Techniques Accident & Incident Investigation

226302001-KM-01-KT-08

QCTO: Occupational Health, Safety Quality Practitioner Qualification – NQF Level 5

ISO NET (Pty) Ltd

Learner Guide

COURSE CONTENTS:

The difference between an INCIDENT and an ACCIDENT in the Workplace

- Workplace Incidents
- Workplace Accidents

Generally accepted hierarchy of how incidents lead to accidents

- Table 1: Incidents that can be traced back to management
- Table 2: Preventive measures by design and supervision
- Table 3: A hierarchy of causes

Meaning and Consequence of Incidents

- *Meaning of "accident"*
- There are 3 important elements in the definition of accident
- *Meaning of "incident"*
- *Meaning of "safety"*
- *Meaning of "loss"*

Incident Ratio Study

The hidden costs of incidents – the Iceberg Study

Injury and Illness Costs

- Property, Process, Material, Miscellaneous
- Types of losses from incidents
- Below is a table of the types of losses that can result from an incident:
- Impact of loss on profitability

Responsibility for investigating incidents

- Who should investigate incident
- Why supervisors should investigate
  - *They have a personal interest.*
  - *They know the people and conditions.*
  - *They know best how and where to get the information needed.*
  - *They will start or take the action.*
  - *They benefit from investigating.*
- Why managers should investigate
  - *There is a major loss or a high potential incident.*
  - *The circumstances cross into other supervisors' or leaders' areas.*
  - *The remedial actions have a broad scope or significant costs.*
- Investigation by experts

Initial actions after an incident

- Emerging scenarios
  - *employees/witnesses may try to get rid of incriminating factors.*
  - *The supervisor is placed in a "make or break" situation.*
- Exercising control by management
  - *It demonstrates management concern.*
  - *Operational shutdowns may be necessary.*
  - *Easier access*
  - *Immediate knowledge*
- Supervisors initial actions
  - *at the scene.*

- *Ensure first aid and call for emergency services.*
- *Control potential secondary Incidents.*
- *Identify sources of evidence at the scene.*
- *Preserve evidence from alteration or removal.*
- *Determine the loss potential.*
- *Notify appropriate personnel.*

Reporting incidents

- Reasons why incidents are not reported
  - *Fear of punishment.*
  - *Concern about the record.*
  - *Concern about reputation.*
  - *Fear of medical treatment.*
  - *Dislike of medical personnel.*
  - *Desire to avoid work interruption.*
  - *Desire to keep personal records clear.*
  - *Avoidance of red tape.*
  - *Concern about the attitude of others.*
  - *Poor understanding of importance.*
- How to get incidents reported
  - *React in a positive way.*
  - *Give more attention to loss control performance.*
  - *Recognise individual performance promptly.*
  - *Develop awareness of the value of incident information.*
  - *Show personal belief by action.*
  - *Make mountains out of molehills.*

Example of Preliminary incident report

Legal requirements – OHS-Act

- *Section 24 - Report to inspector regarding certain incidents*
- *Section 25 - Report to chief inspector regarding occupational disease*
- *When to report*
- *Reporting incidents involving persons other than employees*
- Incidents not reportable as per Sections 24 / 25

Incident Investigation

- What is an incident and why should it be investigated?
- Who should do the investigating?
- Should the immediate supervisor be on the team?
- Why look for the root cause?
- What are the steps involved in investigating an incident?
- What should be looked at as the cause of an incident?

Causation Models

Figure 4: Incident Categories

- Incident Categories
- Task
- Material
- Work Environment
- Personnel
- Management

How are the facts collected?

- Physical Evidence
- Witness Accounts
- Interviewing
- Other Information

What should I know when making the analysis and recommendations?

Why should recommendations be made?

The Written Report

- What should be done if the investigation reveals human error?
- How should follow-up be done?

Example of an Incident Causation Model

An illustration of this model:

- Loss
- Incident
- Immediate Causes
- At-risk behaviours
- Substandard conditions
- Root Causes

Root causes can be found in two major categories:

- Human Factors
- Workplace Factors (Work Environment)

Workplace factors can include the following:

- Inadequate Systems control
- Inadequate System
- Inadequate Standards
- Inadequate compliance with standards
- Inadequate Risk Assessment

Baseline Risk Assessments

- Issue Based Risk Assessments
- Continuous Risk Assessments

The concept of multiple causes

- Incidents are caused - they do not just happen
- The stages of control
- *Pre-Contact Control.*
- *Contact Control*
- *Post-Contact Control*

Incident Reports

- Compilation of reports
- Benefits of a standard form
- Elements of a good investigation report
- Measurement of report quality
- Example of Management review Report

Remedial Action

- Meaning of the types of remedies
- When the remedies apply

Data Analysis

- Common categories for analysis

- Incident frequency and severity rates by organisation and department.
- trends by cause factor
- Incidents by experience level of people involved.
- Incidents by time of day or time into work shift.

Incident investigation exercise

- Scenario
- Result
- Investigation
- Cause Determination: Final Analysis: *Basic*
- Cause Determination (Fault Tree)
- Final Analysis
- *Root Cause is Basic - Management or Design*

The difference between an INCIDENT and an ACCIDENT in the Workplace

The terms 'accident' and 'incident' often get confused in general speak. However, when it comes to health and safety in the workplace, they are two very separate things. In fact, they are two words which are defining in explaining what happened in an occurrence.

Never has two words been confused so greatly but with so much important to what they mean.

The basic definitions of 'incident' and 'accident' in the workplace are:

- An **incident** is something that has happened in the workplace unexpectedly, which hasn't caused any personal injury, but may or may not have caused damage, and that warrants reporting.
  This could be something like a spill or something falling, which has not injured a person, but may (or may not) have done some damage to property.
- An **accident** is something unexpected that has happened in the workplace which has caused personal injury, death or ill-health of an employee or member of the public, or damage to property.
  This could be anything from somebody slipping or tripping over to something falling on their head, burning themselves or part of a building collapsing.

These are two very different situations and should be dealt with in different ways.

Workplace Incidents

A workplace incident can be categorised into:

- A **near miss** – which is an internal incident, which should be recorded and investigated by the workplace
- A **dangerous occurrence** – which must be reported under RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations) in fewer than 10 days. This is when an incident occurs that potentially could have caused serious injury, incapacity or death.

There is a famous health and safety saying that states that "an incident is an accident waiting to happen". And this is why all incidents must be reported an investigated, to make sure that the occurrence doesn't happen again, or that it doesn't get worse.

To be able to ensure that an incident is properly investigated and reported, it is recommended that a workplace has someone who understands the health and safety laws, as well as someone who is responsible for investigating the incident.

This Accident and Incident Investigation course will give you the skills and knowledge to enable you to properly investigate an incident and reduce the chance of it happening again.

By reporting and investigating an incident, you can not only take out measures which will help to reduce the risk of it happening again, but it can also focus other employee's minds onto the potential for it turning into an accident.

In the words of the Health and Safety Executive (HSE), “An investigation is not an end in itself, but the first step in preventing future **adverse events”.**

Workplace Accidents

When there is an accident in the workplace, there is a legal requirement to report it to an employer (usually via an accident book) an ensure that they are aware of it.

The RIDDOR guidelines stipulate that employers or other people who are in control of a workspace must report:

- Work-related accidents which cause serious injuries or death
- Any diagnosed cases of industrial diseases
- Incidents or dangerous occurrence which have the possibility of causing harm

This allows local authorities to investigate if need be to check that no-one was negligible and ensure that the proper processes are put in place to ensure that nothing happens again.

Most companies prefer to have someone who is responsible for overseeing the health and safety of the business. For many businesses, it is best to get somebody who is qualified in health and safety, knows exactly what the requirements are for an employer and has their finger on the pulse in terms of law changes.

They should also be able to properly investigate incidents and be able to produce reports and plans which are essential to keeping all of the employees safe in their particular working environment.

One of the most important jobs of the person responsible for health and safety is ensuring that all employees are abiding by codes of practice and regulations, but also spotting potential health and safety risks, as well as overseeing the reporting of incidents and putting ideas into place to reduce the risk of accidents.

The difference between an ‘incident’ and an ‘accident’ is an important difference to distinguish. It is also important that any occurrence is dealt with in the appropriate way, so being able to define these two words is very useful. When it comes to workplace health and safety the most important this is to ensure that potential risks are eliminated as far as possible.

Generally accepted hierarchy of how incidents lead to accidents

All of these incidents were followed by major inquiries which revealed failures in management systems as their root cause. Table 1 gives some more simple examples.

Table 1: Incidents that can be traced back to management

Immediate cause	Example	Possible root cause	Possible management failure
Poor housekeeping	Employee trips over article on floor/Material falls from shelf	Hazard not recognised	Training, planning, layout
Improper use of equipment	Using side of grinding wheel rather than face, and wheel breaks/Use of compressed air to remove dust from surface causes eye injury	Inadequate facilities/Lack of skill, knowledge, proper procedures	Training of operators and supervisors, operating procedures, enforcement of procedures
Defective equipment	Electric drill without earth wire/Hammer with loose head/Vehicle with defective brakes	Lack of recognition/Poor design or selection/Poor maintenance	Training of operators and supervisors, maintenance
Procedures absent	No check for flammable mixture – explosion/No instruction to lock out power before maintenance	Omission/Error by design and by supervision	Operating procedures, training, supervision
Lack of safety device	Machine has exposed gear – severe cut/No warning horn – person hit by vehicle/No guard rail on scaffold 3 m high	Need not recognised/Inadequate availability/Deliberate act	Planning, layout, design, safety rules, equipment, awareness, motivation, training
Lack of personal protective equipment	Dermatitis because gloves or protective lotion not used/Foot injury because materials handler not wearing safety shoes	Need not recognised/Inadequate availability	Planning, design, safety rules, awareness, training
Inattention, neglect of safe practice	Welder picks up hot metal with bare hands/Person walks under suspended load/Broken glass and spillages not cleaned up from floor	Lack of motivation/Poor appreciation of risks	Enforcement of rules, procedures/Training, awareness, motivation

Often, preventive measures could be taken at the design and at the supervisory stage as shown in Table 2.

Table 2: Preventive measures by design and supervision

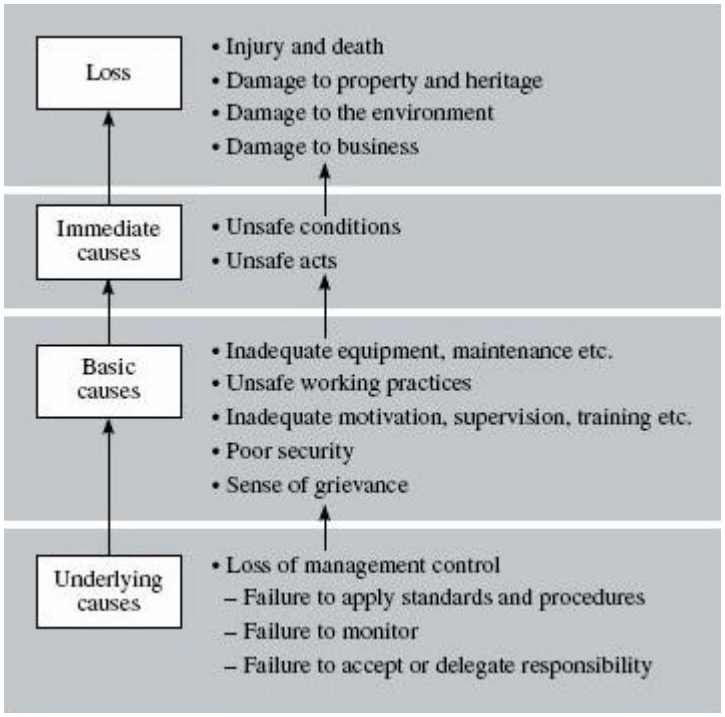
Cause of primary error	Preventive measures by designer	Preventive measures by supervisor
Improvisation	Provide adequate instruction	Ensure procedures supplied to person
Failure to follow correct procedure	Ensure procedure not too lengthy or cumbersome	Review procedures to ensure appropriate and not difficult
Procedures not understood	Ensure instructions easy to understand	Ensure person understands
Lack of awareness of hazards	Provide warnings, cautions and explanations in instructions	Point out precautions that must be observed
Errors of judgement, especially under stress	Minimise need for making hurried judgements, programme contingency measures	Provide instruction on action under abnormal conditions
Critical components installed incorrectly	Design components so that only correct installation possible, e.g. asymmetric configurations on mechanical and electrical connections, male and female threads on critical flow systems	Provide instruction on maintenance and repair. Ensure no change from design and do not modify a part to make it fit
Lack of suitable tools and equipment	Ensure need for special equipment minimised; provide those that are unavoidable and emphasise use in instructions	Ensure correct equipment is available and is used
Error or delay in use of controls	Avoid proximity, interference, difficult location or similarity of critical controls. Locate indicator above control so that hand making adjustment does not obscure view of indicator. Label prominently	Check equipment during selection and ensure critical controls are easily accessible, easy to select and easy to operate
Vibration and noise cause irritation and loss of effectiveness	Provide vibration isolation or eliminate noise	Where noise levels cannot be suppressed, provide ear defenders
Slipping and falling	Incorporate friction surfaces, guard rails or protective harnesses etc.	Determine where safeguards are needed to deal with hazardous locations and ensure their provision and application

You can probably add to these lists to cover other scenarios, such as irritation and loss of effectiveness through excessive heat or humidity. No matter what the organisation, management failures can be linked to risks to the organisation or to individuals.

Now we ask the question, ‘What in turn led to those unsafe conditions, or what promoted those unsafe acts?’ These are the so-called root or *basic causes*. The following is a fairly exhaustive list of these basic causes.

1. Inadequate standard of equipment.
2. Unsafe working practices – often called systems of work.
3. Poor standards of maintenance – of either equipment or systems of work.
4. Inappropriate or inadequate information.
5. Inappropriate or inadequate training.
6. Inappropriate or inadequate supervision.
7. Inappropriate or inadequate personal action.
8. Personal grievance.
9. Poor security.

Table 3: A hierarchy of causes



Meaning and consequences of Incidents

Many people tend to assume that incidents happen by chance, and are therefore not included to spend time or resources on investigating the incident fully, in order to determine corrective action.

Even worse, the same people may assume that incidents are an inevitable part of doing business (with the mindset that an investigation is consequently a futile exercise).

With regards to incidents / accidents, certain important points should be borne in mind:

- any incident has causes behind it - it is not merely a “freak’ occurrence.

- any incident warrants investigation in order to determine what went wrong, rather than merely accept it as an inevitability

incident investigation, as part of a general health and safety programme, is an important element of loss control - itself a crucial element of maximising the profitability of a business

Meaning of "accident"

ACCIDENT - an event that results in unintended harm or damage

This event can include anything in the work or external environment. It results from contact with a substance or source of energy above the threshold limit of the body or structure, e.g.

- exposure to a chemical - the toxic nature of the chemical is more powerful than the ability of the persons immunity to eliminate the toxic effect.

- car collision with a barrier - the energy field of the stationary barrier is greater than the energy field of the moving car (i.e. its structural strength), and therefore the car crumples upon collision.

There are 3 important elements in the definition of accident:

- *it includes harm/damage to anything in the workplace, or surrounding environment.*

  This could include trauma suffered by witnesses, or production downtime loss due to disruption (all of which would be "unintended").

- *it includes injury (harm).*

  An accident may cause injury to a person, but injury is not necessarily the only result of accidents. An accident (except, perhaps for Acts of God), can be controlled by proactive health and safety measures.

  An injury, however, is always a matter of chance e.g. the quick thinker may escape a following electromagnet, while the slow thinker may be crushed to death - it depends on reaction of a person - something a health and safety programme cannot control.

- *it includes property damage*

An event where no-one is injured, but machinery is destroyed, it is nevertheless an accident.

Meaning of "incident"

INCIDENT - an event which could, or does result in unintended harm or damage

In the field of health and safety management this term is sometimes more popular than the term "accident". This term is wider in the sense that it includes events which could have resulted in harm or damage. In other words, it includes the "near - accident", or "near - miss" situation.

Part of the acceptance of the term "incident", in preference to "accident", is the practice of giving a near-miss situation equal priority with an actual accident, for investigation purposes.

"Incident" includes accidents i.e. events which do result in harm/damage, but also includes events which could have (i.e. did not) result in harm/damage.

ALL ACCIDENTS ARE INCIDENTS
BUT NOT ALL INCIDENTS ARE ACCIDENTS

Meaning of "safety"

SAFETY - control of accidental loss, to an acceptable level

Again, "accidental loss" can include injury, physical property damage, as well as the lesser obvious losses e.g. production downtime, incident investigation time etc. There are 2 senses to "*control*" namely:

- *proactivity* - i.e. implementing measures to try and prevent losses from arising

- *reactivity* - i.e. implementing measures to minimise the extent of loss when an incident occurs (damage control)

This definition also serves to provide a hint of what safety (and health) management, by executives, is all about.

Meaning of "loss"

Loss is the avoidable harm to the following (which also constitute the four elements of a working system):

- ***People***
  There are tangible losses associated with injuries (such as the visible trauma, compensation costs, broken and disfigured bodies, rehabilitation costs, absenteeism, etc.) as well as intangible costs (such as anguish, suffering, pain, poor morale, etc.).

- ***Property***
  This includes equipment, material, building and parts damage.

- ***Process***
  This includes production interruption, increased defect rates, increased feed-stock use, etc.

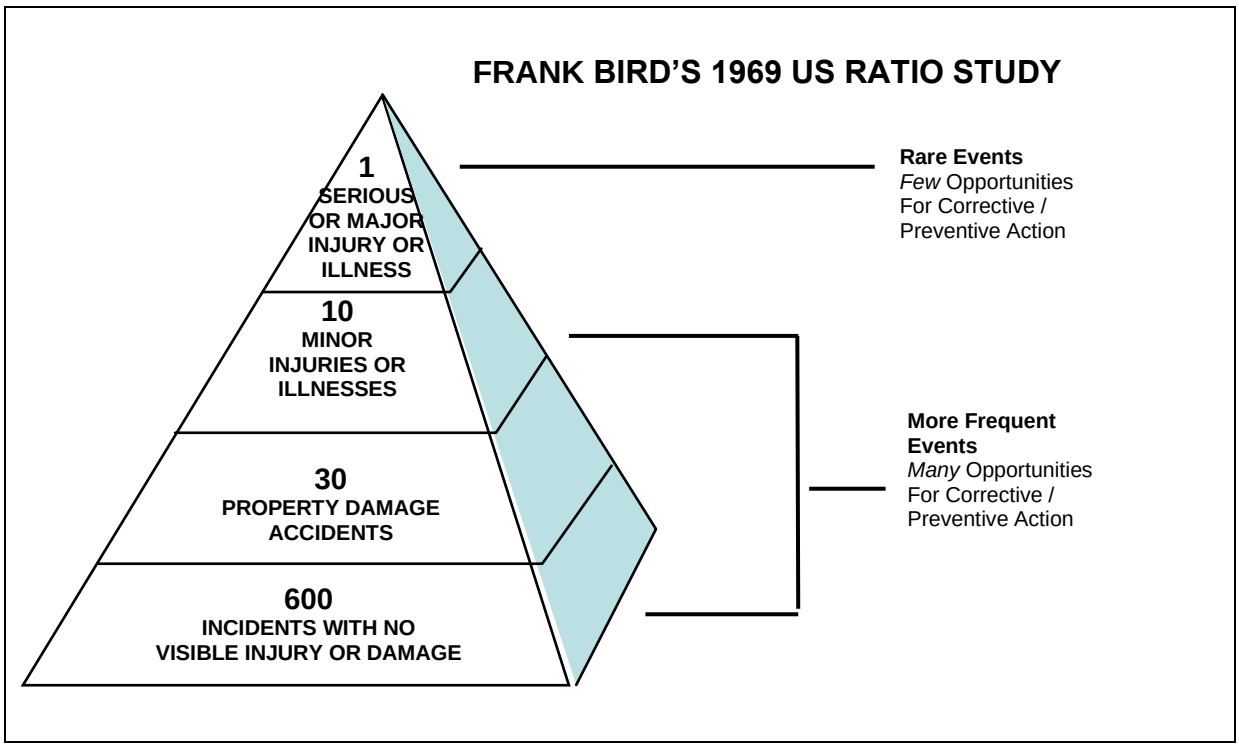
- ***Environment***

This includes community nuisances and harm to the atmosphere, soil, water, flora and fauna.

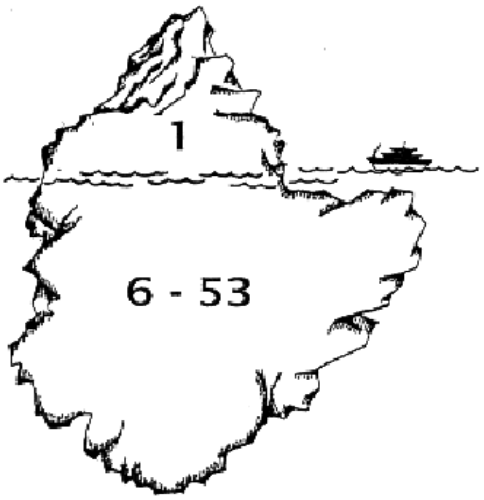
Incident Ratio Study

In 1969, in the US, Frank Bird, Jr. undertook a study of typical industrial incident**.** The findings were intended for insurance purposes, and were based on a study of 1.8 million incidents reported by 300 companies participating in the exercise.

Particularly important, with regard to the above, is that it shows how many "minor" incidents, and opportunities for exercising loss control, are ignored by the traditional thinking of Incidents being inevitable.



The hidden costs of incidents – the Iceberg Study



Injury and illness Costs

1. Medical
2. Lost Time
3. Compensation

Property, process, material, Miscellaneous

(6-53 times as much)

1. Production Loss
2. Building Damage
3. Plant Damage
4. Tool and Equipment Damage
5. Material Damage
6. Legal Fees
7. Emergency Supplies

8. Clerical Costs
9. Investigation Costs
10. Replacement Costs

Types of losses from incidents

Since injuries and illnesses have traditionally received so much attention, a wealth of information has been gained regarding their costs compared to the costs of property damage, down-time, and environmental spills and emissions.

While the direct costs of injuries and illnesses are significant, they represent only a small proportion of the actual costs of a company's incidents. In fact, since these actual costs of injuries and illnesses are often insured, many people do not appreciate the impact they have on the site.

Below is a table of the types of losses that can result from an incident:

Injured Worker Time	
(1)	Productive time is lost by injured employee and is not reimbursed by worker's compensation.
Co-Worker Time	
(2)	Time is lost by co-worker at the scene, as well as when assisting the injured to dispensary or ambulance.
(3)	Time is lost through sympathy or curiosity, and work interruption at time of injury and later from discussing the case, telling similar stories, swapping opinions of cause, grumbling etc.
(4)	Incidental lost time results from clean-up, collecting donations to aid the employee and his or her family, review hearings, etc. The cost of other employee overtime required to accomplish the injured employee's work and the time spent by safety organization personnel on the Incident should be included.
Supervisor Time	
(5)	Assisting injured employee.
(6)	Investigating Incident cause, i.e. initial investigation, follow-up, research on prevention, etc.
(8)	Selecting and training new employee, including obtaining applicants, evaluating candidates, training new employees or transferred employee.
(9)	Preparing Incident reports, i.e. injury reports, property damage reports, incident reports, variance reports, vehicle Incidents, etc.
(10)	Participating in hearings on Incident case.

General Losses	
(11)	Production time is lost due to upset, shock , or diverted interest of workers, slowdown of others, discussion by others - " did you hear …" (applies to employees of other units not included in item 3, above).
(12)	Losses result from work stoppage of machines, vehicles, plants, facilities, etc. and can be either temporary or long-term.
(13)	The injured employee's effectiveness is often reduced after return to work, from work restrictions, reduced efficiency, physical handicaps, crutches, splints, etc.
(14)	Loss of business and goodwill, adverse publicity, problems in obtaining new hires, etc. are common general losses.
(15)	Legal expenses arise from compensation hearings, liability claims handling, etc. that involve contractor legal services, rather than the insurance carrier legal expense that appears in direct costs.
(16)	Cost can increase for insurance reserves and tax multipliers which are, respectively, small annual percentages of the gross incurred losses, and taxes based upon the dollar value of losses, that are tied up in reserves.
(17)	Miscellaneous additional items should be included which may be unique to particular operations and are appropriate to specific Incident cases.
Property Losses	
(18)	Expenditures of emergency supplies and equipment.
(19)	Cost of equipment and materials above use derived and salvage.
(20)	Material cost of repair and replacement parts.
(21)	Time cost of equipment repair and replacement in terms of productivity lost and delay of scheduled maintenance on other equipment.
(22)	Cost of corrective actions other than repair.
(23)	Obsolescence losses of spare parts in stock for the equipment destroyed.
(24)	Pro-rata cost of rescue and emergency equipment.
(25)	Production lost during period of employee reaction, investigation, clean-up, repair and certification.
Other Losses	
(26)	Penalties, fines, citations levied.

Impact of loss on profitability

In times of keen competition and low profit margins, loss control may contribute significantly more to profits.

As an example, it is necessary for additional sales of R 1,667,000 in products to pay the costs of R 50,000 in annual losses from injury, illness, damage or theft, assuming an average profit on sales of 3%.

The amount of sales required to pay for losses will vary with the profit margin. Below is a table which illustrates the required sales required to recoup various incident costs depending on the company's profit margin.

INCIDENT COSTS	PROFIT MARGIN				
	1%	2%	3%	4%	5%
1,000	100,000	50,000	33,000	25,000	20,000
5,000	500,000	250,000	167,000	125,000	100,000
10,000	1,000,000	500,000	333,000	250,000	200,000
25,000	2,500,000	1,250,000	833,000	625,000	500,000
50,000	5,000,000	2,500,000	1,667,000	1,250,000	1,000,000
100,000	10,000,000	5,000,000	3,333,000	2,500,000	2,000,000
150,000	15,000,000	7,500,000	5,000,000	3,750,000	3,000,000
200,000	20,000,000	10,000,000	6,666,000	5,000,000	4,000,000

Responsibility for investigating incidents

Who should investigate incidents

Why supervisors should investigate

In any incident investigation, most of the findings would invariably be of concern to front line supervisors, hence it is extremely important that they are involved in the investigation.

- ***They have a personal interest.***

  Supervisors and group leaders are responsible for specific work and work areas. Incidents affect the work output, quality, cost and every other aspect of the jobs they have to get done.

They must deal with the absence of people who are injured or ill, the lack of equipment which has been damaged and the shortage of materials which have been spilled or wasted.

- ***They know the people and conditions.***

  They plan the use of resources daily. They make some of the decisions that affect selection, training, standards and schedules. They know what things influenced other decisions. They already know much of the information that an investigator has to seek.

- ***They know best how and where to get the information needed.***

  They know their people. They know "who knows what". They have set up communications with other work groups. They know what records are kept and where they are. They can get accurate information about an incident, or the underlying problem, quickly.

- ***They will start or take the action.***

  They can determine what will work and what won't, and why. They will follow through better if they are involved in the decisions on remedial actions. It makes good sense for them to be involved from the start so they can do better in the end.

- ***They benefit from investigating.***

  When the procedure lets them start the investigation, it has several benefits:

  - *It shows concern* - Supervisors and leaders who do conscientious investigations of accidents and incidents give clear evidence of their concern for people.

It increases productivity - Incidents, investigation activities, emergency actions and remedial actions interrupt work

When supervisors and leaders do these things efficiently, it minimises the interruptions. When they do investigations well, it prevents future interruptions.

- *It reduces operating costs* - Injuries, absences, damage, waste and other effects of Incidents all cost time and money. Effective investigations spell Incident prevention, which in turn spells lower net operating costs, with benefits for everyone.

- *It shows that supervisors and leaders have control* - People go to those who have control with their problems and ideas. They follow the instructions of those who are really in charge.

Studies of leading organisations also show that people who work for those who are in control take greater pride in their work. Upper managers also look for subordinates who have demonstrated control in their responsibilities.

Why managers should investigate

Sometimes investigations require participation by middle- or higher-level managers. Typical situations are when:

- ***There is a major loss or a high potential incident***.

  The seriousness of some situations takes them beyond the supervisor's hands. It would be unfair to ask supervisors to solve problems beyond their level of knowledge. Also, major losses might get the attention of the government, the public, executives or owners, who should be met by higher-ranking managers.

- ***The circumstances cross into other supervisors' or leaders' areas***.

  Incidents, as a rule, should be investigated at the lowest level with authority over the entire operation involved.

- ***The remedial actions have a broad scope or significant costs***.

  In such cases, it is simply a matter of needing a greater authority to develop the most effective and practical actions. At times a supervisor will start an investigation only to discover that other operational areas could be affected. Then it is appropriate that the investigation responsibility be passed up to a higher level.

In all of these situations, the line supervisor or leader can still give valuable assistance. They can be included as members of investigation teams to make the most of their knowledge and abilities.

Investigation by experts

Occasionally, special knowledge is needed in an investigation. This could be because of a new process, suspected equipment failure, use of hazardous materials, or a complex situation. Parts of the information may need to be obtained or analysed by a technical expert.

Such experts then become advisors to the investigators. The problems are still operational ones. The people to solve the problem are still those at the appropriate level of leadership. Safety personnel are included in the group as technical staff advisors.

Initial actions after an incident

Emerging scenarios

The first few minutes after an incident has taken place are extremely critical, not least of all for a front line supervisor. During this phase, the following scenarios become applicable.

- ***employees/witnesses may try to get rid of incriminating factors***.

  In so doing, the true nature of an incident may become distorted, thus hindering the effective investigation of the incident. The front line supervisor would be able to get to the scene of the incident fairly quickly. The abovementioned is one of the important reasons for him doing so.

- ***The supervisor is placed in a "make or break" situation***.

If the supervisor is able to demonstrate the ability to take control, he stands to gain much credibility/respect after the investigation. If he fails to exercise such control, however, his reputation can be seriously damaged.

Exercising control by management

A common practice in industries is for the Head of a Department/Section Manager to immediately proceed to the scene of an incident. To make this effort has several benefits, namely:

- ***It demonstrates management concern.***

  Almost as important as leadership example, is the ability to demonstrate interest in the well-being of employees and property involved) in the incident. This is a crucial phase for management:

  - by making the effort to visit the scene, the manager would gain much credibility, and succeed in overcoming the traditional negative perception of managers (namely, people who sit in offices, and never take an interest in the plant).

  - Conversely, by not making an effort to appear at the scene, the manager of the concerned workplace, risks having the abovementioned negative perception reinforced against not only himself, but other members of the management team, as well.

- ***Operational shutdowns may be necessary.***

The incident may be of such a nature that all machinery in the plant section has to be shut down, perhaps for evidence gathering purposes, or to prevent further dangers posed by the "aftermath of the incident.

The obvious benefit of having a manager on site is that such an order, if necessary, can be immediately granted, rather than having time spent on having such a request pass through a normal reporting procedure.

- ***Easier access***

  Having a manager present makes access to documents and persons easier (i.e. a manager would have authority, which a supervisor may not necessarily have)

- ***Immediate knowledge***

The management team gain immediate knowledge of the facts/circumstances of an incident, by having one of their "team members" present.

Supervisors initial actions

The success of an investigation often comes in the first few moments. A lot of critical things happen in quick order. On the bad side, a lot can be done in these same moments to distort information and doom the investigation to failure.

A supervisor who is trained adequately can both reduce the extent of the loss and get the investigation started properly. In a brief time the supervisor can get evidence that might take others days to get.

A supervisor or leader's initial actions vary for every Incident. The person on the scene must be the judge of what is critical. These steps are guidelines to apply as appropriate:

- ***Take control at the scene***.

  Incidents make people act differently. They are curious and they want to help. Often they are irrational and do more harm than good. Unless a senior manager is there, the supervisor or leader needs to take charge, directing and approving everything that is done.

- ***Ensure first aid and call for emergency services***.

People's lives and their well-being come first. If medical help is not close by, give necessary first aid or ensure that it is done. Have someone call for help. Be specific. Tell what service to call, where the telephone is, and where the number can be found. Every telephone should have emergency numbers posted on or close to it to help get prompt response.

- ***Control potential secondary Incidents.***

  The explosion that follows a puncture, the collapse that follows an impact, the absentminded action that follows a minor trauma are common examples.

  Secondary Incidents are usually even more serious because the normal controls over the loss exposure have been weakened by the incident. Positive, temporary actions need to be taken after quick, but careful, thought of the consequences.

- ***Identify sources of evidence at the scene***.

  It is important to identify essential information before it can be disturbed or destroyed. Evidence can be grouped into five general categories:

  - *People*
  - *Positions*
  - *Parts*
  - *Paper*
  - *Process*.

- ***Preserve evidence from alteration or removal.***

  If there seems to be a significant loss potential, good investigation is more important than getting back to work. Supervisors or leaders have authority to keep things from being moved. They should also keep people away from the Incident site so nothing is disturbed before they get to look it over.

- ***Determine the loss potential.***

  It's easy to see how badly people are hurt and property is damaged. That's important, but what could happen is vital to future loss prevention.

  Supervisors or leaders should make a prompt appraisal of how bad the incident could have been and how likely it is to occur again. Then they can decide how the investigation should proceed.

- ***Notify appropriate personnel.***

Some managers need to be on the scene right away. Others may need just a courtesy notification.

Reporting incidents

Reasons why incidents are not reported

There are various reasons as to why incidents are not always reported:

- ***Fear of punishment.***

  Many people see investigation as fault finding rather than fact-finding. No one is perfect, and people fear they might get punished for some contributory negligence. Good supervisors or leaders know that substandard actions are only symptoms of the problem. They don't use their people as scapegoats. But the fact remains that many supervisors haven't been well trained in how to manage people. Their reaction is to criticize and punish, so people keep things from them.

- ***Concern about the record.***

  The average person doesn't want to spoil the safety record of the group. When group recognition and awards programs are based on Incident-free records, the programs discourage good reporting. No one wants to be the person who spoiled the records with some minor injury, damage or incident.

- ***Concern about reputation.***

  People don't want to be labelled as Incident-prone or as a dangerous worker by their supervisors, leaders or peers. They try to avoid bringing such negative attention to

themselves. The employee who has an incident may feel responsible for it and decide to just be more careful next time.

- ***Fear of medical treatment***.

  It is surprising how many people dread simple medical care. Many lose fingers, toes or even die because they waited too long to get treatment. Others fear that when they go for simple treatment some major disorder will be found. As a result, their injuries never get reported.

- ***Dislike of medical personnel***.

  Some people don't want to be treated by certain medical personnel because of sex or personality. This might also be due to a previous experience or to distorted stories of bad treatment.

- ***Desire to avoid work interruption***.

  Most employees have a sincere interest in getting the job done. They don't want stop things to get medical aid or to repair damage.

- ***Desire to keep personal records clear***.

  Many individual recognition programs and performance appraisals are based on Incident-free records. Incident analyses often include personal data. People who don't fully understand these things see reporting incidents as giving themselves black marks and threatening their own job security.

- ***Avoidance of red tape***.

  Many have heard people say, "Why, you have to answer two dozen questions just to get a band-aid". Or, people are asked to fill out long forms on incidents they report. Inconvenience is a sure way to stop getting reports but not to stop Incidents.

- ***Concern about the attitude of others***.

  People value their good relationships with their peers and leaders. Often, they feel that reporting an incident would be "telling on" another employee. That would threaten the relationship.

- ***Poor understanding of importance***.

  Often, people don't see any immediate, positive action after they report problems. They see this as a lack of concern, and they decide not to do anything either. This happens when there is little or no communication on the benefits of incident and hazard reporting, or on the progress of remedial actions.

These were identified as the most typical reasons. Another finding of the research exercise, was that many employees actually believe that they assist a company, by not reporting incidents.

How to get incidents reported

- ***React in a positive way***.

  If information can be utilized to prevent or control future incidents that could be of major or even catastrophic dimension, let the worker know the contribution his information is making.

  If reactions are handled properly and positively, the experience of sharing valuable predictive and preventive data will create an atmosphere of co-operation and not of interrogation.

- ***Give more attention to loss control performance***.

Talk about things like good housekeeping, following safety rules and practices and use of personal protective equipment regularly with the work group

  Make more objective records of individuals' compliance, and coach the people on these.

  The good athletic coach wins games by measuring and improving each individual's skills on specific plays. He realises that skill improvement gets the desired score. Likewise, improvements in program activities result in lower Incident rates.

- ***Recognise individual performance promptly***.

  Learn to pay more attention to people's actions and practices that contribute to Incident prevention. Commend people when they perform to the standards. Give praise as often as criticism. Develop pride in performance instead of fear of failure.

- ***Develop awareness of the value of incident information***.

  Use group meetings and personal contacts to give feedback. Tell people how incidents reported were used to improve safety for everyone. Use these cases as illustrations in employee orientations and training.

- ***Show personal belief by action***.

  Make sure that problems are followed up. There is always something that can be done right away. Do it. Then keep checking on work orders, education, materials, equipment purchases etc.

  Verify that the corrective measure works as planned. Check that it is still in use a month later. Show people by your actions that you truly believe in the importance of their incident reports.

- ***Make mountains out of molehills***.

Emphasize near-accidents and minor accidents, especially those with high potential. Praise good examples whenever possible. Encourage workers to share good examples verbally in group meetings. Publicize preventive actions on bulletin boards and in company newsletters.

EXAMPLE OF PRELIMINARY INCIDENT REPORT

Preliminary Incident Report *(MUST ALWAYS BE COMPLETED)*	
Initiator name	
Initiator's Section & Department	
Responsible Section **Department**	
COMPLETE IF INJURY ON DUTY:	
Name of insured's company *(Contractors Only)*	
Company number of injured	
Years of Experience	
Age of injured	
Nature of injuries	
Type of contact	
Body Part Injured	
Description of Incident: *(Who, what, how, when)*	

Details of Injury/Damage/Impact: *(Nature and extent of injuries/damage/impact)*

Immediate Actions Taken:

Signature of Initiator:_____ Date:____/_____/_____ **Telephone/email: _____**

Legal requirements – OHS-Act

Certain incidents must be reported to the Department of Labour in a prescribed manner and form. Incidents that must be reported are described in detail in *Sections 24* and *25* of the *Occupation Health and Safety Act, 85 of 1993.*

Section 24 - Report to inspector regarding certain incidents

1) *Each incident occurring at work or in connection with the activities of persons at work, or with the use of plant or machinery, where*

   a) any person :

   - *dies ;*
   - *becomes unconscious ;*
   - *suffers the loss of a limb or part thereof ;*
   - *is injured/ill such that he is likely to die/ suffer permanent physical defect ; or*
   - *is likely to be unable to work for 14 days or longer*

   b) a major incident occurred

   c) the health or safety of any person was endangered and where :

   - *a dangerous substance was spilled ;*
   - *the uncontrolled release of a substance under pressure ;*
   - *failure or fracture of machinery;*
   - *machinery running out of control.*

   shall, within the prescribed period and manner, be reported to an inspector by the employer or the user of the plant or machinery concerned, as the case may be.

Section 25 - Report to chief inspector regarding occupational disease

Any medical practitioner who examines or treats a person for a disease:

- *described in Schedule 2 to the Workmen's Compensation Act, 30 of 1941, or*

- *any other disease which he believes arose out of that person's employment,*

shall within the prescribed period and manner report the case to the employer and to the chief inspector, and inform that person accordingly.

When to report

The manner and prescribed time periods for reporting of incidents and occupational diseases, is set out in ***Regulation 8*** of the ***General Administrative Regulations*** to the Act. For ease of reference, the requirements have been summarised in the table below:

Incident	**Reporting procedure**	**Period**
Death (S 24.1.a)) unconsciousness (S 24.1.a)) loss of limb (S 24.1.a)) injury / illness likely to cause death, or permanent physical defect (S 24.1.a))	Telephone, telegram or fax the Provincial Director, Department of Labour Forward Annexure 1 to Department of Labour	Immediately Within 7 days
Person dies subsequent to notification of injury given (GAR 8.2)	Telephone, telegram or fax the Provincial Director, Department of Labour *(further WCL Form notification not necessary)*	Immediately
Absent 14+ days (S 24.1.a))	Forward Annexure 1 to Department of Labour *(immediate notification not necessary)*	Within 7 days
Major incident (S 24.1.b))	Telephone, telegram or fax the Provincial Director, Department of Labour	Immediately
Health and Safety of person endangered (S 24.1.c))	*(WCL Form notification not necessary)*	

Dangerous substances spillage (S 24.1.c)) Uncontrolled release of substance under pressure (S 24.1.c)) Machinery / part fracture / failure causing flying, falling or uncontrolled moving objects (S 24.1.c)) Machinery running out of control (S 24.1.c))		
Occupational illness diagnosed by medical practitioner (S 25)	Forward Annexure 1 to Department of Labour *(immediate notification not necessary)*	Within 14 days

In terms of ***Section 13*** of the Act, the employer must inform the Health and Safety Representative in whose section the incident occurred, of the incident.

Reporting incidents involving persons other than employees

Regulation 8.3 of the ***General Administrative Regulations*** to the Act provides that where an incident involves persons other than employees, the employer must immediately notify the Provincial Director of the incident.

The notification must be by facsimile or similar means of communication, and include:

a) name of the injured person;
b) address of the injured person;
c) name of the user, employer or self-employed person;
d) address of the user, employer or self-employed person;
e) telephone number of the user, employer or self-employed person;
f) name of contact person;
g) details of incident:
    i) what happened;
    ii) where it happened (place);
    iii) when it happened (date and time);
    iv) how it happened;
    1. why it happened; and
h) names of witnesses.

Incidents not reportable as per Sections 24 / 25

Section 24.3 provides that the duty to report incidents, as per this Section, shall not apply in respect of-

a) a traffic accident on a public road;
b) an incident occurring in a private household, provided the householder forthwith reports the incident to the South African Police (*Section 24.4* then provides that a member of the SAPS, to whom the incident was reported, shall notify an inspector of the incident); or
c) any accident which is to be investigated under the ***Aviation Act, 74 of 1962*.**

Incident Investigation

What is an incident and why should it be investigated?

The term incident can be defined as an occurrence, condition, or situation arising in the course of work that resulted in or could have resulted in injuries, illnesses, damage to health, or fatalities.

The term "accident" is also commonly used, and can be defined as an unplanned event that interrupts the completion of an activity, and that may (or may not) include injury or property damage. Some make a distinction between accident and incident. They use the term incident to refer to an unexpected event that did not cause injury or damage that time but had the potential. "Near miss" or "dangerous occurrence" are also terms for an event that could have caused harm but did not.

Please note: The term incident is used in some situations and jurisdictions to cover both an "accident" and "incident". It is argued that the word "accident" implies that the event was related to fate or chance. When the root cause is determined, it is usually found that many events were predictable and could have been prevented if the right actions were taken - making the event not one of fate or chance (thus, the word incident is used). For simplicity, we will now use the term incident to mean all of the above events.

The information that follows is intended to be a general guide for employers, supervisors, health and safety committee members, or members of an incident investigation team. When incidents are investigated, the emphasis should be concentrated on finding the root cause of the incident so you can prevent the event from happening again. The purpose is to find facts that can lead to corrective actions, not to find fault. Always look for deeper causes. Do not simply record the steps of the event.

Reasons to investigate a workplace incident include:

- most importantly, to find out the cause of incidents and to prevent similar incidents in the future
- to fulfill any legal requirements
- to determine the cost of an incident
- to determine compliance with applicable regulations (e.g., occupational health and safety, criminal, etc.)
- to process workers' compensation claims

The same principles apply to an inquiry of a minor incident and to the more formal investigation of a serious event. Most importantly, these steps can be used to investigate any situation (e.g., where no incident has occurred ... yet) as a way to prevent an incident.

Who should do the investigating?

Ideally, an investigation would be conducted by someone or a group of people who are:

- experienced in incident causation models,
- experienced in investigative techniques,
- knowledgeable of any legal or organizational requirements,
- knowledgeable in occupational health and safety fundamentals,
- knowledgeable in the work processes, procedures, persons, and industrial relations environment for that particular situation,
- able to use interview and other person-to-person techniques effectively (such as mediation or conflict resolution),
- knowledgeable of requirements for documents, records, and data collection; and
- able to analyze the data gathered to determine findings and reach recommendations.

Some jurisdictions provide guidance such as requiring that the incident must be conducted jointly, with both management and labour represented, or that the investigators must be knowledgeable about the work processes involved.

Members of the team can include:

- employees with knowledge of the work
- supervisor of the area or work
- safety officer
- health and safety committee
- union representative, if applicable
- employees with experience in investigations
- "outside" experts
- representative from local government or police

Note: In some cases, other authorities may have jurisdiction, such as if a serious injury or fatality occurred. Your organization should establish, implement, and maintain a procedure to coordinate managing incidents with the authority having jurisdiction (e.g., police, OH&S inspectors, etc.). This coordination may include the authority taking control of the incident scene.

Should the immediate supervisor be on the team?

The advantage is that this person is likely to know most about the work and persons involved and the current conditions. Furthermore, the supervisor can usually take immediate remedial action.

The counter argument is that there may be an attempt to gloss over the supervisor's shortcomings in the incident.

This situation should not arise if the incident is investigated by a team of people, and if the worker representative(s) and the investigation team members review all incident investigation findings and recommendations thoroughly.

Why look for the root cause?

An investigator or team who believe that incidents are caused by unsafe conditions will likely try to uncover conditions as causes. On the other hand, one who believes they are caused by unsafe acts will attempt to find the human errors that are causes. Therefore, it is necessary to examine all underlying factors in a chain of events that ends in an incident.

The important point is that even in the most seemingly straightforward incidents, **seldom, if ever, is there only a single cause**. For example, an "investigation" which concludes that an incident was due to worker carelessness, and goes no further, fails to find answers to several important questions such as:

- Was the worker distracted? If yes, why was the worker distracted?
- Was a safe work procedure being followed? If not, why not?
- Were safety devices in order? If not, why not?
- Was the worker trained? If not, why not?

An inquiry that answers these and related questions will probably reveal conditions that are more open to correction.

What are the steps involved in investigating an incident?

First:

- Report the incident occurrence to a designated person within the organization.
- Provide first aid and medical care to injured person(s) and prevent further injuries or damage.

The incident investigation team would perform the following general steps:

- Scene management and scene assessment (secure the scene, make sure it is safe for investigators to do their job).
- Witness management (provide support, limit interaction with other witnesses, interview).
- Investigate the incident, collect data.
- Analyze the data, identify the root causes.
- Report the findings and recommendations.

The organization would then:

- Develop a plan for corrective action.
- Implement the plan.

- Evaluate the effectiveness of the corrective action.
- Make changes for continual improvement.

As little time as possible should be lost between the moment of an incident and the beginning of the investigation. In this way, one is most likely to be able to observe the conditions as they were at the time, prevent disturbance of evidence, and identify witnesses. The tools that members of the investigating team may need (pencil, paper, camera or recording device, tape measure, etc.) should be immediately available so that no time is wasted.

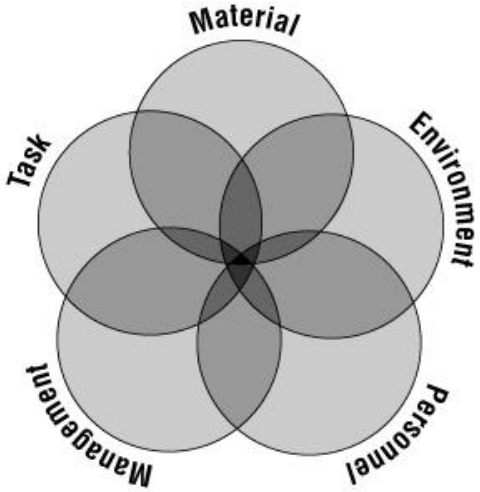
What should be looked at as the cause of an incident?

Causation Models

Many models of causation have been proposed, ranging from Heinrich's domino theory to the sophisticated Management Oversight and Risk Tree (MORT).

The simple model shown in Figure 1 attempts to illustrate that the causes of any incident can be grouped into five categories - task, material, environment, personnel, and management. When this model is used, possible causes in each category should be investigated. Each category is examined more closely below. Remember that these are sample questions only: no attempt has been made to develop a comprehensive checklist.

Figure 4: Incident Categories



Task

Here the actual work procedure being used at the time of the incident is explored. Members of the investigation team will look for answers to questions such as:

- Was a safe work procedure used?
- Had conditions changed to make the normal procedure unsafe?
- Were the appropriate tools and materials available?
- Were they used?
- Were safety devices working properly?
- Was lockout used when necessary?

For most of these questions, an important follow-up question is "If not, why not?"

Material

To seek out possible causes resulting from the equipment and materials used, investigators might ask:

- Was there an equipment failure?
- What caused it to fail?
- Was the machinery poorly designed?
- Were hazardous products involved?
- Were they clearly identified?
- Was a less hazardous alternative product possible and available?
- Was the raw material substandard in some way?
- Should personal protective equipment (PPE) have been used?
- Was the PPE used?
- Were users of PPE properly educated and trained?

Again, each time the answer reveals an unsafe condition, the investigator must ask **why** this situation was allowed to exist.

Work Environment

The physical work environment, and especially sudden changes to that environment, are factors that need to be identified. The situation at the time of the incident is what is important, not what the "usual" conditions were. For example, investigators may want to know:

- What were the weather conditions?
- Was poor housekeeping a problem?
- Was it too hot or too cold?
- Was noise a problem?
- Was there adequate light?
- Were toxic or hazardous gases, dusts, or fumes present?

Personnel

The physical and mental condition of those individuals directly involved in the event must be explored, as well as the psychosocial environment they were working within. The purpose for investigating the incident is **not** to establish blame against someone but the inquiry will not be complete unless personal characteristics or psychosocial factors are considered. Some factors will remain essentially constant while others may vary from day to day:

- Did the worker follow the safe operating procedures?
- Were workers experienced in the work being done?
- Had they been adequately educated and trained?
- Can they physically do the work?
- What was the status of their health?
- Were they tired?

- Was fatigue or shiftwork an issue?
- Were they under stress (work or personal)?
- Was there pressure to complete tasks under a deadline, or to by-pass safety procedures?

Management

Management holds the legal responsibility for the safety of the workplace and therefore the role of supervisors and higher management and the role or presence of management systems must always be considered in an incident investigation. These factors may also be called organizational factors. Failures of management systems are often found to be direct or indirect causes. Ask questions such as:

- Were safety rules or safe work procedures communicated to and understood by all employees?
- Were written procedures and orientation available?
- Were the safe work procedures being enforced?
- Was there adequate supervision?
- Were workers educated and trained to do the work?
- Had hazards and risks been previously identified and assessed?
- Had procedures been developed to eliminate the hazards or control the risks?
- Were unsafe conditions corrected?
- Was regular maintenance of equipment carried out?
- Were regular safety inspections carried out?
- Had the condition or concern been reported beforehand?
- Was action taken?

This model of incident investigation provides a guide for uncovering all possible causes and reduces the likelihood of looking at facts in isolation. Some investigators may prefer to place some of the sample questions in different categories; however, the categories are not important, as long as each question is asked.

Obviously there is considerable overlap between categories; this overlap reflects the situation in real life. Again it should be emphasized that the above sample questions do not make up a complete checklist, but are examples only.

How are the facts collected?

The steps in the investigation are simple: the investigators gather data, analyze it, determine their findings, and make recommendations. Although the procedures are seemingly straightforward, each step can have its pitfalls. As mentioned above, an open mind is necessary in an investigation: preconceived notions may result in some wrong paths being followed while leaving some significant facts uncovered.

All possible causes should be considered. Making notes of ideas as they occur is a good practice but conclusions should not be made until all the data is gathered.

Physical Evidence

Before attempting to gather information, examine the site for a quick overview, take steps to preserve evidence, and identify all witnesses. In some jurisdictions, an incident site must not be disturbed without approval from appropriate government officials such as the coroner, inspector, or police.

Physical evidence is probably the most non-controversial information available. It is also subject to rapid change or obliteration; therefore, it should be the first to be recorded. Based on your knowledge of the work process, you may want to check items such as:

- positions of injured workers
- equipment being used
- products being used
- safety devices in use
- position of appropriate guards
- position of controls of machinery
- damage to equipment
- housekeeping of area
- weather conditions
- lighting levels
- noise levels
- time of day

You may want to take photographs before anything is moved, both of the general area and specific items. A later study of the pictures may reveal conditions or observations that were missed initially. Sketches of the scene based on measurements taken may also help in later analysis and will clarify any written reports.

Broken equipment, debris, and samples of materials involved may be removed for further analysis by appropriate experts. Even if photographs are taken, written notes about the location of these items at the scene should be prepared.

Witness Accounts

Although there may be occasions when you are unable to do so, every effort should be made to interview witnesses. In some situations witnesses may be your primary source of information because you may be called upon to investigate an incident without being able to examine the scene immediately after the event.

Because witnesses may be under severe emotional stress or afraid to be completely open for fear of recrimination, interviewing witnesses is probably the hardest task facing an investigator.

Witnesses should be kept apart and interviewed as soon as possible after the incident. If witnesses have an opportunity to discuss the event among themselves, individual perceptions may be lost in the normal process of accepting a consensus view where doubt exists about the facts.

Witnesses should be interviewed alone, rather than in a group. You may decide to interview a witness at the scene where it is easier to establish the positions of each person involved and to

obtain a description of the events. On the other hand, it may be preferable to carry out interviews in a quiet office where there will be fewer distractions. The decision may depend in part on the nature of the incident and the mental state of the witnesses.

Interviewing

The purpose of the interview is to establish an understanding with the witness and to obtain his or her own words describing the event:

DO...

- put the witness, who is probably upset, at ease
- emphasize the real reason for the investigation, to determine what happened and why
- let the witness talk, listen
- confirm that you have the statement correct
- try to sense any underlying feelings of the witness
- make short notes or ask someone else on the team to take them during the interview
- ask if it is okay to record the interview, if you are doing so
- close on a positive note

DO NOT...

- intimidate the witness
- interrupt
- prompt
- ask leading questions
- show your own emotions
- jump to conclusions

Ask open-ended questions that cannot be answered by simply "yes" or "no". The actual questions you ask the witness will naturally vary with each incident, but there are some general questions that should be asked each time:

- Where were you at the time of the incident?
- What were you doing at the time?
- What did you see, hear?
- What were the work environment conditions (weather, light, noise, etc.) at the time?
- What was (were) the injured worker(s) doing at the time?
- In your opinion, what caused the incident?
- How might similar incidents be prevented in the future?

Asking questions is a straightforward approach to establishing what happened. But, care must be taken to assess the accuracy of any statements made in the interviews.

Another technique sometimes used to determine the sequence of events is to re-enact or replay them as they happened. Care must be taken so that further injury or damage does not occur. A witness (usually the injured worker) is asked to reenact in slow motion the actions that happened before the incident.

Other Information

Data can be found in documents such as technical data sheets, health and safety committee minutes, inspection reports, company policies, maintenance reports, past incident reports, safe-work procedures, and training reports. Any relevant information should be studied to see what might have happened, and what changes might be recommended to prevent recurrence of similar incidents.

What should I know when making the analysis and recommendations?

At this stage of the investigation most of the facts about what happened and how it happened should be known. This data gathering has taken considerable effort to accomplish but it represents only the first half of the objective. Now comes the key question - why did it happen?

Keep an open mind to all possibilities and look for all pertinent facts. There may still be gaps in your understanding of the sequence of events that resulted in the incident. You may need to re-interview some witnesses or look for other data to fill these gaps in your knowledge.

When your analysis is complete, write down a step-by-step account of what happened (the team's conclusions) working back from the moment of the incident, listing all possible causes at each step. This is not extra work: it is a draft for part of the final report. Each conclusion should be checked to see if:

- it is supported by evidence
- the evidence is direct (physical or documentary) or based on eyewitness accounts, or
- the evidence is based on assumption.

This list serves as a final check on discrepancies that should be explained.

Why should recommendations be made?

The most important final step is to come up with a set of well-considered recommendations designed to prevent recurrences of similar incidents. Recommendations should:

- be specific
- be constructive
- identify root causes
- identify contributing factors

Resist the temptation to make only general recommendations to save time and effort.

For example, you have determined that a blind corner contributed to an incident. Rather than just recommending "eliminate blind corners" it would be better to suggest:

- install mirrors at the northwest corner of building X (specific to this incident)
- install mirrors at blind corners where required throughout the worksite (general)

Never make recommendations about disciplining a person or persons who may have been at fault. This action would not only be counter to the real purpose of the investigation, but it would jeopardize the chances for a free flow of information in future investigations.

In the unlikely event that you have not been able to determine the causes of an incident with complete certainty, you probably still have uncovered weaknesses within the process, or management system. It is appropriate that recommendations be made to correct these deficiencies.

The Written Report

The prepared draft of the sequence of events can now be used to describe what happened. Remember that readers of your report do not have the intimate knowledge of the incident that you have so include all relevant details, including photographs and diagrams. Identify clearly where evidence is based on certain facts, witness accounts, or on the team's assumptions.

If doubt exists about any particular part of the event, say so. The reasons for your conclusions should be stated and followed by your recommendations. Do not include extra material that is not required for a full understanding of the incident and its causes such as photographs that are not relevant and parts of the investigation that led you nowhere. The measure of a good report is quality, not quantity.

Always communicate your findings and recommendations with workers, supervisors and management. Present your information 'in context' so everyone understands how the incident occurred and the actions needed to put in place to prevent it from happening again.

Some organizations may use pre-determined forms or checklists. However, use these documents with caution as they may be limiting in some cases. Always provide all of the information needed to help others understand the causes of the event, and why the recommendations are important.

What should be done if the investigation reveals human error?

A difficulty that has bothered many investigators is the idea that one does not want to lay blame. However, when a thorough worksite investigation reveals that some person or persons among management, supervisor, and the workers were apparently at fault, then this fact should be pointed out. The intention here is to remedy the situation, not to discipline an individual.

Failing to point out human failings that contributed to an incident will not only downgrade the quality of the investigation, it will also allow future incidents to happen from similar causes because they have not been addressed.

However never make recommendations about disciplining anyone who may be at fault. Any disciplinary steps should be done within the normal personnel procedures.

How should follow-up be done?

Management is responsible for acting on the recommendations in the investigation report. The health and safety committee or representative, if present, can monitor the progress of these actions.

Follow-up actions include:

- Respond to the recommendations in the report by explaining what can and cannot be done (and why or why not).
- Develop a timetable for corrective actions.
- Monitor that the scheduled actions have been completed.
- Check the condition of injured worker(s).
- Educate and train other workers at risk.
- Re-orient worker(s) on their return to work.

Example of an Incident Causation Model

All too frequently companies carry out thorough investigations into the *immediate* causes of an incident. What is, however, overlooked is the fact that any incident is usually the product of *a multitude of causes*, not all of them direct.

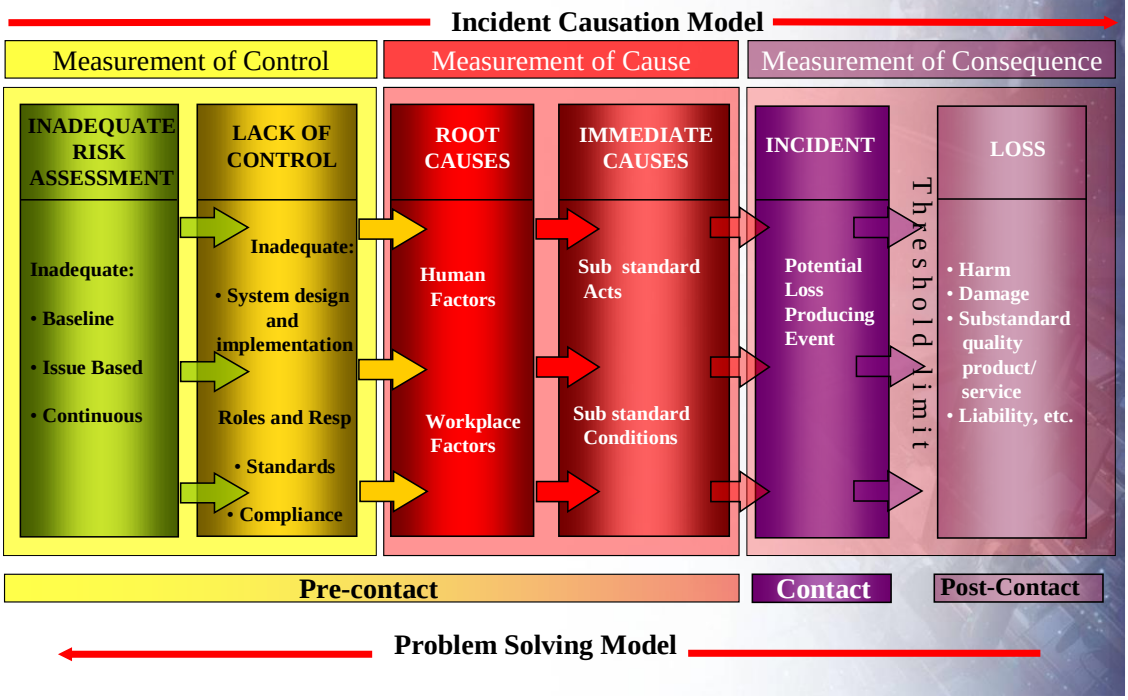
The Health and Safety Acts impliedly require a proactive system of prevention of incidents Thus, when an incident occurs, this indicates a failure of the system, even if the immediate cause is the blatant negligence of the injured person himself

The important thing is to *be seen to be very reactive* when an incident occurs. This would involve a thorough investigation of all factors which may have played a role in the incident, and to take all steps to ensure that a repeat incident never has the opportunity to occur. This is viewed in a serious light by the Departmental Inspectors.

A useful methodology for uncovering all the factors behind an incident is the Incident Causation model.

Below is an illustration of this model:

CAUSATION MODEL



The analysis is primarily about the search for the truth behind an incident. As such all witnesses and involved persons must be encouraged to come forth and provide whatever information they have without intimidation or fear of repercussions from management.

Finally, a successful exercise would invariably uncover information which could seriously incriminate a company if discovered by the Inspectorate. In lieu of this it is always advisable to have any documentation classified as legally privileged, and that these be forwarded to the legal advisors.

Loss

The result of an Incident is loss. The most obvious losses are harm to people and property. Implied and important related losses are performance, interruption, quality degradation, environmental damage and profit reduction.

Once the sequence of events leading to the loss has occurred, the type and degree of loss are somewhat a matter of chance. The effect may range from insignificant to catastrophic, from a scratch or dent to multiple fatalities or loss of a plant.

The type and degree of loss depend partly on circumstances and partly on the controls in place or actions taken to minimize loss. Actions to minimize loss at this stage of the sequence include:

- prompt and proper first aid and medical care,
- fast and effective fire fighting,
- prompt repair of damaged equipment and facilities,

- efficient implementation of emergency action plans, and
- effective rehabilitation of people for work.

Incident

This is the event that precedes the loss - the contact that could or does cause the harm or damage to anything in the work or external environment.

When potential causes of incidents are permitted to exist, the way is always open for a contact with a source of energy or substance above the threshold limit of the body or structure.

As an example, a flying or moving object involves kinetic energy which transfers to the body or structure it hits or contacts.

If the amount of energy transferred is too much, it causes personal harm or property damage. This is true not only of kinetic energy but also electrical energy, acoustic energy, thermal energy, radiant energy, chemical energy, etc.

Here are some of the more common types of energy transfers and substance contacts.

- Struck against (running or bumping into)
- Struck by (hit by moving object)
- Fall to lower level (either the body falls or the object falls and hits the body)
- Fall on same level (slip and fall, tip over)
- Caught in (pinch and nip points)
- Caught on (snagged, hung)
- Caught between (crushed or amputated)
- Contact with (any harmful energy or substance)
- Overstress/over exertion/overload
- Release of (any harmful energy or substance)

Immediate Causes

The immediate causes of Incidents are the circumstances that immediately precede the contact. They usually can be seen or sensed.

Frequently they are called ***substandard acts, or at-risk behaviours*** (behaviours which acts could permit the occurrence of an Incident) and ***substandard conditions*** (circumstances which could permit the occurrence of an Incident).

The terms at risk behaviours and substandard conditions are used to indicate both the individual acts of people as well as the accepted practices of the organisation.

If the management system does not correct (or even encourages) at-risk behaviours, they become part of the substandard conditions.

At-risk behaviours

Substandard acts/practices are usually are seen in one or more of the following forms:

- Operating equipment without authority
- Failure to warn
- Failure to secure
- Operating at improper speed
- Removing or making safety devices inoperable
- Using defective equipment
- Using equipment improperly
- Failing to use personal protective equipment personally
- Improper loading
- Improper placement
- Improper lifting
- Improper position for task
- Servicing equipment in operation
- Horseplay
- Under influence of alcohol and/or other drugs
- Failure to follow procedures

Substandard conditions

Substandard conditions are usually are seen in one or more of the following forms:

- Inadequate guards or barriers
- Inadequate or improper protective equipment
- Defective tools, equipment or materials
- Congestion or restricted action
- Inadequate warning systems
- Fire and explosion hazards
- Poor housekeeping, disorderly workplace
- Hazardous environnemental conditions: gases, dusts, smokes, fumes, vapours
- Noise exposure
- Radiation exposures
- High or low temperature exposures
- Inadequate or excessive illumination
- Inadequate ventilation

Root Causes

Root causes are the diseases or real causes behind the symptoms, the reasons why the substandard acts and conditions occurred; the factors that, when identified, permit meaningful management control. Often, these are referred to as root causes, real causes, indirect causes, underlying or contributing causes.

This is because the immediate causes (the symptoms, the substandard acts and conditions) are usually quite apparent, but it takes a bit of probing to get at root causes and to gain control of them.

Root causes help explain why people perform substandard acts/practices. Logically, a person is not likely to follow a proper procedure if he or she has not been trained in it. Likewise, the operator of equipment requiring precise and skillful handling will not operate it efficiently and safely without the chance to develop skill through guided practice.

It is equally logical that poor quality of work and substantial waste will result from placing a person with faulty eyesight on a job where good vision is critical for proper performance. Similarly, a person who is never told the importance of a job is unlikely to be motivated to a high degree of pride in his or her work.

Root causes also help explain why substandard conditions exist. Equipment and materials which are inadequate or hazardous will be purchased if there are not adequate standards and if compliance with standards is not managed.

Unsafe structures and work process layouts will be designed and built if there are not adequate standards and compliance for design and construction.

Equipment will wear out and produce a substandard product, create waste or break down and cause an Incident if that equipment is not properly selected, properly used and properly maintained.

Root causes can be found in two major categories:

- ***Human Factors***
- ***Workplace Factors (Work Environment)***

Human factors can include the following:

- Inadequate capability
- Physical/Physiological
- Mental/Psychological
- Lack of knowledge
- Lack of skill
- Stress
- Physical/Physiological
- Mental/Psychological
- Improper motivation

Workplace Factors (Work Environment

Workplace factors can include the following:

- Inadequate leadership and/or supervision
- Inadequate engineering
- Inadequate purchasing
- Inadequate maintenance

- Inadequate tools, equipment, materials
- Inadequate work standards
- Wear and tear
- Abuse or misuse

Inadequate Systems control

Control is one of the four essential management functions, namely:

- ***plan,***
- ***organise,***
- ***lead,***
- ***control.***

These functions relate to anyone's work, regardless of level or title. Whether the function is administration, marketing, production, quality, engineering, purchasing or safety, the supervisor/leader/manager must plan, organise, lead and control to be effective.

The person who manages effectively knows the loss control system; knows the standards; plans and organises work to meet the standards; leads people to attain the standards; measures performance of self and others; evaluates results and needs; commends and constructively corrects performance. This is managing control.

Without it, the Incident sequence begins and triggers the continuing casual factors that lead to loss. Without adequately managing control, the Incident cause and effect sequence is started and, unless corrected in time, leads to losses.

There are three common reasons for lack of control:

- ***inadequate system,***
- ***inadequate standards***, and
- ***inadequate compliance*** with standards.

Correcting these three common reasons for lack of control is a critical activity for success.

Inadequate System

A loss control system may be inadequate because of too few or improper system activities.

While the necessary activities vary with an organization's scope, nature and type, significant research and the experience of successful programs in many different companies.

Inadequate Standards

A common cause of confusion and failure is performance standards that are not specific enough, not clear enough and/or not high enough. To be measurable, performance standards should clearly indicate the following:

- who is responsible,
- what they are responsible for, and
- when or how often they need to carry out that responsibility.

Adequate standards are essential for control.

Inadequate compliance with standards

Lack of compliance with existing standards is a common reason for lack of control. In fact, most leaders agree that this is the single greatest reason for failure to control loss.

Inadequate Risk Assessment

Risk assessment is about being pro-active / having a "vision of the future" / seeing what can go wrong BEFORE it happens. This involves the following:

- **FIRST** understanding the RISK it presents to the organization
- **THEN** designing / developing POLICIES to deal with risk, developing SYSTEMS (multiple) to *implement policies* and to REDUCE risk e.g.:

  Transport company reducing the risk of vehicle collisions causing fatalities, damage and liabilities:

  - Training *system* for drivers
  - Inspection and maintenance *system* for vehicles
  - Insurance policy to cover injury, damage, liability, etc.
  - But, a *system for correct labeling of packages would have zero risk reduction value – it impacts a different risk*

STANDARDS are contained within the SYSTEMS and *it is standards that will DETERMINE THE DEGREE OF RISK REDUCTION ACHIEVED.* The higher the risk, i.e. high probability of the event and/or severe consequences for the event, the more barriers needs to be put in place.

Baseline Risk Assessments

Organisations have to assess where they are in terms of risk, identifying the major risks and thereby establishing their priorities and a system for future risk control.

This baseline risk assessment needs to be comprehensive and may well lead to further, separate, more in-depth risk assessment studies. The baseline risk assessment must be periodically reviewed, say every one to two years, to ensure that it is still relevant and accurate.

Issue Based Risk Assessments

As circumstances and needs arise, separate risk assessment studies need to be conducted. These are normally associated with a system for the management of change.

Continuous Risk Assessments

The concept of multiple causes

Among the practical principles of professional management is the Principle of Multiple Causes: problems and loss-producing events are seldom, if ever, the result of a single cause. This is an essential principle for safety/loss control management. One should never assume that there is a single cause of an accident or incident.

Experience shows that a majority of incidents involve both substandard acts/practices and substandard conditions. And these are only symptoms. Behind the symptoms are the root causes, the personal factors and job factors which led to the substandard acts/practices and conditions.

Even after uncovering all of these causes, there is more to be done. Then one should determine what deficiencies in the management system (e.g. poor hiring and placement, lack of training, inadequate maintenance) permitted or caused those personal and job factors.

In effect, there are three levels of causes: a) immediate causes; b) root causes and c) lack of management system control factors.

It is good to keep in mind that, while we must try to identify every possible cause of a problem, we should give the greatest amount of attention to those with the greatest potential of loss severity and the greatest probability of recurrence. This is essential to effective control.

Incidents are caused - they do not just happen

The stages of control

The Incident Causation model not only reflects multiple causes but also multiple opportunities for control. These opportunities can be grouped into three major categories or stages of control:

- ***pre-contact,***
- ***contact,*** and
- ***post contact.***
- ***Pre-Contact Control***.

This is the stage that includes everything we do to develop and implement a system to avoid the risks, prevent the losses from occurring, and plan actions to reduce loss if and when contacts occur. Here are some examples:

- Give adequate emphasis to safety and ergonomic considerations in designing or modifying the workplace.
- Implement effective loss control policy and procedures
- Emphasise safety/loss control in group meetings and written communications

- Provide proper personal communications such as employee orientation, task instruction, safety contacts, key point tips, and job performance coaching
- Train, at all organisational levels, for optimum performance
- Ensure an adequate inspection system
- Analyse critical tasks and develop proper task procedures
- Conduct task observations
- Provide positive behaviour reinforcement for desired behaviours.
- Ensure proper use of PPE
- Provide wellness programs, preventive medical services and employee assistance programs
- Give adequate consideration to safety-health-environmental concerns in purchasing and contracting activities
- Attend to both on-the-job and off-the-job safety-health-environmental control
- Apply the results of management/leadership system audits to the process of continuous improvement

Pre-contact control is the PREVENTION part of control. This is where one develops an optimum system, establish optimum standards, maintain effective performance feedback, and manage compliance with performance standards.

Contact Control

Incidents, namely accidents usually involve contact with a source of energy or substance above the threshold limit of the body or structure.

Many control measures take effect at the point and time of contact, by reducing the amount of energy exchange or harmful contact.

The control involves placing barricades or barriers between the source of energy and the people or property. Examples of such control include the following:

- personal protective equipment or devices

  ⇒ skin creams and lotions
  ⇒ fire walls
  ⇒ explosion bunkers
  ⇒ enclosures or insulation for noise-emitting machines, for heat and cold, for electricity and for radiation
  ⇒ filters for removing toxic elements from the air

- strengthening the body or structure

  ⇒ weight control and physical conditioning
  ⇒ immunisation vaccines

The contact stage is where the incident occurs, that may or may not result in loss, depending on the amount of energy or substance involved. Effective controls keep the exchange at a minimum, resulting in minor rather than major losses, and close calls rather than Incident losses.

⇒ These measures do not prevent the contacts or incidents, but they do contribute significantly to the control of losses.

Post-Contact Control

After the Incident or contact, the extent of losses can be controlled in many ways, such as:

- *implementation of the emergency action plans*
- *proper first aid and medical care for people*
- *rescue operations*
- *fire and explosion control*
- *removal of damaged equipment, materials and facilities from use until repaired*
- *prompt repair of damaged equipment, materials and facilities*
- *prompt ventilation of the air-polluted workplace*
- *effective cleanup of spills*
- *compensation claims control*
- *liability claims control*
- *salvage and waste control measures to reclaim all possible value from damaged items*
- *prompt and effective rehabilitation of injured workers to a productive life*

Post-contact controls do not prevent the Incidents, but they minimise the losses. They can mean the difference between injury and death, between reparable damage and total loss, between a complaint and lawsuit, between business interruption and business closing.

CAUSAL CHECKLIST	
CODING OF IMMEDIATE CAUSES: (CHECK ALL APPLICABLE)	
Substandard Actions/At Risk Behaviour:	**Substandard /At Risk Conditions:**
1. Following Procedures/Practices/Rules/Regs/Standards ☐ **2. Use of Tools or Equipment** ☐ **3. Use of Protective Devices** ☐ **4. Inattention/Lack of Awareness** ☐	**5. Protective Systems** ☐ **6. Transport/Equipment/Tools** ☐ **7. Work Exposure to** ☐ **8. Work Place Environment/Layout** ☐
CODING OF ROOT CAUSES:	**TYPE OF CONTACT / CONTACT WITH:**

Human Factors	Work factors	
1. Physical Capabili ☐ 2. Physical Conditio ☐ 3. Mental State ☐ 4. Mental Stress ☐ 5. Behaviour ☐ 6. Skill Level	7. Training/Knowledge Transfe ☐ 8. Management/Supervision/ Employee Leadership ☐ 9. Contractor Selection and Oversight ☐ 10.Engineering/Design ☐ 11.Work Planning ☐ 12.Purchasing Material Handlin ☐ and Material Control ☐ 13.Tools and Equipment ☐ 14.Work Rules/Policies/Standards/ Procedures (PSP) ☐ 15.Communication	Caught between ☐ Contacted by ☐ Contact with ☐ Caught in ☐ Caught on ☐ Struck against ☐ Struck by ☐ Exposure ☐ Fall from elevation ☐ Fall on same level ☐ Overstress/overexertion ☐ Handling ☐ Inundation

REVIEWER'S COMMENTS:

Reactions to the investigator's analysis of the causes and the remedial actions

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Signature : _____ **Title :** _____ **Date :** _____

Incident Reports

Compilation of reports

The investigation report puts all the investigation findings together in a brief summary:
It communicates the critical facts to people who have to act on them
It makes a record which many uses in the management system, e.g. for training purposes.

It gives feedback on a supervisor's problem solving.

Benefits of a standard form

Most organisations have a standard investigation report form, which has several benefits:
It raises all the basic questions that should be answered by the investigation. These are: What was the loss? What were the causes? What is the loss potential? What happened? Where? How? What was done to control the loss exposures? What needs to be done? Is the report complete and accurate?
It provides consistency in data reported. That aids managers' reviews. It prompts sharing of information with others in the organisation.
it allows analysis for incident trends, and that helps program management.
It provides information for follow-up on action plans. It gives the status of actions in one convenient record.
A well-designed form also accommodates investigations of all types of losses. The simpler the form, the better it meets this goal.

Elements of a good investigation report

The report must effectively communicate the important information relating to the incident. The language used in the report should be clear and simple. The following are elements of a good investigation report:
Identifying information - fill in all spaces. This gives details, so use specific words and numbers.
Evaluation - what was the real potential for loss (not just what happened?) If no corrective action is taken, how often could it be expected to recur?
Description - tell what you have decided actually happened: what actions led up to the incident, the contact and what was done post-contact to reduce the loss.

Cause Analysis - list the symptoms (the substandard acts/practices and conditions) and the basic causes (the job/system and personal factors). Give a few words explaining each cause. In listing basic causes, list first those that made the greatest contribution to the Incident.
Action plan – Write first in a short sentence or a few words what was done right away. Then write your recommendations. Put them in the same order as the basic causes so they will be easier to follow. If the recommendations call for work orders, purchase requests or other things set up in a company format, write these out and attach them. Make it easy for the senior manager to approve your ideas.
One doesn't have to be a literary wizard to write a good investigation report. All you need to do is communicate. The key to that is to be clear and simple. Use words that are common, short and specific.

Measurement of report quality

As a report is reviewed by the next-level manager, its quality will naturally be evaluated. Also, in many organisations the safety professional will use a measurement system.
The measurement is made by dividing the report into sections and setting value factors for each section. Value factors could include the following:
Timeliness of reporting - Give points if the report is submitted within one workday after the incident. Subtract points for each day late.
Identifying information - Give the report points if all boxes are filled in and the information seems to be accurate.
Risk evaluation - Give points for a correct evaluation of how bad the loss could have been and how often the incident could occur if nothing is done about the causes.
Description - Give the report points on clarity. Does the description tell what happened? It should tell, step-by-step, the actions, conditions and decisions that led to the incident. It should describe the energy or substance contact. It should say what emergency care and damage control followed.
Cause analysis - Give the report points for listing and describing all significant immediate causes and basic causes. Allocate points for substandard acts/practices and conditions, and points for personal and job/system factors.

The cause statement should say what each basic cause was and why it existed, e.g. “a lack of knowledge of how to lock out a machine because the procedure was overlooked in the job training lesson plan”.

Remedial action plan - Give points on the adequacy of temporary actions taken and the suitability of recommendations.

The actions should correct the substandard acts/practices and conditions which are symptoms of the problem. Most of the reviewer’s interest, and most of the points given, should go to solutions to the personal factors and job/system factors.

Signatures - Give points if the report is properly dated and signed.

This method of report reviews helps to objectively identify good reports for commendations, specify deficiencies for improvement and point out supervisors’ problem-solving weaknesses for personal counselling

EXAMPLE OF MANAGEMENT REVIEW REPORT

Location	Area/department	
Incident date	Date of review	Incident Number

NATURE OF LOSS/HARM	NATURE AND EXTENT OF ACTUAL OR POTENTIAL HARM TO PEOPLE, PROPERTY, PROCESSES, QUALITY OR THE ENVIRONMENT : (INCLUDE ESTIMATED COSTS)
DESCRIPTION OF INCIDENT	BRIEF DESCRIPTION OF INCIDENT (WHO, WHAT, WHEN, HOW) :
CAUSES	WHAT CAUSES LED TO THE INCIDENT :
CONTROLS	ACTION TO PREVENT RECURRENCE: INFORMATION FOR SITE-WIDE ATTENTION:

ATTENDEES	ATTENDEES : Name Date Name Date _____ _____ _____ _____ _____ _____ _____ _____ Review Board Chairperson

REMEDIAL ACTION

Meaning of the types of remedies

In general, remedial action comprises the following types:

1. *Corrective action*
2. *Preventive action*
3. *Contingency action*
4. *Tolerate*

These can be explained as follows:

Term	**Meaning**	**Example**
Corrective Action	Action to bring into accordance with standard	Cover hole/Replace damaged tool
Preventive Action	Eliminates the cause of a problem or reduces its probability of occurrence	Construct machine guard
Contingency Action	Reduces the seriousness of the problem	Wearing of PPE
Tolerate	To accept as part of operational risk/not cost effective to eliminate cause no action taken	Recurrence rate - Rarely - Severity Rate - Minor e.g. Loss of R1 000 in possibly 5 years, but will cost R10 000 to prevent.

When the remedies apply

The types of remedial action would generally apply to the three stages of an incident / event.

These are shown as follows:

Before the event	**The event occurs**	**After the event**
Preventive Action	Contingency	Contingency action
	Tolerate	Tolerate
		Corrective action

Data Analysis

Even after methodical investigation and careful review, there is still another way to get more information out of accidents and incidents. That way is to analyse certain data for trends.

Trend analyses can unmask problems. They can show, for instance, that large numbers of incidents involve the use of certain materials or equipment, involve people with certain levels of experience or occur at certain times of the workday.

Common categories for analysis

There are many subjects for incident/accident analysis. The ones chosen will depend on several factors: the staff capability to work up analyses, the training in the use of analyses that will be given to managers and the overall level of risk. Some of the common or most useful categories are:

- ***Incident frequency and severity rates by organisation and department***.

  These numbers show how many Incidents occur, or how many days are lost, per base number of days worked. They show the history of Incidents and give the trend from year to year.

  That is important, but overall, the only truth they tell is who is honestly reporting incidents. Other data on degree or risk is needed before these numbers are meaningful.

- ***trends by cause factor***

  More useful for positive action are compilations of the number of times each of the basic factors is a cause. When the majority of causes fall into a few categories it gives clues to trends. For example, a number of “lack of knowledge” factors indicate that there may be a deficiency in the training program.

- ***Incidents by experience level of people involved***.

Large numbers of Incidents involving inexperienced people can point toward complacency, initial training, review training or employee development problems.

- ***Incidents by time of day or time into work shift***.

Incident investigation exercise

Work through this example scenario. It is designed to provide you with an understanding of the incident investigation process.

Scenario:

- Joe is operating a conveyor system upon which product is placed after packing and prepping for shipment. His job is to make sure the conveyor is operating and carries enough product so that fork truck drivers have a continual flow to fill trailers.
- He has a backup in the system and goes to investigate, and finds some shrink wrap has wound around a gear on the conveyor. This causes the pallet to be off centre, and a jam occurs. He pushes the pallet of boxes to release the jam (while standing on the edge of the conveyor). The jam is released, and several pallets of product move and impact Joe. He subsequently falls off the conveyor.

Result:

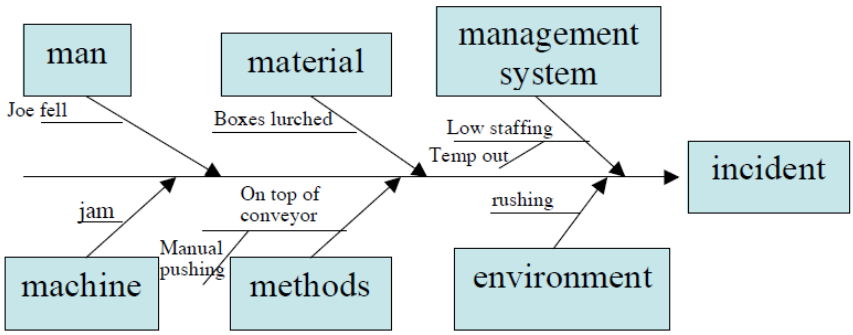
- Joe suffers a contusion on his left temple from an upright post, scrapes his left knee and wrenches his back. He is currently out of work.
- Time 3:00 PM (shift ends at 4:30 PM)
- Temporary employee that works with Joe was not in that day.

Investigation:

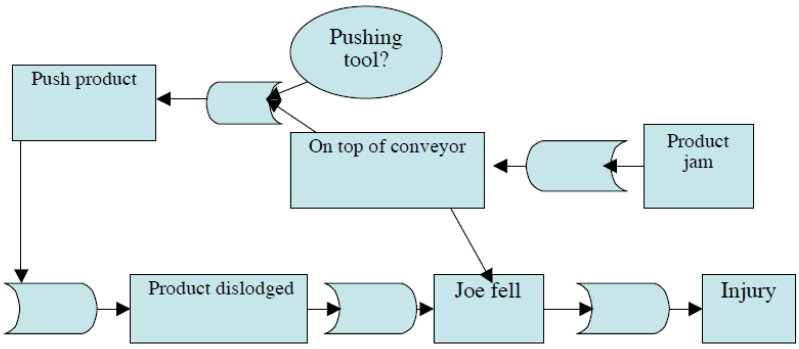
- There are three employees who work in the department and were present at the time of the incident:
    - 1: 'He was stressed because several trucks were waiting for product'
    - 2: 'Jams happen a lot there, something always catches, but maintenance
- cannot seem to find anything'
    - 3: 'I have seen Joe clear jams like that before'

- Joe's supervisor, the warehouse manager: 'Maintenance has made a tool to push jams out so that employees do not have to climb on the conveyor, apparently Joe did not use it.'

Cause Determination: Final Analysis: *Basic*



Cause Determination (Fault Tree):



Final Analysis:

- *Basic Causes:*
  - Improper Design, Maintenance, Enforcement of Tool Use, Lack of Help;
- *Indirect Causes (Intermediate Causes):*
  - Climbing on Conveyor; Rushing;
- *Direct Causes:*
  - Boxes Lurched;
- *Result*
  - Fell and was injured;

Root Cause is Basic - Management or Design