BRITISH STANDARD

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Occupational health and safety management systems — Guide

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Committees responsible for this British Standard

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Contents

Foreword

This British Standard has been prepared by Technical Committee HS/1. It supersedes BS 8800:1996, which is withdrawn.

This revision has been prepared to reflect national and international occupational health and safety (OH&S) issues which have arisen since the publication of BS 8800:1996. These include the publication of OHSAS 18001:1999, Occupational health and safety management systems — Specification [1] and OHSAS 18002:2000, Occupational health and safety management systems — Guidelines for the implementation of OHSAS 18001 [2] and the International Labour Organisation's ILO-OSH 2001, Guidelines on occupational safety and health management systems [3]. This British Standard reflects the approach given in HSG 65, Successful health and safety management [4], but incorporates elements of ILO-OSH 2001, in particular the initial status review (ISR) (see **3.2**).

This British Standard gives guidance on OH&S management systems to assist organizations in achieving compliance with stated OH&S policies and objectives and on how OH&S should be integrated within the organization's overall management system. The annexes have been updated and include the following:

— Comparison between this guide; BS EN ISO 9001; BS EN ISO 14001; OHSAS 18001 and ILO-OSH 2001 (Annex A);

— Guidance on organizing (Annex B);

— Promoting an effective OH&S management system (Annex C);

— Guidance on planning and implementing (Annex D);

— Guidance on risk assessment and control (Annex E);

NOTE This has been developed to provide additional guidance on the practicalities of the assessment process and to place greater emphasis on risk control.

— Measuring performance and audit (Annex F);

— Hazardous event investigation (Annex G).

There are sound economic reasons for reducing work related accidents and ill health, as well as ethical and regulatory reasons. Effective OH&S management promotes business efficiency, reduces costs and makes good business sense. A comprehensive legal framework already exists for OH&S, requiring organizations to manage their activities in order to anticipate and prevent circumstances that might result in occupational injury or ill health. This British Standard seeks to improve the OH&S performance of organizations by providing guidance on how the management of OH&S can be integrated with the management of other aspects of business performance, in order to:

a) minimize risk to employees and others;

b) improve business performance; and

c) assist organizations to establish a responsible image within the marketplace.

This standard shares common management system principles with the BS EN ISO 9000, *Quality management* series and the BS EN ISO 14000, *Environmental management* series of standards, but these are not required for the implementation of this British Standard. This guide is consistent with:

— ILO-OSH 2001, Guidelines to health and safety management systems [3];

— OHSAS 18001, Occupational health and safety management systems — Specification [1];

— The Health & Safety Commission's, Management of Health and Safety at Work Regulations 1999, Approved Code of Practice [5];

— The Health & Safety Executive's booklet HSG65: Successful health and safety management [4];

This publication contains guidance and recommendations. It should not be quoted as if it were a specification and should not be used for certification purposes.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

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Introduction

OH&S management systems are critical in maintaining a healthy and safe working environment. Measures in place to control risks must be managed in accordance with the Management of Health and Safety at Work Regulations 1999 [5] to ensure that they are and remain in place; are used and remain effective in reducing risk to as low a level as reasonably practicable. The importance of managing OH&S effectively is increasingly highlighted in both the media and official reports of major accidents, resulting in greater emphasis on the management of OH&S in legislation. Several parties can have a legitimate interest in an organization's approach to OH&S including: employees; customers/clients/suppliers; the community; shareholders; contractors; insurers; as well as regulatory agencies. The aim for the organization is to ensure that their OH&S management systems meet these needs in a balanced way. The importance of managing OH&S effectively is increasingly highlighted in both the media and official reports of major accidents, resulting in greater emphasis on the management of OH&S in legislation. The profile of occupational health has become higher in recent years, with growing awareness of the need for proper protection of those exposed to risks in the workplace, taking account of the health needs of individuals.

Managing health and safety adds value to businesses helping to improve overall performance. More and more organizations attach the same importance to achievement of high standards in OH&S management as they do to other key aspects of their business activities. This demands the adoption of a structured approach to the identification of hazards and the evaluation and control of work-related risks.

This guide is intended to help organizations develop a framework for managing OH&S so that employees and others whose health and safety might be affected by the organization's activities are adequately protected. Many of the features of effective OH&S management are identical to management practices advocated by proponents of quality and business excellence. These guidelines are based on the general principles of good management and are designed to enable the integration of OH&S management within an overall management system. Various approaches could equally well be adopted, but this guide is based on HSE guidance Successful health and safety management HSG65 [4] and is designed for organizations wishing to base their OH&S management systems on this approach.

Human factors including the culture, attitudes and beliefs within organizations can make or break the effectiveness of any management system and need to be managed very carefully when implementing this guide.

Figure 1 illustrates part of a cycle for continually improving OH&S management and its integration within the overall management system. By following the stages in Figure 1, as described in Clause **3**, organizations are able to set OH&S policy and objectives, establish procedures for their implementation and demonstrate achievement against their defined criteria.

While the general principles outlined in the annexes apply to all organizations, small organizations need to be proportionate in implementing these guidelines. The guidance contained in this British Standard will assist organizations in continually improving their performance beyond legal compliance.

NOTE Lists provided in this guide are not intended to be definitive or exhaustive.

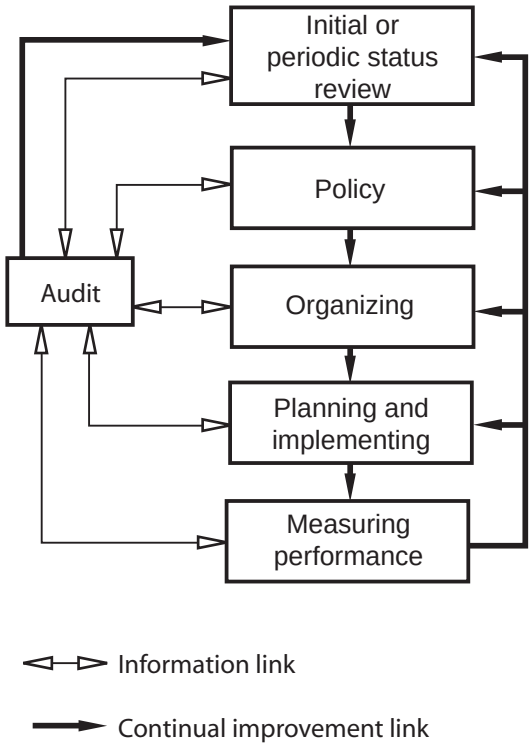

Figure 1 — Elements of successful health and safety management based on the approach in HSG65

1 Scope

This guide is intended to help those with responsibility for ensuring OH&S issues are managed effectively to develop and maintain their own system.

This British Standard gives guidance on:

a) the design and implementation of OH&S management systems;

b) the evaluation of effective OH&S management with a view to continual improvement;

c) the relationships to and integration of an OH&S management system with other management systems standards.

This guide is intended for use by organizations of all sizes and regardless of the nature of their activities. It is intended that its application is proportional to the circumstances and needs of the particular organization.

2 Terms and definitions

For the purposes of this British Standard the following terms and definitions apply.

2.1
accident
undesired event giving rise to death, ill health, injury

2.2
audit
systematic and independent process for obtaining evidence and evaluating it objectively to determine the extent to which specified criteria are fulfilled

NOTE Independent does not necessarily mean external to the organization.

2.3
competent person
person with the appropriate combination of skill, knowledge qualifications and experience

2.4
continual improvement
recurring process of enhancing the occupational OH&S management system in order to achieve improvements in overall occupational health and safety performance consistent with the organizations OH&S policy

NOTE 1 The process need not take place in all areas of activity simultaneously.

NOTE 2 [Adapted from BS EN ISO 14001].

2.5
hazard
source or situation with a potential for harm in terms of death, ill health or injury, or a combination of these

2.6
hazard identification
process of recognizing that a hazard exists and defining its characteristics

2.7
hazardous event
occurrence that results in, or has the potential to result in, an accident

NOTE This could include long-term exposure.

2.8
OH&S objectives
goals, in terms of OH&S performance, that an organization sets itself to achieve

2.9
health surveillance
monitoring health of employees to detect signs or symptoms of work related ill health so that steps can be taken to eliminate, or reduce the probability of, further harm

2.10
ill health
identifiable disease or adverse health condition that is judged to have been caused by or made worse by a person's work activity or environment

NOTE This is sometimes referred to as occupational work-related ill health.

2.11
incident
hazardous event where no harm occurs

2.12
integration
combining the elements of an OH&S management system with those of another, e.g. environmental management system

2.13
interested party
person or group concerned with, affecting or affected by the health and safety performance of the organization

2.14
management system
series of elements for establishing policy, objectives and arrangements for implementation and continual improvement

2.15
organization
company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has some autonomy over its administration

NOTE 1 For organizations with more than one operating unit a single operating unit can be defined as an organization.

NOTE 2 [Adapted from BS EN ISO 14001].

2.16
risk
combination of the likelihood and consequence(s) of a specified hazardous event

2.17
risk assessment
process of identifying hazards and evaluating the risks to health and safety arising from these hazards taking account of the existing risk controls (or, in the case of a new activity, the proposed risk controls)

2.18
risk control
selection and application of suitable measures to reduce risk

2.19
status review
formal evaluation of the OH&S management system

2.20
safety culture
product of individual and group values, attitudes, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's approach to health and safety

2.21
worker representative
safety and health representative and or representative of employee safety and health

3 OH&S management system elements

3.1 General

Within some organizations elements of the OH&S management system might already be in place, such as the policy and risk assessment records, but others need to be developed further. However, it is important that all the elements in this guide are incorporated into the OH&S management system, but the manner and extent to which individual elements should be applied depends on factors such as the size of the organization, the nature of its activities, the hazards and the conditions in which it operates. Whilst there are various methods of developing the elements it is recommended that the guidance in Annex B, Annex C, Annex D, Annex E, Annex F and Annex G should be followed.

3.2 Initial status review

An initial status review should be carried out in all organizations that do not have an established and effective OH&S management system. The initial status review should provide information on the scope, adequacy and implementation of the current management system. Where no formal management system exists, or if the organization is newly established, the initial status review should serve as a basis for establishing what arrangements should be made to ensure an effective OH&S management system is implemented. The initial status review should indicate where the organization currently stands in relation to managing risks.

The review should be carried out by competent persons in consultation with the workforce or its representatives. The review should establish to what extent existing arrangements are in place for:

a) identifying and meeting the requirements of relevant legislation and regulations dealing with OH&S management issues (see **3.5.4**);

b) identifying and implementing best practice and performance in the organizations employment sector and other appropriate sectors (e.g. from relevant HSC industry advisory committees and trade association guidelines) (see **3.5.4**);

c) obtaining or developing guidance on OH&S management and making it available throughout the organization (see **3.4.3**);

d) consultation within and disseminating information throughout the organization (see **3.4.3**);

e) identifying, anticipating and assessing hazards and risks to health and safety arising out of the work environment and work activities (see **3.5.3**);

f) ensuring the health and safety of those involved in, or affected by, work activities (see **3.5.3**);

g) developing and implementing effective risk controls to eliminate hazards and minimize risk to health or safety (see **3.5.3**);

h) measuring and evaluating OH&S management performance (see **3.6**);

i) establish effective arrangements for the review and audit of the OH&S management system (see **3.8** and **3.9**).

The results of the initial status review should:

1) be documented;

2) become the basis for developing and implementing the OH&S management system;

3) provide a baseline from which continual improvement can be measured.

An effective approach to the initial status review is to review each element of the existing or proposed management system against the guidelines for each element of the process described in this standard.

NOTE The annexes provide information to ensure coverage of key activities.

3.3 OH&S policy

An effective OH&S policy should demonstrate the organization's commitment to OH&S. It should contribute to all aspects of business performance as part of a demonstrable commitment to continual improvement and the development of human factors including the culture, attitude and beliefs within the organization. The organization's top management should set in place procedures to define, document and endorse its OH&S policy. Care should taken to ensure that the policy includes a commitment to protecting the safety and health of persons at work and others who might be affected by their work activities. Good practice indicates that the above can be achieved by:

a) recognizing and implementing OH&S as an integral part of improving business performance;

b) achieving a high level of OH&S performance, and a commitment to continual cost-effective improvement in performance;

NOTE Attention is drawn to the legal duty to reduce risk to as low a level as is reasonably practicable.

c) minimizing risk and the prevention of injury, ill health, diseases and incidents;

d) acknowledging that people are the key resource and promoting the general health and safety of employees;

e) providing adequate and appropriate resources to implement the policy including access to competent specialist advice where necessary;

f) setting and publishing OH&S objectives at a minimum by internal notification;

g) placing management of OH&S as a prime responsibility of line management from most senior executive to first-line supervisory level;

h) ensuring its understanding, implementation and maintenance at all levels in the organization;

i) ensuring employee involvement, participation and consultation to gain commitment to the policy and its implementation;

j) ensuring that employees at all levels receive appropriate training and are competent to carry out their duties and responsibilities;

k) periodically reviewing the policy, the management system and audit of compliance to policy, as a driver of continual improvement;

l) periodically reporting OH&S management performance internally and to external parties where relevant.

The organization's OH&S policy should be set out in a succinct policy statement that captures appropriately the key issues set out in the above list. This policy statement should be signed and dated by the top manager with responsibility for OH&S. Depending on the type of organization and risks associated with the organization's operations, the policy statement might need to be supplemented in more detail.

The OH&S policy and policy statement should be reviewed, revalidated and where necessary revised by top management as often as necessary. It should be communicated and made readily accessible to all persons at their place of work and made available to relevant interested parties, as appropriate (see **3.5.6**).

3.4 Organizing

3.4.1 *General*

Responsibilities and relationships that promote a positive health and safety culture and secure the implementation and continued development of the OH&S policy should be defined.

The management structure and the processes used within the organization should:

a) establish and maintain control of the OH&S arrangements;

b) promote co-operation between individuals, safety representatives and groups so that health and safety is a collaborative effort;

c) ensure the communication of relevant information throughout the organization;

d) secure the competence of employees and the selection of competent contractors;

e) provide clear and visible leadership on OH&S;

f) ensure continual improvement.

3.4.2 *Responsibilities*

3.4.2.1 *Management responsibilities*

Ultimate responsibility for OH&S rests with the managing director, board of directors or management board as appropriate (see HSE Directors' responsibilities for health and safety [6] for further information). In very small organizations the responsibility lies with the owner or senior partner. Good practice is to appoint a person at the top management level (e.g. in a large organization, a board or executive committee member) who has particular responsibility, accountability and authority for:

a) ensuring that the OH&S management system is properly developed, implemented and performing to expectations in all locations and spheres of operation within the organization (see Annex C);

b) ensuring that where necessary one or more competent persons are appointed to help undertake the measures needed;

c) the achievement of all OH&S objectives;

d) the management review (see **3.9.3**) and evaluation of the OH&S management system; and

e) the periodic and comprehensive reporting to the top management on the OH&S management performance.

Top management should demonstrate, by example, their commitment by being actively involved in the continual improvement of OH&S performance.

3.4.2.2 *General responsibilities*

All levels of the organization should be competent, trained and fully aware of the relevance and importance of their activities and how they contribute to the achievement of the organization's OH&S objectives (see **B.4**). All employees should be made aware of the following:

a) their responsibility for the health and safety at work of themselves, those they manage, and others with whom they work;

b) their responsibility for the health and safety of people who might be affected by the activities they manage, e.g. contractors and public;

c) the influence that their action or inaction can have on the effectiveness of the OH&S management system.

Systems should be in place to encourage employees to report shortcomings in the OH&S arrangements, make suggestions for improvements and be involved, where appropriate, in the development of new or improved OH&S arrangements and procedures.

3.4.2.3 *Responsibility allocation*

Individual responsibilities for the implementation of OH&S policy should be clearly allocated and communicated to those involved. To achieve this the following aspects should be addressed.

a) Individual OH&S responsibilities should be clearly defined to those involved. Where job descriptions are used they should include such responsibilities.

b) Responsibilities should be reasonable and all employees should be given the authority and resources (including time) necessary to carry out their responsibilities.

c) Appropriate arrangements should exist whereby employees are held accountable for discharging their responsibilities.

d) Reporting relationships should be clear and unambiguous.

e) Where personal appraisal systems exist, OH&S performance should be included in the appraisal system.

In addition to any allocated responsibilities, all employees should be made aware that they have a general responsibility for their own and others' health and safety (see **B.4**).

3.4.3 ***Organizational arrangements***

It is important that OH&S, in its broadest sense, is fully integrated across the organization and into all its activities, whatever the size or nature of its work (see Annex B). When organizing the implementation of the policy and the effective management of OH&S, the organization should:

a) have (or have access to) sufficient OH&S knowledge, skills and experience to manage its activities safely and in accordance with legal requirements;

b) establish effective arrangements to identify and eliminate or control OH&S hazards and risks and promote health at work (see **3.5.3**);

c) define the allocation of responsibilities and accountabilities in the management structure (see **3.4.2**);

d) ensure employees have the necessary skills and authority to carry out their responsibilities;

e) allocate adequate resources commensurate with the size of the organization and the nature of its activities;

f) identify existing skills, knowledge, expertise, competencies actually required and any gaps between them. This should be carried out at all levels within the organization and any necessary training provided;

g) make effective arrangements for employee involvement, participation, consultation and representation where appropriate;

h) effectively communicate OH&S information to all interested parties;

i) effectively communicate with external agencies, (such as the enforcement agencies, emergency service etc.) where appropriate.

3.5 Planning and implementing

3.5.1 *General*

Planning is an integral part of all elements of an OH&S management system as described in Clause **3** and illustrated in Figure 1. However, in this clause planning refers explicitly to the development of plans for continual improvement and the design, development and implementation of risk assessment and control. An effective OH&S management system should be planned to:

a) control risks;

b) react to changing demands;

c) sustain a positive health and safety culture.

Effective planning is concerned with prevention through identifying, eliminating and controlling hazards and risks. This is equally important when dealing with health risks, which might only become apparent after a long latency period. Planning should be a collaborative effort involving individuals throughout the organization. This is a good way of demonstrating and gaining commitment to continual improvement and promoting a positive health and safety culture.

NOTE Annex C offers practical guidance on how to develop an OH&S management system in a way that promotes a positive safety culture. It also offers guidance on how to measure and improve the safety culture of an organization.

Planning an OH&S management system involves:

1) designing, developing and installing suitable management arrangements, workplace precautions and their associated risk control systems proportionate to the needs, hazards and risks of the organization (see Annex E); and

2) operating, maintaining and improving the system to suit changing needs and process hazards and risks.

Annex D provides guidance on a planning process that could be used to develop any aspect of the OH&S management system.

The planning process should address the following key areas:

— setting objectives (see **3.5.2**);
— risk assessment and risk control (see **3.5.3**);
— legal and other requirements (see **3.5.4**);
— OH&S management arrangements (see **3.5.5**).

3.5.2 *Setting objectives*

It is important that the criteria for judging success or failure of the planned activity are transparent. The OH&S objectives are identified either based on the results of the initial status review, subsequent periodic reviews (see **3.9.2**) or other available data. Clear performance and measurement criteria defining what is to be done, who is responsible, when it is to be done and the desired outcome should be set.

The key elements to planning and setting the objectives are as follows.

a) The organization's objectives should be clearly defined and prioritized.

b) Objectives should be specific to the organization and appropriate relative to its size, the nature of its activities, the hazards, risks and the conditions in which it operates.

c) Suitable and specific performance indicators should be chosen to measure whether objectives have been or are being achieved. These indicators should be defined before moving to the next stage.

d) Plans should be prepared to achieve each objective. The plan should be developed first in broad terms and then in detail as performance needs: the specified tasks that have to be carried out by designated people or teams to implement the plan.

e) Adequate financial, human resources and technical support should be made available.

f) The full implementation of plans should be measured.

g) The plans' successes in achieving objectives should be measured.

h) The objectives and plans should be reviewed as a basis for continual improvement.

Selecting and priortizing objectives is most effectively achieved by involving the workforce in the decision making process.

3.5.3 *Risk assessment and risk control*

It is essential that there is a comprehensive appreciation of the significant OH&S hazards and risks associated with the organization's undertakings. Where hazards cannot be eliminated the organization should ensure that appropriate and effective risk controls are provided to reduce risks to acceptable or tolerable levels. In high hazard industries, organizations need to ensure that proper attention is given to the high consequence, low probability type event to ensure that adequate control is achieved. It could be that the effort needed to achieve this is disproportionate to that needed for the day-to-day risks of the organization.

The planning process should define the arrangements for:

a) ongoing, pro-active identification of hazards and assessment of risks to OH&S arising out of the work environment and work activities;

b) the development and implementation of effective workplace precautions and their associated risk control systems that eliminate hazards or reduce risk;

c) recording the significant details and findings of the risk assessment and making them available to those who need the information.

A risk assessment should always be carried out, and the control measures implemented, before changes are made to work activities or before new activities commence.

Depending on the nature of the change and circumstances the risk assessment could differ in depth and detail. Temporary measures might need to be taken in certain circumstances but should always be confirmed by full risk assessment.

NOTE Annex E provides guidance on the principles and practicalities of OH&S risk assessment and risk control.

3.5.4 *Legal and other requirements*

The organization should establish and maintain arrangements to ensure identification and access to all current and emerging legal and other OH&S requirements and guidance relevant to their activities and services. Relevant employees within the organization should be aware of and understand these requirements.

The organization should seek to emulate best practice and performance, in the organization's business sector and other appropriate sources, (e.g. from regulatory agency and trade association guidelines). Best practice guidelines can be of great assistance and arrangements should be made for their identification, dissemination and use.

3.5.5 *OH&S management arrangements*

The design of management arrangements should reflect the organization's business needs and the nature of their risks. However, there should be appropriate activity across all six elements of the model (policy, organizing, planning and implementation, measuring performance, audit and review).

Specifically the organization should make arrangements to cover the following key areas:

a) overall plans and objectives, including employees and resources, for the organization to implement its policy;

b) operational plans to implement arrangements to control the risks identified in **3.5.3** and to meet the recommendations identified in **3.5.4**;

c) contingency plans for foreseeable emergencies and to mitigate their effects (e.g. prevention, preparedness and response procedures);

d) planning for organizational activities (see **3.4.3**);

e) plans covering the management of change of either a permanent or temporary nature (e.g. associated with new processes or plant, working procedures, production fluctuations, legal requirements organizational and staffing changes);

f) plans covering interactions with other interested parties, (e.g. control, selection and management of contractors, liaison with emergency services, visitor control);

g) planning for measuring performance, audits and status reviews (see **3.6**, **3.8** and **3.9**);

h) implementing corrective actions;

i) plans for assisting recovery and return to work of any staff who is injured or becomes ill through their work activities.

Where fundamental changes cannot be made immediately prioritized action plans should be drawn up and implemented. In the interim properly assessed short-term measures should be taken to minimize the risk.

3.5.6 *Implementing and documenting*

Workplace precautions, risk control systems and management arrangements are more effective if they are well designed and developed recognizing existing business practice. The strength and limitations of human behaviour should be considered in the design.

All the components of the OH&S management system should be adequately inspected, maintained and monitored to ensure continued effective operation. Risk assessment and risk control should be reviewed in the light of changes and technological developments.

Documentation is vital in enabling an organization to communicate and implement a successful management system. It is also important in assembling and retaining OH&S knowledge. It is important that documentation is:

a) tailored to the organization's needs;

b) detailed proportionate to the level of complexity, hazards and risks;

c) kept to the minimum required for effectiveness and efficiency.

Among the most important written communications are:

1) health and safety policy statements;

2) organization statements showing health and safety roles and responsibilities (see **3.4.2**);

3) documented performance requirements and measures;

4) supporting organizational and risk control information and procedures;

5) appropriate findings from initial status reviews (see **3.2**), risk assessments investigations (see **3.5.3**), audits (see **3.8**) and periodic status reviews (see **3.9.2**).

The organization should maintain any records necessary to:

i) demonstrate compliance with legal and other requirements;

ii) ensure retention of appropriate OH&S knowledge;

iii) mitigate any liability claims.

Organizations should ensure that sufficient documentation is available to enable OH&S plans to be fully implemented and is proportional to their needs (see **B.5**).

Organizations should make arrangements to ensure that OH&S documentation is up to date, applicable to the purpose for which it is intended taking into account requirements of data protection legislation and communicated to all those who need it.

3.6 Measuring performance

The primary purpose of measuring health and safety performance is to judge the implementation and effectiveness of the arrangements for controlling risk. Performance measurement provides information on the progress and current status of the arrangements (strategies, processes and activities) used by an organization to control risks to health and safety.

Measurement information sustains the operation and development of the OH&S management system, and so controls the risk, by:

a) providing information on how the system operates in practice;

b) identifying areas where corrective action is necessary;

c) providing a basis for continual improvement; and

d) providing feedback and motivation.

Health and safety performance measurement should seek to answer such questions as the following.

1) Where are we now relative to our overall health and safety aims and objectives?

2) Where are we now in controlling hazards and risks?

3) How do we compare with others?

4) Why are we where we are?

5) Are we getting better or worse over time?

6) Is our management of health and safety effective (doing the right things)?

7) Is our management of health and safety reliable (doing things right consistently)?

8) Is our management of health and safety proportionate to our hazards and risks?

9) Is our management of health and safety efficient?

10) Is an effective OH&S system in place across all parts of the organization?

11) Is our culture supportive of health and safety, particularly in the face of competing demands?

12) Are there any aspects of our OH&S management that can be readily improved?

These questions should be asked at all management levels including the top management level. Managers across the organization should be given the responsibility, accountability and authority for performance measurement in the areas for which they are responsible. The aim should be to provide a complete picture of the organization's health and safety performance.

Both qualitative and quantitative measures should be taken where appropriate and should be tailored to the needs of the organization (see Annex F).

Performance measurement should be carried out both proactively and reactively and should include consideration of both leading and lagging performance indicators (see Annex F).

The performance measures chosen should be appropriate to the nature of the hazards and risks presented by the organization's activities. In particular, for organizations in the major hazards sector with the potential for low probability high hazard events such as major releases of flammable or toxic material, the measures chosen should be specific to measuring performance against prevention of such events.

Although the primary focus for performance measurement is to meet the internal needs of the organization, there is an increasing need to demonstrate to external stakeholders (regulators, insurance companies, shareholders, suppliers, contractors, members of the public etc.) that arrangements to control health and safety risks are in place, operating correctly and are effective. Health and safety performance should be communicated to the organization's various stakeholders as appropriate.

3.7 Investigation and response

Arrangements should exist to ensure a consistent response to, and thorough investigation of, substandard performance including accidents. The results of investigations should be analyzed and reviewed to identify common features and trends that might reveal areas for improvement. It is essential that these arrangements include the use of competent persons.

The depth and/or detail of the investigation should reflect the significance or the potential significance of the event being investigated. Investigations should establish reasons for substandard performance in order to identify underlying failures in the OH&S management system and to establish the root causes of, and learn from, events. Where necessary existing systems or procedures should be amended to prevent recurrences.

Investigations are also necessary to:

a) satisfy legal recording and reporting requirements;

b) collect information which might be needed if the incident becomes the subject of legal action;

c) collect information for potential insurance claims;

d) maintain records for other purposes specific to the organization;

e) review the adequacy of risk assessments in place.

Arrangements should ensure that appropriate managers are responsible for carrying out the investigations with the support of health and safety advisers, technical support and employees, where necessary. Arrangements to involve external investigative agencies, where necessary, should be clearly defined.

Investigations should identify both the immediate circumstances and the underlying organizational causes. Recommendations should be made on measures to improve the management system and arrangements, workplace precautions and risk control systems. Systems should be in place to ensure that remedial actions arising from investigations are prioritized, tracked and completed. Organizational and policy changes should be considered and recommendations made. Such recommendations should be reported to the level of management with the authority to initiate the necessary remedial action.

Following reviews actions should be prioritized and incorporated into an action plan. Essential and urgent actions should be given a high priority. All actions should be assigned to a responsible individual and progress on implementation monitored.

Where fundamental changes cannot be made immediately or within a reasonable time, properly assessed, short-term measures should be taken to minimize the risk in the meantime.

3.8 Audit

In addition to measurement of OH&S performance and periodic status reviews (see **3.9.2**), there should be periodic audits that enable a deeper and more critical appraisal of all the elements of the OH&S management system (see Figure 1). The programme of audits should be proportionate to the nature of the organizations hazards and risks. To maximize the benefits, audits should be conducted by competent persons independent of the area or activity being audited (see Annex F).

Auditors should collect evidence from interviews, documents and worksite visits, and check for consistency.

While audits need to be thorough, their approach and frequency should be tailored to the size of the organization and the nature of its hazards and the results of previous audits.

At different times and for different reasons audits need to cover the following.

a) Is the established OH&S management system understood and implemented?

b) Is the organization's overall OH&S management system capable of achieving the required standards of OH&S performance?

c) Is the organization fulfilling all its obligations with regard to OH&S?

d) What are the strengths and weaknesses of the OH&S management system?

e) Is the organization actually doing and achieving what it claims?

Audits can be comprehensive or address selected topics according to circumstance. The results of audits should be made available, communicated and corrective action taken as required.

The audit reports containing both favourable and unfavourable conclusions should be used by top management in the management review (see **3.9.3**).

3.9 Reviewing performance

3.9.1 *General*

There are two review processes, namely periodic status review (see **3.9.2**) and management review (see **3.9.3**) that are the major drivers for continual improvement.

The periodic status reviews should be carried out at an appropriate level within the organization, in contrast management reviews should be undertaken by top management.

3.9.2 *Periodic status review*

The purpose of the periodic status review is to make judgements about the adequacy of performance throughout the organization. The output should be used to make decisions about the nature and timing of actions necessary to remedy deficiencies or compensate for changes. In general, the periodic status review follows a similar approach to that used for the initial status review (see **3.2** and **D.4**).

The periodic status review should consider:

a) the overall performance of the OH&S management system;

b) the performance of individual elements of the system (see Figure 1);

c) the findings of audits (see **3.8**);

d) internal and external factors, such as changes in organizational structure or production patterns, pending legislation, introduction of new technology, etc.

This information should be used to review the performance of the organization against its policy and objectives, to improve the organization's approach to:

— minimizing risk;

— improving business performance;

— allowing comparisons to be made between its performance and other organizations in the same (and different) business sector.

The periodic status review also provides an opportunity to anticipate potential future changes.

It is essential that the findings of the review should be translated, where appropriate, into definite changes and improvements to the OH&S management system (see Figure 1). Annex D provides a structured approach for making changes to any element of the management system deemed necessary.

Reviewing performance is based on information from measuring activities (including both proactive and reactive monitoring), incident investigations and from auditing activities.

Performance measurement is a continual process and responses to the findings are undertaken at various levels within an organization, and include, for example:

1) responses by line supervision to remedy failures to implement workplace precautions and risk control systems which they observe in the course of routine activities;

2) responses to remedy specific examples of substandard performance which are identified by reactive or proactive monitoring;

3) responses to the assessment of plans and objectives either at the individual, department, site, group or organizational level.

The effectiveness of the review process is enhanced by:

i) clearly establishing who is responsible for implementing the remedial action identified in the review process;

ii) setting deadlines for the completion of remedial action.

3.9.3 *Management review*

Top management should review the organization's OH&S management system, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness. This review should include assessing opportunities for improvement and the need for changes in the OH&S management system including the OH&S policy and objectives. The results of the management review should be documented.

The inputs to management review should include, among other information, the following:

— results of the periodic status review;

— results of OH&S management system audits;

— communications from interested parties;

— the performance of the OH&S management system;

— the extent to which objectives have been met;

— status of corrective and preventive actions;

— follow-up actions from previous management reviews;

— changing circumstances; and

— recommendations for improvement.

The outputs from the management review should include any decisions and actions related to possible change to OH&S policy, objectives and other elements of the OH&S management system, consistent with the commitment to continual improvement.

The findings of the review should be documented and communicated to ensure appropriate action, where necessary. They can also be incorporated within performance reports (e.g. annual report, corporate governance and social responsibility statements) for communication to their various stakeholders, including shareholders.

Annex A (informative)
Comparison with other management system standards

A.1 General

Ideally, the health and safety arrangements of an organization are integrated into the overall management system. This annex considers integration with BS EN ISO 9001:2000, BS EN ISO 14001:2005, OHSAS 18001:1999 and ILO-OSH 2001, although the principle applies to other management systems. The aim is to provide users with guidance as to how they can incorporate the elements of their OH&S management system into other management systems.

No major difficulty is posed by the integration of BS 8800 into the above management systems or vice versa. There are no fundamental differences between any of the management systems discussed. The requirements of the common elements used in all the approaches show a large amount of overlap with approximately 70 % upwards being common requirements. The differences therefore largely relate to scope with respect to BS EN ISO 9001:2000 and BS EN ISO 14001:2005 and the specific needs of OH&S versus the quality and environment specifications. The distinction between BS 8800 and OHSAS 18001 and ILO-OSH 2001 is mainly in the order in which the elements are addressed. The intent and basic requirements are common to all three documents.

BS 8800:2004 and ILO-OSH 2001 are guides. A guide gives broad and general information about a subject, with background information and recommendations where appropriate. The wording of a guide is usually in the form of descriptive statements and recommendations using the auxiliary "should".

OHSAS 18001:1999, BS EN ISO 9001:2000 and BS EN ISO 14001:2005 are specifications. Specifications set out detailed requirements, using the prescriptive "shall", to be satisfied by a product, material, process or system and the procedures for checking conformity to these requirements.

A.2 Integration of BS 8800:2004 and BS EN ISO 9001:2000

A.2.1 *General*

The quality management system can selectively be applied to the output alone. Sometimes it is not applied to specific activities unless the organization has extended the system to Total Quality Management or an Excellence model. OH&S, on the other hand, cannot be so restricted and applies to all employees of the organization as well as visitors and contractors and anyone affected by the organization's activities.

A second distinction is the importance of risk assessment and control in any OH&S system. Risk assessment and control is fundamental to the effective operation of the system and a legal requirement. It is not given the same degree of importance in BS EN ISO 9001:2000 and it is vital that care is taken to ensure that it is adequately covered in an integrated system. It might therefore be preferable to provide a more generic framework for your system if it is decided to combine OH&S and quality, which encompasses the elements of risk control, legal and other requirements and the emergency preparedness elements recommended by BS 8800:2004.

The best way of integrating an OH&S system with a quality management system based on BS EN ISO 9001:2000 depends on the details of the systems in operation within a particular organization. There is no right or wrong way. The following list makes some suggestions but the details are different for different organizations.

Table A.1 — Comparison of BS 8800:2004 and BS EN ISO 9001:2000

Element	Comparison	
	BS 8800:2004	BS EN ISO 9001:2000
Initial status review (see **A.2.2**)	Yes (see **3.2**)	No
Policy (see **A.2.3**)	Yes (see **3.3**)	Yes (see **5.3**)
Organizing (see **A.2.4**)	Yes (see **3.4**)	Yes (see **5.5**)
Planning and implementation (see **A.2.5**)	Yes (see **3.5**)	Yes (see **5.4** and **7.1**)
Performance measurement including investigation and response (see **A.2.6**)	Yes (see **3.6** and **3.7**)	Yes (see Clause **8**)
Audit (see **A.2.7**)	Yes (see **3.8**)	Yes (see Clause **8**)
Reviewing performance (see **A.2.8**)	Yes (see **3.9**)	Yes (see **5.6**)
NOTE Where "Yes" has been indicated in the comparison it means that the element is either addressed either fully or in part within that standard. Where "No" is indicated the element has not been addressed within that standard.		

A.2.2 *Initial status review*

The initial status review is not a requirement of BS EN ISO 9001. It is, however, recommended in BS 8800 when it is thought to be beneficial to the organization. Although periodic status reviews are a regular part of the OH&S system, the initial status review is a one-off exercise at the start of the process of implementation.

A.2.3 *Policy*

The policy can be amplified to cover the recommendations of OH&S although BS 8800:2004 might not cover succinctly all the demands in BS EN ISO 9001:2000, **5.3**. BS EN ISO 9001:2000 specifically requires that top management ensure that the quality policy includes a commitment to comply with requirements and continually improve the effectiveness of the quality management system.

A.2.4 *Organizing*

The guidance given on OH&S organizing in BS 8800:2004 satisfies the requirements of BS EN ISO 9001:2000.

A.2.5 *Planning and implementing*

Whilst elements of BS 8800:2004 covers the planning and implementing elements of BS EN ISO 9001:2000, they sit readily under BS EN ISO 9001:2000, **7.1**. For integration purposes these elements ought to be reconciled in the same part of any integrated system. Emergency preparedness also needs to be included.

A.2.6 *Performance measurement*

The guidance given in BS 8800:2004 aligns well with BS ISO 9001:2000, Clause **8**, and in particular **8.1** and **8.2**.

A.2.7 *Audit*

The guidance given in BS 8800:2004 satisfies the requirements set out in BS ISO 9001: 2000, Clause **8** in particular **8.2.2**.

A.2.8 *Reviewing performance*

Both the periodic status review and the management review recommended in BS 8800:2004 can be integrated with BS EN ISO 9001:2000.

NOTE A number of sections within BS EN ISO 9001:2000 can be usefully embraced within a BS 8800 system, such as **7.2.3**, customer communication, **8.2.1** customer satisfaction where the customer is seen as being the "employee".

A.3 Integration of BS 8800 and BS EN ISO 14001:2005[1)]

A.3.1 *General*

There are no fundamental differences in the management of OH&S and environmental management systems, and there is no essential difficulty in managing the systems as an integrated whole. Whilst not all the provisions of this version of BS 8800 are matched by specific requirements in BS EN ISO 14001:2005, it can easily be expanded to cover the requirements of the environmental standard as shown in Table A.2. Equally those wishing to embrace OH&S within their environmental system will find the process has many common features.

[1)] In preparation.

Table A.2 — Comparison of BS 8800:2004 and BS EN ISO 14001:2005

Element	Comparison	
	BS 8800:2004	BS EN ISO 14001:2005
Initial status review (see **A.3.2**)	Yes (see **3.2**)	Yes (guidance is given in Annex A)
Policy (see **A.3.3**)	Yes (see **3.3**)	Yes (see **4.2**)
Organizing (see **A.3.4**)	Yes (see **3.4**)	Yes (see **4.4.1**)
Planning and implementation (see **A.3.5**)	Yes (see **3.5**)	Yes (see **4.3** and **4.4**)
Performance measurement including investigation and response (see **A.3.6**)	Yes (see **3.6** and **3.7**)	Yes (see **4.5**)
Audit (see **A.3.7**)	Yes (see **3.8**)	Yes (see **4.5.5**)
Reviewing performance (see **A.3.8**)	Yes (see **3.9**)	Yes (**4.6**)
NOTE Where "Yes" has been indicated in the comparison it means that the element is either addressed either fully or in part within that standard. Where "No" is indicated the element has not been addressed within that standard.		

A.3.2 *Initial status review*

Whilst the initial status review is not a requirement of BS EN ISO 14001: 2005, it is a good starting point to the implementation of an environmental management system and is outlined in BS EN ISO 14001:2005, Annex A. The breadth of the status review in BS 8800:2004 is greater than that considered in the environmental management standard.

A.3.3 *Policy*

The OH&S policy can be expanded so that it fulfils the policy requirements in BS EN ISO 14001:2005 by defining the organization's environmental policy and ensuring that it:

a) is appropriate to the nature, scale and environmental impacts of its activities, products and services;

b) includes a commitment to continual improvement and prevention of pollution;

c) includes a commitment to comply with applicable legal requirements and other requirements to which the organization subscribes which relate to its environmental aspects;

d) provides the framework for setting and reviewing environmental objectives and targets;

e) is documented, implemented and maintained;

f) is communicated to all persons working for or on its behalf;

g) is available to the public.

Equally an environmental management policy can embrace the specific recommendations of BS 8800:2004.

A.3.4 *Organizing*

Organizing is not dealt with as a specific topic in BS EN 14001:2005. However, BS EN 14001:2005, **4.4.1** requires that the organization's top management appoint specific management representative(s) who, irrespective of other responsibilities, have defined roles, responsibilities and authority for:

a) ensuring that environmental management system requirements are established, implemented and maintained in accordance with BS EN ISO 14001: 2005;

b) reporting on the performance of the environmental management system to top management for review and as a basis for improvement of the environmental management system.

Communication is dealt with, at least in part, in **3.4** of BS 8800:2004, but the element of communication in BS EN ISO 14001:2005, **4.4.3** is much broader where it states that "the organization shall decide whether to communicate externally about its significant environmental aspects".

A.3.5 *Planning and implementation*

The implementation of the system defined in BS 8800:2004 can be supplemented to incorporate the requirements of BS EN ISO 14001:2005, Clauses **4.3** and **4.4** to effectively cover the needs of the environmental management system. The implementation of BS 8800:2004 within an environmental management system is also a simple extension. Risk control is not specifically demanded by BS EN ISO 14001:2005, but is recommended. It should be borne in mind that the risk assessment approach is essential for OH&S and is not required for an Environmental Management System (EMS). Those wishing to integrate systems might need to consider a common approach for effectiveness and efficiency.

A.3.6 *Performance measurement*

The guidance on performance measurement in this standard can be extended to cover environmental provisions by incorporating the requirements of BS EN ISO 14001:2005, Clauses **4.5.1**, **4.5.2** and **4.5.3**.

A.3.7 *Audit*

The audit requirements of BS EN ISO 14001:2005 can be accommodated by extending the approaches given in **3.8** of this guide to include the requirements in BS EN ISO 14001:2005, **4.5.5** which are as follows:

a) determine whether the environmental management system:

1) conforms to planned arrangements for environmental management including the requirements of this International Standard; and

2) has been properly implemented and is maintained;

b) provide information on the results of audits to management.

Audit programme(s) shall be planned, established, implemented and maintained by the organization, taking into consideration the environmental importance of the operation(s) concerned and the results of previous audits.

Audit procedure(s) shall be established, implemented and maintained that address:

— the responsibilities and requirements for planning and conducting audits, reporting results and for maintaining records;

— the determination of audit criteria, scope, frequency and methods.

A.3.8 *Reviewing performance*

Clause **3.9** of this British Standard gives guidance on reviewing performance. There is no specific requirement for a periodic status review in BS EN ISO 14001:2005 and this is therefore optional.

The requirements for a periodic management review are generally similar and the reviews for both disciplines can be combined if desired.

A.4 Integration of BS 8800 and OHSAS 18001:1999

A.4.1 *General*

If the recommendations of BS 8800:2004 are applied within an organization all the requirements of OHSAS will have been addressed as shown in Table A.3. In general, the guidance in BS 8800:2004, particularly in the annexes, meets and expands upon the requirements that are given in OHSAS 18001:1999.

Table A.3 — Comparison of BS 8800:2004 and OHSAS 18001:1999

Element	Comparison	
	BS 8800:2004	OHSAS 18001:1999
Initial status review (see **A.4.2**)	Yes (see **3.2**)	No
Policy (see **A.4.3**)	Yes (see **3.3**)	Yes (see **4.2**)
Organizing (see **A.4.4**)	Yes (see **3.4**)	Yes (see **4.3** and **4.4**)
Planning and implementation (see **A.4.5**)	Yes (see **3.5**)	Yes (see **4.3** and **4.4**)
Performance measurement including investigation and response (see **A.4.6**)	Yes (see **3.6** and **3.7**)	Yes (see **4.5.1**)
Audit (see **A.4.7**)	Yes (see **3.8**)	Yes (see **4.5.4**)
Reviewing performance (see **A.4.8**)	Yes (see **3.9**)	Yes (see **4.6**)
NOTE Where "Yes" has been indicated in the comparison it means that the element is either addressed either fully or in part within that standard. Where "No" is indicated the element has not been addressed within that standard.		

A.4.2 *Initial status review*

Whilst an initial status review is not a requirement of OHSAS 18001:1999, the guidance document OHSAS 18002:2000 does recommend an initial status review.

A.4.3 *Policy*

The guidance given on OH&S policy in BS 8800 covers the requirements given in OHSAS 18001:1999, **4.2** although reference to the detail is advised.

A.4.4 *Organizing*

Organizing is not a separate topic in OHSAS 18001:1999 but is incorporated in the clauses on Planning (see OHSAS 18001:1999, **4.3**), and Implementation and Operation (see OHSAS 18001:1999, **4.4**).

A.4.5 *Planning and implementing*

OHSAS 18001:1999 requires procedures to be maintained for risk assessment and implementation of control measures (see OHSAS 18001:1999, **4.3** and **4.4**). These form part of the suitable management arrangements recommended by BS 8800:2004. In other respects BS 8800:2004 fully covers the OHSAS requirements. In particular, the OHSAS 18001:1999 definitions for "hazard identification" and "risk assessment" are treated as separate processes whereas in BS 8800:2004 the combined process is described under the heading of risk assessment (see **3.5.3** and Annex E).

A.4.6 *Performance measurement*

The guidance in BS 8800:2004, if fully implemented, would meet the requirements of OHSAS 18001:1999.

A.4.7 *Audit*

The guidance in BS 8800:2004, if fully implemented, would meet the requirements of OHSAS 18001:1999.

A.4.8 *Reviewing performance*

There is no requirement in OHSAS 18001:1999 for periodic reviews, apart from the management review, which is adequately covered in BS 8800:2004.

A.5 Integration of BS 8800 and ILO-OSH 2001

A.5.1 *General*

There are no fundamental differences between BS 8800:2004 and ILO-OSH 2001 but the latter is more specific on employee involvement and places emphasis on change management and supply chain management in one or two areas. Table A.4 compares BS 8800:2004 and ILO-OSH 2001. A management system based on BS 8800:2004 could readily be expanded to accommodate these additional features.

Table A.4 — Comparison of BS 8800:2004 and ILO-OSH 2001

Element	Comparison	
	BS 8800:2004	ILO-OSH 2001
Initial status review (see **A.5.2**)	Yes (see **3.2**)	Yes (see **3.7**)
Policy (see **A.5.3**)	Yes (see **3.3**)	Yes (see **3.1**)
Organizing (see **A.5.4**)	Yes (see **3.4**)	Yes (see **3.3**)
Planning and implementation (see **A.5.5**)	Yes (see **3.5**)	Yes (see **3.8**)
Performance measurement including investigation and response (see **A.5.6**)	Yes (see **3.6** and **3.7**)	Yes (see **3.11**)
Audit (see **A.5.7**)	Yes (see **3.8**)	Yes (see **3.13**)
Reviewing performance (see **A.5.8**)	Yes (see **3.9**)	Yes (see **3.14**)
NOTE Where "Yes" has been indicated in the comparison it means that the element is either addressed either fully or in part within that standard. Where "No" is indicated the element has not been addressed within that standard.		

A.5.2 ***Initial status review***

BS 8800:2004 does cover the initial status review given in ILO-OSH 2001. ILO-OSH 2001 further recommends that the initial status review should "analyse the data provided from workers' health surveillance".

A.5.3 ***Policy***

BS 8800:2004 does cover the policy element given in ILO-OSH 2001. ILO-OSH 2001 further recommends a statement of compliance with voluntary programmes and collective agreements and also that "workers and their representatives are consulted and encouraged to participate actively in all elements of the … system".

A.5.4 ***Organizing***

There is considerable guidance in ILO-OSH 2001 for worker involvement, which is accommodated within BS 8800:2004.

In matters of procurement the ILO-OSH 2001 states that "Procedures should … ensure that … compliance with safety and health … requirements for the organization is identified, evaluated and incorporated into purchasing and leasing specifications" and that "Arrangements should be established … for ensuring that the organization's safety and health requirements … are applied to contractors and their workers".

A.5.5 ***Planning and implementing***

BS 8800 does cover the planning and implementing elements given in ILO-OSH 2001. In the area of documentation ILO-OSH 2001 further recommends that OH&S records should have retention times specified and workers should have right of access.

A.5.6 ***Measuring performance***

BS 8800:2004 covers the guidance of the ILO-OSH 2001.

A.5.7 ***Audit***

BS 8800 does cover the audit element given in ILO-OSH 2001. ILO-OSH 2001 further ILO-OSH 2001 recommends that the audit should cover worker participation and that "Consultation on the selection of the auditor and all stages of the workplace audit, including analysis of results, are subject to worker participation, as appropriate".

A.5.8 ***Reviewing performance***

ILO-OSH 2001 does not recommend a periodic review.

ILO-OSH 2001 recommends that the findings of the management review should be communicated to the safety and health committee, employees and their representatives.

Annex B (normative)
Guidance on organizing

B.1 General

The OH&S policy (see **3.3**) sets the direction for health and safety, but in order to deliver improved performance, organizations need to create a robust framework for management activity. This should detail the responsibilities and relationships that lead to improved performance. This annex provides guidance on the allocation of responsibilities and the organization of people, resources and communications to define and implement policy and effectively manage OH&S.

B.2 Integration and co-operation

Organizations vary greatly in their complexity and the terms used to describe different activities all of which have an active part to play within the overall OH&S management system. However, significant differences often exist between the different parts of the organization in terms of:

a) work carried out;

b) management system;

c) technology used;

d) hazards encountered;

e) staff competence;

f) resources;

g) past experience of OH&S issues;

h) OH&S expertise;

i) attitudes to risk;

j) attitudes to OH&S co-operation with other functions.

As a result of these potential differences top management should ensure OH&S activity, in its broadest sense, is embraced both within and between functions so that:

1) common OH&S needs are addressed;

2) wide variations in OH&S performance are avoided;

3) duplication of effort and waste of resources are avoided;

4) OH&S responsibilities are appropriate, clear and agreed, e.g. for shared equipment, workplaces and staff;

5) different employers sharing a workplace co-operate;

6) artificial barriers and unnecessary conflicts are avoided;

7) any decisions made take into account the resulting OH&S effects on other activities;

8) OH&S objectives, plans and performance for each activity are consistent with those relating to its business.

This integration of activities requires the commitment of employees, which is best achieved by actively encouraging their participation and co-operation.

Approaches and techniques that encourage co-operation include:

i) an effective process for consultation on OH&S issues;

ii) employee involvement in areas such as risk assessment, writing operating procedures, accident investigation and measuring performance;

iii) OH&S project teams/task groups comprising employees from and working with different parts of the organization;

iv) managers, OH&S specialists, safety representatives and safety committees addressing problems common to different parts of the organization;

v) OH&S audits and reviews.

B.3 Employee involvement

Effective management of OH&S requires the support and commitment of the employees [see **3.3**i)], and their knowledge and experience is a valuable resource which should be utilized in the development and operation of the OH&S management system.

In many organizations, OH&S consultation and representation can be successfully accommodated within the existing general management framework. Some organizations might need to formalize their arrangements to achieve this. OH&S committees provide one method of involving the workforce, but the aim should be to promote their active involvement in all aspects of the OH&S management system.

B.4 Competency and training

B.4.1 *OH&S management system training*

The training arrangements of the OH&S management system should include:

a) systematic identification of the competencies necessary of each member of the workforce (including, for example owners, directors and managers at all levels) the training needed to remedy any shortfalls;

b) systematic identification of the competencies necessary for effective team working, e.g. emergency response teams;

c) provision of any training identified as being necessary in a timely and systematic manner;

d) assessment of individuals to ensure that they have acquired and maintained the necessary level of competence;

e) the maintenance of appropriate training/skills records.

B.4.2 *Elements in organizational training programmes*

The following elements might be included in the organizational training programmes:

a) a systematic programme of induction and on-going training for employees and those who transfer between divisions, sites, departments, areas, jobs or tasks in the organization. The training could include the local OH&S arrangements; the hazards, risks, precautions and procedures of work to be undertaken, before work commences;

b) training for all individuals who manage staff, contractors and others, e.g. temporary workers. This could include training in risk assessment and control techniques for designers, maintenance personnel and those responsible for the development of the process or working methods;

c) training for directors and top managers addressing their roles and responsibilities for ensuring the OH&S management system functions as necessary to control risks and minimize ill health, injury and other losses to the organization.

Contractors, temporary workers and visitors should be included in the training programme according to the level of risks to which they might be exposed or could cause.

The organization should devise means to ensure that the training is effective and understood.

B.5 Communications

Organizations should ensure that they have effective communication arrangements for:

a) identifying and receiving relevant OH&S information from outside the organization including:

1) new, amendments or pending changes to legislation;

2) information necessary for the identification of hazards and evaluation and control of risks;

3) information and developments in health and safety management practice.

b) ensuring that pertinent OH&S information is communicated to all employees in the organization who need it. This involves arrangements to:

1) determine information needs and ensure that these needs are met, bearing in mind that relevant information ought to be provided in a form and manner that is comprehensible to the person receiving it;

2) ensure that information flows up, down and across the various parts of the organization;

3) avoid restricting OH&S items to dedicated OH&S meetings by including them on the agenda of a variety of meetings wherever appropriate;

4) report hazards and shortcomings in OH&S arrangements;

5) ensure that lessons are learnt from accidents and incidents to avoid recurrence;

c) ensuring that relevant information is communicated to people outside the organization who require it;

d) ensuring that top management make it clear that they are keen to hear the bad news as well as good news and that they will take action on the information they receive.

B.6 Specialist advice and services

Organizations should have access to sufficient knowledge, skills or experience to identify and manage OH&S risks effectively, meet the health needs at work of individuals and to set appropriate OH&S objectives. This can be achieved by one or more of the following:

a) training managers to a sufficient level of competence to be able to manage their activities safely and keep up-to-date with developments in OH&S;

b) employing appropriate OH&S professionals as part of the management team;

c) engaging external specialist support where in-house expertise and/or resources are insufficient to meet the organization's needs.

Whichever method or combination of methods is chosen, there should be adequate provision of information, resources and co-operation to ensure specialist advisers are able to discharge their duties effectively. Specific tasks and responsibilities of parties need to be clearly understood.

NOTE An employer is required by law, with limited exceptions, to appoint, where necessary one or more competent persons, from within or outside the organization, to help in applying the provisions of occupational health and safety law. However, the employment of an OH&S adviser does not relieve the management of the organization of their legal responsibilities.

Annex C (normative)
Promoting an effective OH&S management system

C.1 General

Some organization's OH&S management systems appear to be satisfactory on paper, but are not followed in practice. Rules might be perceived, rightly or wrongly, as bureaucratic, unworkable and unnecessary. There might be conflicts between the needs to get the work done in time, and the time required to do the work safely. Organizations thus face two challenges when designing and developing an OH&S management system: first to devise arrangements that are suitable and sufficient to control the hazards, and secondly to ensure that employees at all levels agree that the control arrangements are necessary and effective.

The extent to which organizations are successful in managing OH&S is heavily influenced by the leadership of OH&S by top management who should regard it as a key business objective, and the active involvement of the work force and their representatives.

Organizations which possess a positive safety culture will demonstrate a commitment to their OH&S management systems.

NOTE Example 1 gives characteristics of an organization with a positive safety culture.

Key determinants of an organization's safety culture include the effectiveness of communications, the level of trust between staff at all levels, the degree to which all staff are encouraged to be proactive in improving safety performance and the commitment of everyone to the overall goals of the organization.

C.2 Barriers to a positive health and safety culture

Indicators of weaknesses in a safety culture might include disregard for rules and procedures, risk taking and other unsafe acts. Organizations should investigate the underlying causes of these symptoms.

The organization should take account of the factors that might impair the quality of their safety culture and hence the effectiveness of their OH&S system.

NOTE Example 2 lists factors that could impair the organization's OH&S culture.

EXAMPLE 1 — Some characteristics of positive health and safety culture

Safety culture is usually inseparable from an organization's overall culture and can rarely be managed in isolation. Therefore many of the characteristics are common. Some with particular relevance to safety include the following.

a) Staff are committed to the aims of their organization, and the way the organization is managed.

b) Top management and senior staff demonstrate visible OH&S commitment, including their personal behaviour, showing leadership by example. They make it clear that they are keen to hear the bad news as well as good news and they will take action on the information they receive.

c) Senior staff and supervisors spend time discussing and promoting OH&S in the work environment; commend safe behaviour and express concern if OH&S procedures are not being followed.

d) OH&S is managed with the same determination as other key business objectives.

e) Health and safety representatives carry out their functions actively with the support of management.

f) OH&S advisers have high status within the organization with direct access to top management.

g) OH&S committees have high status, are pro-active, are regularly attended by senior staff, and publicise their work throughout the organization.

h) The motivation for high OH&S standards is driven more by internal motivators and less by external pressures.

i) Staff at all levels are seen as a key resource of the organization particularly in suggesting improvement and receive the support and training they need especially when changes are taking place.

j) Communication methods are multi-way and are both informal and formal, and verbal and written.

k) Training is seen as vitally important, covering underpinning knowledge for competency, on-the-job instruction, and motivational training to promote compliance.

l) Everyone participates in OH&S decision-making that affects them, for example in carrying out risk assessments and devising appropriate risk controls.

m) The organization provides feedback on OH&S performance to all personnel (see Annex F).

n) OH&S is a normal topic of day-to-day discussion in the workplace.

o) Effective employee participation.

EXAMPLE 2 — Some factors that could impair health and safety culture

The following are typical examples of factors that could impair safety culture:

a) existing rules and safeguards developed in response to serious hazardous events that are perceived, probably correctly, as over-zealous (see Annex D);

b) inconsistencies in rules and procedures;

c) supervisors and managers not acting upon non-compliances with OH&S rules, e.g. when there is a production emergency;

d) rules and procedures developed without due consideration for their practicability;

e) rules and safeguards imposed by external agencies and consultants that do not take into account the complexity of the operation and the challenges of compliance;

f) situations that present opportunities for ego enhancement, for example, public displays of daring;

g) failures to communicate shortcomings in OH&S arrangements;

h) suggestions for improvements or changes from employees are not welcome and/or are not acted upon;

i) there is no employee involvement in for instance, risk assessment, developing operating procedures or carrying out accident and incident investigations;

j) there is an acceptance that violations are inevitable, and that little can be done to eliminate them;

k) a culture of blame exists;

l) underestimation of the magnitude of risk due to one or more of the following factors:

1) where the consequences are delayed (for example, a long latent period between exposure and ill health);

2) consequences that affect people outside the immediate work group;

3) where perceptions might not be adjusted sufficiently in the light of new information;

4) where the hazards have been encountered for long periods without apparent adverse affect.

m) lack of support leading to impairment of individual's ability to act safely:

i) when affected by life-event stressors (for example, bereavement, divorce);

ii) when under stress (as a result of, for example, a lack of confidence in the established procedures, lack of control and excessive demands);

iii) when they believe that they have no power to influence their own destiny or that of others (fatalism).

C.3 Measuring and improving safety culture

C.3.1 *Measurement of health and safety culture*

It is possible to measure with some accuracy the perceptions that influence behaviour as well as the behaviours themselves. The following methods are recommended:

a) informal discussions, feedback from briefings/tool box talks;

b) semi-structured questionnaire/interviews with groups/individuals;

c) organizational questionnaires;

d) attitude surveys of employees within the organization, typified by the example questions shown in Example 3;

e) observations of individual and group behaviours in practice.

C.3.2 *Improving health and safety culture*

In addition to taking specific steps to improve support for, and compliance with, OH&S management systems as part of system development generally, organizations should consider taking specific steps to improve their safety culture.

The interpretation of the findings of attitude surveys in particular should highlight, for example, whether a poor safety culture results from shortcomings in the way the organization is managed, or where employees are cynical of management commitment etc. Relevant employees should discuss the findings and have an opportunity to contribute to discussions about the strengths and weaknesses of the culture and how the culture is best improved.

The planning and implementing process described in Annex D should be used to identify objectives and plans to improve the safety culture. It is not appropriate to set over-ambitious objectives, rather a tightly focussed step-by-step approach is required, where a review of the achievement of the one objective provides the starting point for further initiatives.

There are occasions that might prove particularly fruitful for the development of initiatives to improve the safety culture. These include:

a) the arrival of a new top manager;

b) major reorganization, including a move to new premises;

c) the enactment of goal setting, as distinct from prescriptive, legislation relevant to the organization;

d) the aftermath of a serious hazardous event;

e) regulatory agency action;

f) failure to obtain a contract, or to be placed on an approved contractor's list, as a result of a client's reservations about the organization's OH&S arrangements.

Example 3 — Example of an attitude survey questionnaire

Please tick the appropriate box to show your level of agreement with each of the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. Senior management are fully committed to health and safety	1	2	3	4	5
2. Staff are blamed when they make mistakes	1	2	3	4	5
3. The company is interested in my opinions about health and safety	1	2	3	4	5
4. Management place a high priority on health and safety training	1	2	3	4	5
5. Supervisors turn a blind eye to unsafe behaviour	1	2	3	4	5
6. Health and safety procedures are much too stringent in relation to the risks	1	2	3	4	5
7. My workmates would criticise me for breaking the health and safety rules	1	2	3	4	5
8. I am given adequate health and safety training	1	2	3	4	5
9. Little is done to prevent accidents until someone gets injured	1	2	3	4	5
10. Everyone wears their protective equipment when they are supposed to	1	2	3	4	5
11. Action is rarely taken when someone breaks the health and safety rules	1	2	3	4	5
12. I fully understand the health and safety instructions that relate to my job	1	2	3	4	5
13. Time pressures for completing jobs are reasonable	1	2	3	4	5
14. I was involved in risk assessments relating to my work	1	2	3	4	5
15. Staff are praised for working safely	1	2	3	4	5
16. Action has been taken on the basis of risk assessment findings	1	2	3	4	5
17. The risk controls do not get in the way of my doing my job	1	2	3	4	5
18. Knocks and bruises are bound to happen at work no matter how careful you are	1	2	3	4	5
19. Health and safety briefings are very useful	1	2	3	4	5
20. My workmates take risks that I would not take myself	1	2	3	4	5
21. Accidents that happen here are always reported	1	2	3	4	5
22. Some health and safety rules are only there to protect management's back	1	2	3	4	5
23. The permit-to-work system leads to unnecessary delays in getting the job done	1	2	3	4	5
24. I know that if I follow the safety procedures I will not get hurt	1	2	3	4	5
25. The use of personal protective equipment is strictly enforced	1	2	3	4	5

Annex D (normative)
Guidance on planning and implementing

D.1 General

The methods adopted to plan and implement OH&S programmes should be the same as those used to plan and implement changes in any aspect of an organization's activities (see **3.5.3**).

The planning process used to implement OH&S management systems can also be used to prepare plans for quality and environment and to meet other business objectives.

The planning and implementing process is critically dependent on risk assessment and control (Annex E) and also on the criteria use to monitor performance (see Annex F).

For small and medium-sized enterprises (SMEs) general principles of planning and implementing for OH&S are the same as for any organization. However, managers within SMEs should note that planning and implementing OH&S could be carried out by a single individual or a small number of people within the organization. The approach adopted should be tailored to their needs.

D.2 Pro-active planning and responding reactively

D.2.1 *Pro-active OH&S planning*

A comprehensive approach that emphasizes prevention should be used when planning OH&S. Some organizations might have difficulty evaluating their OH&S system, assessing risks and setting priorities for improvements. The guidance set out in this annex is designed to help overcome such difficulties.

Pro-active OH&S management systems should promote continual improvement and ensure that:

a) appropriate arrangements are in place that are adequately resourced with competent employees who have defined responsibilities, and that incorporate effective channels of communication (see **3.5.2**);

b) processes are adopted to set objectives, devise and implement plans to meet objectives, and to monitor both the implementation and effectiveness of plans;

c) hazards are identified and risks assessed and controlled before anyone could be adversely affected (see Annex E);

d) OH&S performance is measured with a range of indicators (see Annex F), and an absence of hazardous events is not seen as conclusive evidence that all is well.

A vital part of pro-active OH&S planning is the management of change. Changes that might affect OH&S include:

1) changes in staffing and organizational structure;

2) proposals for new products, plant, processes or services;

3) changes in working methods, materials and processes;

4) process and software modifications.

External changes that among others might affect OH&S include:

i) new legislation, standards, guidance or good practice;

ii) developments in OH&S knowledge and technology.

As part of the review cycle, organizations should evaluate the impact of such changes and take appropriate steps to control risks prior to the introduction of change.

D.2.2 *Limitations of reactive OH&S management*

Organizations should assess, during the initial status review process, whether the operation of their OH&S management system:

a) depends unduly on lagging performance indicators, limitations of lagging indicators such as accident and ill health data as the only data types are discussed in **F.2**;

b) is based upon mistaken beliefs that action is only necessary in the aftermath of a serious accident or the appearance of severe symptoms of occupational ill health and that preventive action is only required to prevent a repetition of the particular event;

c) often relies on superficial hazardous event investigations. Hazardous events usually have many causes. An investigation limited to a study of unsafe acts by personnel actually involved in the operation might not reveal weaknesses in systems of work and physical safeguards, and shortcomings in the OH&S management system (see Annex G).

Hazardous event and occupational ill health prevention require a balanced package of technical and procedural controls supported by training. But rules, procedures or safeguards devised in the aftermath of accidents or occupational ill health might:

1) be over-zealous (as perceived some time after the event);

2) conflict with the need to get the job done;

3) conflict with controls adopted for other hazards;

4) fail to keep pace with changes at the workplace and with technical developments generally.

A reactive approach might be simple to apply but then OH&S management is reduced to solution of apparently self-contained problems with self-contained remedies. An OH&S management system founded purely on reactive measurements is neither a secure nor a cost-effective basis for controlling risks. Annex G describes how hazardous event investigations can be used to develop an improved management system.

D.3 Planning and implementing in practice

D.3.1 *General*

Organizations might find it useful to draw upon the experience of a number of individuals to plan and implement improvements in their OH&S system. Large organizations could establish a number of teams working in different parts and at different levels in the organization. Organizations should use systematic processes when planning and implementing for example, the following:

a) changes shown to be necessary by initial and/or periodic status reviews;

b) risk control action plans (see **E.3.7**);

c) emergency arrangements.

D.3.2 *Overall process for planning and implementing*

NOTE 1 Figure D.1 illustrates a step-by-step process for OH&S planning.

NOTE 2 Example 4 shows how the process can be used to plan a programme to increase usage of hearing protection.

NOTE 3 Figure D.2 is a check process in planning and implementing review.

NOTE 4 Example 5 applies the process to the control of site transport risks at warehouse premises.

NOTE 5 Some plans can be simply implemented, and their effectiveness is self-evident, making the formal use of this process unnecessary.

For simplicity, the planning and implementing process is explained in the context of a planning team seeking to select and achieve one primary objective. In practice organizations are likely to use the process to develop plans to attain several objectives at the same time.

The various steps in the process might need to be re-visited several times before the primary objective, the plan itself or the performance indicators, are finalized.

Moreover many plans are on-going, for example to maintain specific controls for particular risks such as housekeeping to control slips and trips, guards for dangerous parts of machines and control of work of contractors. Here there is no formal end point to the implementation process shown in Figure D.1. Measurement and review would occur at defined intervals, leading to a re-evaluation of the primary objective and the plan itself.

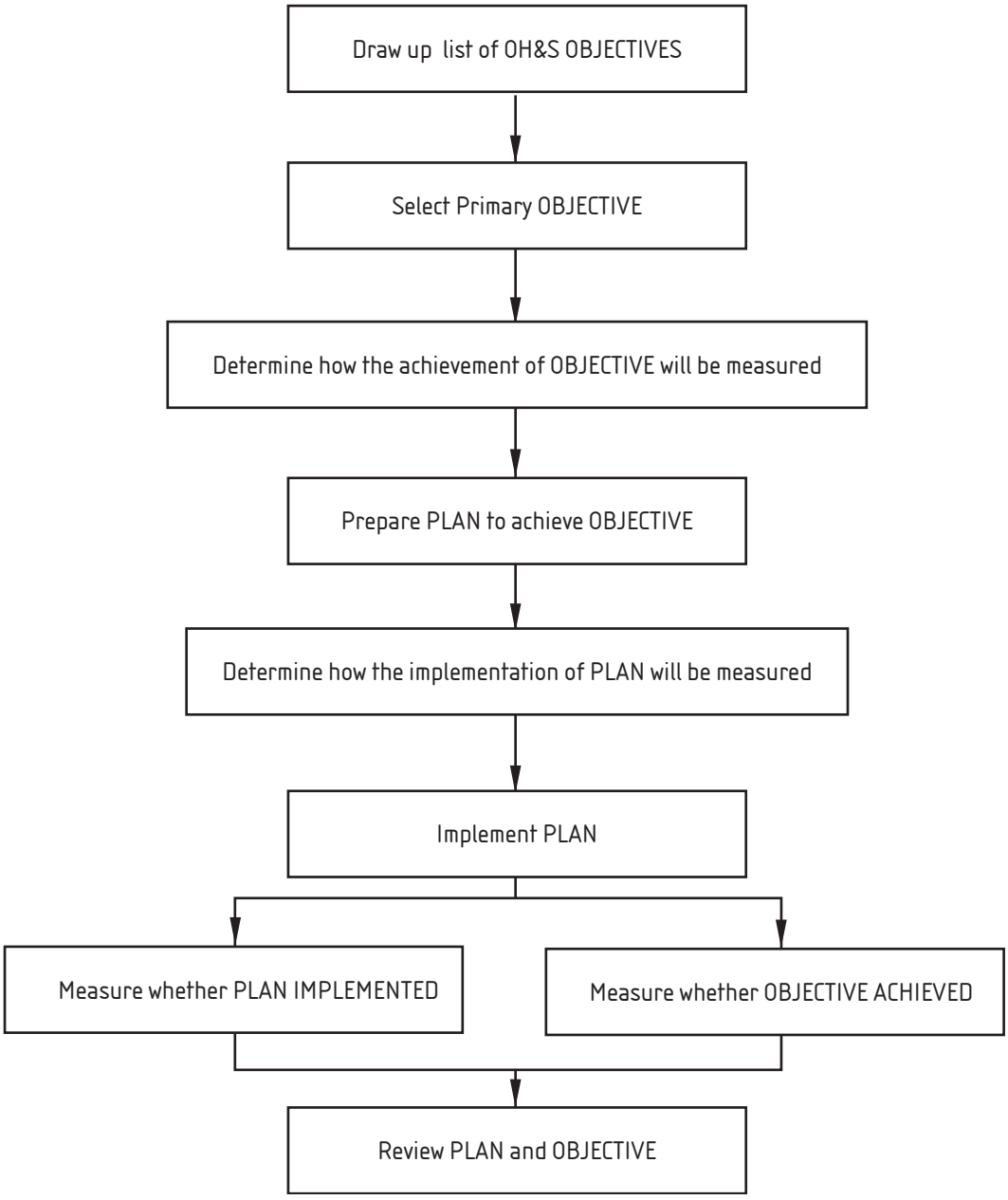

Figure D.1 — A process for OH&S planning and implementing

D.4 Where are we now and where should we be?

Organizations should use initial status reviews and risk assessments to compare their existing arrangements and risk controls with:

a) requirements of OH&S law;

b) existing guidance on OH&S management and risk controls within the organization;

c) good practice in relevant employment sectors;

d) efficiency and effectiveness of existing resources devoted to OH&S management and risk control.

A helpful technique is to compile a list of objectives from a variety of sources, e.g. audit reports, risk assessment, accident and incident data, and legislative requirements. The following guide words can be used to produce the list of objectives. The guide words relate to matters that the organization wishes to:

1) *increase/improve,* e.g. near miss reporting; machinery safeguards; training; usage of personal protective equipment (PPE); communications; employees' perceptions of risks;

2) *maintain/continue*, e.g. workplace inspections; supervisor training; accident reporting;

3) *reduce,* e.g. hazardous events; specific hazardous events relating to slips, trips and falls; exposure to hazardous substances, levels of stress that could lead to ill health;

4) *introduce,* e.g. risk assessment; an emergency plan; a system for active monitoring; strategic OH&S training for top managers; permit-to-work systems for specified tasks;

5) *eliminate,* e.g. all hazardous events; usage of specified hazardous substances; use of damaged equipment.

D.5 Selecting and prioritizing object

D.5.1 *Selecting objectives*

A list of prospective objectives should be selected. These form the basis for decisions about improvements in an organization's OH&S management system and in specific risk controls. Wherever possible objectives should be SMART:

— Specific;
— Measurable;
— Achievable;
— Relevant;
— Timely.

D.5.2 *Prioritizing objectives*

The list of prospective objective should be reduced to the point where primary objectives emerge that match the organization's needs. Early attention should be given to objectives that can be achieved relatively easily and cheaply, and ideally those that maximize workforce participation. Priority objectives to begin with are likely to relate to:

a) ensuring legal compliance;

b) information gathering;

c) risk assessment (see Annex E);

d) maintenance of existing risk controls;

e) remedies to specific and obvious shortcomings in existing controls such as the failure of employees to use protective equipment.

Figure D.1 illustrates the stages to fulfil each objective. Planning to achieve secondary or consequential objectives should follow the same process.

D.6 Determine how the achievement of the objective is measured

It is important to select an objective whose achievement can be measured. It is first necessary to define more precisely the objective in a way that facilitates measurement of leading and/or lagging performance indicators. Objectives can be defined in the following ways.

a) Objectives to increase or reduce something should specify a numerical figure (e.g. reduce handling accidents by 20 %) and a date for the achievement of the objective.

b) Objectives to introduce or eliminate something should be achieved by a specified date.

c) Objectives to maintain or continue something should specify the existing level of activity (e.g. supervisors will continue to inspect their sections once per week).

In many cases it is easy to define the objective with precision and to select relevant performance indicator data. For example, an objective to increase usage of hearing protection from the existing level of 20 % to 100 % (by a specified date) is tested simply by observing the usage level – a leading performance indicator. But an objective to introduce an effective risk assessment and control programme can only fully be tested with a range of leading and lagging performance indicators.

Where relevant, it is important to measure the baseline. For example, if an objective is to reduce the time taken to take action on staff OH&S suggestions, the organization should find out how long it takes at present.

D.7 Assigning responsibilities and allocating resources

Assigning responsibly and allocating resources first involves developing the broad content of the plan.

Detailed performance requirements should be specified for designated persons or teams in order to implement the plan. The plan should specify who is to do what, by when. For example, in the hearing protection plan (see Figure D.2), a person should be designated to rewrite conditions of service on the basis of appropriate consultations with employees and their representatives.

Performance requirements should be clearly drafted so that designated persons/teams know exactly what they have to do. Employees who are allocated tasks should be consulted about their practicality, should be competent to undertake them and should be accountable for their achievement (e.g. at periodic staff appraisals).

The implementation of the performance requirements can be measured with pro-active monitoring and the data used as leading performance indicators. The performance requirements can be listed as a series of questions (see Figure D.2).

The resource implications of the plan should also be considered. The plan should have the full support of top management.

D.8 Moving from planning to implementing

The plan should be implemented in accordance with the performance requirements. However, the plan should be flexible. Adjustments might be necessary in response to early evidence of failures to meet the plan's requirements, or information that performance indicators relating to the objective are not moving in the desired direction.

D.9 Measuring and reviewing progress

D.9.1 *Measuring the implementation of plan*

The implementation of the performance requirements should be continually monitored throughout the period of the plan's lifetime. Evidence in the form of leading performance indicators should be used to determine the organization's success in fully implementing the plan.

D.9.2 *Test whether the objective has been achieved*

Trends in the leading and lagging indicators should be continually monitored throughout the period of the plan's lifetime, and beyond if necessary.

These performance indicators should be used to test the organization's success in achieving the objective.

D.9.3 *Review*

At the review stage organizations should consider if the plan has been implemented and if so:

a) was it the right plan?

b) is the plan relevant to the organization's changing circumstances?

c) for a continuing programme, is the objective and plan still relevant?

Figure D.2 draws attention to the possibility that an objective can be achieved despite a failure to implement the plan. This might occur typically when the objective is to reduce accidents. For example a reduction in the number of accidents could be a statistical fluke or result from a reduction in work-place activity.

Figure D.2 illustrates total success and total failure. In practice plans can be partially effective, in which case consideration should be given to the need to revise the plan.

Organizations should also review the cost-effectiveness of their objectives and plans. It might be that not all the elements of the plan contributed to its success. For example, in the hearing protection case (see Example 4), it might not have been necessary to make hearing protection a condition of employment.

Finally, organizations should consider whether the objective is still relevant. For example, the use of personal hearing protection might no longer be necessary following the introduction of new, quieter machinery.

The review should be carried out not only to improve the outcome of the specific plan under review, but also to improve the quality of organizational decision-making generally.

		PLAN IMPLEMENTED?	
		YES	**NO**
OBJECTIVE ACHIEVED?	**YES**	No corrective action required but continue to monitor.	Plan was not relevant. Find out what has led to the achievement of objective.
	NO	Plan is not effective therefore prepare a new plan.	Make renewed effort to implement plan; continue to measure performance indicators. Consider whether the method proposed for implementing the plan should be revised.

Figure D.2 — Planning and implementing review

EXAMPLE 4 — Planning improved usage of hearing protection

1. Primary objective

Increase usage rate of hearing protection in designated hearing protection zones from the present (baseline) value of 20 % to 100 % within one year.

2. Performance indicator

Records of hearing protector usage observed in designated zones.

3. Prepare plan — To achieve objective

The broad elements of a plan to improve usage of hearing protection might involve:

a) gaining top management commitment;

b) giving employees choice in the protection they wear;

c) training to demonstrate effects of occupational deafness and importance of wearing protection at all times in designated areas;

d) changes in terms of employment;

e) periodic checks that hearing protection is being worn;

f) ensuring that hearing protection is cleaned, maintained and replaced as necessary.

4. Prepare performance requirements

Performance requirements should be prepared to deal with each of the broad elements of the plan. For example, the requirements for changing conditions of employment might be listed as follows.

1) Has a person been made responsible for amending the terms of employment making it obligatory to wear approved hearing protection in designated hearing protection zones?

2) Have all employees affected been consulted on the change and do they understand why the change is necessary?

3) Has the organization's disciplinary process been amended to take account of the revision?

4) Has a date been set for the change in the terms of employment?

5) Have all employees affected signed a statement that they have received a copy of their revised terms of employment, and have understood the meaning of the change?

EXAMPLE 5 — Planning and implementing site transport risk controls in a cash-and-carry warehouse

1. Findings of risk assessment

Risk assessment revealed that controls of site transport were inadequate. The main problems that led to the unfavourable assessment were.

a) customers, suppliers and company vehicles were required to manoeuvre in congested areas;

b) warehouse racking systems were not protected from lift truck impact;

c) warehouse vehicle routes were narrow with blind corners;

d) pedestrians had access to vehicle manoeuvring areas and warehouse vehicle routes;

e) rider-operated lift truck drivers were not trained;

f) lift trucks were not inspected and maintained on a regular basis.

2. Primary objectives

The organization's primary objective is to plan and implement an action plan to reduce site transport risks to a level that is as low as reasonably practicable within six months.

The plan specified improvements in performance indicators that would demonstrate a site transport risk that was as low as reasonably practicable and that could be sustained over time.

3. Performance indicators (leading and lagging)

Performance indicators identified are:

a) compliance with relevant regulations;

b) numbers of transport-related unsafe acts and conditions observed by planned observations;

c) relevant comments by employees, customers, and drivers of suppliers' vehicles;

d) evidence of lift truck impacts with storage racks/protective bollards;

e) reported near-misses;

f) transport accidents.

Baseline information was obtained as part of risk assessment.

4. Prepare plans to achieve objective

The broad content of the action plan to achieve the primary objective, within an agreed budget, was finalized after consultation with relevant parties and a review of the plan's adequacy:

a) introduce one-way traffic systems and speed limits;

b) segregate where possible pedestrians and vehicles using, as appropriate, road markings and barriers;

c) install pedestrian crossings;

d) install bollards to protect storage racks;

e) fit mirrors to improve vision at blind corners in warehouse;

f) introduce daily, weekly and annual inspections of lift trucks;

g) train all drivers of lift trucks to meet the requirements of the current *Approved Code of Practice*;

h) introduce on-site training and a driver's competency test.

EXAMPLE 5 — Planning and implementing site transport risk controls in a cash-and-carry warehouse (*continued*)

5. Prepare performance requirements

A detailed plan showing who would do what and by when was prepared as a set of requirements for each part of the risk control action plan. For example the training requirements were.

Has [a designated person] within defined time-scales:

a) prepared a schedule for releasing drivers to attend training that ensures that sufficient drivers are still at work?

b) booked places for all drivers on training?

c) consulted approved guidance on site training and competency certification?

d) prepared an on-site training and testing schedule?

e) completed on-site training and certification?

f) made arrangements, as appropriate, for training and certification of new drivers?

6. Is the plan fully implemented?

The performance requirements for training and the performance requirements prepared for each of the other parts of the plan provided a pro-active monitoring checklist that was used to determine whether the plan was implemented.

7. Has the objective been achieved?

Following implementation of the plan, the performance indicators are used to test whether the plan had been effective.

8. Review

The review revealed that the plan was fully implemented and the objective achieved. The organization made arrangements to continue monitoring site transport safety, and to review the continuing success of the plan in a year's time.

NOTE The purpose of this case study is to illustrate the methodology and is not meant to be comprehensive or to be used as a guide to risk control in warehouse activities.

Annex E (normative)
Guidance on risk assessment and control

E.1 General

E.1.1 *Principles*

The principles of risk assessment that have general applicability, and provides a starting point for the development of company risk assessment procedures by describing some of the practical issues that need to be considered.

NOTE Guidance in Annex D, on planning and implementing, can also be applied to risk assessment and risk control programmes.

E.1.2 *Explanation of key terms*

The key terms associated with risk assessment and control are used across a wide range of organizations, and appear in a variety of standards and guidance documents. However, in some other sources, it is alternatively defined. This section explains how the key terms are used within this annex, and highlights where differences occur between this and other sources.

Risk assessment and risk control is the area where there is the least consistency in terminology. Some sources use the single term "risk assessment" to cover both the "assessment" and "control" activities. Other sources use the term "risk assessment" to refer only to the assessment of risks from identified hazards. In these situations the overall process becomes "hazard identification, risk assessment and risk control".

Some other sources use the terms "controls", "control measures" or "risk control measures" to mean the same thing as risk controls.

E.1.2.1
hazard
source or a situation with a potential for harm (in terms of human injury or ill health, or a combination of these)

NOTE Some examples of hazards are given in **E.3.5.1.2**.

E.1.2.2
risk
combination of the likelihood and consequence(s) of a specified hazardous event

NOTE 1 A risk always has two elements:

— the likelihood of a hazardous event;

— the consequences of the event (i.e. the severity of the harm in terms of human injury or ill health).

NOTE 2 Particularly in relation to hazards to health, the harm might arise not from one event, but from exposure over a period of time.

NOTE 3 In some other sources it is alternatively defined as a statistical probability of a specified undesired event, e.g. the probability of a fatality.

E.1.2.3
risk assessment
process of identifying hazards and evaluating the risks to health and safety arising from these hazards taking account of the existing risk controls (or, in the case of a new activity, the proposed risk controls)

E.1.2.4
risk controls
workplace precautions, for example, physical safeguards, containment of airborne contaminants and noise, safe systems of work, competency, and personal protective equipment (PPE)

E.1.2.5
risk control systems
arrangements that ensure that the workplace precautions are implemented and kept in place, for example, designation of responsibilities, training, supervision, work equipment maintenance, performance measurement, audit, and the selection, briefing and control of contractors

E.1.2.6
unacceptable risk
risk that cannot be accepted whatever the level of benefits gained from the activity giving rise to the risk

E.1.2.7
tolerable risk
risk at a level that can be accepted provided risk controls are implemented to reduce risk as low as is reasonably practicable i.e. reduced to the point where it can be shown that the costs (in terms of time, money and/or effort) of further risk reduction would be disproportionate to the further benefits

NOTE In UK law the words "grossly disproportionate" are used to define the test that should be applied.

E.1.2.8
acceptable risk
risk that is regarded as insignificant either as it stands, or as a result of risk controls

E.1.2.9
unacceptable, tolerable and acceptable risk
each organization should define, according to its own circumstances, the boundaries between levels of risk. The level of risk should be determined as an unacceptable risk, tolerable risk or an acceptable risk

Consider the example of a machine in the workplace with accessible moving parts, in close proximity to, and capable of trapping or entangling its operator. The machine is equipped with guarding and interlocks to prevent the operator contacting these moving parts.

Routine operation of the machine with all the guards removed, and with the interlocks disabled, would be regarded as an unacceptable risk.

Occasional operation with guards removed and/or interlocks disabled, as part of maintenance activity carried out by specially trained and qualified personnel, operating under a safe system of work, could be a tolerable risk.

Routine operation with the guards and interlocks in place, with operators who are aware of the hazards, and trained to respect the importance of the risk controls, would be likely to be a acceptable risk.

Redesigning the machine so the operator can operate the machine remotely, and is no longer in proximity to the moving parts, could make the risk of trapping or entanglement insignificant, and therefore this risk is also acceptable. If this approach is too costly at the time of the risk assessment, it might become an option when the existing machine requires replacement.

E.1.3 *Systematic risk assessment and control*

Risk assessments are the foundation for pro-active OH&S management. No matter how simple or complicated the risk assessment, it requires a systematic process to be effective. In many countries, employers are legally obliged to carry out systematic, documented OH&S risk assessments. Risk assessment is an essential tool for organizations seeking continual improvement in their OH&S management systems.

The requirements for risk assessment vary depending on the novelty of the work activities and uncertainties about the consequences of things going wrong. Consequently, an organization can use different risk assessment processes as part of an overall strategy addressing different areas or aspects of its activities. Not all of these will necessarily be documented, since there is often a case for managers and employees being trained to make a judgement before work begins or as a response to changing circumstances as to whether there are appropriate risk controls in place. This process is often referred to as "dynamic risk assessment".

At the other extreme, there are some systematic documented methods which are complex, and appropriate only to the special circumstances of major hazard activities. For example, risk assessment of a chemical process plant might require complex mathematical calculations of the probabilities of events leading to major release of agents that might affect employees, contractors and others in the workplace, or the public. In many countries, sector-specific legislation specifies where this degree of complexity is required.

A problem that is observed frequently, particularly in the major hazard industries, is the question of achieving a balance between the management of obvious personal injury risks at one end of the scale, and low-probability/high-consequence events on the other. High consequence events merit a precautionary approach, as they generally involve *societal* and *business risk*.

In many circumstances, OH&S risk can be addressed using simpler methods, which are either qualitative, or semi-quantified (see **E.3**). These approaches typically involve a greater degree of judgement, since they place less reliance on hard numerical data. In some cases such methods will serve only as initial screening tools, to identify where more detailed assessment is needed, or where measurements are needed. For example, risk assessments to evaluate the harm from continuing exposure to toxic dusts might require sampling dust concentrations with appropriate instruments, and comparing these concentrations with given limits or standards.

Some organizations develop generic risk assessments for typical activities, the precise details of which can vary, for example between different locations or sites. Such generic assessments can be used as the starting point for more specific assessments, by identifying and assessing any differences between the conditions assumed in the generic assessment, and those in the situation actually being addressed. This approach can help both to increase the speed and efficiency of the risk assessment process, and to improve the consistency of risk assessments for similar tasks.

Certain key steps should be identifiable in any systematic approach to risk assessment. These are described in the overview of risk assessment and control in **E.2**. One common approach to risk assessment, based on a risk matrix, is illustrated in **E.3**. Subclause **E.3** also highlights a number of issues that should be considered to ensure that the chosen approach is effective.

E.1.4 *The purpose of risk assessment and control*

The overall purpose of risk assessment and control is to understand the hazards that might arise in the course of the organization's activities and ensure that any risks to people arising from the hazards are acceptable or tolerable. This is achieved by:

— identifying hazards and making an estimate of the associated risk levels on the basis of existing or proposed risk controls;

— determining whether these risks are tolerable;

— determining whether further analysis is required to establish whether the risks are, or are not, tolerable, for example noise levels might need to be measured to determine the more exact risk of hearing damage;

— devising improved risk controls where these are found to be necessary.

Risk assessment can also be used to make a systematic comparison of different risk control/reduction options. It aids the organization to prioritize any resulting actions to reduce risk.

E.2 Key steps in the process of risk assessment and risk control

Figure E.1 shows the key steps in risk assessment and control. The steps are outlined below and described more fully in **E.3**.

In order for organizations to perform effective risk assessment and control the following steps are necessary.

a) *Classify work activities*: prepare a list of work activities covering for example premises, plant, people and processes, and gather information about them (see **E.3.4**); define the scope and limits of the individual risk assessments.

b) *Identify hazards*: identify all significant hazards relating to each work activity. Consider who might be harmed and how.

NOTE The term "significant" has been introduced to emphasize that a practical cut-off should be applied, and that it is neither sensible nor practicable to expend effort identifying hazards and assessing risks that are manifestly implausible, or which have negligible harm potential.

c) *Identify risk controls*: identify the risk controls that exist (or are proposed for planned activities), to reduce the risk associated with each hazard.

d) *Determine risk*: estimate the risk associated with each hazard assuming that planned or existing controls are in place. The effectiveness of the risk controls, and the likelihood and consequences of their failure should be considered.

NOTE It is often useful to determine the level of risk without any controls in place. This serves to demonstrate the importance of maintaining planned or existing controls.

e) *Determine tolerability*: determine the tolerability of the risks and decide whether planned or existing OH&S controls (if any) are sufficient to keep the hazard under control and meet legal requirements. In order to be able to assess the tolerability of any particular risk, the organization should first establish tolerability criteria to provide a basis for consistency in all its risk assessments (see **E.3.6.2**).

f) *Prepare action plan*: prepare a risk control action plan to improve risk controls if necessary, or to address any other issues that require attention.

g) *Review adequacy of action plan*: re-assess risks on the basis of the revised control measures and risk control systems and check that risks will be acceptable or tolerable.

h) *Maintenance*: maintain new and existing risk controls and ensure that they are effective. Update risk assessments as necessary, to maintain their validity.

Assessments should be recorded and reviewed to ensure that they are suitable and sufficient (appropriately detailed and rigorous).

E.3 Risk assessment and risk control in practice

E.3.1 *General*

The risk assessment process covers all OH&S hazards. It is usually better to integrate assessments for all hazards, and not carry out separate assessments for health hazards, manual handling, machinery hazards and so on. If assessments are carried out separately, ranking risk control priorities is more difficult. Separate assessments might also lead to needless duplication. However, as stated in **E.1.3** more detailed, assessments might need to be carried out for particular hazards.

The following aspects of risk assessment need to be considered carefully at the outset:

a) planning the overall process of risk assessment and control and those who should carry it out (see **E.3.2.1**);

b) design of the risk assessment method and any supporting procedure and/or pro-forma (see **E.3.3**) including;

1) criteria for classifying work activities and information needed about each work activity (see **E.3.4**);

2) methods to identify and categorize hazards (see **E.3.5.1**);

3) methodology for making an informed determination of risk based on likelihood and severity of harm (see **E.3.5.2**);

c) criteria for deciding whether risks are tolerable, i.e. whether planned or existing control measures are sufficient (see **E.3.6.3** and Table E.2);

d) prioritization of any necessary remedial actions (see Table E.2);

e) risk control methodology (see **E.3.7.1**, **E.3.7.2** and **E.3.7.3**);

f) criteria for reviewing the action plan (see **E.3.7.5**);

g) maintaining and updating the assessments (see **E.3.8**).

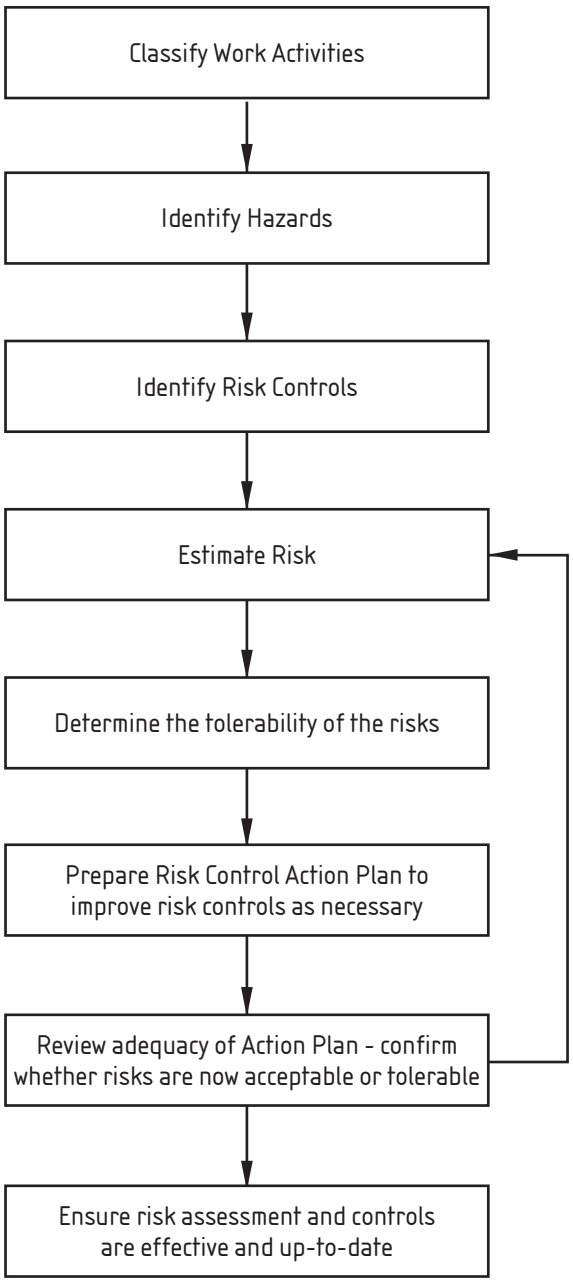

Figure E.1 — The process of risk assessment and control

E.3.2 *Organizing for risk assessment and risk control activities*

E.3.2.1 *Planning the risk assessment*

Risk assessment and risk control needs to be planned and prioritized in order to be effective. Without planning, organizations can waste time and effort producing assessments that are of little practical value. Poorly-planned assessments, carried out in the belief that they are bureaucratic impositions, have minimal effect on risk reduction and control. Moreover, organizations can get bogged down in unnecessary detail. Risk assessment should form a practical basis for decisions about which actions (risk control measures) to take to reduce or control risk.

Preliminary consideration of where the risks are most likely to be high should be given when planning risk assessment. Where such consideration is not given potentially high risk activities might not necessarily be assessed urgently. Prioritization can be of enormous practical value and the top five or so hazards should be assessed first. The output from the initial status review (see **3.2**) can help with the identification of these and other significant hazards.

The level of detail in a risk assessment should be related to the magnitude of the risk. It is counterproductive to apply elaborate assessment methods to risks that are manifestly trivial. Small, low risk organizations in particular should be highly selective about the risks that they assess in detail.

Provided that no changes in circumstances have occurred, it is not necessary or cost-effective to create new risk assessments when a previous assessment has shown that existing or planned controls:

— conform to well-established legal requirements or standards;

— are appropriate for the tasks;

— are understood and used by everyone concerned; and

— are effective (i.e. result in an acceptable or tolerable risk).

In such cases, no further action is required other than to record the fact that the assessment has been reviewed and is still deemed to be applicable and to ensure, where appropriate, that controls continue to be used.

E.3.2.2 *Selecting the people*

Risk assessment should be carried out by competent people with practical knowledge of the work activities, using an open, questioning approach. A useful method, whenever possible, is to train small teams to coordinate assessments in order to combine the inputs of those who work in the affected area with the perspective of colleagues from another part of the organization who might have greater objectivity. Specialist advice might be required.

Risk assessments based on a participative approach provides opportunity for management, safety representatives and the work force to agree that an organization's OH&S procedures:

— are based on shared perceptions of hazards and risks;

— are necessary and workable;

— will succeed in preventing harm.

This can contribute to the promotion of the positive safety culture (see Annex C).

Ideally, everyone should be able to contribute to assessments that relate to them. For example, they should be encouraged to tell assessors what they think about the need for, and practicality of particular risk controls.

E.3.3 *Selecting the risk assessment method*

Organizations should use a simple pro-forma to record the findings of an assessment, typically covering:

— work activity/area under assessment;

— hazard(s);

— controls in place;

— employees at risk;

— likelihood of harm;

— severity of harm;

— risk levels and their tolerability;

— action to be taken following the assessment, or to initiate additional data gathering (e.g. air sampling), including the action owner, target date for completion and/or prioritization category for the action;

— risk levels that result from those actions which involve changes to risk controls, and the tolerability of the resulting risks;

— any significant assumptions made in the assessment;

— administrative details, e.g. name of assessor, other people consulted during the assessment, reviewers, endorsement by accountable manager, date of the assessment, date by which the assessment should be reviewed.

Organizations might need to carry out initial trials of the risk assessment process and continually review how the process is working.

E.3.4 *Classify work activities*

An initial list of rational and manageable work activities should be complied. In addition to everyday activities it is vital to include, for example, infrequent maintenance tasks and foreseeable emergencies, as well as day-to-day production work. Information is then gathered about the risks from these activities.

Possible ways of classifying work activities, which can be used separately or in combination, include:

— geographical areas within/outside the organization's premises;

— stages in the production process, or in the provision of a service;

— planned and reactive work;

— defined tasks (e.g. driving);

— phases in the lifecycle of work equipment: design, installation, normal operation, maintenance, repair, decommissioning and disposal;

— different operational states of plant and equipment to allow for transient states such as start-up and shut-down where control measures might be different to those in normal operation;

— risks arising from the particular layout of equipment or buildings (or changes to layout) involving issues such as escape routes, siting of hazardous equipment, e.g. furnaces, chemical stores;

— tasks carried out by contractors;

— risks arising from plant on the site provided or maintained by others, e.g. a gas supplier's bulk storage compound.

For some activities, depending on the risks involved, and its own competence in such matters, the organization might rely upon risk assessments carried out by others, for example, by requesting a construction contractor to carry out the risk assessments for on-site construction activities.

Information needed for each work activity should include, but might not be limited to, items from the following:

— tasks being carried out, their duration and frequency;

— location(s) where the work is carried out;

— proximity to and scope for hazardous interaction with other activities in the workplace;

— who normally/occasionally carries out the tasks;

— others who might be affected by the work (e.g. cleaners, visitors, contractors, the public);

— training that personnel receive about the tasks;

— any existing written systems of work and/or permit-to-work procedures prepared for the tasks;

— manufacturer's or supplier's instructions for operation and maintenance of plant;

— machinery and powered hand tools that are used;

— size, shape, surface character and weight of materials that might be handled;

— distances and heights that materials have to be moved by hand;

— services used (e.g. compressed air);

— substances used or encountered during the work including their physical form (fume, gas, vapour, liquid, dust/powder, solid);

— content and recommendations of safety data sheet relating to substances used or encountered;

NOTE In many countries these are referred to as "Material Safety Data Sheets" (MSDS).

— relevant legislation and standards applicable to the work being done, the plant and machinery used, and the substances used or encountered;

— control measures believed to be in place;

— access to, and adequacy/condition of, emergency equipment, emergency escape routes, emergency communication facilities, and external emergency support etc;

— reactive monitoring data: incident, accident and ill health experience associated with the work being done, equipment and substances used gained as a result of information from within and outside the organization;

— findings of any existing assessments relating to the work activity.

It is important that the classification of work activities, and the scope of individual risk assessments, is clearly communicated among the assessment team, and clearly recorded, to ensure the correct scope and coverage is achieved. For example, it should be apparent whether the risk assessment of a particular plant area includes machinery cleaning and maintenance activities, as well as normal operation, or whether cleaning and maintenance is subject to separate risk assessment.

E.3.5 ***Analyzing risk***

E.3.5.1 *Identify hazards*

E.3.5.1.1 *General*

Three questions should be used to enable hazard identification:

— is there a source of harm?

— who (or what) could be harmed?

— how could harm occur?

Hazards that clearly possess negligible potential for harm need not be documented or given further consideration.

E.3.5.1.2 *Hazards prompt list*

A hazard prompt list can help with the identification of the hazards at work. The list below is not necessarily exhaustive but conversely, many organizations will not encounter all the hazards shown. The list also includes some examples of consequences and factors that influence the size of the hazard. For example, the hazard from a drum of acid varies due to factors such as the quantity and strength of the acid.

The prompt list below gives hazards, together with contributory factors that might influence risk assessment.

a) Physical hazards:

— slippery or uneven ground leading to slips/falls on a level;

— work at heights, leading to falls (linked to factors such as the distance of the fall);

— falls from height of objects such as tools or materials, leading to impacts on passers by;

— inadequate space to work, such as low headroom, leading to head impacts;

— poor ergonomics (e.g. bad posture or repetitive work), leading to acute or chronic health effects;

— manual lifting/handling of materials, etc., with the potential for back, hand and foot injuries (linked to factors such as the characteristics of the load);

— trappings, entanglement, burns and other hazards arising from equipment;

— transport hazards, either on the road or on premises/sites, while travelling or as a pedestrian (linked to the speed and external features of vehicles and the road environment);

— fire and explosion (linked to the amount and nature of flammable material);

— harmful energy sources such as electricity, radiation, noise or vibration (linked to the amount of energy involved);

— stored energy, which can be released quickly and cause physical harm to the body (linked to the amount of energy);

— frequently repeated tasks, which can lead to upper limb disorders (linked to the duration of the tasks);

— unsuitable thermal environment, which can lead to hypothermia or heat stress;

— violence to staff, leading to physical harm (linked to the nature of the perpetrators);

— ionising radiation (from x- or gamma-ray machines or radioactive substances);

— non-ionising (e.g. light, magnetic, radio-waves).

b) Chemical hazards:

— substances hazardous to health or safety due to inhalation (such as carbon monoxide (CO) the hazard would be linked to the amount of CO);

— contact with, or being absorbed through, the body [such as acids the hazard would be linked to the strength and amount of the acid];

— ingestion (i.e. entering the body via the mouth), such as lead paint;

— stored materials that degrade over time (such as oxidizers);

— lack of oxygen.

c) Biological hazards:

— biological agents, such as bacteria or viruses that might be:

i) inhaled;

ii) transmitted via contact with bodily fluids (including needle-stick injuries). The hazard would be linked to the nature of the pathogen;

iii) ingested (e.g. via contaminated food products).

d) Psychological hazards:

— excessive workload, lack of communication or control, workplace physical environment, leading to stress (linked to the magnitude and duration of stressors);

— physical violence, bullying or intimidation within the workplace, leading to stress;

— involvement in a major incident, leading to post traumatic stress. The hazard would depend on the nature of the incident.

When using prompt-lists assessors still need to be observant and use a questioning approach to help recognize any hazards that are not on the list. When drawing up and using a hazard list, organizations should consider the work activities of their own employees, and others in or close to the workplace, such as visitors or contractors. It might also be necessary to determine whether hazards could impact on the nearby public or even the surrounding neighbourhood.

E.3.5.2 *Determine risk*

E.3.5.2.1 *General*

The risk is determined by estimating the potential severity of harm and the likelihood that harm will occur (see Table E.1). It is often helpful to develop a series of categories for the severity and likelihood of harm to enable comparable events to be grouped and assessed together. This is the basis of the risk matrix approach, used for illustration throughout the remainder of this annex. In adopting this approach, however, it is important to define the categories with enough precision to enable consistent application by different assessors, and at different times within the organization. Clear definition of the terms "likely", "unlikely" or "very unlikely" is necessary for different assessors within the organization to interpret these consistently, and to ensure they are used consistently over time.

There can be confusion over whether and how risk assessments should take into account the number of people exposed to a hazard. Clearly, a given hazard is more serious if it affects a greater number of people.

In cases where, either a single hazardous event would cause harm to more than one individual, or a number of people carry out an activity (e.g. at different times, or at different locations within the workplace) and all are exposed to the same individual risk, it is first necessary to assess whether that level of risk is tolerable for individuals. In judging whether any further risk reduction measures are reasonably practicable, account should be taken of the fact that the greater the number of individuals who are exposed to that risk, the greater the benefit that will be achieved by reducing it. The fact the benefit is greater affects how much it is reasonable to spend on control measures, i.e. for a given reduction in individual risk – the greater the benefit, the more it is reasonable to spend.

Where the hazardous activity could also cause severe harm to large numbers of people in one incident, e.g. multiple fatalities, as well as considering individual risk there is a further factor to consider, termed *societal risk*, which is intended to take account of public aversion to large numbers being killed in a single incident. This *societal risk* factor also affects how much it is reasonable to spend on control measures and should be added to the effect of benefiting a greater number of individuals.

The vulnerability of individuals to various hazards can vary. The most appropriate way to take account of this is to perform the risk assessment in relation to one or more hypothetical or representative persons, e.g. the person most exposed to it, or a person living at some fixed point or with some assumed pattern of life. For example, occupational exposure to substances hazardous to health is usually assessed by considering the exposure of a hypothetical person who is in good health and works a normal working week exposed to the hazard. The actual individuals who are to be exposed to the risk will have to be considered. When the control measures determined via risk assessment are applied in practice, consideration should be given to the particular susceptibilities of the actual persons involved to consider whether the control measures need to be adapted, for example, to take account of individuals' ability to read instructions or to allow for colour-blindness.

E.3.5.2.2 *Severity of harm*

When seeking to establish the potential severity of harm, the following should be considered.

— How the person is likely to be affected?

— What harm will result?

Care should be taken to ensure harm category definitions reflect both (short term) health and safety consequences and (longer term) health effects, e.g. hearing loss. Procedural prompts and/or assessor training might be necessary to reinforce to assessors the need to consider both these types of harm, as there can be a tendency to focus exclusively on short term risks.

A possible categorization of severity of harm levels based on a basic three band categorization is shown in Table E.1.

Table E.1 — Examples of harm categories

Harm category[a] (examples)	Slight harm	Moderate harm	Extreme harm
Health	Nuisance and irritation (e.g. headaches); temporary ill health leading to discomfort (e.g. diarrhoea).	Partial hearing loss; dermatitis; asthma; work related upper limb disorders; ill health leading to permanent minor disability.	Acute fatal diseases; severe life shortening diseases; permanent substantial disability.
Safety	Superficial injuries; minor cuts and bruises; eye irritation from dust.	Lacerations; burns; concussion; serious sprains; minor fractures.	Fatal injuries; amputations; multiple injuries; major fractures.

[a] The health and safety harm categories are effectively defined by quoting examples and these lists are not exhaustive.

Organizations should adapt such a structure to reflect their objectives. For example, the structure illustrated in Table E.1 could be expanded to four bands by separating the “extreme harm” category into two categories such as “severe harm” (e.g. major fractures) and “extreme harm” (e.g. fatal). However, Table E.1 illustrates an approach that could be suitable for an organization carrying out low-risk activities where very serious consequences are less likely.

E.3.5.2.3 *Likelihood of harm*

When seeking to establish the likelihood of harm, the adequacy of existing control measures should be taken into account. When carrying out risk assessment for new activities, the initial assessment should be based on the intended control measures. In both cases, these measures should be clearly documented so that the basis of the assessment will be clear when the assessment is revisited at a later date. Legal requirements, codes of practice and guidance published by regulatory agencies indicate appropriate controls for specific hazards. The following issues should typically be considered in addition to the work activity information given in **E.3.4**:

a) frequency and duration of an individual’s exposure to the hazard;

b) vulnerability of the individual or group (e.g. young or inexperienced personnel, expectant mothers, those working alone);

c) potential failure of services, e.g. electricity and water;

d) potential failure of plant and machinery components and safety devices;

e) exposure to the elements;

f) protection afforded by PPE and whether personal protective equipment is correctly worn when required;

g) unsafe acts (unintended errors or intentional violations of procedures) either by the individual carrying out the activity, or by others (e.g. adjacent personnel, visitors, contractors) who:

— might not know what the hazards are;

— might not have the knowledge, physical capacity, resources, skills or motivation to work safely;

— underestimate risks to which they are exposed;

— underestimate the practicality and utility of safe working methods;

— might be influenced in their behaviour by organizational culture (e.g. a perception that the organization tolerates risk-taking in the interests of productivity);

NOTE 1 This includes considering people's behaviour during abnormal and emergency situations as well as during routine tasks.

h) the potential for common-cause failures to increase the likelihood of harm occurring, e.g. via failures which could simultaneously disable a number of the control measures in place for a given hazard.

In assessing the likelihood of harm, organizations should not place sole reliance on historical data, the data might not reflect the current plant and equipment, or current ways of working, which have not materialized in the period covered by the data. However, in the case of ill health data an analysis can provide useful information on patterns of absence that could inform risk priorities.

NOTE 2 Likelihood of harm is equivalent to the likelihood that a hazardous event actually results in harm. An approach which can also be taken here is to assess the likelihood of a hazardous event occurring and then assessing the likelihood that harm arises from that event. In practice this leads to an approach where a full assessment is made only where harm is reasonably foreseeable.

A simple categorization of likelihood of harm, based on a four band structure is illustrated in Table E.2.

Table E.2 — Examples of categories for likelihood of harm

Categories for likelihood of harm	Very likely	Likely	Unlikely	Very unlikely
Typical occurrence	Typically experienced at least once every six months by an individual	Typically experienced once every five years by an individual	Typically experienced once during the working lifetime of an individual	Less than 1 % chance of being experienced by an individual during their working lifetime

An organization should use categories for likelihood that suit its circumstances ensuring that the range is appropriate both to one-off safety-related incidents and to health effects that might manifest themselves after prolonged exposure to the hazard or some time after exposure to the hazard has occurred. Similarly, organizations can use different definitions for categories of likelihood.

Some organizations might prefer to further subdivide the above categories. However, a system with too many bands could give a spurious impression of accuracy and make consistent assignment to the correct band more difficult. Whatever the structure the example above illustrates the need for organizations to define terms such as "frequent" and "unlikely", to enable assessments to be carried out consistently and with repeatability by different assessors and at different times.

Care should be taken to ensure the scheme is designed to ask questions that the workers and managers can reasonably be expected to answer. For example most people find it far easier to judge the typical frequency of a hazardous event (e.g. once or twice a year) than judge the probability that an incident will occur during a particular operation (e.g. between one in a hundred and one in a thousand). Assessors also need to be aware of the limitations in the quality and accuracy of data used in risk assessments, and the possible effect this could have on the resulting true risk level. There are instances where sensitivity assessment is necessary to establish whether the overall conclusions of the risk assessment are robust in the light of data uncertainties. The greater the uncertainty, greater is the need for an adequate margin of safety.

Where there is a range of possible ways in which a hazardous scenario might develop, it is appropriate to select a representative sample for risk assessment. Care should be taken, however, to ensure that the selected sample is indeed representative and that control measures which are suitable and sufficient for the sample cases, are also suitable and sufficient in the other cases.

For complex scenarios modelling techniques such as Fault Tree Analysis or Event Tree Analysis can assist in building up a picture of the combinations of events, or failures in control measures, that would be required for harm to occur. These can be quantified or used simply as qualitative tools. However, some expertise is needed to use these techniques correctly without which potentially misleading errors could arise.

E.3.6 *Estimating risk*

E.3.6.1 *General*

Table E.3 shows a simple method for estimating risks. Risks are estimated according to their likelihood and potential severity of harm, combining the severity and likelihood categories shown in **E.3.5.2.1** and **E.3.5.2.2**.

Some organizations might wish to develop more sophisticated approaches. For example, an organization with high risks might use a matrix with a larger or smaller number of "likelihood" or "harm" categories for example to discriminate between very harmful and extremely harmful consequences. For a low risk organization a smaller matrix might suffice.

Throughout the risk assessment particular attention should be given to risks associated with very harmful and extremely harmful consequences. In these cases it is also useful to estimate the risk ratings with and without controls in place. This emphasizes the critical importance of maintaining the controls. For example, in relation to health working near a very noisy machine with an effective acoustic enclosure would be a low risk, but if the enclosure is frequently removed, there would be a very high risk of deafness. In terms of safety a fall on a scaffold with full edge protection would normally be a low or perhaps a medium risk, but in the absence of edge protection the risk would be very high.

Table E.3 — A simple risk estimator

Likelihood of harm (see Table E.2)	**Severity of harm**		
	Slight harm	**Moderate harm**	**Extreme harm**
Very unlikely	Very low risk	Very low risk	High risk
Unlikely	Very low risk	Medium risk	Very high risk
Likely	Low risk	High risk	Very high risk
Very likely	Low risk	Very high risk	Very high risk
NOTE These categorizations and the resulting asymmetry of the matrix arise from the examples of harm and likelihood illustrated within this British Standard. Organizations should adjust the design and size of the matrix to suit their needs.			

E.3.6.2 *Determining the tolerability of risks*

The next step is to decide which risks are acceptable, tolerable or unacceptable (see **E.1.2.9**). In a fully quantified assessment, it is possible to evaluate the risk before deciding on the level of risk that is deemed to be acceptable, tolerable or unacceptable. However, with semi-quantified methods such as the risk matrix, the categories or bands need to be established as acceptable, tolerable and unacceptable. In making decisions as to whether the risk is tolerable the work force should be consulted.

To do this the organization should first establish tolerability criteria to provide a basis for consistency in all its risk assessments. This should involve consultation with workers representatives and other stakeholders and should take account of legislation and regulatory agency guidance, where applicable.

A simple evaluation of risk tolerability, based on a five band structure could be developed as illustrated in Table E.4 below.

Table E.4 — A simple risk categorization

Category of risk	**Evaluation of tolerability**
Very low	Acceptable
Low[a]	Risks that should be reduced so that they are tolerable or acceptable
Medium[a]	
High[a]	
Very high	Unacceptable
[a] In this example these three categories are used to allow for different types actions or different timescales for action that might need to be applied according to the level of risk.	

In deciding the tolerability of risks from particular hazards, account should be taken of individuals' total exposure to risk, allowing for the fact that they could be exposed to risks associated with a number of different hazards, or to different attributes of the same hazard. The individual risk exposure of members of special groups should also be considered for example, vulnerable groups such as new or inexperienced workers, or those most directly involved in the highest risk activities, i.e. the most exposed group of workers.

E.3.6.3 *Decide on action to control or reduce risks*

Table E.4 shows an example of the general rules that might be established to reduce or control risks in the various categories of tolerability and the priority that should be given to such actions. Individual organizations will determine their own levels of risk and could choose to use greater detail than shown in Table E.5. For example, an organization might specify timescales for the implementation of additional risk controls.

Dividing the time spent on a hazardous activity between several individuals, however, should not be considered to be a valid risk reduction measure. Risk from individual hazards should be tolerable irrespective of individual exposure to the hazard; an unacceptable risk does not become tolerable if exposure to it is limited to a short time.

E.3.6.4 *Preparing a risk control action plan*

Risk levels as shown in Table E.1 form the basis for deciding whether improved controls are required and the timescale for action. Table E.3 shows that control effort and urgency should be proportional to risk. As discussed in **E.3.5.2.1** it might also be appropriate to take account of the number of individuals exposed to the risk, when setting priorities and timescales. Guidance on the selection of appropriate risk controls follows in **E.3.7**.

The outcome of a risk assessment should be an inventory of actions, in priority order, to devise, maintain or improve controls. A process for planning the implementation of necessary changes following risk assessment is described in Annex D.

Table E.5 — A simple risk-based control plan

Risk level	Tolerability: Guidance on necessary action and timescale
Very low	These risks are considered acceptable. No further action is necessary other than to ensure that the controls are maintained.
Low	No additional controls are required unless they can be implemented at very low cost (in terms of time, money and effort). Actions to further reduce these risks are assigned low priority. Arrangements should be made to ensure that the controls are maintained.
Medium	Consideration should be given as to whether the risks can be lowered, where applicable, to a tolerable level, and preferably to an acceptable level, but the costs of additional risk reduction measures should be taken into account. The risk reduction measures should be implemented within a defined time period. Arrangements should be made to ensure that the controls are maintained, particularly if the risk levels are associated with harmful consequences.
High	Substantial efforts should be made to reduce the risk. Risk reduction measures should be implemented urgently within a defined time period and it might be necessary to consider suspending or restricting the activity, or to apply interim risk control measures, until this has been completed. Considerable resources might have to be allocated to additional control measures. Arrangements should be made to ensure that the controls are maintained, particularly if the risk levels are associated with extremely harmful consequences and very harmful consequences.
Very high	These risks are unacceptable. Substantial improvements in risk controls are necessary, so that the risk is reduced to a tolerable or acceptable level. The work activity should be halted until risk controls are implemented that reduces the risk so that it is no longer very high. If it is not possible to reduce risk the work should remain prohibited.

NOTE Where the risk is associated with extremely harmful consequences, further assessment is necessary to increase confidence in the actual likelihood of harm.

E.3.7 *Risk control*

E.3.7.1 *Risk control measures*

While identifying hazards and risks are essential elements of the risk assessment process, only the application of suitable control measures reduces risks. In many cases, this will require no more than comparing the controls in place against what is required by established, authoritative good practice.

A risk assessment should be detailed enough to identify hazards and the required control measures to reduce the risk of harm, including those planned or in place. For example, in an environment where several hazardous chemicals are in use, with the potential for a variety of harmful effects, and requiring the use of a number of different types of PPE, a risk assessment in which the hazard is broadly defined as "Chemical exposure" and the corresponding control measures are "PPE" and "Training" is unlikely to be of value. If the risk assessment is to be meaningful and effective it should:

— specify the chemical exposure paths associated with groups of workplace tasks, e.g. inhalation versus absorption through the skin;

— describe the type of harm (a general description could be enough);

— relate these to the particular types of PPE required for these tasks; and

— identify which particular (mandatory or recommended) training course or other control measures are appropriate for personnel carrying out these tasks.

This creates an assessment, which specifically relates the adequacy of control measures to the individual hazards. The risk assessment process should also form the basis for identifying the situations and scenarios that require emergency and evacuation plans, and for which emergency equipment or assistance is necessary.

Experience also shows the value of checking the existence of the control measures, as part of the risk assessment process, rather than making assumptions. For example where a training course is cited as a control measure, particularly where course content evolves over time, it is worthwhile checking that the course still addresses the particular hazards, risk or risk controls relevant to the area being assessed.

E.3.7.2 *Risk control systems*

As well as identifying the necessary control measures for particular risks, the risk assessment process should consider the arrangements to ensure that these control measures are implemented and kept in place or amended as needed. Such arrangements, sometimes called Risk Control Systems, provide the method of management control for individual control measures, or types of control measure. Taking a Permit-to-Work (PTW) system as an example, this would include defining aspects such as:

— the scope (range of activities) for which PTW is needed;

— responsibility for the design of the PTW system and the responsibilities of those involved in its operation;

— training and competency of those who design or operate the PTW system;

— communication and consultation needed in the design and operation of the system;

— arrangements for inspections and audits of the system and its implementation;

— arrangements to review the performance of the PTW system and determine whether improvements are needed.

E.3.7.3 *Hierarchy of risk control*

When evaluating existing control measures and risk control systems, or considering changes to such controls, consideration should be given to measures that reduce the likelihood of harm, or to measures that reduce the severity of harm, or a combination of the two. The following hierarchy should be applied.

a) If practicable, eliminate hazards altogether, or combat risks at source, e.g. use a safe substance instead of a dangerous one.

b) If elimination is not practicable, try to reduce the risk at source, e.g. by use of low voltage electrical appliances; introduce machinery guards.

c) Finally, reduce risk via procedures and safe systems of work, adopting PPE only as a last resort after all other control measures have been considered.

In applying this hierarchy consideration should be given to the relative costs, risk reduction benefits, and robustness of the available options. An organization should also take into account:

— the need for a blend of technical and procedural controls (combining elements from the hierarchy);

— established good practice in the control of the particular hazard under consideration. Risk assessment should not be used to attempt to justify applying weaker control, or tolerating higher levels of risk, than are achieved via established good practice;

— adapting work to the individual (e.g. to take account of individual mental and physical capabilities);

— taking advantage of technical progress to improve controls;

— using measures that protect everyone (e.g. by selecting engineering controls that protect everyone in the vicinity of a hazard, in preference to PPE);

— the discipline within the organization, and whether the workforce will accept and use a particular control measure and whether management can enforce it;

— the need to introduce planned maintenance of, for example, machinery safeguards;

— the possible need for multiple control measures;

— the possible need for emergency/contingency arrangements where risk controls fail.

In some cases it might be necessary to adopt a short term solution while a better long term solution is developed for example the use of hearing protection as an interim measure until the source of noise can be eliminated, or the workplace segregated to reduce the noise levels.

E.3.7.4 *Outputs from the risk assessment process*

Risk assessment records should enable the organization to demonstrate that it has systematically identified all significant hazards, evaluated the associated risks, and determined the adequacy of its control measures and risk control systems. Records should normally address the items listed in **E.3.3**. Where risk assessments result in a programme of actions to improve control measures and/or the associated risk control systems, or to ensure that risk controls are robust and remain effective, records should demonstrate the tracking of these actions to completion.

E.3.7.5 *Action to improve risk control*

Where the risk assessment process results in a programme of actions to improve risk control, such actions should be prioritized taking account of:

i) the magnitude of the risk; and

ii) their risk reduction benefits.

The same factors should be considered in setting timescales for the completion of improvement actions. Hence an action that addresses a high risk activity and offers a substantial reduction in that risk, should take priority over actions which affect only medium risk tasks, or have only limited risk reduction benefit. In some cases it could be necessary to:

— suspend work activities, or preclude the start-up of operations, until risk reduction actions have been satisfactorily completed; or

— apply additional temporary risk controls until more effective actions are completed.

Prioritizing actions needed a pragmatic approach. For example, there could be both high and lower priority actions that need to be undertaken together in the interests of efficiency. Consideration should also be given to low cost solutions that enable quick actions to partially address a particular risk; such approaches can be effective in providing an early demonstration of management commitment to the risk assessment and control process. However, interim measures should not be regarded as a long term substitute for more effective risk control measures.

Table E.3 provides an example of how control effort and urgency might be prioritized in relation to risk, based on the risk categories and tolerabilities defined in Table E.2.

The process for planning and implementing changes, described in Annex D, could be applied to actions arising from risk assessment.

In making changes to control measures and risk control systems the following aspects should be considered.

— Have new hazards been created? If so a new risk assessment should be carried out.

— Have the risks from other hazards changed? If so a revised risk assessment should be carried out.

— Has the most cost-effective solution been chosen, bearing in mind both the immediate costs and any through-life (maintenance) costs?

— What do people affected think about the need for, and practicality of, the revised preventive measures?

— Will the revised controls be used in practice, and not ignored in the face of, for example, pressures to get the job done?

E.3.8 ***Maintaining the validity of risk assessments and risk controls***

Risk assessment and control is a continual process. Thus, risk assessments should be subject to periodic formal review to confirm the validity of the assessment and whether risk controls are still effective and adequate. Where conditions have changed improvements should be made as necessary.

Similarly, irrespective of the schedule for formal review, if conditions change to the extent that hazards and risks are significantly affected then risk assessments should be reviewed. Such changes can include:

— expansion, contraction or restructuring of activities;

— reallocation of responsibilities;

— changes to methods of working or patterns of behaviour, e.g. part production and re-work;

— occurrence of a hazardous event (see Annex G).

The review of risk assessments and in particular, the scrutiny of risk assessments during audits are useful tools to help maintain the validity and effectiveness of risk assessments and controls.

The review can help ensure consistency across risk assessments carried out by different people or at different times.

Internal audit is an opportunity to check that assessments are in place and up to date. It can also be a useful opportunity to check whether the assessment reflects actual workplace conditions and practice. Experience suggests that a competent auditor can often provide a useful independent check by examining:

— whether a risk assessment exists for a particular task;

— when it was last revised;

— whether it includes any hazards/risks that are obvious from observation, or from discussion with personnel carrying out the task;

— whether relevant control measures cited in the risk assessment are in evidence at the work location (including guards, tools, PPE etc.);

— whether personnel carrying out the task are familiar with the risks and control measures (including whether they have received the stated training);

— whether actions arising from risk assessments have been completed, or are being progressed.

Hazardous event investigations provide an important opportunity to review the effectiveness of:

a) the overall risk assessment process; and

b) the validity of the risk assessment for the particular activity affected by the hazardous event.

Since risk assessment is intended to reduce the occurrence of hazardous events, such occurrences might indicate weaknesses in the way risks have been assessed or in the way controls have been designed, implemented, or monitored.

Annex F (normative)
Measuring performance and audit

F.1 General

F.1.1 *Responsibilities and competence*

Line management play a key role in measuring OH&S performance and audit. Those responsible for carrying out performance measurement in OH&S should be competent to do so.

F.1.2 *Purposes of performance measurement*

Performance measurement is an essential part of an OH&S management system. The main purposes of performance measurement are to:

a) determine whether OH&S plans have been implemented and objectives achieved;

b) check that risk controls (see **E.3.7**) have been implemented;

c) learn from OH&S management system failures, including non-conformance with risk controls, hazardous events, and cases of ill health;

d) promote implementation of plans and risk controls by providing feedback to all parties;

e) provide information that can be used to review and, where necessary, improve aspects of an OH&S management system;

f) demonstrate the effectiveness of the organization's OH&S to stakeholders.

F.1.3 *Explanation of key terms*

For the purpose of this annex the following key terms apply:

F.1.3.1
pro-active monitoring
timely routine and periodic checks:

a) that OH&S plans have been implemented;

b) to determine the level of conformance with OH&S management systems;

c) that seek evidence of harm that has not otherwise come to the attention of the organization via reactive monitoring

F.1.3.2
reactive monitoring
structured responses to OH&S management system failures, including hazardous events and cases of ill health

F.1.3.3
leading performance indicator
data on compliance or non-compliance with the performance requirements of OH&S plans and compliance or non-compliance with the organization's OH&S management system generally

NOTE The data results mainly from pro-active monitoring.

F.1.3.4
lagging performance indicator
exclusive data on the prevalence of hazardous events: incidents and accidents, and of occupational ill health

NOTE The data results mainly from reactive monitoring.

F.1.3.5
key performance indicator
small number of both leading and lagging performance indicators that have been selected as the principal indicators that are used by an organization in reviews of the OH&S management system

F.1.4 ***General***

In a fully effective OH&S management system, pro-active monitoring provides reassurance that the system is operating as intended, for example confirmation that employees have received relevant training, and that safe systems of work are being followed. In a less than fully effective system pro-active monitoring provides timely evidence of problems that need to be remedied, for example, work being carried out without a risk assessment, or that all accidents have been reported.

Reactive monitoring is exclusively concerned with systematic responses to non-conformances in the OH&S system and the investigation of hazardous events and the causes of ill health. These problems could have been brought to the attention of the organization for example by a statutory inspector or by complaints by employees or members of the public or in the case of hazardous events or adverse health effects, by the people who have experienced or witnessed near misses or harm.

In summary, an important distinction between the two methods of monitoring is the way that non-conformances are detected by an organization routinely seeking out evidence of short-comings (pro-active monitoring), or by others, often when it is too late (reactive monitoring). Organizations should use both types of monitoring.

An exclusive reliance on reactive monitoring might lead to complacency, regulatory agency action, complaints by the public that could adversely affect corporate image, and above all the organization's OH&S management system is likely to lie dormant until harm occurs.

It is wrong to assume that full compliance with risk controls, confirmed by pro-active monitoring, means that risks are in fact fully controlled. For example a safe system of work might not cater for all eventualities.

Thus, reactive monitoring should be combined with pro-active monitoring. Reactive hazardous event investigations might reveal that while risk controls were fully implemented, and this was confirmed by pro-active monitoring, they were nonetheless ineffective in preventing harm.

Pro-active monitoring OH&S performance in many cases (for example where routine checks are carried out by supervisors) leads to immediate corrective action and the information about the findings might not be formally recorded. But organizations should, where practicable, record the findings of pro-active monitoring, and always document the findings of reactive monitoring. The data thus obtained should be used as indicators of OH&S performance (see **F.2.1** and **F.4**).

Hazardous events and cases of ill health are usually monitored reactively so it is common to refer to the findings of these investigations as the exclusive source of reactive monitoring data, however this is not necessarily the case.

It is necessary to refer to data on the prevalence of hazardous events and ill health as lagging performance indicators, and management system successes and failures such as the possession or absence of an up-to-date OH&S policy, or compliance or non-compliance with a safe system of work, as leading performance indicators. These are considered further in **F.3** and later in **F.4**.

When choosing performance indicators for low probability/high consequence situations such as those in the major hazard industries care should be taken to ensure that the indicators are suitable to provide information on the control of the event under consideration. In most cases indicators such as accident incidence rate have proved to be poor indicators of performance in this area.

F.2 Leading and lagging performance indicators, data types, and key performance indicators

F.2.1 *Leading and lagging performance indicators*

An organization should use both leading and lagging performance indicators to assess the overall performance of the OH&S management system.

Typical examples of both kinds of indicator, and the reasons why both kinds should be used by organizations for performance measurement are included in **F.4**. Information on both kinds of indicator should be communicated to staff, and where appropriate to, for example, contractors and the public. They should be primary inputs to management reviews.

F.2.2 *Selecting performance indicators and KPIs relevant to the organization*

Information needs vary at different levels and in different parts of an organization. Top management need KPIs to determine whether or not the OH&S system is working effectively. At operational level many performance indicators might be necessary to monitor implementation and effectiveness of risk controls.

Large organizations should make arrangements to aggregate OH&S data that can form the basis for selecting appropriate KPIs. Appropriate KPIs for the organization's industry sector should be identified.

The careful selection of relevant KPIs is vital: too few could result in an incomplete picture of the robustness of the system; too many might swamp senior staff with extraneous detail. Moreover, KPI data could be distorted by their use: managers might be reluctant to report accidents in their area of responsibility if accident rates are a KPI used in their performance appraisal. So the leading and lagging indicators selected as KPIs should be reviewed to ensure that they continue to be valid.

F.2.3 *Limitations of leading performance indicators as the exclusive measure of OH&S performance*

Leading performance indicators (for example, house-keeping standards, personal protective equipment use) should predict the prevalence of lagging indicators in the months and years ahead. Such indicators are useful in that they provide early evidence of success or failure, although their link with long-term performance might not be perfect. For example, an increase in the indicator, i.e. number of persons trained in the safe operation of internal transport; might not in itself result in a reduction in site transport accidents.

For these reasons, leading performance indicators should not be used as the only measurements of OH&S performance.

F.2.4 *Limitations of lagging performance indicators as the exclusive measure of OH&S performance*

Lagging indicators such as accident and ill health data are vital as they are the final check on the effectiveness of an OH&S management system. However, there are cautions relating to their use, for example.

a) Most organizations have too few injury accidents to distinguish real trends from random effects.

b) If more work is done by the same number of people in the same time, increased workload alone might account for an increase in accident rates.

c) The length of absence from work attributed to injury or ill health could be influenced by factors other than the seriousness of injury or ill health, such as poor morale, monotonous work and poor management and employee relations.

d) Accidents are often under-reported (and occasionally over-reported). Levels of reporting can change. They might improve as a result of increased workforce awareness and better reporting and recording systems.

e) Accident rates are influenced by the proportion of employees carrying out high risk work. If additional staff are recruited for low risk work, the accident rate (e.g. per person employed) will go down, although the risk to the actual operators is not reduced. On the other hand an organization's accident rate might appear to improve when high risk tasks are taken over by contractors.

f) A substantial time delay can occur between OH&S management failures and any harmful effects. Moreover many occupational diseases have long latent periods. It is not desirable to wait for harm to occur before judging whether OH&S systems are working.

For these reasons, lagging performance indicators should not be used as the only measurements of OH&S performance. Moreover, lagging data needs careful interpretation to ensure that, for example, confounding factors do not mislead.

F.2.5 *Leading and lagging performance indicators, and indicators that might be leading or lagging*

Selecting appropriate performance indicators depends on the organization's plans. Examples of leading and lagging performance indicators relevant to a range of objectives are listed in Examples 6 and 7. The lists include examples of both objective/subjective and quantitative/qualitative monitoring and data, (see **F.5**).

Leading performance indicator data relating to an organization's OH&S plans are evidence that the performance requirements of the plan have, or have not, been implemented, (see Annex D).

Most performance indicators are clearly either leading or lagging indicators, but some could be either leading or lagging depending on the context. For example an organization might be prosecuted for a continuing failure to provide adequate OH&S training (leading indicator) or prosecuted following an accident (lagging indicator). Examples of these are given in Example 8.

EXAMPLE 6 — Leading performance indicator data

The following are examples of leading performance indicators:

a) appropriate safety policy has been written;

b) a safety policy has been communicated;

c) a director with health and safety responsibilities has been appointed;

d) OH&S specialist staff have been appointed;

e) the extent of influence of OH&S specialists;

f) the extent to which plans have been implemented;

g) staff perceptions of management commitment to OH&S, (see Annex C);

h) number of top managers' OH&S inspection tours;

i) frequency and effectiveness of OH&S committee meetings;

j) frequency and effectiveness of staff OH&S briefings;

k) number of staff suggestions for OH&S improvements;

l) time to implement action on suggestions;

m) number of personnel trained in OH&S;

n) staff understanding of risks and risk controls;

o) number of risk assessments completed as a proportion of those required;

p) extent of compliance with risk controls;

q) extent of compliance with statutory requirements;

r) staff attitudes to risks and risk controls (see Annex C);

s) house-keeping standards;

t) personal exposure sampling reports;

u) workplace exposure levels (e.g. noise, dust, fumes);

v) personal protective equipment use;

w) worker safety representatives and representatives of employee safety have been appointed and are able to exercise their powers.

EXAMPLE 7 — Lagging performance indicator data

The following are examples of lagging performance indicators:

a) health surveillance reports;

b) sickness absences – employee absences due to illness (occupationally-related or non-occupationally-related);

c) cases of occupational diseases or conditions, such as dermatitis, deafness, work-related upper limb disorders; stress, asbestosis, occupationally – induced cancers;

d) near misses;

e) damage only accidents;

f) reportable dangerous occurrences;

g) lost-time accidents – when at least one work shift (or other time period) is lost by a person as a result of an accident injury;

h) reportable accidents involving absence from work for more than three days;

i) reportable major injuries;

j) fatal accidents.

EXAMPLE 8 — Data that can be either leading or lagging

The following are examples of performance indicators that might be leading or lagging, depending on the context:

a) complaints made by the workforce;

b) indicators that demonstrate that the organization's OH&S objectives have been achieved;

c) criticisms made by regulatory agency staff;

d) regulatory agency enforcement action;

e) complaints made by employees who are not direct employees of the organization or by members of the public.

F.3 Performance measures — Objective and subjective; quantitative and qualitative data types

Organizations should adopt a well-formulated combination of all four data type combinations, namely: objective-quantitative, objective-qualitative, subjective-quantitative, and subjective-qualitative in measuring the success of an OH&S programme. This allows a much better overall assessment of OH&S performance than reliance on any single measure.

Examples of performance measurement data types are described, with cautions associated with their use:

a) *objective data*: data which is detached from an assessor's personal judgement, e.g. reading a calibrated noise meter; number of employees using hearing protection; whether an OH&S specialist is in post;

b) *subjective data*: data which could have been influenced by those doing the measuring. Examples are measures of the adequacy of housekeeping or a safe system of work where no defined standard has been laid down. These measures can be very useful but need to be treated with care. For example, two people might report different findings about the adequacy of workplace controls;

c) *quantitative data*: data which describes numbers and recorded on a scale, e.g. the numbers of accidents reported. Where possible, it is desirable to quantify performance measures so that comparisons can be made over time. However, such data might give an unjustified impression of precision;

d) *qualitative data*: data which describes conditions or situations that cannot be recorded numerically, for example a commentary on the deliberations of an OH&S committee. While qualitative data is very important it might be difficult to relate to other performance measures.

Attention should be given to the level of competence required of those responsible for devising, carrying out and analysing data from all performance measures.

F.4 Monitoring techniques

Organizations should decide how often monitoring takes place on the basis of the level of risk, and the likely rate of change.

The following are examples of methods that can be used to measure OH&S performance:

a) examination of documents, for example, policies, plans, risk assessment pro-formas, inspection checklist pro-formas, permit-to-work pro-formas;

b) examination of records, for example, completed risk assessment pro-formas, maintenance records;

c) informal workplace inspections;

d) systematic workplace inspections using checklists;

e) work activity inspections;

f) safety tours, for example on a walk through basis;

g) workplace environmental monitoring**,** measuring exposure to substances or energies and comparing with recognized standards;

h) inspections of specific machinery and plant to check that safety-related parts are fitted and in good condition;

i) behaviour sampling**,** assessing workers' behaviour to identify unsafe work practices that might require correction, for example by work design improvements or through training;

j) attitude surveys of personnel at all levels (see Annex C);

k) benchmarking against good OH&S practices in other organizations.

F.5 OH&S audits

F.5.1 *The nature and scope of auditing*

Audits are periodic, typically annual, systematic and thorough assessments of the implementation and, in most cases, the suitability and effectiveness of the OH&S management system. Auditors should use some or all of the methods for monitoring performance described in **F.5** Audit findings might include performance indicators described in **F.3** and **F.4**, and the performance measurement data types given in **F.5**.

The key differences between monitoring performance and auditing are:

a) an audit always involves pro-active monitoring;

b) an audit is carried out by employees without line management responsibility for the activities being audited;

c) an audit is carried out to provide an independent input into the management review process leading to continual improvement. Management support should be given to auditors.

OH&S auditing comprises pro-active assessments of parts or all of an OH&S management system. Typically, an auditor carries out a comprehensive audit of the whole OH&S management system, or looks at a horizontal slice, e.g. an audit of "organizing", or a vertical slice where the arrangements to control a specific hazard are audited in terms of the policy, organization, planning and implementing, measurement and review processes in relation to that hazard, see **F.5.2**a).

F.5.2 *Planning audits*

The nature and extent of the audit to be undertaken should be determined. This involves answering such questions as the following.

a) Will the audit look at the whole or just part of the organization, or focus on a specific activity, location or issue?

b) Will the audit look solely at the OH&S management system or will it involve technical matters concerning plant, equipment and processes?

c) Is the audit intended to establish the effectiveness or otherwise of the OH&S management system (validation audit), or to verify whether the organization is complying with its own standards and procedures (compliance audit), or both?

d) Should the audit be carried out by internal or external auditors or a combination of both?

e) Will the audit as proposed require any special skills of the auditors?

F.5.3 *Auditors and composition of audit teams*

F 5.3.1 *Auditors*

Audits can be undertaken by one or more persons. A team approach, involving managers, worker and employees might improve co-operation. The people chosen as auditors should be competent. Wherever possible, they should be independent of the part of the organization or the activity that is to be audited. The nature and extent of the audit will determine whether it is undertaken by employees from another part of the organization or by external auditors. Other factors to be taken into consideration include:

a) the availability of auditors for the length of time necessary to undertake the audit;

b) the availability of auditors with the necessary skills;

c) the level of audit experience required;

d) the requirement for specialist knowledge or technical expertise;

e) any requirement for training;

f) the cost differential between using internal or external auditors;

g) the danger of an internal auditor being over familiar or satisfied with the organization's arrangements, compared with the benefits of the fresh eyes and a possibly more questioning approach of an external auditor;

h) the danger of unfamiliarity or lack of understanding, particularly where complex technical issues or processes are involved.

F.5.3.2 *Composition of audit teams*

Where an audit team is used, as opposed to an individual auditor, the composition of the team depends on the nature and scope of the audit and also whether:

a) in-house, external or a combination of both are used;

b) specialist knowledge, experience, skills or technical expertise required;

c) agreements have been reached about the involvement of employee representatives.

F.5.4 ***Audit question sets***

F.5.4.1 *General*

A common approach to auditing is to devise a set of questions that can be used to check compliance with an OH&S management system, or to test the OH&S management system against a standard or good practice; effectively benchmarking. These questions that should be both open and closed, could be prepared within the organization, or by an auditor, or purchased as a proprietary question set. Question-sets are usually combined with a scoring system, so that organizations can review their performance under each element of the management system. Some organizations choose to combine internally written questions with proprietary questions.

The question set can be used directly by auditors, or the questions might be answered by line management with subsequent verification by an auditor.

Organizations should not use the same set of questions over an extended period of time. Answering increasingly familiar questions can become a chore, and can lead to audit fatigue. Crucially, some employees might seek to improve their score by chasing easy improvements which do not enhance the OH&S system in practice, for example by buying additional safety journals if points are awarded for each journal purchased.

F.5.4.2 *In-house question sets*

Consideration should be given to the use of in-house question sets. The advantages of in-house questions are that they manifestly relevant to the work and systems of the organization. The disadvantages are that they time consuming to prepare, and could lack objectivity.

F.5.4.3 *Proprietary question sets*

Consideration should be given to the use of proprietary question sets. The advantages, generally, of proprietary question sets are that they are:

a) often used by many organizations, thus facilitating benchmarking;

b) written in the context of an appropriate OH&S management system model;

c) usually supplied as part of a software package which facilitates score calculations and the presentation of results and offers online help.

The disadvantages, generally, of proprietary question sets are that they might:

1) not adequately reflect the size, organizational arrangements, nature of the work and nature of the hazards and the level of risk within the organization;

2) prescribe standards that might be inappropriate, for example requiring safety committees to meet at least once a month, where a two-month frequency might be more appropriate;

3) in contrast, include questions that are insufficiently searching, for example asking whether safety committee meetings are held regularly.

Annex G (normative)
Hazardous event investigation

G.1 Reasons for investigating hazardous events

It is necessary to investigate all significant work-related hazardous events, i.e. those that can or do cause significant harm, in order to: establish immediate and root causes; identify the need for preventive measures, including improvements to the OH&S management systems; and to inform the risk assessment process. Hazardous events in this context include fatal/major/lost-time injuries, occupational ill health cases (see **G.7**), fires, explosions, accidental releases or exposures, structural collapses and near misses with serious potential. There are legal, moral, societal and business reasons for hazardous event investigation.

G.2 Establishing the causes

Hazardous events generally have multiple causes, both immediate (personal and job factors) and root (management and organizational factors) as follows:

a) personal factors, e.g. lack of appropriate decision making, behaviour, skill, knowledge, experience and aptitude to carry out duties safely;

b) job factors, e.g. unsuitable working environment, plant, equipment, substances, precautions, procedures and systems of work;

c) management and organizational factors, e.g. shortfalls in an organization's OH&S policy, resources and arrangements, resulting in ineffective management of risk.

It is estimated that up to 80 % of accidents can be attributed to actions or omissions of people, commonly referred to as human error or human failure. Where this is the case, investigations need to establish what type of human failure has contributed to the event and why it was not prevented. Human failures are divided into two types, errors (slips, lapses or mistakes) or violations and investigators need to establish the personal, job or management and organizational factors that led to these failures.

G.3 Pre-investigation preparations

Hazardous events can range in severity from those with minor harm potential or outcome, to those with catastrophic potential or outcome. The level of investigation, in terms of resource allocation, depth and overall approach should be proportional to the health and safety significance of the event and its potential for enhancing organizational learning. To facilitate this it is advisable to have plans in place for dealing with varying types of incident, so that pre-determined investigators or teams can be called upon. In addition to ensuring sufficient staff are adequately trained in investigation and/or that the organization has access to such expertise, appropriate investigative equipment should also be readily available, e.g. digital camera/video, portable tape recorder, tape measure, writing materials, personal protective equipment, sealable sample containers, portable detection equipment, torch, etc. It can also be beneficial to have use of a mobile phone, containing useful contact numbers, and a laptop computer.

NOTE Electrical devices might need to be intrinsically safe to avoid creating ignition sources.

G.4 Pre-investigation actions

G.4.1 *Reasons for investigating hazardous events*

Incidents should be reported to a designated person in the organization, who will:

a) assess risk (see **G.4.2**);

b) make safe (see **G.4.3**);

c) make secure (see **G.4.4**);

d) report (see **G.4.5**).

G.4.2 *Assess risk*

Where the event occurs on a worksite, a pre-investigation risk assessment should be arranged conducted by a competent person(s) and any risk control measures to be implemented. This is necessary in order to identify, assess and control hazards that could have arisen as a result of, or caused/contributed to, the hazardous event. Sometimes referred to as Dynamic Risk Assessment (see **E.1.3**), this process should be reviewed as frequently as changing circumstances demand and should embrace all those potentially exposed to risk. This can include internal investigators, facility engineers, first-aiders, etc. and also external bodies such as police, enforcement officers, insurers, emergency services, forensic and other specialists, utility engineers, contractors, etc.

G.4.3 *Make safe*

Ensure, so far as possible, that the scene of the hazardous event is made safe and casualties treated/rescued. This might involve using the organization's emergency procedures or disaster recovery plan, depending on the seriousness of the situation and the assembly of a disaster recovery team. Making safe requires controlling any hazardous situations, e.g. by isolating sources of energy as necessary, preventing further leakage or spillage, neutralising harmful substances, extinguishing fires, purging the atmosphere of smoke or gases, etc. Care should be taken however to ensure that vital forensic data is not unnecessarily disturbed or degraded. Should it become essential, for safety reasons, to remove anything or alter its location, then its position should be recorded as accurately as possible before it is moved, e.g. by photography, video, a scaled sketch, written description or marking its position in situ.

G.4.4 *Make secure*

Where the event has occurred on a worksite, at the earliest possible stage following the above, ensure the primary scene (the actual location of the hazardous event) is secured, in order to preserve relevant information. This might involve cordoning-off; erecting solid barriers; or locking doors/gates to the area; and posting appropriate warning signs. It is also advisable to keep a record of all visitors to the scene, including names; reasons for visit and contact details. Secondary scenes, i.e. those scenes away from the incident that might contain pertinent data, need to be identified and either secured or the relevant information obtained. Where an event occurs in another domain, for example, on a road or in domestic premises, options for securing the primary scene and gathering facts might be more limited. However, secondary scene information, such as at work road risk policies, training and maintenance records, risk assessments, etc. can be important in helping to establish the root cause.

NOTE At work road risk policies are policies related to the management of occupational road risk, associated with employees driving during the course of their work.

G.4.5 *Report*

Ensure that hazardous events are reported and recorded internally and also reported externally to relevant enforcing authorities by the prescribed means, as appropriate. The enforcing authorities are likely to investigate major hazardous events and in these situations, investigators might be required to co-operate and work with the enforcers. It is good practice for minor hazardous events to be reported internally and investigated, even if only informally, to prevent recurrence and help build a culture of trust and co-operation when dealing with more serious incidents. It is often easier in practice to learn from events not giving rise to injury, because there are fewer barriers to the investigation process such as those associated with possible prosecution, common law claims, disciplinary action or the traumatization of witnesses.

G.5 Investigation

G.5.1 *Team approach*

Consultation is necessary between managers, employees and worker representatives to agree the level of investigation required and terms of reference. Wherever possible, a team approach is recommended, as this enables all the relevant competences to be harnessed; supports learning about health and safety management; enhances team building; and increases numbers of individual champions for investigation recommendations. The investigation team should be led by a supervisor/line manager and include as a minimum a competent health and safety practitioner, and a worker representative. Depending on the incident, additional team members might include a process or operations specialist, maintenance engineer, etc. Ideally, for serious and high-potential events, the team leader should be a senior line manager from another area of the organization and team members should not have been personally involved in planning or managing the tasks associated with the incident. Investigators need sufficient competence in investigative techniques, occupational safety and health, and the activity and organization concerned, to undertake the level of investigation required. It is vital for investigators to be open-minded and objective and that a blame or defence approach are avoided.

G.5.2 *Level and scope*

Once the terms of reference of the investigation have been decided, it is essential that an appropriate investigator or team be engaged as quickly as possible. Among the first tasks of the investigator(s) are to carry out a preliminary review to confirm the level and scope of investigation required (and to amend terms of reference if necessary); determine the composition of the team; roles and responsibilities; and working methods.

G.5.3 *Information gathering*

It is important that data is collected and recorded as soon as practicable and safe following an event, so that it reflects as closely as possible the circumstances that pertained at the time. Information can be gathered by making observations, examining documentation and by interviewing witnesses. The investigation should be based close to the scene, in a lockable room allocated exclusively for its duration.

G.5.4 *Observations*

Inspection of the scene allows investigators to make and record initial observations regarding the physical condition and relative locations of premises, plant/equipment, substances and also the work environment, e.g. weather, temperature, humidity, light, noises, odours, etc. including sampling and testing. All observations should be made and recorded using appropriate investigative equipment and kept securely. Even where a scene is unlikely to be disturbed, it is advisable to make a video/photographic record for subsequent reference and inclusion in the report.

G.5.5 *Documents*

Essential information can also be obtained from documents such as policies; procedures and method statements; risk assessments; incident investigation, inspection, examination, survey or audit reports; test certificates and licences; maintenance descriptions; training records, permits to work, site plans and equipment drawings, etc. All relevant documents should be retained or copied, referenced and kept securely, together with a log of all documentation examined.

G.5.6 *Witnesses and interviews*

The primary objective of the investigation is to establish the cause. Witnesses should be identified and interviewed as early in the investigation as possible, to ensure that their recollection of events does not degrade with the passage of time or become unwittingly altered. Priority should be given to interviewing the key witnesses first, i.e. those involved or present at the time of the event (though this will possibly need to be delayed until people recover sufficiently if they are injured, ill or psychologically traumatised). Other witnesses include those in the vicinity who might have seen, heard, felt or smelt something relevant; those with knowledge of the event or surrounding circumstances; and those who can corroborate the actions of others and/or validity of data gathered.

It should be explained to witnesses prior to commencing interviews, that the objective is to establish the cause of the event and how future incidents can be avoided and not to attribute blame. The interview should be planned, using open questions on topic areas, inviting the interviewee to, for example: give their personal details, background, experience and training; outline normal activities, organizational arrangements and systems of work; and give their opinion on how the event was caused and could have been avoided. Witnesses should also be asked to describe what happened and what they actually saw or heard and to give their opinion on how the event was caused and could have been avoided. The interviewer should only take brief notes whilst a witness is speaking. Although it is important to ensure witness interviews are as relaxed and open as possible, it is often helpful to have two interviewers, one to lead, the other to take notes. Similarly, the interviewee might wish to have someone present, to provide moral support. The interview should be conducted in a private area or room free from distractions. If necessary, the interviewee should be taken to the scene of the event, making it easier for them to point out what happened and perhaps concluded in a quiet room, where a witness statement can be prepared.

G.5.7 *Hazardous event file*

All relevant information should be catalogued and kept or referenced in a hazardous event file. This will provide the investigator(s) with a comprehensive information resource about the event on which cause analysis will be based and a final report produced. This file should be kept securely, but be readily accessible to the investigator(s).

G.5.8 *Structured approach*

It is helpful to approach an investigation in a systematic way. A recommended technique for helping to structure an investigation is Events and Causal Factors Analysis (ECFA). This process requires deductive reasoning to determine which events and/or conditions (causal factors) contributed to the hazardous event and involves producing a sequential diagram depicting the contributory factors. An initial Events and Causal Factors (ECF) chart should be commenced as soon as facts emerge about possible causative factors. These are stated and positioned as primary events, secondary events or conditions, for example, by use of adhesive notes placed in chronological order on a bare wall, whiteboard or flipchart, to form a hazardous event sequence or chain, using the following conventions:

a) an event (supported by evidence) is described in a solid-line rectangle;

b) a presumed event (not supported by evidence) is described in a broken-line rectangle;

c) a condition (supported by evidence) is described in a solid-line oval;

d) a presumed condition (not supported by evidence) is described in a broken-line oval;

e) events are linked together by solid-line arrows;

f) conditions are linked together or to events by broken-line arrows;

g) each event or condition should be precisely described and quantified if possible e.g. “the roofer fell 10 m from the roof” rather than “the roofer fell from the roof” and dates and times can also be included;

h) events and conditions are clearly distinguished from one another. Events are discrete occurrences, e.g. “the windscreen shattered” rather than “the windscreen was cracked”;

i) short sentences are used with one subject and one active verb, e.g. “the roofer fell 10 m from the roof” rather than “the roofer slipped on moss and fell 10 m from the roof”;

j) each event should follow logically from the one before, if not, one or more sequential steps might be missing;

k) secondary events or conditions should be above or below the primary sequence;

l) events should be shown chronologically from left to right.

Although incomplete, the initial ECF chart helps to identify gaps in events, conditions and relevant information and can guide the investigation in certain directions, for example, to seek further data. The chart will develop in the light of new information and be re-ordered as appropriate, helping to:

1) confirm the sequence of events;

2) establish contributing factors;

3) structure the investigation report; and

4) illustrate the event sequence from beginning to end, providing a useful communication aid both during and after the investigation.

It is essential that the investigator consider each event in the sequence and judge whether, had it been absent, the hazardous event would still have occurred. This will allow the investigator to identify the critical events and conditions in the sequence.

G.5.9 ***Analysis***

Having established the facts and possible cause, it is necessary to construct and test theories to help determine not only what happened but also why the critical events and conditions contributing the incident were not prevented. In determining such root causes, simple checklists can be used to prompt thought and examination of previously unconsidered areas and to categorize the types of failure, helping to identify trends. An example checklist of possible areas to consider is as follows:

a) risk controls selected on the basis of an unsuitable or insufficient risk assessment;

b) poor implementation of controls;

c) failures of pro-active monitoring to detect poor implementation of controls;

d) controls implemented but ineffective;

e) failures of reactive monitoring to detect near misses that would have revealed ineffective controls;

f) controls not reviewed or improved in the light of information of pro-active and/or reactive monitoring;

g) failure to manage change effectively.

Consideration should also be given to root causes that can be associated with the following factors.

1) *Design*, e.g. failure to apply ergonomic principles, creating problems for users.

2) *Tools and equipment*, e.g. poor quality/condition or not fit for purpose.

3) *Maintenance*, e.g. only reactive and/or inadequate.

4) *Housekeeping*, e.g. lacking or inadequate causing trip hazards.

5) *Error enforcing condition*s, e.g. environmental or other stressors.

6) *Procedures*, e.g. inadequate, unavailable or not followed.

7) *Training*, e.g. lacking or inadequate for gaining competence (see **B.4**).

8) *Communication*, e.g. lacking or inadequate at organizational, group or individual level (see **B.5**).

9) *Incompatible goals*, e.g. production rates having precedence over health and safety.

10) *Organization*, e.g. weaknesses in policy, structure or arrangements, and deficiencies in resources and management (see Annex B). and

11) *Defences*, e.g. lack of or inadequate alarms, sensors, barriers, sprinklers, protective equipment.

NOTE [Adapted from Groeneweg 1998].

For larger scale investigations, it might be appropriate to use more complex techniques involving the use of Risk Trees, such as Management and Oversight Risk Tree (MORT) or Fault Tree Analysis (FTA), which require training and experience for effective application.

G.5.10 *Conclusions and recommendations*

The investigator(s) should check and agree that the findings, conclusions and recommendations reflect the evidence base and professional judgement available during the investigation. This is particularly important where a team is involved. All recommendations should be specific, appropriate, proportionate, prioritized and timescaled. If, during the investigation, weaknesses are discovered that do not pertain to the hazardous event, then these should be dealt with in a separate report. It is also helpful if costs are assigned to the hazardous event (e.g. costs of lost product/materials; business interruption; damaged plant, equipment, tools and buildings; fines; legal expenses; site clearing; training; overtime and temporary labour; emergency supplies; investigation time, etc.) as these can help to reinforce the business case for safety improvements. In the UK, the Health and Safety Executive provides a web-based tool to assist in costing hazardous events.

G.5.11 *Investigation report*

The report should include the date, time, place of the hazardous event and what happened; date reported to external authorities; details of all injured parties (name, age, sex, etc.); harm that occurred; the activity taking place; the potential consequences; details of others involved; initial post-event actions; immediate and root causes; details of successful controls; recommendations to prevent recurrences; details of reviewed risk assessment; and details of investigator(s).

In a free-form report, the investigator(s) can use the sequence charts to help organize the information. In addition to the basic information listed above, the report might also have an executive summary and possibly appendices containing copies of significant documents, including: sequence charts; sketches; photographs; details of costs; forensic reports; witness statements; other evidence of failures, e.g. deficient risk assessments, procedures, maintenance records, etc. If the report makes reference to, or bases conclusions on, presumed events or conditions (i.e. those not supported by evidence), the investigator(s) should justify the inclusion and use of these.

Top managers should always review investigation reports. Action should be taken to implement recommendations, including improvements to the OH&S management system.

G.6 Post-investigation

G.6.1 *Risk assessments*

A risk assessment for the area or activity should be conducted in light of the investigation findings to ensure that there is adequate risk control (see **E.3.7**) in place before the scene is released (see **G.4.2**).

G.6.2 *Releasing the scene*

Once all relevant information is gathered and it is safe to resume operation, a formal handover of the scene from the investigator(s) to the appropriate line manager should take place. This should happen as early as is practicable, without compromising either health and safety or the investigation. There might be unavoidable delays in this process, for example, external authorities might be involved and the scene might not be made available to internal investigators until the authorities have concluded their investigations. Where recovery of normal operations requires significant planning and resource, it is appropriate for recovery teams (see **G.4.3**) and investigation teams to liaise, with large incident scenes possibly being released in stages.

G.6.3 *Implementing recommendations*

It is incumbent on the line management of the area or activity affected to plan and implement the agreed remedial actions, within the prescribed timescales. These actions should be monitored and tracked to ensure timely closure and efficacy. In order to achieve effective implementation the workforce, and their representatives where appropriate (see also **G.5.1**), should be consulted and their commitment and co-operation gained (see **B.2** and **B.3**). The reasons for any changes should be explained to those who will be affected and who might need retraining, etc. Implementation of changes arising from investigations should be included in subsequent monitoring and review.

G.6.4 *Learning lessons*

In order for lessons to become embedded in the corporate memory and survive personnel changes, they should be incorporated into policy (see **3.3**), systems, procedures and training (see **B.4**). It is essential that lessons learnt from any hazardous event, including elements that went well, be shared as widely as possible across the organization concerned and ideally, wider still. This is possible if the organization is a member of a trade association, federation or other such body, as lessons can be shared (anonymously if necessary) with those in the wider community who might have similar hazards.

It is important, whilst preserving individual confidentiality, that significant findings and recommendations from the report should be widely communicated to all who might benefit from the lessons, for example, by using briefings/tool-box talks and the organization's intranet. The communication should include all those directly or indirectly involved in the event and also those engaged in activities with similar hazards.

G.7 Investigating occupational ill health cases

As soon as an occupational health issue is raised by an employee (or their representative), or indicated by: adverse environmental monitoring or health surveillance reports; absence trends; or a relevant doctor's note, the situation should be investigated. The investigative team should include or consult occupational health professionals and/or other specialists, e.g. a physician, nurse, hygienist, ergonomist when appropriate. The investigator(s) should establish whether the conditions suspected to have caused the ill health still exist and if so, whether the affected individual or others are currently being exposed. If this is the case, the process might have to be halted until it is made safe. Documentary information, such as personal medical records, are not accessible to the investigators without consent because of patient confidentiality, however, other health surveillance records; air-sampling results; maintenance records for local exhaust ventilation; personal dosimeter readings; and the results of risk assessments, should all be accessible.

NOTE Certain occupational diseases with long latency, e.g. noise induced hearing loss, occupational cancers, asbestosis, etc. can prove difficult to investigate, as exposure might have occurred many years prior to onset of disease and witnesses, documentation, etc. are not always readily available. Also, as the process concerned might have ceased operation, investigation with a view to remediation can be inappropriate. On the other hand, where ill health effects arise more rapidly, e.g. work-related upper-limb disorders, asthma and dermatitis, many of the approaches to investigation, indicated in this annex, are applicable.

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