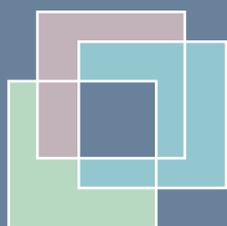




International  
Labour  
Office  
Geneva



# Investigation of Occupational Accidents and Diseases

A Practical Guide for Labour Inspectors



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A Practical Guide for Labour Inspectors

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## Contents

Abbreviations .....	IV
Definitions .....	IV
Preface .....	V
<b>1. Introduction .....</b>	<b>1</b>
1.1 What is an investigation? .....	1
1.2 What makes a good investigation? .....	2
1.3 What gets investigated? .....	5
<b>2. Skills required by investigators .....</b>	<b>7</b>
2.1 Interviewing skills .....	8
2.2 Questioning witnesses .....	10
<b>3. Main stages of an accident investigation .....</b>	<b>13</b>
3.1 Preparations before starting the investigation .....	13
3.2 Gathering information .....	15
Arrival at the site .....	19
Prior to leaving the site .....	20
3.3 Analysing the information .....	21
3.4 Identifying preventive/risk control measures .....	25
3.5 Implementing an action plan .....	26
3.6 Completing the report/documenting the information .....	27
<b>4. Accident investigation checklist .....</b>	<b>29</b>
<b>5. Investigation report .....</b>	<b>33</b>
<b>Case study: Employee injured while operating a circular saw bench .....</b>	<b>37</b>
Step 1: Actions to take upon receiving notification of the accident .....	37
Step 2: Gathering information .....	38
Step 3: Analysing the information .....	43
Step 4: Identifying preventive/risk control measures .....	45
Step 5: Implementing an action plan .....	46
Step 6: Investigation report .....	46

## Abbreviations

**ILO** International labour Organization  
**OSH** occupational safety and health

## Definitions

**Occupational accident** – An occurrence arising out of, or in the course of, work which results in a fatal or non-fatal injury, e.g. a fall from a height or contact with moving machinery.

**Occupational disease** – Covers any disease contracted as a result of an exposure to hazards arising from a work activity e.g. asthma resulting from exposure to wood dust or chemical compounds.

**Dangerous occurrence** – A readily identifiable event, as defined under national laws and regulations, with the potential to cause an injury or disease to persons at work or to the public, e.g. a crane toppling over that results only in damage to property.

**Near-miss/incident** – An event, not necessarily defined under national laws and regulations, that could have caused harm to persons at work or to the public, e.g. a brick that falls off scaffolding but does not hit anyone.

*In this guide, any reference to an “accident investigation” may refer to any of the above unless specifically identified.*

**Hazard** – Anything with the potential to cause harm, such as chemicals, electricity, work on ladders, an unguarded machine, an open drawer, demanding and stressful work, etc.

**Risk** – The risk is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.

# Preface

In 2014 the International Labour Organization (ILO) estimated that occupational accidents and work-related diseases cause over 2.3 million fatalities per year, of which over 350,000 result from occupational accidents and close to 2 million from work-related diseases. In addition to these fatalities, it is estimated that there were over 313 million non-fatal occupational accidents (requiring at least four days of absence from work) in 2010. These figures, while astounding, do not convey the pain and suffering of the global workforce and their families or the global economic losses to enterprises and societies.

Whilst not forgetting that occupational accidents and work-related diseases are preventable it is also essential that lessons are learned when they occur. This will enable workers and employers to take preventive action to improve working conditions, which, in turn, will lead to a reduction in the number of such incidents.

In order to learn from these events, it is crucial that effective investigations are conducted to determine the immediate, underlying and root causes and to identify appropriate risk control measures that can be implemented in order to reduce the likelihood of recurrence.

One of the roles of labour inspectors is to conduct such investigations and this publication has been developed in order to provide information, guidance and a methodology to assist them with this important task.

The guide was developed in conjunction with the ILO International Training Centre in Turin following a workshop on conducting occupational accident and disease investigations, which was attended by constituents from Brazil, Italy, Norway, Portugal, Romania, the United Kingdom and the United States of America and technical specialists from the Labour Administration, Labour Inspection and Occupational Safety and Health Branch of the international labour office.

I trust that it will serve as a useful source of information for labour inspectors and others involved in investigations and will allow readers to help the ILO to deliver an improvement in working conditions and a reduction in occupational accidents and work-related diseases.

**Ms Nancy J. Leppink**

Chief

Labour Administration, Labour Inspection and Occupational Safety and Health Branch

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# 1. Introduction

This guide is designed to equip labour inspectors with the necessary skills to conduct effective investigations into occupational accidents, occupational diseases and other undesired events (such as dangerous occurrences and near miss/incidents) that could have led to personal injuries affecting workers or members of the public. It should be borne in mind that occupational accidents, diseases and other undesired events are preventable. Conducting an effective investigation will identify not only causal factors, but actions that would have prevented the event from occurring.

The guide provides inspectors with information on the importance of, and a suggested methodology for, conducting effective investigations and compiling reports.

While the ILO understands that other methodologies for conducting investigations are available, it believes that following the methodology presented below will help inspectors to identify all the immediate and root causes of the event under investigation. This, in turn, will enable inspectors to help employers, enterprises and worker representatives to identify appropriate prevention/risk control measures to prevent a recurrence of the actions that led to the event under investigation, thereby improving occupational safety and health (OSH) management.

## 1.1 What is an investigation?

An investigation into an occupational accident, disease or dangerous occurrence (near miss)

- identifies how and why an undesired event (accident, contraction of a disease, dangerous occurrence, near miss) occurred; and
- establishes actions required to prevent a similar event,

thereby leading to an improvement in occupational safety and health management.

Investigations carried out by labour inspectors should also identify, with regard to the event under investigation:

- all those with legal obligations – e.g. the enterprise, managers, workers, suppliers etc.;
- the applicable legislation, whether it has been violated and any associated enforcement decisions; and
- actions required to ensure that the enterprise complies with all relevant OSH legislation.

The investigation is **reactive** because an event must occur before it can be investigated. The labour inspector must determine not only what the result of the event was, but also how and why it occurred so that control (safety) measures can be identified and implemented to prevent its recurrence, thereby improving safety and health management. In addition, as part of the inspector's job is to ensure that employers and workers comply with national legislation, including OSH legislation, legal issues relating to the investigation must be addressed.

**Any investigation must answer six basic questions, the 5Ws and 1H:**

**Who** was injured, suffered ill health or was otherwise involved in the event under investigation?

**Where** did the accident occur?

**When** did the accident occur?

**What** happened at the time of the accident?

**How** did the accident occur?

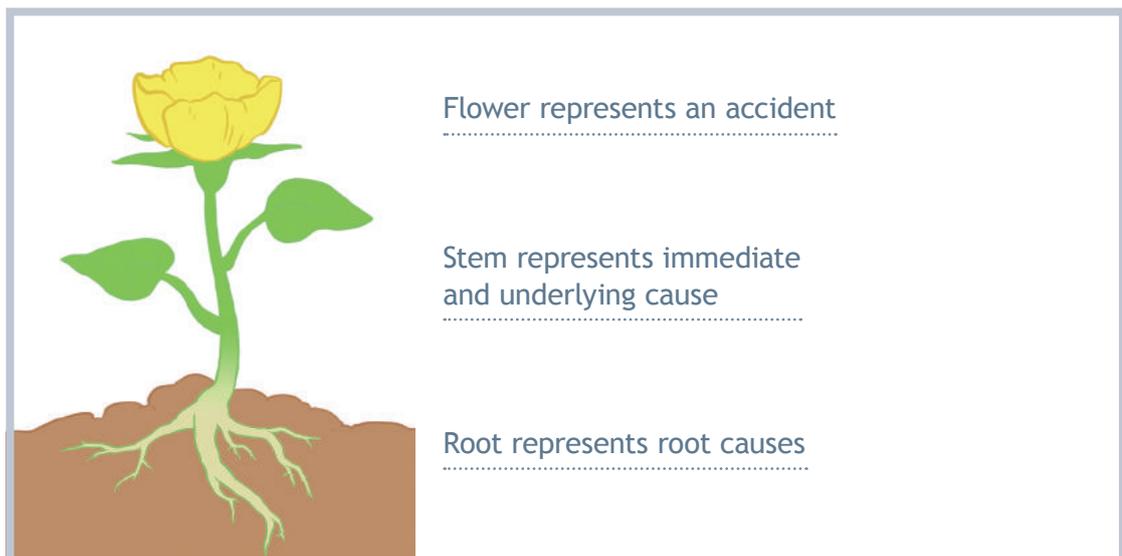
**Why** did the accident occur?

The skill required for an accident investigation is to find the answers to these six fundamental questions.

## 1.2 What makes a good investigation?

A good investigation will identify the immediate and underlying cause(s) of the accident, its root cause(s) and the prevention and control measures required in order to break the chain of causation.

In the case of this plant, while the stem is the flower's most obvious support, its roots are also needed.



The same is true of most accidents. If the flower represents an accident and the stem is cut, the flower will die but the plant will be able to flower again since the root system has not been destroyed; in other words, another accident may occur.

Let us look at an accident scenario:

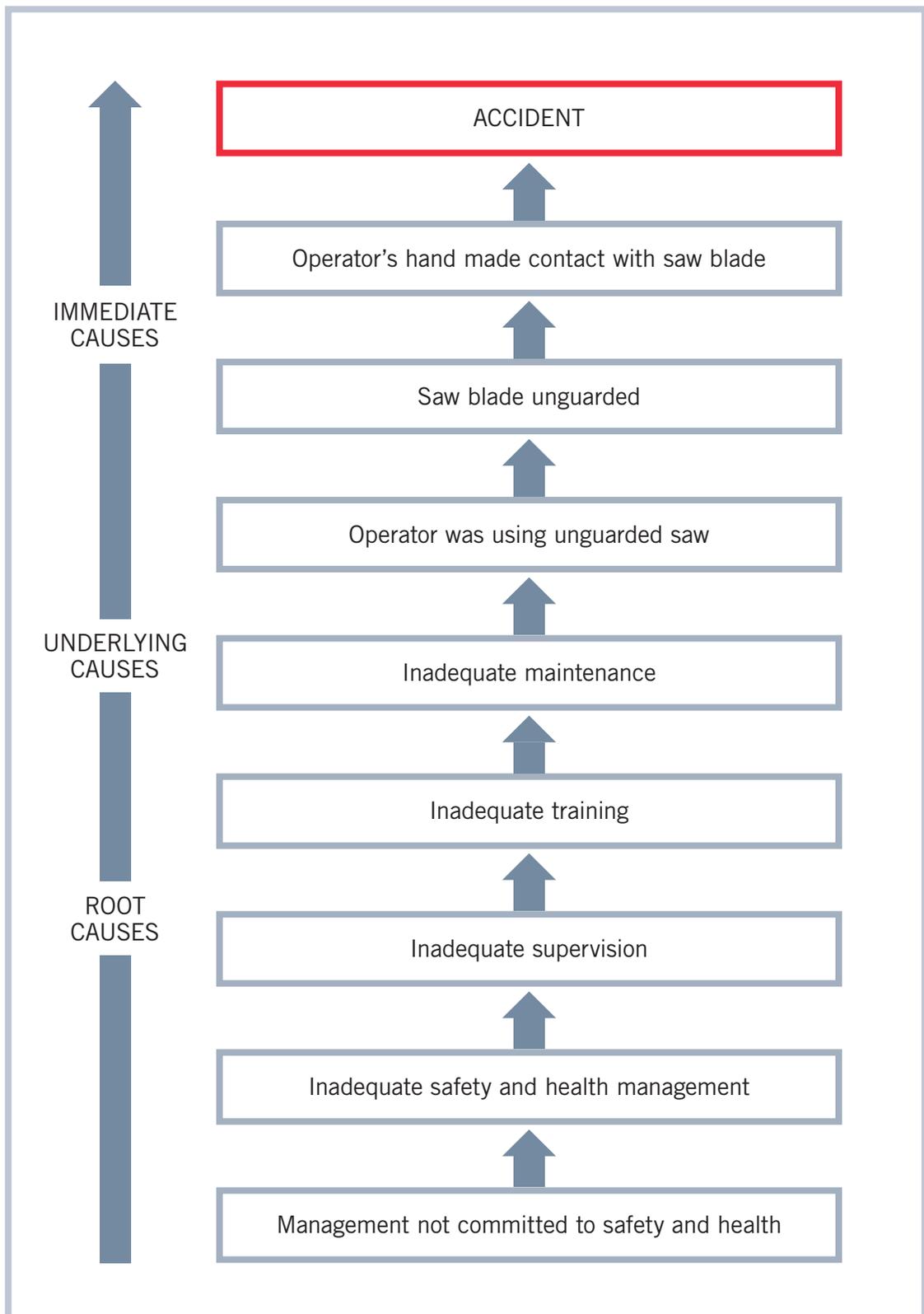
**An operator was injured when his hand came into contact with the blade of the circular saw bench that he was operating.**



The investigation will identify both the immediate cause of the accident – the operator's hand came into contact with the saw blade – and the underlying causes, including the fact that the blade was not guarded and that the operator was using the saw in this unsafe condition. However, a thorough investigation will also identify the root causes of the accident, for example – and this list is not exhaustive – why the saw blade was not guarded, why the operator used the saw in that condition and what procedures the enterprise had put in place to ensure that the machines were only used when properly guarded and that operators and supervisors were correctly trained in safe working practices.

When conducting investigations, inspectors must be aware that accidents are the result of multiple causes (immediate, underlying and root) or defects in a system.

The following diagram shows a causation chain:



## 1.3 What gets investigated?

A very small percentage of accidents, diseases and dangerous occurrences – and indeed, very few near misses – are investigated. There are a number of possible reasons, including inspectors who are not aware of the incident (lack of reporting) and lack of resources. For whatever reason, if accidents are not investigated, opportunities to identify their causes and required risk control measures to prevent their recurrence are lost. It is therefore vital that when investigations are conducted, they are thorough and identify all the causes, immediate, underlying and root, and the appropriate control measures to prevent recurrences.

Most countries have legislation requiring employers to report accidents to the authorities and compliance gives inspectorates an opportunity to decide whether to investigate, perhaps by using accident selection policy criteria. However, even where legislation is lacking or compliance limited, inspectorates may become aware of accidents through the media, the social security authorities, the injured persons or their families and this information can be used to inform the decision as to whether the incident will be investigated.



## 2. Skills required by investigators

Before inspectors begin to lead investigations, it is vital that they are familiar with all relevant national legislation, their inspectorial powers and the inspectorate's procedures. Owing to the wide international diversity on these matters, this guide can only provide illustrative examples.

The relevant national legislation comprises not only the relevant OSH legislation, but also the legislation governing evidence collection procedures, continuity (chain of custody) as well as the rules to be observed when obtaining statements, including whether other persons may be present during the process, how the information may be recorded, e.g. in writing or digitally, and whether and how such statements must be signed.

As regulators, inspectors must be conversant with their powers as established in national legislation. Such powers are likely to include, among other things, the right to enter premises without prior notice, conduct examinations to ensure that the relevant legal provisions are being observed, question witnesses, collect documentary information, take enforcement action and collect materials for testing.

The inspectorate's investigation procedures and practices must also be known. These may cover the composition of the investigation team (required resources); the policies and/or memorandums of understanding for inter-agency cooperation; the communications policy (dealing with the media, communicating with injured persons and with relatives of the deceased and sharing the findings of the investigation); involvement of worker and employer representatives in the investigation; and reporting (completion of initial, interim and final reports).

### Inspectors will also need the following skills:

- **Interviewing** – the ability to draw out the relevant information through effective questioning
- **Communication (verbal and written)** – the ability to interact effectively with injured persons, witnesses and suspects, as well as other investigators, and to communicate the findings of the investigation to a wide variety of individuals and organizations
- **Technical competence** – the awareness of safe working procedures that should be adopted, with particular relevance to the event under investigation
- **Hazard recognition** – the ability to ensure workers and investigators are not exposed to unnecessary risk
- **Interaction** – personal attributes that enable effective relations with other people
- **Deduction** – the ability to scrutinize all the evidence obtained, e.g. through observation, from witnesses' statements and from documentary evidence, and to form a coherent picture that enables the causal factors to be identified

- **Organizational** – the ability to record and organize the information obtained
- **Attention to detail** – the ability to ensure that all reasonable lines of enquiry have been followed.

## 2.1 Interviewing skills

When conducting investigations, inspectors will find themselves speaking to witnesses, including employers, managers, worker representatives, workers and injured persons, and will thus need to possess and/or develop interviewing skills. The information obtained from the above groups will depend not only on the approach taken by the inspectors, but also on the witnesses'

- Past experience
- Training and education
- Age
- Physical condition
- Stress
- Peer pressure
- Personal interests/home life
- Job satisfaction/security
- Ambition.

Therefore, investigators should take these matters into account when questioning witnesses and analysing the information obtained.

One investigative interviewing technique is known as “the **PEACE** Interview”:

**P** – Planning and preparation  
**E** – Engage and explain  
**A** – Account, clarify and challenge  
**C** – Closure  
**E** – Evaluation

**P – Planning and preparation.** The purpose of an interview is to obtain information, usually by asking the witnesses questions. Investigators must know what information is needed and which questions will produce the required information. The amount of planning required for the interview will depend on the stage of the investigation and on who is being questioned. However, it is unlikely that an interview can be carried out without some form of planning.

This stage of the process involves identifying not only the questions to be answered, but also the resource requirements for the interview and the role of the interviewers. It is not

unusual for inspectors to make a written record of what a witness has stated to be the truth, a witness statement. These statements are generally made in response to questions, which will, of course, require planning. National legislation or best practice may establish requirements for interviewing certain witnesses and/or suspects, e.g. the need for two interviewers or specific recording procedures, and these must be followed.

If the interview will be conducted by two interviewers, they should agree on their roles during this planning and preparation stage. There is generally a lead interviewer, who asks questions and probes the answers to obtain further information. The second interviewer takes notes on responses, asks additional questions at the lead interviewer's invitation, and then summarizes the witness's replies to a particular line of questioning and invites him or her to confirm the accuracy of the summary or provide clarification, giving the lead interviewer time to prepare for the next line of questioning. This process is followed throughout the interview.

**E – Engage and explain.** This is the beginning of the interview. It is often the investigators' first contact with the witness and thus has a bearing on the relationship that they will build with the witness or suspect. The investigators should explain what the purpose of the interview is and how it will be conducted; national legislation may also establish how the interview is to be carried out.

Since the witnesses have probably never been interviewed by a person in authority, e.g. a labour inspector, putting them at ease may make it easier to obtain accurate information.

**A – Account, clarify and challenge.** This involves two stages of the interviewing process. Initially, the investigators request the witness to tell them what happened, bearing in mind that, if they interrupt, they will break the witness's thought process and information may be lost. Initially, the witness should be encouraged to provide information on all aspects of the investigation; the investigators may then request further clarification.

Only when all the information has been obtained is the challenge part of the interviewing process conducted, sometimes after a break. During this stage, the witness is asked to explain any inconsistencies between his or her account and information that has previously been obtained. This explanation should be requested in a non-accusatorial manner as it is not known which of the witnesses' accounts is accurate.

During this stage, it is vital for the investigators to show that they are listening, for example by making eye contact, nodding, taking only brief notes and thanking the witness for answering the question; witnesses are far more likely to provide information if they believe that the investigators are interested in what is being said. If no interest is shown, it is likely that the answers will be much briefer and information may be lost.

The questioning of witnesses is a skill and will be discussed below.

**C – Closure.** When the investigators believe that they have obtained all available information from the witness, they should summarize the information, ask whether the witness

agrees with the summary and, if not, request clarification. The interview is then closed and the witness is thanked; this is important since treating witnesses professionally and courteously makes them more likely to agree to further interviews if necessary. The investigators should also tell the witness what will happen next, for example, that the information provided by all the witnesses will be reviewed and a report prepared.

**E – Evaluate.** Once information has been obtained from witnesses, it must be evaluated by the investigators to ensure that all relevant questions have been answered. This evaluation may reveal the need for further interviews or, on the contrary, enable some lines of inquiry to be closed.

## 2.2 Questioning witnesses

Before questioning witnesses, investigators must ensure that they will be able to communicate with them. It is vital that the witness clearly understands the questions; in some cases, the services of an interpreter may be required.

At the beginning of an interview, the inspectors do not know what information the witness can provide. The type of question asked will affect the witness's responses, and thus the information obtained.

There are two types of questions:

Open questions  
Closed questions

**Open questions** require a longer, perhaps descriptive, response; they cannot be answered in one word. (Example: Please explain what was happening at the time of the accident?)

**Closed questions** can usually be answered by a single word and can be used to establish facts (Example: Did you drive to work? How old are you? Were you at work yesterday?)

Interviewers should also beware of asking leading questions, e.g. questions that plant a thought in the mind of the witness, usually by suggesting or pointing towards a desired answer. A leading question may be either open or closed. Examples:

- Why was the vehicle going too fast? This is an open leading question; the witnesses are likely to provide a descriptive answer even if, at the time, they did not actually think that the vehicle was going too fast.
- Do you think the injured person was rushing? This is a closed leading question; the answer provided will be “yes” or “no”, but the witnesses may say “yes” even if, at the time, they did not think that the injured person was rushing.

**Consider these examples:**

1. What speed was the **car** doing when it **careered** into the other vehicle?
2. What speed was the **car** doing when it **hit** the other vehicle?
3. What speed was the **car** doing when it **bumped** into the other vehicle?
4. Can you estimate the speed of either vehicle at the time of the accident?
5. What do you think about the two vehicles' speed at the time of the accident?

Examples 1 to 3 are leading questions, which, in descending order, may reduce the speed of the car in the witness's mind: **careered** implies a violent contact while **bumped** implies a far gentler one. Examples 4 and 5 are more neutral, although question 4 is a closed question as the witness could answer "No". Question 5 is an open question that is more likely to obtain information that will be of use to the investigation.

Investigators should also ensure that their questions can be answered by the witness. For example, it would be inappropriate to ask "Could your supervisor see everything too?" since the witness cannot know what someone else was able to see.

Investigators must also be aware of "hearsay", e.g. information that the witness received from someone else. For instance, if the witness is asked, "How was the machine set up at the time of the accident?" and replies, "So-and-so (a co-worker) told me that the guard was not fitted", this is hearsay as the witness is stating what their co-worker told them rather than what they actually had knowledge of. In this case, the investigators should first identify and then question the co-worker about how the machine was set up.

During many interviews, the investigators show the witnesses documents and photographs. In such cases, it is vital that they are labelled appropriately.

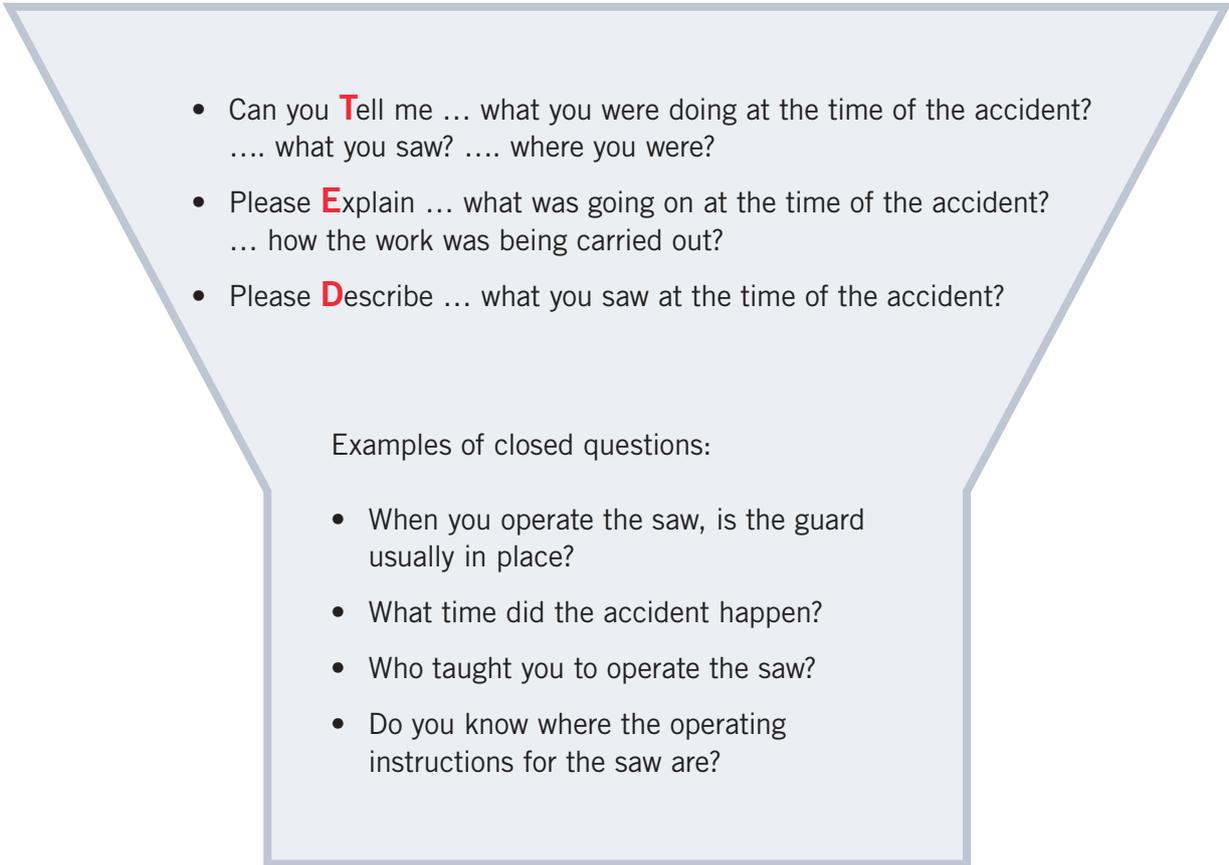
For example, if the photograph shown below is labelled "AFC1" and shown to witnesses, asking them to describe what it shows, they will use their own words. However, if it is labelled "AFC 1 showing unguarded angle grinder with inappropriate electrical connections", the witnesses will be less likely to describe what they see in the photograph and more likely to describe what they have been told that it shows.



The above matters should be taken into account when planning the interview, deciding which exhibits will be placed before the witness and drafting the questions; however, new issues may arise during the interview and further planning may be required, do not be afraid to take a break and decide what additional questions to ask.

One method of questioning witnesses during an interview is known as the “funnel” approach, whereby general information is collected by asking open questions, after which more specific and detailed information is sought using closed questions.

The open questions used in the first instance are known as **Tell, Explain, Describe (TED)** questions:

- 
- Can you **T**ell me ... what you were doing at the time of the accident?  
.... what you saw? .... where you were?
  - Please **E**xplain ... what was going on at the time of the accident?  
... how the work was being carried out?
  - Please **D**escribe ... what you saw at the time of the accident?

Examples of closed questions:

- When you operate the saw, is the guard usually in place?
- What time did the accident happen?
- Who taught you to operate the saw?
- Do you know where the operating instructions for the saw are?

**Remember:** When conducting interviews, do not show emotions, do not agree or disagree with the witnesses and do not help them answer any question it is the information they have that you require. If they begin to offer their own views on the event or their excuses and explanations for what happened, politely request that they stick to the facts.

## 3. Main stages of an accident investigation

There are six main stages of an accident investigation:

1. Preparations before starting the investigation
2. Gathering the information
3. Analysing the information
4. Identifying preventive/risk control measures
5. Implementing an action plan
6. Completing the report/documenting the information

### 3.1 Preparations before starting the investigation

Once the decision to investigate an accident has been made, the investigating inspector(s) has/have a number of things to do before visiting the site.

Consideration should be given to the possibility of contacting the enterprise to inform it that, other than taking emergency action – i.e. giving first aid and ensuring that the site is safe, which in some cases may have to be done prior to giving first aid – **the scene must be preserved**. Inspectors should aim to begin the investigation as soon as possible after they receive notification of the accident. It is likely that the scene of a serious and fatal accident will be visited within a very short time of the event.

However, for less serious accidents, the inspectors may not be able to immediately visit the site and it would be helpful for the employer and/or worker representative to photograph the scene. Inspectors will, of course, have to consider the accuracy of the photographs with which they are provided when they begin their investigation.

In addition, inspectors should:

- (1) Ensure that they are fully aware of:
  - The relevant national OSH legislation and national legislation regarding the collection of evidence
  - Their inspectorial powers
  - The Inspectorate's investigation policies/procedures, including any memorandums of understanding with other agencies.

- (2)** Determine whether they need assistance from colleagues. In some situations, this will be useful, as when investigating a fatal accident or an accident involving specific hazards that may require support from specialized inspectors. However, many investigations can be conducted by a single inspector with the necessary experience.
- (3)** Collect any information or records that the Inspectorate has on the enterprise in order to provide the inspector with basic information on, for example, its size, the number of employees, the types of processes carried out, its accident history and its attitude towards the Inspectorate and towards OSH management.
- (4)** Ensure that the required personal protective equipment is available; inspectors must not expose themselves to risk and should set an example to employers and workers. For example, it would be inappropriate for them to enter a construction site for which protective footwear and a hard hat were required without wearing it themselves.
- (5)** Ensure that they have equipment to record the site conditions and the information supplied, including, among other things, cameras with still and video capability (remember extra batteries and memory card/film), tape measures, notebooks, writing materials, a torch (flashlight) and a mobile phone.
- (6)** Provide themselves with the necessary legal paperwork. These will depend on national legislation but may include stop notices, statement forms, means to record and tag physical evidence and other paperwork that inspectors may be required to complete during the initial stages of an investigation, e.g. initial reports and internal forms for management; the requirements may vary depending on the seriousness of the incident under investigation.
- (7)** Bring guidance materials. If it is known what machinery was involved in the accident, it may be useful to provide the enterprise with any available documentation on its safe operation; these materials may also be useful to the investigator.
- (8)** Carry food and water since they have no way of knowing how long they will be on-site; caring for their own needs shows their impartiality and independence.
- (9)** Ensure they have the appropriate identification, warrant card and visiting cards.
- (10)** Ensure they know the exact location of the accident and have the means to travel to and from the site.

## 3.2 Gathering information

Once the inspectors arrive on site, they can begin to gather the information that will enable them to answer the 5Ws and 1H questions in order to understand what happened. This is a required step before the necessary prevention and control measures to prevent a recurrence can be identified. It is a vital part of the investigation and should not be rushed.

Inspectors need to gather information from the injured person, people who saw the accident (eye witnesses) and other witnesses, e.g. workers and managers. They will also gather information from what they see at the enterprise, the photographs they take and the documents and, potentially, machine parts and samples they obtain.

The information obtained should cover the site of the accident, the equipment and its condition at the time of the event, the working conditions and the way in which the work was being carried out.

**Information, also known as evidence, is usually classified into one of three categories:**

- 1. Witness information/evidence,**  
e.g. information obtained from people
- 2. Physical information/evidence,**  
e.g. machine parts, dust or chemical samples and personal protective equipment
- 3. Documentary information/evidence,**  
e.g. manufacturer's operating instructions, enterprise records, safety data sheets, photographs and security videos.

When carrying out an investigation, it is not unusual to obtain a great deal of information and it is not always easy to keep track of its origins. It is important to develop a method of recording the evidence.

Witness information can be recorded on a statement form or in the inspector's notebook. The method used will depend on several factors, including national legislation, the stage of the investigation and the type of information required. When interviewing witnesses, investigators should make sure to identify the person who provided the information by recording his or her full name, date of birth, position/working title and/or other specific identifying information. This ensures that the inspectors can locate the witness again if necessary.

When gathering physical information, it is important to record exactly what was obtained and where it was obtained. When taking photographs, it is useful to follow a methodology, for example, beginning with the general scene and then focusing more and more closely on the accident site.

Where possible, equipment and other objects should be photographed in position before being removed. National legislation may stipulate how this type of information is to be treated/handled in order to ensure the continuity of evidence, and inspectors need to be aware of these requirements.

When gathering documentary evidence, e.g. taking photographs, inspectors should make a note of what the photograph shows. This may appear obvious, but it is a good habit to cultivate. It may be useful to create a template/table for recording such photographs:

Photographs taken at enterprise:		
On: (date)		At: (record time)
Photographer's name	Photograph number	Description of photograph

It is unlikely that all of the photographs taken will be needed; however, those that are used may need to be recorded as an exhibit with a unique identifying number. If so, the information may be transferred to an exhibit table or log (see below).

When documents are supplied by individuals, the inspector should record the document's content, who provided it and the date and time that it was received, e.g. "Obtained from Ms Sarah Jones on 12/4/12 at 13.15, a 15-page document entitled 'Operating instructions for the Freeman model 183 circular saw bench'". In this case, the document was labelled SJ1. It may also be useful for the person who provided the information to sign the record in confirmation of that fact, particularly where national legislation requires a subsequent statement from the provider of the information.

Keeping a log of such information enables inspectors to manage and retrieve it more easily:

Exhibit number	Exhibit reference	Description of exhibit	Obtained from, on, at	Exhibited by (witness and statement number)	Page/para. of relevant statement	Exhibit storage location
1	SJ1	15-page document entitled "Operating instructions for Freeman model 183 circular saw bench"	Ms Sarah JONES, on 12/4/12 at 13.15			Evidence store
2	CFS1	Photograph of Freeman model 183 circular saw bench	Mr Carlos FLOREZ SÁNCHEZ, on 12/4/12 at 10.20			

The remaining information can be filled in if and when statements are obtained.

A similar log can be used to record statements:

Statement number	Date obtained	Witness name (full)	Role / occupation
1	13/4/12	Pablo MARTINEZ	Injured person/Employee – circular saw bench operator
2	15/4/12	Thomas Andrew WATSON	Employee – circular saw bench operator
3	18/4/12	Jane SAVAGE	Employee – machine shop supervisor

In both of the above cases, it will be easier to retrieve the information for re-examination if the exhibits and statements are stored in numerical order.

Inspectors visiting the scene will be looking for information that will enable them to answer the **5Ws** and **1H** questions, e.g.:

- Where and when the accident happened
- The precise details and severity of the injuries and how they were caused, as well as the worker's job title, employment history at the site, date of birth and contact information
- Details of the work activity in which the injured worker was engaged and the system of work in use at the time of the accident
- Details of the equipment that was in use, including make, model and serial number, as well as other equipment, such as ladders, scaffolding, electric cables and personal protective equipment
- Information on the exact condition of the equipment in use, including location, guarding arrangements and position of control switches, before and after the accident
- The names, contact information and position of other workers at the scene and information on the activities and systems of work in which they were engaged
- The system of work that would normally have been used to carry out the activity in which the injured person was engaged, and any differences from the system of work that was being followed at the time of the accident
- The environmental conditions at the time of the accident, e.g. day or night, weather conditions
- The general conditions at the workplace, including housekeeping, lighting and noise levels, vehicle movement, ventilation equipment, welfare facilities.

The inspectors may also wish to obtain documentation, which may include but not be limited to:

- Employment/contract records for the injured person(s) including any training records
- Maintenance and service records for the equipment in use
- Manufacturer's operating instructions for the equipment in use
- Safety data sheets for any substances in use that had a bearing on the accident
- Enterprise workplace inspection reports
- Workplace and equipment risk assessment reports
- OSH committee minutes
- Previous accident reports
- Photographs taken by the enterprise and/or workers, security videos.

## Arrival at the site

When the inspectors arrive at the site, they should identify themselves to the relevant parties, state their objectives for the visit and then visit the scene of the accident.



The inspectors should be careful when approaching the site and ensure that it is safe. They should not place themselves or others in danger; for example, when investigating an incident in which someone had been overcome by fumes, it would be important to ensure that the area had been ventilated before entering. The people on site may have assessed the site conditions and concluded that it is safe to enter the accident scene, but inspectors must still satisfy themselves that entering the accident area will not result in exposure to unnecessary risk.

When viewing the accident site, it should be borne in mind that rescue operations may have altered the scene and that the conditions may not be as they were at the time of the event. This will have to be verified during the investigation.

Inspectors should also remember that the investigation they are about to conduct is theirs; it is they who will determine the order in which activities will be carried out and the information that they wish to collect rather than being led or guided by employers and workers. A visit to the accident site is usually one of the first activities to be carried out. It is more than likely that the persons whom the investigator has met have already visited the scene and formed an opinion as to what happened. If they begin to share these opinions, the inspectors should politely advise them that this information will be collected later but that, as they have just arrived, they need to see the accident scene; only then will they be in a position to continue with the investigation. When looking at the scene, the inspectors should remember to keep an open mind since they do not yet know what happened.

In some instances, other enforcement authorities/agencies, such as the police and representatives of the Coroner's Office or an environmental agency, may be present. Inspectors should be aware of any inter-agency agreements so that all agencies are able to carry out their work and should ensure that everyone knows which is the lead agency and how the

evidence collected will be handled and shared. Other authorities may be able to provide useful information; however, it is very important that investigators keep an open mind when visiting the accident site.

Inspectors should remember to use multiple methods to record the information obtained, e.g. cameras, entries in notebooks and sketches. They should not rush; it is better to record too much information than to miss important evidence.

Depending on the complexity of the accident under investigation, the inspectors may or may not be able to gather all the required information at one time; a single visit may be sufficient for a simple investigation, but for more complex investigations they must identify the persons with whom they need to speak by analysing the information obtained.

Having visited the accident scene and obtained as much first-hand information as possible, the investigators may find it useful to remove themselves from the scene to collect their thoughts before speaking to witnesses. This will give them time to plan and prepare their initial questions, bearing in mind that they will have only one chance to do so before the witnesses discuss matters among themselves, after which the truth may be more difficult to obtain. Once again, the investigators must remember that it is their investigation and see that it progresses as they wish.

Since there may be insufficient time and resources to speak to all the witnesses during the first visit, it is important to determine the order in which the witnesses will be interviewed and to obtain preliminary statements as soon as possible, perhaps during the initial visit, so that the information provided represents what the witnesses know or saw, not what they have heard or been told.

## Prior to leaving the site

Inspectors must remember that one of their roles is to ensure that working conditions are such that the safety and health of workers is protected. They do so by securing by compliance with the relevant legislation.

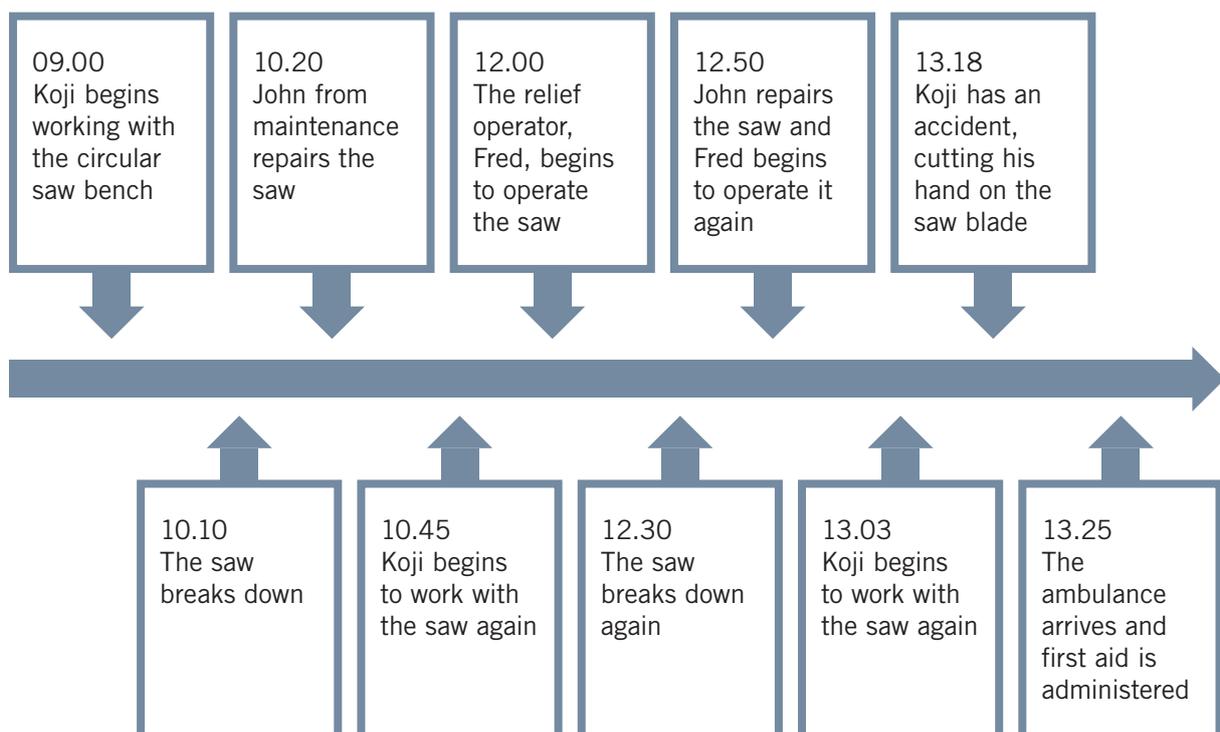
Where the inspectors are visiting a site following an accident, it would be inappropriate to leave the site without ensuring that any causal factors identified as contributing to it are not present elsewhere. For instance, if one of the causal factors was that a machine was unguarded, the inspectors should ensure that all machines in use are guarded. They may not have the means to inspect all areas of the enterprise, but they should confirm that both employers and workers are following safe systems of work.

### 3.3 Analysing the information

Having gathered information, inspectors should organize and analyse it in order to identify all the causal factors – immediate, underlying and root – that led to the accident (“**what**” happened and “**why**” it happened). In many cases, the immediate and underlying causes are easy to identify, while the root causes remain unknown.

Examples of immediate causes include the agent of injury, e.g. a blade or a chemical. Examples of underlying causes include the lack of a machine guard and failure to follow instructions or to maintain the equipment. Examples of root causes include poor building and machine layout, excessive time pressure and failure to identify safe systems of work (by conducting a risk assessment) or to ensure that they are followed.

One way of organizing the information obtained is to create a timeline of events:



As seen from the above example, the timeline helps investigators to determine “**what**” happened – in this case, Koji’s accident – but not “**why**” the accident occurred.

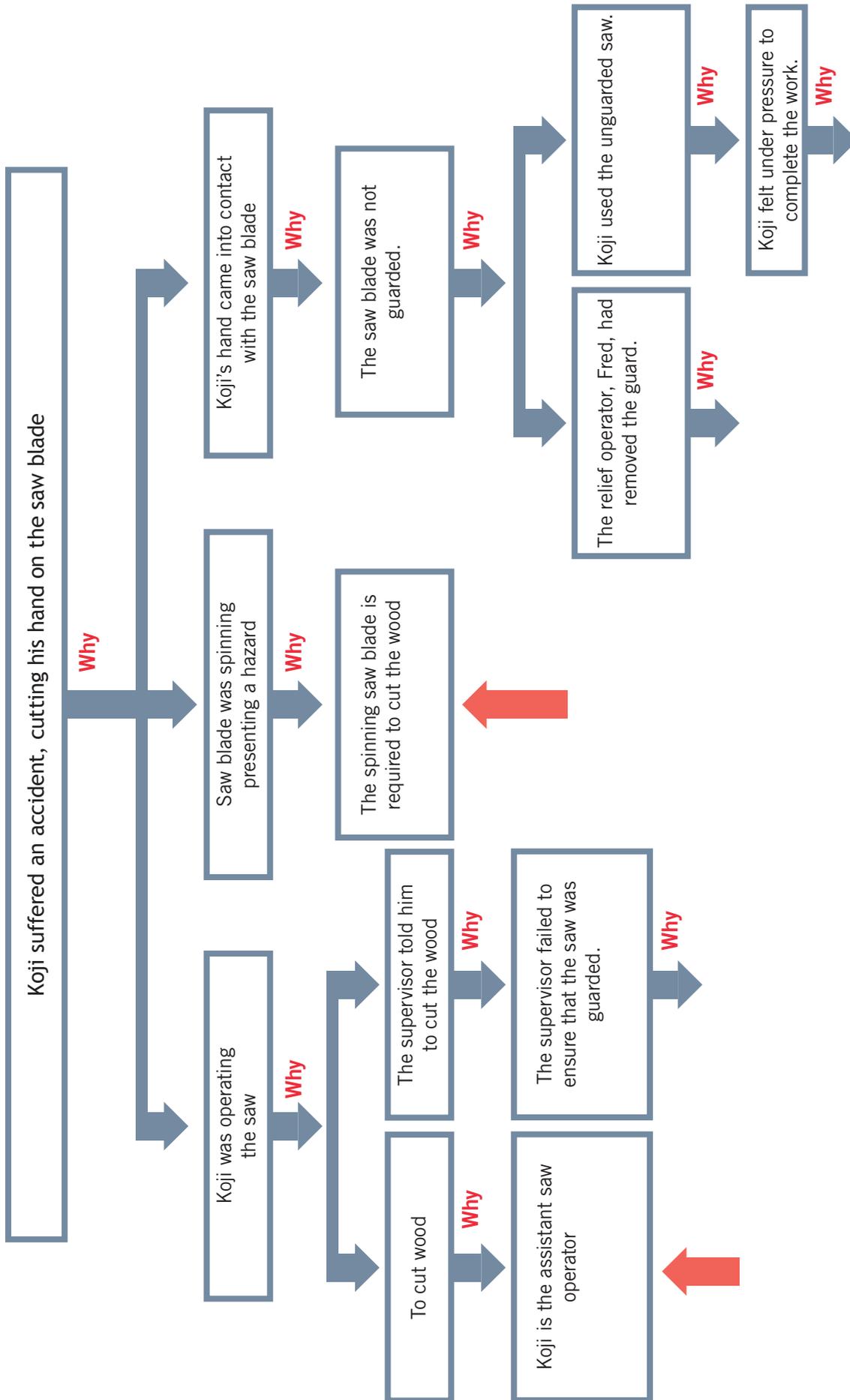
One way to answer the “**why**” question is to conduct a “**fault tree**” analysis. This technique, shown in the following diagram, reconstructs the events and conditions that led to an accident by continually asking the question “**why?**” and working backwards, beginning with the incident under investigation. In this example, the tree begins when Koji cut his hand on the saw. The second line identifies the vulnerable person (Koji), the hazard (the saw blade) and the circumstances that brought them together (Koji’s hand came into contact with the blade).

The investigator continues to ask “why?” until the answer is no longer meaningful; in the example below, the line of “why” questions might be abandoned after “to cut wood” but other lines of inquiry could be pursued, e.g. “why” Fred removed the guard; “why” Koji felt pressure to complete the work, etc. In pursuing the line of “why” questions, the investigator may identify a need for additional information or the questions may be answered by information that has already been obtained.

Where there is no answer to a “why” question, the inspectors will have to seek out the necessary information, bearing in mind that information is factual; it cannot be presumed but must be obtained.

An analysis of the information obtained should enable the inspectors to identify first the immediate cause(s) of the accident and then the control measures – in the above example, guarding the circular saw bench–will prevent the immediate cause(s) from recurring. However, the underlying/root cause(s) of the accident – in the above example, why the saw was not guarded at the time of the accident – must still be identified to ensure that the immediate cause – the unguarded saw – does not recur.

For every immediate cause of an accident, the inspectors must identify all the underlying root causes that allowed the immediate cause to exist. Identifying and taking corrective action to prevent recurrence of the root causes reduces the likelihood that a similar accident, or indeed other accidents, will occur.



Other lines of questioning that require answers will emerge, for example, “Why didn’t the supervisor ensure that the saw was guarded? Why did Fred remove the guard?” and so on.

Inspectors may determine that human failings contributed to the accident, in which case the type of failing must be identified so that appropriate corrective action can be taken. They must also realize that such failings do not normally occur in isolation. Employee error is unlikely to be the sole cause of an accident; all the reasons must be identified.

#### **Human failings fall into three broad categories:**

- Skill-based errors, which occur (a) when carrying out a familiar task incorrectly, e.g. flipping the wrong switch; or (b) when a familiar task, e.g. closing a guard before operating a piece of equipment, is not carried out. Measures can be taken to reduce the likelihood of this type of error, for example by installing an interlocked guard so that the equipment will not operate unless the guard is closed.
- Mistakes, which may be (a) rule-based, e.g., a rule is in place but the operator fails to apply it correctly or applies the wrong rule; or (b) knowledge-based, e.g. there is no rule covering the situation and the operator takes the wrong decision on the basis of his or her own knowledge. Detailed safe systems of work, comprehensive training and good equipment design help to reduce both types of mistake.
- Violations such as rule-breaking and deliberate attempts to defeat a safe system of work. Appropriate training and adequate supervision helps to prevent violations of the rules.

If human failings are identified as one of the causal factors of an accident, the investigators must recommend action that can be taken to reduce the likelihood of recurrence. In making such recommendations, they should be aware that many factors (see below) can influence human behaviour and must be taken into account.

#### **Human factors**

- Physical ability (size and strength)
- Competence (knowledge, skills and experience)
- Fatigue, stress, morale, alcohol or drugs.

#### **Job factors**

- How much attention is needed for the task?  
(Either too little or too much can lead to higher error rates)
- Divided attention or distractions
- Inadequate procedures
- Amount of time available.

### Organizational factors

- Work pressure, long hours
- Availability of sufficient resources
- Quality of supervision
- Management's commitment to safety and health ("safety culture").

### Plant and equipment factors

- How clear and easy to read and understand are the controls?
- Is the equipment designed to detect or prevent errors (for example, by using different-sized connectors for oxygen and acetylene bottles to prevent errors in connecting hoses)?
- Is the workplace layout user-friendly?

Having identified all the causal factors in the accident, the inspectors must now turn to the issue of risk control measures.

## 3.4 Identifying preventive/risk control measures

By now, the investigators will have determined the sequence of events that led to the accident (what happened and why). They must now identify all the risk control measures that, had they been in place, would have prevented the accident from occurring by breaking the chain of events that led to it.

While all possible risk control measures must be identified at this stage of the investigation, the inspectors will not necessarily require the enterprise to implement each and every one of them. Some of the measures identified, if put in place, have the potential to prevent not only similar accidents, but others as well.

When all of the possible control measures have been identified, the next step is to decide which of them to recommend and what the implementation priorities should be.

**The following hierarchy of risk control measures should be followed:**

1. Elimination: measures that eliminate risk, e.g. by using safer products (water- rather than solvent-based paints)
2. Substitution: e.g. replacing a machine currently in use with one that has a better guard or a product which is less hazardous
3. Engineering controls: measures that reduce the likelihood of exposure to the hazard, e.g. the installation of guards or local exhaust ventilation
4. Administrative controls; measures that minimize the risk through safe systems of work, e.g. rotation of workers to reduce exposure or increased safety signage
5. Personal protective equipment: to be used where collective protective measures (those that protect several workers) cannot be identified.

The rationale for this hierarchy is that, if the hazard is removed, a similar accident cannot occur; moreover, solutions that rely on elimination, substitution and engineering controls are more dependable than those that rely on human action.

It must be borne in mind that, whichever control measure is chosen, information, instruction and training will be needed in order to ensure a reduction of the risks; the inspectors may also identify a need for training as a preventive measure.

Generally, one of the inspectors' roles is to ensure that workplaces are safe and that employers and workers comply with national legislation. Issuing personal protective equipment may improve the immediate safety of the workplace, but longer-term action, e.g. the installation of local exhaust ventilation, will reduce the risk for everyone present. By identifying all possible control measures, the inspectors will be better able to advise on ways to improve safety in the workplace, and thus long-term compliance with the relevant legislation.

## 3.5 Implementing an action plan

At this point, the investigation will have identified a selection of risk control measures that could be implemented. Some may require immediate implementation, e.g. reattaching guarding to machinery, while others may require more time, e.g. installing local exhaust ventilation or completing in-depth risk assessments.

The inspectors must ensure that the enterprise and its workers take the necessary steps to prevent a similar accident from occurring. To that end, they may take immediate action, e.g. by issuing an enforcement notice requiring that a guard is fitted and/or a letter setting out the action to be taken required within prescribed time periods.

The inspectors' action plan may include follow-up visits to verify that there has been a general improvement in working conditions at the enterprise and that the agreed actions have been completed.

## 3.6 Completing the report/documenting the information

No investigation is complete without a final report. The level of detail in each report will vary and will depend to some extent on the complexity of the event that led to the investigation.

The report provides a record of the investigation into the incident. It should explain what happened and why, as well as the action taken to prevent a recurrence. It is likely that the findings of the investigation will be communicated to a variety of individuals and organizations, for example: internal management, the injured person or the deceased's family, the employer and workers at the site where the accident occurred, workers' and employers' organizations, other agencies involved in the investigation, legal teams and the media. The information contained in the various sections of the report can be used to publicize the lessons learned, thereby ensuring the safety of workers at other enterprises.

National legislation and/or inspectorate procedures may require inspectors to use an investigation report template; this ensures that all investigations follow a similar procedure and helps to ensure consistency.

If templates are used, care should be taken to ensure that their use does not limit the information recorded. Fields should not be limited as to size as this often reduces inputs, despite instructions to use additional pages if necessary.

When completing reports, it is important to recognize that the reader will not have the in-depth knowledge of the event that the investigators have acquired; therefore, all relevant details should be included. Appropriately labelled photographs and sketches will also give the reader a better understanding of the accident.

The report should include information on the witnesses who provided information or made statements and on the exhibits obtained (see the examples provided in Section 3.2 above).



## 4. Accident investigation checklist

It is important to realize that this checklist is not exhaustive; it is designed to prompt consideration of the areas to be covered in an investigation. Some of these areas may not need to be covered or, on the other hand, all of them and additional ones as well may need to be addressed.

The goal is to answer these questions:

**Who? Where? When? What? How? and Why?**

### 1. Action to be taken upon notification of the accident

- Advise the enterprise of the inspectors' intention to visit and instruct it to leave the area undisturbed.
- Identify the appropriate human resources.
- Ensure all investigators carry formal identification.
- Gather the previous enterprise inspection records.
- Ensure that the necessary personal protective equipment is available.
- Ensure that all site recording equipment is available, including cameras with still and video capability (remember extra batteries and memory card/film), tape measures, notebooks, writing materials, a torch (flashlight) and a mobile phone.
- Ensure that the necessary legal paperwork is present.
- Identify the relevant guidance material.
- Identify the appropriate means of transport to the site.

### 2. Gather information

**A. Upon arrival at the site identify the employer and worker representatives and explain the purpose of the visit.**

**B. For each injured worker, collect the following information (this list is not exhaustive):**

- The precise details and severity of the injuries and how they were caused, as well as the worker's job title, employment history at the site, date of birth and contact information
- Where and when the accident happened
- Details of the work activity in which the injured worker was engaged and the system of work in use at the time of the accident

- Details of the equipment that was in use, including make, model and serial number, as well as other equipment, such as ladders, scaffolding, electric cables and personal protective equipment
- Information on the exact condition of the equipment in use, including location, guarding arrangements and position of control switches, before and after the accident
- The names, contact information and position of other workers at the scene and information on the activities and systems of work in which they were engaged
- The system of work that would normally have been used to carry out the activity in which the injured person was engaged, and any differences from the system of work that was being followed at the time of the accident
- The environmental conditions at the time of the accident, e.g. day or night, weather conditions
- The general conditions at the workplace, including housekeeping, lighting and noise levels, vehicle movement, ventilation equipment, welfare facilities.

**C. Obtain the following documents (this list is not exhaustive):**

- Employment/contract records for the injured person(s) including any training records
- Maintenance and service records for the equipment in use
- Manufacturer's operating instructions for the equipment in use
- Safety data sheets for any substances in use that had a bearing on the accident
- Enterprise workplace inspection reports
- Workplace and equipment risk assessment reports
- OSH committee minutes
- Previous accident reports
- Photographs taken by the enterprise and/or workers, security videos.

**Remember:** When collecting information, label it and record who provided it and when. When taking photographs, note what they show (use the template provided in Section 3.2 above).

**Before leaving the site,** *ensure that working operations similar to those that led to the incident under investigation are not present in other parts of the enterprise.*

#### D. Interview the witnesses:

- Identify all witnesses and, once the planning has been completed, begin the interviews.
- Use the **PEACE** model (**P**lan, **E**ngage, **A**ccount/Challenge, **C**losure, **E**valuate).
- Use “**TED**” (open) questions to obtain information.
- Use closed questions to clarify facts or obtain specific information.

### 3. Analyse the information obtained

Complete the timeline to establish the sequence of **what** happened and conduct a fault tree analysis to identify **why** it happened. Keep asking “why” questions until no more meaningful information is obtained.

### 4. Identify risk control measures

Identify all of the preventive control measures that would have broken the chain of causation and determine which of them are to be implemented in the future, following, if possible, the hierarchy of controls: Elimination, Substitution, Engineering controls, Administrative controls, Personal Protective Equipment.

### 5. Monitor implementation of the action plan

Ensure that the agreed actions designed to improve working conditions have been completed, including, among other things, by conducting follow-up visits.

### 6. Complete report(s)/document information



## 5. Investigation report

### Part A – Investigation details

(It may be useful to create a template with fields to be filled in.)

- A1** Name(s) of the enterprise(s) (Give the full name of the legal entity)
- A2** Address(es) of the enterprise(s) (For companies, include the registered office address; for individuals, include any personal identification details)
- A3** Role of the duty holder (employer, self-employed, contractor, etc.)
- A4** Address/location of the incident (address at which the incident under investigation occurred)
- A5** Date on which the investigation commenced
- A6** Investigation number
- A7** Event under investigation (Give a brief summary of the subject of the report)
- A8** Date on which the incident occurred
- A9** Name(s) and address(es) of the injured and/or deceased person(s)
- A10** Name, department and full office address of the lead investigator
- A11** Names of other investigators in the same department as the lead investigator
- A12** Names and contact information of the other investigators
- A13** Further dates of the investigation

### Part B – Factual report

**B1** Description of the facts and circumstances that led to the accident/incident. This section should be confined to factual information, cross-referenced to the relevant statements, documents, sketches or photographs. Provide a comprehensive account of the facts. In the event of conflicting accounts, do not comment on the merit of any particular version.

Where appropriate, the account should be structured into sub-sections covering, for example:

- Plant, equipment and substances
- Systems of work
- Training, instruction and supervision
- Risk assessment
- Outcome and consequences, e.g. the extent of any injury.

**B2** Preventive measures taken by the duty holder(s) BEFORE the incident (Describe the safety and health risk control measures in place before the accident occurred.)

**B3** Safety and health management (Where appropriate and to the extent not covered above, describe the safety and health management system in place before the incident, including any arrangements between duty holders that are relevant to the investigation.)

**B4** Preventive measures taken by the duty holder(s) AFTER the incident (Describe the measures taken after the event in order to secure compliance. State which measures resulted from the investigators' intervention, including enforcement action.)

**B5** Safety and health management changes AFTER the incident (Describe any changes not covered by the previous categories. State where they resulted from the investigators' intervention, including enforcement action.)

### Part C – Analysis of the event and compliance with the legal requirements

**C1** The investigators' conclusions as to the cause(s) of the accident (Describe the immediate and underlying causes. This is the point at which the investigators, having analysed the facts, can offer their opinions of what happened and why.)

**C2** Legal requirements (List the relevant legal provisions.)

**C3** Application of the law (Stipulate which of the legal provisions listed in section C2 above have been violated) It is useful to include comments on:

- The extent to which the risk could have been foreseen and the reasonable practicability of effective preventive measures
- The relevant standards and their source (national guidance, international standards, etc.)
- The effectiveness of the control measures and management arrangements in place before the accident
- The nature and extent of the violations, e.g. how far below the expected standard the duty holder fell and whether the violation was an isolated occurrence.

## Part D – Action taken or proposed

**D1** The investigators should record any action taken or planned in order to comply with the relevant legislation and prevent a recurrence of the incident. This may include verbal advice, written advice, improvement notices, prohibition notices (stop orders) or prosecution.

### **Appendix 1**

Details of the witnesses who supplied the information

### **Appendix 2**

Details of the exhibits obtained

### **Appendix 3**

Mandatory log books, decision-recording forms, etc.



## Case study: Employee injured while operating a circular saw bench

Owing to differences in national legislation, this case study does not address legal issues, including those relating to compliance with OSH legislation and the interviewing of witnesses or collection of evidence. It does, however, lead the reader through the investigative process.

**Scenario.** The Inspectorate has received information that, while operating a circular saw bench, a young employee of XYZ Ltd. has suffered a serious hand injury that has resulted in the partial amputation of all four fingers on his left hand.

You are required to investigate the event.

### Step 1: Actions to take upon receiving notification of the accident

#### Before visiting the accident site:

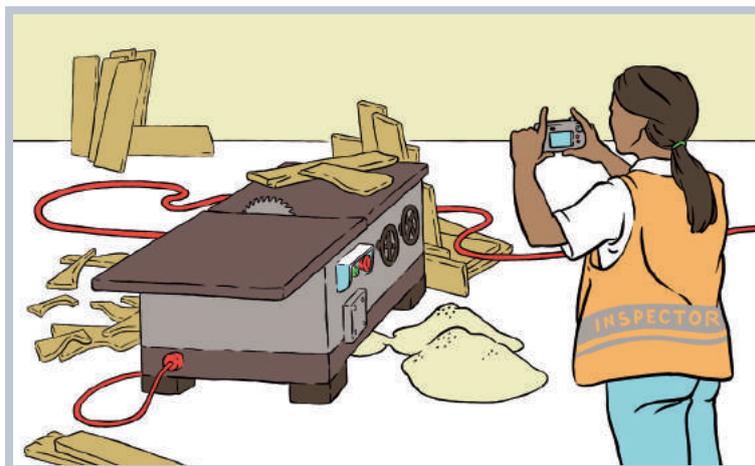
- Inform the owner/manager of XYZ Ltd. that you will be arriving at the site in one hour to begin the investigation and that the accident scene should be left undisturbed. Request details on the address at which incident occurred.
- Collect any information that the Inspectorate has on XYZ Ltd. (manufacturing processes, number of employees, recent inspection records, accident history and the management's attitude towards OSH).
- Ascertain whether this will be a solo investigation or whether an investigation team (>1 inspector) will be required. If so, determine whether resources are available and identify the respective roles of the investigators.
- Make sure that you have all the necessary personal protective equipment and all the required recording equipment, including cameras, batteries, film/memory sticks, tape measures, note books and writing instruments.
- Make sure that you have all the necessary legal paperwork e.g. statement forms and stop notices.
- Determine whether there is any guidance material on the safe operation of circular saw benches.
- Make sure that you and your colleagues have formal identification, visiting cards and the accident investigation checklist with you.
- Arrange for transportation to the accident site.

## Step 2: Gathering information

In order to answer the questions **Who? Where? When? What? How? and Why?**

### Upon arrival at XYZ Ltd.:

- Introduce yourselves to the employer and worker representatives and explain the purpose of the visit.
- Determine the exact time of the accident.
- Identify the injured person: full name, date of birth, sex, job title, length of time in the job and, if known, the extent and severity of the injuries.
- Visit the accident site and identify the make, model and serial number of the circular saw bench and its location. Photograph the saw (making sure to identify the guarding arrangements), the work station and its surrounds. Form an opinion as to whether the accident scene has been altered. Does it look as if a guard was fitted after the event occurred?



- Form an opinion regarding the working conditions; is the area around the accident site tidy? Are there trailing cables or offcuts of wood that could cause someone to trip? What is the level of lighting? Is there sufficient space to operate the saw safely? Is dust collection equipment (local exhaust ventilation) in place?
- Identify any other workers who use the same saw and obtain their contact information.
- Identify the people who may have witnessed the incident, as well as the foreman, and obtain their contact information.
- Request to see the operating instructions for the saw and obtain a copy, noting who supplied it.
- Request to see any employee records for the injured person, including training records.

*You have learned that the circular saw bench in question is a PPPP saw Model 123, serial number 987456. It is located in the centre of the workshop and you note that there is no guard in place, that the power cable is trailing on the floor and that the saw is surrounded by offcuts of wood. No extraction equipment is present and there is a great deal of wood dust on the floor.*

*You have photographed the unguarded saw and the immediate work area.*

*Mr Qwerty of XYZ Ltd. has informed you that the injured worker is Mr. Xavier Jones, aged 17, date of birth 15/4/1992. He is no longer on site as he has been taken to hospital.*

*You have determined that, at the time of the accident, the saw was also being operated by Mr. Taro Yamada, aged 24, date of birth 19/9/1985.*

*At 3 p.m. on 25/9/2009, you were supplied with a copy of the 15-page operating instructions for the saw by the foreman in the woodworking shop, Mr Karim Haddad, and have labelled it KH1.*

In light of the information that you have obtained, you decide to interview Mr Yamada. However, before the interview, you plan the issues that you wish to discuss with him, namely:

- Details regarding the accident, using “**TED**” questions, e.g. Please describe what you saw when Xavier had his accident. Please explain to me what you were both doing.
- Work information: What his usual role is, who gives him his work instructions and whether he and Xavier had worked together before.
- The normal systems of work for use of the saw.
- Obtain personal information, including his job title and length of service in the enterprise.
- Request specific information, including on the normal guarding arrangements and the training received, particularly with regard to operation of the circular saw bench. Has he ever seen the operating instructions.

During the planning stage, you study the operating instructions and note that they cover the saw’s safe operation and guarding arrangements, in particular the use of push sticks and guarding arrangements. You decide to discuss this information with Mr Yamada.

### The interview:

Remember to engage with Mr Yamada as you explain your role as investigator and conduct the interview.

### The interview reveals the following information, which is recorded in a statement following national legislative guidelines:

*As usual, Taro and Xavier had been instructed by the foreman, Karim, to cut 50 pieces of hardwood in half using the PPPP saw Model 123, located in the middle of the workshop. The pieces were initially 1m wide by 2m long and had to be cut lengthwise into pieces measuring 0.5m by 2m.*

*After receiving these instructions, they collected the wood and began to cut it with Taro feeding the wood into the saw and Xavier removing the cut pieces from the circular saw bench. They had cut about 20 pieces when Xavier, on his way back towards the saw, tripped over the power cable and reached out to keep from falling. His hand came into contact with the spinning saw blade and was badly cut.*

*This occurred at approximately 10.45 a.m. on 25/9/2009. Taro and Xavier often worked together on this task and it was always Taro who fed the wood into the saw and Xavier who removed the cut wood from the circular saw bench. Taro is employed as a wood machinist and has worked for XYZ Ltd. for 6 years. Prior to Xavier's arrival, it was he who removed the cut wood from the circular saw bench but, since then, they have divided the work as described.*

*The saw was always set up as it was on the day of the accident; the blade is raised through the bench. There is no guard on the blade, nor has there ever been one since Taro began working for XYZ Ltd. When shown the operating instructions for the PPPP saw Model 123 labelled KH1, he said that he had never seen them before and confirmed that the saw had never been set up as shown in diagram 6, which shows a guard on the blade. He also confirmed that there was no push stick as shown in diagram 8 and that he did not know what its purpose was.*

*Since he and Xavier began working together and he took over the task of feeding the wood into the saw, he has used the same method as the previous operator, whose name he has forgotten. He was given no specific instructions on how to feed the wood into the saw. Except when he is on holiday, he is the only person who operates the saw; when he is away, it is operated by the foreman, Karim.*

In light of the information received from Taro, you decide to interview the foreman, Karim, after planning the matters to be discussed.

You begin by asking “**TED**” questions, including what his job entails and how the saw is set up when he operates it. You also ask whether he witnessed the accident, how long he has worked for the enterprise and to see the employee training records.

**The interview reveals the following information, which is recorded on a statement following national legislative guidelines:**

*Karim is the foreman at XYZ Ltd. and gives instructions to the workers who operate the machinery. He has been employed by the XYZ Ltd for 10 years, initially as a saw operator, and was promoted to foreman five years ago. He considers that his role is to give instructions to the workers to ensure that the clients' orders are filled.*

*He confirms that, at about 09.30 a.m., he asked Taro and Xavier to cut pieces of wood measuring 1m wide by 2m long into pieces measuring 0.5m by 2m using the PPPP saw Model 123, located in the middle of the workshop. He was not in the workshop at the time of the accident and has no direct knowledge of what happened.*

*After hearing about the accident, he called the emergency services and went to the workshop. Xavier was taken to hospital. He confirms that, at 3 p.m. on 25/9/2009, he provided you with the 15-page operating instructions for the PPPP saw Model 123, serial number 987456, which was labelled KH1.*

*He has never seen a guard over the saw blade as seen in diagram 6, and the blade was never guarded when he operated the saw. He does not consider that he is responsible for supervising the systems of work in the workshop, but only for ensuring that the work is done. He is not aware of the existence of any employee training records.*

You decide that the next person to be interviewed will be the injured worker, Xavier Jones, who is in hospital, and you inform the people on site that you will contact them if you require further information.

However, before leaving the site, you take steps to ensure that the working conditions will be safer from now on: you issue a stop order prohibiting the use of the PPPP saw Model 123 until it is appropriately guarded and its power cable has been secured to the floor and covered to reduce the risk of tripping. You also order that the offcuts of wood surrounding the machines are cleared away on a regular basis and that the enterprise reviews the guarding arrangements on other machines to ensure that safe systems of work are in place.

Before interview Xavier, you again plan the interview, beginning with “**TED**” (open) questions about the accident itself (e.g. Please describe what happened, the system of work being followed, explain what are your duties? What instructions were you given? etc.) Before moving on to more closed questions (e.g. What time did you start work? and How long have you worked at this enterprise? What is your job title?). Discuss the operating instructions and the guarding arrangements for the saw and ask whether he received any training and, if so, from whom.

Begin the interview by engaging with Xavier. Explain the purpose of the investigation and your role in it.

**The interview reveals the following information, which is recorded in a statement following national legislative guidelines:**

*Xavier confirms that he was born on 15/4/1992 and that he has been working at XYZ Ltd. for six months. He is employed to help out as needed and works with various people, most often with Taro, whose family name he does not know. Normally his instructions come from Karim, the foreman.*

*On the day of his accident, he started work at 8 a.m. as usual and began by sweeping the back area of the workshop. At about 9.30 a.m., Karim asked him to help Taro collect some wood and cut it into two equal pieces. At 10.15, a.m. after the 10.00 a.m. morning break, they began the task and, as usual, he had to take the cut pieces from the circular saw bench after Taro had fed them through the saw.*

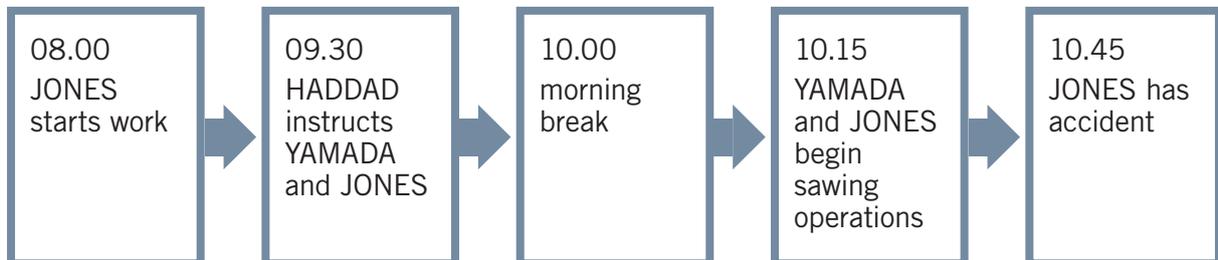
*He cannot remember what time the accident happened, but he was on his way back to the saw after stacking two pieces of wood on the pile when he tripped over the power cable and felt himself falling. He threw out his left arm to catch himself and his hand came into contact with the saw blade, which was still spinning. The saw cut off the 4 fingers on his left hand beyond the first knuckle of the three longest fingers and the second knuckle of the little finger.*

*He confirms that Photo CFS1 shows the saw on which the accident occurred and that, as shown in the photo, there was no guard on the blade. Photo CFS 2 shows the power cable that caused him to trip. (Photographs CFS 1 and 2 were taken by you, the inspector) He states that the first time he worked with the saw, Taro told him what to do and warned him to keep his hands away from the blade; he has received no other instructions. Having been shown the operating instructions for the PPPP saw Model 123 labelled KH1, he states that has never seen them before and that the saw has never been set up as it appears in diagram 6 (showing a guard over the blade). He also states that there was no push stick as shown in diagram 8 and he does not know what its purpose is.*

As the investigator, you now begin to analyse the information that you have gathered.

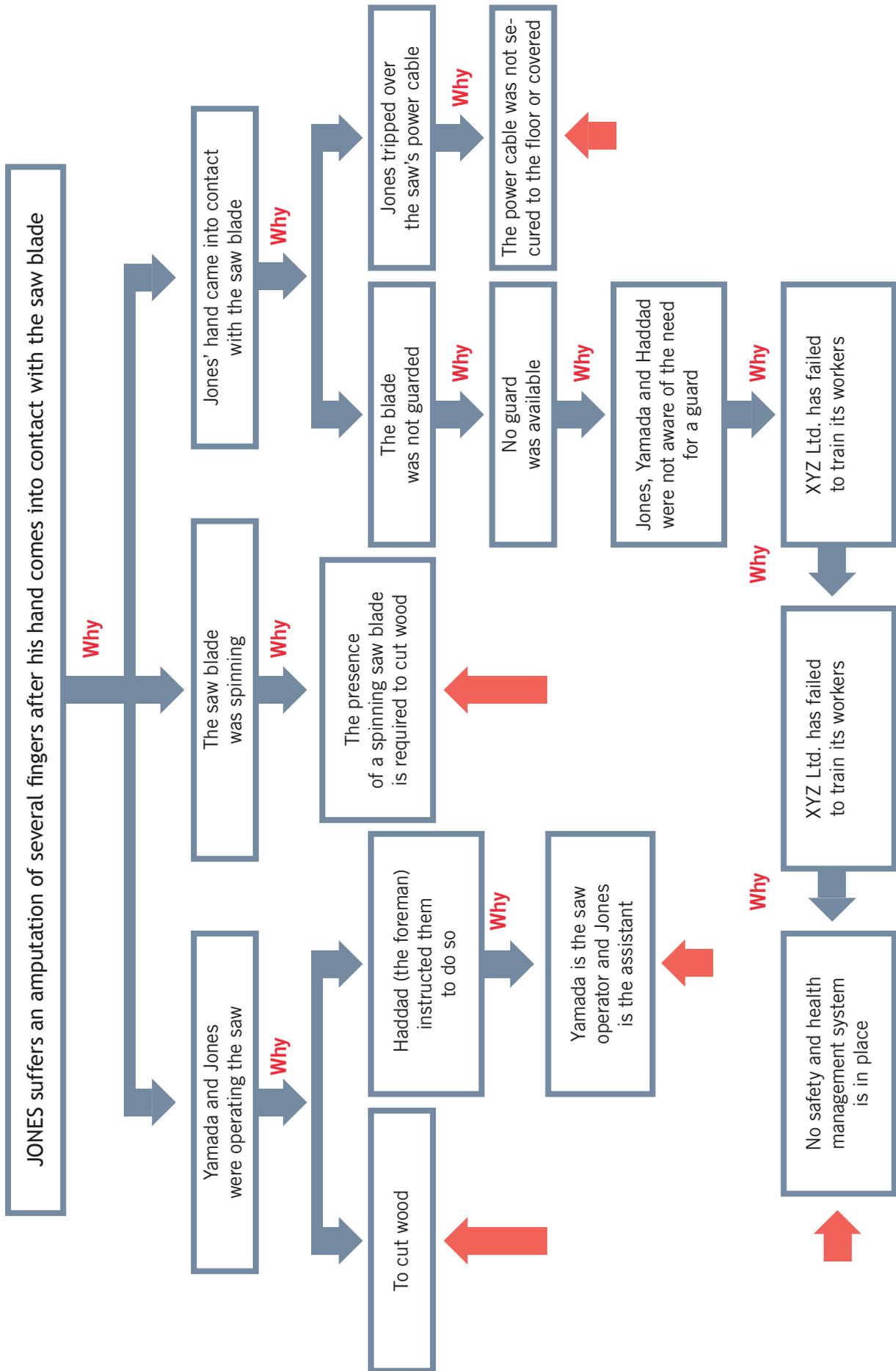
### Step 3: Analysing the information

Since you now know what happened, you begin by producing the timeline:



This information has emerged from the statements that you have taken.

You are then able to conduct a fault tree analysis. By asking “**why**” questions (Why did the event occur?), you should be able to supply the following information on the basis of the witnesses’ statements or your own observations:



## Step 4: Identifying preventive/risk control measures

What are the immediate, underlying and root causes?

### Immediate causes:

- The injured person's hand came into contact with the unguarded saw blade because he had tripped on the saw's trailing power cable, which was unsecured and uncovered.

### Underlying and root causes:

- The saw blade guard was not available.
- There were tripping hazards, including the power cable, in the vicinity of the machines. (Other tripping hazards were also present, e.g. offcuts of wood).
- Space around the woodworking machines was limited.
- XYZ Ltd. had not trained its employees in the saw's operation.
- The supervisor's role was not defined.
- There was no OSH management system to identify hazards and ensure that appropriate risk control measures were in place.

### Risk control measures:

- Obtain and install guard for the saw blade.
- Reroute the saw's power cable or, if this is impossible, secure it to the floor and cover it.
- If possible, rearrange the workshop to provide more space around the machines.
- Increase the frequency of housekeeping to keep the area around the machines clear.
- Train all employees in the safe operation of woodworking machines.
- Train the foremen/supervisors in their supervisory role of ensuring that safe systems of work are in place by conducting regular workplace inspections.
- Establish a safety and health management system that identifies all the hazards present, as well as appropriate risk control measures. Review the system once it is in place to ensure its effectiveness.

## Step 5: Implementing an action plan

Make sure that the risk control measures identified above will be implemented. The time frame for the enterprise to complete this task may vary; some steps may be taken immediately while others may take several months.

## Step 6: Investigation report

### Part A – Investigation details

- A1** Name(s) of the enterprise(s) (Give the full name of the legal entity) *XYZ Ltd.*
- A2** Address(es) of the enterprise(s) (For companies, include the registered office address; for individuals, include any personal identification details)  
*35 Green Road, Blue Square, Flat Country.*
- A3** Role of duty holder (employer, self-employed, contractor, etc.) *Employer*
- A4** Address/location of incident (address at which the incident under investigation occurred)  
*35 Green Road, Blue Square, Flat Country*
- A5** Date on which the investigation commenced *25/09/2009*
- A6** Investigation number *A30697*
- A7** Event under investigation (Give a brief summary of the subject of this report)  
*Mr Xavier JONES suffered the partial amputation of four fingers on his left hand when they came into contact with the saw blade of the PPPP model 123 circular saw bench that he was operating.*
- A8** Date on which the incident occurred *25/9/2009*
- A9** Name(s) and address(es) of the injured and/or deceased person(s)  
*Mr Xavier JONES, Flat 3, Busy Road, Flat Country*
- A10** Name, department and full office address of lead investigator  
*Mr Carlos Florez Sánchez, Ministry of Labour, Labour Inspectorate, 25 High Street, Flat Country*
- A11** Names of other investigators in same department as the lead investigator *NONE*
- A12** Names and contact information of other investigators *NONE*
- A13** Further dates of the investigation *27 and 29/09/2009*

## Part B – Factual Report

### **B1** Description of the facts and circumstances leading to the accident/incident

This section should be confined to factual information, cross-referenced to the relevant statements, documents, sketches or photographs. Provide a comprehensive account of the facts. In the event of conflicting accounts, do not comment on the merit of any particular version.

Where appropriate, the account should be structured into subsections covering, for example:

- Plant, equipment and substances
- Systems of work
- Training, instruction and supervision
- Risk assessment
- Outcome and consequences, e.g. the extent of any injury.

*Mr Xavier JONES, who was working with Mr. Taro YAMADA (statements 1 and 3), suffered a partial amputation of the fingers on his left hand (statement 3) when he tripped over the power cable for the PPPP Model 123, serial number 987456, circular saw bench and his hand came into contact with the unguarded saw blade, shown in photographs CFS 1 and 2 as exhibited by Mr Carlos FLOREZ SÁNCHEZ, Investigator (statement 4). JONES, YAMADA and the foreman, Mr Karim HADDAD (statements 1, 2 and 3) were not aware that the saw blade required guarding as per the operating instructions, KH1 (Exhibit 1), provided by HADDAD. JONES, YAMADA and HADDAD (statements 1, 2 and 3) stated that there was no formal training programme for workers on the woodworking machines and HADDAD (statement 3) stated that he was not aware of any training records.*

### **B2** Preventive measures taken by the duty holder(s) BEFORE the incident (Describe the safety and health risk control measures in place before the accident occurred) *NONE*

### **B3** Safety and health management (Where appropriate and to the extent not covered above, describe the safety and health management system in place before the incident, including any arrangements between duty holders that are relevant to the investigation)

*There was no evidence of a safety and health management system before the accident occurred.*

### **B4** Preventive measures taken by the duty holder(s) AFTER the incident (Describe the measures taken after the event in order to secure compliance. State which measures resulted from the investigators' intervention, including enforcement action.)

*XYZ Ltd. fitted a guard to the circular saw bench and secured and covered the power cable following the issuance of a stop order preventing the use of the machine until it had been appropriately guarded and the tripping hazards around the saw had been removed. The enterprise also initiated a training programme for all wood machine operators and provided HADDAD with clarification of and training in his supervisory role.*

**B5** Safety and health management changes AFTER the incident (Describe any changes not covered by the previous categories. State whether they resulted from the investigators' intervention, including enforcement action.)

*XYZ Ltd. initiated an occupational safety and health management system, identifying the hazards on the premises and suitable risk control measures.*

### Part C – Analysis of the event and compliance with the legal requirements

**C1** The investigators' conclusions as to the cause(s) of the accident (Describe the immediate and underlying causes. This is the point at which the investigators, having analysed the facts, can offer their opinions of what happened and why.)

#### **Immediate causes:**

*The injured person's hand came into contact with the unguarded saw blade because he had tripped on the saw's trailing power cable, which was unsecured and uncovered.*

#### **Underlying and root causes:**

- *The guard for the saw blade was not available.*
- *There were tripping hazards, including the power cable, in the vicinity of the machines. (Other tripping hazards were also present, e.g. offcuts of wood)*
- *Space around the woodworking machines was limited.*
- *XYZ Ltd. had not trained its employees in the saw's operation.*
- *The supervisor's role was not defined.*
- *There was no OSH management system to identify hazards and ensure that appropriate risk control measures were in place.*

*The causes of this accident are outlined above. The accident happened not while the employees were cutting wood, but when the injured person, JONES, tripped while approaching the saw. However, if the circular saw bench had been correctly guarded, the risk of an accident would have been lower even if the employee had tripped over the trailing cable and fallen. The employees were following an unsafe system of work as they had not received training. They had not defeated the guarding arrangements for the saw since no such arrangements were available for them or others to use. The fact that operating the saw in this condition had not resulted in previous accidents does not mean that a safe system of work was being followed. The supervisor, HADDAD, was unaware of the correct guarding arrangements and thus was unable to ensure that safe systems of work were*

*followed; he was also unaware and had not been informed of his supervisory role with regard to safe systems of work. The enterprise was more concerned with ensuring that a product was delivered than with safety in the workplace.*

**C2** Legal requirements (List the relevant legal provisions.)

*This section has not been completed as national legislation varies from country to country.*

**C3** Application of the law- The investigators should determine which of the legal provisions listed in section C2 above have been violated.

*This section has not been completed as national legislation varies from country to country.*

#### **Part D – Action taken or proposed**

**D1** The investigators should record any action planned or taken in order to comply with the relevant legislation and prevent a recurrence of the incident. This may include verbal advice, written advice, improvement notices, prohibition notices (stop orders) or prosecution.

*National legislation varies from country to country; in many instances, sanctions may be called for. The following example shows some of the actions that might be appropriate:*

*On 25/9/2009, a stop order preventing use of the PPPP circular saw bench until a guard had been installed and the trip hazard presented by the power cable had been reduced was issued. The enterprise was instructed to ensure that all operatives received training in the safe systems of work for the use of woodworking machines and to ensure that other work systems were reviewed to verify that appropriate control measures were in place; this was confirmed in writing. It was orally recommended that the areas around all the woodworking machines should be kept clear of offcuts, thereby reducing tripping hazards. Written advice was also provided.*

## Appendix 1

### Information on the witnesses who supplied information

Statement number	Date obtained	Witness's name (full)	Role / occupation
1	25/09/2009	Taro YAMADA	Employee – Circular saw bench operator
2	25/09/2009	Karim HADDAD	Employee – Machine shop foreman
3	27/09/2009	Xavier JONES	Injured person/Employee – Assistant circular saw bench operator
4	29/09/2009	Carlos FLOREZ SÁNCHEZ	Labour inspector

## Appendix 2

### Information on the exhibits obtained

Exhibit number	Exhibit reference	Exhibit description	Obtained from, on, at	Exhibited by (witness and statement number)	Page / para. of relevant statement	Exhibit storage location
1	KH1	15-page document “Operating instructions for PPPP saw model 123”	Mr. Karim HADDAD  25/09/2009 3 p.m.	Mr. Karim HADDAD Statement 2	Page 2, para. 6	Evidence store
2	CFS1	Photograph of PPPP saw model 123	25/09/2009	Inspector CFS Statement 4	Page 1, para. 3	Evidence store
3	CFS2	Photograph of power cable for PPPP circular saw bench model 123	25/09/2009	Inspector CFS Statement 4	Page 1, para. 3	Evidence store

### Appendix 3

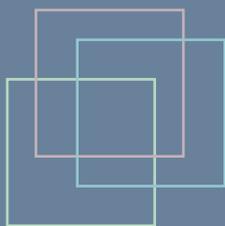
Mandatory log books, decision recording forms etc. *NONE*

## Investigation of Occupational Accidents and Diseases A Practical Guide for Labour Inspectors

The ILO estimates that every day approximately 6,300 people die and 860,000 people are injured or suffer ill health due to occupational accidents and diseases. These figures, while astounding, do not convey the pain and suffering of the global workforce and their families or the global economic losses to enterprises and societies.

Whilst not forgetting that occupational accidents and work-related diseases are preventable it is also essential that lessons are learned when they occur. Effective investigations will determine the immediate, underlying and root causes and identify appropriate risk control measures that can be implemented in order to reduce the likelihood of recurrence.

This guide has been developed in conjunction with, the ILO International Training Centre in order to provide information, guidance and a methodology for labour inspectors and others involved in investigations to ensure that effective investigations can be conducted.



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