

Chemical Process Safety
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Lecture – 48 Accident Investigation Procedure – I

Welcome to this module of accident investigation procedure so before we start let us have a look that what we had studied in the previous modules. We had gone through about the accidents.

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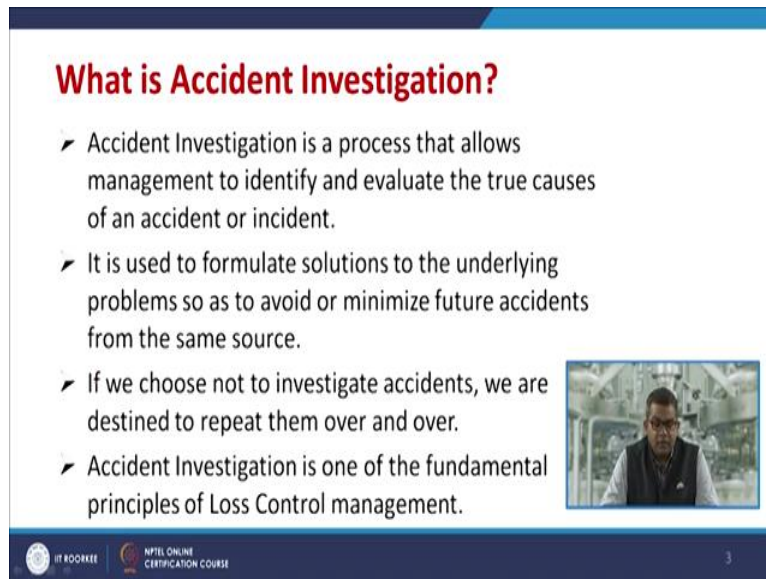
What we had studied in last module.

- Accident
- Some facts about Accident.
- Accident Weed
- Accident Studies
- Accident Near miss
- Dangerous Occurrences
- Outcomes of Accident
- Accident causation theories

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We have find out some facts about the accidents this we had a discussion about the accident weed, accident studies, accident those who are near misses and we had a discussion about various dangerous occurrence and we have gone through about the outcomes of accidents. In the previous module we have discussed about the various accident causation theories.

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What is Accident Investigation?

- Accident Investigation is a process that allows management to identify and evaluate the true causes of an accident or incident.
- It is used to formulate solutions to the underlying problems so as to avoid or minimize future accidents from the same source.
- If we choose not to investigate accidents, we are destined to repeat them over and over.
- Accident Investigation is one of the fundamental principles of Loss Control management.

The slide includes a small video inset of a man in a blue shirt speaking. At the bottom, there are logos for IIT Kharagpur and NPTEL ONLINE CERTIFICATION COURSE, along with the number 3.

So in this particular module we are going to discuss that different aspect of accident investigation, we will ask several questions related to the accident investigation, so the first question in this aspect is that what is an accident investigation? So the accident investigation is a process that allows management to identify and evaluate the true causes of an accident or incident so that it cannot be repeated in subsequent protocols or subsequent steps or some in the scenario cannot be repeated.


Now it is used to formulate the solution to the underlying problems so as to avoid or minimise any kind of future accident from the same source. Now, if you choose not to investigate the accident we are destined to repeat them over and over. Now this may become a very dangerous scenario. Now accident investigation is one of the fundamental principle of loss Control Management because ultimately in previous modules we had a discussion about the hazard safety etc.

Then this (con) we told you that the concept of safety has changed to the lost control management system. Now this loss control management system attributes towards the economic losses. So whenever you are performing any kind of plant design layout design etc. you cannot overlook the importance of those safety aspects that is why it is called the fundamental principle of loss control measurement.

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What is Accident Investigation?

- All supervisors need to be aware of the need for and the benefits of an effective accident investigation program.
- They should also be provided with the skills to consistently and thoroughly investigate workplace accidents and incidents.
- It is an important part of any safety management system.
- It highlights the reasons why accidents occur and how to prevent them.



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Now the question is that who how we can go ahead with this accident investigation? So the things is that all supervisors need to be aware of the need for and the benefit of an effective accident investigation program. They should also be provided with the skills to consistently and thoroughly investigate the workplace accident and incident and they should be provided at training.

So that they can analyse those near misses which we had discussed in the previous module so that they not only investigate the accident but they should be in a position to prevent those accidents so it is an important part of any safety management system. Now it highlights the reason why accidents occur and how we can prevent them.

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Accident Investigation

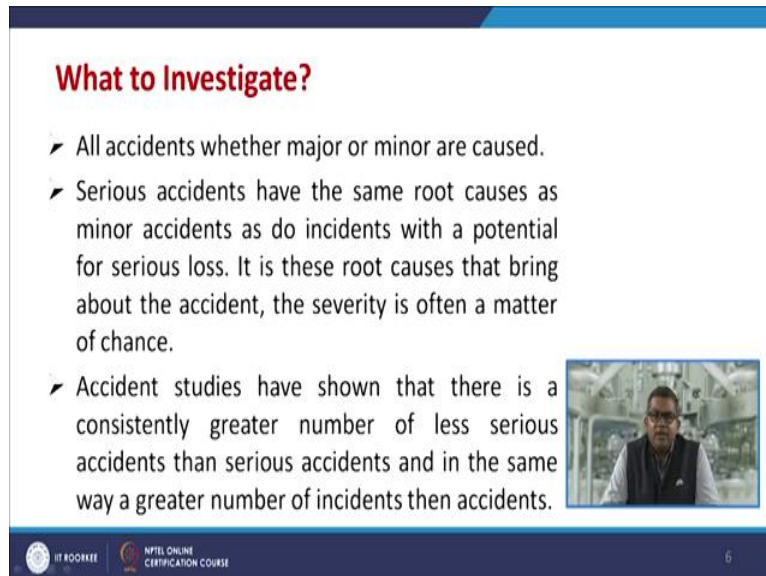
- The primary purpose of accident investigations is to improve health and safety performance by:
 - Exploring the reasons for the event and identifying both the immediate and underlying causes;
 - Identifying remedies to improve the health and safety management system by improving risk control, preventing a recurrence and reducing financial losses.



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The primary purpose of any accident investigation is to improve the health and safety performance by the resistors. One step may be the exploring the reason for the event and identifying both the immediate and underlying causes. The second is the identifying remedies to improve the health and safety management system by improving risk, control preventing reoccurrence of and reducing the financial losses.

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What to Investigate?

- All accidents whether major or minor are caused.
- Serious accidents have the same root causes as minor accidents as do incidents with a potential for serious loss. It is these root causes that bring about the accident, the severity is often a matter of chance.
- Accident studies have shown that there is a consistently greater number of less serious accidents than serious accidents and in the same way a greater number of incidents than accidents.

The slide includes a small video inset showing a man in a white shirt and dark vest speaking. At the bottom, there are logos for IIT Kharagpur and NPTEL Online Certification Course, along with the number 6.



Then the question maybe ask that what to investigate remember all accidents whether major or minor are caused. The serious accident have the same root cause as minor accident, as to do the incident with the potential for serious loss. Now, it is these root causes that bring about the accident, the severity is often a matter of chance.

Now just let me recall you about the Bhopal Gas tragedy because the MIC was leaked and just because of the wind direction the accident became more and more serious, so it was a matter of fact that or matter of chance that the severity is on the extreme side. So accident studies they have shown that there is a consistently greater number of less serious accidents then the serious accidents and the same way a greater number of incidents then accident.

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What to Investigate?

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- Accident studies have shown that there is a consistently greater number of less serious accidents than serious accidents and in the same way a greater number of incidents than accidents.



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So if you recall the we have studied about the accident pyramid, there are larger number of near misses there maybe certain things those we have investigated and then we have taken the certain remedial measures and this attribute the serious accidents, this may be some minor accident. So this last line that the consistently greater number of less serious accident then the serious accidents, so this number is on the great higher side compared to this one.

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Benefits Of Accident Investigation...

Some of the benefits includes:

- Prevention of future, similar losses.
- Accident Investigation helps in contribution to the bottom line.
- Helps in reduction of human suffering.
- Lead to the continuous improvement process.



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Now, question is that what are the benefits of accident investigation? Now some of the benefits of the accidents investigations are that prevention of future or similar losses, accident investigation helps in contribution to the bottom line, they helps in reduction of human

suffering or environmental suffering, they led to the continuous improvement of the process now if you recall the previous module we had frames several set of questions.

Now these the answer to those several questions they are for the betterment or improvisation of the process, now if their answer is yes then definitely you have to take it the corrective measures so that is the plus point of any kind of accident investigation.

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What's the difference between accident investigation and Analysis?

What's the purpose of an OSHA investigation?
First - determine what happened to see if the employer violated safety rules.

To gain the greatest benefit, why does the employer conduct accident analysis?
First - determine what happened to see safety management system weaknesses exist.

The slide features two illustrations: on the left, two people in safety gear examining a scene under a spotlight; on the right, two people holding up a large puzzle piece. A small video inset shows a man speaking. The footer includes logos for IIT Kharagpur and NPTEL Online Certification Course, with the number 8 in the bottom right corner.



Now another question or you can say the more systematic question is asked that what is the difference between the accident investigation. And analysis then the questions may be ask that what is the purpose of an OSHA investigations OSHA stands for occupational safety and health administration. Now first thing is that determine what happened to see if employer violated any kind of safety rules because these safety rules are frame for the benefit of employee, benefit of mankind or benefit of the environment.

So what happened to see if the employer those were violated the safety rules these rules again, these rules are framed to look into the local conditions or national conditions, etc. Now to gain the greatest benefit why does the employer conduct the accident analysis, this is again a very good question. The first thing is that the determine what happened to see the safety management system weakness exist.

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When to conduct an Accident/Incident Investigation?

- As it was already studied in last modules, all incidents, whether a near miss or an actual injury-related event, should be investigated.
- Near miss reporting and investigation allow you to identify and control hazards before they cause a more serious incident.
- Accident/incident investigations are a tool for uncovering hazards that either were missed earlier or have managed to slip out of the controls planned for them.



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Now question arises that when to conduct an accident or incident investigation. Now we have already studied in last module that all incident whether they are near miss or an actual injury related event should be investigated, so these near miss reporting and investigation allow you to identify and control hazard before they cause a more serious accident.

Now, to find out those near misses you must have a proper safety knowledge, you must have a proper safety commitment and you must have a proper safety training only then you will be in a position to identify those near misses. So the accident or incident investigations they are tool for uncovering the hazard that either were missed earlier or have managed to slip out the control plant for them.

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When to conduct an Accident/Incident Investigation?

- It is useful only when done with the aim of discovering every contributing factor to the accident/incident to "foolproof" the condition and/or activity and prevent future occurrences.
- In other words, your objective is to identify root causes, not to primarily set blame.





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Now, it is useful only when done with the aim of discovering every contributing factor to the accident incident to foolproof the condition and the activity and other preventive future occurrence so in other words your objective is to identify the root causes not to primarily set blame. Remember, while you are identifying the root cause, you should not wait for an accident.

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Who should do Accident/Incident Investigation?

- The usual investigator for all incidents is the supervisor in charge of the involved area and/or activity.
- It generally represent a good way to involve employees in safety and health.
- Employee involvement will not only give you additional expertise and insight, but in the eyes of the workers, will lend credibility to the results.



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Now another question is that who should do the accident or incident investigation the usual investigator for all incident is the supervisor in charge of the involved area or activity or facility. Now, it generally represent a good way to involve employees in the safety and health because it is not a one man show it is a team effort so sometimes worker of the lower side

may give you proper information or more information about the near misses and the faulty things etc. at the process arena. So the employee involvement will not give will not only give you additional expertise and inside but in the eyes of the worker will lend credibility to the result so it turns a psychological factor also.

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Who should do Accident/Incident Investigation?

- Employee involvement also benefits the involved employees by educating them on potential hazards, and the experience usually makes them believers in the importance of safety, thus strengthening the safety culture of the organization.
- The safety department or the person in charge of safety and health should participate in the investigation or review the investigative findings and recommendations.
- Many companies use a team or a subcommittee or the joint employee-management committee to investigate incidents involving serious injury or extensive property damage.



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Then the employee involvement also benefits the involved employees by educating them on potential hazard and the experience usually makes them believers in the importance of safety so you may strengthening the safety culture in the organisation by adopting this particular aspect. Now, the safety department or the person in charge or the safety officer in other words or those who are involved in the safety.

And health operation they should participate in the investigation or review the investigative findings and recommendations. So many units or companies they use a team or sub committee of the joint employee Management Committee to investigate incidents involving serious injury or extensive property damage.

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Training for Accident Investigation?

- No one should investigate incidents without appropriate accident investigation training.
- Many safety and health consultants and professional organizations provide this type of training.
- Before committing resources to training, one might want to check the course contents against the information found in the National Safety Council's pamphlet, **"Accident Investigation ... A New Approach."**



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Then question arises that whether we should impart training for accident investigation or not. Remember no one should investigate incident without appropriate accident investigation training because sometimes they may miss interpret the facts. So a many safety and health consultant and a professional organisation provide this type of training.


So before committee, before committing any kind of resources to training one might want to check the course content against the information found in various kind of authorities, one of the foremost authorities in Indian context is the National Safety Council. This may be represented as the accident investigation, a new approach.

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Accident Investigation: A 6-step Process

Accident Investigation is a six step process.

1. Collect Information
2. Analyze All Causes
3. Assess Future Accident Potential
4. Develop Corrective Action
5. Report Data and Recommendations
6. Take Corrective Action and Monitor



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Now this incident investigation is a six step process. Now these very steps those involved in the accident investigation they are enlisted over here that is the collect information, the second is the analyse all kind of the causes, you may assess the future accident potential, the fourth one is the developed corrective action, fifth is the report data and recommendation, the sixth one is the take corrective action and monitor.

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STEP 1

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Collecting Information: ON Site

- **Securing the scene:** Once we have an accident or incident to investigate, several activities will take place at the actual accident scene.
- When is it appropriate to begin the investigation?
- What are effective methods to secure an accident scene?

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So, let us start with the first step. The first step said the collect all kind of information. Now there maybe various issues related to the collecting information so let us take the first issue on site now this on site information or covers that securing the scene, so once we have an accident or incident to investigate the several activity will takes place at the actual sightseeing. So you need to have answer for various question when is it appropriate to begin

the investigation where the effective methods what are the effective methods to secure an accident scenes.



Now the securing the scene is again important and you can see that sometimes they maybe carden off with this yellow tape the reason is that sometimes, if it is a deliberated event or it is being involved by the sabotage or there may be certain issues related to the management failure, certain issues related to the compensation issues sometimes the people may try to hide the facts so as quickly as you are securing the scene are you securing you are the securing the plant Arena or accidental Arena then you may protect the things to be destroyed or alter.



Now in this particular aspect sometimes it may happen maybe because of certain medical issues or sometimes maybe because of other environmental issues the authorities may take a corrective measures a priory so proper securing of scene is essential sometimes the debris may be dislocated from the place of accident because all these debris may give your proper source or a vital source of information for the accident investigation. So the securing of the scene is extremely important. Now other thing is that the investigating or investigation at the scene or a desktop.

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Collecting Information: ON Site

- **Investigating at the scene:** If warranted by the circumstances, the scene may need to be barricaded and physically segregated against further injury or merely to preserve the scene for the initial investigation.
- List methods to document the scene and collect data about what happened.
- What documents will you be interested in reviewing?
- Why?



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Now if warranted by the circumstances the scene may need to be barricaded and the physically segregated against to the further injury or nearly to preserve the scene for the initial investigation. Now sometimes it may happen that if the barricading or segregation is

not performed then the building or anything suppose if the accident took place related to the fire so it may we can the building.

And if it is not working properly barricaded or segregated sometimes it may fall and it may create the further losses. So the list methods to document the scene and collect data about what happened. Now you have to be very clear that what kind of documents will you be interested in reviewing and why because collecting the unnecessary documents, collecting unnecessary information may some time lead to the confusion.

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Collecting Information: ON Site

- **Recording key information:** Information will be largely determined by the nature of the accident.
- Equipment is needed.



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Then next aspects is that recording the key information so this information will be largely determined by the nature of the accident, so sometimes you may enlist various kind of equipment what are needed for recording of those information camera maybe other kind of secured bags etc. So you are the key factor is that all kind of information whatever necessary may be recorded.

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Collecting Information: OFF Site

Interview key people:

- ✓ *When is it best to interview? Why?*
- ✓ *Who should we interview? Why?*
- ✓ *Where should we conduct the interview?*

The slide features an illustration of two people in an office setting, one sitting and one standing, with a clock and a map on the wall. Below this is a video inset showing a man in a white lab coat and glasses, likely a professional or expert, speaking.

At the bottom of the slide, there are logos for IIT Kharagpur and NPTEL ONLINE CERTIFICATION COURSE, along with the page number 19.

Then there are certain issues related to the offsite. Offsite includes that you may interview the key people, when is it best to interview and why, who should we interview then you must have a segregated or you must have find out or you must have select the person to whom you should have an interview and why, sometimes, for an example, sometimes any kind if any Pressure Vessel fails so the person nearby me provide a very vital information so you have to select that particular person for interview.

Then where should we conduct the interview? Sometimes at the site of the accident and sometimes because of some psychological reasons you make call them to some other appropriate place. Because it helps that at the person may recall the things more smoothly compared to when they are at the site. So this type of again aspect is extremely important.

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Collecting Information: OFF Site

Interview key people:

- Consider interviewing to collect more information about an accident.
- Initially, the injured person and any eye-witnesses.
- Every effort should be made to interview any witnesses.
- Witnesses can be a very good source of information regarding the cause of an accident and the conditions associated with it.



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Now the considering interviewing on to collect more information about the accident that is the key point of interviewing the people initially the injured persons or any eyewitness they may not be in a position to tell you more about the accident. But later on you can because the prime of is its essential that the injured person should have a first right to be treated rather than being interviewed. So every effort should be made to interview any witness, any eyewitness, now these witnesses can be a very good source of information regarding the cause of an accident and the conditions those who are associated with it.

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Collecting Information: OFF Site

Interview key people:

- Eye-witnesses can provide critical information about an accident as far as describing the activities and events that led up to the accident itself.
- Witnesses should be interviewed as soon as possible after the accident.
- Record the names, addresses & telephone nos. of witnesses and other persons with information.
- Have witnesses document their statements and ask them to date and sign.



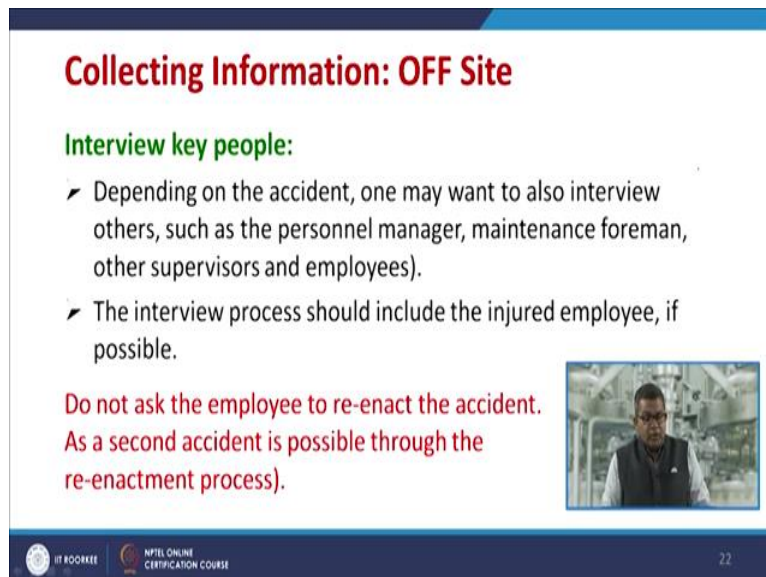
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So, eyewitness they can provide critical information about an accident as far as the describing the activities and events that led up to the accident itself. Now witnesses should be

interviewed as soon as possible after the accident provided they are in a good physical or mental health because sometimes if you have any delay about this interviewing process then there may be a chance that they may skip or they may forget core issues related to that particular accident.

So you record the name address and telephone or contact details of all those witnesses and other persons with information so that in case if you required further information or further query then you can easily approach to them. Now, have witnesses document their statements and ask them to date and signs. So, that they may not be in a position to change their statement or they it also helps them to recall all that they have said they have reported this thing to the investigation team in such a manner.

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Collecting Information: OFF Site

Interview key people:

- Depending on the accident, one may want to also interview others, such as the personnel manager, maintenance foreman, other supervisors and employees).
- The interview process should include the injured employee, if possible.

Do not ask the employee to re-enact the accident. As a second accident is possible through the re-enactment process).



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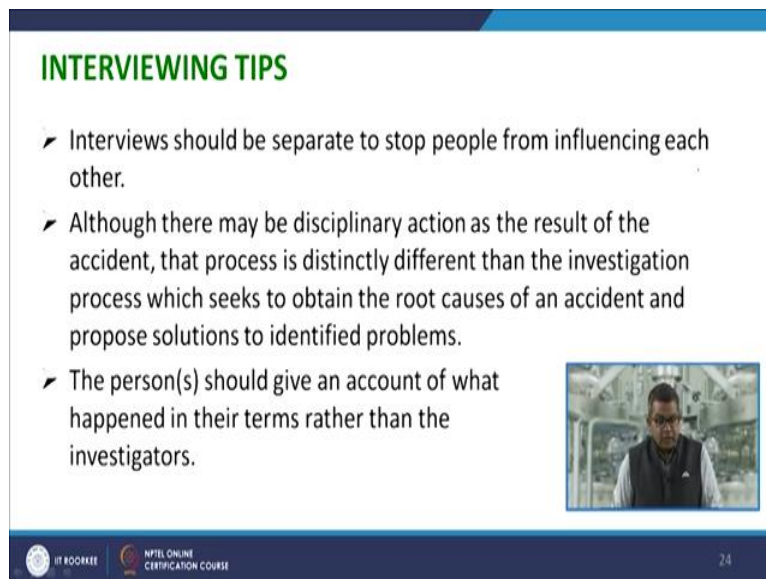
Now depending on the accident one may want to also interview other such as the personnel manager maintenance foreman, other supervisory staff and employees. The interview process should include the injured employee if possible because again the injured employee should get the proper Medicare first. So do not ask the employee to re-enact the accident, now as a second accident is possible through the re-enactment of process so sometimes it may not be very helpful aspect to re-enact the accident.

There are certain interviewing tips like it is important initially put the witness at ease by carefully explaining the purpose of the investigation staff and it is their right to know that why they are being interviewed. So interviewing person involve and witnesses to the accident

is of prime importance ideally in familiar surrounding, so as not to make the person uncomfortable.


Sometimes if you go there to the accident site the psychological things says that they may be little bit uncomfortable. Now this process is fact-finding in nature and not a means to assess blame or discipline the employees. Now, questions when asked should not be intimidating that as the investigator will be seen as aggressive and reflecting a blame culture, so they should be made clear to them.

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INTERVIEWING TIPS

- Interviews should be separate to stop people from influencing each other.
- Although there may be disciplinary action as the result of the accident, that process is distinctly different than the investigation process which seeks to obtain the root causes of an accident and propose solutions to identified problems.
- The person(s) should give an account of what happened in their terms rather than the investigators.



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The interview should be separate to stop people from influencing each other so proper segregation of interviewers be there. Although there maybe disciplinary action as the result of the accident the processes distinctly different than the investigation process which seeks to obtain the root causes of an accident and the proposed the solution to identified problem. The person should give an account of what happened in their terms rather than the investigators.

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INTERVIEWING

- A good questioning technique in this process is to ask open-ended questions, i.e., questions that cannot be answered with just a one word response.
- This technique often provides the investigator with more information than questions that are not open-ended.
- Investigating the accident vs. disciplining the employee.

In all likelihood, the information we have now discovered will have raised a new set of questions about how and why the accident occurred.



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Good questioning technique in this particular process is to ask open-ended question that is a question that cannot be answered with just a one word response because all the detail may be very useful. Now this technique often provide the investigator with more information than questions that are not open-ended. So investigating the accident versus disciplining the employee. Now, in all likelihood the information we have now discovered will have raised a new set of questions about how and why the accident occurred.


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Collecting Information: OFF Site

Assess past accident history:

- Determining past accident history with a particular operation, machine or work activity is valuable to evaluating future accident potential.
- However, this is not the only piece of information to be considered.
- A series of near misses in a particular area will not show up as past accidents, but may represent a potential for a serious future loss if left unchecked.

Review pertinent records

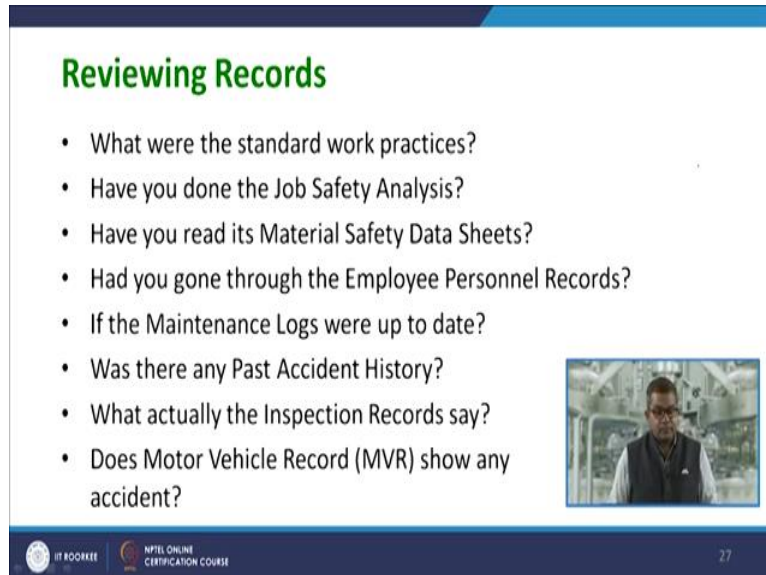


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Now you may have assess past accident history so the determining the past accident history with a particular operation machine or work activity is valuable to evaluating the future accident potential so sometimes the logbook plays a very vital role for pre accident history is

the plays a very vital role. However, this is not only the piece of information to be considered a series of near misses in particular area will now not show up as a past accident but may represent a potential for a serious future loss if left unchecked, so you the pertinent records so that because sometimes it may give up a very good source of information.

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Reviewing Records

- What were the standard work practices?
- Have you done the Job Safety Analysis?
- Have you read its Material Safety Data Sheets?
- Had you gone through the Employee Personnel Records?
- If the Maintenance Logs were up to date?
- Was there any Past Accident History?
- What actually the Inspection Records say?
- Does Motor Vehicle Record (MVR) show any accident?

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The slide features a list of eight questions related to reviewing records. To the right of the list is a small video inset showing a man in a white lab coat and glasses, likely a safety professional, in an industrial setting. The slide has a blue header and footer with the NPTEL logo and course information.

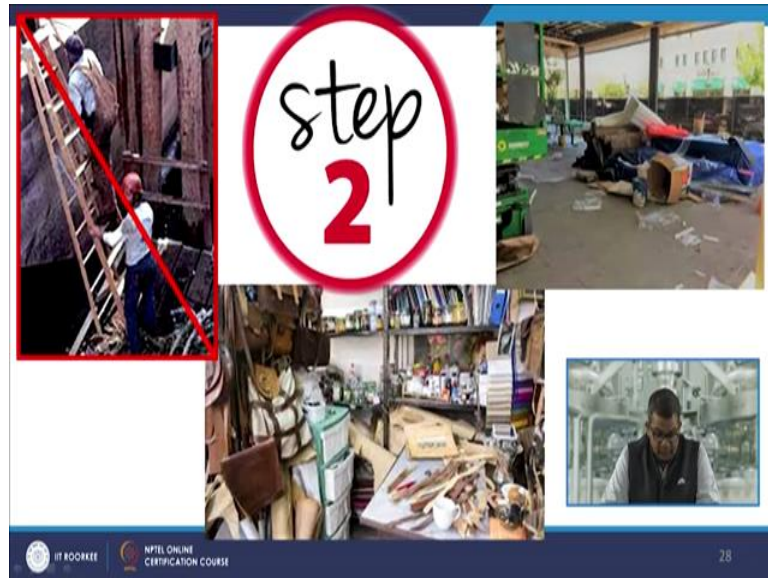
Now reviewing record you may frame various questions like what were the standard work practice, have you done the job safety analysis because it may lead to the managerial aspect also, have you read the material safety data sheet, had you gone through the employee personal record sometimes the personal record may give a proper information about the mental stability of the person then the past job record etc.

Now, if the maintenance logs were up to date because sometimes in the lacuna in the maintenance log maybe the vital source of an accident. Was there any past accident history in if it is then what were the corrective measures were taken at the time of those accidents? What actually the inspection record says because sometimes based on the standard work practice and all kind of safety reviews the inspection may taken place in at the workplace.

So what actually the inspection records say, sometimes they may find certain lacuna in the process arena, then was the management in the position to correct them, does the motor vehicle record show any kind of accident because sometimes any kind of fertility or any kind of injury motor vehicle record will provide a proper clue because sometimes the medication or sometimes of the medical care may be given or maybe the injured may be transferred to

some hospital etc. So motor vehicle record is the best clue to give the proper vital information.

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Now let us have a look about the step number 2.

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Determining Causes

- The root cause is the most fundamental and direct cause of an accident or incident.
- There may be one or more contributory causes, in addition to the root cause. However, the root cause is the one event or condition that precipitated the accident.
- The key is that if we were to remove the root cause, the accident would not have occurred. If we removed the contributory causes, the accident still may have occurred, although the severity of the accident may have been less.
- Accident Investigation is ineffective unless all causes are determined and corrected.



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That is the determining the cause. The root cause is the most fundamental and direct cause of an accident or incident there maybe one or more contributory causes in addition to the root cause however the root cause is one event or condition that participated in that particular accident which you are investigating. Now the key is that if we were to remove the root cause the accident would not have occurred.

Now if we remove the contributory cause the accident still may have occurred although the severity of that particular accident may be minimised. So accident investigation is ineffective unless all causes are determined and corrected and that is why you need to find out the (contributory) and more other contributory causes.

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Categories of Root Causes

- Root causes can generally be grouped as either being Workplace Factors or Employee Factors.
- **Workplace Factors:** These are largely under the control of management.
- **Employee Factors:** These are under the control of the individual employee.




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Now the category of root causes are in two fold, they are grouped under the workplace factors or the employee factor. Now the workplace factor these are the largely under the control of a management so in a broad spectrum you can responsible, you can fix responsibility of the management. The second is the employee factor these are the under the control of individual employee.

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Categories of Root Causes

- ✓ Workplace Factors: Some of the examples of workplace factors are as follows:
 - Improper Tools & Equipment,
 - Inadequate Maintenance,
 - Lack of Job Procedures,
 - Poor Workstation Set-Up,
 - Poor Housekeeping,
 - Lack of Job Supervision,
 - Lack of Job Training.

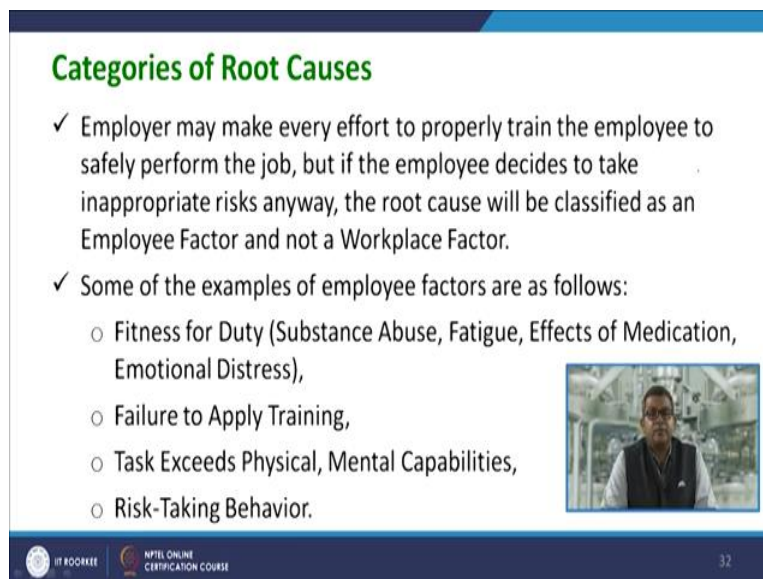


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Now, the workplace factor there are some of the example of the workplace factor are as follows the improper tools and equipment, whatever tools are required but you are the management does not supply those tools to the workers, then inadequate maintenance that means the either management they did not follow the proper maintenance protocol or they are having the lack of commitment towards this maintenance.

Then lack of job procedures, this job procedure may included like formation of standard operating practices availability of the manuals etc. The poor workstation setup, sometimes the managerial aspect or workplace factor may include the poor housekeeping, things may be in a shabby condition sometimes the solvent or solvents are lying there, then electrical circuits they are open without keeping any kind of insulation etc. Then lack of jobs supervision, these lack of job supervision may lead sometimes nobody is caring to that particular Arena. Lack of job training that means, the workers are not provided with adequate training to handle the scenario.

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The slide is titled "Categories of Root Causes" in green text. It contains two main bullet points, each preceded by a green checkmark. The first bullet point states that even if an employer makes every effort to properly train an employee, if the employee decides to take inappropriate risks, the root cause is classified as an Employee Factor, not a Workplace Factor. The second bullet point lists examples of employee factors, including Fitness for Duty (Substance Abuse, Fatigue, Effects of Medication, Emotional Distress), Failure to Apply Training, Task Exceeds Physical, Mental Capabilities, and Risk-Taking Behavior. A small video inset on the right shows a man in a blue shirt and glasses. The slide footer includes the NPTEL logo, the text "NPTEL ONLINE CERTIFICATION COURSE", and the number "32".

Categories of Root Causes

- ✓ Employer may make every effort to properly train the employee to safely perform the job, but if the employee decides to take inappropriate risks anyway, the root cause will be classified as an Employee Factor and not a Workplace Factor.
- ✓ Some of the examples of employee factors are as follows:
 - Fitness for Duty (Substance Abuse, Fatigue, Effects of Medication, Emotional Distress),
 - Failure to Apply Training,
 - Task Exceeds Physical, Mental Capabilities,
 - Risk-Taking Behavior.

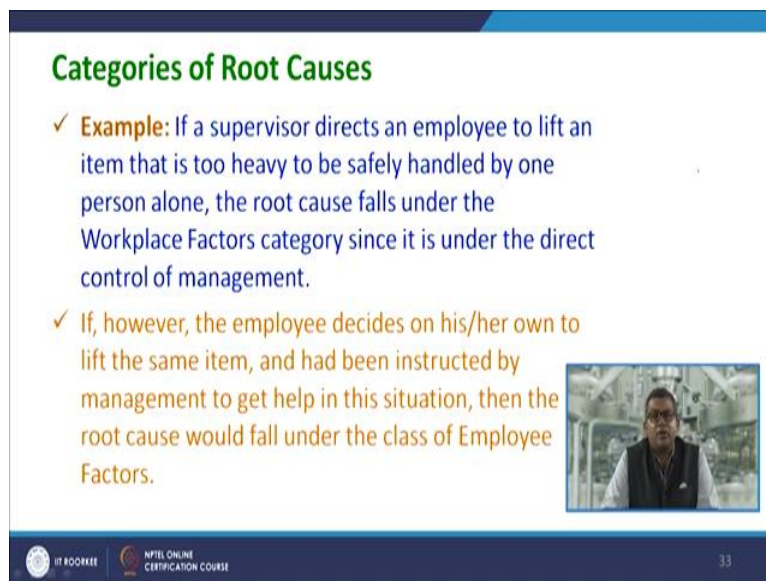
So employer may make every effort to properly train the employee to the safely (pro) perform the job but if the employee decides to take inappropriate risk anyway the root cause will be classified as an employee factor and not the workplace factor. So some of the example of employee factors are like fitness for duty, substance abuse, fatigue, effect of the medication, emotional distress etc. so these may be the major contributory aspect.

Then failure to apply the training sometimes the adaptability maybe because of the age maybe because of the certain psychological factor or emotional factors the employee may not

be in a position to adopt the training being given to them, so this may be clubbed under the head of the failure to apply the training. Then task exceeds the physical and mental capabilities because sometimes big maybe because of the age maybe because of some other capabilities they are not coping up with the task given to them.

Then the task exceeds to the mental and physical capital, then sometimes some of the employee they are having the risk taking behaviours so in that particular case there may be a chance of or sometimes they may be so innovative that they may be in a position to violet the the safety rules so this type of cause should be recorded.

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Categories of Root Causes

- ✓ **Example:** If a supervisor directs an employee to lift an item that is too heavy to be safely handled by one person alone, the root cause falls under the Workplace Factors category since it is under the direct control of management.
- ✓ If, however, the employee decides on his/her own to lift the same item, and had been instructed by management to get help in this situation, then the root cause would fall under the class of Employee Factors.



The slide includes a small video inset showing a man in a lab coat. The footer contains the IIT Kharagpur logo, the text 'NPTEL ONLINE CERTIFICATION COURSE', and the slide number '33'.

Now, let us have an example, if a supervisor directs an employee to lift an item that is too heavy to be safely handle by one person alone, the root cause falls under the workplace factor category, since it is under the direct control of management. If however, the employee decides on his or her own to lift the same item because sometimes it may not be physically fit to handle the scenario. So had been instructed by the management to get help in the situation then the root cause would be the fall under the class of employee factor.

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Determining Root Causes

- After answering **Who, What, Where, When and How** initially, this step answers Why and “completes the puzzle”
- There are initially **“Five Why’s”**.
- 5 Whys is an iterative interrogative technique used to explore the cause-and-effect relationships underlying a particular problem.
- The primary goal of the technique is to determine the root cause of a defect or problem by repeating the question “Why?”.




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Now after answering who, what, where, when, and how. Initially the system answers why and completes the puzzle. So there initially 5 whys in an iterative, interrogative technique used to explore the cause and effect relationship underlying a particular problem. The primary goal of the technique is used to determine the root cause of a defect or a problem by repeating the question why so why why why why etc.

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Determining Root Causes

- Each answer of question “WHY” forms the basis of the next question.
- The “5” in the name derives from an anecdotal observation on the number of iterations needed to resolve the problem.
- After the “Five Why’s” have been asked and answered, the “Key Question” is simply a screening tool that tells us if we have indeed gotten to the root cause level.





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Now each answer of question why forms the basis of the next question. So in 5, the five in the name derived from and small story observation that a number of iteration needed to resolve the problem, so after the five ‘why’ have been asked answer the key question is simply a screening tool that tells us if we have indeed gotten to the root cause level.

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Determining Root Causes

- The fundamental here is not to stop short of obtaining the root cause.
- The “Five Whys” and the “Key Question” help us avoid this pitfall of Accident Investigations.
- When the satisfaction is attained that the investigation is at the root cause level, it is time to propose corrective actions so the accident is not likely to reoccur.



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The fundamental here is not to stop short of obtaining the root cause. The five whys and the key question help us avoid this pitfall in the accident investigation. So when the satisfaction is attained that the investigation is that the root cause label it is time to propose corrective action so that the accident is not likely to reoccur. So in this module we have discussed about the various root causes and we have discussed about the two steps of this accident investigation in the subsequent model module will discuss the remaining steps of this accident investigation thank you very much!