

MODULE 3

WORKSITE ANALYSIS

At the end of this module, you will be able to...

- Identify the factors OSHA includes under *worksite analysis* in its voluntary Safety and Health Program Management guidelines.
- Define and identify the relationship between safety, hazards, and incidents.
- Identify methods that can be used to conduct a worksite analysis.
- Prepare a hazard inventory as part of worksite analysis.
- Describe hazards according to types/categories.
- Using a case study, review hazards found during a worksite analysis to determine what failure in the safety system permitted the hazard(s) to occur.

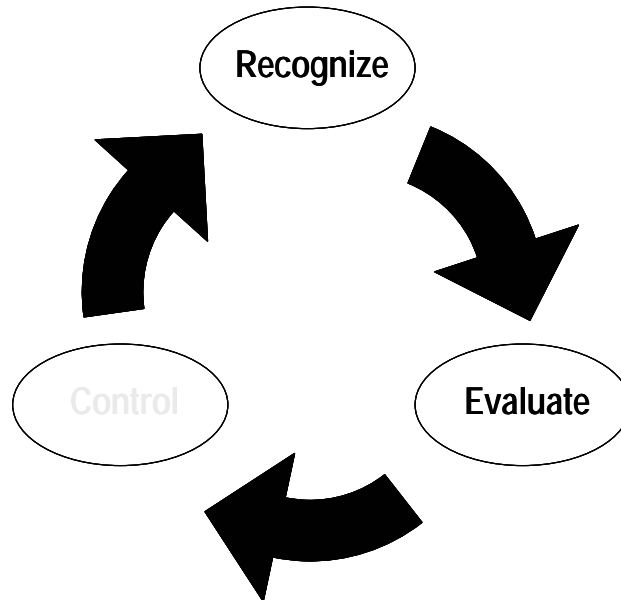


Introduction to Worksite Analysis

Definition of Worksite Analysis



The Safety Process



When you conduct a worksite analysis, you are performing both the *Recognize* and the *Evaluate* portion of the safety process.

OSHA's Guidelines for Worksite Analysis

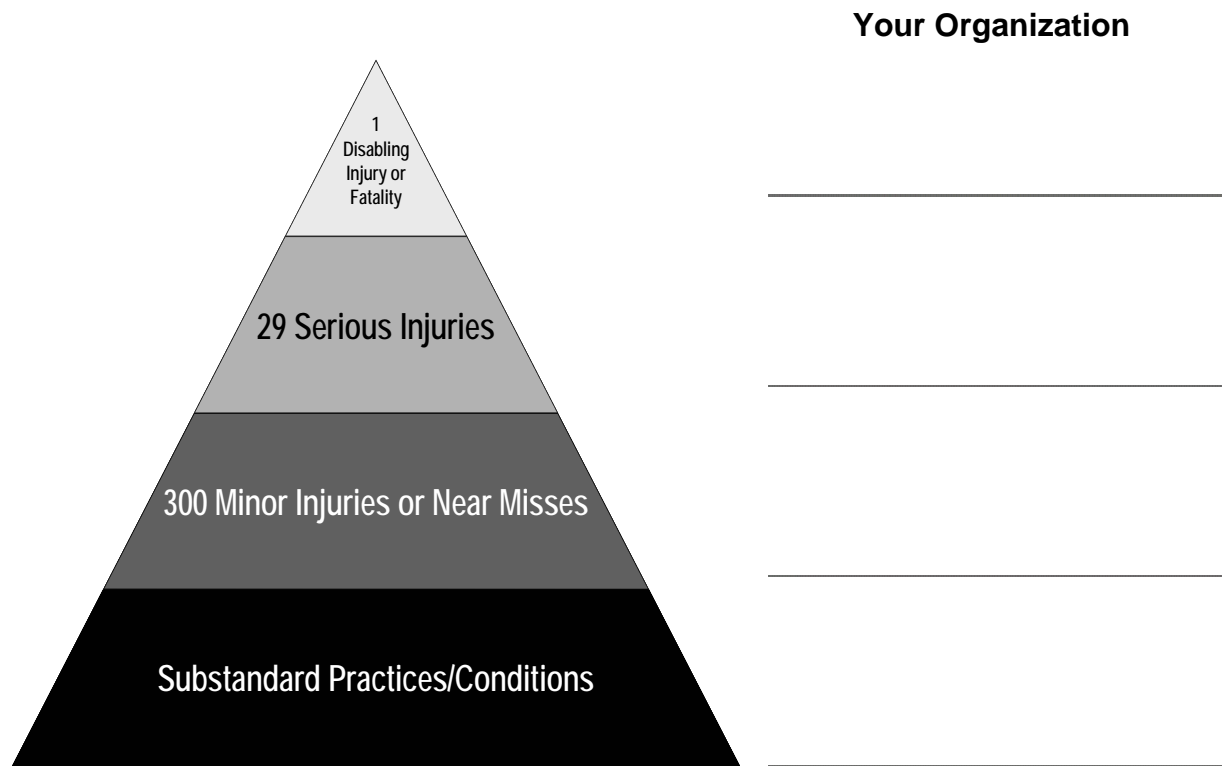
Directions: The OSHA guidelines outline a number of factors that indicate performance of worksite analysis. Assess your organization by checking the items you feel your organization does well.

- The organization has conducted a comprehensive baseline survey for safety and health.
- The organization conducts periodic update surveys for safety and health for comparison to the baseline survey.
- The organization performs a safety and health analysis prior to building new facilities.
- The organization performs a safety and health analysis prior to implementing new processes.
- The organization performs a safety and health analysis prior to using new materials.
- The organization performs a safety and health analysis prior to installing new equipment.
- The organization has a worksite analysis for every job, task, and phase of work.
- The organization conducts regular site inspections to identify new or previously missed hazards and failures in hazard controls.
- The organization has a reliable system to encourage employees to notify management personnel, without fear of reprisal, of conditions that appear hazardous.
- The organization has a reliable system for responding in a timely and appropriate manner to employee notification of safety and health concerns.
- The organization investigates accidents and “near misses” to determine their causes and to create prevention strategies.
- The organization analyzes injury and illness trends over extended periods to identify patterns and prevent problems.

Note: The above checklist can be helpful during your efforts to build a safety management system. It list can be found on your *Tools and Resources* CD.

Heinrich's Triangle

- H.W. Heinrich, an engineer, worked for an insurance company in the early 20th century.
- In 1931, he published a book titled *Industrial Accident Prevention*.
- In the book, Heinrich analyzed data from industrial accidents and provided guidelines for how they could be prevented.
- In an analysis of over 50,000 claims, Heinrich observed that accidents that caused serious injury or death often came after numerous similar accidents that, by pure chance, did not cause a serious injury.
- Heinrich observed that, for every one fatality or disabling injury, there were:
 - 29 serious injuries.
 - 300 minor injuries or near misses.
 - Multiple substandard practices or conditions.



Worksite Analysis Methods

We have discussed that a worksite analysis is performed by managers or employees or both to identify existing or potential hazards with the goal of controlling or eliminating them. There are many methods for conducting a worksite analysis.

Method:	Comprehensive Baseline Survey
What it is:	This is a survey that is conducted when an organization begins its safety and health management system.
Purpose:	It gets a complete baseline assessment of all the hazards and potential hazards in the organization. It serves as a basis for selecting goals for improving safety and health. It also provides a basis for comparison when the organization conducts future assessments.
What it assesses:	At a minimum: <ul style="list-style-type: none"> → All chemical and hazardous materials at the worksite → The hazard communication program → Air samples → Noise levels → The respirator program → Ergonomic risk factors
Roles:	

Method:	Job Hazard Analysis
What it is:	A step-by-step review of every job or task is conducted.
Purpose:	Each step of a job or process is analyzed for current or potential hazards.
What it assesses:	At a minimum, it answers these questions: <ul style="list-style-type: none"> → What hazards exist for this job? → Are chemicals or other hazardous materials being used on this job? → How are these materials being handled? → Is the job noisy? → Is the job being performed under extreme temperature conditions? → Are there potential ergonomic hazards?
Roles:	

Worksite Analysis Methods—continued

Method:	Change Analysis
What it is:	A step-by-step review whenever there are changes such as a new building, new equipment, a new process or new materials.
Purpose:	To ensure there are no new hazards as a result of the change.
What it assesses:	→ All elements of a job or process that has experienced change.
Roles:	

Method:	Safety and Health Inspection
What it is:	A routine inspection of a worksite conducted at regular intervals.
Purpose:	To identify hazards that may appear after the baseline assessment. Identified hazards should be corrected and tracked.
What it assesses:	<ul style="list-style-type: none"> → The facility—for example, lighting, the electrical system, ventilation, fire protection, and housekeeping. → Equipment and processes—for example, hand tools, electrical equipment, materials handling equipment, and welding. → Work practices—for example, using personal protective equipment, lockout/tagout, safe lifting techniques, procedures for handling and storing hazardous materials, and use of machine guards.
Roles:	

Method:	Incident Investigation
What it is:	An investigation conducted to determine how and why an occupational incident has occurred. The investigation examines the role of people, the environment, equipment and work practices.
Purpose:	To identify the root cause(s) of an incident or injury in order to prevent future incidents.
What it assesses:	<ul style="list-style-type: none"> → Why an incident occurred → How similar incidents can be prevented in the future
Roles:	

Other Analysis Methods

Method:	Employee Reports of Hazards
What it is:	A system in which employees report hazards they see on their jobs and make suggestions for controlling these hazards
Purpose:	<ul style="list-style-type: none"> → To ensure the people closest to the job—employees—understand their role in identifying and reporting hazards → To ensure employees are active in hazard prevention and control
Important elements of the reporting system:	<ul style="list-style-type: none"> → A policy that encourages employees to report safety and health concerns → Timely and appropriate responses to the reporting employee → Timely and appropriate action where a valid concern exists → Tracking of required hazard correction → Protection of reporting employees from any type of reprisal or harassment
Roles:	

Method:	Trend Analysis
What it is:	A systematic analysis of injury and illness trends over time
Purpose:	To determine hazard trends and patterns so that common causes can be identified and corrected.
What it analyzes:	<p>At least three to five years of any of the following records:</p> <ul style="list-style-type: none"> → Hazards found in routine safety inspections → OSHA injury and illness forms → Incident investigation reports
Roles:	



The Hazard Inventory

A hazard inventory is used to conduct a number of worksite analyses, including the comprehensive baseline survey and the job hazard analysis. The inventory is a thorough list that prompts the evaluator to look at all aspects of a job and working environment.

Purposes for the Hazard Inventory

- To identify safety and health hazards
- To use as a basis for setting safety and health priorities
- To use as a basis for employee discussions and problem-solving sessions
- To uncover previously hidden or unknown hazards
- To determine where the biggest dangers are in the organization

Items Included in the Hazard Inventory

- Potential chemical hazards
- Potential biological hazards
- Potential physical hazards
- Potential ergonomic hazards

Resources for Small Businesses

- OSHA conducts a comprehensive hazard inventory for small businesses at no cost.
- Many insurance providers offer their services in evaluating safety and health hazards.
- An organization can download a hazard inventory form from the Internet, customize it, and conduct its own hazard inventory.

Samples from a Hazard Inventory

Chemical Hazards

Following is a sample hazard inventory form for chemicals. Use it to evaluate all the chemicals used at your worksite. If there is a danger of exposure, further analysis is required to determine exposure limits.

Chemical Name	Danger of Exposure From:				
	Inhalation	Skin Contact	Absorption	Injection	Ingestion
Acetone					
Acetylene					
Acrylamide					
Antimony					
Artist Chemicals					
Alkanes					
Adriamycin					
Aflatoxins					
Amitrole					
Chloroform					
Cupferron					
Cycasin					
Acetylaminofluorene (-2)					
Lead (inorganic)					
Methylenedianiline					

Note: The above checklist is only a partial listing of chemicals. You can find a more complete list of chemicals on the Ames Laboratory Hazard Inventory, which is on your *Tools and Resources* CD. In addition, a blank version of this form is also on the CD. Feel free to print it and use it to perform a hazard inventory of the chemicals at your worksite.

Samples from a Hazard Inventory—continued

Physical Hazards

Employee: _____ Job: _____

WORK AREA	Never	Occasional	Frequent	Remarks/Comments
Indoors				
Outdoors				
Laboratory				
Desk Work				
Shop				
Vehicle				
EXPOSURE TO:	Never	Occasional	Frequent	Remarks/Comments
Electrical operations				
Fires/explosions				
Noise				
Ionizing radiation				
Non ionizing radiation				
Hot environments				
Cold environments				
Confined spaces				
DANGER OF:	Never	Occasional	Frequent	Remarks/Comments
Getting caught on or between				
Pinch points				
Slips or falls				
Getting struck by				
Getting struck against				
Puncture wounds				

Note: This physical hazard inventory form is available on your *Tools and Resources* CD.

Samples from a Hazard Inventory—continued

Biological Hazards

Employee: _____ Job: _____

WORK ENVIRONMENT	Never	Occasional	Frequent	Remarks/Comments
Clinic				
Hospital				
Laboratory				
Research facility				
Hazmat responder				
Agricultural environment				
Water and wastewater				
EXPOSURE TO:	Never	Occasional	Frequent	Remarks/Comments
Bloodborne pathogens				
Brucella				
Streptococcal and staphylococcal bacteria				
Tuberculosis				
Influenza viruses				
Building related				
Mold				
Legionnaires' Disease				
Rabies				
Giardia				
Listeria				
Shigella				
West Nile virus				
Plant and insect				

Note: This biological hazard inventory form is available on your *Tools and Resources* CD.

Samples from a Hazard Inventory—continued

Ergonomic Assessment

Employee: _____ Job: _____

WORK AREA	Never	Occasional	Frequent	Remarks/Comments
Indoors				
Outdoors				
Laboratory				
Desk Work				
Shop				
Vehicle				
ACTIVITIES	Never	Occasional	Frequent	Remarks/Comments
Prolonged walking/standing				
Frequent kneeling/squatting				
Bending/stooping				
Ladders/heights				
Forceful pushing/pulling				
LIFTING/CARRYING	Never	Occasional	Frequent	Remarks/Comments
Less than 20 pounds				
20 to 40 pounds				
More than 40 pounds				
PHYSICAL MOBILITY	Never	Occasional	Frequent	Remarks/Comments
Strenuous exertion				
Full use of both legs				
Full use of both arms/hands				
VISION	Never	Occasional	Frequent	Remarks/Comments
Viewing a computer screen				
Reading fine print				
Working in bright sunlight				

Note: This ergonomic hazard inventory form is available on your *Tools and Resources* CD.

Case Study Preparation: How a Palletizer Works

Directions: Shortly, you will be working on a case study that involves an incident with an automatic palletizer. To help in your analysis of the case study, here is an overview of how the palletizer in this facility works.

- The facility manufactures and processes ice cream products.
- The palletizer involved in the incident is computer controlled and equipped with multiple emergency stops located around the machine.
- Once the products are packaged, they travel via a conveyor to the palletizer.
- When they reach the palletizer, they are ejected off the conveyor and onto a slide plate located on the top section of the palletizer.
- Once the slide plate has a complete layer of containers, a hoist raises a pallet to the bottom of the slide plate. (See Figure 1)
- The slide plate then retracts, causing the layer of containers to drop onto the pallet below.
- Then the slide plate returns to the start position and the pallet's height is adjusted to prepare for the next layer of containers.
- Electronic eyes located under the slide plate determine the height at which the palletizer's hoist should stop to accept the next layer of product onto the pallet.
- This stacking process continues until 14 layers are placed on a pallet (See Figure 2).
- The complete pallet is lowered and ejected out of the palletizer through a sensing device—a light curtain (see Figure 1)—onto a second conveyer.
- The pallet is transported by this conveyor to a plastic wrap machine where the pallet and ice cream containers are wrapped.
- The cycle starts over when an empty pallet moves into the hoist area via a third conveyor.

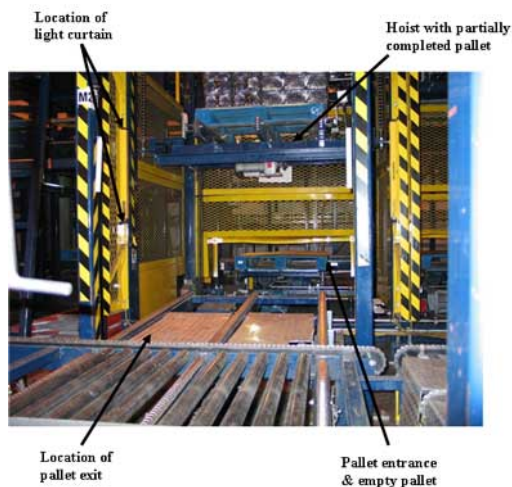


Figure 1

Palletizer with a partially complete pallet raised inside the hoist area

Case Study Preparation: Hoist Information

Following is additional information about the hoist that you might find useful in your analysis.

- The hoist has four sides and three are guarded by a fixed cage.
- The fourth side, the location where completed pallets exit the machine, is guarded by a light curtain (see Figure 1).
- The hoist has two sets of electronic eyes that help to position the empty pallets.
- The electronic eyes are located at the pallet entrance and exit.
- When a pallet enters the hoist area, it is first detected by the electronic eye located at the pallet exit, which reverses the conveyor's motion moving the pallet backward to the electronic eye located at the pallet entrance.
- When the electronic eye located at the entrance detects the pallet, this signals the hoist to rise up to the slide plate and the machine begins loading product onto the pallet.
- This also turns on the light curtain located at the machine's exit.
- The light curtain will stay activated throughout loading.
- Once a pallet is loaded, the light curtain deactivates until another pallet is properly positioned.
- Broken or crooked pallets sometimes are not detected by the electronic eyes, thereby stopping the palletizing process, which means the hoist fails to rise and the light curtain remains deactivated.



Figure 2

Palletizer with a complete pallet getting ready to exit the hoist area

Activity: Case Study

Directions: Now you will have the opportunity to perform a worksite analysis by analyzing a case study. Read the following summary of an incident that actually happened. As you read, write the hazards you detect in the right column. After you read the summary, complete the worksheet on Page 17.

Case Summary

Hazards

A 45-year-old male was fatally injured when he was crushed in a palletizer hoist. The employer, a manufacturer of ice cream and frozen products, had been in business over 80 years at the time of the incident. The victim had been employed by the company for eight years. He started as a laborer and a few years later became a chessman. Initially, his primary task was to manually place containers of ice cream onto pallets. When the company switched to an automated palletizer, the employee's main task became operating the palletizer.

The company had designated individuals in charge of employee safety and health and had a written safety and health program that included lockout/tagout procedures. The company provided safety training and documented this training. The written safety and health program was developed at the corporate level and tailored for each local facility.

One of the main tasks of the palletizer operator (the victim), is to monitor the pallets as they are fed into the hoist area. The operator manually adjusts a pallet's position only if the palletizer stops due to an incorrectly positioned pallet. The operator enters the hoist area through the deactivated light curtain at the pallet exit to complete this task.

On the day of the incident, the victim had worked his normal shift (3:00 - 11:30 p.m.) and volunteered to work four hours of overtime. In addition to his normal task of operating the palletizer, the victim was training an employee on the palletizing machine. The company had four automatic palletizing stations that typically were operated by five employees during a shift. At any given time there were two operators, each in charge of two palletizing stations, two employees by the plastic wrap machine and one employee on break. All five employees rotated tasks throughout the shift.

Activity: Case Study—continued

Case Summary—continued

Hazards

At the time of the incident, an empty pallet had entered into the hoist area but was not detected by the machine. Although the incident was unwitnessed, it appears the victim entered the hoist area through the deactivated light curtain at the pallet's exit and started to adjust the pallet's position. The pallet was then detected by the sensor and the hoist began to rise with the victim caught on top of the empty pallet.

Co-workers heard the employee yelling for someone to shut off the machine. The hoist continued rising to its preset position to load the product. This preset position brings the empty pallet to within a few inches of the slide plate. As the hoist rose, the victim was crushed between the pallet and the slide plate.

A co-worker engaged an emergency button, stopping the machine. Then this co-worker unsuccessfully attempted to lower the hoist using the control panel. Another co-worker was able to manually lower the hoist. Once the hoist started to lower, the victim fell off the raised pallet to the ground below.

At the time of the investigation, the plant manager stated that the palletizer involved was evaluated after the incident and found to be in the automatic mode and not locked out at the time of the incident. In addition, the company reported that they planned to have a second light curtain installed on the palletizer. They had also developed a pole type tool to assist in straightening askew pallets.

Activity: Case Study—continued

Directions: In your group, analyze the case on the previous pages, then answer the following questions.

1. What hazards/substandard conditions were caused by people?

Management:

Employees:

2. What hazards/substandard conditions were caused by equipment?

3. What hazards/substandard conditions were caused by work practices?

4. What hazards/substandard conditions were inherent in the environment?

