

OSHA 7505

Introduction to Incident [Accident] Investigation



A SYSTEMS APPROACH TO HELP PREVENT INJURIES AND ILLNESSES

Objectives

TLO 1: Explain basic incident investigation procedures.
 ELO1.1: Explain the language of incident investigations including the difference between accident and incident.
 ELO1.2: Explain the value of conducting an incident investigation.
 ELO1.3: Explain employer responsibilities related to workplace incident investigations.

TLO 2: Apply the 4-Step Incident Investigation Process to conducting an incident investigation.

- ELO 2.1: Preserve/document the scene
- ELO 2.2: Collect information
- ELO 2.3: Determine root causes
- ELO 2.4 Implement corrective actions

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Module 1

Basic Incident Investigation Procedures

“Accident” vs. “Incident

- This course uses the term “incident,” not “accident”
- “accident” conveys a *random act that could not be prevented*
- Actually, these are wholly preventable


Pretest: We do Incident Investigations Because (T or F):



1. It's required for the Worker's Compensation Claim.
2. We like doing all the extra paperwork- so we don't have to do any real work!
3. It's an important tool for determining root causes of incidents, identifying corrective actions, and making sure this same incident never occurs again.

Answers: Incident Investigation Benefits Us Because:

- A thorough investigation will identify corrective actions that will prevent future accidents.
- Positive effect on morale.
- Continuous improvement in overall operation.
- Raises safety awareness.



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Language of Incident Investigation

Incident A work-related event in which an injury or ill-health (regardless of severity) or fatality occurred, or could have occurred.

Root Causes The underlying reasons why unsafe conditions exist or if a procedure or safety rule was not followed in a workplace. Root causes generally reflect management, design, planning, organizational or operational failings (Such as damaged guard had not been repaired; failure to use the guard was routinely overlooked by supervisors to ensure the speed of production).

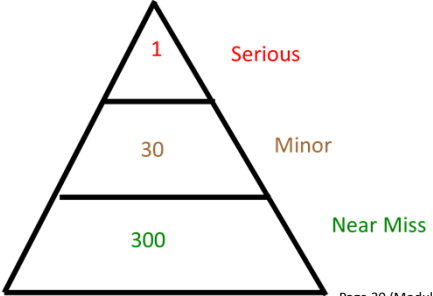
Close Call An incident that could have caused serious injury or illness but did not; also called a "near miss."

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Heinrich's "Accident" Triangle:



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Activity/Discussion:

Exercise/Discussion: What are some examples of "workplace factors" that can lead to incidents?


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A combination of factors causes the incident:

Human Component: Actions of Incident Victim AND Coworkers



Environmental Conditions, Machinery, Tools, Etc

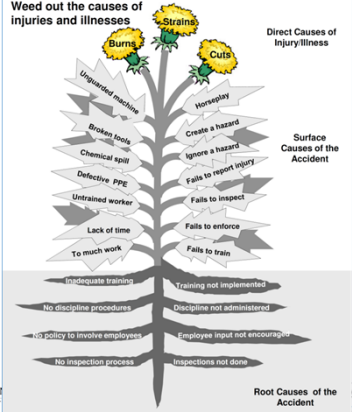
The difference between an injury and a near miss

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Weed out the causes of injuries and illnesses



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Value of Incident Investigations

- Prevent injuries and illnesses
- Save lives
- Save money
- Demonstrate commitment to health and safety
- Promote positive workplace morale
- Improve management

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Prevention Saves Lives

- Investigations are incident prevention tools
- Should be integral to an Occupational Safety and Health Management Program
- Uncover root causes that were the underlying factors
- Prevent future incidents IF actions are taken to correct root causes uncovered in the investigation

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Prevention Saves Money

On average, preventing a:

- Workplace injury can save \$39,000
- Fatality can save more than \$1.4 million

OSHA is a resource for the Business Case for Safety and Health, visit the OSHA website to learn more:

<https://www.osha.gov/dcsp/products/topics/businesscase/costs.html>



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What do Incidents Cost a Company?

Direct - Insured Costs "Just the tip of the iceberg"

Unseen costs can sink the ship!

Indirect - Uninsured, Hidden Costs - Out of Pocket

Examples:

1. Lost time by fellow employees and supervisor.
2. Investigation of incident.
3. Schedule delays.
4. Legal fees.
5. Training costs for new/replacement workers.
6. Damage to tools and equipment.
7. Lower morale.
8. Increased absenteeism.
9. Poorer customer relations.
10. Others?

Practice Scenario

- During a safety inspection, you notice that an elevated platform area in a warehouse does not have a proper guardrail. You note that several workers work on the platform each day, and a well-used walkway passes directly under the platform.
- **Determine the costs:**
 - Estimate direct and indirect costs for the most likely resulting injury/illness if corrective actions are not taken
 - Briefly list what factors you considered in arriving at your estimate in each area

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Practice: Determine total cost

To calculate **Direct Cost** of the *Most likely injury: Fall to lower level*
Total value of the insurance claim for injury or illness **\$40,043**

To calculate **Indirect Cost**, multiply direct cost by a cost multiplier.
The cost multiplier that you use will depend on the size of the direct cost.

Direct Cost	Cost Multiplier
\$0 - \$2,999	4.5
\$3,000 - \$4,999	1.6
\$5,000 - \$9,999	1.2
\$10,000 or more	1.1

Direct Cost \$40,043 X 1.1 = \$44,047 Indirect Cost

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TOTAL = \$84,090

Employer Responsibilities

- Easy to follow written procedures
- Training on incident investigation and company procedures
- Collaboration between workers, worker representatives and management
- Focuses on identifying root causes
NOT on establishing fault
- Emphasize correcting root causes timely based on investigation findings
- Annual program review

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Investigation Plans Identify:

WHO

- Who to notify
- Who contacts police, fire, etc.
- Who conducts investigation
- Who receives/acts on reports

WHEN

- Timetables for investigation and follow-up

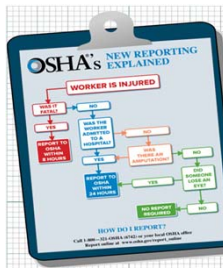
HOW

- Requirements to conduct investigator training

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OSHA Reporting Requirements

- Fatalities: Report within 8 hours
- Hospital admissions, amputations and loss of an eye: Report within 8 hours
- State plans may be more stringent



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Alaska Reporting Requirements

Occupational accidents that result in the **death or overnight hospitalization** of one or more employees must be reported to AKOSH within **8 hours**.

Immediately report accidents to:

- **1-800-770-4940**

or **(907) 269-4940**

(8 am to 5 pm M-F; AK time)

- **1-800-321-6742**

(After 5 pm or on weekends and holiday)

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Oregon Reporting Requirements

Report within 8 hours:

- **Death** of any employee or a **catastrophe**
 - Catastrophe: Two or more employees are fatally injured, or three or more employees are admitted to a hospital or clinic as a result of the same incident

Report within 24 hours:

- Inpatient hospitalization, loss of an eye, and either an amputation or avulsion that results in bone loss

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Washington Reporting Requirements

- A workplace **fatality or in-patient hospitalization of any employee within eight (8) hours** of the incident.
- A **non-hospitalized amputation or loss of an eye(s) of any employee within twenty-four (24) hours** of the incident.

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Investigation: Promote a Positive Workplace

- Focus on finding root causes, not blame or fault
- Investigations should be a team effort. A supervisor may take the lead.
- Working together:
 - Everyone “owns” conclusions and recommendations
 - Jointly ensure timely corrective actions taken

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Investigation Ground Rules:

- Fact finding, not fault finding
- Treat injured employee and witnesses with respect
- Avoid atmosphere of blame
- Set aside any personal issues
- Be objective
- Thank others for their participation



Investigate Programs, Not Behaviors

IF...	WHY...
A procedure or safety rule was not followed...	Was the procedure or rule not followed?
Production pressures play a role...	Were production pressures permitted to jeopardize safety?
Procedure is out-of-date or safety training is inadequate...	Hasn't the procedure been updated? Why isn't safety training adequate?
If it had been identified...	Wasn't it addressed?

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Activity

Review of Module 1 Concepts:
Exercise/Discussion: In groups, list as many items as possible for each of the questions below:

Why do we use the term "incident" instead of "accident"?

How does incident investigation add value to a work organization?

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Module 2

The 4-Step Incident Investigation Process



A SYSTEMS APPROACH TO HELP PREVENT INJURIES AND ILLNESSES

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A Systems Approach

A systems approach always looks beyond the immediate causes of the incident.

Example:

If a worker suffers an amputation on a table saw, the investigator would ask questions such as:

- Was the machine adequately guarded? If not, why not?
- Was the guard damaged or non-functional? If so, why hadn't it been fixed?
- Did the guard design get in the way of the work?
- Had the employee been trained properly in the procedures to do the job safely?

Systems Approach That is Documented

Who is the audience of the report?

- Worksite management
- Worker's compensation adjudicators
- Medical professionals
- Safety committee
- Yourself (or your successor) in future years

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Activity

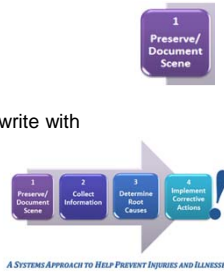
Exercise/Discussion: Review the sample incident investigation forms on the following pages. What elements on these forms could you adopt for an incident investigation form in your workplace?

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Step 1: Preserve and Document the Scene

What items do you need?

- Camera
- Measuring devices
- Clipboard and something to write with
- Incident investigation forms
- Flashlight
- Magnifying glass
- PPE
- ????



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Discussion

Exercise/Discussion: Review the sample incident investigators toolkit in Appendix B of OSHA's Incident Investigations: A Guide for Employers. What items do you want in your incident investigation toolkit for use in your workplace?

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1 Preserve/Document Scene Determine What Happened

OSHA recommends beginning the investigation immediately

- Before material evidence moves or disappears
- Before memories fade or become distorted
 - Emotional response
 - People talk!



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1 Preserve/Document Scene Preserve the Scene

- Maintain scene safety
- Control hazards
- Keep people out who don't need to be there
 - Cones and tape
 - Security guard



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1
Preserve/
Document
Scene

Investigation Methods

- Witness interviews
- Injured worker statement
- Photographs/sketches
- Measurements
- Physical evidence: i.e., broken parts or damaged equipment
- Look at accident site

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1
Preserve/
Document
Scene

Document the Scene

- Personal observation (notes)
- Video
- Initial statements
- Sketches
- Photos
- Samples

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1
Preserve/
Document
Scene

Sketch the Scene Techniques

- Reconstruct the incident
- Include incident details:
Time, date, location, conditions
- Note distances
- Indicate direction (north, south, east, west)
- Mark locations where photos are taken
- Location of people or objects

Example Sketch for a Fatality
Lumber Storage Area, XYZ Sawmill, Ltd.

Incident Details:
Time: 4:45 p.m.
Lighting: Dusk
Deceased: 6'1" Tall
Eye Level of Operator: 7' 0" (approx.)
Top of Load: 9'4"
Traveling Speed of Load: Approx. 5 mph
Very Poor Operator Visibility

Photo Location: From East

Direction of travel of deceased

MI - J Operator

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Activity

Exercise:
DRAW: CASE STUDY - SKETCH OF THE SCENE -
Draw a sketch of the scene given the scenario on the next page. Then, compare your sketch to those done by your classmates.

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2
Collect
Information

Step 2: Collect Information

- Look into details
- "Why" and follow up questions
- Sources of information?
 - Witness interviews
 - Equipment manuals
 - Industry guidance
 - Maintenance
 - Training records
 - Audit reports
 - Enforcement policies
 - ???

A SYSTEMS APPROACH TO HELP PREVENT INJURIES AND ILLNESSES

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2
Collect
Information

What Documents Should be Reviewed?

- Equipment manuals
- Industry guidance documents
- Audit reports
- Policies/procedures
- Previous corrective actions
 - Recommendations
 - Actions taken
- OSHA logs/incident reports
- Safety committee records
- Other...?

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W


2
Collect
Information

Interview Preparation


- Who should be interviewed?
Why?
- When is it best to interview?
Why?
- Where should the interview be conducted?
- When *shouldn't* the interviews be conducted?



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W

2
Collect
Information


Interview Tips

- Build rapport
- Communicate clearly
- Ask them to recount their version of the incident
- Allow the interviewee to complete their statements
- Repeat questions and answers for clarity
- Ask follow-up questions

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W

2
Collect
Information


Interview Techniques

- Take notes
- Keep in mind the focus is determining root causes of the incident
- Put the person at ease
- Ask open-ended questions
- Let the individual talk
- Active listening
- Check understanding
- Repeat the facts & sequence of events back to the person

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W

2
Collect
Information


Investigator Do's and Don'ts

<ul style="list-style-type: none"> ✓ Do explain who you are ✓ Do be specific as to why you're there ✓ Do be positive-their knowledge is important ✓ Do be diplomatic and understanding ✓ Do be adaptable ✓ Do express concern and desire to prevent similar incidents ✓ Do ask their opinion ✓ Do thank them for their cooperation 	<ul style="list-style-type: none"> ✗ Don't argue ✗ Don't ask "yes/no" questions ✗ Don't be defensive ✗ Don't suggest answers ✗ Don't accuse ✗ Don't rush ✗ Don't interview in a crowd
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W


Exercise

Exercise: Work in groups. Review the Carol Oest case study incident. Make a list of witnesses that you would like to interview, and write down what questions you would like to ask them. Be prepared to report out to the class.

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W

2
Collect
Information


Step 2 Review

1. What relevant information might be obtained by reviewing the OSHA Injury and Illness records?
2. What is the purpose of the interview process?
3. What is an effective interview technique?
4. Why is it important to repeat the facts and sequence of events back to the interviewee?

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3 Determine Root Causes

Step 3: Determine Root Causes

Identify Root Causes

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3 Determine Root Causes

Identify Root Causes

My car will not start. (the problem)

- 1) Why? - The battery is dead. (first why)
- 2) Why? - The alternator is not functioning. (second why)
- 3) Why? - The alternator belt has broken. (third why)
- 4) Why? - The alternator belt was well beyond its useful service life and has never been replaced. (fourth why)
- 5) Why? - **I have not been maintaining my car according to the recommended service schedule.** (fifth why and the **root cause**)

- Software
- Flow charting
- Fishbone diagram
- Fault tree
- Create a timeline
- Ask "why" five times

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3 Determine Root Causes

Incident Investigation

Typically, incidents are caused by multiple failures or "root causes"

The "Incident Weed"

Root Causes

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Exercise

Exercise in groups. Create a sequence of events to identify root causes for the following case study. Be prepared to share findings with the class.

CONLIN CASE STUDY:

Mary Alice Conlin - Application Case Study

The accident occurred on a Walsh 55-ton full-revolution mechanical power press at Tool and Die, Inc. Mary Alice Conlin, 37 years old, lost three fingers and part of her thumb on the right hand when she reached into the press to extract a part.

The maintenance man did not secure the shield a week before the injury event as he was in a hurry to get to another machine breakdown. Besides, he needed a part to fix this press and had to wait for the part to be ordered.

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3 Determine Root Causes

Step 3 Review:

1. An "event" occurs as a result of...
2. Root causes are...
3. Developing the sequence of events is critical to...

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4 Implement Corrective Actions

Step 4: Implement Corrective Actions

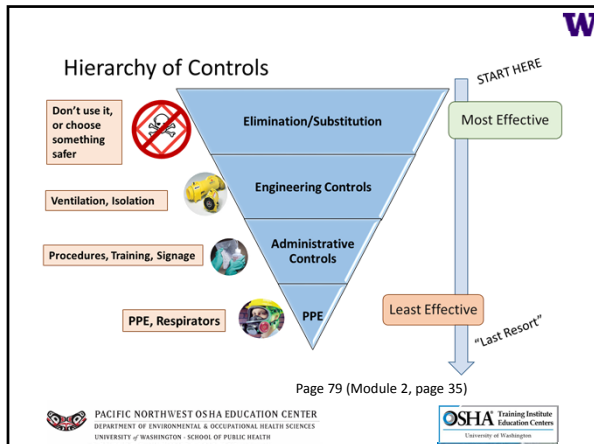
- Link corrective actions to the root causes identified
- Make sure the corrective action gets done

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4 Implement Corrective Actions

Elimination/Substitution

Eliminate the hazard or substitute it with something less harmful

- If using substitution, look for something less hazardous

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4 Implement Corrective Actions

Engineering Controls

Reduce hazards by applying the principles of:

- Removal
- Substitution
- Enclosure
- Barriers or local ventilation

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4 Implement Corrective Actions

Administrative Controls

Administrative controls change the way people work:

- Signs
- Training
- Job rotation
- Work practices
- Procedures (SOPs)
- Established safe work routines

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4 Implement Corrective Actions

Personal Protective Equipment (PPE)

PPE is specialized clothing or equipment used by employees to protect against hazards

- Face shields
- Steel toed shoes/boots
- Hard hats
- Gloves
- Harnesses
- Forearm guards
- Hearing protectors
- Respirators

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4 Implement Corrective Actions

Personal Protective Equipment (PPE)

If PPE is provided, employers must:

- Conduct hazard assessment
- Match PPE to the hazards
- Train employees
- Maintain PPE
- If respirators:
 - Fit tests and medical evaluations
- If hearing protection
 - Hearing conservation program

Head Protection 1910.135


- Type I: Top protection
- Type II: Top and Lateral Protection
- Electric
 - E > 2000 volts
 - G < 2000 volts
 - C-not for electrical work
- Bump Caps: Protect from protruding objects
- Must meet ANSI standards
 - Z89.1-1986 or later
 - Z89.1-1997 or later in Washington & Oregon

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Case Study




- **Incident:** Employee on 3rd shift went into the vacuum pump room and became very ill. He opened the doors to air out the room. The next morning two other employees were ill. One went to the doctor, who diagnosed carbon monoxide poisoning. Monitoring showed high carbon monoxide levels.
- **Observation:** The vacuum pump had over-heated and had no oil.

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Unsafe Conditions

- Carbon Monoxide
- Old equipment
- Overheating pump
- Enclosed room-no ventilation
- Equipment failed
- Oil level empty
- Burning oil






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Human Factors

- Technician on 2nd shift did not report malfunction of vacuum pump (overheating)
- PM records: Last oil change not completed (due to staff shortage)
- Supervisor had purchased a grade of oil not rated for vacuum pumps







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Corrective Action

- Rebuild vacuum pump
- Provide ventilation in room
- Purchase correct grade of oil
- Technicians to properly maintain vacuum pump-review PM procedures & compliance
- Increase communication between shifts



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W

Exercise

Exercise: Fill out an incident investigation report with corrective actions for the Mary Corbin incident.

Incident Investigation Report

XYZ MANUFACTURING CO.
Don't neglect safety & health until it's too late!

Name of Employee: _____ Job Title: _____


Department: _____ Date/Time of Incident: _____

Location of Incident: _____


Description of Injury(ies): (If no injury write "none" or "near miss")

Investigation Conducted by: _____

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4
Implement
Corrective
Actions

Safety Committee Review


Oregon and Washington require safety committees and that safety committees review incident reports

- Was the root cause properly identified?
- Will the corrective action actually fix the hazard?

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Case Study-Incident report

- Incident:** Employee was installing a belt. He had to hold two clips open and slip the belt in between. His finger slipped and was caught between the clips.
- Corrective Action:** Re-train employee on procedure.




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Case Study




Safety Committee Review: Why does this accident keep happening? Shouldn't we have a tool to hold the clips open so the employees can keep their fingers away from the clips?

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Results



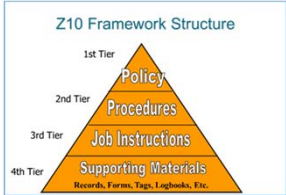
- Further investigation revealed there **was** a tool. It was being used to prop the door open. One of the more senior employees remembered using it to hold the clips open a long time ago.
- Employees started using this tool, and this accident stopped happening.

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4 Implement Corrective Actions Fix the System

- Policies, procedures, training, or lack thereof, may be the root cause
- Until these are fixed, incidents can recur



Z10 Framework Structure

- 1st Tier: Policy
- 2nd Tier: Procedures
- 3rd Tier: Job Instructions
- 4th Tier: Supporting Materials (Records, Forms, Tags, Logbooks, Etc.)

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4 Implement Corrective Actions Occupational Safety and Health Management Systems

Workplace incidents are an opportunity for improvement



ANSI Z-10 Elements

- 3.0 Management Leadership and Employee Participation
- 4.0 Planning
- 5.0 Implementation and Operation
- 6.0 Evaluation and Corrective Action
- 7.0 Management Review

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Exercise

Exercise/Discussion: Based on what you have learned through investigating the Kirby Center incident, what changes would you make to policies, procedures, and training programs that support the safety program?

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4 Implement Corrective Actions **Justify Recommendations**

```

    graph LR
      1[1. Pinpoint the problem] --> 2[2. Find out problem history]
      2 --> 3[3. Pinpoint the solution]
      3 --> 4[4. Who is the decision maker?]
      4 --> 5[5. What motivates the decision maker?]
      5 --> 6[6. Determine cost/benefits of solving the problem]
  
```

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4 Implement Corrective Actions **Begin with Total Cost**

- Recall guard rail example from Module 1
- Demonstrate Return on Investment (ROI) for this corrective action

Practice: Determine Total Cost

To calculate **Direct Cost** of the Most likely injury: **Fall to lower level**
Total value of the insurance claim for injury or illness **\$40,043**

To calculate **Indirect Cost**, multiply direct cost by a cost multiplier.
The cost multiplier that you use will depend on the size of the direct cost.

Direct Cost	Cost Multiplier
50 - \$2,999	4.5
\$3,000 - \$4,999	1.6
\$5,000 - \$9,999	1.2
\$10,000 or more	1.1

Direct Cost \$40,043 X 1.1 = \$44,047 Indirect Cost

TOTAL = \$84,090

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4 Implement Corrective Actions **Determine Total Cost**

- Preventable incident: A fall to a lower level
- Total Cost: Preventable incident total direct and indirect costs: \$84,090
- Investment: Cost to purchase and install guardrail: \$1,500
- Cost: \$82,590

$$\begin{array}{r}
 \$84,090 \\
 - \quad 1,500 \\
 \hline
 \$82,590
 \end{array}$$

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4 Implement Corrective Actions **Determine Return on Investment**

$$\begin{array}{r}
 \$84,090 \\
 - \quad 1,500 \\
 \hline
 \$82,590
 \end{array}$$

$$\begin{array}{r}
 \$82,590 \\
 \div \quad 1,500 \\
 \hline
 =55.06 \\
 =5506\%
 \end{array}$$

- Divide Cost by Total Investment
- Return on Investment (ROI) = 5506%

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4 Implement Corrective Actions **Prevention**

- Corrective actions should be feasible given the resources available.
- Recommendations must be clear, well defined, and specific.
- Provide completion date or estimated completion date

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4 Implement Corrective Actions **Track to Completion**

- Corrective actions don't prevent incidents if they are not implemented
- Corrective action tracking log

Sample Action Item Tracking Log:

Hazard:	Corrective Action	Responsible Person	Status (date)	Assigned Completion Date

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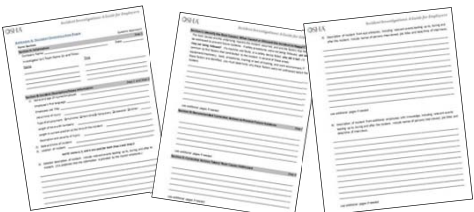
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Implement
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Review Reports

- Make final edits to your incident reports.
- Review with class.



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Implement
Corrective
Actions

Key Course Takeaways

- Incidents are preventable
- Incident investigations must focus on the root causes of the incident
- An effective incident investigation:
 - Uses a systems approach
 - Promotes a positive workforce
 - Encourages all parties to “own” conclusions and recommendations to facilitate implementation

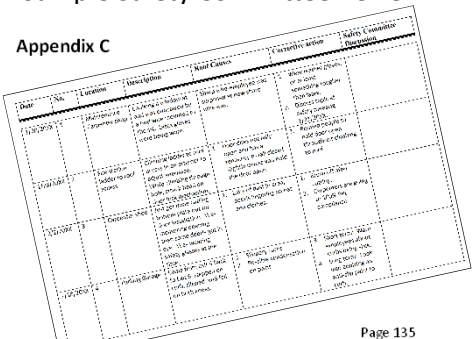
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Sample Safety Committee Review

Appendix C




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Knowledge Check/Test



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Questions?

What will you do when you get back to work?

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