CHAPTER 1
INDUSTRIAL SAFETY PROCEDURES

BASIC COMPETENCIES

Students are able to understand, analyze, and communicate industrial safety procedures in English orally and in writing using appropriate technical terminology.

LEARNING OBJECTIVES

After studying this chapter, students are expected to:

1. Understand various industrial safety terms in English
2. Read and understand the procedure text on occupational safety
3. Write safety checklists and safety reports
4. Presenting safety briefings and safety training
5. Applying knowledge of safety procedures in a real-world industry context

PHASE 1: PRE-ACTIVITY

Early Knowledge Activation

Opening Discussion:

Task 1: Before starting the lesson, answer the following questions:

1. What do you know about occupational safety in the industry?
2. Why are safety procedures important in an industrial environment?
3. Have you ever seen or read the safety manual? What is it?

Task 2: Learning Objectives Setting:

Write down 3 things you want to learn from the topic of Industrial Safety Procedures:

1. _____
2. _____
3. _____

PHASE 2: INPUT & EXPLORATION

PROCEDURE TEXT 1: LOCKOUT/TAGOUT (LOTO) PROCEDURE

TASK 3: Read the following procedure text carefully and answer the questions that follow.

LOCKOUT/TAGOUT PROCEDURE FOR EQUIPMENT MAINTENANCE

Goal: To safely isolate equipment from all energy sources before performing maintenance or servicing work, preventing unexpected startup or release of stored energy that could cause injury.

Materials Needed:

- Lockout devices (padlocks, hasps)
- Tagout devices (warning tags)
- Energy isolation verification equipment
- Personal protective equipment (PPE)

Steps:

Step 1: Preparation

Notify all affected employees that the equipment will be shut down and locked out. Identify all energy sources (electrical, mechanical, hydraulic, pneumatic, chemical, thermal) associated with the equipment.

Step 2: Equipment Shutdown

Shut down the equipment using normal stopping procedures. Operate the switch, valve, or other energy-isolating device so that the equipment is isolated from its energy source.

Step 3: Apply Lockout/Tagout Devices

Attach the lockout device to each energy-isolating device. Each authorized employee must apply their own personal lock. Attach a tagout device clearly indicating that the equipment must not be operated.

Step 4: Release Stored Energy

Dissipate or restrain any stored or residual energy. This includes bleeding hydraulic lines, releasing spring tension, blocking elevated parts, and grounding electrical capacitors.

Step 5: Verify Isolation

Verify that the equipment has been properly isolated by attempting to start it using normal operating controls. Ensure all controls are returned to the "off" position after verification.

Step 6: Perform Maintenance

The equipment is now safely locked out. Authorized personnel may proceed with the required maintenance or servicing work.

Step 7: Restore Equipment to Service

After maintenance is complete: (a) Remove all tools and materials from the equipment area; (b) Ensure all employees are safely positioned away from the equipment; (c) Verify that operating controls are in the neutral position; (d) Remove lockout/tagout devices; (e) Reenergize the equipment and notify affected employees.

⚠ **WARNING:** Only authorized personnel who have received proper LOTO training may perform lockout/tagout procedures. Each employee must use their own personal lock—never share locks or remove another person's lock.

Source: *Adapted from Occupational Safety and Health Administration (OSHA). (2024). Control of hazardous energy (lockout/tagout) (Standard No. 1910.147). U.S. Department of Labor. https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.147*

Questions.

1. What is the main goal of the lockout/tagout procedure?
2. List four materials needed for the LOTO procedure.
3. What types of energy sources must be identified during preparation?
4. What must be done before removing lockout devices in Step 7?
5. Why is it important for each authorized employee to apply their own personal lock?
6. What could happen if stored energy is not properly released in Step 4?
7. Why must operating controls be returned to the "off" position after verification?
8. In your opinion, which step is the most critical in the LOTO procedure? Explain your reasoning.
9. How would you modify this procedure for a team of workers performing maintenance together?
10. Discuss the potential consequences of skipping any step in this procedure.

PROCEDURE TEXT 2: EMERGENCY EVACUATION PROCEDURE

TASK 4: Read the following procedure text carefully and answer the questions that follow.

EMERGENCY EVACUATION PROCEDURE FOR INDUSTRIAL FACILITIES

Goal: To ensure safe and orderly evacuation of all personnel from an industrial facility during emergencies such as fires, chemical spills, or equipment failures.

Required Equipment:

- Emergency alarm system
- Exit route maps and signage
- Emergency lighting
- Employee roster for accountability
- First aid kits and fire extinguishers

Steps:

Step 1: Recognize the Emergency

When you detect an emergency (fire, chemical leak, explosion, or other hazard), immediately alert others in your immediate area. Activate the nearest fire alarm pull station if appropriate.

Step 2: Alert Personnel

Use the designated alarm system to notify all employees. The alarm signal must be distinct and recognizable. Evacuation wardens should begin directing personnel toward designated exit routes.

Step 3: Shut Down Critical Operations (If Safe)

If time permits and it is safe to do so, designated employees should shut down critical equipment, close windows, and turn off gas supplies. Do not delay evacuation to perform these actions if danger is imminent.

Step 4: Evacuate Using Designated Routes

Walk calmly but quickly to the nearest marked exit. Follow the established evacuation routes shown on posted floor diagrams. Do not use elevators. Assist visitors and employees with disabilities if needed.

Step 5: Assemble at Designated Area

Proceed to the designated assembly point located at a safe distance from the building. Stay at the assembly area until an "all clear" signal is given by emergency coordinators or emergency services.

Step 6: Account for All Personnel

Evacuation wardens or supervisors must conduct a head count using employee rosters. Report any missing personnel and their last known location to emergency responders immediately.

Step 7: Do Not Re-enter

Never re-enter the building until emergency responders have declared the area safe. Wait for official authorization from the designated emergency coordinator before returning to work areas.

⚠ **WARNING:** Exit routes must be kept clear and unobstructed at all times. Never prop open fire doors or block emergency exits with equipment or materials.

Questions.

1. What is the goal of the emergency evacuation procedure?
2. What must employees do at the designated assembly area?
3. Why should elevators not be used during evacuation?
4. What information should be reported about missing personnel?
5. Why is it important to have a distinct and recognizable alarm signal?
6. What is the role of evacuation wardens during an emergency?
7. Why should employees walk "calmly but quickly" rather than run?
8. How would this procedure need to be modified for a multi-story building?
9. Discuss the importance of regular evacuation drills in maintaining emergency preparedness.
10. What challenges might arise when evacuating visitors who are unfamiliar with the facility?

VOCABULARY BUILDING

A. Technical Terms in Safety Procedures

TASK 5: Study the following key vocabulary ITEMS from the procedure texts:

Read the text again and find the meaning of the following terms

No	Term	Indonesian Meaning	Example in Context
1	Lockout/Tagout (LOTO)	Penguncian/Penandaan	LOTO procedures prevent accidental equipment startup.
2	Energy isolation	Isolasi energi	Verify energy isolation before beginning work.
3	Stored energy	Energi tersimpan	Release all stored energy before maintenance.
4	Evacuation route	Jalur evakuasi	Follow the designated evacuation route to the exit.
5	Assembly point	Titik kumpul	Proceed to the assembly point for head count.
6	Authorized personnel	Personel berwenang	Only authorized personnel may operate this equipment.
7	Hazardous energy	Energi berbahaya	Control hazardous energy to prevent injuries.
8	Emergency responders	Tim tanggap darurat	Wait for emergency responders to declare the area safe.
9	Head count	Penghitungan jumlah orang	Conduct a head count after evacuation.
10	Reenergize	Mengaktifkan kembali	Reenergize the equipment after maintenance is complete.

B. Action Verbs in Safety Procedures

Verb	Meaning	Usage in Safety Context
Isolate	Memisahkan/mengisolasi	Isolate the equipment from all energy sources.
Verify	Memverifikasi/memastikan	Verify that all personnel have evacuated safely.
Dissipate	Melepaskan/menghilangkan	Dissipate stored energy before beginning work.

Verb	Meaning	Usage in Safety Context
Notify	Memberitahukan	Notify all affected employees before shutdown.
Proceed	Melanjutkan/bergerak	Proceed to the nearest emergency exit.
Restrain	Menahan/membatasi	Restrain any residual energy in the system.

C. Safety Signs and Their Meanings

Sign Type	Meaning	Example Usage
DANGER	Immediate hazard - serious injury or death	DANGER: High Voltage - Keep Out
WARNING	Potential hazard - could result in injury	WARNING: Wear Eye Protection
CAUTION	Minor hazard - could result in minor injury	CAUTION: Wet Floor
NOTICE	Information not related to injury	NOTICE: Authorized Personnel Only
SAFETY	General safety instructions or equipment	SAFETY: First Aid Kit Located Here

GRAMMAR FOCUS: MODAL VERBS FOR OBLIGATION AND PROHIBITION

In procedure texts and safety documentation, modal verbs are essential for expressing obligation (what **must** be done) and prohibition (what **must not** be done). Understanding these modals helps you read and write clear safety instructions.

(Reference: Swan, M., 2016, Practical English usage, 4th ed., Oxford University Press)

A. Modal Verbs for Obligation

Modal	Meaning/Strength	Example
must	Strong obligation (mandatory)	All workers must wear safety helmets.
have to	External obligation (rules/regulations)	Employees have to attend safety training.
need to	Necessary action	Technicians need to follow LOTO procedures.
should	Advice/recommendation	Workers should report hazards immediately.

B. Modal Verbs for Prohibition

Modal	Meaning/Strength	Example
must not	Strong prohibition (forbidden)	Workers must not remove safety guards.
cannot/can't	Not allowed/not possible	Employees cannot enter without PPE.
may not	Not permitted (formal)	Visitors may not operate equipment.
should not	Advised against	You should not ignore warning signs.

GRAMMAR EXERCISES

Exercise 1: Fill in the blanks with appropriate modal verbs (must, have to, should, must not, cannot, may not)

1. All personnel _____ wear protective eyewear in the production area.
2. Visitors _____ enter the facility without an escort.
3. Employees _____ report any unsafe conditions to their supervisor.
4. Equipment _____ be locked out before maintenance begins.
5. Chemicals _____ be stored without proper labeling.
6. New employees _____ complete safety orientation before starting work.
7. Machine guards _____ be removed while the machine is operating.
8. Workers _____ proceed to the assembly point during evacuation.

Exercise 2: Rewrite these sentences using modal verbs

1. It is mandatory to wear hard hats on the construction site.
   → _____
2. Operating heavy machinery without certification is prohibited.
   → _____
3. It is recommended that workers take regular breaks.
   → _____
4. Entry to the hazardous area without PPE is not allowed.
   → _____

PHASE 3: PRACTICE & APPLICATION

TASK 6: VOCABULARY IN CONTEXT

Complete the sentences with appropriate vocabulary from the vocabulary building section:

1. All workers must proceed to the designated _____ for head count after the alarm sounds.
2. Before maintenance work begins, technicians must complete the _____ procedure to prevent accidental startup.
3. The _____ checked all offices and restrooms before being the last person to evacuate.
4. Only _____ may operate this machinery.
5. The company conducted a thorough _____ to identify workplace hazards.
6. All _____ must be released before beginning maintenance work.
7. _____ will arrive within minutes to handle the emergency situation.
8. After completing repairs, the technician will _____ the equipment.

TASK 7: COLLABORATIVE DISCUSSION

Group Discussion (3-4 people):

1. Identify 5 potential hazards that may exist in your Industrial Engineering laboratory.
2. For each hazard, determine:
   a. Risk level (high/medium/low)
   b. Possible consequences
   c. Control measures that can be implemented
3. Present your group's findings to the class.

PHASE 4: PRODUCTION

TASK 8: WRITING A PROCEDURE TEXT

Instructions:

Write your own procedure text (150-200 words) for one of the following safety procedures. Include: Goal, Materials Needed, and Steps (minimum 5 steps). Use appropriate modal verbs for obligation and prohibition.

Choose one topic:

- Fire extinguisher operation procedure
- Chemical spill cleanup procedure
- Personal protective equipment (PPE) donning procedure
- First aid for minor cuts and wounds procedure

TASK 9: CREATING A SAFETY CHECKLIST

Create a Daily Safety Checklist for one of the following areas (minimum 15 items):

- Manufacturing Floor
- Warehouse
- Laboratory
- Construction Site

TASK 10: ROLE-PLAY SIMULATION

Scenario: Safety Briefing for New Employees

Roles:

- Safety Officer: Conduct safety orientation
- New Employees (2-3 people): Ask questions about safety procedures
- Supervisor: Add specific department safety requirements

Guidelines:

1. Safety Officer presents: general safety rules, emergency procedures, PPE requirements, and incident reporting procedures
2. New employees ask relevant questions using appropriate language
3. Supervisor adds department-specific information
4. Simulate an emergency alarm and evacuation procedure

Duration: 10-15 minutes

Evaluation: Peer assessment using communication rubric

PHASE 5: AUTOMATIZATION, FLUENCY & ENRICHMENT

TASK 11: WRITING A SAFETY INCIDENT REPORT

Scenario:

You are a safety inspector. Yesterday, a minor accident occurred in the workshop. Write an incident report (minimum 250 words) based on the following information:

Incident Details:

- Date: .....
- Time: .....
- Location: Machine Shop, Station 5
- Injured Person: Operator, 3 years experience
- Injury: Minor cut on left hand
- Cause: Contact with sharp edge while removing metal chips
- Worker was wearing gloves, but they were torn
- Machine was running during chip removal

TASK 12: CASE STUDY ANALYSIS

Read and Analyze:

A manufacturing company experienced three similar accidents within six months. In each case, workers injured their hands while operating stamping machines. Investigation revealed: (1) All workers had received basic safety training; (2) Machines had proper guards installed; (3) Workers often removed guards to speed up production; (4) Supervisors were aware but focused on meeting quotas; (5) No disciplinary action was taken for safety violations.

Analysis Questions:

1. What are the root causes of these repeated accidents?
2. What systemic problems exist in this company's safety culture?
3. Design a comprehensive improvement plan addressing: technical controls, administrative procedures, and cultural changes.
4. How would you measure the effectiveness of your improvement plan?

Write a comprehensive analysis (300-400 words)

STEP 6: REFLECTION & TRANSFER

LEARNING REFLECTION

1. What I Learned:

- 3 most important concepts: _____
- New vocabulary mastered: _____
- Skills developed: _____

2. How I Can Apply This:

- In my future workplace: _____
- In my current studies: _____
- In my personal life: _____

3. Questions I Still Have:

_____

_____

4. Self-Assessment (Rate 1-5):

- Understanding safety terminology: _____
- Reading procedure texts: _____
- Writing safety reports: _____
- Presenting safety information: _____

TRANSFER TO REAL CONTEXT

Action Plan:

This Week:

- Observe safety practices on campus/in lab
- Identify one potential hazard
- Suggest improvement

This Month:

- Research safety standards in Indonesian industries
- Visit a local factory (if possible) to observe safety practices
- Create a safety improvement proposal

Long-term Goal:

- How will you promote safety culture as a future industrial engineer?
- What additional safety certifications will you pursue?