Incident Investigation

On January 20, 2012, a massive explosion at the Babine sawmill in Burns Lake in northern British Columbia killed two workers and injured 20 others. The explosion, powerful enough to blow off the mill’s roof and send a giant fireball into the sky, was caused by a buildup of wood dust in the mill’s atmosphere. Ryan Clay, a worker at the mill, said the dust had built up to dangerous levels. “You couldn’t see across the mill, that’s how bad the dust levels were. Even with the fans going full blast, the dust was just horrendous.”

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In incidents this serious, the investigation becomes the responsibility of the provincial government, in this case WorkSafeBC. It took 19 days for WorkSafe investigators to gain access to the site, first because of RCMP investigations of criminal acts and then because of unsafe conditions. The investigation was finally completed on November 29, 2012, with a recommendation to lay charges against the employer under BC’s health and safety legislation. Nevertheless, the Criminal Justice Branch (which makes all final decisions about prosecutions) decided it could not proceed with charges due to significant flaws in the investigation procedure. A review of the investigation found it had failed to collect all pertinent information, interview certain key witnesses, and follow.

Learning Objectives

After reading this chapter, you will be able to:

- Identify the reasons for conducting an incident investigation.
- Explain the steps in an investigation.
- Describe the tools and techniques employed in an incident investigation.
- Distinguish between proximate and root cause.
- Outline the purpose of recommendations and follow-up.
On January 20, 2012, a massive explosion at the Babine sawmill in Burns Lake in northern British Columbia killed two workers and injured 20 others. The explosion, powerful enough to blow off the mill’s roof and send a giant fireball into the sky, was caused by a buildup of wood dust in the mill’s atmosphere. Ryan Clay, a worker at the mill, said the dust had built up to dangerous levels. “You couldn’t see across the mill, that’s how bad the dust levels were. Even with the fans going full blast, the dust was just horrendous.” It was the largest sawmill explosion in BC history until—as we saw in Chapter 1—the Lakeland sawmill in Prince George exploded three months later.

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due process in interviews with managers. It also came to light that WorkSafe inspectors had been to the mill a month before the incident and, while they issued citations for violation of safety rules, they did not highlight a risk of explosion from the wood dust.²

Government investigations serve a different purpose than incident investigations conducted by employers, as government investigators have a legal mandate to determine if penalties under the Act are warranted. Nevertheless, the failures of the Babine investigation show what can go wrong if an investigation is not conducted properly. Incident investigations are intended to uncover all of the key facts about how and why an incident occurred so that action can be taken to prevent it happening again. Not conducting the investigation in a careful and thorough manner can undermine the results and create the risk of a repeat incident. Any incident where significant injury occurs should be thoroughly investigated, but there is value in investigating minor injury and near miss events as well, as they can reveal important insights that might prevent a future injury.

Sometimes, incident investigations are used to place blame (usually on the worker) for the events that transpired in the workplace. This misuse of an investigation often occurs when investigators become too focused on the proximate (i.e., immediate) cause(s) of the incident and do not seek out root causes. This chapter will explain how to conduct an incident investigation and write an incident report. It will also discuss how investigations can identify both the proximate and root causes of an event.

INVESTIGATION STEPS

A successful incident investigation begins with a consistent process designed to uncover what happened so future incidents can be avoided. Investigations need to be performed as soon after the incident as possible and be completed as quickly as possible. Witnesses’ recall may deteriorate over time and important evidence may disappear if there is a delay. The sooner an investigation is completed, the sooner changes can be made to make the worksite safer. Employers may also be required to report incidents and investigation results within a specified time period.

The first step in an investigation is the development of an investigative process. This step takes place before any event has occurred and begins with answering key questions about the investigation:
• What types of incident will trigger an investigation (e.g., injuries, near-misses)?
• Who will lead the investigation and who will participate in it?
• How will the information that is gathered be recorded?
• What tools and training are needed for the investigation?
• What procedures will be followed during the investigation?

Who investigates an incident is a particularly important question. The lead investigator should be someone with investigative experience, knowledge of the work and work processes, and an understanding of how OHS incidents are caused. Many workplaces will task a senior health and safety official or senior manager with managing incident investigations. No one should investigate an incident alone, and other people should be selected to assist, to provide different perspectives, and to divide the workload. Other possible participants should include joint OHS committee members or some other worker representative, people linked to the work that had been performed, and, in most cases, the direct supervisor of the work (although there are cases when inclusion of the supervisor may not be appropriate). Union agreements often stipulate that a union steward or representative participate in incident investigations—one of the ways in which the presence of a union alters OHS in a workplace. Anyone who is identified as an investigator should be properly trained beforehand.

Creation of an investigation kit is also a useful pre-incident task. An incident investigation kit is a pre-assembled box containing the tools, forms, and material needed in an investigation. It might include pens, paper, camera, flashlight, tape measures, and audio/video recording devices. If resources allow, it might even include a laptop with software to help keep track of evidence (e.g., spreadsheet or database). Investigators can then act quickly by grabbing the kit and beginning their work.

Once an incident occurs, the first step of incident investigation is to attend to any injured workers, evacuate any imperilled workers, and secure the scene. This step should correspond closely with the emergency response plan and be performed by the emergency responders. Securing the scene entails two actions. First, any uncontrolled hazard (e.g., leaking gas) needs to be eliminated to ensure the safety of the investigators and others. Second, the scene needs to be protected so that no evidence can be destroyed or altered (intentionally or unintentionally) until the completion of the investigation.
Protection normally includes restricting access to the scene. In some circumstances, it may also require protecting the scene from inclement weather.

The second step in an investigation is to gather evidence. There are a number of techniques for collecting the relevant information. They will be used in various combinations depending on the nature of the incident and the workplace. Gathering might begin with a *walk-through*, which is an inspection of the incident scene to get an overall picture of the environment. A walk-through may also clarify which additional evidence-gathering techniques are appropriate. These further techniques should include recording the scene through photos or video or drawings (if photos or video are not practical) to create a visual record of the scene.

Investigators normally prioritize interviewing witnesses, including the injured worker(s). Witnesses should be interviewed as soon as possible after the incident while their memories are fresh and uncontaminated by discussing the event with others. A few principles should be followed in interviewing to ensure accurate information and the well-being of the witness:

- Ensure the witness is physically and emotionally well. Witnessing an incident can traumatize people and assistance, such as counselling, may be necessary before an interview takes place.
- Be clear about the purpose of the interview and the investigation, highlighting that it is not about laying blame.
- Interview witnesses separately and in a neutral location. A worker representative should be provided if the witness requests it or if the union agreement requires it.
- Allow witnesses to describe what happened in their own words. Do not lead or put words in their mouths.
- Ask only questions that elicit more information or clarify answers. Do not ask the witness “why” they think something happened.
- Be an active listener. Ensure you have correctly heard them by repeating or summarizing what they said.
- Record the interview in some fashion—either with detailed notes or (if appropriate) audio recording.
- Be aware of power relations. Interviews can be distorted by unrecognized power imbalances, such as the interviewer being the supervisor.
of the worker, or the worker who was injured being under the witness’s supervision. These dynamics can be a barrier to accurate reporting of the incident.

Another investigative technique is a **re-enactment** of the incident, which is a simulation designed to recreate the circumstances that led to the incident. A re-enactment might entail asking witnesses to act out the events that took place before the incident, or re-establishing a set of conditions relevant to what occurred. The value of the re-enactment is that it can identify how circumstances, events, or behaviours interacted to cause the incident. These interactions can be difficult to identify solely through witness testimony because of the limited perspective any one witness will have on an incident. Other investigative techniques might include inspecting machinery and tools, checking logs and records, collecting debris, materials and other relevant items, or conducting air sampling or noise testing. Investigators should also gather any relevant company policies, government regulations, or operator’s manuals and guides.

Once all the information has been gathered, the next step is to analyze the data to determine the causes. This is a crucial step, and is often where investigations go wrong. The immediate reasons for (or “proximate cause” of) the incident will be the first to appear. These causes will usually be worker error or some factor that may appear to be uncontrollable. Stopping the investigation at this point will lead to an incomplete analysis and the investigation will likely fail at one of its key goals—preventing future incidents. Additional analysis of the data will reveal underlying reasons for (the “root cause” of) the incident. A simple way to think about probing data for root causes is to keep asking “why?” Asking why something happened allows the investigators to get past their initial understanding of the incident. The question of finding root cause is important and will be discussed in greater detail below.

The process of incident investigation is often involved and highly technical. Much of current incident investigation procedures are designed for large industrial workplaces. It is highly unlikely a retail store, a small charity, or a fast food outlet will have the infrastructure, resources, or employer investment to create a trained investigation team equipped with a stocked kit. There are few resources available to small employers to develop the skills in accident investigation. The result is that accidents in small enterprises are less likely to lead to effective preventive measures (see Box 9.1).
Box 9.1 Negative learning in small enterprises

The lack of effective incident investigation resources in small enterprises has very real consequences for safety in those workplaces. Post-incident investigations are intended to spark changes in the workplace to prevent future events. In larger enterprises, studies have found that careful investigations lead to the prevention of future incidents. The opposite can occur in small enterprises, and incidents can lead to a perverse form of negative learning in small workplaces:

Circumstances unique to small . . . enterprises (such as the close social relationships) contribute to their owners predominantly attributing the causes of accidents to unforeseeable circumstances, and the owners reject that circumstances under their control have caused the accident. Subsequently, there is little organisational learning from the accident, and the injured workers often return to work under the same unsafe conditions as before the accident.³

In short, the occurrence of an accident, rather than shocking a small employer into improving safety, tends to push them into greater inaction. The mechanism behind this dynamic is lack of an objective investigation process. The small business owner is left to ascertain the cause of the incident without the benefit of a careful analysis of the evidence.

As a result of the lack of a credible investigation, owners are more likely to accept that the most obvious factors—normally worker error or an uncontrollable event—caused the incident. This then leads them to view the incident as an unpreventable “accident” and take no action to improve safety.

**ROOT VS. PROXIMATE CAUSE**

Chapter 1 introduced the concepts of proximate and root cause, which distinguish between the immediate factors leading to an incident and the factors under the surface that created the possibility of the incident. It is crucial in
incident investigation to differentiate between root and proximate cause. It is the goal of investigations to establish root cause. Unfortunately, too often investigations only identify proximate causes. The core principle of root-cause analysis is that no incident is ever caused by a single action or factor but, instead, occurs as a result of a combination of factors, many of which may have appeared long before the incident itself. Also, as previous chapters have demonstrated, injury and ill health are caused by a broader spectrum of factors than is generally accepted, including the work relationship, gender, and race. The data analysis phase of incident investigation must include techniques that reveal all causal factors and their interconnection to the incident.

In an attempt to help investigators get to root cause, a variety of analysis models have been developed. A couple of models are commonly highlighted in OHS textbooks. The *domino theory* dates back to 1936 and remains popular due to its ease of illustration. It envisions cause as a series of five dominos lined up together. Each domino represents factors reaching back from an incident. The first (closest) domino is labelled Injury, followed by Incident, Unsafe Acts and Conditions, Personal Defects (e.g., equipment failure, personal factors), and finally Background (e.g., lack of management control). The theory contends that injury results from failure at all five levels. If any of the failures does not happen (i.e., one of the dominos is removed from the chain), an injury will not occur. For example, if a worker is taught to work safely, an injury might be prevented even though failures in background decisions still occurred.

A more recent revision to domino theory is the *Swiss cheese model*. This model retains the five factors giving rise to injuries that are outlined in domino theory. Each of these dominos is then given “holes” that represent various subfactors that influence whether an incident occurs or not, such as organizational influences, local working conditions, unsafe acts, and defences, barriers, and safeguards. In the Swiss cheese model, an incident requires that the holes in the dominos line up—in other words, a failure must occur in each domino. This model emphasizes that injuries are the result of multiple failures. If one of the subfactors is functioning properly, then weakness in the other four may still not lead to an incident. For example, bad organizational culture (an organizational influence) around safety may not lead to injury if there are appropriate guards (a defence, barrier, or safeguard) to prevent injury.
The domino theory and Swiss cheese models are popular because of their simplicity in articulating a core principle that an investigator must look beyond immediate actions and explore underlying factors that contributed to the incident. That said, these models have two significant shortcomings. First, both models still centre on the unsafe worker. The worker’s unsafe action is contextualized by examining underlying factors, but incident and injury is always preceded by an unsafe action. The models presume the goal of prevention is to implement appropriate background conditions and safeguards to prevent unsafe actions from leading to injury. While they may help investigators look at underlying causes, they will still do so through a lens of worker behaviour.

Second, the trajectory of cause in these models is linear, assuming that one failure leads sequentially to another. In reality, incidents result from a much more complex, interconnected matrix of causes that act simultaneously and may interact with each other to lead to an event. For example, consider the case of a truck driver for a parcel delivery company rushing on a winter day to keep up with the schedule. While delivering a parcel, the driver slips on an icy sidewalk, injuring her back. A variety of factors might have contributed to the fall: inattention, pace of work, inadequate footwear, awkward parcel shape, insufficient response by manager to weather conditions, a culture of pushing the pace despite risks, lack of training around lifting and handling loads, working alone, fatigue, or being an inexperienced worker due to high turnover. Which of these factors occurred first? While the root cause may point to the company’s giving a low priority to safety, that attitude interacts with the other factors in a variety of ways that led to the injury. A simple, linear explanation might miss some of those interactions.

OHS experts have developed more sophisticated models of tracing causation, many of which attempt to incorporate the non-linear aspects of incidents. The downside of these newer models is that their complexity renders them usable by only the most highly trained OHS experts, making them impractical for average workplaces. Most workplaces must still attempt to work out cause on a case-by-case basis.

A broader concern about investigation models is that they tend to live up to the maxim that you tend to find what you’d looking for. More specifically, most models identify several categories of potential causal factors (e.g., human, technology, organization, and information) that an investigator
should explore when investigating an incident. Not surprisingly, the causes the investigator eventually identifies tend to fall into those categories. This, in turn, shapes the incident prevention recommendations because, as the saying goes, you fix the problems that you find. This focus on categories of causes means investigators tend to become preoccupied with the events and factors leading up to the events (i.e., the parts) while ignoring the broader dynamics that gave rise to the incident (i.e., the whole).

Finally, we cannot lose sight of the fact that incident investigation, like all areas of OHS, is shaped by the competing interests in the workplace. In practice, there is an ongoing tension in investigations between finding readily identifiable issues that can be fixed and identifying structural factors that contribute to incidents. It is in employers’ financial interests to keep the causal chain short and the investigation tightly focused on specific issues. Examining how employer decisions about the design and management of work contribute to incidents threatens management control of the work process and entails more costly changes. More concretely, it is easier for employers to resolve an issue by placing a new guard on a saw blade than it is to recognize that the profit or cost containment imperative drives employers to organize work in ways that compromise workers’ safety—such as processing pine beetle-killed wood, which creates excessive (and explosive) dust in the workplace (as occurred at Lakeland).

INCIDENT REPORTS

The final step in the investigation process is to write up a formal report outlining the findings and making recommendations. In some respects this can be considered the most crucial phase, as a careful investigation is without value if the recommendations fail to improve the situation. The incident report will be the permanent record of the incident and its causes and thus should clearly outline what happened and why it happened. It may even have future legal ramifications, as its recommendations may be used by government inspectors to determine if an employer met the standard of due diligence in controlling hazards after the incident.

Incident reports can take different forms depending on context, organization, and situation. All incident reports should include the following elements:

- Who performed the investigation
• Details of the incident, including date, time, persons involved, outcomes
• Details of the investigation and how it was conducted, timelines, etc.
• An outline of the factors that led up to the incident
• Clear identification of the root causes of the incident
• Specific recommendations designed to prevent future incidents

In designing a report template, a report that requires investigators to answer open-ended questions is preferable to a report that provides a checklist of options. It is also advisable to avoid distinctions such as “primary cause” and “contributing factors,” as that creates an assumption that some causes are more important than others.\(^8\)

Recommendations can be tricky. To elicit action, recommendations need to be specific and directed to the identified causes. Nevertheless, if they are too specific, they risk not addressing systemic issues adequately. The recommended action also needs to be within the control of the employer. This can be difficult when environmental conditions played an important role in the incident. For example, bad weather may have been a factor in an incident. While the employer cannot control weather, the employer can implement controls that neutralize the effect of weather on workers. There is also the issue of how to report on the role of human error in the incident (see Box 9.2).

**Box 9.2 Reporting on human error**

The goal of an incident investigation is to prevent future incidents rather than attribute blame. But what happens when human error, either on the part of a worker or management, is identified as a key factor in the incident? If human error is relevant it needs to be included in the report. To leave it out would be to distort what happened and undermine the effectiveness of the report. The key is how to report the role of human error.

First, the report should never recommend discipline or reprimand. That is not the purpose of the investigation. Once the investigation is complete, an employer can separately consider whether discipline is warranted. Second, the report should outline as objectively and neutrally as possible the course of events in order to prevent implied
blame. The report should indicate the context for the failure. It can do this by reporting on why the error was made (e.g., lack of training, time pressures, unclear procedures) or by referring to broader dynamics in the workplace (e.g., lack of priority given to safety).

The recommendations should not single out a person or persons for corrective action. For example, saying “Joe needs more training” will be less effective at making the workplace safer than recommending “refresher training on deep fryer safety procedures should be provided to all kitchen staff.” The latter phrasing recognizes that a single error is indicative of broader systemic issues and thus addresses those systemic issues more directly.

All incidents will have a human component to some degree. The challenge is to ensure the report does not lose sight of broader and, likely, more important factors in what caused the incident.

The investigator(s) should ensure all affected parties receive a copy, including involved workers, the joint OHS committee (if applicable), and responsible managers. It is the responsibility of the employer to implement recommendations. Often employers will delay implementation, seek out other solutions, or respond that the recommendation is too expensive or not practicable. Lack of follow-through on recommendations is a reality of OHS in practice (a topic discussed more fully in Chapter 11), and it can undermine both workplace safety and how carefully investigators examine future incidents.

SUMMARY

In the aftermath of the Babine mill explosion investigation, the BC government reviewed WorkSafeBC’s procedures and has promised to implement reforms to ensure more careful investigations. In 2016, workers at the Babine mill and Lakeland mill (the mill explosion discussed in Chapter 1) launched an unprecedented class action lawsuit against WorkSafeBC for negligence in its investigations of the incidents and for failing its duty of care to workers. Incident investigations at an average workplace will not have the high stakes of WorkSafeBC’s investigation of the Babine mill explosion. All investigations, however, have the task of preventing injury and ill health, meaning they should be conducted with care and precision.
This chapter examined the key steps involved in an incident investigation and preparation of the incident report. The issue of root cause is more complex than first imagined, as it is easy to fall into the trap of predefining what causes the investigation is looking for. It is important to adopt a systemic perspective when analyzing the information gathered, in order to ensure no relevant cause is overlooked. Finally, due to conflicting pressures there will always be a challenge in ensuring report recommendations are fully implemented by the employer.

**DISCUSSION QUESTIONS**

› What things should go into an investigation kit and how does its assembly assist the investigation?

› Why is it important to collect all the information before beginning the analysis step?

› Why should investigations focus on root cause and what are some of the ways that investigators can lose sight of it?

› How might accurately reporting the cause of an incident result in blaming workers for their own injury?

**EXERCISES**

Read the following scenario describing a workplace incident:

Amy worked for Chris’s Catering, a small catering company that specializes in special events. On June 12, Amy was dispatched to work a small outdoor wedding taking place in a park overlooking the river. The size of the job called for two chefs in the kitchen (the husband and wife co-owners), one wait staff responsible for clearing plates after guests were finished, and two porters who would set up the serving tables and carry chafing dishes (hot metal pans for buffet-style serving) and other serving trays from the kitchen to the serving tables. Amy was assigned as a porter and was required to wear a short-sleeved black uniform with the company’s logo.
The wedding was located outside a community hall. The kitchen was inside the hall. The buffet table was at the opposite end of the small park, about 100 metres away. It was a hot and sunny afternoon. The other designated porter, Andy, called in sick at the last minute, leaving Amy to do the job alone with occasional help from the wait staff. As the time of the reception neared, the chefs were running behind schedule. Amy began shuttling chafing dishes to the buffet table. The dishes weighed approximately 12 kg each when filled with food. Amy used dishcloths to protect her hands from the heat of the dishes. She delivered eight dishes to the table.

As Amy was about to place the ninth and final tray, containing a hot minestrone soup, she took a sudden step backward, bumping into a guest behind her. The collision caused Amy to lose control of the dish, which spilled over her and the guest. It also caused Amy to fall into the buffet table. Amy suffered a severely sprained ankle, burns on her arms, and some bruising to her face and arms. The guest also experienced some minor burns.

Write 200-word answers to each of the follow questions:

1. How would you conduct the investigation? What tools and techniques you would use and who you would interview?
2. How you would analyze and report the information you gathered?
3. Identify the potential causes of the incident, distinguishing between proximate and root causes.

NOTES

10 This story is fictionalized. Any resemblance to actual people or companies is purely coincidental.