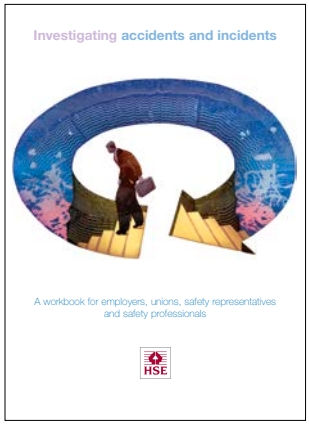
Investigating accidents and incidents

A workbook for employers, unions, safety representatives and safety professionals



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Every year people are killed or injured at work. Over 40 million working days are lost annually through work-related accidents and illnesses.

This workbook gives organisations an opportunity to find out what went wrong. Learning the lessons and taking action may reduce, or even prevent, accidents in the future.

As a step-by-step guide, it will help all organisations, particularly smaller businesses, to carry out their own health and safety investigations. *Investigating accidents and incidents* explains why you need to carry out investigations and takes you through each step of the process:

Step one: Gathering the information
Step two: Analysing the information
Step three: Identifying risk control measures
Step four: The action plan and its implementation

Contents

Reducing risk and protecting people

Recent figures show that an average of 250 employees and self-employed people are killed each year as a result of accidents in the workplace.[1] A further 150 000 sustain major injuries or injuries that mean they are absent from work for more than three days. Over 2.3 million cases of ill health are caused or made worse by work.[2]

According to the Labour Force Survey,[3] over 40 million working days are lost through work-related injuries and ill health, at a cost to business of £2.5 billion.[4]

"If you think safety is expensive, try an accident" *Chairman of Easy Group*

Clearly, there are good financial reasons for reducing accidents and ill health. Costings show that for every £1 a business spends on insurance, it can be losing between £8 and £36 in uninsured costs.[4]

The same accidents happen again and again, causing suffering and distress to an ever-widening circle of workers and their families. The investigation and analysis of work-related accidents and incidents forms an essential part of managing health and safety. However, *learning* the lessons from what you uncover is at the heart of preventing accidents and incidents. Identify what is wrong and take positive steps to put it right. This guide will show you how.

Carrying out your own health and safety investigations will provide you with a deeper understanding of the risks associated with your work activities. Blaming individuals is ultimately fruitless and sustains the myth that accidents and cases of ill health are unavoidable when the opposite is true. Well thought-out risk control measures, combined with adequate supervision, monitoring and effective management (ie your risk management system) will ensure that your work activities are safe. Health and safety investigations are an important tool in developing and refining your risk management system.

An effective investigation requires a methodical, structured approach to information gathering, collation and analysis. The findings of the investigation will form the basis of an action plan to prevent the accident or incident from happening again and for improving your overall management of risk. Your findings will also point to areas of your risk assessments that need to be reviewed. This link with risk assessment(s) is a legal duty.[5]

This guide will help you to adopt a systematic approach to determining why an accident or incident has occurred and the steps you need to take to make sure it does not happen again.

Understanding the language of investigation

Figure 1 Accident

Figure 2 Near miss

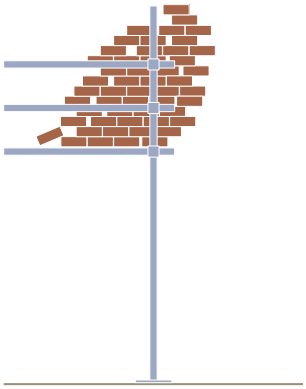


Figure 3 Undesired circumstance

Certain key words and phrases will be used regularly throughout this guide.

'Adverse event' includes:

- **accident:** an event that results in injury or ill health;
- **incident:**
  - **near miss:** an event that, while not causing harm, has the potential to cause injury or ill health. (In this guidance, the term near miss will be taken to include dangerous occurrences);
  - **undesired circumstance:** a set of conditions or circumstances that have the potential to cause injury or ill health, eg untrained nurses handling heavy patients.

Dangerous occurrence: one of a number of specific, reportable adverse events, as defined in the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR).

Hazard: the potential to cause harm, including ill health and injury; damage to property, plant, products or the environment, production losses or increased liabilities.

Immediate cause: the most obvious reason why an adverse event happens, eg the guard is missing; the employee slips etc. There may be several immediate causes identified in any one adverse event.

Consequence:

fatal: work-related death;

major injury/ill health: (as defined in RIDDOR, Schedule 1), including fractures (other than fingers or toes), amputations, loss of sight, a burn or penetrating injury to the eye, any injury or acute illness resulting in unconsciousness, requiring resuscitation or requiring admittance to hospital for more than 24 hours;

serious injury/ill health: where the person affected is unfit to carry out his or her normal work for more than three consecutive days;

minor injury: all other injuries, where the injured person is unfit for his or her normal work for less than three days;

damage only: damage to property, equipment, the environment or production losses. (This guidance only deals with events that have the potential to cause harm to people.)

Likelihood that an adverse event will happen again:

certain: it will happen again and soon;
likely: it will reoccur, but not as an everyday event;
possible: it may occur from time to time;
unlikely: it is not expected to happen again in the foreseeable future;
rare: so unlikely that it is not expected to happen again.

Risk: The level of risk is determined from a combination of the likelihood of a specific undesirable event occurring and the severity of the consequences (ie how often is it likely to happen, how many people could be affected and how bad would the likely injuries or ill health effects be?)

Risk control measures: are the workplace precautions put in place to reduce the risk to a tolerable level?

Root cause: an initiating event or failing from which all other causes or failings spring. Root causes are generally management, planning or organisational failings.

Underlying cause: the less obvious 'system' or 'organisational' reason for an adverse event happening, eg pre-start-up machinery checks are not carried out by supervisors; the hazard has not been adequately considered via a suitable and sufficient risk assessment; production pressures are too great etc.

The causes of adverse events

Adverse events have many causes. What may appear to be bad luck (being in the wrong place at the wrong time) can, on analysis, be seen as a chain of failures and errors that lead almost inevitably to the adverse event. (This is often known as the Domino effect.)

These causes can be classified as:

- immediate causes: the agent of injury or ill health (the blade, the substance, the dust etc);
- underlying causes: unsafe acts and unsafe conditions (the guard removed, the ventilation switched off etc);
- root causes: the failure from which all other failings grow, often remote in time and space from the adverse event (eg failure to identify training needs and assess competence, low priority given to risk assessment etc).

To prevent adverse events, you need to provide effective risk control measures which address the immediate, underlying and root causes.

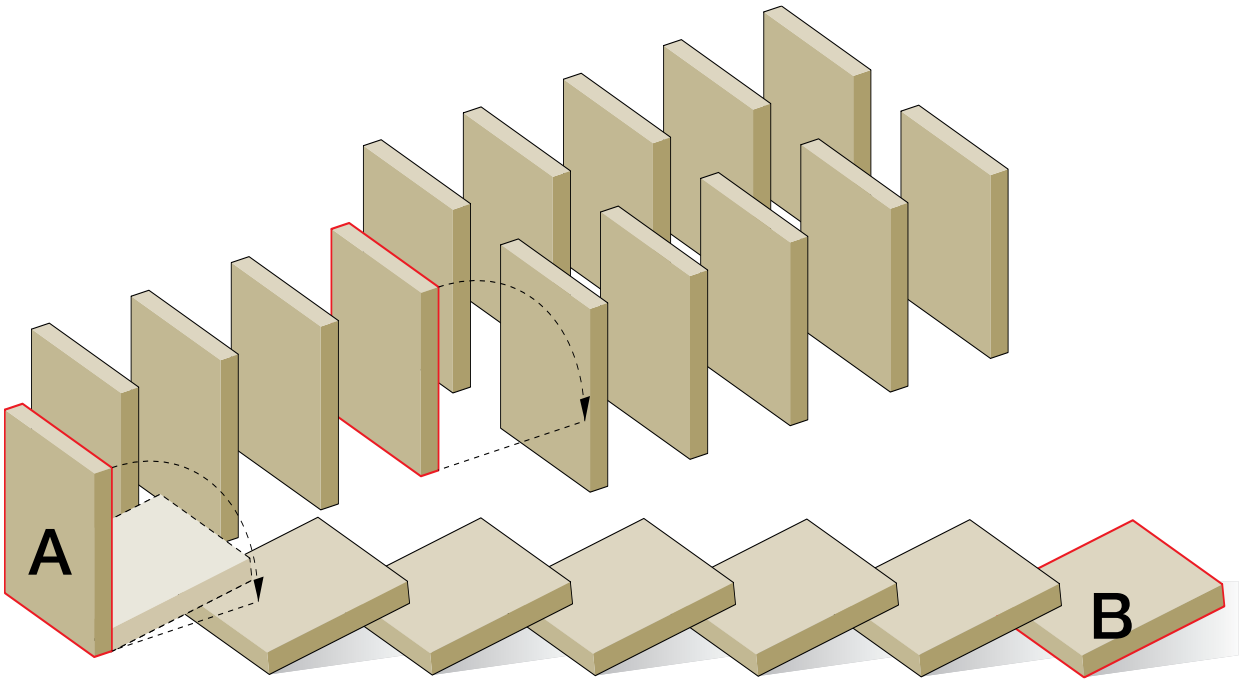


Figure 4 Sequence of dominoes

Note: Each domino represents a failing or error which can combine with other failings and errors to cause an adverse event. Dealing with the immediate cause (B) will only prevent his sequence. Dealing with all causes, especially root causes (A) can prevent a whole series of adverse events.

Why investigate?

There are hazards in all workplaces; risk control measures are put in place to reduce the risks to an acceptable level to prevent accidents and cases of ill health.

The fact that an adverse event has occurred suggests that the existing risk control measures were inadequate.

Learning lessons from near misses can prevent costly accidents. (The Clapham Junction rail crash and the *Herald of Free Enterprise* ferry capsize were both examples of situations where management had failed to recognise, and act on, previous failings in the system.) You need to investigate adverse events for a number of reasons.

Legal reasons for investigating

- To ensure you are operating your organisation within the law.
- The Management of Health and Safety at Work Regulations 1999, regulation 5, requires employers to plan, organise, control, monitor and review their health and safety arrangements. Health and safety investigations form an essential part of this process.
- Following the Woolf Report[6] on civil action, you are expected to make full disclosure of the circumstances of an accident to the injured parties considering legal action. The fear of litigation may make you think it is better not to investigate, but you can't make things better if you don't know what went wrong! The fact that you thoroughly investigated an accident and took remedial action to prevent further accidents would demonstrate to a court that your company has a positive attitude to health and safety. Your investigation findings will also provide essential information for your insurers in the event of a claim.

Information and insights gained from an investigation

- An understanding of how and why things went wrong.
- An understanding of the ways people can be exposed to substances or conditions that may affect their health.
- A true snapshot of what really happens and how work is really done. (Workers may find short cuts to make their work easier or quicker and may ignore rules. You need to be aware of this.)
- Identifying deficiencies in your risk control management, which will enable you to improve your management of risk in the future and to learn lessons which will be applicable to other parts of your organisation.

Benefits arising from an investigation

- The prevention of further similar adverse events. If there is a serious accident, the regulatory authorities will take a firm line if you have ignored previous warnings.
- The prevention of business losses due to disruption, stoppage, lost orders and the costs of criminal and civil legal actions.
- An improvement in employee morale and attitude towards health and safety. Employees will be more cooperative in implementing new safety precautions if they were involved in the decision and they can see that problems are dealt with.

- The development of managerial skills which can be readily applied to other areas of the organisation.

While the argument for investigating accidents is fairly clear, the need to investigate near misses and undesired circumstances may not be so obvious. However, investigating near misses and undesired circumstances is as useful, and very much easier than investigating accidents.

Adverse events where no one has been harmed can be investigated without having to deal with injured people, their families and a demoralised workforce, and without the threat of criminal and civil action hanging over the whole proceedings. Witnesses will be more likely to be helpful and tell the truth. (Consider the following: 'I mistakenly turned the wrong valve which released the boiling water because the valves all look the same' or 'I don't know how John was scalded.' Which is the likely response to a near miss and which to an accident? More importantly, which is the most useful?)

It is often pure luck that determines whether an undesired circumstance translates into a near miss or accident. The value of investigating each adverse event is the same.

An investigation is not an end in itself, but the first step in preventing future adverse events. A good investigation will enable you to learn general lessons, which can be applied across your organisation.

The investigation should identify why the existing risk control measures failed and what improvements or additional measures are needed. More general lessons on why the risk control measures were inadequate must also be learned.

Which events should be investigated?

Having been notified of an adverse event and been given basic information on what happened, you must decide whether it should be investigated and if so, in what depth.

It is the **potential consequences** and the likelihood of the adverse event recurring that should determine the level of investigation, not simply the injury or ill health suffered on this occasion. For example: Is the harm likely to be serious? Is this likely to happen often? Similarly, the causes of a near miss can have great potential for causing injury and ill health. When making your decision, you must also consider the potential for learning lessons. For example if you have had a number of similar adverse events, it may be worth investigating, even if each single event is not worth investigating in isolation. It is best practice to investigate all adverse events which may affect the public.

Who should carry out the investigation?

For an investigation to be worthwhile, it is essential that the management and the workforce are fully involved. Depending on the level of the investigation (and the size of the business), supervisors, line managers, health and safety professionals, union safety representatives, employee representatives and senior management/ directors may all be involved.

As well as being a legal duty, it has been found that where there is full cooperation and consultation with union representatives and employees, the number of accidents is half that of workplaces where there is no such employee involvement.[7]

This joint approach will ensure that a wide range of practical knowledge and experience will be brought to bear and employees and their representatives will feel empowered and supportive of any remedial measures that are necessary. A joint approach also reinforces the message that the investigation is for the benefit of everyone.

In addition to detailed knowledge of the work activities involved, members of the team should be familiar with health and safety good practice, standards and legal requirements. The investigation team must include people who have the necessary investigative skills (eg information gathering, interviewing, evaluating and analysing). Provide the team with sufficient time and resources to enable them to carry out the investigation efficiently.

It is essential that the investigation team is either led by, or reports directly to someone with the authority to make decisions and act on their recommendations.

When should it start?

The urgency of an investigation will depend on the magnitude and immediacy of the risk involved (eg a major accident involving an everyday job will need to be investigated quickly).

In general, adverse events should be investigated and analysed as soon as possible. This is not simply good practice; it is common sense – memory is best and motivation greatest immediately after an adverse event.

What does it involve?

An investigation will involve an analysis of all the information available, physical (the scene of the incident), verbal (the accounts of witnesses) and written (risk assessments, procedures, instructions, job guides etc), to identify what went wrong and determine what steps must be taken to prevent the adverse event from happening again.

It is important to be open, honest and objective throughout the investigation process. Pre-conceived ideas about the process, the equipment or the people involved in an adverse event may blind you to the real causes. Question everything. Be wary of blaming individuals.

What makes a good investigation?

To get rid of weeds you must dig up the root. If you only cut off the foliage, the weed will grow again.

Similarly it is only by carrying out investigations which identify root causes that organisations can learn from their past failures and prevent future failures.

Simply dealing with the immediate causes of an adverse event may provide a short-term fix. But, in time, the underlying/root causes that were not addressed will allow conditions to develop where further adverse events are likely, possibly with more serious consequences. It is essential that the immediate, underlying causes and root causes are all identified and remedied.

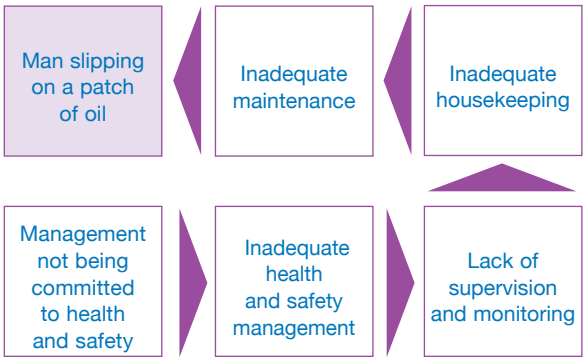
Investigations should be conducted with accident prevention in mind, not placing blame. Attempting to apportion blame before the investigation has started is

counterproductive, because people become defensive and uncooperative. Only after the investigation has been completed is it appropriate to consider whether any individuals acted inappropriately.

Investigations that conclude that operator error was the sole cause are rarely acceptable. Underpinning the 'human error' there will be a number of underlying causes that created the environment in which human errors were inevitable. For example inadequate training and supervision, poor equipment design, lack of management commitment, poor attitude to health and safety.

The objective is to establish not only how the adverse event happened, but more importantly, what allowed it to happen.

The root causes of adverse events are almost inevitably management, organisational or planning failures.



Look carefully at your health and safety policy and how it is reflected in the workplace. Do staff understand the health and safety message in general and in particular those parts that relate to their work? Is something missing from the policy? Is it implemented, or is management failing to ensure that health and safety measures remain in place and are effective at all times? If not, your health and safety policy needs to be changed.

The investigation should be thorough and structured to avoid bias and leaping to conclusions. Don't assume you know the answer and start finding solutions before you complete the investigation. A good investigation involves a systematic and structured approach.

Information gathering:

- explores all reasonable lines of enquiry;
- is timely;
- is structured, setting out clearly what is known, what is not known and records the investigative process.

Analysis:

- is objective and unbiased;
- identifies the sequence of events and conditions that led up to the adverse event;
- identifies the immediate causes;
- identifies underlying causes, ie actions in the past that have allowed or caused undetected unsafe conditions/practices;
- identifies root causes, (ie organisational and management health and safety arrangements – supervision, monitoring, training, resources allocated to health and safety etc).

Risk control measures:

- identify the risk control measures which were missing, inadequate or unused;
- compare conditions/practices as they were with that required by current legal requirements, codes of practice and guidance;
- identify additional measures needed to address the immediate, underlying and root causes;
- provide meaningful recommendations which can be implemented. But woolly recommendations such as 'operators must take care not to touch the cutters during run-down' show that the investigation has not delved deep enough in search of the root causes.

Action plan and implementation:

- provide an action plan with SMART objectives (Specific, Measurable, Agreed, Realistic and Timescaled);
- ensure that the action plan deals effectively not only with the immediate and underlying causes but also the root causes;
- include lessons that may be applied to prevent other adverse events, eg assessments of skill and training in competencies may be needed for other areas of the organisation;
- provide feedback to all parties involved to ensure the findings and recommendations are correct, address the issues and are realistic;
- should be fed back into a review of the risk assessment. The Approved Code of Practice[5] attached to the Management of Health and Safety at Work Regulations 1999 regulation 3 (paragraph 26), states that adverse events should be a trigger for reviewing risk assessments);
- communicate the results of the investigation and the action plan to everyone who needs to know;
- include arrangements to ensure the action plan is implemented and progress monitored.

The last three steps, though essential, are often overlooked. But, without them, the full benefits of the investigation will not be realised and in the long term nothing will change.

Techniques for analysing adverse events

There are many tools and techniques for structuring the investigation, analysing adverse events, and identifying root causes.[8] HSE does not endorse any one method – it is for you to choose which techniques suit your company. These techniques are simply tools, not an end in themselves.

For large, complex or technically demanding investigations, these techniques may be essential in determining not only how the adverse event happened, but also what were the root causes.

However, provided a methodical approach with full employee participation is adopted, a less complicated approach, such as that set out in this publication, will be appropriate.

A step by step guide to health and safety investigations

Steps to take following an adverse event

Emergency response:

- take prompt emergency action (eg first aid);
- make the area safe (in some cases this may need to be done first).

Initial report:

- preserve the scene;
- note the names of the people, equipment involved and the names of the witnesses;
- report the adverse event to the person responsible for health and safety who will decide what further action (if any) is needed.

Initial assessment and investigation response:

- report the adverse event to the regulatory authority if appropriate.

RIDDOR

For those accidents and dangerous occurrences that are reportable under the provisions of RIDDOR (the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995), this information must be notified to the enforcing authority.

Whether you are HSE or LA-enforced, to make a report, go to www.hse.gov.uk/riddor. A telephone service can be used to report fatal and major injuries **only** – call the Incident Contact Centre on 0845 300 9923 (opening hours Monday to Friday 8.30 am to 5 pm).

You must also keep a record of the reports you make that are required under RIDDOR. You can do this by:

- keeping a copy of the form;
- recording the incident in the accident book;
- recording the incident electronically.

You also need to enter details of the accident in an accident book. And, you need to decide on the scale of the investigation. Where appropriate, decide who will carry out the investigation, the resources required and brief the investigation team.

Note: The prompt notification of RIDDOR reportable events is a legal requirement. Do not wait until you have carried out a thorough investigation before you report it. Fatalities and major injuries (as defined in RIDDOR) must be reported immediately. Those accidents where employees have been absent from work (or moved to other duties as a result of the accident) for greater than three days must be reported within ten days of the accident date. Where a death has occurred the police may take charge and they should be notified immediately.

The decision to investigate

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		Minimal level		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, underlying and 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, eg 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.

3 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, eg that a machine or particular piece of equipment has been moved around and caused injuries on separate occasions, in different locations.

4 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, eg 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.

5 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 recognise and adapt to changing circumstances?

6 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.

7 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.

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

Where an accident is relatively straightforward, 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, eg, be that the employee cut themselves or spilt chemicals on their skin.

9 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.

10 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.

11 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 slip and fall;
- tools not in immediate use should be stored appropriately and not left lying around the work area.

12 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.

13 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, eg 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, eg providing a clear walkway around machinery will discourage people from crawling under or climbing over it.

14 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, eg heavy and awkward materials, materials with sharp edges, splinters, poisonous chemicals etc.

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

15 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 - ie safely. Consider user instructions here. A machine that requires its operator to follow a complicated user manual is a source of risk in itself.

16 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, eg 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.

17 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.

18 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.

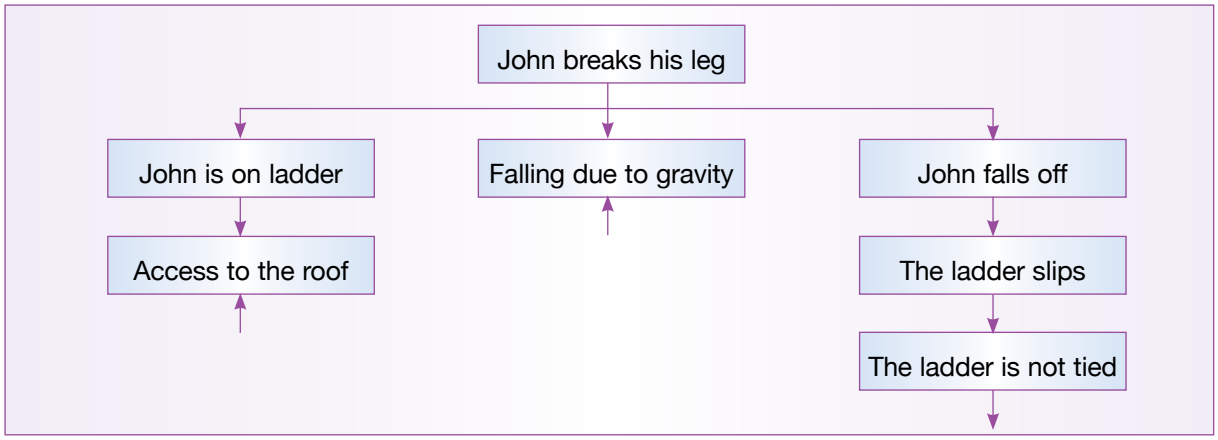


Figure 5

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, eg '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 (ie 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.

Worked examples of the Adverse Event Report and Investigation Form are on page 29.

What if 'human failings (errors and violations)'[10] are identified as a contributory 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.

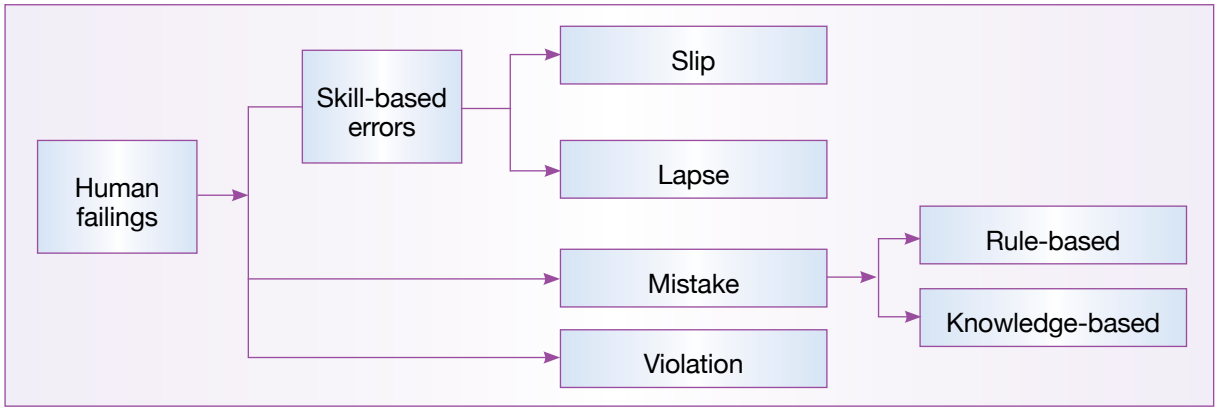


Figure 6

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, eg 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, eg 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, eg colour coding, a checklist, an interlock etc.

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, eg 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.

19 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, eg use 'inherently safe' products, such as a water-based product rather than a hydrocarbon-based solvent;
- measures which combat the risk at source, eg provision of guarding;
- measures which minimise the risk by relying on human behaviour, eg 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.

20 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.

21 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

22 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, ie 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.

23 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]

24 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.

The step by step approach that is set out in this guide is only one of a number of possible approaches. It is for you to decide which approach suits your business best.

References and further reading

References

1 *Health and safety statistics 2000/01* Report HSE Books 2001 ISBN 978 0 7176 2110 1

2 *Health and Safety Statistics Highlights 2002/03* Report MISC623 HSE Books 2003

3 *European Social Statistics: Labour Force Survey Results* 2001 ISBN 9289436050

4 *The cost to Britain of workplace accidents and work-related ill health in 1995/96* HSG101 (Second edition) HSE Books 1999 ISBN 978 0 7176 1709 8

For the latest workplace health and safety statistics see www.hse.gov.uk/statistics/index.htm.

5 *Management of health and safety at work. Management of Health and Safety at Work Regulations 1999. Approved Code of Practice and guidance* L21 (Second edition) HSE Books 2000 ISBN 978 0 7176 2488 1 (Regulations 3(3) and 5 refer) www.hse.gov.uk/pubns/books/L21.htm

6 *Access to Justice: Final report* by the Right Honourable Lord Woolf, Master of the Rolls July 1996 available on the Lord Chancellor's Department website www.lcd.gov.uk/civil/finalfr.htm

7 *Safety representatives and safety committees* L87 (Third edition) HSE Books 1996 ISBN 0 7176 1220 1 (Out of print. Replaced by *Consulting workers on health and safety: Safety Representatives and Safety Committees Regulations 1977 (as amended) and Health and Safety (Consultation with Employees) Regulations 1996 (as amended)* L146 HSE Books 2008 ISBN 978 0 7176 6311 8 www.hse.gov.uk/pubns/books/l146.htm)

8 *Root causes analysis: Literature review* CRR325 HSE Books 2001 ISBN 978 0 7176 1966 5

9 *Events and Casual Factors Analysis* is a technique developed for the United States Department of Energy. A full description of the technique is available via their Environmental Health and Safety internet information portal at http://tis.eh.doe.gov/analysis/trac/14/trac14.htm

10 *Reducing error and influencing behaviour* HSG48 (Second edition) HSE Books 1999 ISBN 978 0 7176 2452 2 www.hse.gov.uk/pubns/books/hsg48.htm

Further reading

Five steps to risk assessment Leaflet INDG163(rev3) HSE Books 2011 (priced packs of 10 ISBN 978 0 7176 6440 5) www.hse.gov.uk/pubns/books/indg163.pdf

Leading health and safety at work: Leadership actions for directors and board members Leaflet INDG417 HSE Books 2007 (priced packs of 5 ISBN 978 0 7176 6267 8) www.hse.gov.uk/pubns/indg417.pdf

Management of health and safety at work. Management of Health and Safety at Work Regulations 1999. Approved Code of Practice and guidance L21 (Second edition) HSE Books 2000 ISBN 978 0 7176 2488 1 www.hse.gov.uk/pubns/books/L21.htm

A guide to the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 L73 (Third edition) HSE Books 2008 ISBN 978 0 7176 6290 6 www.hse.gov.uk/pubns/books/L73.htm

Successful health and safety management HSG65 (Second edition) HSE Books 1997 ISBN 978 0 7176 1276 5 www.hse.gov.uk/pubns/books/hsg65.htm

Reducing error and influencing behaviour HSG48 (Second edition) HSE Books 1999 ISBN 978 0 7176 2452 2 www.hse.gov.uk/pubns/books/hsg48.htm

Improving maintenance: A guide to reducing human error Guidance HSE Books 2000 ISBN 978 0 7176 1818 7 www.hse.gov.uk/pubns/books/improve-maint.htm

Adverse event report and investigation form

Part 1 Overview

Ref no

The purpose of this form is to record all adverse events. The term **accident** is used where injury or ill health occurs. The term **incident** includes **near-misses** and **undesired circumstances**, where there is the potential for injury. Part 1 should be filled out immediately by the manager or supervisor for the work activity involved. Part 2 should be completed by the person responsible for health and safety. Part 3 should be completed, where appropriate, by the investigation team. Part 4 should be completed by the investigating team, together with managers who have the authority to take decisions. When completing Parts 2, 3 and 4 refer to the guidance under 'A step by step guide to health and safety investigations'.

Part 1 Overview

Reported by: *R Osmund*			**Date/time of adverse event** *23.06.03 10.00am*	
Incident	**Ill health**	**Minor injury**	**Serious injury** X	**Major injury**
Brief details (What, where, when, who and emergency measures taken) *Norman Brown was trying to fix a problem on the edge gluer when the machine operated. Norman cut his right hand quite badly. He was given first aid and taken to hospital.* *The fuses have been taken out of the edge gluer and a sign hung on it.*				

Forwarded to: Richard Wills	**Date** 23.06.03 **Time** 11.00am

Part 2 Initial assessment (to be carried out by the person responsible for health and safety)

Type of event

Accident	X
Ill health	
Near-miss	
Undesired circumstance	

Actual/potential for harm

Fatal or major	
Serious	X
Minor	
Damage only	

RIDDOR reportable?	**Y/N** Y	**Date/time reported** 15.03.03
Entry in accident book	**Y/N** Y	**Date entered/reference** 15.03.03 123/03

Investigation level

High level		**Low level**	
Medium level	X	**Basic**	

Initial assessment carried out by: Richard Wills	**Date** 23.06.03
Further investigation required? Yes	**Priority** Immediate
For investigation by: Peter Peterson (fitter), John Evans (foreman) and Richard Wills	

Part 3 Investigation information gathering

1 Where and when did the adverse event happen?

Woodmachine shop
Monday 23rd July 2003 at 11.00 am

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

Norman Brown – Injured person woodmachinist
No witnesses

3 How did the adverse event happen? (Note any equipment involved).

Norman discovered a defect in the edge gluing machine. He opened the interlocked lid where the skirting boards are sawn off and planed down. Norman put his pencil into the interlock switch, so he could operate the machine with the guard open, so he could see what was wrong. The cross cut saw operated and cut Norman's hand.
Wilmatron 440 edge gluing machine series No 1234/23 1998.
Sharpcut Mk1 200mm diameter circular saw blade.

4 What activities were being carried out at the time?

Norman was working on the edge gluing machine on a batch of aluminium skirtings.

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

Yes. This machine normally is used with mdf skirtings, not aluminium.

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

No. Machines should be isolated before carrying out repairs.

Part 3 Investigation information gathering

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

Severe laceration to the top of the right hand at the knuckles resulting in severing of tendons.

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

The rotating blade of the cross cut saw.

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

Yes, but Norman thought he would be OK having a look inside the guard.

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

No, but Norman had been having trouble with the machine all morning. After the coffee break, he decided to get it fixed.

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

Yes

Part 3 Investigation information gathering

12 Were the people involved competent and suitable?

Norman was a qualified wood machinist with 9 years' experience. He had worked on the edge gluing machine for 3 years.

13 Did the workplace layout influence the adverse event?

Yes – access to the edger is difficult. Access to the viewing window in the guard is difficult.

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

Yes – the machine was being used with aluminium rather than the normal mdf skirtings.

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

Yes, in that the edge gluer was malfunctioning.

16 Was the safety equipment sufficient?

No – the interlock switch was of a type easily defeated.

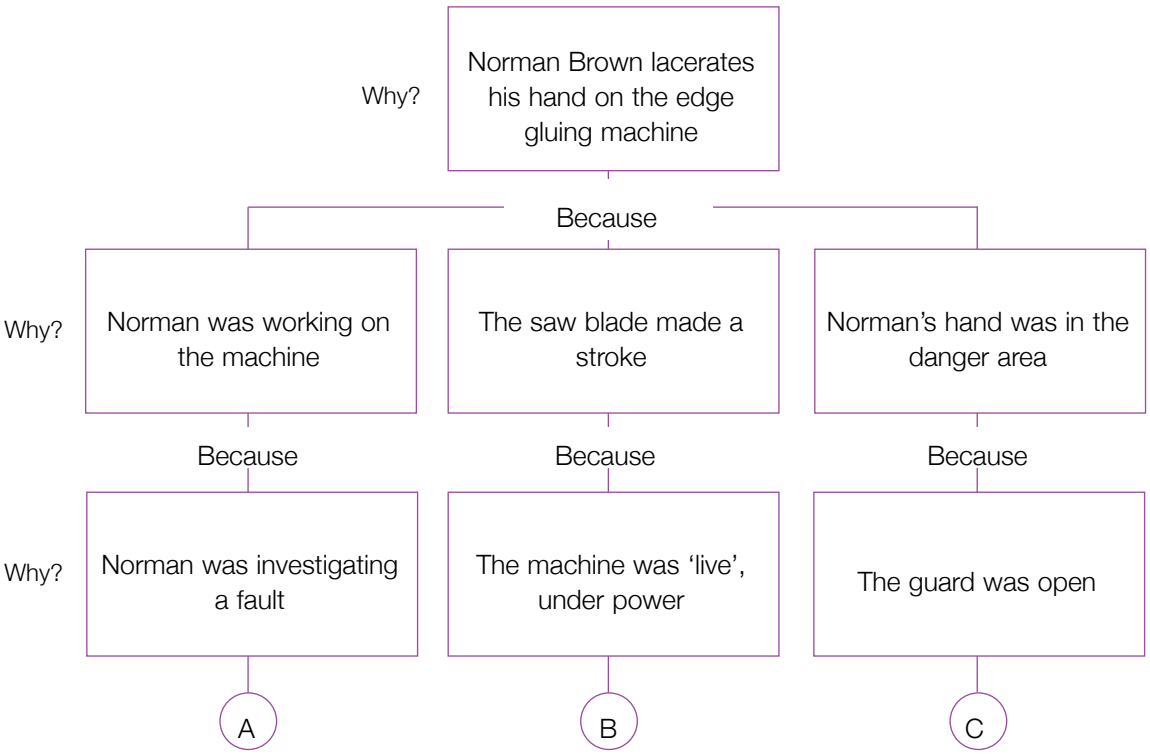
17 Did other conditions influence the adverse event?

No

Analysis and further action

18 What were the immediate, underlying and root causes?

Analysis (see 'Analysis' under '*Step two*')



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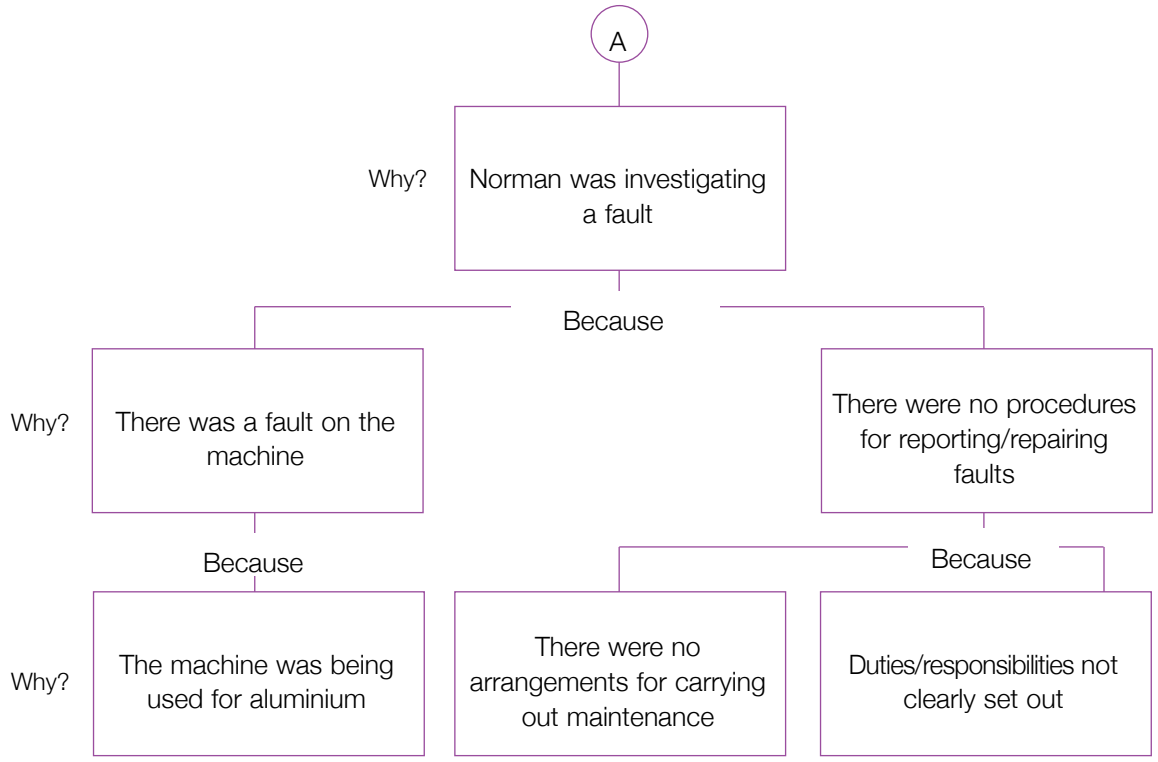

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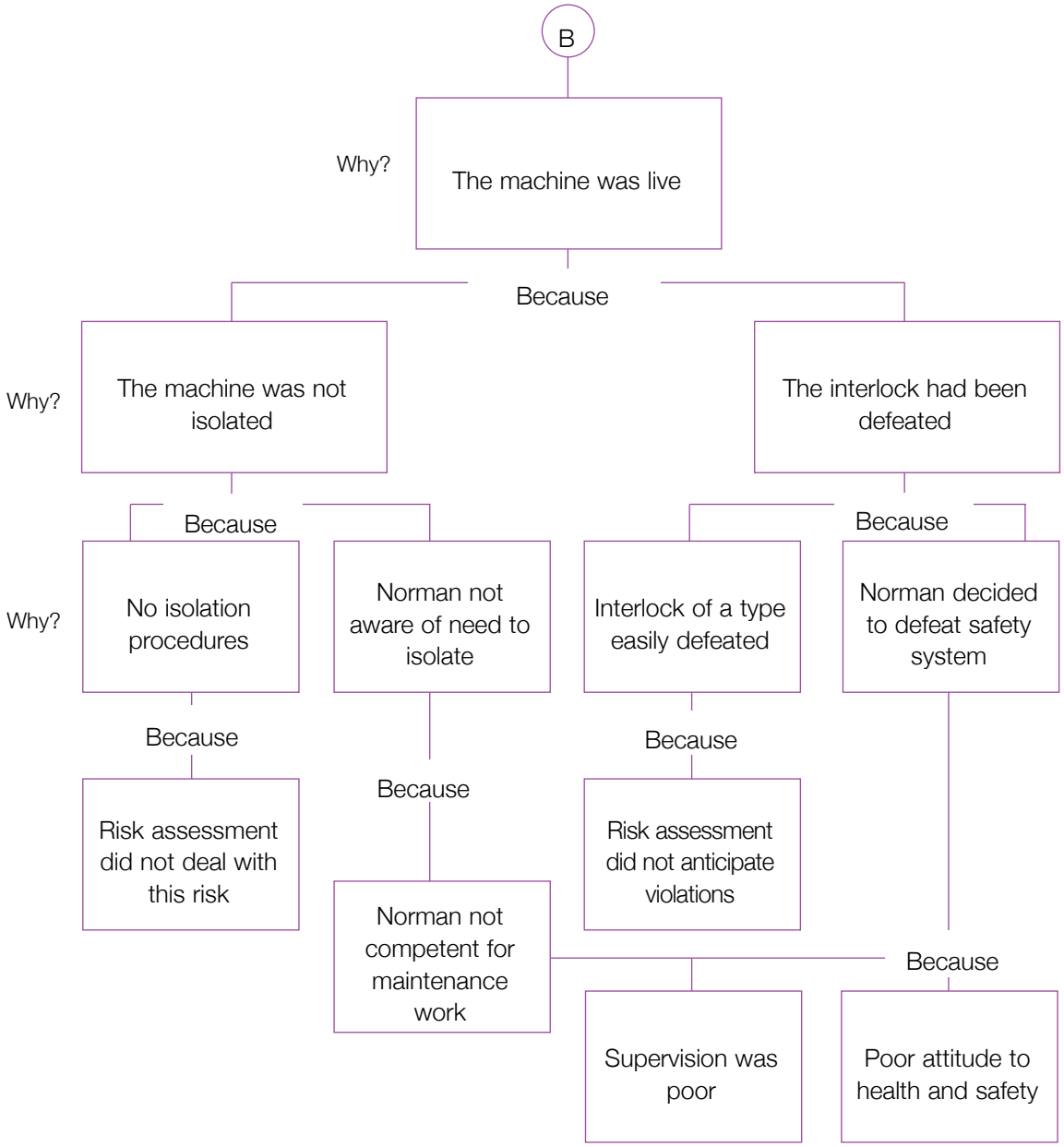

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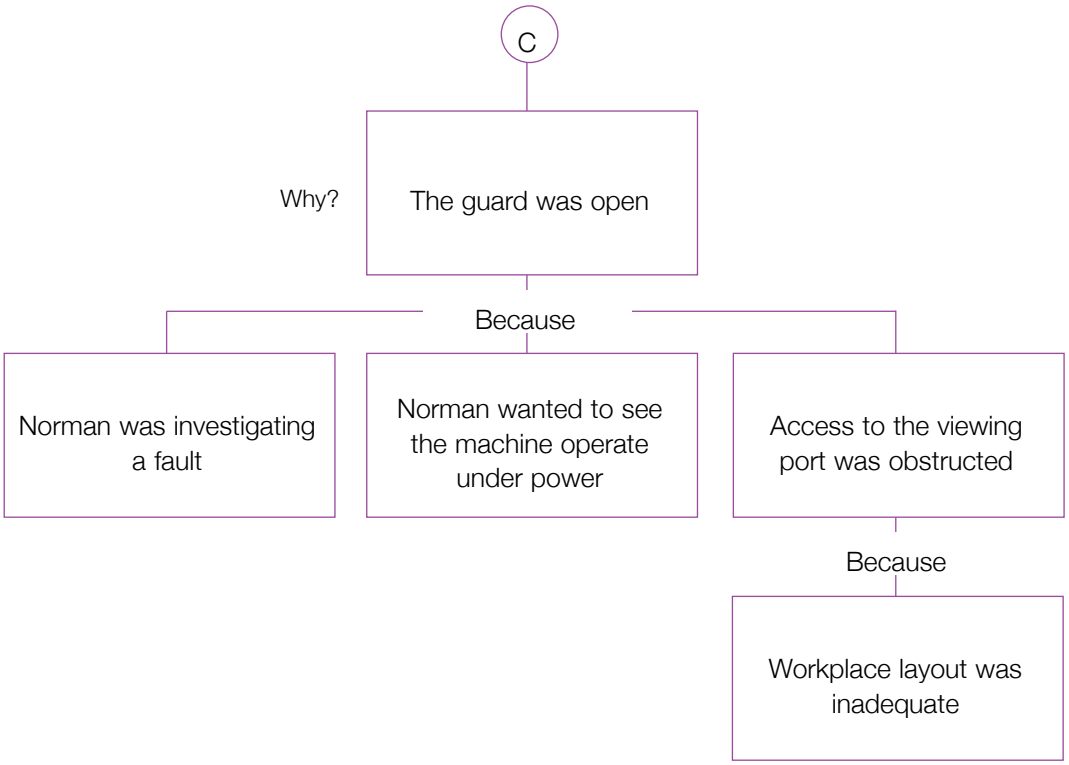


Analysis and further action

18 What were the immediate, underlying and root causes?

Analysis (see 'Analysis' under '*Step two*')

How/Why

1 Edge gluer was used for aluminium without adjusting to suit
2 The saw blade was tearing the end of the sections
3 The operator decided to investigate the cause
4 The operator decides that to find the cause he has to run the machine
5 The operator is unable to see through the viewing port
6 The operator opens the guards and defeats the interlock
7 The machine makes a cutting stroke
8 The operator's hand is cut by the saw blade

Immediate causes

1 Not enough room around the machine to do the job
2 The saw set up was not suitable for use on aluminium
3 The interlocks fitted were of a type easily defeated
4 There were no safe working procedures for the job
5 Operative not fully competent

Underlying causes

6 Poor workplace layout
7 No risk assessments for use/maintenance of machine
8 Risk assessments didn't address use of other materials
9 Risk assessments didn't address violations
10 SWPs were not prepared following risk assessments
11 Operators not trained on machine maintenance and safety devices
12 Level of supervision not adequate – should have detected violations
13 All staff to be reminded of their duties and essential health and safety measures

Root causes

Management commitment to H&S not communicated to employees
Health and safety assistants not fully competent and resourced
Unclear lines of communication and responsibilities

Part 3 Investigation information gathering

19 What risk control measures are needed/recommended?

1	Replace interlock switch with tongue type switch
2	Rearrange machine to allow access to window
3	Procedures for isolation of machine
4	Procedures for reporting/repairing defects
5	Clear allocation of duties
6	Review risk assessment

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

Yes – there are similar interlock switches on the multi-headed moulder/planer

21 Have similar adverse events happened before? Give details.

No

Part 4 The risk control action plan

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

	Control measure	Completion Date	Person responsible
1	Replace interlocks	Before use	Peter (fitter)
2	Rearrange workshop	Before use	John (foreman) Richard (H&S)
3	Prepare SWPs for isolation and reporting and repair/maintenance	1.12.03	John (foreman) Richard (H&S)
4	Assess competence and training needs & deliver training	1.12.03 1.3.04	John (foreman) Richard (H&S)
5	Prepare/review risk assessments	1.03.03	Richard (H&S)

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

	Name of risk assessment safe working procedure	Completion Date	Person responsible
1	Risk Assess. For workplace	1st week in July	Richard (H&S)
2	Risk Assess. For machinery	1st week in July	Richard (H&S)
3			
4			

Part 4 The risk control action plan

24 Have the details of the 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?

Details have been recorded – no trends or common causes – need to check quality of risk assessments.

Estimated cost of accident £3,700

25 Signed on behalf of the investigation team

Name	Signature

26 Members of the investigation team

Name	Position
Richard Wills	H&S Officer
John Evans	Foreman
Peter Peterson	Fitter

Part 4 The risk control action plan

27 The findings of this investigation need to be communicated to the following managers, union and employee safety representatives

Person	Signature	Date
A. Director		
W.K.S Manager		
A. Rep		

Adverse event report and investigation form Part 1 Overview

Ref no

The purpose of this form is to record all adverse events. The term **accident** is used where injury or ill health occurs. The term **incident** includes **near-misses** and **undesired circumstances**, where there is the potential for injury. Part 1 should be filled out immediately by the manager or supervisor for the work activity involved. Part 2 should be completed by the person responsible for health and safety. Part 3 should be completed, where appropriate, by the investigation team. Part 4 should be completed by the investigating team, together with managers who have the authority to take decisions. When completing Parts 2, 3 and 4 refer to the guidance under 'A step by step guide to health and safety investigations'.

Part 1 Overview

Reported by: Adam Jones (Wages Dept)			**Date/time of adverse event** Unknown	
Incident	**Ill health** X	**Minor injury**	**Serious injury**	**Major injury**
Brief details (What, where, when, who and emergency measures taken) Sick paper received from John Smith together with a note from his GP which states that he is suffering from occupational asthma				

Forwarded to: Paul Melish	**Date** 09.11.03 **Time** 10.30am

Part 2 Initial assessment (to be carried out by the person responsibile for health and safety)

Type of event

Injury	
Ill health	X
Near-miss	
Undesired circumstance	

Actual/potential for harm

Fatal or major	
Serious	X
Minor	
Damage only	

RIDDOR reportable?	**Y/N** Y	**Date/time reported** 11.30 am
Entry in accident book	**Y/N** Y	**Date entered/reference** 09.11.03

Investigation level

High level		**Low level**	
Medium level	X	**Basic**	

Initial assessment carried out by: Paul Melish	**Date** 09.11.03
Further investigation required? Yes	**Priority** Immediate
For investigation by: P Melish, workshop manager and foreman	

Part 3 Investigation information gathering

1 Where and when did the adverse event happen?

Spray shop – sometime over last 6 months? John Smith was taken on 6 months ago as a paint sprayer

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

John Smith – paint sprayer
Also other sprayers Peter John and Roger Wilson

3 How did the adverse event happen? (Note any equipment involved).

John works in the paint spray booth.
Booth – Windflow Mark 3 serial no 12345/97
Spray guns – Paintspraymaster model 2
Gun wash – Cleanomax mark 4 serial no 247/99
Half mask – Wearmask model 12 with AXP3 filters

4 What activities were being carried out at the time?

Duties carried out would have been limited to the mixing and spraying of isocyanate-based spray paint in the spray booth

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

Nothing different

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

As normal

Part 3 Investigation information gathering

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

Reported Occupational Asthma

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

Exposure to isocyanate-based paint suspected
Also possible poor quality of air fed to mask

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

Risks of paint known – existing controls assumed to be sufficient
Poor air quality not known

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

No supervision or monitoring of paint spray shop – air-fed mask not always used – for small jobs half-masks were sometimes used (suitable for working with isocyanates but NOT suitable for spray painting)

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

Spray booth not examined for 2 years – compressed air quality to air-fed masks not tested. Both subsequently found to be inadequate

Part 3 Investigation information gathering

12 Were the people involved competent and suitable?

John Smith was an experienced paint sprayer with 2½ years' experience with his previous employer

13 Did the workplace layout influence the adverse event?

No

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

Yes solvent-based isocyanate paints are respiratory sensitisers

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

No

16 Was the safety equipment sufficient?

Spray booth air flow was found to be inadequate
Air quality to air-fed masks was poor – contaminated
Correct Respiratory Protective Equipment not always used.

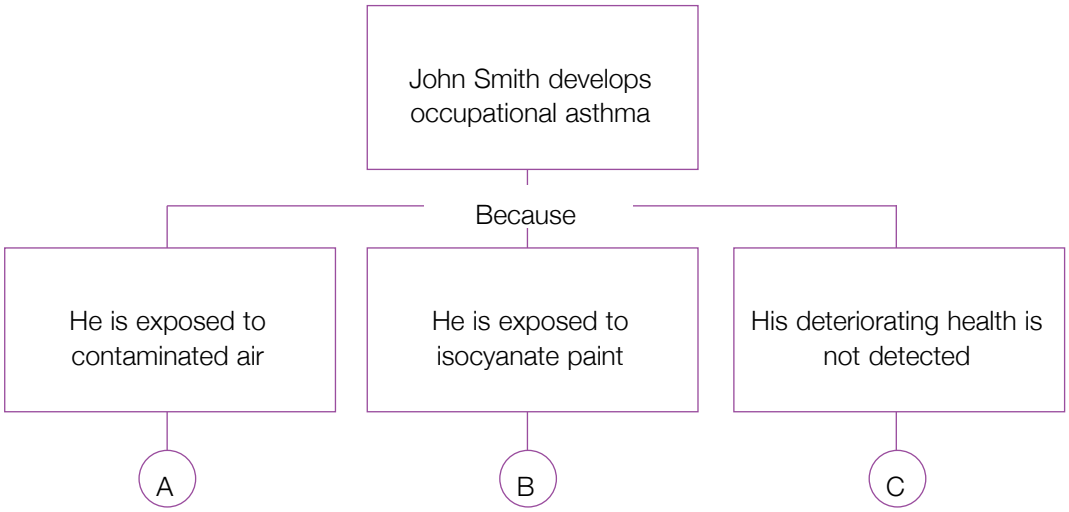
17 Did other conditions influence the adverse event?

No

Analysis and further action

18 What were the immediate, underlying and root causes?

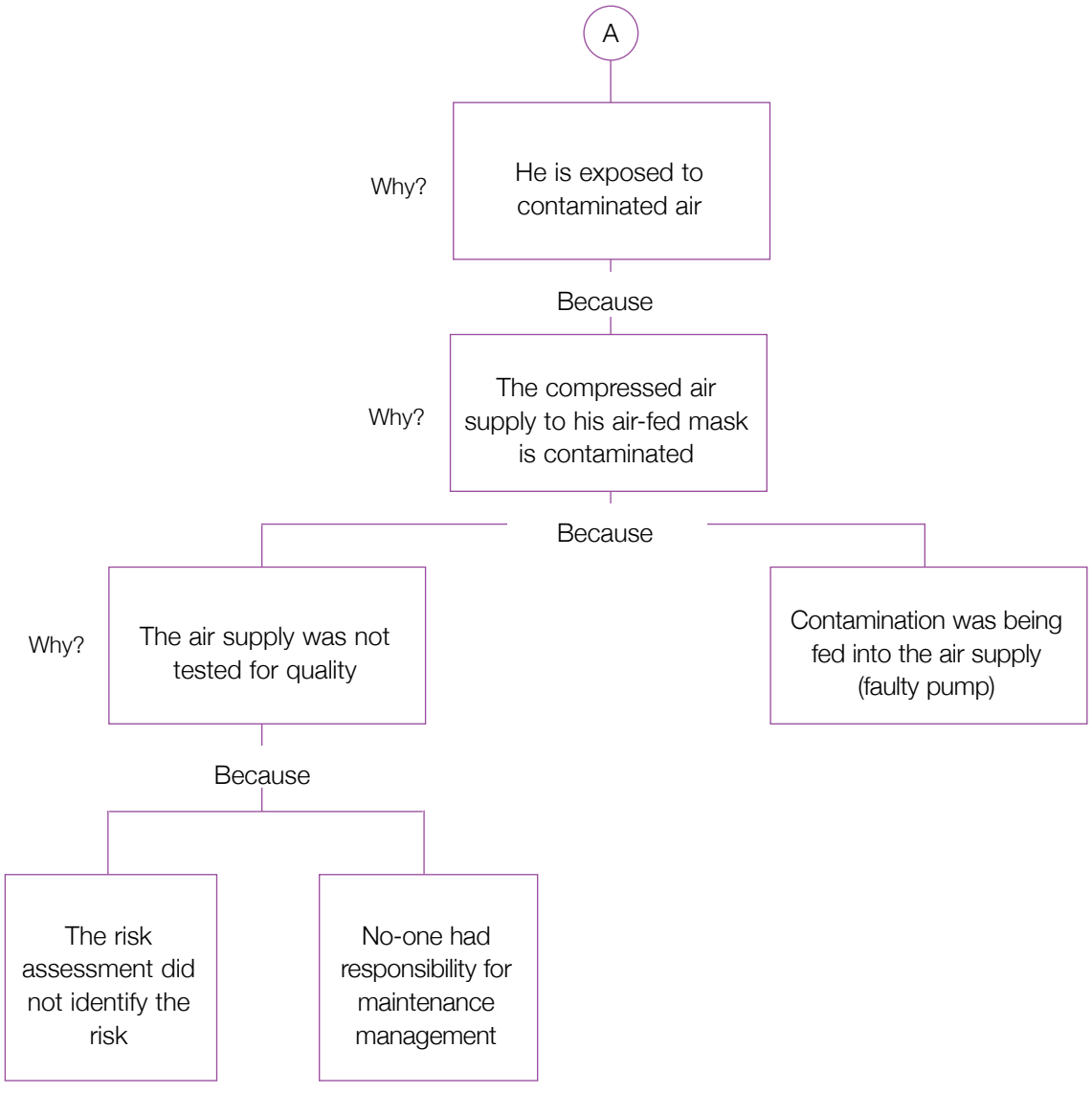
Analysis (see 'Analysis' under '*Step two*')



Analysis and further action

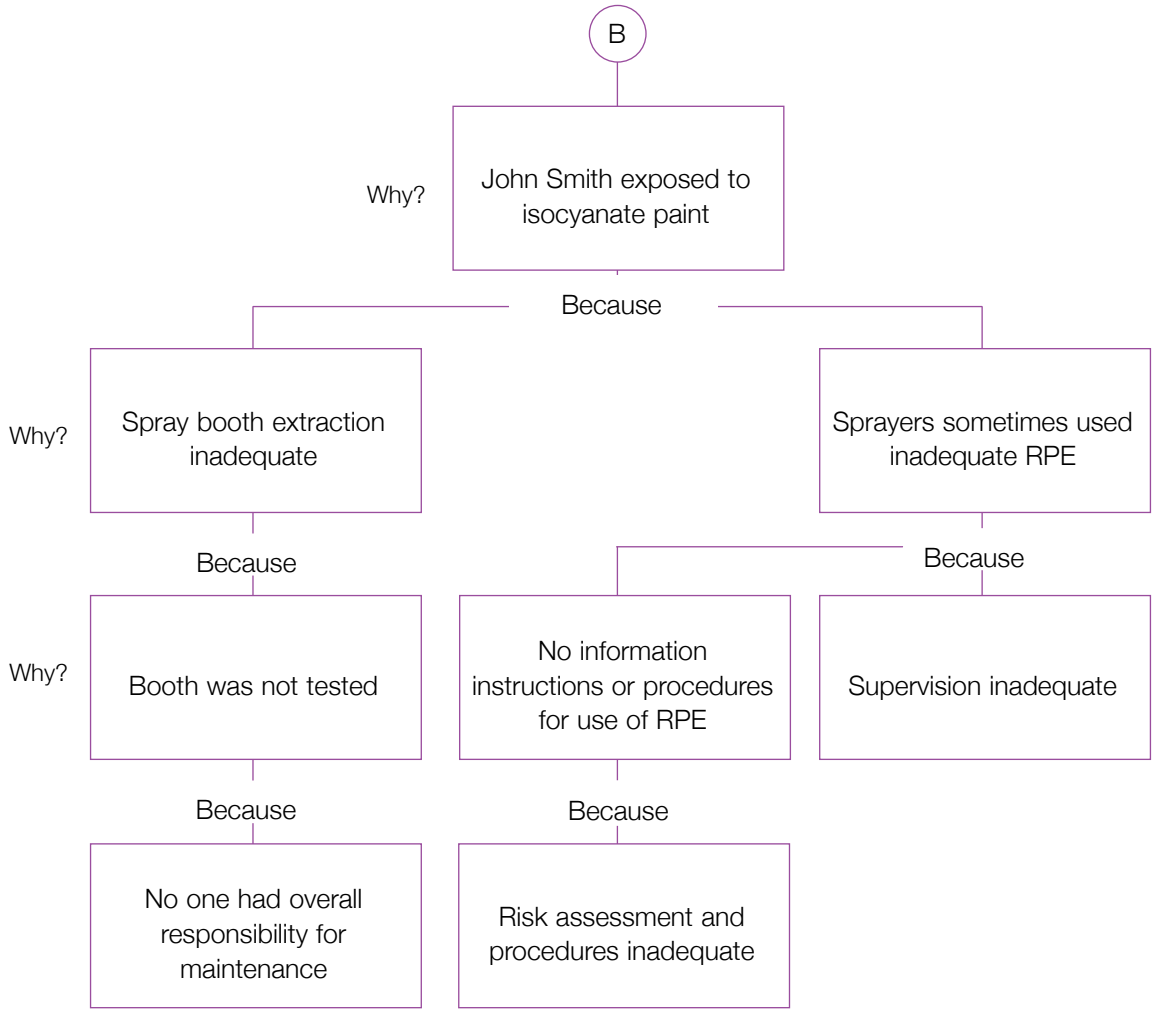
18 What were the immediate, underlying and root causes?

Analysis (see 'Analysis' under '*Step two*')



Analysis and further action

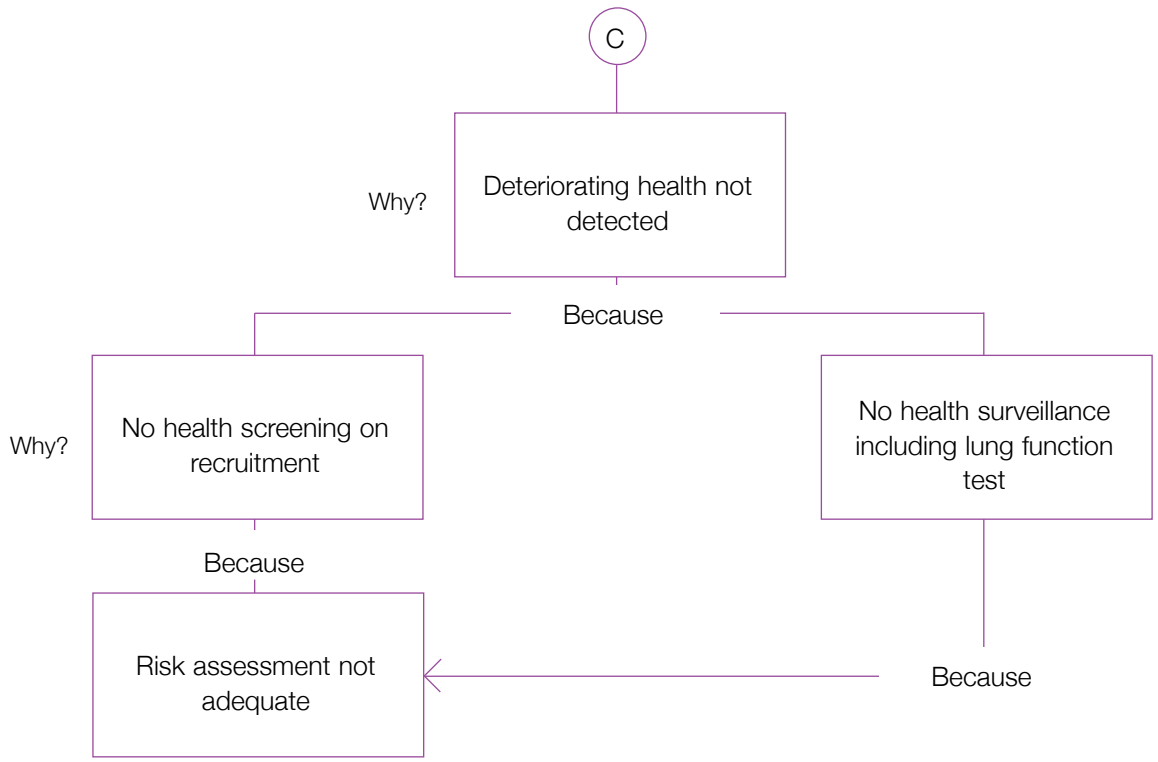
Analysis (see 'Analysis' under '*Step two*')



Analysis and further action

18 What were the immediate, underlying and root causes?

Analysis (see 'Analysis' under '*Step two*')



Analysis and further action

18 What were the immediate, underlying and root causes?

Analysis (see 'Analysis' under '*Step two*')

How/why might he have been exposed to substances which caused occupational asthma

1 The compressed air supply to the breathing equipment was contaminated
2 The spray booth extraction was not adequate
3 Sprayers sometimes used RPE which was not adequate

Immediate Causes

1 Spray booth performance had deteriorated – not tested/maintained
2 Air quality to air-fed masks had deteriorated – not tested/maintained
3 Incorrect RPE sometimes used
4 No safe working procedures for RPE and booth

Underlying Causes

1 Risk assessments inadequate for spraying operations
2 No one in overall charge of testing/maintenance
3 Supervision and monitoring of work practices inadequate
4 Sprayers not fully competent – training/instruction on use/choice of RPE
5 Risk assessment didn't recognise risk from previous employment exposure
6 No arrangements for health screening

Root Causes

No senior partner in overall charge of H&S
H&S performance to be monitored
Responsibilities unclear

Part 3 Investigation information gathering

19 What risk control measures are needed/recommended?

1	Spray booth & air to be tested
2	Health surveillance & screening for sprayers
3	Responsibilities for maintenance to be allocated
4	Refresher training on hazards and PPE
5	Increased supervision and monitoring
6	Partner appointed to manage H&S

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

No

21 Have similar adverse events happened before? Give details.

No

Part 4 The risk control action plan

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

	Control Measure	Completion Date	Person responsible
1	Booth and air to be tested	Immediate	Maintenance fitter
2	Health surveillance and screening	Jan 2003	Peter Riley
3	Maintenance schedule	Jan 2003	Maintenance fitter
4	Training PPE	Jan 2003	Peter Riley
5	Supervision/monitoring	Jan 2003	All foreman/Peter Riley
6	Partner appointed to review	Jan 2003	P Melish

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

	Name of risk assessment safe working procedure	Completion Date	Person responsible
1	Spray painting	Jan 2003	Peter Riley
2			
3			

Part 4 The risk control action plan

24 Have the details of the 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?

No trends

Estimated total cost £2,700

25 Signed on behalf of the investigation team

Name	Signature
Paul Melish	

26 Members of the investigation team

Name	Position
Paul Melish	Partner
A Coome	Work Manager
P Berry	Foreman
T Roberts	Employee rep

Part 4 The risk control action plan

27 The findings of this investigation need to be communicated to the following managers, union and employee safety representatives

Person	Signature	Date
A. Manager		
A. Supervisor		
A. Representative		

Adverse event report and investigation form Part 1 Overview

Ref no

The purpose of this form is to record all adverse events. The term **accident** is used where injury or ill health occurs. The term **incident** includes **near-misses** and **undesired circumstances**, where there is the potential for injury. Part 1 should be filled out immediately by the manager or supervisor for the work activity involved. Part 2 should be completed by the person responsible for health and safety. Part 3 should be completed, where appropriate, by the investigation team. Part 4 should be completed by the investigating team, together with managers who have the authority to take decisions. When completing Parts 2, 3 and 4 refer to the guidance under 'A step by step guide to health and safety investigations'.

Part 1 Overview

Reported by:			**Date/time of adverse event**	
Incident	**Ill health**	**Minor injury**	**Serious injury**	**Major injury**
Brief details (What, where, when, who and emergency measures taken)				

Forwarded to:	**Date** **Time**

Part 2 Initial assessment (to be carried out by the person responsible for health and safety)

Type of event

Accident	
Ill health	
Near-miss	
Undesired circumstance	

Actual/potential for harm

Fatal or major	
Serious	
Minor	
Damage only	

RIDDOR reportable?	Y/N	Date/time reported
Entry in accident book	Y/N	Date entered/reference

Investigation level

High level		Low level	
Medium level	X	Basic	

Initial assessment carried out by:		Date
Further investigation required?	Y/N	Priority
For investigation by:		

Part 3 Investigation information gathering

1 Where and when did the adverse event happen?

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

3 How did the adverse event happen? (Note any equipment involved.)

4 What activities were being carried out at the time?

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

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

Part 3 Investigation information gathering

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

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

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

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

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

Part 3 Investigation information gathering

12 Were the people involved competent and suitable?

13 Did the workplace layout influence the adverse event?

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

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

16 Was the safety equipment sufficient?

17 Did other conditions influence the adverse event?

Analysis and further action

18 What were the immediate, underlying and root causes?

Analysis (see 'Analysis' under '*Step two*')

Part 3 Investigation information gathering

19 What risk control measures are needed/recommended?

1
2
3
4
5
6

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

21 Have similar adverse events happened before? Give details.

Part 4 The risk control action plan

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

Control measure	Completion date	Person responsible
1		
2		
3		
4		
5		

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

Name of risk assessment safe working procedure	Completion date	Person responsible
1		
2		
3		
4		

Part 4 The risk control action plan

24 Have the details of the 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?

25 Signed on behalf of the investigation team

Name	Signature

26 Members of the investigation team

Name	Position

Part 4 The risk control action plan

27 The findings of this investigation need to be communicated to the following managers, union and employee safety representatives

Person	Signature	Date

Adverse event analysis: Rooting out risk

Using the information gathered during your investigation, go through each of the four sections on the immediate causes (the Place, the Plant, the Process and the People). If the answer to any of the questions is 'no', then this is an immediate cause of the adverse event under investigation. After identifying the immediate causes, direct your attention to the potential underlying causes (which are set out to the right of the immediate causes identified) and consider the questions under the relevant headings. For example if the answer to the first question below 'Were the access and egress adequate?' is 'no', you should consider whether the design of the workplace and the risk assessment for workplace access/egress were adequate.

Immediate causes

1	The place or premises where the incident happened							
	The place or premises where the incident happened. If there was anything about the condition of the workplace that contributed to the adverse event, answer the following question, which will suggest other areas to consider. If not, go to 'Plant, equipment and substances'.	Control	Co-operation	Communication	Competence	Design	Implementation	Risk assessment
1	Were the access and egress adequate?					■		■
2	Were the access and egress points being used?	■	■	■				
3	Was the workplace suitable for the task in hand?					■		■
4	Was there sufficient space for the task in hand?					■		■
5	Was the workplace being used as intended?	■		■				
6	Were people segregated from hazardous areas/processes/machinery?	■				■		■
7	Was the work environment (lighting, temperature and ventilation) suitable?	■				■		■
8	Did the ergonomics of the workstation suit the person using it?				■	■		■
9	Was the work area clean and tidy? (Routine cleaning programme and dealing with spills.)	■					■	■
10	Were weather conditions a factor?							■
11	Were the noise levels within acceptable levels?	■					■	■
12	Were the appropriate warning signs in place?	■						■
13	Were contractors provided with adequate information on access/egress and the hazards within the premises?		■	■			■	

Immediate causes

2	The plant, equipment and substances (used or generated)							
The plant, equipment and substances (used or generated). If the equipment being used, or the substances/materials used or generated, contributed to the adverse event, answer the following questions, which will suggest other areas to consider. If not, go to 'Process/procedures'.		Control	Co-operation	Communication	Competence		Implementation	Risk assessment
1	Were the most suitable plant and equipment available for the job?						■	■
2	Were the plant and equipment used suitable for the person using them?				■			■
3	Were the plant and equipment used suitable for the job?	■			■			■
4	Had the plant and equipment been chosen, or modified, so that its health and safety efficiency could not be improved?		■				■	■
5	Were plant and equipment in working order and adequately maintained? Was there a routine maintenance programme? Was there a procedure for repair when a defect was discovered?	■		■	■		■	■
6	Were the plant and equipment being properly used?	■		■	■			
7	Were there adequate controls or guards for the safe use of the equipment?					■	■	■
8	Were the controls or guards fitted, maintained and properly used?	■		■	■		■	■
9	Were the controls well laid out and easy to understand?				■	■	■	■
10	Were the most suitable materials or substances available for the job?						■	■
11	Were the correct materials being used?	■		■	■			
12	Were the materials as specified?	■			■			
13	Were the materials or substances used suitable for the job and person?				■		■	■
14	Were the materials or substances being properly used?	■		■	■			
15	Was exposure to hazardous materials and by-products adequately controlled?	■					■	■
16	If the need for personal protective equipment (PPE) had not been identified, was it safe to do the job without PPE?							■
17	If necessary, was suitable PPE available?						■	■
18	If necessary, was the correct PPE used?	■		■	■			
19	If the correct PPE was used, was it used correctly?	■		■	■			

Immediate causes

3	The process/procedures							
The process/procedures. If the procedures, instructions or information (or the lack of them), contributed to the adverse event, answer the following questions, which will suggest other areas to consider. If not, go to 'People'.		Control		Communication	Competence	Design	Implementation	Risk assessment
1	Were there safe working procedures and instructions for the tasks under consideration?							
2	If there were safe working procedures and instructions, were they up to date?							
3	If there were safe working procedures and instructions, were they realistic, accurate and adequate?							
4	If there were safe working procedures and instructions, did they deal with the circumstances of the adverse event?							
5	If there were safe working procedures and instructions, were the correct ones followed?							
6	If there were safe working procedures and instructions, were they provided or readily available to those carrying out the work? Include contractors.							
7	If there were safe working procedures, were they policed?							
8	Was the level of supervision adequate? Include contractors.							
9	Were the training needs for this activity identified?							
10	If there were safe working procedures and instructions, were they used as part of training?							
11	Were contractors working in accordance with agreed method statements and safe systems of work?							
12	Were contractors informed of the safe working procedures they should adopt?							

Immediate causes

3	The people involved							
The people involved. If there was anything about the people involved that contributed to the adverse event, answer the following questions which will suggest other areas to consider.		Control	Co-operation	Communication	Competence	Design	Implementation	Risk assessment
1 Were the people involved suited for their job? ■ physically and emotionally (young people need special consideration)? ■ competence (skilled, knowledgeable and experienced)? ■								
2 Was the health of people who could be affected monitored?								
3 Were the people performing their work as expected?								
4 Were workers employed by contractors suitable and competent?								
5 Was the event free of human failings?								
Was it a mistake? If it was a mistake consider:								
Was it a slip or lapse caused by:								
■ fatigue – not enough rest breaks, working excessive hours, already tired? ■ lack of motivation or boredom? ■ being distracted? ■ being preoccupied, eg angry, or excited? ■ being under too much pressure, ie too much or too many things to do? ■ too little time? ■ taking substances, such as alcohol, medicines or drugs?								
If it was a violation, ie breaking the rules or taking short cuts, consider:								

Underlying and Root Causes

If your answers to the Place, Plant, Procedures and People sections identified any immediate cause, consider the relevant 'Underlying and Root Causes' section.

ORGANISATION – how we do things and how we make sure they are done correctly

Control

1 Were the workplace and work activities adequately supervised and monitored in order to ensure that risk control measures were effective and implemented as intended?
2 Did the supervisors have adequate resources to carry out their duties?
3 Were people held accountable for their performance in carrying out their duties with regard to Health and Safety?
4 Were there adequate arrangements for overseeing and controlling contractors?

Co-operation

1 Were trade unions, employees and their representatives involved in determining workplace arrangements, preparing risk assessments and safe working procedures?
2 Did the individuals involved in the incident share information?
3 Were there arrangements for cooperation with, and co-ordination of, contractors?

Communication

1 Were responsibilities and duties clearly set out?
2 Were they clearly understood by those involved?
3 Did everyone involved know who they report to and who reports to them?
4 Was there sufficient, up-to-date information to enable good decisions to be made?
5 Were there adequate arrangements for passing on information at shift changes?
6 Were written instructions, safe working procedures and product information sheets practical and clear?
7 Were the instructions and procedures available to all who needed them?
8 Was communication between workers and supervisors effective?
9 Was the communication between different departments effective?
10 Were there effective communications with contractors?

Competence: Training and suitability

1 Were the people involved assessed as suitable for the work in terms of health and physical ability?
2 Were the health and safety training needs of people identified?
- on recruitment;
- on changing jobs;
- when changes in the work are proposed;
- periodically as part of refresher training?

3 Were the training requirements for particular jobs identified?

4 Was the training effectively delivered?
- with adequate resources?
- effectively?
- and assessed?
- were training records kept?

5 Was the competence of contractors, employees and agency workers checked?

Planning and Implementation: How we prepare to do things effectively and efficiently

Design

1 Were the workplace and equipment layouts designed considering health and safety?
2 Were the controls, displays etc of plant and equipment designed to reduce the risk of, or prevent, human error? For example mis-reading dials or operating the wrong switch

Implementation

1 Were there arrangements for ensuring that sufficient, and suitable, plant, equipment and materials were available?
2 Were there arrangements for ensuring that sufficient and suitable labour was available?
3 Was there adequate cover for leave or sickness absence?
4 Were suitable contractors appointed?
5 Were there adequate arrangements for cleaning?
6 Were there adequate arrangements for reporting defects in plant and equipment?
7 Were there adequate arrangements for carrying out maintenance work?
8 Were there adequate arrangements for reporting health and safety concerns?
9 Were there adequate arrangements for reporting near-misses and undesired circumstances?
10 Were there adequate arrangements for carrying out health surveillance?
11 Were there adequate arrangements for carrying out air monitoring/sampling? (If required)
12 Did production targets take account of health and safety?
13 Were there adequate arrangements for appointing and controlling contractors?

Risk assessment

Risk assessments involve identifying the hazards, identifying who may be affected and putting in place suitable arrangements to eliminate or reduce the risks to an acceptable level.

1 Were there risk assessments for the work in question?
2 Were they adequate?
- did they correctly identify the risks?
- were they up-to-date and reviewed as necessary?
- were correct technical standards used?
- were adequate risk control measures identified?
- were safe working procedures developed?
- were there clear conclusions and recommendations?
- were employees involved in preparing them?

3 Did the risk assessments result in a risk control action plan with SMART (Specific, Measurable, Agreed, Realistic and Timescaled) objectives?
4 Were responsibilities for implementing the risk control action plan set out?
5 Had the risk control action plan been implemented?
6 If there had been similar adverse events in the past, had they been investigated?
7 Were adverse events recorded, investigated and the findings fed back into the risk assessments?
8 Did the risk assessments include the risks from work carried out by contractors?

A 'no' answer to any of the questions in the underlying or root cause section identifies an underlying or root cause.

These underlying or root causes in turn point to failings in the health and safety management system.
Senior management should consider all the questions in the following 'Management' section to identify weaknesses in the overall risk control management of the organisation.

Management: How we create the environment and set the standards under which all other health and safety activities take place

- Was there a written health and safety policy statement?
- Did all employees know and understand the health and safety policy statement?
- Were named partners, directors and senior managers made responsible for health and safety arrangements?
- Was there an adequate commitment to health and safety at a senior level?
- Was this commitment reflected in the actions of directors, partners and managers?
- Were sufficient people appointed to assist with health and safety measures?
- Were the people appointed to assist with health and safety measures adequately trained and competent?
- Did the health and safety assistants have sufficient authority to carry out their duties?
- Were the tasks of carrying out risk assessments and preparing safe working practices given to competent persons?
- Was the carrying out of risk assessments a high priority?
- Were adequate resources allocated to health and safety?
- Was it your policy to learn from adverse event investigations and improve your health and safety performance?
- Were the recommendations and findings of the health and safety team acted on?
- Was the work of the health and safety team (including managers, safety officers, safety assistants, supervisors and safety representatives) monitored?
- Were the health and safety team held to account for their performance?
- Were there clear and integrated lines of communication and control?
- Was there a conflict between production and health and safety?
- Was health and safety performance measured and monitored?
- Did you seek to improve your health and safety performance as a result of your dealings with the regulatory authorities and other health and safety professionals?

Adverse event Ref no	

Adverse event analysis

Using the 'Adverse event analysis: Rooting out risk' checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

1	Place or premises		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/ root cause

Adverse event Ref no	

Adverse event analysis

Using the 'Adverse event analysis: Rooting out risk' checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

2	Plant equipment and substances		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/root cause
Point 5 Equipment not being routinely maintained	Spray booth to be examined immediately and air quality to sprayers masks to be checked	Risk assessment inadequate - did not recognise risks where booth extraction and air quality had deteriorated	Review risk assessments where deterioration in safety equipment will lead to increased risks
Point 15 Exposure to hazardous materials not controlled	Spray booth and air quality to be tested immediately to ensure safe	Control - No clear responsibilities for ensuring equipment working effectively	Maintenance fitter to be made responsible for testing of spray booth and air quality
Point 18 Correct PPE not used	Ensure only air-fed masks are used for all spray painting	Supervision and monitoring inadequate	Ensure supervisors check that correct PPE is used - introduce monitoring of actual use
		Competence - sprayers not fully aware of risks and limitations of RPE	Instructions and training of sprayers on risks and limitations of RPE

Adverse event Ref no	

Adverse event analysis

Using the 'Adverse event analysis: Rooting out risk' checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

3	**Processes and procedures**		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/root cause
Point 1 No safe working procedures (SWPs) or instructions	Prepare SWPs and instructions for the safe use of the spray booth and the RPE required	Risk Assessments and SWPs inadequate	Review risk assessment and prepare SWPs for the maintenance and use of the spray booth and air-fed masks

Adverse event Ref no	

Adverse event analysis

Using the 'Adverse event analysis: Rooting out risk' checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

4	People		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/ root cause
Point 1 People not suited for the job	Ensure that recruitment of sprayers includes health checks	Risk assessment inadequate and no health screening on recruitment	Ensure risk assessments recognise need to screen people for ill health which may be made worse by their work
Point 2 No health monitoring	Spray painters to have annual lung function tests as a part of their health monitoring	Risk Assessments inadequate	Ensure that risk assessments recognise where health monitoring can detect the onset of ill health and set up the necessary arrangements

Adverse event Ref no	

Adverse event analysis

Health and safety management issues

This section should be completed by managers/directors/partners with the authority to make decisions on the management of health and safety. It should be completed using the management section of the 'rooting out risk' checklist and with reference to the immediate, underlying/root causes identified earlier in the analysis.

What weaknesses in the overall management of health and safety allowed the underlying/root causes of the adverse event to exist?	Remedial action
No one in overall charge of health and safety at senior level	Appoint partner to take overall charge of managing Health and Safety
The work of the people responsible for day-to-day health and safety arrangements was not monitored	Partner to monitor health and safety performance
No clear lines of communication and control	Responsibilities and lines of communication on health and safety matter to be established

Adverse event Ref no	

Adverse event analysis

Using the 'Adverse event analysis: Rooting out risk' checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

1	Place or premises		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/root cause
Point 4 Not enough room for the job	Re-arrange machinery to allow access to viewing port	Planning - design of layouts Risk assessments - not adequate	Review risk assessments - look at safe working access to all areas of machinery for operation and maintenance

Adverse event Ref no	

Adverse event analysis

Using the 'Adverse event analysis: Rooting out risk' checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

2	Plant equipment and substances		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/root cause
Point 3 Equipment not suitable for the job	Machine not to be used on aluminium until manufacturer's literature checked and adjustments made	Risk assessment didn't deal with use for other materials	Risk assess machine for use with aluminium Procedures for use with aluminium to be produced and instructions/training given
Point 4 Equipment not most effective - interlocks of a type easily defeated	Arrange for interlocks to be changed for better design All employees to be reminded of need for interlocks	Risk assessments not adequate - didn't anticipate violations	Review how tamperproof safety equipment is Remind workforce of the importance of safety measures and procedures and the importance the business places on H&S

Adverse event Ref no	

Adverse event analysis

Using the 'Adverse event analysis: Rooting out risk' checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

3	**Processes and procedures**		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/root cause
Point 1 No safe working procedures (SWP) for job	Prepare SWP for working for repairs, locking off and isolation procedures Training	Risk assessments and procedures	Update risk assessments and prepare and communicate procedures for reporting of defects, repairs, locking off and isolation - training Monitor

Adverse event Ref no	

Adverse event analysis

Using the 'Adverse event analysis: Rooting out risk' checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

4	People		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/ root cause
Point 1 Competence - use of equipment and hazards of job during maintenance	Training in need for interlocks and isolation/locking off. Training on hazards and accepted use of machine	Competence - training requirements not assessed or delivered	Ensure all necessary information on machinery is available and training needs are identified and suitable training given
Point 4 Violation - defeating of interlock guards	Fit less easily defeated switches Instruction to all operatives	Control and communication	Staff to be reminded of need for and consequences of interfering with safety equipment Levels of supervision and monitoring to be increased

Adverse event Ref no	

Adverse event analysis

Health and safety management issues

This section should be completed by managers/directors/partners with the authority to make decisions on the management of health and safety. It should be completed using the management section of the 'rooting out risk' checklist and with reference to the immediate, underlying/root causes identified earlier in the analysis.

What weaknesses in the overall management of health and safety allowed the underlying/root causes of the adverse event to exist?	Remedial action
Employees not fully aware of management commitment to health and safety	Ensure all employees are aware of management commitment to health and safety - as set out in our policy statement
Health and safety assistants not fully competent and resourced	Ensure those responsible for preparing risk assessments/SWPs and in charge of maintenance are adequately trained and have time to carry out their duties
No clear lines of communication and control and unclear responsibilities	Ensure all staff aware of their own duties and how they fit into the organisation

Adverse event Ref no	

Adverse event analysis

Using the ‘Adverse event analysis: Rooting out risk’ checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

1	**Place or premises**		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/root cause

Adverse event Ref no	

Adverse event analysis

Using the ‘Adverse event analysis: Rooting out risk’ checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

2	**Plant equipment and substances**		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/root cause

Adverse event Ref no	

Adverse event analysis

Using the ‘Adverse event analysis: Rooting out risk’ checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

3	**Processes and procedures**		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/root cause

Adverse event Ref no	

Adverse event analysis

Using the 'Adverse event analysis: Rooting out risk' checklist, consider the questions in the immediate cause sections. Enter each of the immediate causes identified in the table and enter the risk control measures required. For each immediate cause the checklist suggests possible underlying/root causes. Consider each of these potential underlying/root causes and enter those that are relevant.
Finally enter the remedial measures required to remedy the underlying/root cause.

4	**People**		
Immediate cause: Point	Risk control measure required	Underlying/root causes	Measures to remedy underlying/root cause

Adverse event Ref no	

Adverse event analysis

Health and safety management issues

This section should be completed by managers/directors/partners with the authority to make decisions on the management of health and safety. It should be completed using the management section of the 'rooting out risk' checklist and with reference to the immediate, underlying/root causes identified earlier in the analysis.

What weaknesses in the overall management of health and safety allowed the underlying/root causes of the adverse event to exist?	Remedial action

Further information

For further information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk/. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory, unless specifically stated, and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance.

This guidance is available at: www.hse.gov.uk/pubns/books/hsg245.htm.