



NEBOSH International General Certificate in Occupational Health and safety



Element 4

Health and safety monitoring and measuring

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4.0 Learning outcomes and assessment criteria

The learner should be able to:

- **Take part** in incident investigations
 - 4.2 **Explain** why and how incidents should be investigated, recorded and reported

- **Help** their employer to check their management system effectiveness – through monitoring, audits and reviews
 - 4.1 **Discuss** common methods and indicators used to monitor the effectiveness of management systems
 - 4.3 **Explain** what an audit is and why and how they are used to evaluate a management system
 - 4.4 **Explain** why and how regular reviews of health and safety performance are needed

4.1 Active and reactive monitoring

An organisation should have systematic approaches for measuring monitoring, and reviewing its health and safety performance on a regular basis, as an integral part of its overall management system. The management system itself should also be subjected to periodic audits to ensure its ongoing effectiveness.

Terminology

Measurements can be either quantitative or qualitative. Quantitative measurements are numerical and objective e.g. the accident injury incidence rate (AIIR). Qualitative measurements are subjective and judgemental e.g. the standards of housekeeping have improved.

Monitoring involves collecting information, such as measurements or observations, over time, which when collated, provides management information on performance trends and fluctuations.

Auditing is the structured process of collecting independent information on the efficiency, effectiveness and reliability of the total health and safety management system and drawing up plans for corrective action.

Reviewing is the process of making judgements about the adequacy of performance and taking decisions about the nature and timing of the actions necessary to remedy deficiencies.

Measuring health and safety performance

‘If you cannot measure your knowledge is meagre and unsatisfactory’ – Lord Kelvin.

Measuring health and safety performance is different to the measurement of other aspects of an organisations performance as success is achieved through the absence of an outcome (no accidents or illness) rather than the presence of an outcome (more orders, more profit).

Good historical performance may be down to luck rather than judgement and is no guarantee of effective control and future safety.

To get a realistic understanding of an organisations health and safety performance requires a *'mixed basket'* or *'balanced scorecard'* of measures to provide information on a range of activities.

The management system requires both active (proactive) and reactive monitoring systems.

- **Active Systems** monitor the effectiveness of workplace precautions, RCSs and management arrangements, and provide leading indicators of performance.
- **Reactive Systems** monitor accidents, ill health, incidents and other evidence of deficient health and safety performance. (*i.e.* lagging indicators).

The domino theory of accident causation explained later in **section 4.2** can be used to illustrate the use of active and reactive monitoring systems as shown in Figure 4.1.

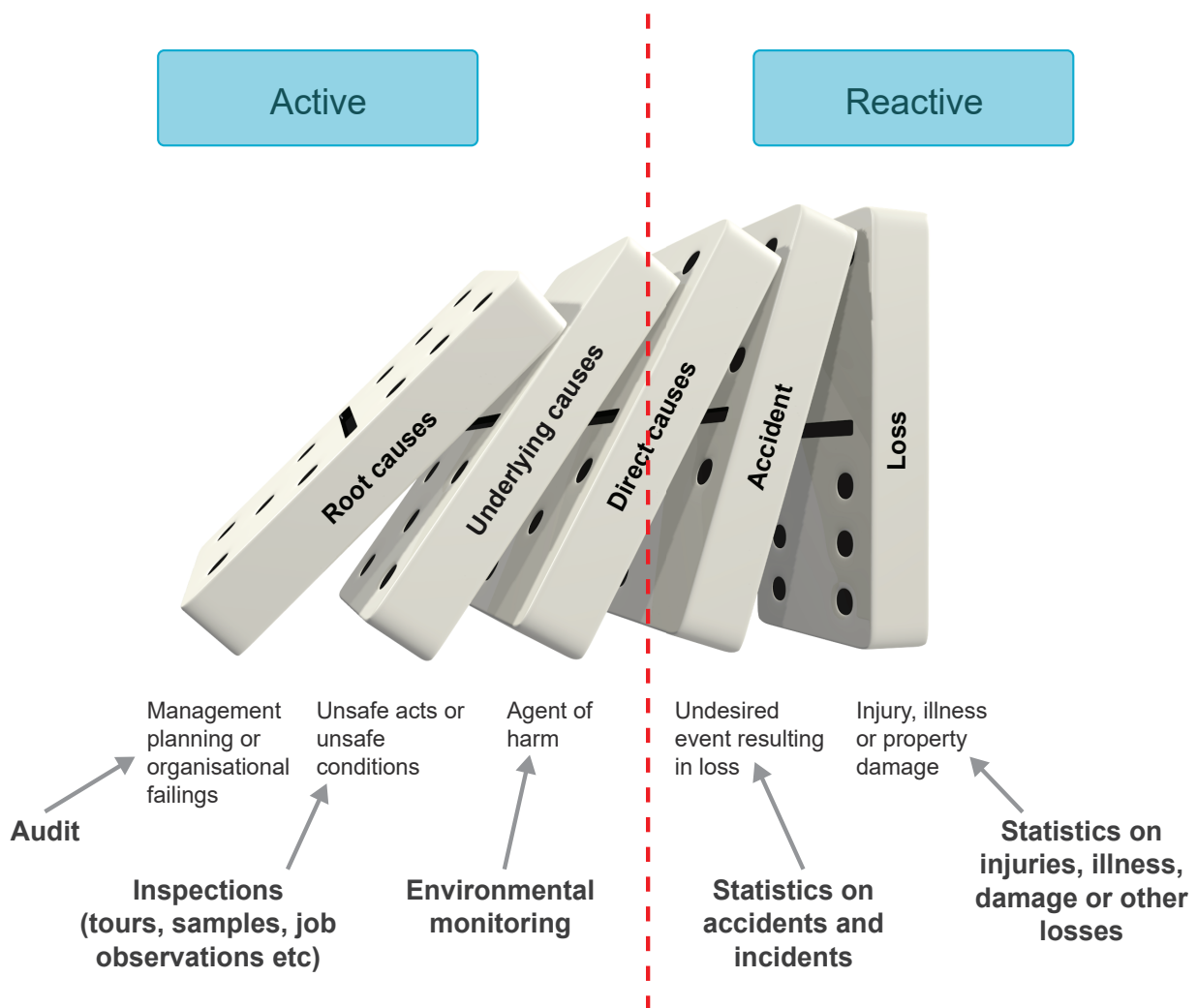


Figure 4.1: (Pro) active and reactive monitoring strategies

Why monitor and review?

There are many good reasons for monitoring and reviewing health and safety performance, including:

- identifying substandard health and safety practices and conditions
- identifying trends of types of accident, injury or illness
- comparing actual performance with previously set targets
- '*benchmarking*' performance against similar organisations or an industry norm
- evaluating the effectiveness of existing control measures and making decisions on addressing any deficiencies identified
- identifying new or changed risks
- assessing compliance with legal requirements
- providing the Board of Directors and/or safety committee with relevant information
- boosting morale and motivate the workforce through positive reinforcement on progress
- maintaining external accreditations such as ISO 45001.

Active monitoring systems

The purpose of active monitoring is to improve the organisation's health and safety performance by providing feedback on its performance before an accident, incident or ill health occurs.

Active monitoring gives information on:

- progress against specific plans and objectives
- the effectiveness of the health and safety management system
- the degree of compliance with performance standards.

This provides a firm basis for decisions about improvements in risk control.

Active monitoring systems should be proportional to the hazard profile. Activity should concentrate on areas where it is likely to produce the greatest benefit and lead to the greatest control of risk.

Key risk control systems and related workplace precautions should therefore be monitored in more detail or more often (or both) than low-risk systems or management arrangements.

The various forms and levels of active monitoring include:

- Audits involving comprehensive and independently executed examinations of all aspects of an organisation's health and safety performance against stated objectives (Audits are discussed later in **section 4.3**)
- Inspections of premises, plant and equipment carried out on a regular or scheduled basis which identify existing conditions and comparing them with agreed performance objectives (Inspections and related tools such as safety surveys, safety sampling and safety tours are discussed later)
- Job observations to check the effective operation of workplace precautions
- Health or medical surveillance using techniques such as audiometry and blood or urine analysis
- Environmental monitoring such as the measurement of noise and dust levels
- Benchmarking to compare aspects of an organisations performance with that of other organisations with similar processes and risks (benchmarking is discussed later).

Inspection

The main features of a health and safety inspection:

- Is a physical examination of the workplace
- Is a legal requirement (HASAW'74, MHSWR'1999)
- Is normally scheduled or planned at regular intervals
- Usually carried out by a manager or employee representative
- Involves the physical inspection of a workplace with the aim of:
 - Identifying hazards
 - Assessing the use and effectiveness of existing control measures
 - Suggesting remedial action where these are found to be non-existent or inadequate.

A suitable inspection programme will take all risks into account but should be properly targeted.

Low risks might be dealt with by general inspections every month or two covering a wide range of workplace precautions such as the condition of premises, floors, passages, stairs, lighting, welfare facilities and first aid.

Higher risks need more frequent and detailed inspections, perhaps weekly or even, in extreme cases, daily or before use. An example of a pre-use check would be before the operation of mobile plant.

Systems for inspecting, examining and testing a range of work equipment are required by legislation (statutory inspections), e.g. pressure vessels, lifts, cranes, chains, ropes, lifting tackle, power presses, scaffolds, trench supports and local exhaust ventilation (LEV).

When determining the frequency and content of inspections, consideration should be given to:

- The accident history of the organisation
- The level risk arising from the activity, equipment or workplace
- The type and experience of the worker(s) involved in the area or process
- The introduction of new equipment/processes
- Statutory requirements (as mentioned above)
- Recommendations following risk assessments or incident investigations
- Schedules and performance standards.

Safety inspections can be conducted in various ways, such as through:

- **Safety tours** – General inspections of the workplace usually involving senior management
- **Safety sampling** – Systematic sampling of particular dangerous activities, processes or areas
- **Safety surveys** – General inspections of a particular dangerous activity, processes or area.

Use of checklists

Inspection forms or checklists are often used and offer a number of *benefits*:

- prior preparation and planning ensures the inspection is structured and systematic
- ensures a degree of consistency in the process and the interpretation of findings
- reduces the chance that important areas or issues might be missed
- can be adapted or customised for use in different areas
- provides an immediate record of findings
- provides an easy method for comparison and audit.

The *weaknesses* associated with the use of checklists are:

- the process may be overly rigid with no flexibility to explore other issues of interest
- the checklist needs to be regularly reviewed and updated to stay current as the workplace evolves
- there may be a tendency for people to complete tick lists without actually undertaking the checks that the list was designed to prompt
- the expectation of consistency can be taken for granted with little effort put into training inspectors to help ensure that consistency.

Inspections should be done by people who are competent to identify the relevant hazards and risks and who can assess the conditions found.

A properly thought-out approach to inspection will include:

- well-designed inspection forms to help plan and initiate remedial action (by prioritising items for attention)
- action plans allocating tasks to responsible persons and specifying deadlines
- periodic review of inspection forms to ensure ongoing effectiveness and drive continual improvement
- periodic review of the inspection programme to identify any need for changes in the frequency or nature of the inspection programme.

Effective report writing

Inspection reports need to be presented effectively to persuade management to take the necessary remedial action. The report should be well written, clear and free of jargon, and should follow a standard report format:

- **Introduction** detailing the scope of the inspection.
- **Discussion** highlighting the significant risks that were found, possible breaches of legislation and their potential consequences.
- **Conclusions** summarising the key issues.
- **Recommendations** including an action plan for remedial action with priorities and timescales.
- **Executive summary** should be prepared and inserted at the beginning of the report.

Reactive monitoring systems

The purpose of reactive monitoring is to improve the organisation's health and safety performance by measuring and learning from past events, mistakes and poor safety practice.

Reactive systems, by definition, are therefore triggered after an event and include identifying and reporting:

- injuries and cases of ill health (including monitoring of sickness absence records)
- other losses, such as damage to property
- incidents, including near misses with the potential to cause injury, ill health or loss
- complaints by the workforce regarding health, safety and welfare issues
- enforcement actions, such as prosecutions, enforcement notices or informal letters
- civil claims for compensation
- the costs arising out of all of the above.

Note: the list above is of outcomes that can be reactively monitored. Reactive monitoring systems involve collecting information over time and collating that information to provide management information on performance trends and fluctuations.

Each event provides an opportunity for an organisation to check performance, learn from mistakes, and improve the health and safety management system and risk controls.

Collecting information on serious injuries and ill health should be straightforward for most organisations, but learning about minor injuries, other losses, and near misses can prove more challenging. There is value in collecting information on all actual and potential losses to learn how to prevent more serious events.

4.2 Investigating incidents

The investigation and analysis of work-related accidents and incidents forms an essential part of the management of health and safety. Learning lessons from experience is critical to preventing future accidents and incidents.

Carrying out an accident investigation provides a deeper understanding of the risks associated with work activities. Learning what went wrong enables improvements to risk control measures, and management arrangements for supervision and monitoring etc.

Definitions

Accident: An undesired event that results in injury, ill health, or property damage.

Near miss: An undesired event that had the potential to cause injury, ill health or property damage, but did not.

Note: Many organisations use the term *incident* as a synonym for ‘near miss’, while other organisations use it as a ‘catch all’ covering both accidents and near misses. The HSE uses the term to cover near misses and **undesired circumstances** which are defined as ‘a set of conditions or circumstances that have the potential to cause injury or ill health, e.g. untrained nurses handling heavy patients.’

In the definitions of accident and near miss used here there is an event and an outcome. Whether or not an event causes harm or not is often a matter of chance.

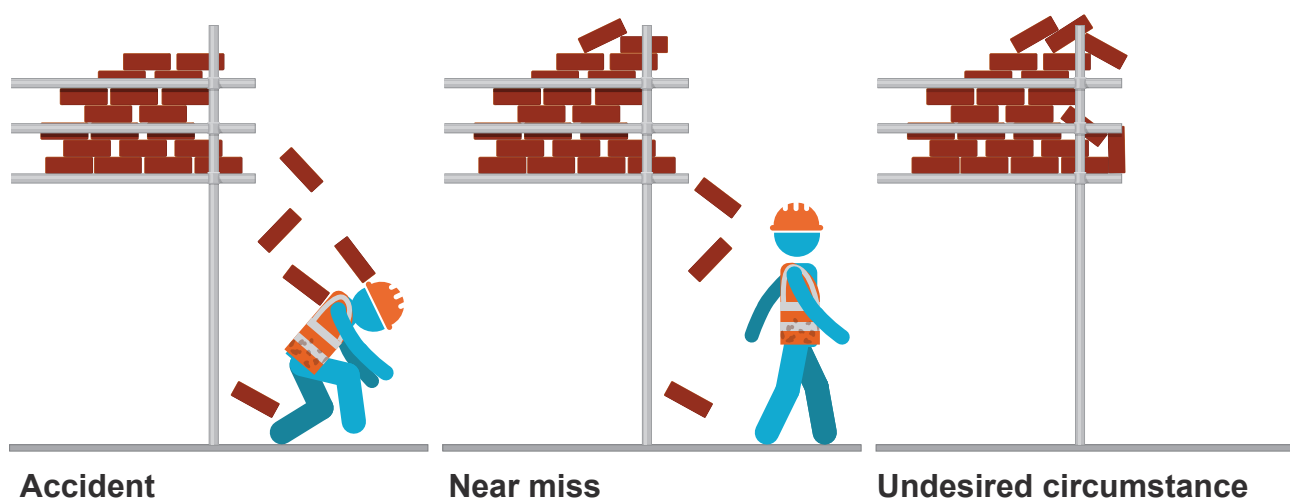


Figure 4.2: Accident, near miss and undesired circumstance

Accident ratios/accident triangles

In 1931 Bill Heinrich first presented an accident triangle to illustrate his theory of accident causation, showing that unsafe acts lead to accidents which largely result in minor injuries but will eventually result in major injuries or fatalities.

In 1969 Frank Bird Jr. undertook research for the Insurance Company of America analysing more than 1.75 million accidents reported across almost 300 businesses.

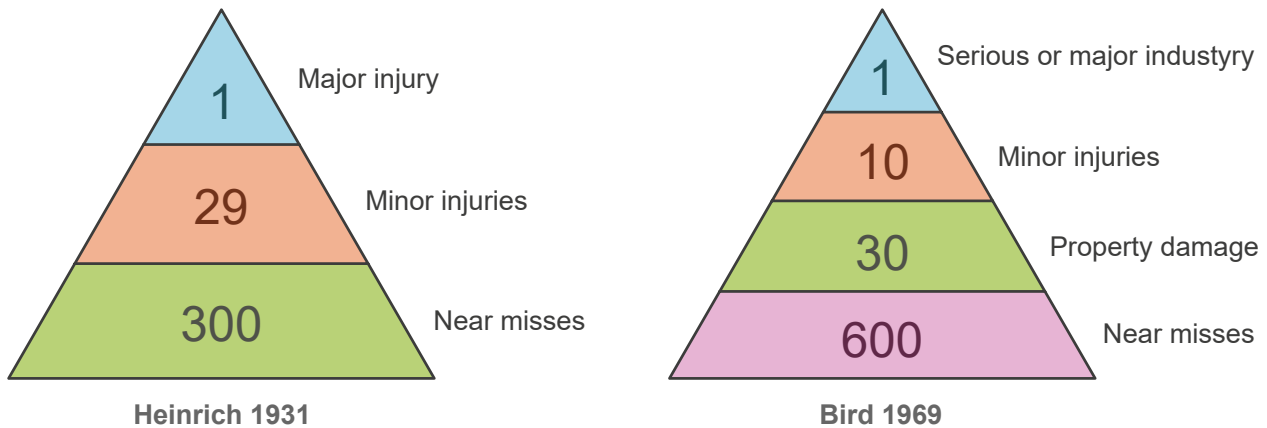


Figure 4.3: Accident triangles

These and later triangles proposed by Tye and Pearson in the 1970s and the HSE in the 1990s all show that the outcome of an unsafe event in the workplace will typically be a 'near miss' but that a proportion will result in minor injuries and a smaller proportion still will result in major injuries or fatalities.

The theory is useful in promoting the reporting of incidents (near misses and undesired circumstances) If the outcome of an event is largely dependent on luck the lessons should be learnt from the event and not the outcome.

If incidents are reported and investigated and lessons are learnt and improvements made the likelihood of a serious injury occurring should be greatly reduced.

How do accidents happen?

'For the want of a nail, the shoe was lost; for the want of a shoe the horse was lost; and for the want of a horse the rider was lost, being overtaken and slain by the enemy, all for the want of care about a horseshoe nail.'

Benjamin Franklin, (Poor Richard's Almanack, 1752)

Domino theories of accident causation suggest that accidents result from a chain of sequential events like a line of dominoes falling over. When one of the dominoes falls, it triggers the next one, and the next, eventually resulting in an accident and injury or other loss. Accident prevention strategies involve removing one of the dominoes from the chain to prevent the sequence progressing to the accident.



| A: Root causes: | B: Underlying causes | C: Direct (or immediate) causes | D: Accident: | E: Loss |
|---|--|--|---|------------------------------------|
| Generally management, planning or organisational failings e.g. failure to identify training needs and assess competence | Unsafe acts and unsafe conditions. (the guard removed, the ventilation switched off etc.) | The agent of injury or ill health (the blade, the substance, the dust etc.). There may be several immediate causes identified in any one adverse event | An undesired event that results in injury, ill health, or property damage | Injury, illness or property damage |

Figure 4.4: Domino theory

Multi-causality theories

A good accident investigation will identify the sequence of events and conditions that led up to the adverse event and identify the immediate, underlying and root causes.

Accidents typically arise as a consequence of a combination of causes so rather than a linear row of dominoes it is better represented as a tree with multiple rows of dominoes coming together to cause the accident.

There are numerous tools and techniques available for structuring the lines of inquiry in an investigation their suitability will depend on the complexity of the accident.

In a simple example the investigation works down from a top event which describes the accident and injury working through different rows of immediate, underlying and root causes.

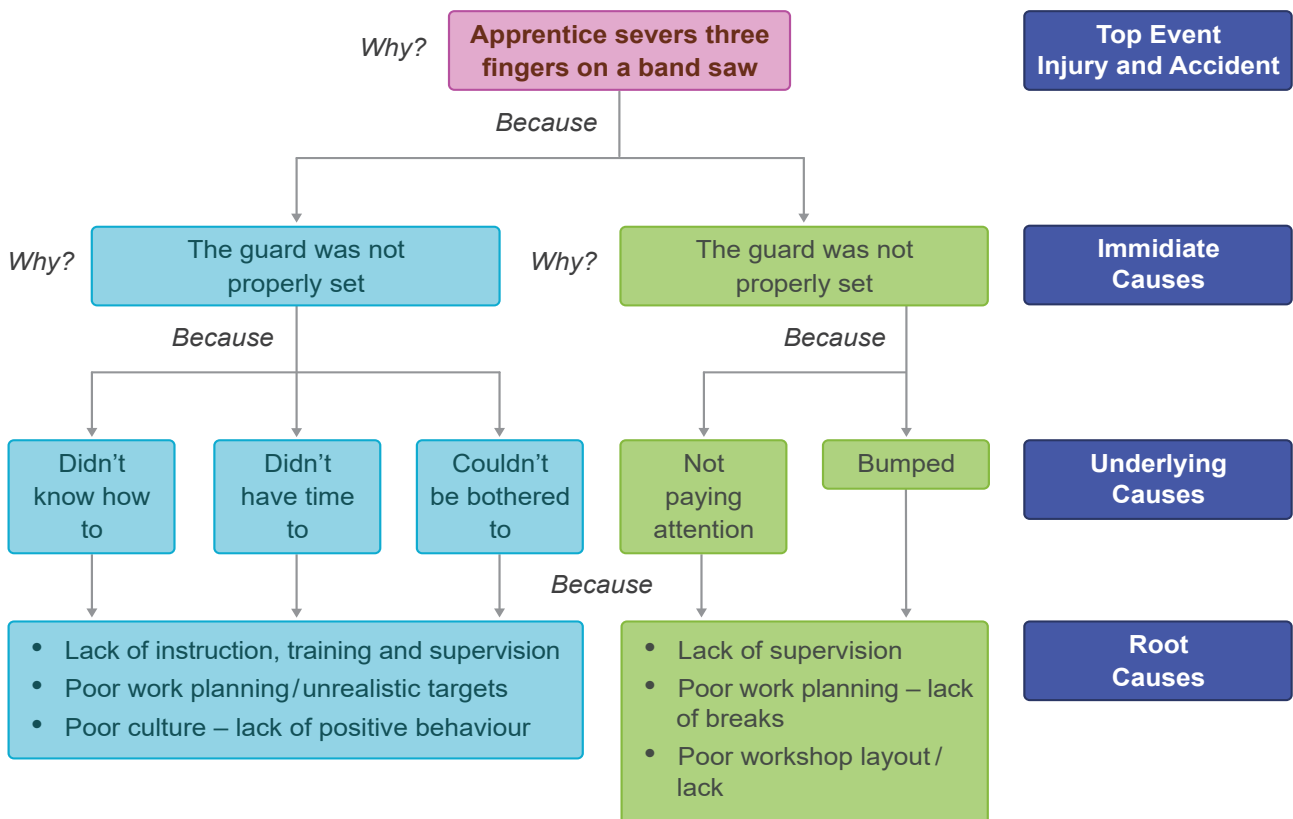


Figure 4.5: A simple example of multi-causality

Why investigate?

The primary reason for investigating an accident is to learn from the experience, and to gain an understanding of:

- how and why things went wrong
- what really happens and how work is really done
- any deficiencies in risk control management, enabling improvement going forward.

There are also specific legal reasons:

- for monitoring and reviewing health and safety arrangements – accident investigation plays an important part in this process.
- for disclosing information for use in a civil action.
- Insurance companies will also require the findings of the investigation when dealing with a compensation claim.

The broader business benefits may also include:

- the prevention of further similar adverse events
- the prevention of business losses due to disruption, stoppage, lost orders and the costs of legal actions
- an improvement in employee morale and attitude towards health and safety as a consequence of positive action
- the development of managerial skills such as problem solving and action planning.

Responding to an accident

Emergency response

Make the area safe and take prompt emergency action (the circumstances will determine what needs to be done first). Actions might include:

- isolating services
- securing the area with barriers
- administering first aid treatment and contacting the emergency services
- informing the next of kin
- informing management and the safety representative
- notifying the enforcement authority by the quickest practicable means
- collecting initial evidence such as photographs, sketches and the names of witnesses and setting up the accident investigation.

Initial report

- Preserve the scene
- Note the names of the people, equipment involved and the names of the witnesses
- Report the adverse event according to company policy and procedures.

Initial assessment and investigation response

- Determine appropriate level of response (see later)
- Report the adverse event to the regulatory authority if necessary.

The accident investigation

The level of investigation

It is the potential consequences and the likelihood of the adverse event recurring that should determine the level of investigation, not the actual injury or ill health suffered. Other considerations include the opportunity to learn and improve, and whether or not members of the public were involved.

The HSE recommends the use of Tables 4.1 and 4.2 to determine the appropriate level of investigation.

| Likelihood of recurrence | Potential worst case consequences | | | |
|--------------------------|-----------------------------------|---------|--------|-------|
| | Minor | Serious | Major | Fatal |
| Certain | Low | Medium | High | High |
| Likely | | | | |
| Possible | | | | |
| Unlikely | Minimal | Low | Medium | |
| Rare | | | | |

Table 4.1: Risk should the accident reoccur

| Risk/investigation level | Suggested scope of investigation |
|--------------------------|--|
| Minimal | Relevant supervisor should look into the circumstances of the event and try to learn any lessons to prevent recurrences. |
| Low | <p>A short investigation by the relevant supervisor or line manager into the circumstances</p> <p>Looks to identify immediate, underlying and root causes of the adverse event, to try to prevent a recurrence and to learn any general lessons.</p> |

| Risk/investigation level | Suggested scope of investigation |
|--------------------------|--|
| Medium | <p>A more detailed investigation by the relevant supervisor or line manager, the health and safety adviser and employee representatives.</p> <p>Looks for immediate, underlying and root causes.</p> |
| High | <p>A team based investigation, involving supervisors or line managers, health and safety advisers and employee representatives.</p> <p>Carried out under the supervision of senior management or directors.</p> <p>Looks for the immediate, underlying, and root causes.</p> |

Table 4.2: Suggested scope of investigation

Who should conduct the investigation?

An accident investigation should be a team effort involving management and employees.

Depending on the level of investigation and the size and complexity of the organisation a range of personnel, including employees, supervisors, managers, safety representatives, safety practitioners and directors, may need to be involved.

HSE research has shown that in organisations where there is cooperation and consultation with employees, the number of accidents is half that of workplaces where there is no employee involvement.

A team approach ensures that a wide range of practical knowledge and experience is brought to bear and reinforces the message that the investigation is for everyone's benefit.

Members of the investigation team will require:

- detailed knowledge of the work activities involved
- familiarity with health and safety good practice, standards and legal requirements
- suitable investigative skills (e.g. information gathering, interviewing, evaluating and analysing)
- sufficient time and *resources* to carry out the investigation efficiently
- the authority to make decisions and act on their recommendations.

Necessary resources

The response of the investigation team should be prompt. It is advisable to have an investigation kit prepared and ready to use. This could be a suitable, portable case containing:

- a camera or video camera
- pens, pencils and paper for notes and sketches
- witness statement forms
- measuring tape
- hazard warning tape
- personal protective equipment (PPE)
- site plans
- an investigation checklist.

The investigation process

The accident investigation will require an analysis of all the information available to identify what went wrong and determine what steps must be taken to prevent the adverse event from happening again.

Step 1: Gathering information

The first stage of the investigation is to gather evidence to help establish what happened and how it happened.

The investigation should look to establish:

1. the time and location of the accident
2. details of injured parties and anyone else involved
3. details of injury or ill-health caused
4. the activities being undertaken at the time
5. any unusual working conditions
6. whether the risk was known or not
7. whether a safe systems of work existed and was being followed
8. the level of competence of all involved
9. whether the organisation and arrangement of work was a factor

10. whether work materials were a factor
11. whether the workplace layout (environment) was a factor
12. difficulties in using plant or equipment
13. whether adequate safety equipment was provided and used
14. contribution of cleaning or maintenance activities
15. any other contributing factors
16. an understanding of the chain of events.

Sources of information will include:

- the *scene* of the incident
- physical evidence including sketches, measurements, photographs, and details of the environmental conditions at the time
- the *people* involved or affected
- verbal accounts and written statements regarding eye witness observations, previous experiences and opinions (*notes on witness interviews follow*)
- relevant *documentation*, including:
 - risk assessments
 - safe systems of work
 - permits-to-work
 - work procedures/job guides
 - operating instructions
 - pre-use inspections of equipment (e.g. fork lift trucks)
 - training records
 - maintenance records
 - previous incident reports
 - workplace inspections
 - environmental monitoring records (e.g. temperature or dust levels).

Witness interviews

An effective a witness interview should be conducted as soon as possible after the incident has occurred, and take place in a suitable, comfortable, private room, with no interruptions.

Witnesses should be interviewed one at a time but may be accompanied if necessary to put them at ease.

The interviewer should bear in mind that the interviewee may be suffering medical shock after the event and be very nervous due to the event or the interview.

The interviewer should make clear that the purpose of the interview is to understand what happened and not to apportion blame, and look to build a rapport with the interviewee, by using appropriate language and tone.

Open questions should be used to ensure that the witness is not led and that the account is a fair. However the questioning should focus on obtaining facts rather than feelings or opinions. Closed questions (Yes/No answers) can be used to confirm or clarify specific points.

At the end of the interview, a written summary of the evidence given should be agreed and signed to enable it to be attached to the final report on the incident.

Step 2: Analysing the information

The analysis involves examining all the facts, to improve understanding of what happened and why.

The analysis should be carried out in a systematic way, so all the possible causes and consequences are fully considered. There are a range of formal methods available to help the process.

Essentially a multi-causal analysis looks to map the contributory factors, continually asking why? To identify not just the direct causes, but also the underlying and root causes.

Understanding the underlying and root causes will help to identify appropriate risk control measures.

Step 3: Identifying suitable risk control measures

A methodical analysis stage will enable failings and possible solutions to be identified. Risk

control measures that were not in place, or were in place but failed should be identified.

Suitable risk control measures, which if they had been in place would have prevented the accident, can be proposed.

These solutions need to be systematically evaluated to ensure that the best options are considered for implementation. If several risk control measures are necessary they should be prioritised in the action plan.

It is useful to consider at this stage whether a similar accident could occur elsewhere in the organisation and might be prevented by the implementation of the recommendations.

Step 4: The action plan and implementation

At this stage in the investigation senior management with the authority to make decisions and act on the recommendations of the investigation team, should be involved.

An action plan for the implementation of additional risk control measures is the necessary outcome of the accident investigation. The action plan should have SMART objectives, *i.e.* Specific, Measurable, Agreed, and Realistic, with Timescale.

Recording and reporting incidents

Reporting incidents

[Article 11 of ILO Occupational Safety and Health Convention C155](#) requires the establishment and application of procedures for the notification of occupational accidents and diseases, by employers and, when appropriate, insurance institutions and others directly concerned, and the production of annual statistics on occupational accidents and diseases.

[The ILO Code of Practice](#) defines the following events as suitable for notification and/or reporting to the enforcing authorities:

Occupational accident: An occurrence arising out of or in the course of work which results in:

- a. fatal occupational injury
- b. non-fatal occupational injury.

Occupational disease: A disease contracted as a result of an exposure to risk factors arising from work activity. Annexe B categorises these as:

1. Diseases caused by agents
 - Chemical agents
 - Physical agents
 - Biological agents
2. Diseases by target organ systems
 - Occupational respiratory diseases
 - Occupational skin diseases
 - Occupational musculoskeletal disorders
3. Occupational cancer
4. Others

Commuting accident: An accident occurring on the direct way between the place of work and:

Note:

Notification is by the quickest practicable means (generally the telephone) to facilitate an urgent investigation by the enforcing authority

Reporting on a prescribed form within a reasonable time frame accommodates statistical analysis

- a. the worker's principal or secondary residence
- b. the place where the worker usually takes his or her meals
- c. the place where the worker usually receives his or her remuneration

... which results in death or personal injury involving loss of working time.

Dangerous occurrence: Readily identifiable event as defined under national laws and regulations, with potential to cause an injury or disease to persons at work or the public.

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR) in the UK, considers dangerous occurrences to be those incidents which have a high potential to cause death or serious injury (even though they do not), but which happen relatively infrequently. Examples include:

- collapse/overturning/failure of any load-bearing part of any lift, hoist, crane, mobile elevated work platform (MEWP) etc.
- the failure of any closed vessel or associated pipe-work in which the internal pressure was above or below atmospheric pressure
- Any plant or equipment unintentionally coming into:
 - contact with an uninsulated overhead electric line in which the voltage exceeds 200 volts
 - close proximity with such an electric line, such that it causes an electrical discharge
- any incident in which breathing apparatus malfunctions while in use, or during testing immediately prior to use
- the complete or partial collapse of any scaffold which is more than 5 metres tall
- any unintended collision of a train with any other train or vehicle.

Organisational requirements for reporting and recording incidents

In addition to the statutory requirements for reporting accidents and dangerous occurrences many organisations have requirements for reporting additional categories of incident such as:

- lost time accidents
- first aid treatment accidents
- near misses.

As discussed in section 4.2, analysis of these events to determine root causes can lead to improvements in management and a reduction in the likelihood of similar events giving rise to more serious consequences in the future.

Features of effective reporting systems

An effective reporting system that encourages workers to report accidents and near-misses will:

- have clear definitions of accidents and incidents that are to be reported
- have clear reporting lines showing who is responsible for completing the paperwork
- have simple forms to be completed
- allow employees time to report
- be developed following consultation with employees
- be implemented after employees have received suitable information and training
- be evaluated after an introductory period
- result in timely action to address any issues of concern
- feedback to those reporting on any actions taken
- ensure there are no disincentives to report (bonuses for having no incidents etc.).

Record keeping

A suitable record should be kept of any reportable injury, disease or dangerous occurrence.

The record should include:

- the date and method of reporting
- the date, time and place of the event
- personal details of those involved
- a brief description of the nature of the event or disease.

The record can be kept in any suitable format, *e.g.*

- A file of hard copies of report forms
- Electronic records on a computer
- Accident Book entries.

The reasons for keeping effective records include:

- to comply with legislative requirements
- to assist with the investigation of an accident with the aim of preventing accidents of a similar type

- to monitor accident/ill health trends
- to provide a useful aid in the review of risk assessments and to inform control strategies
- to assist in the consideration of any civil claims that may arise
- to provide information for the costing of accidents and ill-health
- to provide a useful measure in monitoring health and safety performance within an organisation.

Analysing and reporting of accident data

Learning lessons from individual accidents and incidents is invaluable in improving preventive and protective control measures.

Analysis of a group of accident reports can aid understanding of accident causes, priorities and trends. There are a range of factors that may provide useful information upon analysis, these relate to the accident and injury, the injured person, and the time and location of the accident.

Analysis of Accident and Injury

Types of accident classes detailed in Annexe H of the ILO Code of Practice include:

1. Falls of persons
 - Falls of persons from heights (trees, buildings, scaffolds, ladders, machines, vehicles) and into depths (wells, ditches, excavations, holes in the ground)
 - Falls of persons on the same level
2. Struck by falling objects
 - Slides and cave-ins (earth, rocks, stones, snow)
 - Collapse (buildings, walls, scaffolds, ladders, piles of goods)
 - Struck by falling objects during handling
 - Struck by falling objects, not elsewhere classified
3. Stepping on, striking against or struck by objects excluding falling objects
 - Stepping on objects
 - Striking against stationary objects (except impacts due to a previous fall)
 - Striking against moving objects
 - Struck by moving objects (including flying fragments and particles) excluding falling objects

4. Caught in or between objects
 - Caught in an object
 - Caught between a stationary object and a moving object
 - Caught between moving objects (except flying or falling objects)
5. Overexertion or strenuous movements
 - Overexertion in lifting objects
 - Overexertion in pushing or pulling objects
 - Overexertion in handling or throwing objects
 - Strenuous movements
6. Exposure to or contact with extreme temperatures
 - Exposure to heat (atmosphere or environment)
 - Exposure to cold (atmosphere or environment)
 - Contact with hot substances or objects
 - Contact with very cold substances or objects
7. Exposure to or contact with electric current
8. Exposure to or contact with harmful substances or radiations
 - Contact by inhalation, ingestion or absorption of harmful substances
 - Exposure to ionising radiations
 - Exposure to radiations other than ionising radiations
9. Other types of accident, not elsewhere classified
 - Other types of accident, not elsewhere classified
 - Accidents not classified for lack of sufficient data

Types of injury detailed in Annexe HF of the ILO Code of Practice include:

- fractures
- dislocations
- sprains and strains
- other wounds
- superficial injuries
- contusions and crushings
- burns
- acute poisonings
- effects of weather exposure, and related conditions
- asphyxia
- effects of electric
- effects of radiations
- multiple injuries of different nature
- other and unspecified injuries.

Analysis by site of injury may also be useful, e.g. hand or foot, left or right side etc. Annexe G of the ILO Code of Practice suggests the following classifications.

1. Head

Including skull, brain, scalp, eye, ear, mouth, nose, face and other locations.

2. Neck (including throat and cervical vertebrae)

3. Trunk

Including back (spinal column and adjoining muscles, spinal cord), chest (ribs, sternum, internal organs of the chest), abdomen (including internal organs), pelvis, and unspecified location(s).

4. Upper limb

Including shoulder (including clavicle and shoulder blade), upper arm, elbow, forearm, wrist, hand (except fingers alone), fingers, and unspecified location(s).

5. Lower limb

Including hip, thigh (upper leg), knee, lower leg, ankle, foot (except toes alone), toes, and unspecified location(s).

6. Multiple locations

Including head and trunk, head and one or more limbs, trunk and one or more limbs, one upper limb and one lower limb or more than two limbs, and other multiple locations.

7. General injuries

Including circulatory system in general, respiratory system in general, digestive system in general, nervous system in general, and other general injuries.

4.3 Health and safety auditing

Organisations are often subject to audit, e.g. for finance, environment and quality. The process can also be applied to health and safety. In general safety auditing is recommended for larger more complex organisations with a significant hazard burden. Smaller, lower risk organisations are less likely to see the benefits.

ISO 45001:2018 defines an audit as:

“systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled”

Auditing supports monitoring by providing managers with information on how effectively plans and the components of the health and safety management system are being implemented.

Auditing is an essential element of a health and safety management system, but is no substitute for day to day control. Health and safety, like finance, cannot be managed by audits alone.

The aims of auditing a health and safety management system should be to establish that:

- appropriate management arrangements are in place and any failings or gaps in the management system are identified
- adequate risk control systems exist, are implemented, and consistent with the hazard profile of the organisation
- appropriate workplace precautions are in place.
- there is organisational assurance that health and safety is being managed and learning is taking place.

Various methods can be used to achieve this including product/services audits, process audits and system audits and some components of the system do not need to be audited as often as others.

For instance an audit of the management arrangements and the overall capability of an organisation to manage health and safety need not be done as often as an audit to verify the implementation of risk control systems (RCSs).

Critical RCSs which control major hazards will require most frequent attention and may require specialist technical input.

A team approach, involving managers, safety representatives and employees is an effective way to widen involvement and co-operation in devising and implementing the programme.

Auditing management arrangements

A safety management system audit is designed to assess the key elements of health and safety management. This is illustrated in Figure 4.7 against HSG65.



Audit of the:

- Plan** • intent scope and adequacy of the safety policy
- Do** • adequacy of arrangements for: consulting and communicating, achieving competence and securing control
 - adequacy of arrangements for hazard identification, risk assessment and the management of preventive and protective measures
- Check** • adequacy, relevance and design of measuring systems
- Act** • ability to learn from experience, improve performance, develop the system, and respond to change.

Figure 4.7: Audit of Safety Management System (HSG 65 3rd edition 2013)

Principles of auditing

An effective and reliable audit requires adherence to key principles relating to auditors and the audit process as shown in Table 4.3.

| Auditor | Audit process |
|--|---|
| <ul style="list-style-type: none">• Ethical conduct: Trust, integrity, confidentiality and discretion are essential.• Fair presentation: Truthful and accurate reporting.• Due professional care: Competent application of diligence and judgement. | <ul style="list-style-type: none">• Independence: An impartial objective audit must be free from bias and conflict of interest.• Evidence-based approach: appropriate sampling of the information available and verifiable |

Table 4.3: Principles of auditing

Effective auditing systems display the following characteristics:

- they apply a documented methodology to measure performance against pre-determined targets
- they are carried out by a competent individual or team (of managers, specialists, operational staff, safety representatives, or external consultants) who have received specific training to do the work
- the auditor(s) is independent of the area or section being audited
- they consider a range of sources of information
- lead to recommendations for improvements in performance.

Planning an audit

The planning stage of an audit involves:

- selecting a competent audit team, independent of the area to be audited
- determining the objectives and scope of the audit
- developing audit questionnaires and checklists and agreeing on relevant guidance and standards to be applied
- allocating resources
- agreeing timescales and deciding on methods of feedback.

Senior managers have an important role to play to ensure that resources are made available to enable the audit process runs smoothly. This includes:

- leadership of the process, convincing all participants of the importance of the exercise
- provision of sufficient resources including time for both auditees and auditors to deliver a good audit.

Senior managers may also be involved in the audit process, cross-auditing parts of the organisation they have no direct responsibility for. They also have a significant role to play upon receipt of the audit findings, in ensuring that any shortcomings are addressed in a timely manner.

The audit process

The auditing process involves:

- collecting information about the health and safety management system
- making judgements about its adequacy and performance.

Collecting information

Collecting information about health and safety management requires decisions on the level and detail of an audit. All audits involve sampling and a key question is always: *'How much sampling needs to be done to make a reliable assessment?'*

The nature and complexity of an audit will therefore vary according to:

- its objectives and scope
- the size, sophistication and complexity of the organisation
- the maturity of the existing health and safety management system.

Auditors have three information sources on which to draw:

- *interviewing individuals*, to gain information about the operation of the health and safety management system and the perceptions, knowledge, understanding, management practices, skill and competence of managers and employees at various levels in the organisation
- *examining documents*, assessing records, RCSs, performance standards, procedures and instructions for completeness, accuracy and reliability together with the implications for competence and understanding
- *visual observation* of physical conditions and work activities to examine compliance with legal requirements and verify the implementation and effectiveness of workplace precautions and RCSs.

These information sources are usually used in the following sequence:

Preparation

- discuss and agree the objectives, timescales and scope of the audit with relevant managers and employee representatives
- collect and review documentation
- prepare and agree audit plan.

On-site

- interview people
- examine documents
- observe activity.

Conclusion

- assemble and evaluate evidence
- write the audit report.

Making judgements

The adequacy of a health and safety management system is judged by making a comparison between what is found against a relevant ‘*standard*’ or benchmark. If there are no clear standards, the assessment process will be unreliable.

Legal standards, HSE guidance and applicable industry standards should be used to inform audit judgements.

Auditing should not be perceived as a fault-finding activity but as an integral part of the health and safety management system. Auditing should recognise positive achievements as well as areas for improvement.

Scoring systems may be used to help with comparing audit scores over time or between sites, but there is no evidence to suggest that quantifying the results is better than a qualitative approach.

Scoring systems can introduce difficulties, *e.g.* managers focussing on scoring points rather than improving the health and safety management system.

Audit controls

Audits should be conducted by competent people independent of the area or activities being audited.

This can be achieved by using staff from different sections, departments or sites to audit their colleagues or by using external consultants.

Internal or external audits?

Auditing by external third party auditors is necessary for certification to ISO 45001 or verification of ongoing maintenance of that standard. Other than that the key requirements for auditors are that they are competent and independent of the area or activity being audited. This could be achieved by using internal staff from other departments or sites, or by contracting the audit to a third party organisation. The pros and cons of internal and external auditors are summarised in Table 4.4.

| | Advantages | Disadvantages |
|------------------|--|---|
| Internal auditor | <ul style="list-style-type: none"> • Familiarity with the workplace, its tasks and processes • Awareness of practicable standards for the industry • Able to see improvements or a deterioration from the last audit • Familiarity with the workforce and individual's qualities and attitude • Less costly and easier to arrange audit | <ul style="list-style-type: none"> • May not have recognised auditing skills • May not be up to date with legal requirements • Less likely to be aware of best practice in other organisations • Subject to pressure from management and the workforce • Have time constraints imposed upon them |
| External auditor | <ul style="list-style-type: none"> • Likely to possess auditing skills and credibility. • Less inhibited in criticising members of management or the workforce. • Likely to be up to date with legal requirements and best practice in other companies. • View the organisation's performance with a fresh pair of eyes. | <ul style="list-style-type: none"> • Unfamiliar with the workplace, tasks and processes. • Not familiar with the workforce and their attitudes to health and safety. May have difficulty in obtaining cooperation. • Unfamiliar with the industry and seek unrealistic standards. • May be more costly than an internal staff member. |

Table 4.4: Advantages and disadvantages of internal and external auditors

Non-conformity

Nonconformity is a non-fulfilment of a requirement. It can be any deviation from:

- relevant work standards, practices, procedures, legal requirements etc.
- health and safety management system requirements.

The health and safety management system will require procedures for investigating actual and potential nonconformity to determine the root causes.

Corrective actions remedy actual nonconformities whereas preventive actions eliminate root causes to prevent the occurrence of a potential nonconformity or undesirable situations.

The differences between audits and inspections

Audits and inspections are both useful proactive monitoring techniques that are intended to have quite different applications and benefits. Many organisations do however use the terms interchangeably and thus cause confusion. The key differences are summarised in Table 4.5.

| Audits | Inspections |
|---|--|
| Focus on management system | Focus on workplace, work equipment or work activities |
| Has a visual/observational aspect but also gathers evidence from documentation and staff interviews | Visual/observational |
| Evaluating the efficiency and effectiveness of the management system components | Looking for unsafe acts and conditions (inadequately controlled hazards) |
| Auditors are independent of local line management | Inspections may well involve local managers |

Table 4.5: Key differences between audits and inspections

4.4 Review of health and safety performance

Reviewing is the process of making judgements about the adequacy of performance and taking decisions about the nature and timing of the actions necessary to remedy deficiencies.

Reviews are essential to determine:

- the level of legal compliance within the organisation
- the adequacy and effectiveness of existing control measures
- the damage caused where control is lacking
- priorities for action to address any shortfalls in legal compliance or good risk management
- the ongoing effectiveness of the system as a whole (including any associated issues regarding certification to ISO 45001).

The main sources of information come from monitoring and auditing activities. Reviews should also consider the impact of external information such as new legislation or changes in good practice. Examples of information to be considered during a health and safety performance review include:

- evaluations of compliance with applicable legal and organisational requirements
- new developments in legislation or best practice
- active monitoring data, including:
 - inspections, surveys, tours and sampling
 - audits - corrective and preventive actions
 - monitoring data/records/reports
 - quality assurance reports
- reactive monitoring data including:
 - accident and incident data
 - absences and sickness data
- external communications and complaints
- results of participation and consultation
- progress against action plans/objectives met
- actions from previous management reviews
- assessing opportunities for improvement and the need for change

All available information should be reviewed to determine the need to redesign or amend any parts of the health and safety management system or to change the systems overall direction or objectives.

Suitable performance standards should be established to identify the responsibilities, timing and systems involved.

Feeding information on success and failure back into the system is an essential element in motivating employees to maintain and improve performance.

Reviews will need to examine:

- the operation and maintenance of the system as designed
- the design, development and installation of the health and safety management system in changing circumstances.

Reviewing should be a continuous process undertaken at different levels within the organisation.

Key performance indicators for reviewing overall performance can include:

- assessment of the degree of compliance with health and safety system requirements
- identification of areas where the health and safety system is absent or inadequate (those areas where further action is necessary to develop the total health and safety management system)
- assessment of the achievement of specific objectives and plans
- accident, ill health and incident data accompanied by analysis of both the immediate and underlying causes, trends and common features.

Organisations may also '*benchmark*' their performance against other organisations by comparing:

- accident rates with those organisations in the same industry which use similar business processes and experience similar risks
- management practices and techniques with other organisations in any industry to provide a different perspective and new insights on health and safety management systems.

As part of a demonstration of corporate responsibility, more organisations are mentioning health and safety performance in their published *annual reports*.

Health and safety in annual reports

Although there are legal requirements to monitor and review health and safety performance there is no legal requirement to publish the information in annual reports.

Previous HSE guidance recommends that as a minimum the annual report should include the following information:

- the broad context of the health and safety policy
- the significant risks faced by employees and others and the strategies and systems in place to control them
- the health and safety goals, as per the safety policy
- report on progress towards achieving health and safety goals in the reporting period, and on health and safety plans for the forthcoming period
- the arrangements for consulting employees and involving safety representatives.
- In addition, the report should provide the following data on health and safety performance for the reporting period:
 - the number of RIDDOR reportable injuries, illnesses and dangerous occurrences (presented as the rate of injuries per 100 000 employees)
 - brief details of the circumstances of any fatalities, and of the actions taken to prevent any recurrence
 - the number of cases of illness, disability or health problems that are caused or made worse by work
 - the total number of employee days lost due to all causes of occupational injury and illness
 - the number of enforcement notices served on the company and detail of the requirements
 - the number and nature of convictions for health and safety offences, their outcome in terms of penalty and costs, and what has been done to prevent a recurrence
 - the total cost to the company of the occupational injuries and illnesses suffered by staff in the reporting period.

Companies are encouraged to go beyond the minimum standards and include additional information such as the outcome of health and safety audits, and on the extent and effectiveness of health and safety training provided to staff.

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