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Work Safe for Life

Incident Investigation

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INTRODUCTION

A prime objective of incident investigation is prevention. By finding the causes of an injury and taking steps to control or eliminate them, we can prevent similar incidents.

Work environment, job constraints, and supervisory or worker experience can all play a part in an injury. These factors must be examined to determine what role (if any) each played in causing the incident. Once the causes are established, measures must be identified and implemented to prevent a recurrence.

PART 1: INCIDENT INVESTIGATION

Preparation

It's not enough just to plan for incident investigation. Investigators must be prepared with the tools to carry out the investigation. The following items are a valuable part of an investigation kit:

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SECURE SCENE

Once the injured have been attended to and the threat of further damage is eliminated, the incident scene must be secured and witnesses identified.

Gathering facts will be easier if the incident scene is not altered. When physical evidence is left undisturbed, investigators can relate the material, equipment, and environment to the injury with minimal speculation. The steps outlined in Table 2 will help secure the scene.

TABLE 2: SECURING THE SCENE

Action	Reason for Action
Take charge. Attend to injured persons. Be aware that a crowd will likely gather.	Injured persons always take priority.
Control crowd. Ask someone to assist. Ask onlookers whether they know how the incident happened. Identify witnesses. Tell them that their help will be needed later.	Stabilizes situation, slowly bringing it back to normal. While a crowd can hinder investigation, it can also provide valuable witnesses.
Isolate incident scene.	Ensures that incident scene and evidence will not be disturbed.
If incident occurred in a room, keep onlookers outside. Post someone outside until a barricade can be erected.	Ensures easier crowd control.
If possible, ask emergency crews to leave material where they found it. Only move and remove what is absolutely necessary.	Helps to reduce guesswork for investigators.
Secure area until the investigation is completed. Physically isolate area by locking up or fencing in.	Allows investigators to go back to scene and assess what may have been missed or overlooked.

Securing the scene keeps the situation under control and prevents further disturbance until the investigation is concluded. Unfortunately, injuries always attract a crowd. Evidence can be easily disturbed by people or vehicles. If the site is not secured immediately, fact-gathering can be di□cult.

IDENTIFY WITNESSES

Witnesses can disperse quickly and never be seen again. This is especially true when passersby have witnessed a construction incident.

A good witness can provide an accurate description of the incident. This helps investigators put the pieces of the puzzle together. It is important to identify and interview anyone who

a) saw the incident and/or

b) was in the vicinity immediately before, during, or after the incident, including injured workers.

Table 3 outlines steps for identifying witnesses.

TABLE 3: IDENTIFYING WITNESSESput t2n /Lang (en-US) /MCID 268 BDC

TABLE 4: SURVEYING THE SCENE

Action	Reason for Action
a) **Weather** • Conditions • Temperature • Visibility	Extreme high or low temperatures or high winds may put workers in danger. Poor light may limit workers' view and restrict communication. Glare or bright flashes of light can temporarily blind workers.
b)	

GATHER EVIDENCE

Evidence can be of two kinds—physical objects and verbal testimony. Where appropriate, evidence should be gathered as witnesses are being interviewed. The witness can talk or point to objects and equipment, and together the investigator and the witness can examine physical evidence. The key to collecting evidence is to be thorough and inquisitive. A matrix is a valuable tool in this process.

It can be used, for instance, to follow details before, during, and after the incident. Categories can include people, equipment, and environment.

Table 5 illustrates a typical matrix

TABLE 5: INVESTIGATION MATRIX

	Before	During	After
People			
Equipment			
Materials			
Environment			
Processes			

Question marks should be placed where details are unknown. As the investigation progresses and information is collected, the question marks will disappear. The matrix may also grow as new items and personnel are added. Sometimes questions may remain unanswered, especially when there are no surviving witnesses and/or the person is unable to remember what happened.

Preparing a Matrix

a) Prepare a list of questions for witnesses.

   Interviews can be fast-paced where one question sometimes leads to another. A list helps focus the information and minimize risk of missing vital details. Check o□ the questions

c) List details to be investigated by outside experts.

When dealing with a subject that is not within your expertise, get help.

d) Update matrix as new information is received.

New information may answer some questions as well as generate new ones. The updated matrix provides a running record on progress of investigation.

e) Continue using matrix until as many questions as possible have been answered.

Another way of gathering information is to re-enact the incident. However, this should be done only as a last resort.

Re-enactment can be a traumatic experience for those involved. It should only be done when

- information cannot be obtained in any other way
- it will aid in determining preventive action
- it is necessary to verify facts given by witnesses or victims.

Before re-enacting the incident ensure that those involved

- are emotionally fit
- consent to the re-enactment
- understand that they are to act out the events which preceded the injury, not the final triggering event (close monitoring is essential to ensure that nobody is in danger).

Participants must take the following steps.

- Explain what they are about to do before each step.
- Identify the triggering event.
- Understand the triggering event as the point at which the re-enactment is to be stopped.
- Explain what they are doing and demonstrate each step in slow motion. Slow motion enables the investigator to understand and observe the activity in greater detail and reduces the danger to those involved.

INTERVIEW WITNESSES

Interviews are best done when memories are fresh. This can be achieved by conducting interviews as soon as possible after the incident.

Partial interviews, especially of the injured, can take place while waiting for the ambulance.

Gently questioning the injured while awaiting an ambulance helps determine the seriousness of injuries. It also keeps the injured alert and keeps his or her mind o□ the injury. Asking questions at this stage can give an investigator some feel for what has happened.

Interview witnesses to

- confirm and explain what has happened
- corroborate other witnesses' accounts of the incident
- obtain suggestions on how the incident can be prevented.

Interviews may create as many questions as answers. However, cross-referencing with other witnesses and examining physical evidence should provide missing pieces of the puzzle.

When conducting interviews, keep in mind all potential contributors to the incident. Were the proper equipment and materials used in the operation? Was the correct procedure followed and did it a□ect the outcome?

When asking witnesses to recall what they saw or heard, it is important to pay attention to details on events before the incident. Most of the time, injuries occur as a result of events preceding the triggering event.

During the interview, the investigator should determine

- identity of people involved in the incident
- identity of people with possible knowledge of the incident
- events that occurred before, during, and after the incident
- timing and sequence of events
- location and direction of actions and events
- possible causes of each action and event
- witness' suggestions for preventing similar incidents.

It's also important to put the witness at ease. Table 6 outlines how to conduct an interview.

Action	Reason for Action
Get witness to expand information through open-ended questions/statements such as: • What do you think happened? • What was done? • Describe how the vehicle got into this position. Avoid questions that can be answered by a simple yes and no such as: • Did he turn on the ignition? • Was that the way he did it? • Did the collision with the forklift cause the vehicle to arrive at this position?	Results in more information Questions answered from the witness' perspective. May open other avenues of investigation. Questions answered yes or no limit the information received and close investigator's mind to other possibilities.
Ask why and who questions last.	Often puts people on defensive. Once they feel threatened, flow of information will likely stop.
Repeat witness' account as you understand it.	Confirms investigator's understanding. Speakers often do not listen to themselves talk. It gives witness a chance to correct any errors or oversights. Allows witness to think the story over again.
Close interview on positive note. Thank witness for helping and ask for suggestions on how injury can be prevented. Ask witness to contact investigators should other information come up.	Having to re-live and tell about an incident is often unpleasant. Your gratitude can make the ordeal worthwhile. Seeking suggestions makes witness feel that his/her opinions are worth considering. Encourages witness to come forward later with additional information. Rea□rms purpose of investigation.

At the conclusion of each interview, highlight new questions that need answering by listing information retrieved, what was accomplished, and what needs to be completed. The matrix lets the investigator identify gaps in information and details that need to be confirmed.

Four factors are essential for the report to be e□ective and easy to understand.

1. Outline all events contributing to the incident in sequential order.
2. Point out deficiencies or breakdowns in the system as they occurred.
3. Summarize deficiencies.
4. Link all recommendations to deficiencies.

FOLLOW UP

Circulate results of the investigation to all company sites so others can learn.

Make changes in company operations and raise key issues with trade associations, other contractors, unions, and other groups as necessary.

PART 2: CASE HISTORIES

The following case histories allow the reader to experience two incident investigations, comparing these real-life incidents with the classroom situation cited in Part 1.

Incident investigation may not—and sometimes cannot—follow the steps outlined in the previous section. Instead, the investigators must adapt to the situation and make the best of what is available.

Both case histories are presented in two columns. The first column describes the story from the perspective of the investigation team. The second column provides comments and the investigators' reasons for action or lines of thought.

While the first case history is relatively complex, the causes of the majority of construction injuries are simple and obvious. Causes are immediately known.

The second case history falls into this category. It shows that, though the steps outlined in Part 1 still have to be followed, the situation allows the investigator to execute most of these steps quickly. Some were omitted completely.

CASE HISTORY 1: THE SLIPPING COMPRESSOR

The first incident occurred on a high-rise commercial project. As is common, the project superintendent was designated as the incident investigator.

What Happened?	Comments, Reason for Action, or Line of Thought
Superintendent is working in the site trailer when a supervisor radios in that there's been an incident.	The investigator is seldom the first person to find out about the incident.
"The refrigeration crew has had an incident. They were lowering the compressor through the roof opening when it slipped and hit a couple of the crew!"	As worker explains what has happened, superintendent assesses the situation.
Superintendent immediately calls his assistant superintendent over: "A couple of people are seriously hurt in the mechanical room. Call an ambulance and tell them someone will meet them at the front gate."	It's important to ensure that the injured get medical help as soon as possible. More details can be conveyed to the ambulance crew as they become available.
The superintendent then calls on the radio to get someone to notify the health and safety rep and send him over to the scene.	While getting someone on the scene as quickly as possible is important, superintendent should remain in the office long enough to ensure all emergency procedures are in place.

What Happened?	Comments, Reason for Action, or Line of Thought
Superintendent then radios the supervisor on the scene for more information. “An apprentice says the fitter and a carpenter are hurt. The fitter was hit in the head—he’s unconscious. The carpenter has his leg pinned under the compressor. He’s in pain and screaming like crazy.”	Superintendent now has an idea that the incident involves at least the compressor, the crane, the refrigeration crew, and a carpenter. An apprentice somehow has knowledge of the incident but his role is otherwise unknown. Superintendent knows that, if the incident involves heavy equipment such as a compressor, the injuries to the two workers could be serious. Superintendent is taking charge and initiating emergency response. At the same time, he also realizes that some of the information is second hand. He needs to confirm the accuracy of the information.
The superintendent confirms the details and passes them on to his assistant, who can then provide further information for the ambulance	

What Happened?	Comments, Reason for Action, or Line of Thought
As he arrives at the incident scene, superintendent scans the room quickly. The injured carpenter attracts his attention immediately because he is screaming in pain.	Superintendent must now assess the situation. He sees carpenter and recognizes that he is hurt.
Superintendent sees a bone protruding from the carpenter's leg. He continues to scan the room.	His first priority is ensuring that all personnel in the room are out of immediate danger. He must do this prior to anything else.
Superintendent sees that the compressor is sitting on some 4 x 4s and appears to be in no danger of moving or tipping over. He confirms with the mechanical foreperson that it has been stabilized.	Compressor appears to pose no immediate danger. Superintendent notes that it is not on the carpenter's leg. At least they've moved it. Confirmation assures that superintendent is not assuming that the hazard has been neutralized.
Superintendent is taking stock of incident scene as he tries to find injured fitter. "Where's your fitter?" he asks mechanical foreperson. "Around the corner!" comes the reply.	Superintendent has to quickly locate unconscious fitter and see how serious his head injury is. Has first aid been provided? Why was he left all alone unobserved? That's not good first aid practice. First aid has to be given as soon as possible.
As superintendent moves around compressor to provide first aid, he takes a quick inventory of the condition of the room, mentally summarizing what he knows so far.	A mechanical foreperson, carpenter, electrician, and fitter are all witnesses to the incident. Aside from comforting the carpenter, the mechanical foreperson has not provided him with further first aid. Does he know first aid or can he do anything here without the first-aid kit? As a foreperson and supervisor of the mechanical crew, he should know first aid and therefore probably have done more initially. That requires further investigation later.

What Happened?	Comments, Reason for Action, or Line of Thought
While waiting for the authorities, superintendent asks health and safety rep if he has learned more about the incident. The rep says that he talked to the mechanical foreperson when performing first aid. He learned that the foreperson, who was supervising the lift, was first person on the scene after the incident. “Both injured workers were using a rope to pull the compressor over to the concrete base. The injured carpenter said something about the roof opening not lining up with the concrete base.”	Superintendent is trying to fit pieces of puzzle together as quickly as he can. The more he learns about the incident, the better. He now knows what the injured workers were doing when the incident occurred. Still, this doesn’t explain why his carpenter was involved with the rigging operation. Now he hears that the roof opening didn’t line up with the compressor base.
Superintendent looks up and confirms that the roof opening does not line up with compressor base.	Superintendent doesn’t need his tape measure to tell him that the alignment is o□. He never thought that it mattered. Or does it? Situations such as this are not uncommon. As a matter of fact, he remembers other roof openings that did not line up with the mounts.
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What Happened?	Comments, Reason for Action, or Line of Thought
Superintendent inspects compressor for rope marks. But all he sees are scratches on one side indicating metal-to-metal contact.	

INCIDENT MATRIX 1
(after examination of mechanical room)

Equipment & Tools	Before	During	After
Compressor	Who rigged it,		

INCIDENT MATRIX 1
(after examination of mechanical room)

Environment	Before	During	After
Concrete base	Did not line up with roof opening.	Caused crew to pull compressor over. Was it right procedure?	Chipped on one side where compressor landed.
Roof opening	Did not line up with concrete base.	As above. Scratches on the frame. Did the sling snag? If so, what e□ect did it have down below?	?

What Happened?	Reason for Action or Line of Thought
Some witnesses prefer assistant superintendent over superintendent and vice versa. Superintendent complies with witnesses' wishes. Apprentice has agreed to the interview. He feels more at ease with assistant superintendent and wants her to conduct interview. Based on availability of other witnesses, the apprentice is interviewed first.	It's essential to make witnesses as much a part of interview scheduling and planning process as soon possible.
Before the interview, assistant superintendent reviews matrix and confirms with superintendent information that must be retrieved from apprentice, including: • Who rigged compressor and was rigging inspected before lift? • Where did they rig the compressor? • What was each person's role during the lift? • Does apprentice know why carpenter was involved in the lift? • Can apprentice explain scratch marks on structural frame of roof opening? • Did apprentice see what happened? • What is apprentice's knowledge of what everybody did before, during, and after incident?	Assistant superintendent must be prepared and make sure that interview will give her the most information she can get. Reviewing matrix ensures that no question is left unanswered. Knowing where compressor was rigged will ensure that that site is also investigated.
Assistant superintendent meets apprentice in mechanical contractor's trailer. "Thanks for wanting to talk to me. I really appreciate it. Are you sure you are up to it?" Apprentice nods and says yes.	Meeting on witnesses' "turf" makes them more at ease and less defensive. A thank-you makes witness feel appreciated. Assistant superintendent also shows compassion in making sure that apprentice is all right and mentally prepared for interview.
"Like I said before, we just want to find the facts, not fault. We want to hear your version of what happened." "Then, if you could suggest to us a way we could prevent it from happening in the future, that would be great."	Assistant superintendent is explaining objective of investigation again to apprentice, trying to make him more comfortable.

What Happened?	Reason for Action or Line of Thought
Assistant superintendent continues: “I just wondered if we could talk in the mechanical room instead of here. It would probably be easier for both of us.”	It is better to conduct interview at incident scene. The environment may trigger or refresh memories of incident. It will also be easier for witness to tell investigator what has happened. It also gives interviewer a chance to examine surroundings and evidence as interview proceeds, picking up details not seen earlier
“You can describe and show me what you know. I can probably grasp the situation better if I see it as you describe it. But it’s all right if you don’t want to talk there, we can talk here.”	Assistant superintendent explains reasoning for wanting to conduct interview at incident scene. However, she is leaving it open for witness to decide.
Apprentice agrees to go to mechanical room. Once there, assistant superintendent asks: “Just take your time and tell me in your own words what happened.” Apprentice begins with his account of the incident:	Assistant superintendent just listens without interrupting, knowing that interruption can disturb train of thought or can be regarded as an o□ensive gesture. When questions are necessary, they are open- ended, designed to yield more information than yes-and-no questions. (For easier identi cation, italics indicate questions assistant superintendent will have to follow up on.)
“I only rigged a few loads before. They were mostly just sticking the hook through a ring. They told me to put the sling where the marks were and stick the softeners in between. So I did.”	Now assistant superintendent knows that the apprentice and injured fitter rigged load. By the sound of it, apprentice had little experience even in rigging. She must nd the rigging details from apprentice and cross reference them with tter’s story to see if they are consistent. Did anybody check rigging before lift? Was it proper? Apprentice didn’t say.

What Happened?	Reason for Action or Line of Thought
Then I went back up to the mechanical room. My foreperson asked if I knew hand signals. I said we took them at school." "I ran through half a dozen for him and he said I could handle it. He told me to get up on the roof and be signaller. The experience would do me good. Well, I took signals, sure, but I really wasn't ready for a heavy lift like this."	Apprentice felt that he was not ready for lift but went on and did it anyway. Was he bullied or did he know he had the

What Happened?	Reason for Action or Line of Thought
"Then there was a big crash and somebody screaming like hell. I didn't want to signal. But when you're an apprentice what are you going to do? I keep my mouth shut and do what they tell me."	She must also check with the apprentice's foreperson. Was the apprentice ever told to "put up and shut up" as an apprentice or was it just the apprentice's assumption? She must devise a way to ask such delicate questions so that they will not embarrass the apprentice. It doesn't seem that the apprentice saw what happened down below. Except for the crash and yelling from down below, everything that happened in mechanical room is still unknown. All that is known is that there was a delay between the actual crash and when apprentice signalled for crane to stop lowering. But was it too late by then? Assistant superintendent still does not know where load was rigged. She must ask these details to ll in gaps in matrix. For now, assistant superintendent must review apprentice's information.
"I want to make sure I've got the story right. Can you possibly tell it to me one more time?" assistant superintendent asks.	She must concentrate on details that still need clarification. Assistant superintendent is making sure that she heard right the first time. She also makes notes to be compared with matrix later.
As apprentice tells about incident for the second time, assistant superintendent takes notes. She ensures that apprentice can see what she is writing.	Letting apprentice see her notes shows that there is nothing hidden in the investigation.
After apprentice finishes telling his story, assistant superintendent compares the prepared questions with the apprentice's story.	To make sure she has covered everything, assistant superintendent checks her list of questions.

What Happened?	Reason for Action or Line of Thought
She asks the apprentice any unanswered questions, leaving the ones that may put him on the defensive until last. Among questions she asks are: "Why was the carpenter involved in the lift?" "You said there was confusion and yelling. Can you tell me a little bit more of what was yelled and when?"	Questions such as "Why didn't you tell your foreperson that you didn't want to signal?" may put the apprentice on the defensive, causing him to refuse to answer more questions
Once she hears the apprentice's version of incident, assistant superintendent slowly repeats story to him: "Just to make sure I don't write things you didn't say, I'll repeat your story. You said that you were. . ."	She repeats information slowly and deliberately so that apprentice doesn't miss anything. Repeating story gives witness another chance to correct her/his version. It also makes sure that what is put down on paper agrees with what witness is saying.
After a few clarifications, apprentice agrees with assistant superintendent's record of the event. She then asks how such an incident could be prevented in the future. The apprentice says that he would not have signalled if he had the choice. He also wonders why they didn't stop the load long before the incident happened if they knew they were in trouble.	Asking witness how incident can be prevented gives investigator additional suggestions to consider. It also makes witness feel important by indicating that his/her opinion and suggestions count and are being considered.
"Thanks for your time and input in this. You have been a great help," assistant superintendent says. "If anything ever comes to mind about this incident and you think it might help, please call me, I'd appreciate it."	By thanking apprentice, assistant superintendent lets him know that his time and help is appreciated. She also reminds apprentice that he should call her if he happens to recall anything more about incident.
Once the interview is finished, assistant superintendent goes back to site trailer and compares notes with superintendent. They add the new information to matrix and prepare a list of new questions for the next witnesses.	It is always important to keep focus on what has happened. The new information has answered some of their questions as well as pointing to other areas to be investigated.

What Happened?	Reason for Action or Line of Thought
The scraping noise is confirmed by superintendent when he points to damage to the roof opening. It still doesn't tell them whether load snagged during the operation.	The mechanical foreperson, the carpenter, the electrician, and the tter must be questioned about the possible snag.
Information superintendent has after apprentice's interview: Apprentice and the fitter rigged compressor on truck bed at side of building.	Superintendent makes note to inspect truck bed area and see if he can find anything.
Apprentice and fitter used wood strapping as softeners. Superintendent questions quality of wood but does not know the consequences of using such poor quality material.	Superintendent will have to contact outside experts on the consequences of using poor quality wood as softeners. Softeners somehow slipped o sling.
According to apprentice, the rigging was casually checked by fitter prior to lift. The apprentice and fitter went to mechanical room to meet mechanical foreperson to complete the loading. The apprentice acted as signaller while the fitter and carpenter were working down below.	Superintendent still doesn't know the sequence of events in mechanical room just before incident. What was electrician doing in room? When did he come in? Did he participate in lift? Apprentice did not know.
The mechanical foreperson was supervising and was assumed by the apprentice to be standing inside mechanical room. The apprentice didn't know how carpenter got involved. Apprentice didn't want to signal but was told by his foreperson to do it anyway. Apprentice did not verbally refuse the assignment. He was unaware of the right to refuse. At this point, the apprentice seemed competent in directing compressor to roof opening.	

INCIDENT MATRIX 2
(after interview with apprentice)

People	Before	During	After
Mechanical foreperson	Not supervising installation of sling.	Supervising rigging. Did he ever explain to apprentice the right to refuse? How much does he know about proper rigging? Can he fill in details on what was happening to compressor during all this? See above questions to fitter and carpenter.	In mechanical room, looking after carpenter. Did he undo rope or was the rope on the floor already? Why wasn't first aid provided for carpenter? Does mechanical foreperson know first aid or was he in a state of shock?
Electrician	?	?	In mechanical room, helping mechanical foreperson.
Crane operator	Sitting in cab.	Lowering load into roof opening. Did he understand all signals?	Nothing.

INCIDENT MATRIX 2
(after interview with apprentice)

Equipment & Tools	Before	During	After
Compressor	Rigged on truck bed. Must check condition.	Being lowered through roof opening. What happened? When did it slip? When did scratch occur? Did it tip o□ centre?	Slipped and injured carpenter and fitter. Scratches on one side match paint chip on sling. When did this happen?
Rope	?	Was it used to pull compressor over base? How was it attached?	

What Happened?	Reason for Action or Line of Thought
Once all physical evidence is collected and interviews complete, superintendent and assistant superintendent sort and analyze information.	It is time to see which questions on matrix remain unanswered.
The way compressor was pulled with the rope is reviewed in detail. The investigators find that both the mechanical foreperson and fitter have pulled similar loads the same way with no problems. The tagline was attached to the sling, rather than the compressor. Superintendent asks operating engineers' school about proper procedure for such a lift. The two procedures are compared. Superintendent also inquires about use of poor quality wood for softener.	Sometimes, expert or outside opinion must be obtained. The investigators need to know if the pulling method was used for the first time on this lift. As it turns out, the mechanical foreperson and fitter have been performing this incorrect rigging practice for a while and got away with it until this incident.
Assistant superintendent contacts mechanical apprentice program director to find the extent of the apprentice's training.	This confirms apprentice's training and compares it to what he knows.
Superintendent and his assistant prepare table listing events and deficiencies in procedures, material, or equipment. They compare and exchange their information with health and safety representatives. Matrix is then updated and a sequence of events chart prepared (see accompanying table).	Incidents are often symptomatic of hidden deficiencies in the system. Some problems are direct causes, some are indirect. All deficiencies have to be accounted for when determining the causes of incident.

Sequence of Events	Deficiencies/Immediate Causes	Indirect Causes
Rate of descent was too fast. Apprentice, unfamiliar with all the signals, got confused and signalled “Down,” but not “Slow.” Mechanical foreperson realized problem and headed to roof. At this point, sling got caught in roof opening, causing load to tip even more. Combination of tipping action and rope pulling on sling caused sling to shift position on compressor.	Apprentice was confused. Load kept lowering faster than workers below anticipated. Descent should have been stopped altogether. Workers didn’t have enough sense to stop and correct the condition before going further. Instead, they kept hold of rope and continued with descent, making situation worse.	Lack of experience and training.
Fitter yelled to apprentice and ordered crane to stop. Apprentice did as he was told. This caused load to slip even further.	Crew below still failed to realize danger they were in. Sudden jolt caused great pressure that was too much on softeners. Defective softener failed under pressure and broke into two. The fitter and carpenter were still holding onto rope instead of letting go.	Lack of training.
They realized that their signal to descend slowly was somehow miscommunicated. The only thing they thought about was stopping the descent. They still didn’t think that compressor would slip o sling completely. As the softeners failed, load continued to slip o sling, hitting and injuring the two workers.	Lack of training and common sense in identifying that they were in serious danger.	

Once they identify events and deficiencies, the superintendent and his assistant prepare recommendations for each deficiency.

Deficiencies and corresponding recommendations are listed below.

Since most of the recommendations involve more than one trade on more than one site, the report will be sent to the head o ce of all involved companies, workers' unions, and various agencies as required by law. Among those receiving copies are:

- Superintendent's head o ce
- Mechanical contractor's head o ce
- Mechanical trades union training centre
- Carpentry trades union training centre
- Safety committee
- Ministry of Labour
- Workplace Safety and Insurance Board.

The following was done as a result of the incident.

- A letter was sent to all unions whose members were involved, outlining training recommendations.
- The mechanical foreperson and all other forepersons on site without up-to-date first-aid certificates took first-aid training.
- The mechanical foreperson and the fitter took refresher rigging courses provided by their employer.
- A review of safety regulations was held for all supervisors and workers on site.
- Copies of the Occupational Health and Safety Act and construction regulations were provided to each subcontractor with instructions to post them where everyone has access to them.
- The refrigeration employer instituted a safety policy and supporting program. All workers were informed of the policy, which was incorporated into new worker orientation.

What Happened	Reason for Action, or Line of Thought
Superintendent moves in front of the workers and asks them to move back and give him room. He then tells the roofer not to move: “Take it	

What Happened	Comments, Reason for Action, or Line of Thought
As the superintendent provides first aid, he says: “Well, it doesn’t look like you’re going to play ball tonight. What happened?”	The superintendent is keeping roofer’s mind away from the injury by getting him to talk. It also gives the first aider a good indication of the victim’s level of consciousness and helps keep the injured worker alert. At the same time, the superintendent is asking a few questions to learn more about the incident. Normally, an interview should be conducted one-on-one. In this case, the superintendent’s question is a non-o□ensive one commonly asked of any person involved in an incident. The superintendent should be able to extract enough information from this conversation to start his investigation.
The roofer explains what happened: “I should have fixed that ladder!! Earlier this morning we were on the roof setting the shingles near the edge. I hit the ladder a couple of times with my feet when I was doing it. That ladder wasn’t straight to begin with, so I guess every time I hit it, it just got worse. “I was going to straighten it out, but one thing led to another … I never got around to it.” “I was listening to this joke when I stepped on the ladder to get co□ee. I really wasn’t paying attention.” “The next thing I knew, I was up in the air and boom! Well, you know the rest.”	The picture of what happened is becoming clear. The roofer was working on the roof. His statement that the ladder kept moving as he hit it with his foot indicates that it could not have securely been tied at the top. The superintendent must confirm his assumption. The ladder wasn’t positioned plumb to begin with. It kept tilting as the roofer kept hitting it with his foot when he was positioning the shingles. The roofer’s inattention to his activity also led to the incident.

What Happened	Comments, Reason for Action or Line of Thought
The superintendent briefly repeats what the roofer has said and clears up any discrepancies.	The case is simple. The superintendent feels that he has a good grasp of what happened. He does not feel that the roofer has to repeat his story again. Just to make sure, he repeats what the roofer told him. It gives the roofer a chance tore-evaluate what he told the superintendent and correct any misunderstandings.
He finds that the roofer erected the ladder himself first thing in the morning. The superintendent asks if it was possible that the roofer actually slipped on the roof. The roofer replied that both his feet were on the rungs when he fell. Superintendent also confirmed with the roofer that the ladder was never tied at top to prevent it from moving. The roofer laughed: “If I did that, none of this would have happened, would it? Well, I never thought of it, maybe I should start doing it when I get back to work.”	Superintendent uses the opportunity to consult roofer on details he is not sure of: • Who erected the ladder? • Was ladder secured to roof? • Why wasn’t ladder secured to roof? • Did roofer fall o□ ladder rather than roof? The roofer’s o□hand comment is his recommendation of what should be done to prevent something like this from happening again.
Superintendent asks roofer if anybody ever trained him in safe ladder practice. The answer is negative.	Superintendent wants to locate the deficiency. Is it because the roofer was never trained in proper ladder use or is it because the roofer knew but chose to ignore the practice?
Once the superintendent finishes first aid, he and a few workers help roofer to the car that will take him to the hospital. The superintendent confirms which hospital the roofer will be driven to.	Superintendent must know where the roofer is taken so that he can inform the authorities and the roofer’s employer.

What Happened	Comments, Reason for Action or Line of Thought
As he goes back to his trailer to contact MOL and the roofer's employer, he approaches the roofer's co-worker. He explains that he just wants facts, not finger pointing. The co-worker recites his version of the incident, a story consistent with the roofer's. He confirms that the ladder was crooked at the start but didn't realize that it had been made worse when it was bumped several times. He also confirms that the roofer was listening to one of the other workers while he was getting onto the ladder and wasn't paying much attention to the ladder. And yes, both feet were o□ the roof when the roofer fell.	Superintendent has to reassure the co-worker of the purpose of incident investigation. The co-worker's testimony backs the roofer.
Superintendent asks if any of the crew have received ladder safety training. The answer is negative. Just like the roofer, the co-worker indicates that securing top of the ladder to roof would have prevented the incident. The superintendent thanks the co-worker for his help.	Superintendent wants to see if lack of training is restricted to one person or relates to the whole company. Superintendent ends interview on a positive note by thanking co-worker.
Superintendent picks up his tape measure and note pad and goes back to incident scene.	Superintendent is going to examine the physical evidence to confirm roofer's story.

What Happened	Comments, Reason for Action or Line of Thought
Superintendent examines incident scene. He makes a list of material and equipment involved. It's a short one—ladder and shingles on roof. He draws a sketch of what happened. He includes the ladder's position relative to the townhouse. Its location on the ground was consistent with the roofer's story. He saw no rope or wire tied to the top part of the ladder. Superintendent examines top rungs. No missing rungs, a bit of tar, but no mud or oil on them. He runs his fingers on them, feeling for anything that may have caused the roofer to slip o the rungs. Nothing. Good grip all around. Superintendent climbs up on roof and sees that the shingles are at the edge of roof. No boot marks to indicate that someone has slipped o roof.	Superintendent completes the investigation by looking at all the physical evidence. Everything must be consistent and one piece of evidence must support the other. The roofer and co-worker's testimony seem solid. Their stories match all the evidence.
Superintendent goes through the incident one more time. Everything seems to be in order. All questions are answered.	Superintendent has all the evidence he needs to complete report. He concludes his research and starts writing his report.

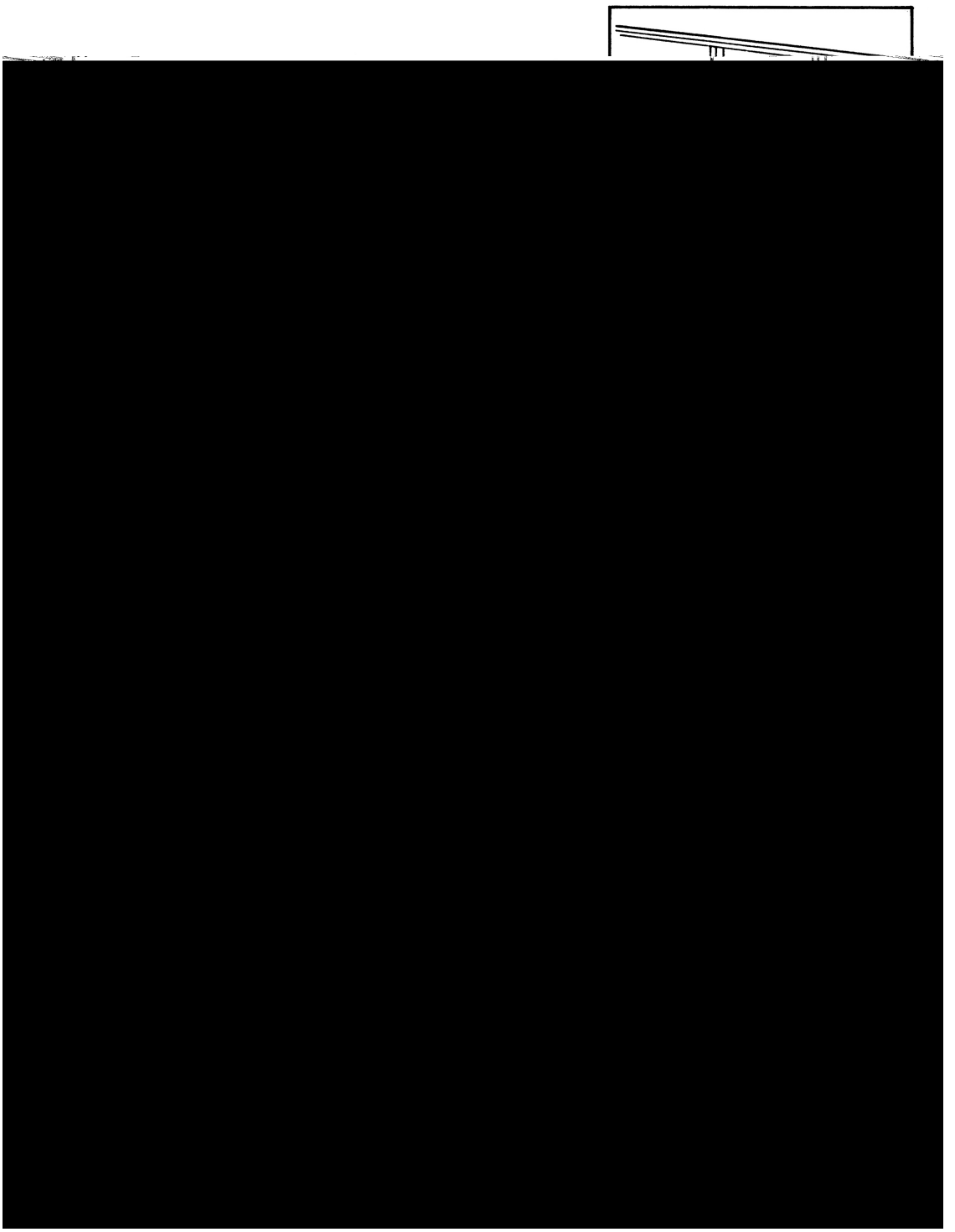
The authorities arrive and the superintendent cooperates fully.

Superintendent goes back to the trailer and fills out the incident report form. Since it was so straightforward, there is no reason to create a matrix. Instead, he lists the chain of events and deficiencies that led to the incident.

Sequence of Events	Deficiencies	Indirect Causes
Roofer erected ladder. Ladder was leaning to one side.	Ladder not secured at top.	Lack of training.
Roofer bumped ladder when arranging shingles, making ladder lean even more.	As above.	
Roofer climbed down ladder, did not concentrate fully on what he was doing.	Inattention to activity.	
Roofer fell down with the ladder.	Ladder not secured at top. Inattention to activity.	Lack of training.

Superintendent recommends to head o□ce that all subcontractors on site should train their personnel in ladder safety. Proper use of ladders should be reinforcD 2564 ⅁BDC BT11 0 0 11 68 517.9202 T

Proper Ladder Set-up



PART 3: APPENDICES

APPENDIX A: WHEN MUST AN INCIDENT BE REPORTED?

An accident or incident must be reported to the Ministry of Labour, the Joint Health and Safety Committee, Health and Safety Representative, and trade union in the circumstances listed below.

Circumstances	How Soon
When it involves a fatality or critical injury.	Immediately by either telephone, telegram, fax, or any direct means, followed by written report within 48 hours of the occurrence detailing information outlined in the construction regulations.
When a person requires medical aid, misses the next shift, or is disabled from doing his or her usual work.	In writing, within four days. In these cases the Ministry of Labour must be notified only if an inspector requires such notification.
When an accident or incident involves: • a worker falling a vertical distance of 3 metres or more. • a worker whose fall is arrested by a fall arrest system other than a fall restricting	

APPENDIX B: INCIDENT INVESTIGATION REPORT

Part A: Identifying Details

Employer

_____

Names and addresses of witnesses

_____

_____

Background

Who made the work assignment _____

Directions the employee received before starting work _____

_____

_____

Were any specific procedures involved? Yes _____ No _____ N/A _____

Description of machinery or equipment involved

_____

_____

Part B: Incident Description

Explain what happened (what, where, when, who, how) _____

_____

_____

_____

_____

Sketch/Diagram

Immediate Cause	Underlying Cause

How can the incident be prevented from happening again?

_____

_____

_____

Actions taken to prevent recurrence

_____

_____

_____

Action by: _____ Report prepared by:_____

Part C: Reviews of Incident Report