their appointed representatives if necessary to keep them informed about matters affecting their health and safety at work. The inspector must not disclose information otherwise, except to take out legal proceedings arising from an accident. |
| | Employment Medical Advisory Service (EMAS) | **Employers, employees and their representatives** and those seeking training or employment: Advice on matters concerning safeguarding and improving the health of employed persons and those seeking employment and training. |
| | Designers, manufacturers, suppliers and importers | **Users**: To provide information to users concerning the safe use of articles and substances at work. |
| | Any person | **A local authority inspector**, regarding any information relevant to any examination or investigation. |
| | Any person | **A local authority inspector**, on the understanding that the information supplied will be inadmissible evidence against the person supplying. |
| | Any person | **HSE or any enforcing authority**, when HSE request with the consent of the Secretary of State. |
| **Safety Representatives and Safety Committees Regulations 1977** | Employer | **Representatives**: To allow the representative to inspect and take copies of any document kept by statutory provision except where it relates to the health record of an identifiable individual. Also, information necessary for representatives to carry out their functions, with some exceptions. |
| **Health and Safety (Consultation with Employees) Regulations 1996** | Employer | • **Employees** directly.<br>• **Representatives** of employee safety. |

(Continued)

| Regulation | Duty placed upon: | To supply information to: |
|---|---|---|
| **Health and Safety Information for Employees Regulations 1989 (as amended)** | Employer | To provide **employees** with one of the following:<br>• The approved poster; or<br>• The approved leaflet (individually).<br>A simplified version of the poster and leaflet was approved from 6th April 2009. Employers can use the old version until 5th April 2014. The new Health and Safety Law poster and leaflet contain a contact number for the HSE Infoline which refers callers to the health and safety enforcing authority for the premises or to the HSE for employment medical advice. |
| **Management of Health and Safety at Work Regulations 1999** | Employer/Self-employed | **Employees (Regulation 10):**<br>• Risks identified by the assessment.<br>• Preventive and protective measures.<br>• Procedures in event of serious and imminent danger.<br>• Identity of competent persons for evacuation.<br>• Risks notified by other employers.<br>**Other workers:**<br>• Risks to health and safety arising from undertaking.<br>• To enable them to identify competent persons for evacuation.<br>• Any special skills required for safe working.<br>• Any requirement for health surveillance.<br>**Other employers/self-employed/employment agencies/ others:**<br>• Risks to health and safety arising from the undertaking.<br>• Compliance measures.<br>• To enable them to identify competent persons for evacuation.<br>• Any special skills required for safe working.<br>• Specific features of jobs in relation to health and safety. |

## Revision Questions

9. Where in the **Health and Safety at Work, etc. Act 1974** is there a duty to provide information?

10. What information should an employer provide to his or her employees as required by the **Management of Health and Safety at Work Regulations 1999**?

11. List the external sources of health and safety information.

12. List the internal sources of health and safety information.

(Suggested Answers are at the end of Unit A.)

# Health and Safety Culture and Climate

## Key Information

- Safety culture may be defined as "a system of shared values and beliefs about the importance of health and safety in the workplace".
- The safety climate is an assessment of people's attitudes and perceptions at a given time.
- Organisational factors, e.g. training, availability of suitable equipment, behaviour of managers, etc. influence individual behaviour.
- There are many indicators of the health and safety culture of an organisation, e.g. housekeeping, relationships between managers and workers.
- Safety culture and climate may be assessed by:
  - Perception surveys.
  - Findings of incident investigations.
  - Effectiveness of communication.

## Culture and Climate

### Jargon Buster

Health and safety culture

*"A system of shared values and beliefs about the importance of health and safety in the workplace"*

or

*"An attitude to safety which pervades the whole organisation from top to bottom and has become a norm of behaviour for every member of staff from the board of directors down to the newest juniors".*

Yet another definition by the former HSC's Advisory Committee on the Safety of Nuclear Installations is:

*"The safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management. Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures."*

What, then, is **safety climate**?

Unfortunately there is no universal definition and many authors use the terms culture and climate interchangeably. One commonly accepted explanation is given by Cooper (2000) who distinguishes between three related aspects of culture:

- Psychological aspects – how people feel, their attitudes and perceptions – **safety climate**.
- Behavioural aspects – what people do.
- Situational aspects – what the organisation has – policies, procedures, etc.

It is generally accepted that safety climate refers to the psychological aspects of health and safety and is measured through a safety climate or attitude survey (see later).

The important thing to remember about a safety culture is that it can be **positive** or **negative**. A company with a negative or poor safety culture will struggle to improve safety or prevent accidents even if they have excellent written procedures and policies and state-of-the-art safety equipment. The reason for this really comes down to people, their attitudes to safety and how this attitude is encouraged and developed.

## Impact of Organisational Cultural Factors on Individual Behaviour

We are all influenced to some degree by things that we see and hear. Billions of pounds are spent on television advertising because companies know how influential television can be - our behaviour is being moulded by

an influential medium. In the workplace who and what are likely to influence our behaviour when it comes to safety?

Typical answers might include:

- **Managers and Supervisors**

  If they appear to condone poor behaviour, then it is likely to go unchecked. Does safe behaviour rank way below productivity? Do they show commitment to safety and lead by example? Do they commit sufficient resources to health and safety?

- **Work Colleagues**

  The way that colleagues behave will probably have an influence on others. What is their attitude to risk taking?

- **Training**

  Not being trained in correct procedures and use of equipment can affect health and safety. Does the organisation see training as a priority? Is the training appropriate?

- **Job Design**

  Job design may be done in a way that makes safe behaviour difficult. How much consideration has been given to the layout of the job and the needs of the individual?

- **Work Equipment**

  If this is not kept in good order or is unavailable, it may affect health and safety. What is the organisation's attitude to equipment maintenance?

The HSE publication, *Reducing Error and Influencing Behaviour* (HSG48), identifies certain factors associated with good safety performance:

- **Effective communication** – between, and within, levels of the organisation, and comprehensive formal and informal communication.
- **Learning organisation** – the organisation continually improves its own methods and learns from mistakes.
- **Health and safety focus** – a strong focus by everyone in the organisation on health and safety.
- **Committed resources** – time, money and staff devoted to health and safety showing strong evidence of commitment.
- **Participation** – staff at different levels in the organisation identify hazards, suggest control measures, provide feedback and feel that they 'own' safety procedures.
- **Management visibility** – senior managers show commitment and are visible 'on the shop floor'.
- **Balance of productivity and safety** – the need for production is properly balanced against health and safety so that the latter is not ignored.
- **High quality training** – training is properly managed, the content is well chosen and the quality is high. Counting the hours spent on training is not enough.
- **Job satisfaction** – confidence, trust and recognition of good safety performance.
- **Workforce composition** – a significant proportion of older, more experienced and socially stable workers. This group tend to have fewer accidents, and lower absenteeism and turnover.

*All staff are focused on health and safety*

## Indicators of Culture

### Topic Focus

**Indicators of safety culture within an organisation** include:

- Housekeeping.
- The presence of warning notices throughout the premises.
- The wearing of PPE.
- Quality of risk assessments.
- Good or bad staff relationships.
- Accident/ill-health statistics.
- Statements made by employees, e.g. "My manager does not care" (negative culture).

Some of these indicators will be easily noticed by a visitor and help to create an initial impression of the company.

## Correlation Between Health and Safety Culture/Climate and Health and Safety Performance

It is quite easy to identify a correlation between cultural indicators and health and safety performance. An experienced safety practitioner can often gauge the standard of safety performance of an organisation from an initial walk-round and first impressions. The standard will often be confirmed on completion of a detailed audit/inspection.

## Measurement of the Culture and Climate

While there are many indicators which can give a first impression of a company's safety culture/climate, it is possible to measure some of the indicators to obtain a more accurate picture of the sense of culture within an organisation.

There are a number of measurement tools available.

### Safety Climate Assessment Tools

The Health and Safety Laboratory (HSL) has published a safety climate tool which uses eight key factors mapped around 40 statements on which respondents are asked to express their attitude.

- Organisational commitment.
- Health and safety behaviours.
- Health and safety trust.
- Usability of procedures.
- Engagement in health and safety.
- Peer group attitude.
- Resources for health and safety.
- Accidents and near-miss reporting.

The kit is available in a software format and will analyse and present the results as charts that can be easily communicated to the workforce.

### More...

Further details of the HSL Safety Climate Assessment Tool may be found at:

http://www.hsl.gov.uk/health-and-safety-products/safety-climate-tool.aspx

Loughborough University have developed a Safety Climate Assessment Tool which may be downloaded from:

http://www.lboro.ac.uk/departments/sbe/downloads/pmdc/safety-climate-assessment-toolkit.pdf

### Perception or Attitude Surveys

These are survey questionnaires (often within a safety climate tool) containing statements which require responses indicating agreement or disagreement. Respondents are asked to indicate to what extent they agree or disagree with each statement, generally using a five-point scale which can then be coded to give a score. High scores represent agreement and low scores disagreement.

It is not difficult to produce a questionnaire about general health and safety which would give some idea as to the safety culture within an organisation. The questionnaire must be worded to avoid bias, and to obtain truthful answers confidentiality is necessary. When carried out properly these questionnaires can identify underlying anxieties and problems which would be difficult to identify by any other means. Take care, however, to make sure that the questionnaires themselves do not create anxiety or suspicion in the minds of employees. When carried out regularly, attitude surveys can identify trends and it is then possible to quantify how attitudes are changing.

### Findings of Incident Investigations

Sometimes during an accident/incident investigation the underlying cause is identified as 'lack of care'. This may indicate individual carelessness or, where carelessness

is found to be the widespread cause of accidents/ incidents, then this may be an indicator of poor safety culture.

Where the same underlying cause keeps recurring, the safety manager has to introduce a process of education or re-education of the workforce to encourage a change of attitude. The findings and lessons learned from incident investigation are invaluable in preventing similar occurrences, setting policy, formulating safe systems of work, writing training materials and, after publication to the workforce, demonstrating company commitment to the principles of good safety management.

### Effectiveness of Communication

**Jargon Buster**

Communication

"*Communication is the transfer of information from one person to another with the information being understood by both the sender and receiver.*" (Koontz)

The process of communication requires a sender, a receiver and feedback. Feedback is the part that is often left out of the process and this is what leads to problems. Successful communication is measured by feedback which allows the sender to test whether the receiver has fully understood the communicated message.

Communication methods are written, verbal or visual or a combination of all three. The method chosen must be appropriate to the type of information to be communicated and its objectives, the sophistication of the audience (receivers), and the structure and culture of the organisation.

Communication surveys can be used to find out how effectively information has been transferred to new members of staff. A sample of comparatively new members of staff can be interviewed to identify how well they have assimilated the company's safety culture or how much they have retained from company health and safety training. This type of survey can be done formally or informally.

Effective communication involves:

- Including everyone who should be included.
- Not overloading people with large quantities of information; prioritise anything urgent.
- Being brief, direct and keeping it simple.
- Being fast but not at the expense of accuracy.
- Being selective; sending only what is necessary.
- Encouraging feedback to ensure the message has been received and understood.
- Using as few links in the communication chain as possible to prevent distortion of the original message.

### Evidence of Commitment by Personnel at all Levels

**Jargon Buster**

Commitment

Commitment can be defined as: "a declared attachment to a doctrine or cause".

It is the goal of the safety practitioner to ensure commitment to health and safety by everyone within an organisation. This commitment must start at the management board level. It is essential that management show their commitment to safety as this sets the standard for the whole organisation. The workforce will only believe in this commitment if they know that management are willing to sacrifice productivity or time in order to ensure worker safety.

Evidence of commitment can be seen by management visibility. If managers are not seen on the 'shop-floor' or at the "sharp end of activity" workers may assume that they are not interested in the job or health and safety. Lack of management visibility is seen as a lack of commitment to safety and this becomes part of the organisation's safety culture.

Visible commitment can be demonstrated by management:

- Being seen and involved with the work and correcting deficiencies.
- Providing resources to carry out jobs safely (enough people, time and money, providing appropriate personal protective equipment, etc.).
- Ensuring that all personnel are competent (providing training and supervision).
- Enforcing the company safety rules and complying with them personally (introducing safe systems of work and insisting on their observance).
- Matching their actions to their words (correcting defects as soon as is reasonably practicable, avoidance of double standards).

*A senior manager showing a commitment to health and safety arrangements*



## Revision Questions

13. Define the term "safety culture".
14. How may the safety climate of an organisation be assessed?
15. Name three ways in which management commitment can be demonstrated.

(Suggested Answers are at the end of Unit A.)

# Factors Affecting Health and Safety Culture

## Key Information

- A positive health and safety culture is promoted by:
  - Management commitment and leadership.
  - High business profile to health and safety.
  - Provision of information.
  - Involvement and consultation.
  - Training.
  - Promotion of ownership.
  - Setting and meeting targets.
- A negative health and safety culture may be promoted by:
  - Organisational change.
  - Lack of confidence in organisational objectives and methods.
  - Uncertainty.
  - Inconsistent signals from management.
- To effect a cultural change needs:
  - Good planning and communication.
  - Strong leadership.
  - A step-by step approach.
  - Action to promote change.
  - Strong employee engagement.
  - Ownership at all levels.
  - Training and performance measurements.
  - Feedback.
- Problems with culture change may arise from:
  - Attempting to change it too quickly.
  - Changing everything at the same time.
  - Lack of trust in communications.
  - Resistance from those not committed to change.

## Promoting a Positive Health and Safety Culture

### Management Commitment and Leadership

The most important thing is 'leading by example'. As soon as management undermines the safety standards in order to increase productivity, or ignores an unsafe act, then they lose employee respect and trust and the whole safety culture of the organisation is threatened. It is important to ensure that management behaviour is positive in order to produce positive results and a positive culture.

### High Business Profile to Health and Safety

A positive health and safety culture can be promoted by including safety in all business documents and meetings. All newsletters, minutes of meetings, notices, advertisements and brochures can include an appropriate reference to safety; it could simply be reference to the organisation's commitment to safety (e.g. a safety phrase appearing on all notepaper) or, with respect to meetings, it could be an opportunity for any safety concerns to be raised. If safety is seen as an integral part of the business then the profile of safety will be raised.

### Provision of Information

It is really important to provide information about health and safety matters in the form of posters, leaflets or in staff newsletters.

### Involvement and Consultation

It is vital to involve staff members in health and safety matters. Areas in which staff representatives or health and safety representatives can be actively involved include:

- Risk assessments.
- Workplace inspections.
- Accident investigations.
- Safety committee meetings.

It is also a legal requirement to consult with employees in good time regarding:

- The introduction of any measures which may substantially affect their health and safety.
- The arrangements for appointing or nominating competent persons.
- Any health and safety information to be provided to employees.
- The planning and organisation of any health and safety training.
- Health and safety consequences of introducing new technology.

Involving and consulting with employees is an important process for getting employees to take ownership of health and safety issues. The fact that they or their colleagues have been involved in health and safety matters encourages respect for safety rules and improves attitudes towards safety. These values all help to produce a more positive safety culture within the organisation.

### Training

Training is vital to ensure that people have the right skills to carry out their job safely. Training also makes individuals feel valued and is an important part of their personal growth and achievement. Employees who receive training are more likely to be motivated and take newly-learned skills or ideas back to the workplace.

### Promotion of Ownership

There are many ways to promote ownership in individuals. We have mentioned involvement and consultation already, but simply talking to people and asking their opinion or their thoughts on a health and safety problem can encourage them to think about health and safety and what they can do to improve it.

### Setting and Meeting Targets

Setting safety targets for individuals or teams can have a positive effect on a safety culture. Usually there will be an incentive, perhaps a bonus, linked to performance-related pay or an award or prize. The target could be, for example, to obtain a higher score in a health and safety inspection.

Aiming for the target should encourage people to work together in order to achieve it and this usually means people talking about health and safety and ways to improve it.

Once the target is met, that standard must be maintained and further improvements encouraged by setting another target. The targets must, however, be achievable in order to prevent employees becoming disheartened and abandoning the target.

## Factors that May Promote a Negative Health and Safety Culture

There are a number of factors that may contribute to a negative health and safety culture.

### Organisational Change

Company reorganisations often leave individuals worried about job security and their position in the organisation. Many people fear change and, unless it is handled correctly, will mistrust management and become suspicious of any alterations to their role or environment (even ones that are beneficial).

Reasons for company reorganisation may be:

- A merger.
- Relocation of the business.
- Redundancies.
- Downsizing.
- External pressures over which the organisation has no power.

Companies may offer voluntary redundancies to make the job losses more acceptable but sometimes the redundancies are compulsory. The company may also offer generous financial packages in excess of the statutory minimum to soften the blow to employees. Problems may occur, however, when the retained staff have to work with reduced manpower and resources. The remaining employees may feel threatened by the possibility of further redundancies, leading to bitterness and anger. Further resentment may develop where shareholders and directors are seen to benefit from the loss of colleagues who have left the business.

Where outside pressures are the cause of the reorganisation employees may be more understanding than if the changes are brought about by the need to improve profits.

Frequent reorganisations can be damaging to a company unless they are handled well. Increased workforce dissatisfaction may lead to some employees leaving, which in turn can leave gaps in the operation which cause further difficulties. This type of situation can lead to more accidents and incidents as well as increased

sickness and absence from work.

### Lack of Confidence in Organisation's Objectives and Methods

Most companies have objectives relating to productivity and safety. If productivity appears to take precedence over safety, however, then worker perception will be that the company is unethical and untrustworthy with little commitment to safety, which will lead to a subsequent deterioration in the safety culture.

Examples where workers may feel that safety has been compromised in order to achieve productivity include:

- Safety improvements only made after incidents have occurred.
- Double standards in the application of safety regulations by safety advisers and management.
- Unsafe practices ignored in order to improve productivity.
- Permit-to-work systems not being operated as they should be.
- Changes made to safety rules during operation.

*Unsafe practices may be ignored to improve productivity*

### Uncertainty

Security is a basic human need. In an uncertain environment, people generate feelings of insecurity. When security cannot be assured, humans cannot achieve their full potential. Uncertainty about the future can lead to dissatisfaction, lack of interest in the job and generally poor attitudes towards the company and colleagues.

Uncertainty is often caused by management behaviour which sends mixed behaviour signals to the workforce. If management are seen to say one thing and then do something different, this undermines their authority and credibility, e.g. managers drinking on the job or failing to wear PPE.

### Management Decisions that Prejudice Mutual Trust or Lead to 'Mixed Signals' Regarding Commitment

Management decisions which are, or are perceived to be, inconsistent or poorly made can generate unrest and distrust in an organisation. There may be good reasons for the decision which is why it is extremely important that management are aware that good communication is an important part of the decision-making process.

Circumstances which could give rise to distrust and doubt about management commitment generally (these could equally apply to decisions about safety) include:

- Where there are no rules or no precedents, decisions may appear to be arbitrary and inconsistent.
- Employees expected to wear PPE whereas visitors or managers are not.
- Refusal to delegate decision-making leads to demotivation and diminution of a sense of responsibility in subordinates.
- Constant rescinding by senior management of decisions made at lower levels of management.
- Delays in making decisions.
- Decisions affected by conflicting goals between management and worker.
- Decisions affected by conflicting goals between different departments.
- Lack of consultation prior to decision-making.

## Effecting Cultural Change

There are three factors that should be considered when managing a change in culture:

- Dissatisfaction with the existing situation, e.g. too many near misses.
- A vision of the new safety culture.
- Understanding how to achieve it.

Change is an inherent part of modern life but there are many people who find change difficult to deal with and who are afraid of it. In order to effect change within an organisational culture, you have to plan the strategy and communicate from the beginning in order to involve employees and not alienate them.

### Planning and Communication

Planning for change should start at the top of the organisation but should encourage participation at all levels. There should be clear objectives as to what is to be achieved by the proposed change, e.g. a cost-benefit analysis of the changes suggested.

Plans for change should clearly designate who is responsible for initiating and implementing specified

changes as well as how each stage of the change process will be conducted. Effective communication between all those implementing change is crucial.

To prevent rumours circulating and misunderstandings developing, it is important to publicise information relating to the pending change as early as possible. Wherever possible, direct briefings, meetings or interviews should keep managers and staff aware of proposed changes and the progress made as changes get underway.

### Strong Leadership

Managers at all levels need to demonstrate strong leadership and not give inconsistent or mixed messages.

### A Gradualist (Step-by-Step) Approach

One of the ways of effecting change in an organisational culture is by taking a gradualist (step-by-step) approach, with changes phased in over a period of time. The main advantage of this approach is that it ensures that there is time for adaptation and modification; it also allows time for the change to become part of the established culture.

The major disadvantage of this approach is that the changes take a relatively long time to implement. This can mean that unsatisfactory conditions and mindsets may be left in place for longer than is desirable.

### Action to Promote Change

- **Direct**

  This is where positive action is carried out with the sole objective of effecting change, perhaps by setting up a two-tiered system, i.e. a steering group and a working party. The steering group should consist of high level personnel (e.g. directors and heads of departments) who give broad objectives, set timescales and meet approximately every three months. The working party, however, will meet every month and will consist of middle management, first-line supervisors and union / worker representatives. The working party will carry the 'message' to the workforce and provide feedback.

  The chair of the working party should also be a member of the steering party and this role is usually filled by a safety professional who can act as the link between the two groups.

  The pace of change should be dictated by the feedback given by the working party.

- **Indirect**

  Indirect methods bring about change but they are not necessarily the primary reason for carrying out the method. For example, risk assessments identify deficiencies in the workplace and corrective action to put them right. Widespread use can indirectly encourage a risk assessment mindset or attitude (a culture of greater awareness of risks, etc.).

### Strong Employee Engagement

Cultural change is not the sole responsibility of management; there also has to be significant commitment from employees who must recognise the need for change.

### Ownership at All Levels

All individuals at all levels must be engaged in the process and be committed to change.

### Training and Performance Measurements

- **Training courses** can include information about new or impending safety legislation or safety technology thereby indirectly paving the way for future changes.
- **Performance measurements** can be introduced to encourage employees to have a greater interest and involvement in health and safety. Where performance measurements improve over time they can be linked to an incentive scheme, but they should not be linked to accident/incident rates as this can lead to under-reporting. Performance measurements are an inexpensive way of promoting health and safety, but they need the support of management and unions to be successful.

### Importance of Feedback

Feedback is crucial to ensure that any changes implemented are working successfully. Feedback from employees will enable management to evaluate the new processes, and fine-tune them where necessary.

## Problems and Pitfalls

In many cases the introduction of change within an organisation is often accompanied by problems such as conflict. Problems associated with change include:

- **Changing Culture Too Rapidly**

  Where changes have occurred too quickly employees may feel extremely vulnerable, insecure, confused and angry.

  Where the changes have brought together new personalities, then conflict between individuals may occur. Differences of temperament are at their most obvious when people are new to each other; a measure of tolerance may build up over time.

- **Adopting Too Broad an Approach**

  Trying to do too much all in one go can dilute the resources so that little impact is seen. It is better to target resources on fewer, manageable issues. It is important to be clear about what the objectives are at the start so that everyone is aware of the changes that will occur.

- **Absence of Trust in Communications**

  This is unsettling and demotivating. Inconsistent management behaviour can lead to mistrust and uncertainty causing a complete breakdown in relations between management and the workforce. Poor communications in periods of change can lead to misunderstanding and confusion, which can fuel conflict.

- **Resistance to Change**

  Some people are more resistant to change than others. Older people tend to be more resistant than young people, and people with heavy financial commitments tend to fear change as they need to feel secure.

  Some people develop set patterns of thought and behaviour which can be difficult to overcome when change occurs. This is known as **perceptual set**, and is the way in which observed information is processed by the individual to fit his/her internal experience, attitude, expectations, sensitivity and culture.

All these factors need to be considered and dealt with as part of the change process.



## Revision Questions

16. Identify the features of a positive health and safety culture within an organisation.

17. Briefly explain what is needed to effect cultural change within an organisation.

(Suggested Answers are at the end of Unit A.)

# Summary

## Internal and External Influences

**Internal influences** on the organisation include:

- Finance.
- Production targets.
- Trade unions.
- Organisational goals and culture.

**External influences** include:

- Legislation.
- HSE/Parliament.
- Enforcement agencies.
- Courts/tribunals.
- Contracts/contractors/clients.
- Trade unions.
- Insurance companies.
- Public opinion.

## Types of Organisations

An **organisation** is a group of persons who interact in order to achieve certain predetermined goals or objectives.

In a **formal** organisation, the organisation's structure is based on relationships from the chief executive down. This hierarchical structure is represented by the company organisation chart, or organogram.

The **informal** organisation is represented by individual and group behaviour, and depends on the quality of personal relationships.

The organisation can be viewed as a **system**; different parts of an organisational system are functionally interrelated - change in one part affects other parts of the organisation.

Conflict may arise as a result of individual goals not being consistent with those of the organisation.

## Third Party Control

Definitions in this area:

- Third parties:
  - Contractors.
  - Visitors and trespassers.
  - Members of the public.
- The particular difference between contractors and other parties.

**Sections 3** and **4** of **HSWA** deal with the duties of employers to non-employees (S. 3) and the duties of those in control of premises (S. 4).

**Regulation 11** of **MHSWR** requires employers in shared workplaces to co-operate with each other.

**Regulation 12** of **MHSWR** requires employers who engage employees of other employers (e.g. contractors) to provide information on the risks to those employees and the control measures taken to control the risks.

When using **contractors** procedures need to be adopted to ensure:

- Planning - including risk assessment.
- Selection - competent contractor.
- During contract – ensure contractor is inducted and is aware of local procedures.

- Checking of performance.
- Review of procedures.

## Consultation with Employees

With regard to **formal consultation**, a duty is placed on employers by **Section 2(6)** of **HSWA** to consult appointed trade union safety representatives.

The functions of **safety representatives**, as laid down in the **SRSCR**, include to:

- Represent the employees in consultation with the employer.
- Carry out inspections of the workplace.
- Look at causes of accidents.
- Receive information from health and safety inspectors.
- Attend safety committee meetings.

Under the **SRSCR**, a duty is placed on the employer, when so requested by at least two safety representatives, to establish a **safety committee**. The **function** of the safety committee is to keep under review the measures taken to ensure the health and safety at work of the employees, and such other functions as may be prescribed.

The **HSCER** allow for consultation with non-trade-union representatives of employee safety. Employers may consult directly with the workforce, or through elected representatives of employee safety.

**Informal consultation** can be a valuable source of information; it can take place in discussion groups, safety circles or departmental meetings.

Consultation may be compromised by peer group pressure, tokenism and areas of conflict.

## Development of a Health and Safety Management Information System

A broad range of both internal and external information is needed for an effective health and safety management information system. This includes loss event data, cost data, suppliers' data and the results of audits and inspections.

Health and safety regulations detail more specific requirements for the provision of information.

The provision of information is governed by **Section 2(2)(c)** of **HSWA**, which requires the employer to provide such information, instruction, training and supervision as is necessary. **Section 2(3)** requires every employer to provide a safety policy.

**Regulation 10** of **MHSWR** requires the provision of comprehensible information capable of being understood by all employees to whom it is addressed.

## Health and Safety Culture and Climate

**Safety culture** may be defined as "a system of shared values and beliefs about the importance of health and safety in the workplace".

**Safety climate** is an assessment of people's attitudes and perceptions at a given time.

Organisational factors, e.g. training, availability of suitable equipment, behaviour of managers, etc. influence individual behaviour.

There are many **indicators** that give a first impression of a company's health and safety culture. It is also possible to measure indicators that give a more accurate picture; these include:

- Attitude surveys.
- Prompt lists.
- Findings of incident investigations.
- Effectiveness of communication.
- Evidence of commitment by personnel at all levels.

## Factors Affecting Health and Safety Culture

A **positive** health and safety culture can be promoted by various factors, such as: the commitment of management, a high business profile, provision of information, involvement and consultation, training, promotion of ownership, and the use of targets.

A **negative** health and safety culture can also be affected by various factors, such as: organisational change, lack of confidence in an organisation's objectives and methods, uncertainty, and inconsistent management decisions.

A **change in attitudes** can be achieved by planning and communication, and should be introduced using a gradualist approach. Action to promote such a change can be direct or indirect.

By now you should be familiar with the style of NEBOSH exam questions; the next one is a straightforward 10 mark question on health and safety culture.

## Question

**Outline** how safety tours could contribute to improving health and safety performance and to improving health and safety culture within a company. Discussion of the specific health and safety requirements, problems or standards that such tours may address, is **not** required. **(10)**

## Possible Answer by Exam Candidate

*Safety tours can contribute to improving health and safety performance and the culture as they should be used to identify good and poor H&S behaviours on the shop floor of the organisation. This information can be used in a simple manner to trend on performance against set behaviours via a performance feedback sheet, such as PPE being worn v. not worn – has it improved since last time or got worse?*

*The tours can be used to target new understanding or compliance with new initiatives and programmes the company introduces and is an effective way of engaging the workforce across an organisation to support these. The actions raised should be solved locally, visually and quickly, which demonstrates leadership and commitment of the company and enables best practice sharing. If the safety tours are carried out by managers they can be an effective demonstration of management commitment to safety; however this does require action to be taken as a result of the tour.*

## Suggested Answer Outline

Remember this is a 10 mark question so try to identify 12 points in order to gain full marks.

The Examiner would be looking for some of the following points to be included in your answer.

Safety tours can be used in an organisation to help improve its health and safety performance and culture by:

- Identifying compliant and non-compliant behaviours.
- Ensuring compliance with legislation and good practice.
- Seeing how effective its actions are.
- Establishing that new programmes are working as expected.
- Identifying good practice across the company.
- Consolidating good relationships with the workforce during tours.
- Assessing workforce behaviour on an unscheduled basis.
- Spotting local issues.
- Identifying company-wide issues.
- Demonstrating leadership/engagement and commitment.
- Highlighting management commitment.
- Ensuring that local remedial actions to solve issues raised have been implemented.
- Encouraging local ownership of health and safety.
- Highlighting the importance of safety.
- Combining it with other types of tours (quality/environmental, etc.) saving time/resources, etc.
- Sharing the findings with the workforce, showing openness.
- Making it easier to communicate on a regular basis with employees.

# Exam Skills

**ELEMENT A6** ORGANISATIONAL FACTORS

An exam candidate answering this question would achieve **poor marks** for:

- Describing how to **carry out** a safety tour.
- Looking at specific issues, although the question particularly said **not** to.
- Focusing on the timing/frequency of tours and not looking at how tours can help improve health and safety performance.

NEBOSH International Diploma Unit IB

# Element IB3: Hazardous Substances – Evaluating Risk



RRC TRAINING

# Contents

## Learning Outcomes

On completion of this element, you should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular you should be able to:

- Outline the factors which should be considered when assessing risks from hazardous substances.
- Describe Occupational Exposure Limits for airborne contaminants, how they are established, and the criteria for their application to the workplace.



### Hints and Tips

Read the course materials with a pen and paper to hand, to take notes. After reading a section of text, try to write out a summary of it in your own words.

# Assessing Risks

## Key Information

- There are certain occupations that are strongly associated with exposure to specific chemical substances.
- The factors to be considered in the assessment of risks to health from chemical agents include:
  - Numbers exposed.
  - Aerosol/particle size.
  - Concentration.
  - Type and duration of exposure.
  - Frequency of exposure.
  - The effect of mixtures.
  - Continuing and contingent exposures.
  - Thresholds of exposure.
- Individual susceptibility affects the risk to persons exposed to chemical agents. Other factors include solubility in body fluids, synergy, age, sensitisation and morphology.
- The World Health Organisation (WHO)/International Programme on Chemical Safety (IPCS) Project on the Harmonisation of Approaches to the Assessment of Risk from Exposure to Chemicals ("Harmonisation Project"), aims to harmonise global approaches to risk assessment by increasing understanding and agreement on basic risk assessment principles and developing international guidance documents on specific issues.

## Occupations Presenting Specific Exposure Risks and Typical Chemical Substances Involved

The following table lists a broad selection of occupations that have been strongly associated with exposure to specific chemical substances. Many of these are now strictly controlled or the hazard has been substituted with a less hazardous substance.

*Garage workers are at risk of exposure to carbon monoxide*

*Occupations at Risk from Hazardous Substances*

| Occupation(s) | Chemical | Disease or Effect |
|---|---|---|
| Lead workers (paint, pipes and manufacture of petrol additives) | Lead | Lead poisoning (anaemia) |
| Mercury workers (manufacture of mercury cells, treatment of furs and dentists) | Mercury | Mercury poisoning (brain damage) |
| Coin manufacture | Nickel | Dermatitis |
| Polystyrene manufacture | Styrene | Irritant (eye, nose and respiratory tract) |
| Pesticide users | DDT | Nerve damage |
| Gardeners | Paraquat (Weedol) | Lung and kidney damage |
| Brewery workers | Carbon dioxide | Asphyxia |
| Garage workers | Carbon monoxide | Asphyxia |
| Sewer workers | Hydrogen sulphide | Asphyxia |
| Electroplating workers | Hydrogen cyanide | Asphyxia |
| Fertiliser manufacturer | Ammonia | Irritant gas |
| Swimming pool workers | Chlorine | Irritant gas |
| Woodworkers | Hardwoods | Nasal cancer |
| Chemical laboratory workers | Benzene | Leukaemia |
| Dye stuff manufacture | Benzidine | Bladder cancer |
| Iron ore mining | Radon | Lung cancer |
| Shipbuilding, car brake shoe manufacture | Asbestos | Lung cancer |
| Nickel refining | Nickel | Lung cancer |
| Gas workers | Benz(a)pyrene | Cancer of the bronchus |

## Factors to be Considered in the Assessment of Risks to Health from Chemical Agents

### Risk Assessment Procedure

Regardless of the hazards involved, you must be totally conversant with Risk Assessment procedure. This is fundamental to workplace safety. Before you can put in control measures, you must know what your problems are.

It is important to remember the stages of risk assessment:

- Identify the foreseeable hazards.
- Measure those at risk.
- Evaluate the risk and determine whether existing controls are suitable.
- Record significant findings.
- Review the process frequently.

As a result of this process, suitable control measures can be introduced.

### Factors to Consider

When measuring those at risk, consider:

- **Numbers exposed** – who is likely to be affected by the substance, either directly or indirectly? (Don't forget shift workers and casual visitors.)
- **Aerosol/particle size** – important in determining the effects of inhalation of airborne contaminants.
- **Concentration** – an important parameter in determining the **likelihood** of harm occurring and also **how much damage** may be done. (Chemical reactions usually proceed faster if the concentration is higher and therefore a toxic substance is likely to 'poison' faster, or a corrosive one to 'burn' quicker if the concentration is higher. Also, the higher the concentration, the more per unit volume of substance we have to deliver a toxic dose or inflict a chemical burn. It is therefore a fair generalisation, although there may be rare exceptions, that the higher the concentration of a chemical agent we are handling, the greater the risk of harm.)
- **Type and duration of exposure** – for how long are they exposed to the substance?
- **Frequency of exposure** – how often are they exposed to the substance?

- **Effect of mixtures** – is exposure to a combination of agents likely to be greater than the sum of the individual effects? One compound may decrease the toxicity of another (e.g. an antidote to a poison); one compound may simply add to the toxicity of another – this is quite common and expected; one compound may enhance the toxicity of the other so that the resultant toxicity is greater than the sum of the individual toxicities (potentiation or synergy).
- **Continuing and contingent exposure** – are they exposed to the substance because of the job that they do (and exposure is likely to continue) or are they exposed because of their proximity to the substance?
- **Thresholds of exposure** – how much are they being exposed to (e.g. the amount of dust in the air)? How does this level compare with national or international set standards or guidance values (UK Guidance Note EH40, for example)?

## Factors Affecting the Risks to the Individual

### Individual Susceptibilities

It is not only the particular properties of the chemical agent in question that determine the risk to the worker; an equally important consideration is the individual susceptibility and this can depend on a number of factors.

#### Atopic Persons

Atopy is a type of hypersensitivity where the tendency to allergy is inherited. Such individuals may be prone to, for instance, asthma attacks, other respiratory problems, or eczema.

#### Women of Child-Bearing Capacity (Including Pregnancy or Women Who Have Recently Given Birth)

Examples of chemicals which can have an adverse effect on pregnant women include:

- Organic mercury (slows growth and affects development of the central nervous system).
- Carbon monoxide (crosses the placenta and affects the foetus).
- Lead (can cause miscarriage, stillbirth and infertility).

As is discussed in Element IB2, as part of hazard communication to users, warning phrases are required on containers of hazardous chemicals. Examples of European labelling warning phrases of particular significance to women of child-bearing capacity include:

- R60: May impair fertility.
- R61: May cause harm to the unborn child.
- R62: Possible risk of impaired fertility.
- R63: Possible risk of harm to the unborn child.
- R64: May cause harm to breastfed babies.

#### Lifestyle

Personal habits can contribute to the vulnerability to harm from exposure to certain chemicals. The effects of some chemicals will be increased where the person is a smoker, drinker or drug user. Respiratory and lung disorders arising from smoking will compound the effects of exposure to airborne contaminants.

Excessive alcohol consumption leading to liver damage will reduce the body's ability to metabolise toxic chemicals. Dietary intake will affect the rate of absorption of certain occupational chemicals.

In practice, these factors should be addressed through the occupational health screening and health surveillance programmes that should support the use of chemical agents in the workplace.

### Solubility in Body Fluids

In the previous element, we encountered a number of examples where the harmful effect of an agent depends on its particular chemical properties and its ability to interact with absorbing areas of the body. Examples include ammonia gas which can dissolve in moist areas of the respiratory tract (and there are many other examples of soluble gases which can cause harm by this route); toxic metals which are only soluble in water at a particular pH, which determines where in the gastrointestinal tract dissolution and absorption can take place; and organic chemicals which are not water-soluble but will dissolve in fats or lipids in the body and consequently accumulate in target organs that are susceptible (e.g. chlorinated hydrocarbons).

Consequently, the particular physical form of the substance (gas, liquid, solid) and its chemical properties (water-soluble, organic liquid soluble in lipids/fats, soluble in acid or alkaline solutions) gives us an indication of the way in which the material may interact with the body and hence its potential for harm.

### Synergy

Chemical agents are able to exert a harmful effect on the body, if exposure to the substance in isolation occurs. However, if exposure to a combination of agents occurs, it is possible, in some cases, for one or other of the agents to enhance the harmful effect of the others. This is called **synergy** and means that the effect of the combination of agents on the body is greater than the sum of the individual effects.

The most common example of this is the effect of exposure to asbestos fibres on smokers. Tobacco smoke is known to contain carcinogenic substances

and it is possible to estimate the likelihood of a smoker contracting lung cancer. Asbestos fibres are also a recognised carcinogen and epidemiological data gives us the probability of an asbestos worker developing lung cancer following exposure to asbestos dust. However, if epidemiological data for asbestos workers **who smoke** is studied, it is found that the likelihood of these individuals contracting lung cancer is much higher than that expected from exposure to each agent individually.

As a result of this, in assessing the risk from exposure to a range of chemical agents, it is necessary to consider any synergic effects that may enhance the harmful effect of one or more of the substances.

## Age

Younger workers are vulnerable to chemicals which affect the reproductive system (e.g. insecticides/ pesticides) and older workers may have pre-existing medical conditions (e.g. respiratory or skin problems) that increase the risk from certain substances.

## Sensitisation

Sensitisation refers to the body's reaction to exposure to a substance that it has become allergic to. Sensitisation occurs when the immune system has been exposed to an allergen (something that will produce an allergic response), remembers it and launches its defence mechanisms should the allergen reappear. If exposure to the same allergen recurs, there is a response by the immune system and the symptoms of allergy are displayed.

Allergies are the body's reactions to substances that it identifies as harmful. While in most people these substances produce no symptoms, sensitised people can suffer from a range of symptoms such as sneezing and itching. Some allergies have been linked to serious chronic respiratory illnesses, such as asthma. In some cases the allergic reaction can prove to be fatal.

Some common allergies include:

- Respiratory – hay fever.
- Skin allergies – eczema following exposure to latex.
- Food allergies – a person who has a nut allergy can suffer very serious effects from traces of nut.
- Allergies to medicine – penicillin is a very common allergen.
- Allergies to insect stings.

*Some substances can produce allergic reactions including respiratory problems*

## Morphology

Morphology simply means the form (size and shape) and structure of an object. Airborne contaminants can be grouped under the general term of **aerosol**. An aerosol is a scientific term that applies to any disperse system of liquid or solid particles suspended in air, so it applies to a wide range of particulate systems encountered occupationally. We met some of the different types and their relative sizes in Element IB2.

Various particle parameters such as size, size distribution, **particle shape**, density, chemical properties and velocity affect their motion in air, including settling rate, and their clearance from, and absorption in, the lungs when inhaled. Particle shapes include:

- **Spherical** - e.g. mists and sprays.
- **Isometric** (non-spherical but compact particles) - e.g. dusts.
- **Platelets** (plate-shaped particles) - e.g. certain dusts such as mica.
- **Fibres** (long, thin needle-shaped particles) - e.g. asbestos and mineral fibre.

Fibres tend to be more difficult for the lung to clear after deposition. In regard to man-made vitreous fibres, fibres with length more than 5 µm and a diameter of less than 1.5 µm have the greatest potential to reach the deep parts of the lung. Fibres with a length of more than 20 µm may be too big for the alveolar macrophages to remove. In regard to asbestos fibres, different sizes of these fibres have been associated with different lung conditions – asbestosis, lung cancer, mesothelioma. It should be noted that asbestos fibres are unusual – they can fracture into multiple, smaller fibrils after inhalation.

Since airborne contaminants occur in a wide range of shapes and dimensions, it is necessary to employ simple indices of size in order to compare the aerodynamic properties of different aerosols. A commonly used index is the aerodynamic diameter, which is the diameter of a sphere of water that has the same falling speed in air as the particle in question. Since we are principally interested in how the aerosol particle behaves in air and also in the respiratory tract, this comparative index gives a useful indication of how different types of aerosol particle are likely to behave.

## Harmonisation of Risk Assessment Methodologies for Hazardous Substances on an International Basis

### The IPCS Harmonisation Project

The World Health Organisation (WHO)/International Programme on Chemical Safety (IPCS) Project on the Harmonisation of Approaches to the Assessment of Risk from Exposure to Chemicals ("Harmonisation Project"), aims to harmonise global approaches to risk assessment by:

- Increasing understanding and agreement on basic risk assessment principles.
- Developing international guidance documents on specific issues.

The Project aims to ensure that risk assessments are performed using internationally accepted methods and these assessments can then be shared to avoid duplication of effort.

The principle is that internationally an agreed process will be produced having the following steps:

- Hazard identification.
- Hazard characterisation.
- Exposure assessment.
- Risk management.
- Risk communication.

The IPCS Harmonisation Project enables governments and others to work towards the achievement of goals first outlined in Agenda 21 Chapter 19 in Rio in 1992 at the United Nations Conference on Environment and Development. Governments made a commitment to "achieve, by 2020, that chemicals are used and produced in ways that lead to the minimisation of significant adverse effects on human health and the environment, using transparent science-based risk assessment procedures and science-based risk management procedures...".

During 2005-2009 the Project has been undertaking expert activities to harmonise methods hand-in-hand with activities in support of country uptake and use of these methods, including communication, promotion and translation into languages.

Although progress has been made in agreeing methodology, it is not clear at what point this will become formalised in international agreements such as ADR and national regulations.

### Revision Questions

1. **List three** occupations associated with asphyxia, and the chemical agent involved.
2. What factors should be considered when assessing risks to health from chemical agents?
3. What specific factors affect the hazard/risk to individuals from chemical agents?

(Suggested Answers are at the end of Unit IB.)

# Occupational Exposure Limits for Airborne Contaminants

## Key Information

- The concept of Occupational Exposure Limits (OELs) is utilised as an important strategy for the protection of people at work from airborne contaminants. The same concept may be referred to by different names, such as Workplace Exposure Limits (WELs); Permissible Exposure Limits; Maximum Allowable Concentrations and Threshold Limit Values (TLVs); depending on the region in which you operate.
- OELs are designed to control the absorption into the body of harmful substances following inhalation. The main objective in each case is to reduce personal exposure to the lowest possible level and compliance is based upon the measurement of environmental contamination by the use of personal monitoring systems.
- Generally, an OEL can be viewed as a maximum which must not be exceeded but in certain situations a stricter level of control may be required (as low as is reasonably practicable) where the hazardous substance is carcinogenic, mutagenic or asthmagenic.
- The two main units used for measuring airborne concentrations are:
  - Parts per million (ppm).
  - Milligrams per cubic metre of air ($mg/m^3$).
- An OEL value is normally set at a level at which no adverse effects on human health would be expected to occur. Where such a level cannot be identified then the OEL value is based at a level corresponding to what is considered to represent good control. Wherever possible, an OEL is not set at a level at which there is evidence of adverse effects on human health.
- Occupational Exposure Limits are established by expert committees such as the Advisory Committee on Toxic Substances (ACTS), the Working Group on Action to Control Chemicals (WATCH) and American Conference of Governmental Industrial Hygienists (ACGIH).
- Biological Limit Values (BLVs) are used as standards for comparison with biological monitoring results and represent the concentration of the hazardous substance or its metabolite found in blood, breath or urine.
- Long-term and short-term exposure limits are designed to reduce the risk of chronic long-term and acute short-term effects resulting from the absorption of harmful substances.

## Meaning and Use of Occupational Exposure Limits

The concept of Occupational Exposure Limits (OELs) is utilised as an important strategy for the protection of people at work from airborne contaminants. The same concept may be referred to by different names depending on the region in which you operate. For example, in the UK these are called **Workplace Exposure Limits** (**WELs**). WELs are legally enforceable and are detailed for a wide range of substances in HSE Guidance Note EH40, which is revised annually.

In the USA, the term used is "Threshold Limit Value" or TLV. Other countries adopt exposure limits which are arrived at by a similar process. Other examples include: in France the VME (Valeur Moyenne dExposition); in Germany the MAK (Maximale Arbeitsplatz-Konzentration); and in Malaysia the PEL (Permissible Exposure Limit).

(The measurement and assessment of airborne contaminants is typically carried out by an occupational hygienist, whose role was discussed in Element IB1.)

Such limits normally establish average concentrations of airborne contaminants against which exposure in the workplace can be compared. We will study the significance of these limits and their application later in this element.

### Occupational Exposure Limits and their Use in Defining "Adequate Control"

**OELs** are designed to control the **absorption into the body** of harmful substances following **inhalation**. They are **not** concerned with absorption following ingestion or skin contact. Control methods are therefore concerned with limiting the amount of harm in respirable air by the use of standard control methods, e.g. local exhaust ventilation, or, where safe-place strategies cannot be applied, by the use of personal protection.

The main objective in each case is to **reduce personal exposure** to the lowest possible level, typically by means which are "reasonably practicable". This also underlines another important factor in the implementation of OELs: that compliance is based upon the **measurement** of environmental contamination by the use of **personal monitoring systems**.

Taking the UK as an example, a **WEL** is defined as the maximum concentration of an airborne substance, averaged over a reference period, to which employees may be exposed by inhalation.

For the average over a reference period (referred to as the time-weighted average (TWA)), two time periods are used – the long-term exposure limit (LTEL) over eight hours, and the short-term exposure limit (STEL) over 15 minutes. These same two time periods are also used for OELs in other regions of the world.

Generally, an OEL can be viewed as a maximum or ceiling which must not be exceeded on a time-weighted average basis.

However, in certain situations a stricter level of control may be required; for example, where the hazardous substance is either carcinogenic or mutagenic (i.e. in Europe, carries the risk phrases R45, R46, R49) or is capable of causing occupational asthma (i.e. carries the risk phrases R42, R43 or is listed by national guidance as an asthmagen). In such cases, control will only be deemed adequate if exposure is reduced to a level which is "as low as is reasonably practicable".

So, for most substances assigned an OEL, employers can achieve adequate control of airborne contaminants by ensuring that the OEL is not exceeded.

For carcinogens, mutagens and sensitising agents capable of causing occupational asthma, employers must ensure that the control measures in place reduce employee exposure as far below the OEL as is reasonably practicable. Thus, for these latter substances a higher degree of control is required by law and can be enforced. For these substances it is not enough just to be below the OEL. Workplace exposure must be below the OEL and further reduced below the OEL to the greatest extent reasonably practicable.

### Units Used for Exposure Limits

The two main units used for measuring airborne concentrations are:

- Parts per million (ppm).
- Milligrams per cubic metre of air (mg/m$^3$, or mg m$^{-3}$).

The gaseous state (vapours and gases) is measured in ppm, which refers to parts of vapour or gas of a substance in a million parts of contaminated air by volume.

Particulate matter or fumes is measured in mg/m$^3$, which refers to the milligrams of substance per cubic metre of contaminated air.

## Criteria for Establishment of Standards/Limits

An OEL value is normally set at a level at which **no adverse effects** on human health would be expected to occur based on the known and/or predicted effects of the substance. Where such a level **cannot** be identified with reasonable confidence or is not reasonably achievable, then the OEL value is based at a level corresponding to what is considered to represent **good control**, taking into account the severity of the likely health hazards and the costs and efficacy of control solutions. Wherever possible, an OEL is **not** set at a level at which there is evidence of adverse effects on human health.

Adoption of national/regional OELs typically depends on the recommendation of expert committees.

### Work of Expert Committees

As an example, let's take a look at how OELs are set in the UK.

In the UK, OELs may be set from two basic sources:

- EU legislation setting Community-level OELs.
- Locally arising limits, e.g. from the British national WEL programme.

In the UK, WELs are set on the recommendation of the Advisory Committee on Toxic Substances (ACTS). When setting an OEL, however, before this takes place there has to be an assessment carried out of toxicological, epidemiological and other relevant data.

The first step in deriving an OEL involves an assessment of the toxicology of the substance in order to identify the potential for adverse health effects and to understand the dose-response relationship. The primary purpose of this stage in the process is to identify the No-Observed Adverse Effect Level (NOAEL); this is the point on the dose-effect curve below which no adverse health effect is observed, but above which some adverse effect is observed.

Many hazardous substances will have such a 'threshold' level, but not all. For example, carcinogens may not have a discoverable threshold level below which there is no possibility of cancer occurring.

If a NOAEL is identified, then this value is used as a starting point for determining the highest level of exposure at which no adverse health effects are predicted to occur in an **occupational** context. In other words, an estimate is made of the highest level of exposure that a worker could be exposed to on a daily basis for their entire working life without experiencing

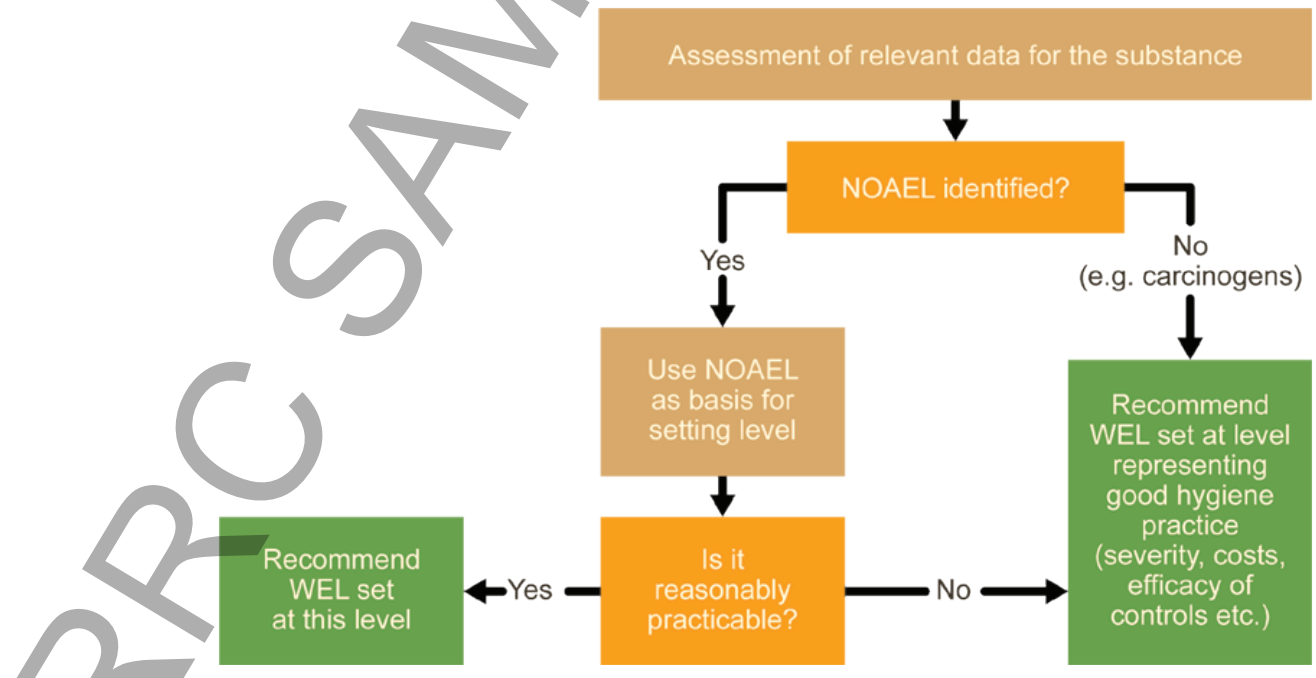
ill-health effects. Since much of the toxicological data is derived from animal studies, this estimate is made with built-in safety factors.

The final step in the process is to determine the actual levels of exposure that are being achieved in the workplace. If these actual exposure levels are below the level identified by ACTS, or if ACTS believes that achieving a lower level is reasonably practicable, then ACTS will recommend that the WEL is set at this level.

In other words, ACTS determines a NOAEL and from this derives an estimated level at which workplace exposure will not cause health effects over a working life. The OEL is then set at this estimated level on the basis that it is reasonably practicable for workplace exposure to be kept below this level.

However, for some substances the process outlined above is not applicable. For certain substances it is not possible to set a NOAEL; this might be because a NOAEL does not exist, or because no scientifically accepted method exists for determining the NOAEL, or because the scientific data is of poor quality and does not allow a NOAEL to be set with a degree of confidence. For other substances a NOAEL can be determined, but ACTS considers that it would not be reasonably practicable to control exposure down to this level in those industries using the substance.

In these cases, ACTS will set an OEL at a level commensurate with good occupational hygiene practice. In setting this level the severity of likely health effects and the costs and efficacy of the possible control solutions are all considered. Wherever possible, the WEL is not set at a level where there is positive evidence of adverse effects on human health. The process is summarised in the figure that follows.




*The Work of ACTS*

ACTS is supported by a number of sub-committees including the **Working Group on Action to Control Chemicals** (**WATCH**), which advises ACTS on issues relating to the assessment and control of health risks from chemicals.

In the USA, a similar role to ACTS and WATCH is fulfilled by the American Conference of Governmental Industrial Hygienists (ACGIH). It produces a guide for evaluation and control of workplace exposures to chemical substances and physical agents. Threshold Limit Value (TLV) occupational exposure guidelines are recommended for more than 700 chemical substances and physical agents. There are more than 50 Biological Exposure Indices (BEIs) that cover more than 80 chemical substances. TLVs and BEIs are determinations made by a voluntary body of independent knowledgable individuals.

There are three such committees within ACGIH:

- Biological Exposure Indices Committee.
- Threshold Limit Values for Chemical Substances Committee.
- Threshold Limit Values for Physical Agents Committee.

## Role of Biological Limit Values

OELs are not the only type of standard in wide use. Biological Limit Values (BLVs) are used as standards for comparison with biological monitoring results (which we will look at in more detail in Element IB5).

A Biological Limit Value is the limit of the concentration in the appropriate biological medium of the relevant agent, its metabolite, or an indicator of effect. In other words it is the concentration of the hazardous substance or its metabolite found in blood, breath or urine.

One type of BLV used in the UK is the Biological Monitoring Guidance Value (BMGV). BMGVs are non-statutory guidance and, like WELs, are published in the guidance document EH40.

In the USA, the best known are published by the American Conference of Governmental Industrial Hygienists (ACGIH) (see above).

The ACGIH Biological Exposure Index (BEI) is based on the average value that might be found in workers who were exposed for eight hours per day to the ACGIH airborne limit.

It is important to note that these BLVs complement, and do **not** replace, the OELs regime for airborne exposure. Airborne monitoring is only effective for monitoring hazardous substances in the air. It is ineffective at assessing whether employees have been exposed by other means, such as ingestion or by absorption through the skin, and therefore BLVs provide a much more accurate assessment of an individual employee's exposure.

## Significance of Short- and Long-Term Exposure Limits

Both long-term and short-term exposure limits are expressed as time-weighted average (TWA) concentrations. This means that measurements are taken and the airborne concentrations are averaged out over a given period of time in the units given earlier. If the concentration of a contaminant measured over one hour was 86 ppm, and over the next two hours was 32 ppm, then the TWA for this period would be:

$$\frac{(86x1)+(32x2)}{1+2} = \frac{86+64}{3} = \frac{150}{3} = 50 \text{ ppm}$$

Long-term and short-term exposure limits are designed to reduce the risk of chronic long-term and acute short-term effects resulting from the absorption of harmful substances.

## Long-Term Exposure Limits (LTELs)

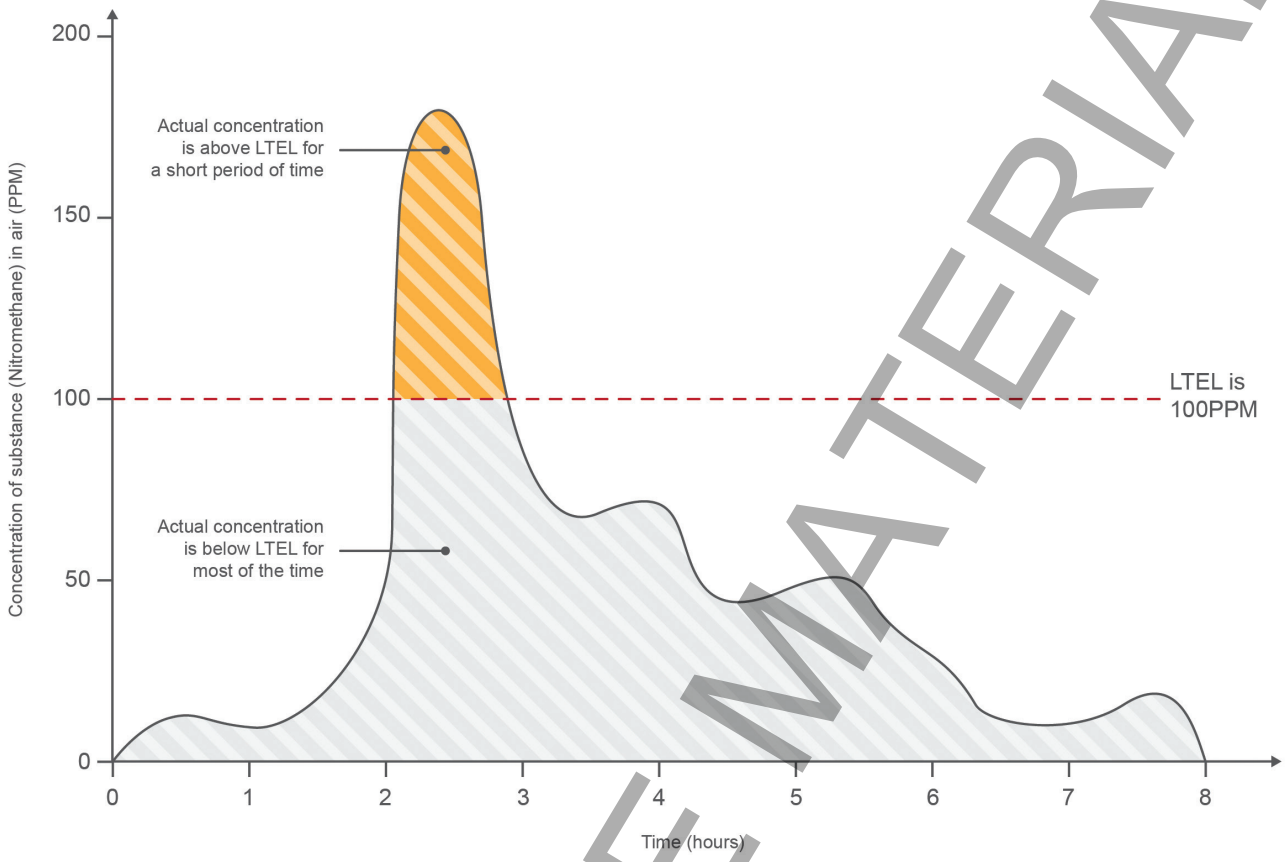
Long-term exposure limits are designed to reduce the accumulation of harmful substances in the body, or conditions which would enhance a disease risk with continuing contact. You should note that risk remains, even when contamination is controlled by reduced-time exposure; but the risk should be at an insignificant level.

The long-term exposure limit is based upon an eight-hour TWA and is related to personal exposure. The general formula for calculating an eight-hour TWA exposure is:

$$\text{LTEL} = \frac{\Sigma \text{ concentration of contaminant x exposure time in hours}}{8}$$

(Note: the symbol "$\Sigma$" is mathematical shorthand meaning "sum of" – i.e. add together.)

The concept of a TWA allows excursion **above** the LTEL, provided there are equivalent excursions **below** the limit to compensate for the excess exposure. There are no stated levels of excursion for an LTEL, but they should not become excessive. The concurrent application of short-term exposure limits will help prevent the occurrence of excessive short-term exposures. The following figure illustrates a variable exposure over an eight-hour period. If the LTEL is not to be exceeded, then the area of the graph above the LTEL value must not be more than the area below it.




*Graph Showing Actual Concentration of a Substance (Nitromethane) in Air Over an 8-Hour Working Period Along with the LTEL for the Substance*

## Short-Term Exposure Limits (STELs)

Short-term exposure limits are designed to control adverse effects which might result from exposure to a high concentration of a contaminant over short periods of time. They are expressed as a TWA concentration for a time of 15 minutes. STELs are aimed primarily at preventing acute effects or, more appropriately, limiting the risk of them occurring. They are only given for substances where there is evidence that harm may result from brief exposures; but if it were considered prudent to use an STEL control strategy for substances without a listed value, then it is suggested that a value of **three times** the LTEL, averaged over **15 minutes**, should be used to control short-term excursions.

The philosophy behind the use of a 15-minute TWA for STELs is based upon the fact that it is the shortest realistic time for a sample to be analysed to give a meaningful result. It has to some extent replaced the concept of 'ceiling value' limit, which defined an instant in time when a concentration was analysed. As this applied to a general and not personal exposure condition, a person could have been put at considerable risk in the immediate working area. If it is considered that a substance should be controlled to a higher standard, then the 15-minute sampling time will be reduced and a note made to that effect alongside the OEL entry.

## Calculations Involving LTELs and STELs

The formula given for calculating eight-hour TWA exposures also applies to 15-minute TWA exposures **except** that the **time is in minutes and the summation is divided by 15**.

## Topic Focus

### Calculating 8-Hour TWA Exposures

The 8-hour TWA exposure for a work activity where the exposures have been measured can be calculated using the formula given in the previous section.

The simplest way of using the formula is:

1. For each partial exposure period multiply the concentration by the duration of exposure (in hours).
2. Add all of these partial exposures together (sum them).
3. Divide the sum by 8 (to give an 8-hour average).
4. Express the answer in the same units as the concentrations were first measured in.

Table showing measured exposures (concentration and duration of exposure) along with the partial exposures (concentration x time in hours) and the sum of the partial exposures (steps 1 and 2).

| Concentration of Contaminant in ppm | Exposure Time in Hours | Product |
|---|---|---|
| 60 | 0.5 | 60 x 0.5 = 30 |
| 40 | 1.5 | 40 x 1.5 = 60 |
| 50 | 2.0 | 50 x 2 = 100 |
| 60 | 3.0 | 60 x 3 = 180 |
| 80 | 1.0 | 80 x 1 = 80 |
| | | sum **450** |

Steps 3 and 4

8-hour TWA = = 56.25 ppm

$$\text{8-hour TWA} = \frac{450}{8} = 56.25 \text{ ppm}$$

If the WEL listed in EH40 for the substance in question was:

- 30ppm - then the WEL would have been exceeded.
- 60ppm - then the limit would not have been exceeded, but the 8-hour TWA would be unacceptably close to the WEL.
- 200ppm - then the exposure would be acceptable in relation to the WEL.

As noted earlier, for things such as carcinogens, mutagens and respiratory sensitisers, the standard of adequacy is usually much more stringent – as low as reasonably practicable (ALARP) and at least below the exposure limit.

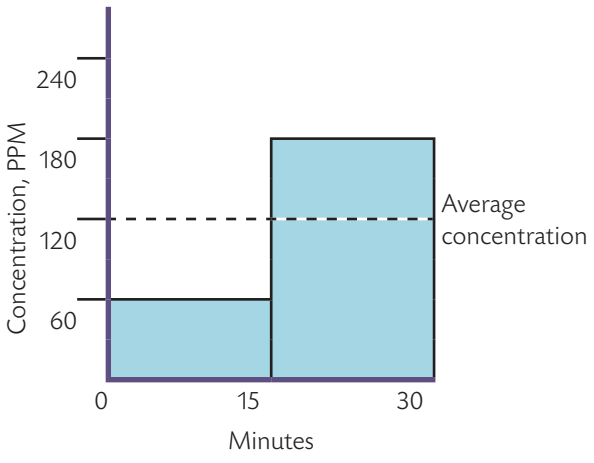
Suppose that an eight-hour analysis has given the following:

| Concentration of Contaminant in ppm | Exposure Time in Hours |
|---|---|
| 120 | 0.5 |
| 50 | 1.5 |
| 100 | 2.0 |
| 0 | 3.0 |
| 115 | 1.0 |

You can see the result is the same as that calculated earlier. Assuming the STEL was 180 ppm (3 × 60), there must be cause for concern about the high results given for the time when a positive contamination was found. Apart from the need for a general review, it is apparent that STEL testing is also required.

If you consider the first line of figures, the 120 ppm represents an average exposure for a period of 0.5 hours or 30 minutes. During this time, there could have been considerable excursions above and below this value. It is therefore imperative that short-term measurements be taken so as to assess the exposure pattern in more detail.

To illustrate the point, the following exposure pattern may have been found. In the overall analysis, a straight line is given for the average result at the 120 ppm position. If two short-term tests were carried out, it might have been found that for the first 15 minutes the TWA result was 60 ppm, but the **main exposure** occurred in the second section where the contamination had risen to 180 ppm (see following figure). This would allow a much more informed approach to improving the contamination level for both the long-term and the short-term exposures.




*Short-Term Exposure Pattern*

Short-term exposure TWAs should be obtained from a 15-minute sampling period. It is **not acceptable** to take results from a 30-minute analysis obtained by doubling up the result of a 15-minute TWA. Sampling over shorter periods is **only** valid if it is known there is no exposure during the time not used, e.g. a five-minute analysis giving 90 ppm can give an acceptable short-term exposure TWA of 30 ppm providing there is zero exposure for the other ten minutes.

EH40 also contains example calculations where exposures are for longer than eight hours. The TWA exposure is scaled up accordingly to give an equivalent eight-hour continuous exposure (in any 24-hour period). For example, an operator works a 12-hour shift each day and is continuously exposed to **4 mg/m3** of a substance. You can calculate an equivalent eight-hour TWA as:

$$\frac{4 mg/m^3}{8 \text{ hours}} \times 12 \text{ hours} = \mathbf{6\ mg/m^3}$$

x 12 hours = 6 mg/m3

This value is then compared with the LTEL for the substance.

## Revision Questions

4. Define Occupational Exposure Limit (OEL).
5. Describe the criteria for setting an OEL.
6. What are Biological Limit Values (BLVs)?

(Suggested Answers are at the end of Unit IB.)

## Summary

This element has dealt with a range of topics related to evaluating the risk from hazardous substances.

### Assessing Risks

In particular we have:

- Identified occupations presenting specific exposure risks and typical chemical substances involved.
- Outlined the factors to be considered in the assessment of risks to health from chemical agents.
- Explained the factors which affect the risk to the individual and in particular the relevance of individual susceptibility.
- Noted the attempts at harmonisation of risk assessment methodologies for hazardous substances on an international basis.

### Occupational Exposure Limits for Airborne Contaminants

We have:

- Examined the concept of Occupational Exposure Limits, with reference to international examples such as Workplace Exposure Limits; Permissible Exposure Limits; Maximum Allowable Concentrations and Threshold Limit Values.
- Noted the use of Occupational Exposure Limits to define 'adequate control'.
- Described the criteria by which expert committees establish Occupational Exposure Limits.
- Noted the role of biological limit values such as Health Guidance Values, Benchmark Guidance Values and Biological Exposure Indices.
- Explained the significance of short term and long term exposure limits (STEL, LTEL) and time-weighted average (TWA) values.
- Examined the standards of exposure control expected for carcinogens, asthmagens and substances causing genetic damage based on the concept of as low as is reasonably practicable.

## Question

A company is considering substituting a solvent it currently uses for one that is thought to be more effective.

**Outline** the factors that should be considered before a decision is taken to make the change. **(10)**

## Approaching the Question

Read the question carefully and try to understand what it actually means.

A company is thinking about substituting a solvent it currently uses for one that is thought to be more effective – the new substance might be a better solvent, but more hazardous to health for those persons using it. So you are being asked to outline the factors that determine the degree of risk to persons exposed, and these are found in the section on assessing risks in your course notes, and include data sheet information, numbers exposed, level, duration and frequency of exposure, etc. Another issue to consider is any additional control measures that might be required particularly for the new solvent, such as ventilation or personal protective equipment.

## Possible Answer by Exam Candidate

*First of all, the manufacturers' safety data sheets for both substances should be compared to obtain details of the risks to health. Important information on the substance would include whether it was being used as a spray or a liquid, and how volatile and flammable it was. You would also need to consider the possible routes of entry into the body - could it be absorbed through the skin as well as being inhaled – and also its short and long term health effects and any exposure limits such as WELs. Other information would include the quantity of the substance that would be used, the number of persons likely to be exposed and the level and frequency of their exposure. In considering persons exposed you would also have to take into account personal susceptibilities of those involved and anyone especially vulnerable such as young persons or workers with a liver condition. As well as the properties of the substance, you would also have to think about any extra control measures that might be required, such as special storage arrangements for the solvent if it was flammable and how it might be safely disposed of. There might also be additional costs for providing ventilation or gloves and respirators.*

## Suggested Answer Outline

The Examiner was looking for an outline which includes 10 points from the following:

- Manufacturers safety data sheet information.
- The form of the substance, whether aerosol or liquid.
- How volatile it was and how flammable.
- Likely routes of entry into the body by inhalation or skin absorption.
- Any applicable exposure limits such as WELs.
- Any particular acute or chronic health effects such as dizziness, dermatitis or long term effects on the kidneys or central nervous system.
- Quantities needed to be used.
- Number of persons exposed, the level of exposure and the frequency of exposure.
- Any particularly vulnerable persons such as young persons or those with liver or heart conditions.
- Any additional control measures required, such as ventilation or personal protective equipment.
- Any special storage arrangements needed for the solvent, particularly if it was flammable.
- Any special disposal arrangements required.
- Additional costs arising from providing respirators and gloves.
- Any additional emergency arrangements required.

## Exam Skills

**ELEMENT IB3** HAZARDOUS SUBSTANCES – EVALUATING RISK

An exam candidate answering this question would achieve **poor marks** for:

- Failing to consider the physical form of the solvent and also the potential routes of entry into the body.
- Not considering the susceptibility of particular persons exposed.
- Concentrating only on the effects of the solvent and not including the additional controls and arrangements that would be required if a new substance was brought into use.