



Investigating incidents

This sheet provides useful information on how an investigation is run – it is not intended to be a detailed ‘how-to-do-it’ manual. Rather, it aims to assist safety and health representatives to understand the principles involved in conducting an investigation and provide procedural hints should they become involved in an investigation.

GENERAL

One of the statutory functions of a safety and health representative is ‘... in the event of an accident, a dangerous occurrence, or a risk of imminent and serious injury to, or imminent and serious harm to the health of, any person, immediately to carry out an appropriate investigation in respect of the matter ...’ (s. 53(1)(b), *Mines Safety and Inspection Act 1994*). However, safety and health representatives may be uncertain about what is ‘appropriate’.

In the event of most serious incidents, it is usual for an inspector to conduct an investigation separate to what is being conducted on site by the principal employer. Any resources required by the inspector will be given priority.

The scope of an investigation largely depends on the seriousness or complexity of the incident. Investigators should perform only those tasks required to identify facts and causative factors.

Bear in mind that there are some legal restrictions. It is an offence (s. 81, *Mines Safety and Inspection Act 1994*) to:

- disturb the site of a serious accident without the authority of the District Inspector of Mines
- disturb the site of a fatality without the authority of the Coroner.

For most incidents that a safety and health representative decides to pursue further, the investigation will be straightforward. For more complex investigations (e.g. serious injury), safety and health representatives would typically be involved either at the invitation of an inspector or by contributing to an employer’s investigation.

An inspector may request that a safety and health representative participates in the inspector’s own investigation of an incident, as the safety and health representative may have valuable local knowledge (of the site, the work systems and the people) and be of great assistance.

Accidents and occurrences, which do not necessarily result in injury or property damage, are unplanned events. A good investigation compares the sequence of events that should have taken place with what actually happened to identify areas that need changing. The aim is to prevent a recurrence of the incident.

Note: The generic term ‘incident’ is used here to cover accidents and occurrences or notifiable incidents.

Accident investigations commonly conclude that the injured person’s conduct contributed in some way to the outcome. In most instances, however, the contributing conduct arises from inadequate procedures or a lack of adequate training or supervision. In other instances, enthusiasm for productivity, including well-meaning but ill-considered attempts to correct equipment malfunctions, plays a part.

It may be difficult to appreciate the role of human behaviour in accident

or incident causation and therefore recommend the most effective responses. Also, relying solely on the number of accidents or incidents in the organisation is not an adequate means of assessing safety performance, if the behavioural component is not understood. Statistics alone are unlikely to indicate how well individual managers or supervisors are dealing with problems, or if further action is required.

The organisation’s effectiveness in identifying and correcting potential hazards should be questioned when an incident occurs.

INVESTIGATION PROCEDURES

Investigation procedures need to be systematic. Competent, professional investigations:

- yield information needed to
 - identify trends and problem areas
 - permit comparisons
 - satisfy legal requirements
- identify the basic causes that contributed directly, or indirectly, to each incident
- identify deficiencies in the production and management system that permitted the incident to occur
- suggest specific corrective action alternatives for the management system.

An investigation may reveal if something went wrong in the management system. Was there an omission, an oversight, or a lack of control of circumstances that permitted the incident to occur? As management systems improve, the overall safety and health performance will also improve.

Accurate, clear and complete information is needed, including:

- a description of the sequence of events leading to the incident
- correct identification of all causal factors
- a description of all causal factors
- the corrective actions already taken
- further recommendations for corrective actions
- proper review
- timeliness.

WHAT TO LOOK FOR

The person or agency conducting an investigation is attempting to define in relation to the following matters:

Causes – not blame

The purpose of conducting an investigation is to establish the cause or causes.

If attempts are made to apportion 'blame' then people who might otherwise provide useful information – and hence guidance on the remedial action needed – will simply become defensive. The result could be:

- witnesses not revealing all of the circumstances and events surrounding the incident
- deliberate obstruction, or provision of false information
- removal of relevant information, documents or evidence.

The investigator must remain impartial and objective if all of the causes are to be established.

Causes – not injury

While it is natural and necessary to show concern for the injured person(s), future injuries will only be prevented if all the faults in the system are identified. Investigations should avoid preoccupation with outcomes (i.e. severity of injury or property damage).

Building the chain of events

For the investigation to be successful in identifying all of the causes, it is necessary to establish the following.

Events leading up to the incident:

- system of work being carried on and the adequacy or suitability of that system for the job in hand

- instructions and training given for the work and the adequacy of such instructions and training
- verification of competency of the workers assigned to undertake the task
- variation from instructions or standard work practices and the reasons for such variation
- workplace conditions (e.g. lighting, floor surfaces, stair treads and handrails, warning signs, temperature, weather if the incident occurred outside)
- exact location of the incident (with sufficient detail for the spot to be readily identified by somebody else reading the report)
- materials in use or being handled
- type of transport or equipment in use
- need for supervision of the work and whether adequate supervision was provided if needed.

Facts of the incident itself:

- state of the system of work and the actions that occurred at the time
- persons directly involved, and those indirectly involved, if any
- tools, equipment, materials and fixtures directly concerned
- the time.

Relevant facts regarding what occurred immediately after the incident:

- injuries or damage that resulted
- events leading to the injury or damage
- persons involved, including those rendering aid
- any problems in dealing with the injuries or damage (e.g. no method for releasing a trapped person, faulty extinguisher, isolation switch difficult to locate).

People who have knowledge of the work in hand or conditions at the scene, whether or not they were at the actual event or saw it occur, can also contribute to establishing the chain of events.

Essential factors and causes

In the events leading up to an incident, there will be a number of essential factors that must be present to allow the sequence to continue and the harm or damage to occur. These factors are all important, and each must have been present for the incident to have occurred. All have design, environmental and behavioural components. To conduct

an effective incident investigation, it is essential to look at each of these components, and not try to isolate a single cause.

The normal practice in an investigation is to look for the cause of any incident. However, in dealing with these essential factors, it is not possible to select any particular one and give it the title 'cause'.

Searching for a single 'cause' of an incident is also restrictive. It focuses attention on only one – or, at best, a very few – of the essential factors while others, which may be more easily controlled, pass unnoticed.

Design components

Poor systems design may result in exposure to hazards such as:

- unguarded dangerous parts of machinery
- ineffective safety devices
- provision of makeshift plant, equipment and tools
- inadequate ventilation.

Environmental components

The production system environment has a direct effect on safety behaviour. How people function in the work environment depends on what they experience in it (e.g. dust, light, space available).

Behavioural components

The reasons why people disregard established safe systems of work or standard work practices and safety practices, procedures or rules should be examined. Examples include misuse of safeguards, improper use of tools and equipment, disregard of cautionary notices, failure to wear personal protective equipment, horseplay and poor standards of housekeeping. Poor practices may indicate that improved communication, further training or some other action (e.g. supervision) are necessary.

CONDUCTING AN INVESTIGATION

An investigation team is usually used for a complex investigation. This team may be put together by an inspector or the company.

An inspector conducting an investigation has full control of the incident site and will direct company resources as appropriate.

For any investigation, the investigation team should do the following.

- Act as soon as possible after the incident.
- Visit the scene before physical evidence is distributed.
- Not prejudge the situation.
- Initially, not move plant or equipment, or remove or take into custody any items at the scene.

Note: other investigating authorities (e.g. the police or inspectors in serious cases) may do this.

- Enquire whether anyone has removed any items, or disturbed or altered anything at the scene.
- After the initial investigation is completed, the investigator or investigative team may take samples of unknown chemical spills, vapours, residues, dusts, and other substances, noting conditions that may have affected the sample(s).

Note: some samples may require specific technical expertise and equipment to ensure their validity.

- Carry out any on-site study required, taking notes at the scene.
- Make full visual records. No one can predict in advance which data will be useful, so photographs should be taken from many different angles and a comprehensive survey completed (or, as a bare minimum, accurate and complete sketches or diagrams should be made) before the scene is altered.
- Determine which incident-related items should be preserved. These may become critical evidence in later litigation. When the investigation reveals that an item may have failed to operate properly, or was damaged, it should be decided whether to preserve the item as it was found at the scene or to document carefully any subsequent repairs or modifications.
- Identify, label, and keep all material evidence (e.g. spanners, defective electrical equipment, eye-bolts, bits, fragments).
- Interview any witnesses separately.
- Find out if there have been any 'near misses' previously in similar circumstances.
- Carefully log the sources of all information. This avoids any impression that information obtained from third parties is based on the investigator's own observations or analysis and can prove valuable if

the investigation is expanded or re-opened later. Note any contradictory statements or evidence and attempt to resolve discrepancies.

- Review all sources of potentially useful information. These may include original design specifications and drawings; operating logs; purchasing records; previous reports; procedures; equipment manuals; verbal instructions; maintenance, inspection, and test records; design data; job safety analysis records; records indicating the previous training and job performance of the employees and supervisors involved; computer simulations; and laboratory tests.
- Reconstruct or re-enact the situation which led up to the incident. This helps to
 - obtain necessary information which cannot be obtained in any other way
 - determine a course of preventive action
 - verify facts given by the victim or witness.
- Precautions must be taken to ensure that the re-enactment does not become a repetition. Before incidents are re-enacted, make certain that
 - the person(s) involved understand that the intention is to show what happened (and not to create a repetition of the actual process)
 - the people taking part are instructed to simulate all procedures and actions in slow motion (and that an explanation of each step is required)
 - people re-enacting the incident are emotionally stable and able to act as accurate demonstrators (bear in mind that they may be upset, particularly if a close work colleague has been injured).

PRINCIPLES OF INVESTIGATION

The following principles should assist the safety and health representative in any investigation.

- An incident investigation is a search for the truth, in the interests of prevention of further harm.
- The process of investigation uses the basic sources of evidence in accordance with the facts of the incident.

- A reduction in the interval between call-time and response-time increases the prospects of the solution to an incident.
- The investigator is a collector of evidence and, as such, must allow the facts to present their own conclusions.
- Physical evidence is real evidence. It always tells the same story and is not subject to the adverse influences affecting human memory.
- Science and technology are aids to, and not substitutes for investigation. The investigator must discover the physical evidence for submission to experts.
- Evidence of witnesses is affected by human frailty. Every effort should be made to obtain corroboration of witness evidence.
- If the investigator asks enough people enough questions, he or she will eventually obtain most of the right answers.
- Written notes should be made progressively throughout the investigations. If it is worth making a mental note of something then it is worth making a written note of it.
- Information is the life blood of investigation. Opportunities for its production must be carefully cultivated.
- Observation, information and interrogation are the most important processes in investigation.
- The standard of investigation will be commensurate with the skills and persistence of the investigator.
- "Luck" can play a part in an investigation, but is often nothing more than a combination of opportunity and preparation.

Investigation involves the processes of induction and deduction; the former to assemble all the available evidence, and the latter to suggest the solution to problems and the answers to questions arising.

QUESTIONS TO HELP ESTABLISH THE FACTS

This list of questions will assist investigators to establish the facts and may help to identify system design weaknesses that contributed to the incident.

Who

- was injured?
- saw the incident?
- was working with the injured?
- had instructed and/or assigned the job to the injured?
- else was involved?
- has information on circumstances or events prior to the accident/incident?

What

- is the injury?
- is the damage or loss?
- was the injured doing?
- had the injured been instructed to do?
- tools were being used?
- machinery/plant/equipment was in use?
- previous similar accidents or near misses (potentially serious incidents) have occurred?
- action had been taken to prevent recurrence?
- did the injured and any witnesses see?
- safety rules were violated?
- safety systems of work, permits to work, isolation procedures were there?
- training had been given?
- system for assessing competency was there?
- were the contributory causes of the incident?
- communication system was in use?

When

- did the incident occur?
- did the damage become evident?
- did the injured start the job?
- was an explanation of the hazards given?

did the supervisor last see the injured?

was something observed to be wrong?

Why

- did the injury occur?
- did communication fail?
- was training not given?
- was competency not assessed?
- were the unsafe conditions permitted?
- was the hazard not evaluated?
- was personal protective equipment not provided?
- was protective equipment not used?
- was there no safe system of work, permit to work or isolation procedure operating?
- were specific safety instructions not given?
- was the injured where they were?
- was the supervisor not consulted when things started to go wrong?
- was the supervisor not there at the time?

Where

- did the incident occur?
- did the damage occur?
- was the supervisor at the time?
- were the witness at the time?

How

- did the injury occur?
- could the incident have been avoided?
- could the injury have been avoided?
- could the supervisor have prevented the incident?
- could better design help?

Note: Care must be exercised in obtaining answers to some of these questions, as the investigator could be accused of apportioning blame.

CHECKLIST TO DETERMINE RECOMMENDATIONS AND CONCLUSIONS

This checklist of questions may help the investigator when determining the recommendations to rectify system faults and what conclusions can be drawn from the facts.

What systems failed?

- How can we prevent failure or make it less likely?
- How can we detect approaching failure?
- How can we detect failure when it occurs?
- How can we control failure (minimise consequences)?

What does the system do?

- Why do we do this?
- What could we do instead?
- How else could we do it?

Which persons failed?

- What did they fail to do?
- How can we make failure less likely?

Note: Consider persons who failed to supervise, train, check, design adequately as well as persons who failed to close a valve, etc.

What is the purpose of the person's action?

- Why do we do this?

What could we do instead?

- How else could we do it?
- Who else could do it?
- When else could it be done?

What specific items in the system triggered the accident/incident?

- What does it do?
- Why do we do this?
- What could we do instead?
- What could we use instead?
- How else could we do it?