ITC-ILO Curriculum on

**"Building modern and effective labour inspection systems"**

MODULE

8

# Occupational safety and health

**What this Module is about**

This module is an overview of the main concepts and principles of occupational safety and health (OSH) based in the international labour standards. It also includes the objectives, justification and methodologies for the prevention of occupational accidents and diseases.

**Objectives**

The aim of this module is to give trainees an overview of the importance of preventing occupational accidents and ill-health, how best to prevent them, and also to promote OSH in general. At the end of this module, participants will be able to:

- ✓ Describe the approaches for accident causation, OSH prevention and management.

- ✓ Describe the human and economic impact of accidents and diseases at work and the benefits of promoting OSH.

- ✓ Examine the main duties and rights of different stakeholders with respect to promoting OSH and key international labour standards that relate to them.

- ✓ Analyse the impact of the changes of the OSH regulations and other initiatives on the labour inspection role.

- ✓ Explain the principles for effective OSH management systems and for risk management.

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# 1. INTRODUCTION TO OCCUPATIONAL SAFETY AND HEALTH

*"… Safety and health of workers is a part and parcel of human security. As the lead United Nations agency for the protection of workers' rights, the ILO has been at the forefront of advocacy and activism in promoting safety and health at work. Safe Work is not only sound economic policy; it is a basic human right …"*

Kofi Annan, former Secretary-General, United Nations.[1]

Occupational safety and health (OSH) brings together many disciplines in anticipating and preventing accidents and diseases in the workplace. However, *OSH is about more than just avoiding injury*; it is also about actively promoting safety and health at work. "Safety" and "health" have been variously defined, but perhaps the best known definition is that of the World Health Organization, which in its Constitution states that health is "*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*".[2]  Thus, OSH involves:

- The prevention of harm and adverse effects on health to workers caused by their working conditions, whatever their employment sector, and regardless of their employment status, gender, racial or ethnic background.

- The adaptation of working environments to workers so that they best suit the physical and mental needs of workers.

- The availability of adequate occupational health and safety services to promote and maintain the well-being of workers.

- The effective management of occupational safety and health, giving the subject priority on the same footing as other business requirements.

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[1] Introductory report "Decent work - Safe work", XVIth World Congress on Safety and Health at Work, 2002.

[2] The World Health Organization Constitution:
http://www.who.int/governance/eb/who_constitution_en.pdf

## 1.1. The causes of occupational accidents[3]

Researchers from different fields of science and engineering have been trying to develop a theory of accident causation which will help to identify, isolate and ultimately remove the factors that contribute to or cause accidents. Many attempts have been made to develop a prediction theory of accident causation, but so far none has been universally accepted. Some of the most common theories are:

The Domino Theory: According to W.H. Heinrich (1931), who developed the so-called domino theory, 88 per cent of all accidents are caused by unsafe acts of people, ten per cent by unsafe conditions and two per cent by "acts of God". He proposed a "five-factor accident sequence" in which each factor would actuate the next step in the manner of toppling dominoes lined up in a row. The sequence of accident factors is as follows:

1. Ancestry and social environment.

2. Worker fault.

3. Unsafe act together with mechanical and physical hazard.

4. Accident.

5. Damage or injury.

In the same way that the removal of a single domino in the row would interrupt the sequence of toppling, Heinrich suggested that the removal of one of the factors would prevent the accident and resultant injury; with the key domino to be removed from the sequence being number (unsafe act together with mechanical and physical hazard). This domino theory was replaced by the *Theory of Multiple Causation*.

Theory of Multiple Causation. It postulates that a single accident is not caused by one unsafe act or condition, but rather by many contributory factors, causes and sub-causes, and that certain combinations of these give rise to accidents. According to this theory, the contributory factors can be grouped into the following two categories:

- *Behavioral.* This category includes factors pertaining to the worker, such as improper attitude, lack of knowledge, lack of skills, and inadequate physical and mental conditions.

- *Environmental.* This category includes improper guarding of other hazardous work elements and degradation of equipment through use and unsafe procedures.

The major contribution of this theory is to bring out the fact that rarely, if ever, is an accident the result of a single cause or act.

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[3] Chapter 56: "Theory of Accident Causes" in The Encyclopedia of Occupational Health and Safety, Fourth Edition Geneva, ILO 1998:
http://www.ilo.org/safework_bookshelf/english/

Iceberg Theory of Accidents: Although it is not a purely accident causation theory, its study is important. According to this theory there is a proportion and relationship among the number of fatal accidents, accidents with minor injuries, incidents and "near misses" that take place in an enterprise. It also suggests that they all share common causes. The investigation and analysis of the incidents (near misses) approach would then be a good way of identifying the potential causes of accidents as well as the precautions needed. This theory also suggests that the potential of an occurrence to become a near miss, or an incident, or an accident with injuries is just probabilistic.
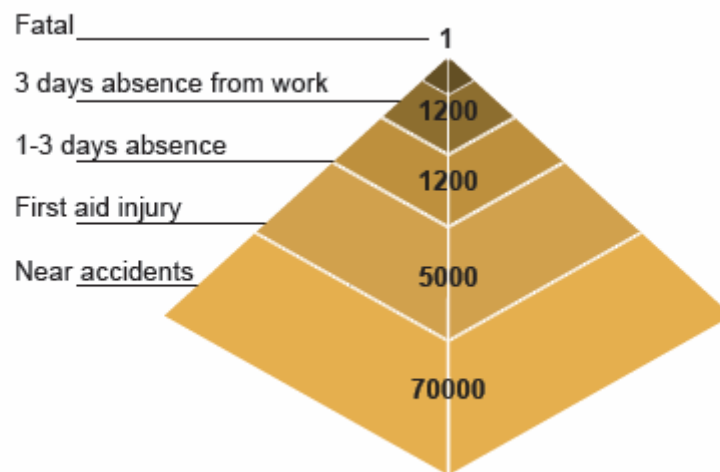


From a historical point of view, in the 1920s, the causes of workplace accidents were attributed to insufficient and poorly-planned technical systems. In the 1930s, the emphasis shifted towards so-called human factors, such as psychological factors of individual behaviour (in particular regarding incorrect behaviour in following safety rules). In the 1960s the emphasis for explanations changed to the so-called "social-technical system," i.e. the interaction between workers and machine.

Since the 1970s, following the systems' theory, the focus is on a wider system including, not only workers and machine, but also the environmental and the organizational context. It emphasizes the role of the management system of the enterprise for preventing occupational accidents and diseases, transferring the responsibility for these occurrences from unsafe acts and unsafe conditions, to the system's defects, to the wrong management decisions, to the lack of employer commitment, and to preventive culture.

## 1.2. The human and economic impact of occupational accidents and diseases

### The human and social impact

Globally, millions of workers and their families are affected by occupational accidents and diseases every year, and available statistics (which are far from complete) show that both the human and the economic burdens of such accidents and diseases are vast. The ILO updates its global estimates of numbers of occupational accidents and diseases regularly; in its Introductory Report for the XVIIIth World Congress in 2008, it provided the following table:[4]

| Estimated numbers of work-related fatal and non-fatal accidents and diseases | | | | |
|---|---|---|---|---|
| Year | Accidents causing ≥ 4 days' absence from work | Work-related fatal accidents | Work-related fatal diseases | Total of fatal diseases and accidents |
| **2001** | 268 million | 351,000 | 2.03 million | 2.38 million |
| **2003** | 337 million | 358,000 | 1.95 million | 2.31 million |

The Report notes that the rise in estimated numbers of non-fatal accidents may in part be explained by an increase of the economically active population globally and, in some regions, an increase of total employment. Although the number of occupational diseases appears to have declined between 2001 and 2003, the number of deaths from hazardous substances are estimated to have almost doubled to about 651,000. The Report goes on to highlight the importance of promoting OSH in such a context, and refers in particular to the recently adopted Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187), mentioned in more detail below.

Occupational accidents and diseases have other serious consequences on the lives of workers and their families, many of which are not reflected in statistics. For example:

- The average reduction of retirement age of workers suffering some disability is of about five years, or about 15 per cent of a working life, representing a significant loss of potential to earning a living wage.

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[4] Introductory Report 'Beyond deaths and injuries: the ILO's role in promoting safe and healthy jobs' to the XVIIIth World Congress on Safety and Health at Work, 2008:
http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_094524.pdf

- A large number of unemployed workers have some impairment of working capacity, but not necessarily enough for the worker to be entitled to a personal disability pension or compensation. However the loss of working ability can be of such magnitude that it can seriously reduce his or her re-employability.

- An estimated average of five per cent of the work force is absent from work every day. This may vary from two per cent to ten per cent depending on the sector, type of work, and management culture.

- In the most hazardous industries, the mortality rate over a period of ten years is higher than the unemployment rate for the same period (e.g., forestry).

- In developing countries the risks are ten times greater than in industrialized countries.

## The economic and business impact

In addition to these human and social burdens, experts now accept that occupational accidents and diseases have a very significant economic impact on business productivity, and thus on national productivity as well. It is realized that the costs of occupational accidents and diseases are actually much greater than was previously estimated, because of the indirect as well as the direct costs involved. For enterprises, this may mean higher insurance premium, damage to business image and reputation, management time spent investigating accidents and other costs. For countries, this means poorer economic development, greater burdens on the labour inspectorate and other authorities, increased social security and national health care costs and so on.

In terms of global impact, the ILO has estimated that the total costs of occupational accidents and diseases amount to approximately four per cent of the world's GDP - a colossal figure that is over 20 times greater than official development assistance. [5] Occupational accidents and diseases can therefore seriously endanger economic development, especially in countries where poverty is greatest, whose employment sectors often include hazardous ones and where, unfortunately, labour inspection services are often weakest.

Conversely, improving OSH can be good for business productivity as well as workers' health and happiness, as several recent studies have shown. The ILO Governing Body paper quoted above[6] discusses some of these studies, including the one referred to in the following box.

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[5] 'Occupational safety and health: Synergies between security and productivity', ILO Governing Body paper, March 2006:
http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/meetingdocument/wcms_110380.

[6] Ibid.

| **The business benefits of OSH** |
|---|
| Many large and small enterprises report that paying attention to OSH is actually good for business. For example, the UK Health and Safety Executive cites many large companies and also SMEs (small and medium-sized enterprises) who report that the costs of preventive measures have been far outweighed by the economic and other social benefits.[7] In summary, the business benefits from giving attention to OSH include many if not all of the following, depending on circumstances:<br><br>• Absenteeism rates are very greatly reduced.<br><br>• Employees are happier, with higher levels of morale, motivation and concentration at work.<br><br>• Employee retention is improved.<br><br>• Productivity and competitiveness are improved, sometimes markedly.<br><br>• Significant sums of money are saved from better plant maintenance.<br><br>• Compensation claims and insurance costs are reduced, sometimes considerably.<br><br>• Client and supplier relations are improved.<br><br>• Company "image" and reputation are enhanced.<br><br>• Contract pre-qualification scores are increased.<br><br>• Substantial savings (and job security) are made as a result of the above. |

These are important arguments for promoting OSH in addition to the humanitarian and legal ones. Moreover, if such benefits can be magnified to the national level, national economic development stand to benefit as well and be made more sustainable.

An often-heard argument is that developing countries cannot afford good standards of OSH and that it is a benefit that only industrialized countries can enjoy. However, there is no reason why the recent evidence quoted above (which admittedly comes from enterprises in industrialized countries) should not be globally applicable. Indeed, there is some evidence from developing countries that the same principles do indeed hold good there too,[8] and that "good safety and health is good business." Further information and references on this subject are given in the ILO

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[7] Business Benefits webpage and related case studies, Health and Safety Executive, UK: http://www.hse.gov.uk/business/business-benefits.htm

[8] Several examples are quoted in 'Occupational safety and health: Synergies between security and productivity', ILO Governing Body paper, March 2006. http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/meetingdocument/wcms_110380.

Governing Body mentioned below. The view that good standards of OSH have a direct relationship to national economic development was also borne out in a study by the World Economic Forum and the Lausanne Institute of Management. This study showed that the most competitive countries also tended to have the best safety records; the study's results are summarized graphically below.
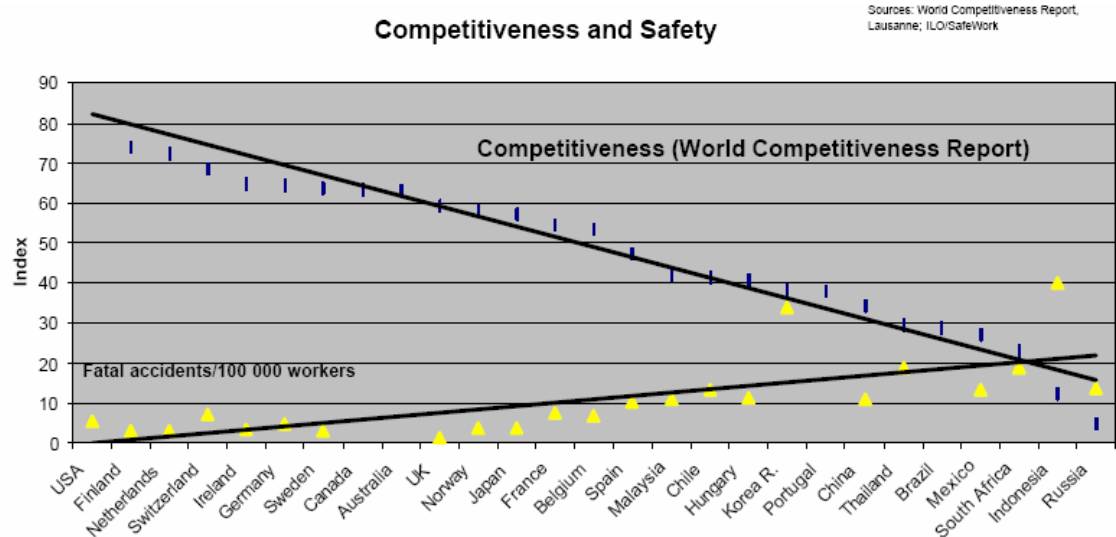


Poor OSH conditions detract from productivity because work-related accidents or diseases are very costly and can have many serious direct, as well as indirect, effects on the lives of workers, their families, and employers. These costs are summarized in the following table:

| Examples of direct and indirect costs of occupational accidents and ill-health at the enterprise level [9] |
|---|
| **Direct costs** |
| • Disruption to business and ongoing lost production from worker absence |
| • Worker's lost wages and possible costs of retraining for a different job |
| • First aid, medical and rehabilitation costs |
| • Insurance costs and possibly higher future premiums |
| • Costs of compensation |
| • Any fines or legal proceedings following the accident/case of ill-health |
| • Replacing or repairing any damaged equipment |

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[9] Ibid.

> **Indirect costs**
>
> - Management time in subsequent investigation, perhaps jointly with the enforcing authority (e.g. labour inspectorate) and other administrations
>
> - Costs of retraining someone else for the job, and possible recruitment of replacement worker
>
> - Poorer long-term worker employability because of injury
>
> - "Human costs" – loss of quality of life and general welfare
>
> - Lower motivation to work and workforce morale, increased absenteeism
>
> - Poorer enterprise reputation and client and public relations
>
> - Damage to the environment (e.g. from chemical incidents)

## 1.3. Prevention of the occupational accidents and diseases

Prevention is the central concept of occupational safety and health, to such an extent that even the concept "prevention of occupational risks" is often used as an equivalent to "occupational safety and health". Sometimes it is just defined in terms of the preferred approach to work on occupational safety and health: all the steps or measures taken or planned at all stages of work in the undertaking to prevent or reduce occupational risks. Prevention is also an attitude of individuals and organizations in the way to deal with the OSH problems. The concept "prevention" is associated with other relevant principles and considerations:

- The principle of prevention. It asserts that avoiding harm is much better than trying to remediate that harm.

- The principle of precaution. When an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.

- Most hazardous conditions at work are preventable. The development and maturation of the OSH as a discipline, discovering the cause-effect relationships and the best control measures, or its progress in reducing the occupational injuries and diseases has increased confidence in the prevention.

- Occupational accidents and diseases can be managed. The realization that many principles of industrial knowledge and procedures used for the production and the labour organization can be applied to accident prevention was an important step. Managers also discovered that efficient production, quality and safety were closely related.

- Although the compensation, medical care and rehabilitation of sick and injured workers are and will remain very important issues, the

main focus and efforts of OSH should be concentrated on prevention10 in the workplace, as this offers the most cost-effective strategy for their elimination and the control of hazards.

■ Prevention is preferred to protection. Protection implies the presence of hazards not removed and the presence of risks in the workplace. Protection measures try to reduce the risk by avoiding the probability of contact between the hazard and the worker and/or the severity of the consequences in an eventual contact between the hazard and the worker. Although protection measures can prevent occupational accidents and diseases, the "preventive approach" implies the prevention of occupational risks by acting directly on the hazards eliminating them or reducing their dangerousness.

■ Proactive approaches are preferred to reactive approaches. Reactive approaches involve the use of actions which are triggered by events (injuries, accidents, incidents, complaints, losses, etc). Active approaches involve data collection on the health and safety performance and actions before an accident, incident or case of ill-health occurs. In general terms, this means collecting data and taking all reasonable actions and precautions to avoid occupational diseases and injuries at the earliest stages (at the planning and design of workplace).

## 1.4. International labour standards for OSH

Since 1919, over 60 Conventions and Recommendations have been adopted that seek to promote safety and health at work, from reasonable working hours and the reduction of exposure to lead in paint to risks from major hazards sites and improved labour inspection services. Occupational safety and health standards broadly fall into four categories:

■ Guiding policies for action.

■ Protection in given branches of economic activity: e.g. construction industry, mines, commerce and offices and dock work.

■ Protection against specific risks: e.g. ionising radiation, benzene, asbestos, guarding of machinery.

■ Measures of protection: e.g. medical examinations of young workers, maximum weight of loads to be transported by a single worker, prevention of occupational accidents on board ship, prevention of occupational cancer, prevention of air pollution, noise and vibration in the working environment.

The international labour standards with widest application are:

The Occupational Safety and Health Convention, 1981 (No. 155) and its accompanying Recommendation (No. 164). These standards have a very broad scope: they apply to all branches of economic activity, to all workers and cover all workplace risks. They set out broad requirements for action at the national level (e.g. for setting for national OSH policy) as well as

action at the enterprise level. The latter includes duties on employers to ensure that workplaces etc are safe and without risks to health "so far as is reasonably practicable". Arrangements should be made under which workers cooperate with their employers and (as per Recommendation No. 164) take reasonable care for themselves and for others.
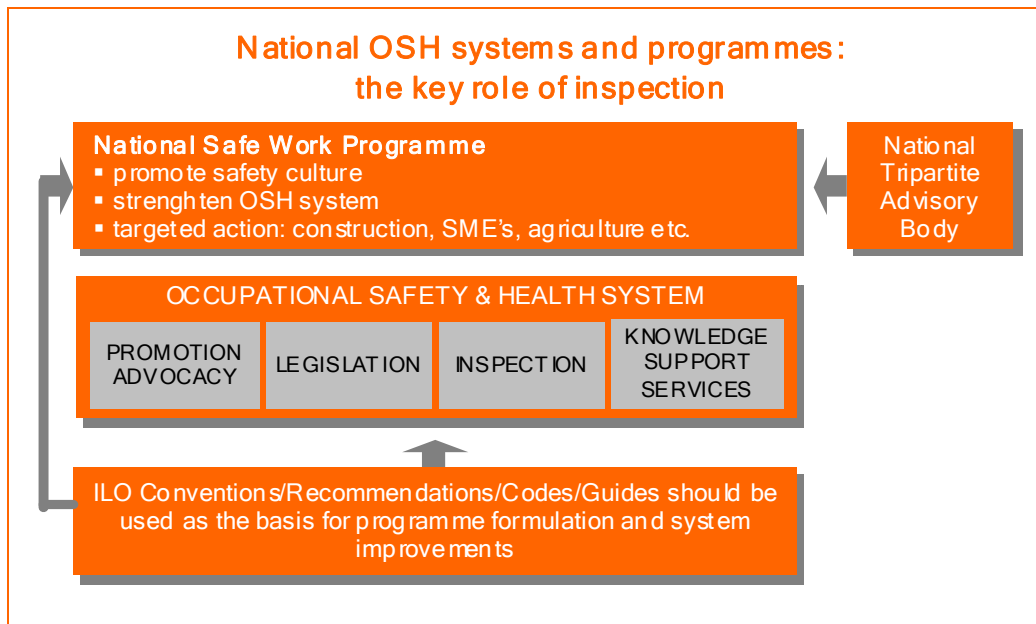
Under Convention No. 155, there should also be an "adequate and appropriate system of inspection" to ensure the enforcement of OSH laws. Recommendation 164 states that such systems of inspection should be guided by the provisions of Labour Inspection Conventions Nos. 81 and 129.

The Occupational Health Services Convention, 1985 (No. 161) and its accompanying Recommendation (No. 171). The scope of these standards is also very broad and deals with the need for a coherent national policy on occupational health services. The functions of such services should be appropriate to the specific risks of enterprises and include such matters as identifying and assessing risks, surveillance of the working environment, giving advice and otherwise promoting health at work. The competent authority should consult representative organizations of employers and workers on the measures necessary to give effect to the provisions of the Convention.

The Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187) and its accompanying Recommendation (No. 197). These standards are likewise very broad in scope and build on the above Conventions and Recommendations and others. Convention No. 187 is based on the concepts that OSH needs to be effectively managed at the national and enterprise levels, and the need for a national preventative safety and health culture. The Convention and Recommendation seek specifically to promote:

- National OSH policies, amplifying the provisions of Convention No. 155 and calling for the formulation and review of such policies.

- National OSH systems, which have a number of essential elements, including national OSH authorities and systems of inspection.

- National OSH programmes, which are strategic and time-bound, focusing on specific national priorities for OSH. Such programmes should engage a wide range of stakeholders, including of course the labour inspectorates, who have an important role to play alongside.

The relationship of inspection within the OSH system as whole can be shown diagrammatically:

**National OSH systems and programmes: the key role of inspection**

**National Safe Work Programme**
- promote safety culture
- strenghten OSH system
- targeted action: construction, SME's, agriculture etc.

National Tripartite Advisory Body

OCCUPATIONAL SAFETY & HEALTH SYSTEM

| PROMOTION ADVOCACY | LEGISLATION | INSPECTION | KNOWLEDGE SUPPORT SERVICES |

ILO Conventions/Recommendations/Codes/Guides should be used as the basis for programme formulation and system improvements

# 2. PROMOTING COMPLIANCE WITH OSH STANDARDS

## 2.1. Main duties and rights of stakeholders

The development of a regulatory framework and the definition of the rights and duties of the main stakeholders have thus been fundamental steps for the progress of the OSH. International labour standards, as described above, establish the framework of relationships, accountabilities and liabilities concerning OSH, making the main stakeholders active in improving the OSH by fulfilling their obligations.

### *Employers*

Employers are the main duty-holders under OSH legislation. Their duty of care and liability for their employees is overriding duties, which means that they should take reasonable care for their worker's safety and health. In much OSH legislation, the employer's duty of care applies not only to employees, but also to other people who might have good reason for being present in the workplace, such as visitors, contractors or the public, ensuring that reasonable protection from risks arising from work activities is afforded to everyone who might be so affected.

Under national OSH legislation, duties on employers are often given in some details, as in Australia,[10] summarized below:

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[10] Occupational Health and Safety (Commonwealth Employment) Act 1991 Section 16: http://www.austlii.edu.au/au/legis/cth/num_act/ohasea1991531/s16.html

**OSH legislation of Australia**

It requires the employer to take all reasonably practicable steps:

- To provide a safe plant.

- To provide safe systems of work.

- To provide adequate facilities for the welfare of employees at work.

- To ensure that commonwealth workplaces are safe and without risks to health.

- To ensure that persons can enter and leave commonwealth workplaces safely and without risks to their health.

- To ensure that employees are safe when they use, handle, store or transport plant or substances.

- To ensure that employees are provided with the necessary information, instruction, training and supervision, and in the appropriate languages.

- To consult with unions and other persons to develop an occupational health and safety policy that will enable effective co-operation between the employer and employees in promoting, developing and reviewing measures to ensure its employee's health, safety and welfare at work.

- To make an agreement with unions to provide appropriate mechanisms for continuing consultation and other occupational health and safety matters.

- To monitor employees' health and safety at work, and the conditions of the workplaces under the employer's control.

- To maintain appropriate information and records relating to its employees' health and safety.

- To provide appropriate medical and first aid services for the employees.

To a large extent, this legislation reflects the requirements of Convention No. 155, described above, and similar requirements can be found in most countries, where employer are held legally responsible for ensuring their workers' health and safety.

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**OSH Management** [11]

Organizations need to manage health and safety with the same degree of expertise and to the same standards as other core business activities, if they are effectively to control risks and prevent harm to people.

Successful OSH management should:

- Start as a visible and active support of strong leadership and commitment of senior managers and directors who should also demonstrate this commitment through their individual behaviour and management practice.

- Share the management's perception and beliefs of the whole organization on the importance of OSH and the need to achieve the OSH objectives.

- Regard OSH objectives in the same way as other business objectives.

- Assign clear lines of authority and well-defined responsibilities.

- Spread the safety culture among all organizations by making OSH a line management responsibility (instead of exclusively assigning this responsibility to the OSH department or unit).

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## Workers

*"In the Trade Union world of today, there is no subject on which workers […] of all shades of opinion, and all varieties of occupation, are so unanimous and so ready to take combined action as the prevention of accidents and the provision of healthy workplaces."*[12]

As this quote indicates, the subject of accident prevention (and thus OSH) has been an important topic to workers for over 100 years, for obvious reasons. Although other considerations can be as important nowadays OSH must still be literally a vital subject for workers.

However, ensuring workers' safety and health requires their cooperation too, and for this reason, many countries have placed legal duties on workers or, on workers to cooperate with their employers in protecting their own and others' safety and health.

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[11] *Successful health and safety management*, Health and Safety Executive, UK, 1991, revised 1997.

[12] Sidney and Beatrice Webb: *Industrial Democracy*, 1902.

> **Workers' obligations in the European Union** [13]
>
> 1.  It shall be the responsibility of each worker to take care as far as possible of his own safety and health and that of other persons affected by his acts or Commissions at work in accordance with his training and the instructions given by his employer.
>
> 2.  To this end, workers must in particular, in accordance with their training and the instructions given by their employer:
>
>     (a) make correct use of machinery, apparatus, tools, dangerous substances, transport equipment and other means of production;
>
>     (b) make correct use of the personal protective equipment supplied to them and, after use, return it to its proper place;
>
>     (c) refrain from disconnecting, changing or removing arbitrarily safety devices fitted, e.g. to machinery, apparatus, tools, plant and buildings, and use such safety devices correctly;
>
>     (d) immediately inform the employer and/or the workers with specific responsibility for the safety and health of workers of any work situation they have reasonable grounds for considering represents a serious and immediate danger to safety and health and of any shortcomings in the protection arrangements;
>
>     (e) cooperate, in accordance with national practice, with the employer and/or workers with specific responsibility for the safety and health of workers, for as long as may be necessary to enable any tasks or requirements imposed by the competent authority to protect the safety and health of workers at work to be carried out;
>
>     (f) cooperate, in accordance with national practice, with the employer and/or workers with specific responsibility for the safety and health of workers, for as long as may be necessary to enable the employer to ensure that the working environment and working conditions are safe and pose no risk to safety and health within their field of activity.

The workers' duties are often accompanied by workers' rights, for example, rights:

■ To receive training and information on the risks involved in their jobs and the preventive measures to be adopted.

■ To leave their workplace in the event of serious and imminent risk.

■ To health surveillance (where necessary) and be informed of the results.

■ To have workers' representation on OSH matters and to be able to participate in such.

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[13] The EU "Framework Directive" 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work, Article 13: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31989L0391:EN:HTML .

The importance of workers' consultation also needs to be emphasized, since effective and substantial progress on OSH cannot be made without workers' consultation and engagement. Workers can contribute to prevention programmes, as they know from first-hand experience the actual working conditions they experience, including any short-cuts or doubtful practices that might persist. This is also true at the national level, where OSH legislation, policies, technical and other guidance require the input of workers through their national Trades Unions or other organisations.

A large majority of the ILO member countries require the establishment of structures for cooperation between management, workers and their representatives (OSH committees and OSH worker representatives, appointed by Trades Unions or otherwise), and define, the nature and composition of those structures according to the size (in terms of number of employees) and functions of the enterprise.

In general, the employer makes available the time and resources needed to have this training provided by external government or private specialized institutions, including organizations of employers and workers.

Labour inspectors' involvement in OSH committees and with OSH representatives is one of the key strategies to promote OSH in the workplace.

## Manufacturers and suppliers

It is one of the principles of OSH that risks are best dealt with at the design or manufacturing stages as far as possible, thus reducing risks for workers. Thus, workplace machinery can be made safer, quieter, with fewer vibrations and so on though better design, and substances pose fewer health risks to workers because of good instructions (properly followed) about safe storage and use. Consequently, many countries have passed OSH legislation or guidelines regarding the duties of designers, manufacturers and suppliers. For example, a number of European Directives dealing with Product Safety are now generally in force in the EU and it is believed that such have had an important impact in the reduction of the occupational accidents and diseases.

Such legislation or guidance may relate to products like machinery, lifts or pressure vessels, to ensure that such are designed, made, tested and supplied with adequate safeguards, for the benefit of workers who use them. Alternatively, they may relate to the supply of dangerous substances and aim to ensure that suppliers provide adequate information regarding safety and health, again for the benefit of users.

Some labour inspectorates have been given the responsibility for enforcing such legislation, which is a relatively new departure for many of them. So-called "market surveillance" requires inspectors to assess products and substances for compliance with relevant "supply legislation" in much the same way they would with normal workplace legislation. Then instead of dealing with employers or workers, inspectors will deal with manufacturers or, if products are from other countries, with the suppliers or importers.

Inspectors have one clear advantage in undertaking the market surveillance of workplace products, namely that they know how such are likely to be used in practice. However, they may need to call on the help of specialists to assess conformity with international or national standards (e.g. for machinery or pressure vessels), which may pose problems for some inspectorates where such expertise is not readily to hand. Another challenge is that with much trade now being undertaken internationally, inspectorates need good cross-border networks and collaboration to follow up any remedial action required. Such networks are easier to set up where high-level regional groups already exist (e.g., within the European Union or the Association of South East Asian Nations).

This area of work is still under development and it is likely that expertise in dealing with supply issues will be built up further in the coming years.

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**Duties of manufacturers and suppliers: Convention No. 155 (Article 12)**

Measures shall be taken, in accordance with national law and practice, with a view to ensuring that those who design, manufacture, import, provide or transfer machinery, equipment or substances for occupational use:

(a) Satisfy themselves that, so far as is reasonably practicable, the machinery, equipment or substance does not entail dangers for the safety and health of those using it correctly.

(b) Make information concerning the correct installation and use of machinery and equipment and the correct use of substances available, and information on hazards of machinery and equipment and dangerous properties of chemical substances and physical and biological agents or products, as well as instructions on how known hazards are to be avoided.

(c) Undertake studies and research or otherwise keep abreast of the scientific and technical knowledge necessary to comply with subparagraphs (a) and (b) of this Article.

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## 2.2. Changes in the OSH regulation

Until the 1970s, OSH legislation focused almost solely on specific workplaces, like factories, quarries and mines, and covered particular items of plant and processes and their risks in some detail, such as for boilers or cranes. In recent decades, however, there has been a marked trend for OSH legislation to be more all-embracing, applying to all employment sectors and all risks.

Old national OSH legislation tended to adopt a prescriptive approach, imposing on employers a very large number of specific obligations either in the main OSH law or in supporting regulations, decrees and ordinances. The emphasis was on achieving compliance with specific requirements, rather than adopting a holistic, prevention-oriented approach to OSH. In many countries, if things went wrong or if there was a lack of compliance, it

was the unfortunate supervisor, foreman or employee who was held responsible and often punished, and the charges always related to contraventions of very specific requirements.

With the spread of generalized and comprehensive obligations, exemplified by the Occupational Safety and Health Convention, 1981 (No. 155), and in the European Union by the provisions of the Framework Directive on safety and health at work, 1989,[14] this approach to OSH was no longer adequate or appropriate. This new approach to legislation made it unequivocally clear that top management was primarily responsible for achieving acceptable OSH standards in their enterprises, and the only practical way of discharging such a comprehensive obligation successfully was by using a management approach to OSH.

New regulations are bringing duties to the employers to ensure that there is a preventive organization in the enterprises (including ways to promote the workers' consultation and participation) and some management practices that include performing preventive activities, being the most common ones:

- Risk assessment.

- Control of working conditions.

- Training and information for workers.

- Surveillance of workers' health.

- Environment monitoring.

- Emergency planning.

- Recording, documentation and notification of OSH information.

- Investigation of occupational accidents.

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**Systems of internal control**

Norway in 1992, and Sweden in 1993, introduced systems of internal control (IC) or self-regulation including the basic responsibility of the employer to organize systematic work on safety and health. The Norwegian Working Environment Act 1990 makes IC obligatory for the employer at each workplace to work systematically to improve the working environment of the enterprise requiring the employer to identify goals, responsibilities and carry out safety and health activities as risk assessments, plan of action, performance monitoring, as well as to document the measures established to provide a sound working environment.

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[14] Council Directive 89/391/EEC.

Another important change in the OSH regulation is the progressive inclusion on new health hazards. Traditionally, the OSH regulation was focused on safety hazards and accidents prevention and progressively it was including health hazards. In the last years, other health problems have been included in the new adopted regulations mainly on ergonomics which are in the origin of the musculoskeletal disorders and on the psychosocial factors leading to psychosocial problems as stress, burn out, mobbing, etc. Psychosocial factors refer to conditions including aspects related to job and work organization (organizational climate or culture, work roles, interpersonal relationships and the design and content of tasks, etc.).

### 2.3. A new approach to labour inspection and OSH

The introduction of this new approach, whether through new national legislation or guidance, has had a profound impact on the process of inspection. Labour inspectors have moved away from their traditional approaches whereby they aimed simply to identify legal irregularities and then give advice or impose sanctions, depending on the seriousness of the offence.  Instead, they adopt a more proactive approach and focus on the way that OSH is managed centrally, referring to individual examples of compliance or non-compliance to indicate how well the enterprise as a whole is actually managing OSH.

This may require a comprehensive and systematic evaluation (or audit) of the enterprise's OSH systems, but more often it involves inspectors making a judgement about the competence of the enterprises management to manage OSH on a day-to-day basis. It means forming an opinion about how well managers assess risks and take action to control them, managing and maintaining necessary preventive measures. Thus, labour inspectors have to consider the enterprise's OSH policy and organization, if such exist, the competence and responsibilities of its staff in matters of OSH, levels of OSH training and supervision, etc. - using practical examples from the workplace to demonstrate such competence or otherwise.

This new approach has not yet been adopted by all labour inspectorates, but there is a clear trend towards such, especially in the more developed countries. The changes are well illustrated by the "Common Principles for labour inspection in relation to health and safety in the workplace,"[15] adopted by the European Union Senior Labour Inspectors Committee (SLIC), which was developed to reflect changes in EU legislation.

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[15]"Common principles for labour inspection in relation to health and safety in the workplace". EU Senior Labour Inspectors Committee, 2006.

> **Common Principles for labour inspection in relation to health and safety in the workplace (SLIC)**
>
> The approach to be taken during an inspection must include a physical examination in the workplace of working practices, standards and conditions, and discussion with representatives of the employer and with workers' representatives. It is important when investigating work-related accidents or cases of ill-health that whenever necessary and possible, the person affected is interviewed. Within the core principles, examination and discussion should be focussed on ensuring compliance with applicable national legislation, including that resulting from the transposition of EU law. (…). The priorities for inspection, based upon the structure of the Framework Directive, are:
>
> (i) to judge whether the employer's policy for health and safety is directed to ensuring the health and safety of his employees;
>
> (ii) to judge whether the organisation and arrangements the employer has introduced for securing health and safety are likely to lead to the identification, rectification and prevention of deficiencies. This will include the employer's arrangements for identifying hazards and for assessing risk;
>
> (iii) in particular to make assessments of the employer's arrangements for:
>
> - the effective planning, organisation, implementation, control, monitoring and review of the protective and preventive measures at the workplace;
>
> - securing expert advice and assistance on health and safety matters;
>
> - dealing with emergencies; providing the employees and/or their representatives with comprehensible and relevant information;
>
> - training the employees in health and safety;
>
> - ensuring consultation with the employees and/or their representatives on matters relevant to health and safety;
>
> - ensuring that the arrangements in place effectively protect workers against the identified risk. (…)″

## 2.4. Initiatives of voluntary compliance[16]

For more than 20 years, voluntary initiatives (VIs) -- that is, codes of conduct or other enterprise initiatives not required by law, which address the performance of enterprises in respect of occupational health, safety, the environment (HSE) and other issues -- are becoming more prevalent. They are increasingly seen as a new policy instrument and management tool to help tackle HSE problems. They are promoted not only by the industries themselves but also by governments, often cash-strapped, who

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[16] Report for discussion at the Tripartite Meeting on Voluntary Initiatives Affecting Training and Education on Safety, Health and Environment in the Chemical Industries. ILO Geneva, 22-26 February 1999
http://www.ilo.org/public/english/dialogue/sector/techmeet/tmci99/tmcirep.htm#1.1

see a mix of government and voluntary (self-) regulation as a way of achieving higher standards in a more efficient and cost-effective manner than through "command-and-control" regulation alone.

VIs range from arrangements in which the parties (usually enterprises or their associations) set their own targets and often do their own monitoring and reporting, to initiatives where an understanding is reached between a non-commercial body (e.g. a government authority, a citizen's organization, or a non-governmental organization) and a commercial party (an industry association or a particular company). The declared intent of the two types of initiative is usually the same: to stimulate members to voluntarily improve their environmental or general HSE performance. Some of the better known VIs are:

- Responsible Care.

- Eco-Management and Audit Scheme (EMAS).

- Standards of the International Organization for Standardization (ISO).[17]

- OSHAS 18001.

- ILO OSH 2001.

Voluntary programmes are only one element of a comprehensive HSE protection strategy that includes a range of policies and programmes. They have important strengths and present particular challenges that should be recognized to ensure that they are used most successfully. The strengths which make them powerful policy instruments are that they:

- use a market-based approach to encourage behavioural change that is not dependent on regulation;

- provide valuable benefits for participants, including access to low-cost information, reduced operating costs, and public recognition for their HSE accomplishments;

- tend to create partnerships between potential adversaries (government and industry, corporate competitors within an industry, industry and trade unions), which leads to improved dialogue and cooperation that can benefit all parties;

- can have far-reaching effects, influencing behaviour by changing the attitude of the public towards the chemical industry thus leading to improvements on many fronts.

The limitations of voluntary programmes, which are linked to their reliance on market forces, are that:

- they can be successful only when participants can be persuaded to change their actions voluntarily. Therefore, a careful analysis of

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[17] For example, ISO's 9000 and 14000 series of standards on Quality and the Environment respectively.

- opportunities and participant motivations is appropriate before choosing a voluntary approach;

- as the prospect of sanctions for non-compliance tends to be absent or weak, voluntary programmes may not be compelling enough to entice participants to change their behaviour;

- voluntary programmes often lack transparency and may fail to protect third-party rights; credible monitoring, evaluation and reporting components are needed to establish credibility with important stakeholders;

- voluntary programmes can violate competition rules in various ways, according to the European Commission, for example, on-signatory companies can be excluded from a market, or consumer prices can be inflated.

Probably, a sound government regulatory and policy framework and public involvement could improve some of these limitations of the voluntary codes.

## 2.5. ILO Guidelines on OSH Management Systems[18]

Prompted by the management approach on OSH and the success of the "systems" approach in international standards (such as those produced by the ISO), the ILO adopted its *Guidelines on Occupational Safety and Health Management Systems* in 2001. The Guidelines, known as ILO-OSH 2001, provide a unique international model, compatible with other management system standards and guides. They also reflect ILO values such as tripartism and relevant international standards such as Conventions Nos. 155 and 161. ILO-OSH 2001 is not legally binding and its application does not require certification, as with other international standards, but countries may formally recognize it as good practice and use it in developing their own guidance on the subject. It has now been translated into over 20 languages and is widely referred to by national administrations.

ILO-OSH 2001 encourages the integration of OSH management system elements into overall policy and management arrangements, though it also allows for some flexibility, depending on the size and type of the enterprise. ILO-OSH 2001 also emphasizes that OSH should be a line management responsibility in enterprises and not be seen as a task solely for OSH departments or specialists. The Guidelines comprise a set of five elements integrated in a continuous cycle of policy, organizing, planning, implementation, evaluation and action for improvement. These follow the internationally accepted Demming cycle of Plan-Do-Check-Act, which forms the basis of the "system" approach to managing OSH.

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[18] ILO Guidelines on OSH Management Systems:
http://www.ilo.org/safework/normative/codes/lang--en/docName--WCMS_107727/index.htm

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**The five elements of the ILO-OSH 2001**

- The 'Policy' section is the basis of the OSH management system. It sets the direction for the organization to follow and includes worker participation.

- 'Organizing' covers the elements of responsibility and accountability, competence and training, documentation and communication. It ensures that the management structure is in place and that responsibilities necessary for delivering OSH policy have been assigned.

- 'Planning' and 'implementation' comprises the elements of initial review, system planning, development and implementation, OSH objectives and hazard prevention. Through the initial review, it shows where the organization stands concerning OSH, and uses this as the baseline to implement OSH policy.

- 'Evaluation' addresses performance monitoring and measurement, investigation of work-related injuries, ill health, diseases and incidents, inspection, audits and management review. Such steps reveal how well the OSH management system functions and identifies any weaknesses that need remedying. It includes the very important element of auditing, which should be undertaken for each stage. Audits should be conducted by persons independent of the activity being audited, though this does not necessarily mean that third party audits are required.

- 'Action for improvement' covers preventive and corrective action and continual improvement. It implements the necessary preventive and corrective action identified by the evaluation and the audits. It also emphasizes the need for continual improvement of OSH performance through the constant development of policies, systems and techniques to prevent and control work-related injuries, ill health, diseases and incidents.

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In the context of labour inspection, it is perhaps important to say that these Guidelines refer to the need for *"systematic inspection"* by employers and workers as part of their evaluation and monitoring of performance.[19] In fact, employers have always been responsible for ensuring that their work equipment, premises and working practices are safe, and "inspection" has been a means to this end.

ILO OSH 2001 promotes the establishment of a national framework for occupational safety and health (OSH) management systems (MS) including the nomination of:

- a competent institution(s) for OSH-MS;

- the formulation of a coherent national policy and the establishment of a framework for an effective national application of ILO-OSH 2001.

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[19] Ibid. (paragraph 3.11.6 (b).

Along these lines, Ireland, (2004) Israel and Argentina (2005) adopted the ILO OSH 2001 and are promoting its implementation to national organization and enterprises

There are other interesting initiatives in the promotion OSH-MS approach by the public authorities through not legally binding instruments as the Voluntary Protection Programmes in USA

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### Voluntary Protection Programmes (VPP) in the USA[20]

The VPP is an initiative launched in 1982 by the Occupational Safety and Health Administration (OSHA) of the United States. Basically, VPP sites are committed to effective employee protection beyond the requirements of OSHA standards. In the VPP, management, labor, and OSHA establish cooperative relationships at workplaces that have implemented a comprehensive OSH management system to effectively identify, evaluate, prevent, and control occupational hazards to prevent employee injuries and illnesses.

Approval into VPP is OSHA's official recognition of the outstanding efforts of employers and employees who have achieved exemplary OSH. VPP sets performance-based criteria for a managed OSH system, invites sites to apply, and then assesses applicants against these criteria. OSHA's verification includes an application review and a rigorous onsite evaluation by a team of OSHA safety and health experts.

Statistical evidence for VPP's success is impressive. As a result, the average VPP worksite has a lost workday incidence rate at least 50 percent below the average of its industry. OSHA removes participant enterprises from programmed inspection lists.

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In Mexico [21] and the USA, enterprises can meet the requirements of Voluntary Protection Programmes and be exempted from preventive inspection. [22] However, similar programmes have been tried in other countries and have not worked well; working conditions in enterprises that have followed voluntary compliance schemes (and were exempted from inspection) have sometimes got worse, and so regular inspections have resumed. The voluntary use of management systems is nevertheless helpful in promoting compliance, since it provides a sound organizational framework within which legal obligations and responsibilities can be more readily identified and met.

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[20] http://www.osha.gov/dcsp/vpp/index.html

**[21]** Accreditation of Occupational Safety and Health Management systems (Spanish):

http://www.stps.gob.mx/DGSST/asis_tec/m_asis_tec_stps.htm .

[22]Voluntary Protection Programs (VPP), Occupational Safety and Health Administration, United States. http://www.osha.gov/dcsp/vpp/index.html .

## 2.6. The preventative safety and health culture[23]

The terms 'safety culture', 'prevention culture', 'preventative safety and health culture' and other variants used in many countries have similar meanings. Experts commonly describe it as the values and practices that management and personnel share to ensure that risks are minimized and mitigated to the greatest degree possible. In short, this means that safety and health is always the first priority and prevention is the key. With a true safety culture, every employee or staff member – whether a worker or a manager – thinks about safety and health and new ways how to improve it.

While there is widespread recognition that there is no prescriptive formula for developing and improving safety culture, there is an emerging belief that there are some common characteristics and practices that organizations can adopt to make progress.

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**The preventative safety and health culture**

**- Common characteristics and practices -**

- Strong leadership and a visible and real commitment (in theory and in practice) of management.

- Communication and consultation with the workforce and active participation of the workers on OSH issues.

- OSH awareness, knowledge and understanding shared by management and personnel incorporating the belief that all accidents are preventable and manageable, the concepts of hazards and risks and how they may be prevented or controlled.

- OSH is everyone's responsibility. The OSH responsibility is not confined into a single department or person. The enterprise should establish comprehensive rules concerning the roles, rights and obligations. However, safety culture includes an error-tolerant culture and open attitude (an atmosphere of co-operation and openness in which employees feel comfortable about discussing errors and near-misses in order to improve learning).

- Constant presence of OSH, not only at the level of OSH conscious attitudes and behaviour of the staff, but also through the inclusions of OSH considerations in the relevant management practices.

- Enterprise is willing to improve its OSH performance from lessons learnt and setting targets for continuous improvement.

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Thus, all managers and workers adopt positive values, attitudes, practices and behaviour, which are conducive to maintaining a working environment that not only complies with the law but is also a good place in which to work.

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[23] ILO:, Safe and healthy workplaces. Making decent work a reality. Report for World Day for Safety and Health at Work, Geneva, 2007.
http://www.ilo.org/legacy/english/protection/safework/worldday/products07/report07.pdf

Such an approach motivates workers and increases their commitment to their employer, encouraging innovation and dedication, with obvious advantages for business productivity and for workers' well-being in general.

Building and maintaining a "national preventative safety and health culture" means increasing general awareness and the knowledge and understanding of hazard and risks through national campaigns, and through training and education, starting from the basic education and continuing throughout working life.

# 3. RISK MANAGEMENT

**Risk management** is a process involving the systematic identification and analysis of hazards inherent in an activity, as well as the assessment of the associated health risks to the workers in order to select and implement the effective measures to control the workplace risks. Risk management includes therefore three main activities:

- Hazard identification.
- Risk assessment.
- Risk prevention and control.

As mentioned, new regulations in many countries set the duty the employers to undertake preventive activities including the risk management. Labour Inspectors need to know how to undertake a risk management process because frequently they have:

- to check how well employers comply with this duty and eventually ask for correction of deficiencies and inaccuracies;
- to train others on risk management.

Even if it is not an operation requested by the OSH regulations, risk management approach is among the best technical approaches that Labour inspectors could suggest to the enterprises to manage their OSH problems.

## 3.1 Hazards and risks

The term "hazard" is often confused with the term "risk". These two concepts are very relevant for many of the process and activities in OSH and need a clear definition and differentiation.

A hazard is an agent, condition or activity with potential to cause harm that, if left uncontrolled, may adversely affect the well-being or health of exposed people. There are an unlimited number of hazards that can be found in almost any workplace, including:

- Chemical hazards, arising from liquids, solids, dusts, fumes, vapours and gases.

- Physical hazards, such as noise, vibration, unsatisfactory lighting, radiation and extreme temperatures.

- Biological hazards, such as bacteria, viruses, infectious waste and infestations.

- Safety hazards associated with gravity (falls of people and objects); manual handling; hand tools; moving parts of plant/machinery and/or their loads, vehicles; electricity, pressure equipment.

- Psychological hazards resulting from stress and strain.

- Hazards associated with poor ergonomic design of workplaces and working methods, such as poor seating for drivers of vehicles like fork-lift trucks, or awkward design of workstations for word process operators.

A risk is a combination of the likely severity and probability that somebody will actually be harmed by a specific hazard.

A risk will be higher when the severity of the consequences is greater and when the probability of occurrence is more frequent. The two factors are independent: the severity of a hazard could be high and the probability may be very low. The probability of the occurrence is related to the frequency in which the worker is in contact with the hazard (the more frequent contacts, the greater the probability) and the frequency in which the hazard can realize its potential harmful effects (continuously present hazards have higher probability to harm that those present and active for short periods).

While hazards are intrinsic to a given process, risks are not so and will vary depending on the levels of prevention and protection afforded. For example, pesticides have intrinsic hazards and spraying them may pose serious risks to farmers. But where those hazards are properly controlled, the risks can be reduced to acceptable levels.

### 3.2. Hazard identification

Hazard identification in any occupational activity is the process of finding and identifying hazardous agents (situations, products etc) that could contribute to provoking an occupational accident or/and disease as well as the groups of workers potentially exposed to these hazards. Hazard identification is one component of the larger process of OSH management. The sources of information to identify workplace hazards include, mainly:

- OSH legislation, codes of practices, guidance documents provided by national and international institutions and organizations.

- Information from national, sectoral or enterprises statistics on the prevalent occupational accident or/and diseases and the hazards involved.

- Information or safety data sheets provided by manufacturers and suppliers of machinery, equipment, tools, products and substances.

- Information from the workers, workers' representatives and joint OSH committees through consultations, observations, complaints, ad-hoc meetings, etc. Workers are often more aware of hazards and the possible ways of controlling them than management is.

- Workplace and job inspections and analysis, through the observation of the tasks being performed, discussions with operational staff involved and analysis of the situation, circumstances, plant/products/substances etc or a combination of them all.

- Review of accident history of (including incidents and "near misses") and occupational illnesses, accident/disease investigations and data from workers' health surveillance, undertaken in the enterprise or in other enterprises.

- Advice, opinions and judgment of competent internal and external OSH professionals. The labour inspectorates themselves should also be approached for helpful advice.

The hazard identification process focuses on the relationship between the worker, the task, the equipment and substances, the work environment and the work organization. Basic steps of hazard identification are:

1. Identification of possible agents at the workplace. A workplace might have different activities (e.g., production plants, construction sites, office buildings, hospitals or farms) and a variable number of workers (small enterprises/big enterprises). Different activities can be localized in special areas such as departments or sections. In an industrial process, different stages and operations can be identified as production proceeds from raw materials to finished products. Detailed information should be obtained about processes, operations or other activities of interest, to identify the agents utilized, including raw materials, materials handled or added in the process, primary products, intermediates, final products, reaction products and by-products. Information on the nature of the work organization, working time, as well as the nature of the task and operations should also be collected.

2. Knowledge about risks should be available from the various sources listed above.

3. Awareness of possible exposure situations. This implies identifying the worker or workers exposed to the hazard as well as the routes and patterns of exposure (who may be harmed and how they may be harmed). The exposure routes can vary from one agent to another. For example, the main exposure routes for chemical and biological agents are inhalation and dermal uptake or accidentally by ingestion. The exposure pattern depends on frequency of contact with the hazards, intensity of exposure and time of exposure. It is important to

look at what actually happens in the workplace (instead of analyzing just the "formal" procedures and operations on paper). Workers might be directly exposed as a result of actually performing tasks, or be indirectly exposed because they are located in the same general area or location as the source of exposure.

When possible, hazards should be identified in the <u>planning or design of new plants or processes</u>, while changes can still be made at an early stage and hazards can be anticipated and avoided.

Hazard identification may be <u>documented</u>, providing useful information of the hazard in a way to help future strides in OSH management:

- Where it is happening (environment).

- Who or what it is happening to (exposure).

- What precipitates the hazard (trigger).

- The outcome that would occur should it happen (consequence).

- Any other contributing factors.

## 3.3 Risk assessment

Risk assessment should cover all work tasks and hazards in the workplace and allow hazards to be assessed to see how harmful they are.

Risk assessment is the process of estimation and evaluation of all the risks associated with each of the hazards identified. Some authors differentiate the two consecutive steps in the risk assessment:

- <u>Risk estimation</u>: process to establish the degree of the risk according to two factors: probability and severity.

- <u>Risk evaluation</u>: judgment on the importance and acceptability of the risk and accordingly the need and urgency to take preventive measures.

Risk estimation is a tool to assist in decision-making and is not a precise science and involves subjective judgment. However, some models have been developed in order to minimize the subjectivity.

There are different techniques (qualitative and quantitative) used to estimate the degree of risk, although most of them share the same principles. One of the simplest methods includes the following steps:

**1st step:** Estimate the probability of each hazard according to its likelihood of occurrence (High; Medium; Low).

**2nd step:** Estimate the severity of each hazard according to its potential of the harm (High; Medium; Low).

**3rd step:** Determine the degree of risk according to the probability and the severity of the hazard estimated (High; Medium; Low).

## The degree of risk

| Severity | | | |
|---|---|---|---|
| Probability | High | Medium | Low |
| High | High | High | Medium |
| Medium | High | Medium | Medium |
| Low | Medium | Medium | Low |

**4$^{th}$ step:** After these steps, it is necessary to decide the importance of the risk and the urgency for the implementation of the control measures).

According to the degree of each risk, it is necessary to evaluate it according the following criterion for action:

- High risk situation requires action immediately.

- Medium risk situation that require action in the short and medium-term.

- Low risk situations may require relatively little or no action.

Risk assessment is also a tool for prioritization: the more likely it is that the hazardous situation will occur and/or the more serious the consequences, the more urgent it is that the risk be controlled. Risk assessment techniques can be used for safety and for health risks, though for the latter (such as exposure to hazardous chemicals), scientific and other measurement techniques will often be helpful to determine appropriate preventative measures.

## 3.4 Risk prevention and control

Risk prevention and control is the third step in the "risk management" process. The first two steps are closely linked but are mainly analytical steps, while risk prevention and control is an active step forward, leading to clear improvements in the workplace and hopefully the reduction of accidents and ill-health.

Before considering a more general approach to risk prevention and control, it is important to recognize that there may also be some specific legal requirements to meet. While some countries have opted for more general 'framework' OSH legislation with few specific regulations, others have more prescriptive approach to OSH legislation overall. Thus, if particular risks have been identified, it is important first to consider whether there is specific legislation that applies which require particular safety or health measures to be provided.

Wider organizational issues, such as the need for behaviour or attitude change or the absence of any preventative OSH culture may also have to be considered when addressing risk prevention and control.

### Risk control hierarchy

If there are no specific legal requirements to be met, risk control can sometimes seem to be a complex process that requires the advice of OSH specialists. However, many risks can be controlled in a relatively straightforward manner, and even though legislation is unspecific, many countries, employers, workers, inspectors and others have developed their own principles for risk control, based on sound experience. These principles are also sometimes encapsulated in legislation (as for example, some EU Product Safety Directives), but whether or not they are encapsulated in legislation, such principles provide a good strategy for risk control.

These principles often take the form of a 'risk control hierarchy'. Some measures are known to be more effective than others and the most obvious solutions are not always the best (such as automatically providing hearing protectors for workers exposed to high noise levels).

The following box below summarizes an approach which employers, workers, labour inspectors and others have used to help decide systematically which control measures are best suited to dealing with which risks.

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**A hierarchy for risk control**

1. _Elimination or substitution of hazards._ The first approach should be to completely remove hazards at source, if possible. For example, a process might be changed to one that uses a hazardous substance to one that does not, such as using a water-based paint instead of a hazardous chemical. Some machine tools can be replaced with ones that are intrinsically safer, for example, using a pneumatic tool instead of an electrical one. And asbestos has now been effectively substituted with safer alternatives.

2. _Reducing hazards through good design._ Many risks can be effectively reduced (rather than eliminated) at the design stage. Thus a machine manufacturer can often reduce noise through careful design of its component parts, or significantly reduce vibration levels of a powered hand-tool through good design (it is very difficult if not impossible to reduce vibration levels subsequently). Pressure vessels must also be designed so that they withstand the maximum pressures to which they may be subjected, resist corrosion etc.

3. _Technical and engineering controls._ Where unacceptable risks remain, employers should consider technical or engineering means to reduce them. Some hazardous processes may be completely isolated and/or enclosed, such as for X-ray equipment: workers are normally kept well

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away from the equipment and entry into the enclosure is strictly controlled. Noisy machines may also be fitted with soundproofed enclosures, which reduce noise levels even if some risks remain. The guarding of machinery may also be considered under this heading: if adequate protection is not provided by the manufacturer or the machine is built to an old standard, improved guarding will be needed.

4. *Administrative controls.* Administrative or organisational controls consist of developing and implementing safe methods of work to reduce exposure to risks, and they may often be used in conjunction with technical controls. Using the above example of the X-ray enclosure, this would mean having effective working rules to ensure that only authorized workers entered the enclosure and that when they did so, there were safeguards in place to ensure that the X-ray equipment was not accidentally switched on. In offices, work programmes should be arranged to give computer operators breaks from keyboard work. Warning signs also come into this category, along with the OSH management system to ensure they are properly implemented.

5. *Personal protective equipment.* Personal protective equipment (PPE) and protective clothing is the least effective method of reducing risks to workers because it is uncomfortable, is ineffective, is not used properly for various reasons or is not properly maintained. PPE should therefore be seen as a last resort for most jobs, although for some it is the only option – for example, fire fighters. PPE may also have value during maintenance or repair or as an additional protective measure. When it is required, the employer should always provide PPE that is suitable and that fits the employees (they should of course be consulted), provide training in its use and ensure it is properly maintained through regular checks and inspection.

This hierarchy thus gives priority to technical or engineering measures rather than ones based on people or organisations. Though in theory, control measures which rely on people and organisations should work, in practice they often do not work because of the realities of working life, including production pressures and tight deadlines, workers' forgetfulness, tiredness, apathy and other 'human factors'.

In deciding which of the control measures is most appropriate, it will also be important to heed any manufacturer's instructions (e.g. with regard to use of chemicals) and to consult the workforce as well as follow other sources of good advice. There are now many sources of good advice on OSH which employers and others can consult.

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**CIS Centres network** [24]

One of these is the CIS Centres network. CIS Centres exist in many countries throughout the world and are linked by a network supported by the ILO, through which they have access to much OSH information and advice. The labour inspectorate may also be able to give good advice as to what practical measures can be taken to reduce particular risks and employers and workers are encouraged to consult them too.

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## 3.5. Implementation and monitoring

When a control measure is decided upon, someone should be made responsible for its implementation within a reasonable timeframe. The staff should be informed of the changes to be undertaken and additional training may also be needed, especially if the measures involve changing working practices. It is of course important that control measures (and the implementation process itself) do not introduce new risks.

Implementing some control measure is not the end of the process. The hazard identification and risk assessment processes may need to be revisited when, for example:

■ Checking the effectiveness of control measures. (Control measures must also be maintained – for example, interlocking guards have to be kept in working order, work procedures have to be monitored to ensure they are being followed, and hearing protectors have to be kept clean and checked for damage.)

■ The residual risk may also need to be assessed from time to time to evaluate its acceptability

■ There are new or changed processes at hazardous installations, or significant changes in transport of hazardous substances.

■ Incidents occur.

■ New technology offers scope for improvements.

■ The experience of labour and/or management is at odds with the risk assessment.

■ New information about the behaviour or effects of substances and processes becomes available.

■ There are proposals for new construction or other developments inside the premises of the installation or nearby.

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[24] International Occupational Safety and Health Information Centre
http://www.ilo.org/safework/info/cis/lang--en/index.htm

# ■ SUMMARY

Occupational safety and health (OSH) is a subject that touches on many different disciplines and approaches. Although there is now more common ground than in the past, there are still differences in understanding of the aims of OSH and meaning of OSH concepts, and of the principles that should guide its action. This lack of common understanding hinders the establishment of a shared viewpoint and basis for fruitful work on OSH. This Module, in addition to being a learning tool, aims also to serve as a useful reference in this respect and specifically it is one of the purposes of the Chapter one.

The main principles and concepts of OSH are set out in various Conventions and Recommendations adopted by the International Labour Conference as well as other documents of the International Labour Organization (ILO), such as codes of practice, resolutions and guidance documents and most of all, the ILO's Encyclopaedia of Occupational Health and Safety. The contents of this Module are derived from information embodied primarily in the above-mentioned ILO documentation as well as those from other national and international bodies of recognized competence in the field.

Chapter two is focused in identifying the main rights and duties of the key stakeholders, as well as the modern approaches for the OSH regulation, the management of the OSH at enterprise level and the role of the inspectors should play in these new approaches.

Chapter three is focused in the explanation of the purposes and the contents of the techniques of hazard identification and risk assessment. Although the responsibility for the implementation these techniques are under the enterprise, inspectors need to know them because they need to verify whether the enterprise is doing it correctly and frequently advice the enterprisers on how to do it.

This Module can not hope to cover all the subject areas in the vast field of OSH. It focuses on the key concepts and principles, summarizing them in a form that will be useful for labour inspectors. It will therefore provide just an overview of the importance of preventing occupational accidents and ill-health, and how best to prevent them and also to promote OSH. Further information can be found in the References mentioned at the end of this Module, such as the above-mentioned ILO Encyclopaedia and its glossary of technical terms, as well as other international and national web sites.

# EXERCISES

# Exercise 1 ✏

| TITLE | Risk assessment exercise |
|---|---|
| AIM | Development the participants' skills to undertake a risk assessment. |
| TASK | The group of participants should be divided in several groups. In each group, you have to elect a spokesperson to report back with your group's views.<br><br>On the basis of the attached scenario and using the risk assessment table collectively,<br><br>- Identify as many hazards as you can and record them in the form.<br><br>- Identify who might be harmed and how<br><br>- Evaluate and prioritize the risks<br><br>- Identify what preventive actions are necessary |
| TIME | The groups have 60 minutes for its deliberations. After that, each spokesperson will have 5 minutes to report back the conclusions of your group. |
| RESOURCES | - Use the picture and the form attached for this exercise.<br><br>- Use the guidance of the Annex 1 of this module and the example table. |
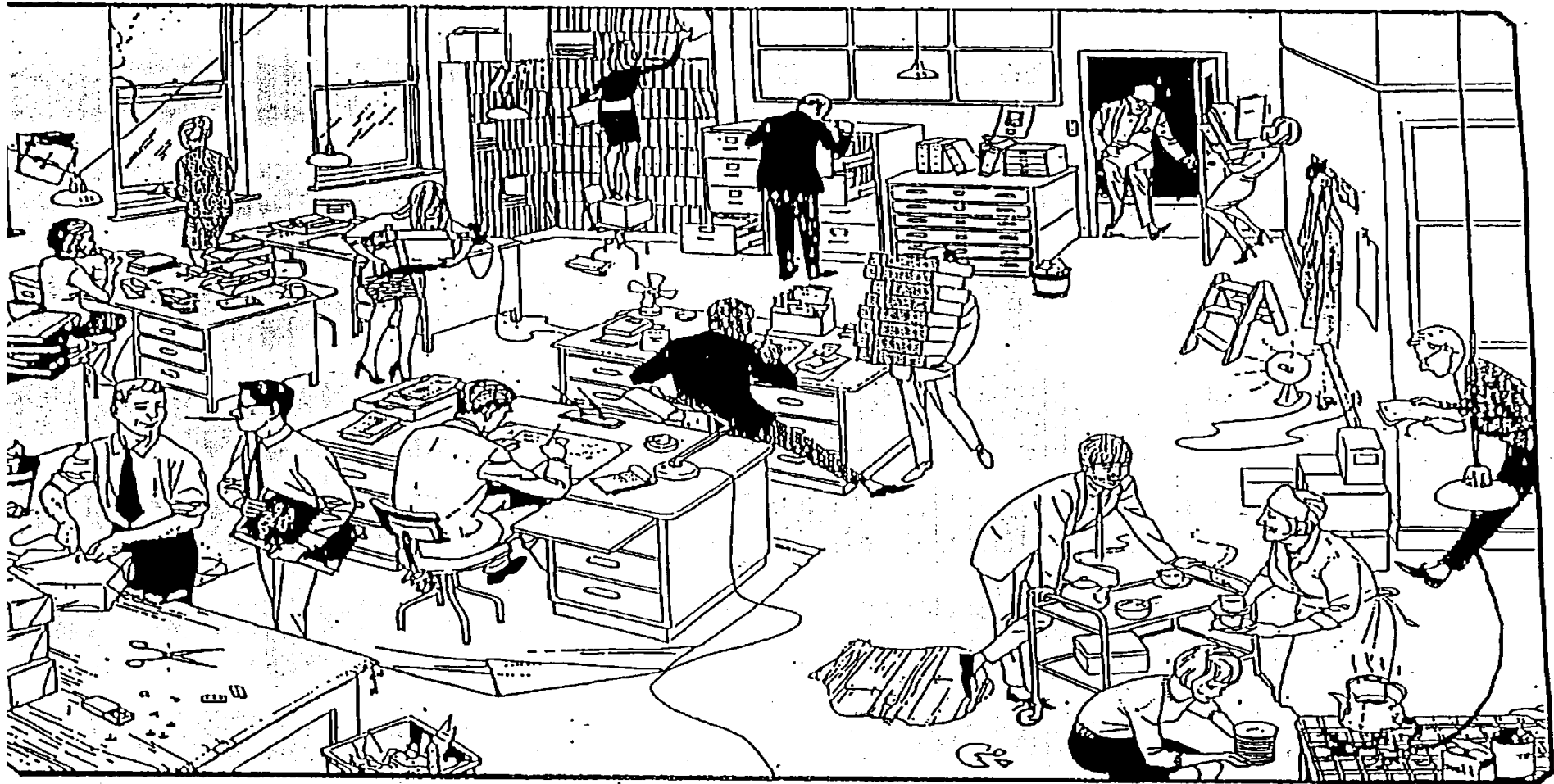
**Spot any hazards?**
**What are the risks?**
**What would you do about it?**

| Risk Assessment Table | | | | | | |
|---|---|---|---|---|---|---|
| What are the hazards? | Who might be harmed and how? | Evaluating and prioritizing risks | Preventive actions | Action by whom | Action by when | Revision |
| | | | | | | |
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# Exercise 2 ✎

| TITLE | Convincing unmotivated employers |
|---|---|
| AIM | Development the participants' skills to convince employers on the need to increase efforts on OSH. |
| TASK | The group of participants should be divided in several groups. In each group, you have to elect a spokesperson to report back with your group's views. <br><br> - On the basis of the attached form on the "opinions" of some employers justifying their scarce implication on OSH, the working group will develop some arguments or strategies to make change these opinions. <br><br> - Each spokesperson will report back the conclusions of your group. <br><br> - Alternatively, the teacher could organize a role-play identifying in which another participant or himself could play the role of the unmotivated employer and the spokesperson the role of the inspector trying to motivate him, using the arguments elaborated in the group. |
| TIME | The groups have 45 minutes for its deliberations. After that, each spokesperson will have 5 minutes for reporting back (or for the role play exercise.) |
| RESOURCES | - Use the form attached for this exercise. <br><br> - Use the guidance of the Annex 1 of this module and the example table |

# Exercise 2 ✎

**Convincing unmotivated employers**

| Opinions | Arguments |
|---|---|
| 1. We people from small enterprises do not have money for purchasing protective devises required by the law. | |
| 2. I have already told to the workers to use the helmet but they do not do it, and I sincerely cannot be behind them all day. | |
| 3. Yes, perhaps we have had many workers sick in the last months… but this is no responsibility of the enterprise. You should see how much the workers of this enterprise smoke and drink alcohol! | |
| 4. With those respiratory masks workers cannot work well, they cannot breathe and take lot of breaks. This is a very unproductive measure. | |
| 5. My business is repairing cars. I do not know anything on occupational safety and health. | |
| 6. What will I gain in doing all these things? | |

# Exercise 3 🖉

| TITLE | **Accident causation and prevention** |
|---|---|
| AIM | • To consolidate the key points of the OSH module regarding why accidents etc happen and how they might be prevented |
| TASK | 1. The group of participants should be divided in several groups. In each group, you have to elect a spokesperson to report back with your group's views.<br><br>2. The facilitator will assign one of the two case studies to each group.<br><br>3. Participants should read the summary report of the two cases, discuss and collectively reply to the following questions:<br><br>• Accident causation: what were the main organisational, physical and human factors that contributed to the accident causation?<br><br>• What preventive measures might be appropriate to prevent a recurrence of this or similar incidents? |
| TIME | • The groups have 40 minutes for its deliberations. After that, each spokesperson will have 5 minutes to report back the conclusions of your group. |
| RESOURCES | • Use the case studies of the accidents attached.<br><br>• Use the model of accident causation presented in the Annex 2 |

| ACCIDENT SUMMARY [25] | |
|---|---|
| Accident Type: | Fatal - electrocution |
| Weather Conditions: | Sunny, Clear |
| Type of Operation: | Steel Erection |
| Size of Work Crew: | 3 |
| Competent Safety Monitor on Site: | Yes - Victim |
| Was the Worksite Inspected Regularly: | Yes |
| Was OSH training provided? | No |
| Employee Job Title: | Steel Erector Foreman |
| Age & Sex: | 43, Male |
| Experience at this Type of Work: | 4 months |
| Time on Project: | 4 Hours |



## BRIEF DESCRIPTION OF ACCIDENT

Employees worked for a steel erection company and were in the process of moving a steel canopy structure using a crane with a long boom. The boom was long enough to touch an overhead power line, operating at 7200 volt. No physical barriers were erected to prevent this happening and it did so, electrocuting the operator of the crane, who was also the site's foreman.

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[25] Case inspired by a real case investigated by the US Occupational Safety and Health Administration (OSHA). For more information, see "Fatal facts. Accident Reports, Occupational Safety and Health Administration of the Unites States".
http://www.osha.gov/OshDoc/toc_FatalFacts.html

| ACCIDENT SUMMARY[26] | |
|---|---|
| Accident Type: | Fatal, heart rupture |
| Weather Conditions: | Cloudy and Dry |
| Type of Operation: | Trenching and excavation |
| Size of Work Crew: | 4 |
| Competent Safety Monitor on Site: | Yes |
| Safety and Health Program in Effect: | Yes |
| Was the Worksite Inspected Regularly: | Yes |
| OSH training provided? | No |
| Employee Job Title: | Pipe Layer |
| Age & Sex: | 32, Male |
| Experience at this Type of Work: | 9 Months |
| Time on Project: | 2 Weeks |

## BRIEF DESCRIPTION OF ACCIDENT



Employees were laying sewer pipe in a trench 15 feet deep. The sides of the trench, 4 feet wide at the bottom and 15 feet wide at the top, were not shored or protected to prevent a cave-in. Soil in the lower portion of the trench was mostly sand and gravel and the upper portion was clay and loam. The trench was not protected from vibration caused by heavy vehicle traffic on the road nearby. To leave the trench, employees had to exit by climbing over the backfill. As they attempted to leave the trench, there was a small cave-in covering one employee to his ankles. When the other employee went to his co-worker's aid another cave-in occurred covering him to his waist. The first employee died of a rupture of the right ventricle of his heart at the scene of the cave-in. The other employee suffered a hip injury.

[26] Case inspired by a real case reported by OSHA: http://www.osha.gov/OshDoc/toc_FatalFacts.html

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# ANNEXES

# ANNEX 1:
# THE FIVE-STEP APPROACH TO RISK ASSESSMENT[27]

The 5 steps of risk assessment are:

- Step 1. Identifying hazards and those at risk.
- Step 2. Evaluating and prioritizing risks .
- Step 3. Deciding on preventive action.
- Step 4. Taking action.
- Step 5. Monitoring and reviewing.


**Step 1. Identifying hazards and those at risk** Here are some tips to help identify the hazards that matter:

- Walk around the workplace and looking at what could cause harm.
- Consult workers and/or their representatives about problems they have encountered.
- Consider long-term hazards to health, such as high levels of noise or exposure to harmful substances, as well as more complex or less obvious risks such as psychosocial or work organizational risk factors.
- Look at company accident and ill-health records.
- Seek information from other sources such as.
  - o Manufacturers' and suppliers' instruction manuals or data sheets.
  - o Occupational safety and health websites.
  - o National bodies, trade associations or trade unions.
  - o Legal regulations and technical standards.

For each hazard it is important to be clear about who could be harmed; it will help in identifying the best way of managing the risk. This doesn't mean listing everyone by name, but identifying groups of people such as 'people working in the storeroom' or 'passers-by'. Cleaners, contractors and members of the public may also be at risk.

Particular attention should be paid to gender issues and to groups of workers who may be at increased risk or have particular requirements (Workers with disabilities Migrant workers, Young and old workers, etc.)


**Step 2. Evaluating and prioritizing risks.** The next step is evaluating the risk arising from each hazard. This can be done by considering:

- How likely it is that a hazard will cause harm;
- How serious that harm is likely to be;
- How often (and how many) workers are exposed.

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[27] Risk assessment: the key to healthy workplaces. European Agency for Safety and Health at Work, 2008.
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A straightforward process based on judgement and requiring no specialist skills or complicated techniques could be sufficient for many workplace hazards or activities. These include activities with hazards of low concern, or workplaces where risks are well known or readily identified and where a means of control is readily available. This is probably the case for most businesses (mainly small and medium-sized enterprises — SMEs). Risks should then be prioritized and tackled in that order.

**Step 3. Deciding on preventive action.** The next step is to decide how to eliminate or control risks. At this stage, it will have to be considered:

- If it is possible to get rid of the risk.
- If not, how risks can be controlled so they do not compromise the safety and health of those exposed.

When preventing and controlling risks, the following general principles of prevention have to be taken into account.

- Avoiding risks.
- Substituting the dangerous by the non-dangerous or the less dangerous.
- Combating risks at source.
- Applying collective protective measures rather than individual protective measures (e.g. Control exposure to fumes by local exhaust ventilation rather than personal respirators).
- Adapting to technical progress and changes in information.
- Seeking to improve the level of protection.

**Step 4. Taking action.** The next step is to put in place the preventive and protective measures. It is important to involve the workers and their representatives in the process. Effective implementation involves the development of a plan specifying:

- The measures to be implemented.
- Who does what and when.
- When it is to be completed.

It is essential that any work to eliminate or prevent risks is prioritized.

**Step 5. Monitoring and reviewing.** Carrying out regular checks must also not be neglected to ensure that preventive and protective measures are working or being implemented and to identify new problems.

The risk assessment has to be reviewed regularly depending on the nature of the risks, the degree of change likely in work activity or as a result of the findings of an accident or 'near miss' (6) investigation. Risk assessment is not a once-and-for-all activity.

**Recording the assessment**

The risk assessment must be recorded.[28] Such a record can be used as a basis for:

- Information to be passed to the persons concerned.
- Monitoring to assess whether necessary measures have been introduced.
- Evidence to be produced for supervisory authorities.
- Any revision if circumstances change.

A record of at least the following details is recommended:

- Name and function of the person(s) carrying out the examination.
- The hazards and risks identified.
- Groups of workers facing particular risks.
- The necessary protection measures.
- Details of the introduction of the measures such as the name of the person responsible and date.
- Details of subsequent monitoring and reviewing arrangements, including dates and the people involved.
- Details of the workers' and their representatives' involvement in the risk assessment process.

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[28] An example of a risk assessment form is attached.

| What are the hazards? | Who might be harmed and how? | What are you already doing? | What further action is necessary? | Action by whom | Action by when | Done |
|---|---|---|---|---|---|---|
| Falling from height | Serious injury or even fatal injury could occur if a worker falls. | • Agree scaffolding requirements at contract stage, including appropriate load rating and provision of loading bays.<br>• Bricklayers supervisor to check with the site manager that the correct scaffold is provided and inspected.<br>• Workers instructed not to interfere with or misuse scaffold – supervisor to keep an eye out for problems.<br>• Ladders in good condition, adequately secured (lashed) and placed on firm surface.<br>• Band stands with handrails to be used for work on internal walls.<br>• Workers trained to put up bandstands. | • Scaffold requirements agreed, including loading bays and appropriate load rating.<br>• Supervisor to speak regularly to site manager to arrange scaffold alterations and ensure that weekly inspections have been carried out. | TB<br><br>LG | 20-03-06<br><br>From: 01-05-06 | 20-03-06 |
| Collapse of scaffold | All operatives on scaffold may incur crush injuries, or worse, if the scaffold collapses on top of them. | • Agree scaffolding requirements at contract stage, including appropriate load rating and provision of loading bays.<br>• Bricklayers supervisor to check with the site manager that the correct scaffold is provided and inspected. | • Supervisor to keep a check to make sure that scaffold is not overloaded with materials. | LG | From: 01-05-06 | |
| Falling objects Hitting head or body, including feet | Serious head, and other injuries to workers, others on site and members of the public. | • Brick guards kept in position on scaffold lifts.<br>• Waste materials removed form scaffolding and placed in skip.<br>• Safety helmets and protective foot wear (with steel toe caps & mid-soles) supplied and worn at all times. | • Supervisor to monitor use of safety hats and protective foot wear. | LG | From: 01-05-06 | |
| Manual handling | All workers could suffer from back injury and long- | • Bricks, mortar etc to be transported and lifted to | • Heaviest blocks are 15kg, no special arrangements necessary. | | | |