Health and safety services

UNIVERSITY OF LEEDS

Investigating accidents and incidents

Guidance

Contents

Questions and answers - General

Q1 - What are some causes of adverse events?

Adverse events have many causes, which can be classified as:

- **Immediate causes** - The agent of injury or ill health (such as a blade, substances, dust)
- **Underlying causes -** Unsafe acts and unsafe conditions (the guard was removed, the ventilation switched off etc.)
- **Root causes -** often remote in time and space from the event (for example failure to identify training needs and assess competence, or low priority given to risk assessments)

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

Q2 - Why Investigate?

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

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

Q3 - What are the legal reasons for investigating?

- To ensure your school or service is operating within the law
- The Management of Health and Safety at Work Regulations 1999, Reg. 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
- The fear of litigation may make you think it is better not to investigate. However the fact that you thoroughly investigated an accident and took remedial action to prevent further accidents would demonstrate to a court that your school or service has a positive attitude to health and safety.
- Your investigation findings will provide essential information for your insurers in the event of a claim.

Q4 - What information and insight can be gained from 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 effect their health
- A snapshot of what really happens and how work is really done
- Identify deficiencies in risk control management in your school or service

Q5 - What benefits can arise from an investigation?

The argument for investigating accidents, near misses and undesired circumstances is clear:

- The prevention of further similar adverse events.
- The regulatory authorities (eg. HSE) will take a firm line if you have ignored previous warnings
- The prevention of business or research losses due to disruption, stoppage etc. and the costs of criminal and civil legal actions.
- An improvement in employee moral and attitude - 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.

Q6 - Which events should be investigated?

The potential consequences and the likelihood of the adverse event occurring again should determine the level of investigation, not simply the injury or ill health differed on this occasion.

Q7 - Is the harm likely to be serious?

Is this likely to happen often? Similarly the cause of a near miss can have great potential for causing injury and ill health. When making a decision you must also consider the potential for learning lessons - For example if you have had a number of similar 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 that may affect the public.

Q8 - Who should carry out the Investigation?

The management of the activity or area should be fully involved. Supervisors, line managers, health and safety professionals, union safety representatives, employee representatives, senior management and directors may be involved.

A joint approach will ensure a wide range of practical knowledge and experience is brought to bear and employees and their representatives will feel empowered and more likely to support any remedial measures that are necessary.

The investigation team must include people who have the necessary investigative skills such as information gathering and interviewing, evaluating and analysis. They should also have sufficient time and resources to enable them to carry out the investigation efficiently.

Q9 - When should it start?

The urgency of any investigation will depend on the magnitude and immediacy of the risk involved. In general, adverse events should be investigated and analysed as soon as possible.

Q10 - What does it involve?

An analysis of all the information available to identify what went wrong and determine what steps must be taken to prevent the adverse event from happening again. This includes information such as:

- Physical (the scene of the incident)
- Verbal (the accident of witnesses), and
- Written (risk assessments, procedures, instructions, job guides etc.)

It is important to be open, honest and objective throughout the investigation process. Preconceived ideas about the process, equipment or people involved in an adverse event may blind you to the real cause.

Q11 - What makes a good investigation?

Investigation should be conducted with accident prevention in mind, not placing blame. The objective is to establish not only how the adverse happened but more importantly what allowed it to happen.

Root causes of adverse events are most inevitably management, organisational or planning failures.

Q12 - How should I gather information?

- Explore all reasonable lines of enquiry
- Ensure it is timely, and
- Structured, setting out clearly what is known, what is not known, and record the investigation process

Q13 - What are the requirements for analysis?

- Objective and unbiased
- Identifies the sequence of events and conditions that led up to the adverse event
- Identifies the immediate causes
- Identifies underlying causes (actions in the past that have allowed or caused undetected unsafe conditions and practices)
- Identifies root causes (such as organisational and health and safety arrangements, supervision, monitoring, training, resources)

Q14 - What are the requirements for risk control measures

- Identify the risk control measures that were missing or inadequate or unused
- Compare conditions or practices as they were with those required by current legal requirements, codes of practice and guidance
- Identify additional measures needed to address immediate underlying root causes
- Provide meaningful recommendations which can be implemented

Q15 - How do I complete the action plan and implement it?

- Provide an action plan with SMART objectives (Specific, Measurable, Agreed, Realistic and Timescaled)
- Ensure action plans deal effectively not only with immediate and underlying causes but also root causes
- Include lessons that may be applied to prevent other adverse events – for example, assessment of skills and training in competences may be needed for other areas of the organisation.
- Provide feedback to all parties involved to ensure findings and recommendations are correct, that they address issues and are realistic
- Should be fed back into a review of risk assessment. ACOP Reg. 3 MHSWR 1999
- Communicate the results of the investigation and action plan to everyone who needs to know
- Include arrangements to ensure action plan is implemented and progress monitored

Step by step guide to health and safety investigations

16 - Emergency response:

- Take prompt emergency action (such as first aid)
- Make the area safe

17 - Initial report

- Preserve the scene
- Note the names of people involved, equipment and the names of any witnesses
- Report the adverse event to the person responsible for health and safety who will decide what further action (if any) is needed

18 - Initial assessment and investigation response

- For accidents and dangerous occurrences that are reportable under the provision of RIDDOR, health and safety services will report the adverse event to the HSE. The incident contact centre in Caerphilly must be notified but this will be done by Central Services.

It is a legal requirement to notify about RIDDOR-reportable events promptly. Do not wait until you have carried out a thorough investigation before you inform health and safety services.

Fatalities and major injuries (as defined in RIDDOR), must be reported immediately

Accidents to employees who are then absent from work for more than three days must be reported within 10 days of the accident date

Step 1 - Gathering information

Find out what happened and what conditions and actions influenced the event - It is important to capture information as soon as possible. Talk to everyone, especially people who saw what happened or know anything about conditions that led to it.

The amount of time and effort spent on gathering information should be in proportion to the level of investigation. This includes options, experiences, observations, sketches, measurements, photographs, check sheets, permits to work and details of the environmental conditions at the time.

Questions and answers

Q1 - Where, when and who?

Where and when did the adverse event happen?
Who was injured, suffered ill health or was otherwise involved with the adverse event?
Be precise and establish the facts.

Q2 - 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. Work out the chain of events be talking to the injured person, eye witnesses, line managers, health and safety supervisors and fellow workers to find out what happened and who did what.

Note the position of injured people, both immediately before and after the event. Be objective, avoid apportioning guilt or making snap judgments on the possible causes.

Plant and equipment that had a direct bearing on the adverse event must be identified clearly. 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 machinery controls immediately after the adverse event. You should consider approaching the supplier if the same machine has been implicated in a number of adverse events.

Q3 - 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, such as surroundings, equipment, the 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

Q4 - Was there anything unusual or different about working conditions?

When faced with a new situation, employees may find it difficult to adapt, particularly if the sources of danger are known to them and if they have not been adequately prepared to deal with the new situation.

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 or was it being followed? If not why not?

Was the way the changes, temperature or other things introduced a factor? Were the workers and supervisors sufficiently trained or experienced to recognise and adapt to changing circumstances.

Q5 - Were there adequate safe working procedures and were they followed?

'We've been doing it that way for years and nothing has ever gone wrong before' or 'he has been working that machine for years and knows what to do'.

Q6 - 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 injury – (bruising, crushing, burns, cuts, broken bones etc). Be as precise as possible.

Q7 - If there was an injury, how did it occur and what caused it ?

Where an accident is relatively straight forward, it may seem difficult to differentiate between the accident itself and the mode of injury. When the accident is more complicated the differences between the two aspects become clearer and so precise descriptions are vital.

The mode of injury concerns two different aspects:

- The harmful object that inflicted the injury (known as the agent)
- The way in which the injury was actually sustained

The object that inflicted the injury might be anything from handheld tools, a chemical, a machine or a vehicle. The way in which it happened might be that the employee cut themselves or spilt chemicals on their skin for example.

Q8 - Was the risk known? If so, why wasn't it controlled?

Was the source of danger and its potential consequences known, and was the information 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 can 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.

An existing risk assessment for the process or task that led to the actual event will help to reveal what was known about the associated risks.

A judgment can be made as to whether the risk assessment was "suitable and sufficient" as required by law, and whether the risk control measures identified as being necessary were ever adequately put in place.

Q9 - 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:

- The standards of supervision and onsite monitoring of working practices may be less than adequate
- Lack of skills or knowledge may mean 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, done too late or in the wrong order.
- Employees' actions and omissions may be a consequence of the way they are paid or otherwise rewarded. High production targets may result in safety measures being degraded and employees working at too fast a pace.

Q10 - Was maintenance and cleaning sufficient? If not, 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 slip or tripping hazard?
- Was there a program 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.

People 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 have deteriorated over time.

Consider:

- A badly monitored machine or tool may mean an employee is exposed to excessive vibration or noise. This could cause them 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 vertical movements hazardous.
- Badly maintained lighting may make carrying out the task more difficult.
- Poorly stored materials on the floor and around the work area will increase the risk of tripping.
- Ice, dirt, and other debris 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.

Q11 - Were the people involved competent?

Training should provide workers with the necessary knowledge and skills and 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 means or skills or experience to do it safely.

- A lack of instruction and training may mean tasks are not done properly
- Misunderstandings can arise more easily when employees lack understanding of the usual routine and procedures in the organisation
- A lack of respect for the risks involved, due to the ignorance of the potential consequences
- Problems due to the inexperience and lack of awareness of existing staff or potential risks amongst young people under 18. You must assess the risks to young people before they start work.
- Poor handling of dangerous materials or work 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.

Q12 - Did the workplace layout influence the adverse event?

The physical layout and surroundings of the workplace can easily influence an adverse event.

Q13 - Did the nature and shape of the materials influence the adverse event?

Materials can pose a hazard simply by their design, weight, quality or packaging. The choice of materials also influences work processes.

Q14 - Did difficulties using plant and equipment influence the adverse event?

Plant and equipment includes all machinery, plant and tools used to organise and carry out the work. All should be designed to suit people using them.

Q15 - Was the safety equipment sufficient?

All safety equipment and procedures should be both sufficient and current for all conditions in which work takes place, including the provision and use of any extra equipment.

- Extra technical safety equipment on machines
- Power supply isolation equipment and procedures
- PPE
- Building safety systems such as extract ventilation systems

Q16 - Did other conditions influence the adverse event?

For example,

- Disagreements or misunderstandings between people
- Weather
- Unauthorised interference in a process or job task
- Defective supply or equipment
- Deliberate acts, such as trespass or sabotage

Step 2 - Analysing the information

Examine all the facts to determine what happened and why.
See Appendix 2 for the analysis and further action form

Questions and answers

Q1 - What were the immediate, underlying and root causes?

The causes of adverse events often relate to each other in a complex way, sometimes they only influence events and at other times have an achieving impact, due to their timing or the way they interact. Keep an open mind.

Q2 - What happened and why?

The first step of analysis is understanding what happened and why.

The starting point is the event. - John has broken his leg, but why did this happen?

Firstly identify:
- The vulnerable person (John on a ladder)
- The hazard (falling due to gravity)
- The circumstances that brought them together (John fell off the ladder)

For each question ask why and set down the answers.
Continue down the page asking why, until answers are no longer meaningful.

Q3 - Checklist / questions analysis of the causes

See Appendix 2 for the analysis and further action form

Record all the immediate causes identified and the necessary risk control measures. For immediate causes, the analysis suggests underlying causes which may have allowed the immediate causes to exist.

Consider the underlying and root causes suggested by the immediate causes. Record those that are relevant and note the measures needed to remedy them.

Consider the environment in which the organisation and planning of health and safety was carried out.

The management section of the analysis must be carried out by people within the organisation who have taken the overall responsibility for health and safety, and authority to make changes to the management system.

Q4 - What if 'human failings' errors and violators are identified as a contributing factor

Carefully consider how to handle this information - not addressing the 'human factors' greatly reduces the value of the investigation

Q5 - Skill based errors - a slip or lapse of memory
Slips happen when a person is carrying out familiar tasks automatically, without thinking, and that persons actions are not planned.
Lapses - happen when an action is performed out of sequence or a step in a sequence is missed.

Q6 - Mistakes - Errors of judgment (rule-based or knowledge-based)

Rule-based - Mistakes happen when a person has a set of rules about what to do in a certain situation and applies the wrong rule.
Knowledge-based - Mistakes happen when a person is faced with an unfamiliar situation for which they have no rules, uses his or her knowledge and works from first principles but comes to a wrong conclusion.

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

Q7 - Violations (rule breaking)
Deliberate failure to follow rules or cutting corners to save time and effort, based on the belief that the rules are too restrictive and are not enforced anyway.

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

Q8 - 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 or time available

Q9 - Human factors

- Physical ability (size and strength)
- Competence (knowledge and skill and experience)
- fatigue
- Stress
- Morale
- Alcohol or drugs

Q10 - Organisational factors
Work pressure, availability of sufficient resources, quality of supervision - management attitudes towards health and safety (the safety culture)

Q11 - Plant and equipment factors
How clear and simple are the controls to record and understand?
Is the equipment designed to detect or prevent errors?
Is the workplace layout user friendly?

Step 3 - Identifying suitable risk control measures

Solutions should be systematically evaluated and only the optimum solutions should be considered for use.

If several risk control measures are identified they should be carefully prioritised as a risk control action plan, setting out what needs to be done, when and by who.

Assign responsibly for this to ensure the time taken for implementation is monitored.

Questions and answers

Q1 - What risk control measures are needed or recommended?

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

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 that

- Use safer products
- Eliminate the risk
- Reduce the risk at source (eg. providing PPE)
- Minimise the risk by relying on human behaviour (eg. safe working procedures)

Q2 - Do similar risks exist elsewhere? If so what and where?

Having concluded your investigation of the adverse event, consider the wider implication:
Could the same thing happen elsewhere in the organisations, school or service, or at another location? What steps can be taken to avoid this?

Even if events have not occurred at other locations, make an evaluation as to whether risks are the same and the same or similar risk control means are appropriate.

Q3 - Have similar adverse events happened before?

If they have, why have things been allowed to happen again?

Step 4 - The action plan and its implementation

The desired outcome of a thorough investigation is an action plan for implementing additional risk control measures. The action plan should have SMART objectives, (Specific, Measurable, Agreed and Realistic with Timescales.)

Managers, 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 given the highest priority should be implemented immediately. In deciding the priority you should consider the magnitude of the risk. Ask yourself:

- 'What is essential in 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.

Each risk control measure should be assigned a timescale, and a person made responsible for implementing it. Progress on the action plan should be reviewed regularly and any significant departures from the plan should be explained, and risk control measure rescheduled.

Questions and answers

Q1 - Which risk assessments and safe working procedures need to be reviewed and updated?
Q2 - Have details of adverse events and the investigation findings been recorded and analysed?

Q1 - 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 the investigation should indicate areas of your risk assessment that need improving. Are they really suitable and sufficient?
Failing to review the relevant risk assessments after an adverse event could mean you are contravening the Management of Health and Safety at Work Regulations 1999 Reg. 3(3)

Q2 - Have details of adverse events and the investigation findings been recorded and analysed?

- Are there any trends of common causes which suggest the need for further investigation?
- What did the adverse event cost?

In addition to the prompt notification of RIDDOR to the HSE you should keep your own records of all adverse events, their causes and remedial measures taken. This will

enable you to monitor your health and safety performance, help you detect trends and the common causes of adverse events, and improve your current understanding of managing risk.

It is also useful to estimate the cost of adverse events and fully appreciate the time lost of accident and ill health.

Keywords and definitions

"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 mill will be taken to include dangerous occurrences);
  - **Undesired circumstances** - a set of conditions or circumstances that have the potential to cause injury or ill health, e.g. untrained nurses handling heavy patients.
- **Dangerous occurrence -** One of a number of specific, reportable adverse events, as defined in 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, (the guard is missing or the employee slips for example). There may be several immediate causes identified in any one adverse event.

Consequence:

- **Fatal -** Work-related death:
- **Major injury or 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;
- **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 by a combination of the likelihood of a specific undesirable event occurring, and the severity of the consequences (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 -** 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, For example:
    - Pre-startup checks are not carried out on machinery by supervisors
    - The hazard has not been adequately considered via a suitable and sufficient risk assessment;
    - Production pressures are too great

Appendix 2

Adverse event report and investigation form

1. Overview	Enter details of accident or incident onto Sentinel accident reporting system. See separate guidance for information
2. Initial assessment To be carried out by person responsible for safety	See assessment form (worked example)
3. Gather Information	See investigating information safety form (worked example)
4. Analysis What were the immediate underlying and root causes?	See analysis and further action (worked example)
5. What risk/lab measures are needed/recommended	See risk control measure form
6. Risk control action plan - Why risk control measures should be implemented in long and short term	See risk lab action plan (worked example)

Appendix 2a

Worked example

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

Type of event

Accident	**X**
Ill Health	
Near-miss	
Undesired Circumstances	

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 Willis		**Date**: 23.06.06
Further investigation required? Yes	**Y/N**	**Priority** Immediate
For investigation by: Peter Peterson (fitter), John Evans (foreman) and Richard Willis		

Appendix 2b

Investigation information gathering form

1. Where and when did the adverse event happen?

Wood machine shop
Monday 23rd July 2003 at 11.00am

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

Norman Brown - Injured person wood machinist
No witness

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.
Sharp cut 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.

Investigation information gathering form

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

Severe lacerations 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 no, 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

12. Were the people involved competent and suitable?

Norman was a qualified wood machinist with 9 year's 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

Investigation information gathering form

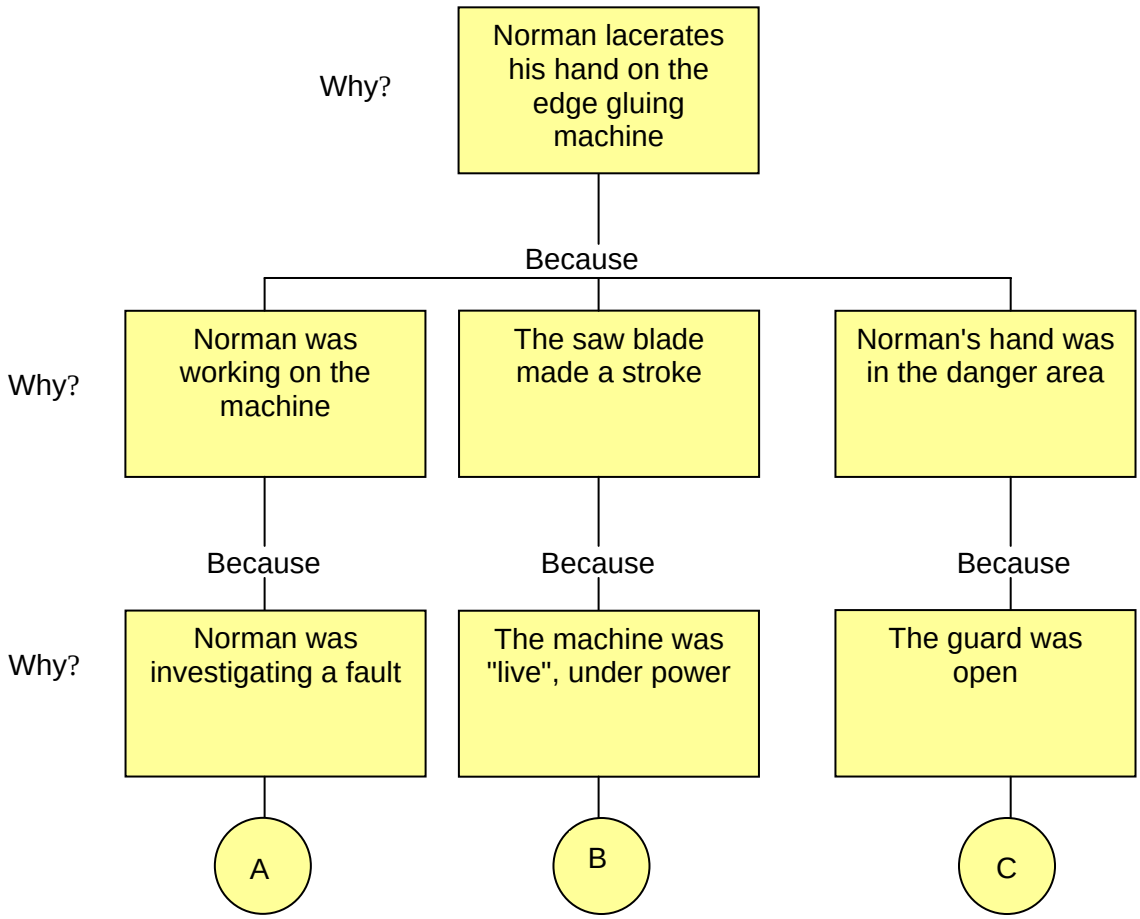
14. Did the nature or shape of the materials influence the adverse event? Yes - access to the edger is difficult. Access to the viewing window in the guard is difficult.
15. Did difficulties using the plant and equipment influence the adverse event? Yes, in that the edge gluer was malfunctioning.
16. Was the safety equipment sufficient? No - the interlock switch was of a type easily defeated.
17. Did other conditions influence the adverse event? No

Appendix 2c

Analysis and further action form

18. What were the immediate, underlying and root causes?

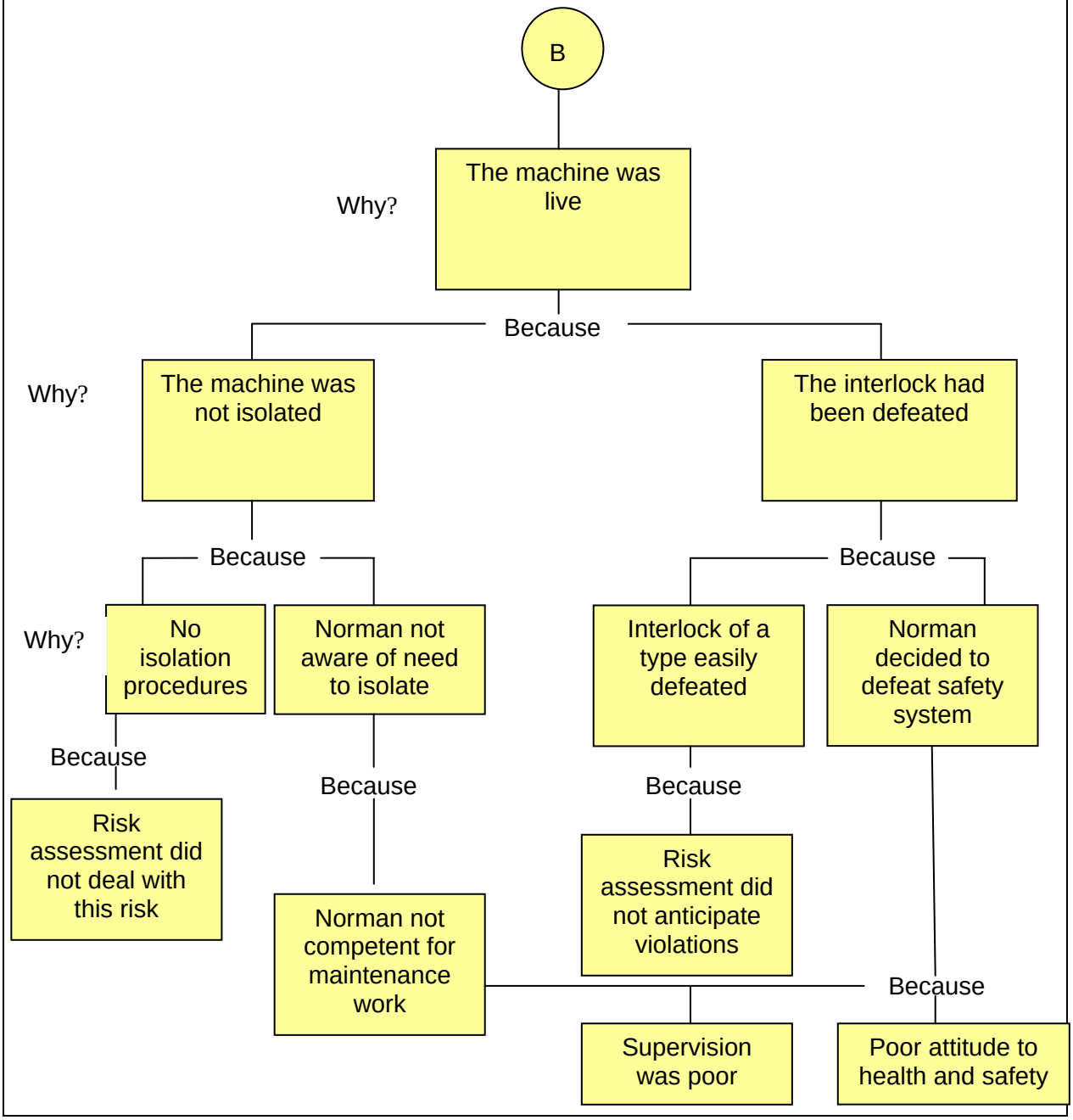
Analysis (See "Analysis" under "Step two")



Analysis and further action form

18. What were the immediate, underlying and root causes?

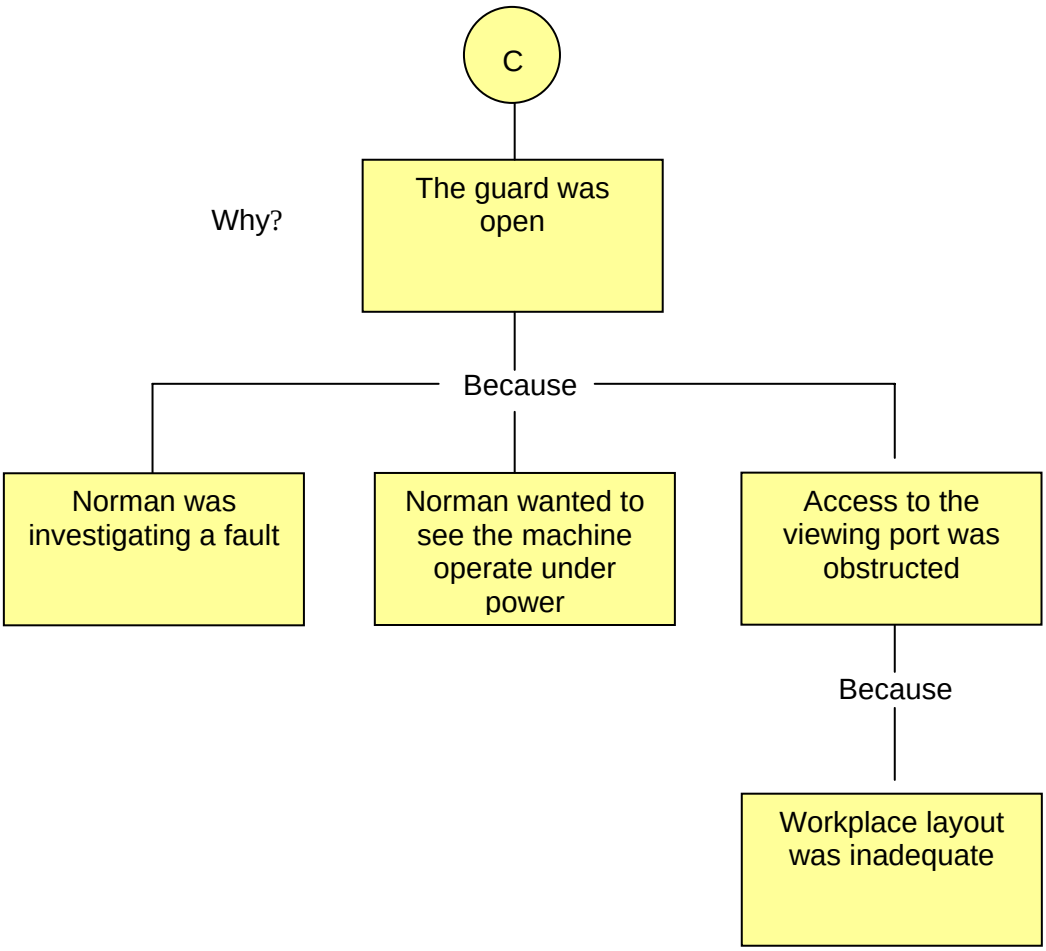
Analysis (See "Analysis" under "Step 2")



Analysis and further action form

18. What were the immediate, underlying and root causes?

Analysis **(See "Analysis" under "Step 2")**



Analysis and further action form

18. What were the immediate, underlying and root causes?

Analysis **(See "Analysis" under "Step 2")**

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 point.
6. The operator opens the guards and defeats the interlock.
7. The machine make 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 health and safety not communicated to employees, health and safety assistants not fully competent and resourced unclear lines of communication and responsibilities.

Analysis and further action form

19. 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

Appendix 2d

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 (health and Safety)
3. Prepare SWP's for isolation and reporting and repair/maintenance	1.12.03	John (foreman) Richard (health and Safety)
4. Assess competence and training needs and deliver training	1.12.03 1.3.04	John (foreman) Richard (health and Safety)
5. Prepare/review risk assessments	1.3.03	Richard (health and Safety)

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 (Health and safety)
2. Risk assess for machinery	1st week in July	Richard (Health and safety)

The risk control action plan form

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 Willis	Health and Safety Officer
John Evans	Foreman
Peter Peterson	Fitter

Appendix 2e

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		

Appendix 3

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 the people segregated from the 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 substance/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	Design	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	Co-operation	Communication	Competence	Design	Implementation	Risk Assessment
1. Were there safe working procedures and instructions for the task 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

4 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 cause by:							
• Fatigue - not enough rest breaks, working excessive hours, already tired? • Lack of motivation or boredom? • Being distracted? • Being preoccupied, e.g. angry, or excited? • Being under too much pressure, i.e. too much or too many things to do? • Too little time? • Taking substances, such as alcohol, medicine or drugs?							
If it was a violation (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?

Cooperation

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 these 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. Where 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

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 or 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 and 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