OLD BUCKENHAM HALL

Appendix 3: Investigation Guidance

The table below will assist you in determining the level of investigation which is appropriate for the adverse event. Remember you must consider the worst potential consequences of the adverse event (eg a scaffold collapse may not have caused any injuries, but had the potential to cause major or fatal injuries).

Likelihood of recurrence	Potential worst consequence of adverse event			
	Minor	Serious	Major	Fatal
Certain				
Likely				
Possible				
Unlikely				
Rare				

(The definitions of 'consequence' and 'likelihood' are set out in the section on'Understanding the language of investigation')

Risk		Minimal		Low		Medium		High
Investigation level		Minimallevel		Low level		Medium level		High level

- In a minimal level investigation, the relevant supervisor will look into the circumstances of the event and try to learn any lessons which will prevent future occurrences.
- A low level investigation will involve a short investigation by the relevant supervisor or line manager into the circumstances and immediate, underlyingand root causes of the adverse event, to try to prevent a recurrence and to learn any general lessons.
- A medium level investigation will involve a more detailed investigation by the relevant supervisor or line manager, the health and safety adviser and employee representatives and will look for the immediate, underlying and root causes.
- A high level investigation will involve a team-based investigation, involving supervisors or line managers, health and safety advisers and employee representatives. It will be carried out under the supervision of senior management or directors and will look for the immediate, underlying, and root causes.

The investigation

The four steps include a series of numbered questions. These set out in detail the information that should be entered onto the adverse event investigation form. The question numbers correspond to those on the form.

Step one Gathering the information

Find out what happened and what conditions and actions influenced the adverse event. Begin straight away, or as soon as practicable.

It is important to capture information as soon as possible. This stops it being corrupted, e.g. items moved, guards replaced etc. If necessary, work must stop and unauthorised access be prevented.
Talk to everyone who was close by when the adverse event happened, especially those who saw what happened or know anything about the conditions that led to it. The amount of time and effort spent on information gathering should be proportionate to the level of investigation. Collect all available and relevant information. That includes opinions, experiences, observations, sketches, measurements, photographs, check sheets, permits-to-work and details of the environmental conditions at the time etc. This information can be recorded initially in note form, with a formal report being completed later. These notes should be kept at least until the investigation is complete.

Where, when and who?

1 Where and when did the adverse event happen?

2 Who was injured/suffered ill health or was otherwise involved with the adverse event?

Gathering detailed information: How and what?

Discovering what happened can involve quite a bit of detective work. Be precise and establish the facts as best you can. There may be a lack of information and many uncertainties, but you must keep an open mind and consider everything that might have contributed to the adverse event. Hard work now will pay off later in the investigation.

Many important things may emerge at this stage of the process, but not all of them will be directly related to the adverse event. Some of the information gathered may appear to have no direct bearing on the event under investigation. However, this information may provide you with a greater insight into the hazards and risks in your workplace. This may enable you to make your workplace safer in ways you may not have previously considered.

2 How did the adverse event happen? Note any equipment involved.

Describe the chain of events leading up to, and immediately after, the adverse event. Very often, a number of chance occurrences and coincidences combine to create the circumstances in which an adverse event can happen. All these factors should be recorded here in chronological order, if possible. Work out the chain of events by talking to the injured person, eye witnesses, line managers, health and safety representatives and fellow workers to find out what happened and who did what. In particular, note the position of those injured both immediately before and after the adverse event. Be objective and, as far as possible, avoid apportioning guilt, assigning responsibility or making snap judgements on the probable causes.

Plant and equipment that had a direct bearing on the adverse event must be identified clearly. This information can usually be obtained from a nameplate attached to the equipment. Note all the details available, the manufacturer, model type, model number, machine number and year of manufacture and any modifications made to the equipment. Note the position of the machinery controls immediately after the adverse event. This information may help you to spot trends and identify risk control measures. You should consider approaching the supplier if the same machine has been implicated in a number of adverse events. Be precise. Shop floor process and layout changes are a regular occurrence. Unless you precisely identify plant and equipment, you will not detect, e.g. that a machine or particular piece of equipment has been moved around and caused injuries on separate occasions, in different locations.

3 What activities were being carried out at the time?

The work that was being done just before the adverse event happened can often cast light on the conditions and circumstances that caused something to go wrong. Provide a good description, including all the relevant details, e.g. the surroundings,the equipment/materials being used, the number of employees engaged in the various activities, the way they were positioned and any details about the way they were behaving etc.

4 Was there anything unusual or different about the working conditions?

Adverse events often happen when something is different. When faced with a new situation, employees may find it difficult to adapt, particularly if the sources of danger are unknown to them, or if they have not been adequately prepared to deal with the new situation. If working conditions or processes were significantly different to normal, why was this?

Describe what was new or different in the situation. Was there a safe working method in place for this situation, were operatives aware of it, and was it being followed? If not, why not? Learning how people deal with unfamiliar situations will enable similar situations to be better handled in the future.

Was the way the changes, temporary or otherwise, were introduced a factor?
Were the workers and supervisors aware that things were different? Were workers and supervisors sufficiently trained/experienced to adapt to changing circumstances?

5 Were there adequate safe working procedures and were they followed?

Adverse events often happen when there are no safe working procedures or where procedures are inadequate or are not followed. Comments such as we've been doing it that way for years and nothing has ever gone wrong before…' or '…he has been working on that machine for years and knows what to do…' often lead to the injured person getting the blame, irrespective of what part procedures, training and supervision – or the lack of them – had to play in the adverse event. What was it about normal practice that proved inadequate? Was a safe working method in place and being followed? If not, why not? Was there adequate supervision and were the supervisors themselves sufficiently trained and experienced? Again, it is important to pose these questions without attempting to apportion blame, assign responsibility or stipulate cause.

6 What injuries or ill health effects, if any, were caused?

It is important to note which parts of the body have been injured and the nature of the injury - ie bruising, crushing, a burn, a cut, a broken bone etc. Be as precise as you are able. If the site of the injury is the right upper arm, midway between the elbow and the shoulder joint, say so. Precise descriptions will enable you to spot trends and take prompt remedial action. For example it could be that what appears to be a safe piece of equipment, due to the standard of its guarding, is actually causing a number of inadvertent cut injuries due to the sharp edges on the guards themselves.

Facts such as whether the injured person was given first aid or taken to hospital (by ambulance, a colleague etc.) should also be recorded here.

7 If there was an injury, how did it occur and what caused it?

Where an accident is relatively straight forward, it may seem artificial to differentiate between the accident itself (question 3) and the mode of injury, but when the accident is more complicated the differences between the two aspects become clearer and therefore precise descriptions are vital.

The mode of injury concerns two different aspects:

- the harmful object (known as the 'agent') that inflicted the injury; and
- the way in which the injury was actually sustained.

The object that inflicted the injury may be a hand-held tool like a knife, or a chemical, a machine, or a vehicle etc. The way in which it happened might, e.g. be that the employee cut themselves or spilt chemicals on their skin.

8 Was the risk known? If so, why wasn't it controlled? If not, why not?

You need to find out whether the source of the danger and its potential consequences were known, and whether this information was communicated to those who needed to know. You should note what is said and who said it, so that

potential gaps in the communication flow may be identified and remedied. The aim is to find out why the sources of danger may have been ignored, not fully appreciated or not understood. Remember you are investigating the processes and systems, not the person.

The existence of a written risk assessment for the process or task that led to the adverse event will help to reveal what was known of the associated risks. A judgement can be made as to whether the risk assessment was 'suitable and sufficient', as required by law[5] and whether the risk control measures identified as being necessary were ever adequately put in place.

9 Did the organisation and arrangement of the work influence the adverse event?

The organisational arrangement sets the framework within which the work is done. Here are some examples; there are many more:

- standards of supervision and on-site monitoring of working practices may be less than adequate;
- lack of skills or knowledge may mean that nobody intervenes in the event of procedural errors;
- inappropriate working procedures may mean certain steps in the procedures are omitted, because they are too difficult and time-consuming;
- lack of planning may mean that some tasks are not done, are done too late or are done in the wrong order;
- employees' actions and priorities may be a consequence of the way in which they are paid or otherwise rewarded;
- high production targets and piecework may result in safety measures being degraded and employees working at too fast a pace.

9 Was maintenance and cleaning sufficient? If not, explain why not.

Lack of maintenance and poor housekeeping are common causes of adverse events. Was the state of repair and condition of the workplace, plant and equipment such that they contributed to or caused the adverse event? Were the brakes on the forklift truck in good working order? Were spills dealt with immediately? Was the site so cluttered and untidy that it created a slipping or tripping hazard? Was there a programme of preventative maintenance? What are the instructions concerning good housekeeping in the workplace? You should observe the location of the adverse event as soon as possible and judge whether the general condition or state of repair of the premises, plant or equipment was adequate. Those working in the area, together with witnesses, and any injured parties, should also be asked for their opinion. Working in the area, they will have a good idea of what is acceptable and whether conditions had deteriorated over time.

Consider the role the following factors may play:

- a badly maintained machine or tool may mean an employee is exposed to excessive vibration or noise and has to use increased force, or tamper with the machine to get the work done;
- a noisy environment may prevent employees hearing instructions correctly as

well as being a possible cause of noise-induced hearing loss;
- uneven floors may make movement around the workplace, especially vehicle movements, hazardous;
- badly maintained lighting may make carrying out the task more difficult;
- poorly stored materials on the floor in and around the work area will increase the risk of tripping;
- ice, dirt and other contaminants on stairs or walkways make it easier to slips and fall;
- tools not in immediate use should be stored appropriately and not left lying around the work area.

10 Were the people involved competent and suitable?

Training should provide workers with the necessary knowledge, skills and hands-on work experience to carry out their work efficiently and safely. The fact that someone has been doing the same job for a long time does not necessarily mean that they have the necessary skills or experience to do it safely. This is particularly the case when the normal routine is changed, when any lack of understanding can become apparent. There is no substitute for adequate health and safety training. Some of the problems that might arise follow:

- a lack of instruction and training may mean that tasks are not done properly;
- misunderstandings, which arise more easily when employees lack understanding of the usual routines and procedures in the organisation;
- a lack of respect for the risks involved, due to ignorance of the potential consequences;
- problems due to the immaturity, inexperience and lack of awareness of existing or potential risks among young people (under18).You must assess the risks to young people before they start work;
- poor handling of dangerous materials or tools, due to employees not being properly informed about how things should be done correctly.

People should also be matched to their work in terms of health, strength, mental ability and physical stature.

11 Did the workplace layout influence the adverse event?

The physical layout and surroundings of the workplace can affect health and safety. Injuries may be caused by sharp table edges. Hazardous or highly inflammable fumes may be produced in areas where operatives work or where there are naked lights. Or, the workplace may be organised in such a way that there is not enough circulation space. Or, it may be impossible to see or hear warning signals, e.g. during fork lift truck movements.

Employees should be able to see the whole of their work area and see what their immediate colleagues are doing. The workplace should be organised in such a way that safe practices are encouraged. In other words, workplace arrangements should discourage employees from running risks, e.g. providing a clear walkway around machinery will discourage people from crawling under or climbing over it.

12 Did the nature or shape of the materials influence the adverse event?

As well as being intrinsically hazardous, materials can pose a hazard simply by their design, weight, quality or packaging, e.g. heavy and awkward materials, materials with sharp edges, splinters, poisonous chemicals etc.

The choice of materials also influences work processes, e.g. a particularly hazardous material may be required. Poor quality may also result in materials or equipment failing during normal processing, causing malfunctions and accidents.

14 Did difficulties using the plant and equipment influence the adverse event?

Plant and equipment includes all the machinery, plant and tools used to organise and carry out the work. All of these items should be designed to suit the people using them. This is referred to as ergonomic design, where the focus is on the individual as well as the work task the item is specifically designed to carry out. If the equipment meets the needs of the individual user, it is more likely to be used as it is intended – i.e. safely. Consider user instructions here. A machine that requires its operator to follow a complicated user manual is a source of risk in itself.

13 Was the safety equipment sufficient?

You should satisfy yourself that any safety equipment and safety procedures are both sufficient and current for all conditions in which work takes place, including the provision and use of any extra equipment needed for employees' safety. For example:

- extra technical safety equipment at machines;
- power supply isolation equipment and procedures;
- personal protective equipment (PPE);
- building safety systems, e.g. an extract ventilation system.

Make a note of whether the safety equipment was used, whether it was used correctly, whether or not it was in good condition and was working properly etc.

14 Did other conditions influence the adverse event?

'Other conditions' is intended to cover everything else that has not been reported yet, but which might have influenced the adverse event. For example:

- disagreements or misunderstandings between people;
- the weather;
- unauthorised interference in a process or job task;
- defective supplies or equipment;
- deliberate acts, such as trespass or sabotage.

Step two **Analysing the information**

An analysis involves examining all the facts, determining what happened and why. All

the detailed information gathered should be assembled and examined to identify what information is relevant and what information is missing. The information gathering and analysis are actually carried out side by side. As the analysis progresses, further lines of enquiry requiring additional information will develop.

To be thorough and free from bias, the analysis must be carried out in a systematic way, so all the possible causes and consequences of the adverse event are fully considered. A number of formal methods have been developed to aid this approach.[8]

One useful method for organising your information, identifying gaps and beginning the analysis is Events and Causal Factor Analysis (ECFA),[9] which is beyond the scope of this guidance.

The analysis should be conducted with employee or trade union health and safety representatives and other experts or specialists, as appropriate. This team approach can often be highly productive in enabling all the relevant causal factors to emerge.

15 What were the immediate, underlying and root causes?

It is only by identifying all causes, and the root causes in particular, that you can learn from past failures and prevent future repetitions.

The causes of adverse events often relate to one another in a complex way, sometimes only influencing events and at other times having an overwhelming impact, due to their timing or the way they interact. The analysis must consider all possible causes. Keep an open mind. Do not reject a possible cause until you have given it serious consideration. The emphasis is on a thorough, systematic and objective look at the evidence.

Analysis

There are many methods of analysing the information gathered in an investigation to find the immediate, underlying and root causes and it is for you to choose whichever method suits you best.

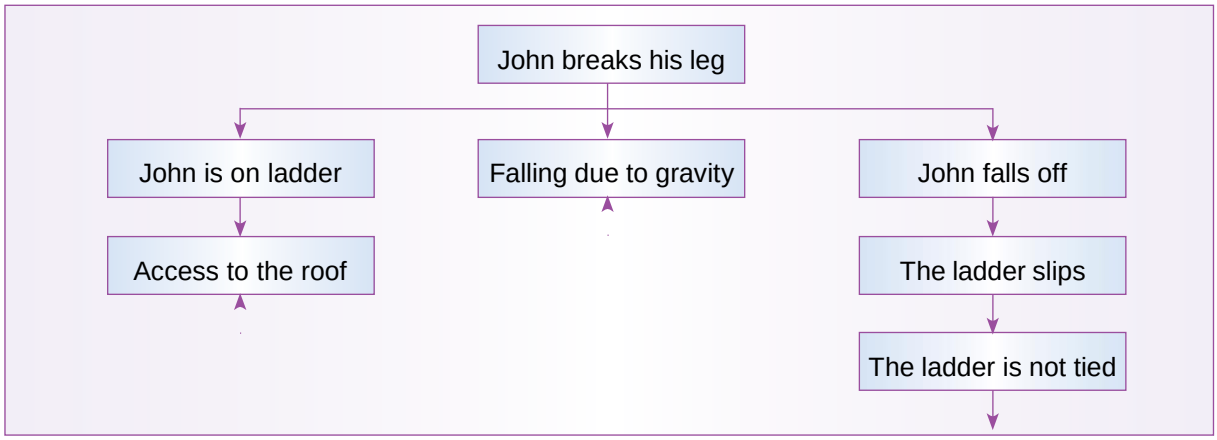

Figure 5

What happened and why?

The first step in understanding what happened and why is to organise the information you have gathered. This guidance uses the simple technique of asking 'Why' over and over, until the answer is no longer meaningful (see Figure 5). The starting point is the 'event', eg John has broken his leg. On the line below, set out the reasons why this happened. This first line should identify:

- the vulnerable person, eg John on a ladder;
- the hazard, eg falling due to gravity;
- the circumstances that brought them together, eg John fell off the ladder.

For each of the reasons identified ask 'Why?' and set down the answers. Continue down the page asking 'Why' until the answers are no longer meaningful.

Do not be concerned at the number of times you ask the question, 'Why?' because by doing so you will arrive at the real causes of the adverse event. Some lines of enquiry will quickly end, e.g. 'Why was the hazard of falling present?' Answer: 'Gravity'.

Having collected the relevant information and determined what happened and why, you can now determine the causes of the adverse event systematically.

Checklist/question analysis of the causes

Using the adverse event analysis work sheets and checklist (in the Adverse Event and Investigation Form), work through the questions about the possible immediate causes of the adverse event (the place, the plant, the people and the process) and identify which are relevant.

Record all the immediate causes identified and the necessary risk control measures.

For each immediate cause, the analysis suggests underlying causes which may have allowed the immediate causes to exist.

Consider the underlying/root cause questions suggested by the immediate causes. Record those that are relevant and note the measures needed to remedy them. The final step of your analysis is to consider the environment in which the organisation and planning of health and safety was carried out.

This 'Management' section of the analysis must be carried out by people within the organisation who have both the overall responsibility for health and safety, and the authority to make changes to the management system. Record the underlying failings in the overall management system (i.e. the root causes of the adverse event)and the remedial action required at management level. The root causes of almost all adverse events are failings at managerial level.

What if 'human failings (errors and violations)'[10] are identified as acontributory factor?

If your investigation concludes that errors or violations contributed to the adverse event, consider carefully how to handle this information.

Not addressing the 'human' factors greatly reduces the value of the investigation. The objective of an investigation is to learn the lessons and to act to prevent recurrences, through suitable risk control measures. You will not be able to do that unless your workforce trusts you enough to co-operate with you.

Laying all the blame on one or more individuals is counter-productive and runs the risk of alienating the workforce and undermining the safety culture, crucial to creating and maintaining a safer working environment.

Speak to those involved and explain how you believe their action(s) contributed to the adverse event. Invite them to explain why they did what they did. This may not only help you better understand the reasons behind the immediate causes of the adverse event, but may offer more pointers to the underlying causes: perhaps the production deadline was short, and removing the guards saved valuable time; maybe the workload is too great for one person etc.

Unless you discover a deliberate and malicious violation or sabotage of workplace safety precautions, it may be counter-productive to take disciplinary action against those involved. Will anyone be open and honest with you the next time an adverse event occurs? What you should aim for is a fair and just system where people are held to account for their behaviour, without being unduly blamed. In any event, your regime of supervision and monitoring of performance should have detected and corrected these unsafe behaviours.

Human failings can be divided into three broad types and the action needed to prevent further failings will depend on which type of human failing is involved. See Figure 6.

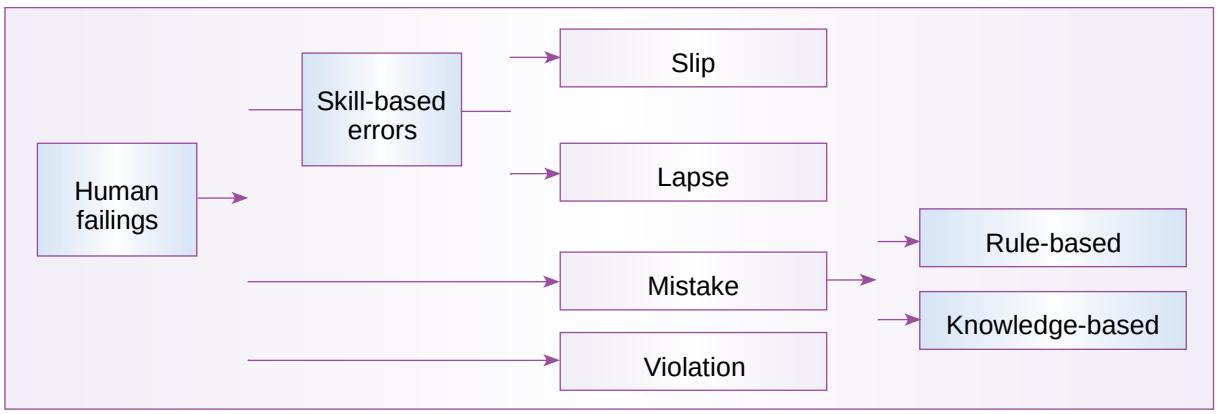

Figure 6

Skill-based errors: a slip or lapse of memory:

- slips happen when a person is carrying out familiar tasks automatically, without thinking, and that person's action is not as planned, e.g. operating the wrong switch on a control panel;
- lapses happen when an action is performed out of sequence or a step in a sequence is missed, e.g. a road tanker driver had completed filling his tanker and was about to disconnect the hose when he was called away to answer the phone. On his return he forgot that he hadn't disconnected the hose and drove off. These types of error can be foreseen and measures can be taken to prevent or reduce their likelihood, e.g. colour coding, a checklist, an interlocketc.

Mistakes: errors of judgement (rule-based or knowledge-based):

- rule-based mistakes happen when a person has a set of rules about what to do in certain situations and applies the wrong rule;
- knowledge-based mistakes happen when a person is faced with an unfamiliar situation for which he or she has no rules, uses his or her knowledge and works from first principles, but comes to a wrong conclusion. For example when the warning light comes on indicating that the cooling system pump is overheating, is there a rule for what to do? If not, do you leave the pump on, turn it off, or shut down the whole unit?

Training, comprehensive safe working procedures and equipment design are most important in preventing mistakes.

Violation (rule breaking):

- deliberate failure to follow the rules, cutting corners to save time or effort, based on the belief that the rules are too restrictive and are not enforced anyway, e.g. operating a circular saw bench with the guard removed.

This type of behaviour can be foreseen. The provision of training, simple practical rules, and routine supervision and monitoring of performance will reduce this type of behaviour.

When considering how to avoid human failings, bear in mind the fact they do not happen in isolation. If human failings are identified as a cause of an adverse event, consider the following factors that can influence human behaviour.

Job factors:

- how much attention is needed for the task (both too little and too much can lead to higher error rates)?
- divided attention or distractions are present;
- inadequate procedures;
- time available.

Human factors:

- physical ability (size and strength);
- competence (knowledge, skill and experience);
- fatigue, stress, morale, alcohol or drugs.

Organisational factors:

- work pressure, long hours;
- availability of sufficient resources;
- quality of supervision;
- management beliefs in health and safety (the safety culture).

Plant and equipment factors:

- how clear and simple to read and understand are the controls?
- is the equipment designed to detect or prevent errors? (For example different-sized connectors are used for oxygen and acetylene bottles to prevent errors in connecting the hoses);
- is the workplace layout user-friendly?

Step three Identifying suitable risk control measures

The methodical approach adopted in the analysis stage will enable failings and possible solutions to be identified. These solutions need to be systematically evaluated and only the optimum solution(s) should be considered for implementation. If several risk control measures are identified, they should be carefully prioritised as a risk control action plan, which sets out what needs to be done, when and by whom. Assign responsibility for this to ensure the timetable for implementation is monitored.

16 What risk control measures are needed/recommended?

Your analysis of the adverse event will have identified a number of risk control measures that either failed or that could have interrupted the chain of events leading to the adverse event, if they had been in place. You should now draw up a list of all the alternative measures to prevent this, or similar, adverse events.

Some of these measures will be more difficult to implement than others, but this must not influence their listing as possible risk control measures. The time to consider these limitations is later when choosing and prioritising which measures to implement.

Evaluate each of the possible risk control measures on the basis of their ability to prevent recurrences and whether or not they can be successfully implemented.

In deciding which risk control measures to recommend and their priority, you should choose measures in the following order, where possible:

- measures which eliminate the risk, e.g. use 'inherently safe' products, such as a water-based product rather than a hydrocarbon-based solvent;
- measures which combat the risk at source, e.g. provision of guarding;
- measures which minimise the risk by relying on human behaviour, e.g. safe working procedures, the use of personal protective equipment.

In general terms, measures that rely on engineering risk control measures are more reliable than those that rely on people.

17 Do similar risks exist elsewhere? If so, what and where?

Having concluded your investigation of the adverse event, consider the wider implications: could the same thing happen elsewhere in the organisation, on this site or at another location? What steps can be taken to avoid this?

Adverse events might not have occurred at other locations yet, but make an evaluation as to whether the risks are the same and the same or similar risk control measures are appropriate.

18 Have similar adverse events happened before? Give details.

If there have been similar adverse events in the past why have they been allowed to happen again? The fact that such adverse events are still occurring should be a spur to ensure that action is taken quickly. You will be particularly open to criticism if you as an organisation ignore a series of similar accidents.

Remember that there is value in investigating near-misses and undesired circumstances: it is often only a matter of luck that such incidents do not result in serious injuries or loss of life.

Step four The action plan and its implementation

19 Which risk control measures should be implemented in the short and long term?

The risk control action plan

At this stage in the investigation, senior management, who have 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 desired outcome of a thorough investigation. The action plan should have SMART objectives, i.e. Specific, Measurable, Agreed, and Realistic, with Timescales.

Deciding where to intervene requires a good knowledge of the organisation and the way it carries out its work. For the risk control measures proposed to be SMART, management, safety professionals, employees and their representatives should all contribute to a constructive discussion on what should be in the action plan.
Not every risk control measure will be implemented, but the ones accorded the

highest priority should be implemented immediately. In deciding your priorities you should be guided by the magnitude of the risk ('risk' is the likelihood and severity of harm). Ask yourself 'What is essential to securing the health and safety of the workforce today?' What cannot be left until another day? How high is the risk to employees if this risk control measure is not implemented immediately? If the risk is high, you should act immediately.

You will, no doubt, be subject to financial constraints, but failing to put in place measures to control serious and imminent risks is totally unacceptable. You must either reduce the risks to an acceptable level, or stop the work.

For those risks that are not high and immediate, the risk control measures should be put into your action plan in order of priority. Each risk control measure should be assigned a timescale and a person made responsible for its implementation.

It is crucial that a specific person, preferably a director, partner or senior manager,is made responsible for ensuring that the action plan as a whole is put into effect.This person doesn't necessarily have to do the work him or herself but he or she should monitor the progress of the risk control action plan.

Progress on the action plan should be regularly reviewed. Any significant departures from the plan should be explained and risk control measure rescheduled, if appropriate. Employees and their representatives should be kept fully informed of the contents of the risk control action plan and progress with its implementation.

20 Which risk assessments and safe working procedures need to be reviewed and updated?

All relevant risk assessments and safe working procedures should be reviewed after an adverse event. The findings of your investigation should indicate areas of your risk assessments that need improving. It is important that you take a step back and ask what the findings of the investigation tell you about your risk assessments in general. Are they really suitable and sufficient?

Failing to review relevant risk assessments after an adverse event could mean that you are contravening the Management of Health and Safety at Work Regulations 1999 regulation 3(3).[5]

21 Have the details of adverse event and the investigation findings been recorded and analysed? Are there any trends or common causes which suggest the need for further investigation? What did the adverse event cost?

In addition to the prompt notification of RIDDOR reportable events to the regulatory authorities you should ensure that you keep your own records of adverse events, their causes and the remedial measures taken. This will enable you to monitor your health and safety performance and detect trends, the common causes of adverse events and so improve your overall understanding and management of risk.

It is also useful to estimate the cost of adverse events to fully appreciate the true cost of accidents and ill health to your business.