Recognition of Accident Potential in Work Environment due to Physical and Environmental Factors

Division of Training and Manpower Development

STUDENT WORKBOOK

Prepared by

AMERICAN SOCIETY OF SAFETY ENGINEERS
PARK RIDGE, ILLINOIS

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
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National Institute for Occupational Safety and Health

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The contents of this workbook and the course are based on concepts developed by the American Society of Safety Engineers. The format and clues are developed in the interest of the safety movement.

NIOSH PROJECT OFFICER - Alphonse F. Schaplowsky

STUDENT WORKBOOK

TABLE OF CONTENTS

PREFACE V

ACKNOWLEDGEMENTS VI

WORD TO STUDENTS VII

ORIENTATION 1-A

REFERENCE LIST 1-H

BASIC CONCEPTS 2-A

SECTION I SITE AND STRUCTURES 4-A

SECTION II OPERATING MACHINERY AND EQUIPMENT . 7-A

SECTION III MATERIALS 10-A

SECTION IV ENERGY 13-A

COMPLETE LIST OF CLUES 15-B

PREFACE

The instructors text, student workbook and slides prepared for this course represent the culmination of several years work by the American Society of Safety Engineers. The last portion of the work has been supported by NIOSH Contract CDC-99-74-66.

This course represents a unique approach to presentation of basic concepts in accident, illness and injury prevention and can be considered as the first step in a sequence of courses presenting the accident prevention techniques. The course has been prepared with a pragmatic rather than research oriented approach to permit understanding by a wide range of students.

It is acknowledged that experienced Safety Professionals perform 'hazard recognition' routinely while carrying out their day to day responsibilities. Such 'hazard recognition' is the result of empirical knowledge based on education and experience over a number of years. When attempting to relate this experience and base knowledge to individuals with minimal (less than one year) experience in the safety field, there is a tendency to identify particular processes, pieces of equipment, acts, materials, etc. which produce hazards, rather than to identify groupings or categories which would permit future recognition of new hazards. Actually in 'hazard recognition' there are two steps which experienced persons perform routinely, first recognition of accident potential and second, evaluation of the potential to determine if an actual hazard is or is not present. If 'accident potential' is recognized early enough, the mitigation or elimination of a hazard may be possible before injury or loss results.

Thus, the course concept is based on the premise that 'recognition' is a condition of 'seeing again', and presenting the student in the controlled classroom atmosphere a first sighting. The objective is to compress the amount of time it takes a newcomer to the field of safety to accumulate a broad range of baseline knowledge and skill and to begin making a meaningful contribution.

ACKNOWLEDGEMENTS

The resources and stimulation of the officers of the American Society of Safety Engineers in starting the original project entitled SEARCH I in 1968, and in seeing it through its various stages must be recognized. The participation, in Phase 1, of Michael Krikorian, LeRoy Faulkner, Herbert Kolodner, Gordon Lemke, Ernest Levens, Jesse Locke, Robert L. Moore, James Van Namee, Robert Wendell, William S. Wood, and Wayne C. Christensen is appreciated and created the basic concepts for the start of the training course development.

Phase 2 which started in 1970 has had numerous participants including Robert Andrews, William J. Larson, Fred Manuele, Ronald Nygren, William Steins, Wayne C. Christensen and Al Baltzer, all of whom provided valuable input and assistance.

In the final development under CDC-99-74-66, the unique and creative talents of Jack Gausch must be recognized for drafting the instructors text and developing the slides. William S. Wood prepared the Student Workbook, discussion questions, quizes, and lesson plans, George Harper who served as the educational consultant and Wayne C. Christensen who served as Project Director, staff resource, and participant must also be acknowledged for their valuable input and assistance.

The assistance of the Advisory Committee of Michael Krikorian, Willian Larson, Jesse Locke and Fred Manuele, in the final phase, is also sincerely appreciated.

Finally, the willingness to listen, recognize and support the completion of this project by NIOSH personnel is acknowledged.

WORD TO STUDENTS

The prime objective of this course is to present information on Accident Potential Recognition to students who are new to the field of safety (one year or less with full-time or major focus on safety). It has been designed to present a 'more or less' universally adaptable course designed to teach representatives from all occupations to recognize the majority of accident potential which may exist in their plant or establishment. Students from uniquely hazardous operations will not necessarily be prepared by this course to recognize the 'special' accident potential present in their jobs.

Individuals with more experience or knowledge in the field of safety may also find these basic concepts useful, providing they keep in mind that discussion of hazards and how to control them are not part of the objectives of the course.

Grasping the concepts in this course will not provide you with a cure-all or make you an expert, but they should provide you with useful philosophies and principles.

This workbook has key information on the left hand page to provide the full right hand page for note taking.

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 1 Length - 50 Minutes

LESSON TITLE - - Orientation

PURPOSES - -

Introduce trainees to the course.
Introduce instructors and trainees to each other.

OBJECTIVES - -

Enable instructors and trainees to:

1. Get acquainted and determine interests
2. Discuss class schedule and the facilities
3. Outline course content and materials.

SCOPE - -

1. Introduction of instructors.
2. Trainee self-introductions.
3. Introduction of course (word to students).
4. Discussion of class schedule.
5. Discussion of facilities.
6. Other necessary details.

REFERENCES - - None

LESSON 1

ACCIDENT POTENTIAL RECOGNITION

ORIENTATION

A Safety Professional performs many tasks as part of a defined responsibility to an employer. Although each type of organization has unique requirements regarding responsibility, one sees common items in the job descriptions of a safety specialist:

- Develops effective safety programs for the company.
- Measures performance and reports progress to superiors.
- Acts as liasion with governmental representatives and insurance companies.
- Develops policy, guidelines and standards for safety.
- Consults with management and workers on maintaining a safe and healthy workplace.
- Conducts periodic audits or inspections of facilities.

There are many others. The one we are most interested in and the core of this course is the audit or inspection of a facility or of special equipment and operations. Most of the time spent in safety and the activity that is best known by the worker is the inspection.

Audits or inspections are not conducted just by safety specialists. In many organizations, managers, supervisors, and union representatives participate in the activity. Over the years, professional safety people have become increasingly concerned about the effectiveness and conduct of audits or inspections.

- What do these people find?
- How many important things do they miss?
- Do inspections help to reduce losses?
- How can they be made more effective?

This leads us to a complete question to which this course addresses itself: How can audits or inspections be made more effective?

Some people seem very skilled at performing the inspection task. Why are they so good at it?

- They usually have many years of experience and have learned to recognize clues that lead to the recognition of accident potential.
- Often their experience will be broad and includes background in more than one safety speciality, such as, personnel safety, industrial hygiene, fire protection, product safety, occupational medicine and even environmental protection.
- They are also thorough. They include in their notes almost everything that looks suspicious

and make further decisions about it or conduct more research later.

- Those who are good at making audits or inspections continuously educate themselves or participate in training and orientation programs.

Recognizing Accident Potential

The task of recognizing accident potential is a product of learned skills in observation and practical experience.

- Beginners reviewing any facility or operation often pass by clues because they have never experienced them before.
- They also miss important potential for accidents because of a lack of skill or understanding of a basic concept of recognition.

Even experienced people can improve in the manner in which they conduct an audit or inspection.

- They tend to become specialized and will walk right by a clue that would be obvious to someone else.
- After years of work in the safety field, complacency tends to develop. Some don't seek and develop new concepts or participate in educational programs.

Purpose of this Program

This course addresses itself to these problems. The course improves an individual's capability of recognizing situations which appear to represent accident potential. After taking the course, a beginner, or even the experienced person, will have a broader and more comprehensive outlook when conducting safety audits.

Upon completion of the 20 hours of exposure to the activities and information presented in this course a participant should be able to:

- Identify and describe the principles and concepts of Accident Potential Recognition.
- Find within one hour, 80% of accident potential situations depicted in problems.
- List within 15 minutes, 90% of the accident potential clues related to a specific piece of equipment.
- Prepare a report showing recognition of accident potential as a step in the recognition and correction cycle.

Background

The American Society of Safety Engineers began an intense and specialized project in the late sixties entitled SEARCH 1. The purpose of this project was to conduct a comprehensive examination of the first item of a new definition of the Scope and Functions of the Professional Safety Position.

The first item is described as, The development of methods of identifying hazards and evaluating the loss producing potential of a given system, operation, or process by:

- Advanced detailed studies of hazards of planned or proposed facilities, operations, and products.

- Hazard analysis of existing facilities, operations, and products.

It was apparent that before decisions can be made, which establish the existence of a hazard, one must recognize a variety of situations worthy of evaluation. Situations worthy of serious consideration were labeled "Accident Potential". How can one identify accident potential? This is done by experienced safety professionsals. They recognize "Clues". They learn to "Know again" conditions or situations which result in losses.

Approach

We will review a series of these selected clues to 'accident potential'. As each clue is reviewed it will help you identify or prepare you to, 'know again' a number of items which present accident potential.

In addition to establishing descriptions of clues, we will discuss significance. Knowing the significance will serve to root the clue firmly in our mind. Our approach is thus framed around simple questions:

What is the clue?

Where will we find it?

How will we recognize it?

Why is it significant?

We will practice recognizing the clue by discussing the subjects, seeing examples on slides, and working on problems to test our skill.

Does such knowledge already exist in books? A review of literature indicates that information appropriate for broadening education and training in such techniques or skills is sparse. Learning to identify clues from reading text material imposes a very formidable problem regarding the transfer of theory into practical application. The reader must be able to step into a plant, or observe a machine in use, and convert book knowledge into practical use. This has been a stumbling block in any professional field, including engineering, police work, and many other occupations.

The SEARCH 1 project team concluded that there is a need for fundamental training in basic philosophies and new techniques.

ACCIDENT POTENTIAL RECOGNITION

LESSON PLAN - REFERENCE LIST

1. Search I, ASSE Journal, January-June 1970, American Society of Safety Engineers, 850 Busse Highway, Park Ridge, Illinois 60068.

2. Professional Safety Magazine (Monthly), American Society of Safety Engineers, 850 Busse Highway, Park Ridge, Illinois 60068.

3. Accident Prevention Manual for Industrial Operations, Seventh Edition, 1974, National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611.

4. Fundamentals of Industrial Hygiene, 1971, National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611.

5. Motor Fleet Safety Manual, Second Edition, 1972, National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611.

6. Guards Illustrated, Second Edition, National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611.

7. Safety Data Sheets, National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611.

8. Fire Protection Handbook, Fourteenth Edition, 1975, National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts 02210.

9. NFPA Inspection Manual, National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts 02210, 1970.

10. Handbook of Industrial Loss Prevention, Associated Factory Mutual Fire Insurance Companies, McGraw-Hill, New York, New York 10020, 1967.

11. Industrial Ventilation--A Manual of Recommended Practice, American Conference of Governmental Industrial Hygienists, P.O. Box 453, Lansing, Michigan 48902, 1974.

12. Industrial Noise Manual, American Industrial Hygiene Association, 66 South Miller Road, Akron, Ohio 44313, 1975.

ACCIDENT POTENTIAL RECOGNITION

LESSON PLAN - REFERENCE LIST (CON'T.)

13. Heat Stress Manual, American Industrial Hygiene Association, 66 South Miller Road, Akron, Ohio 44313, 1975.

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COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 2 Length - 50 Minutes

LESSON TITLE - - Basic Concepts

PURPOSES - -

1. Introduce the concept of Accident Potential Recognition.
2. Stress 'seeing' the big picture.
3. Discuss the Man/Machine/Environment System and the Systems Approach.
4. Show how Accident Potential Recognition is the first of several steps leading to Hazard Control.

OBJECTIVES - -

Enable the student to see the "Big Picture" (Accident Potential), instead of focusing on a few details (Specific Hazards, etc.).

SCOPE - -

1. The problem
2. The approach
3. The focus
4. The clues
5. The system concept

REFERENCES - - Reference List items 1 and 9

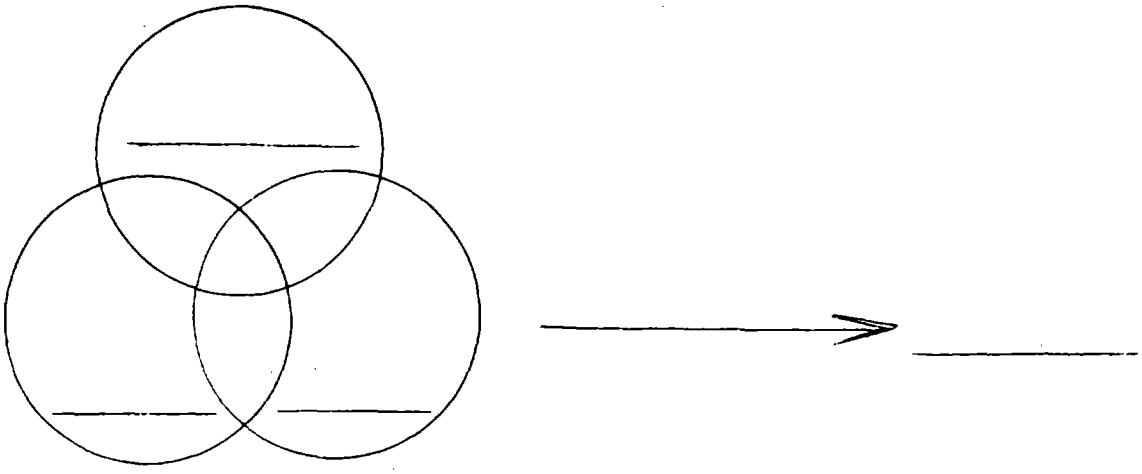
LESSON 2

BASIC CONCEPTS

System Safety concept

task oriented system

Man/Machine/Environment relationship



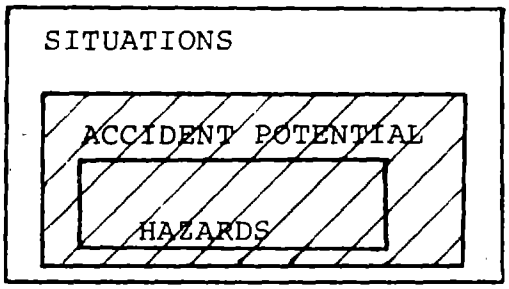
Interaction

Before decisions can be made - which establish the existance of a hazard - one must recognize a variety of situations worthy of serious consideration were labeled 'accident potential'.

Clues to 'accident potential' will be defined by explaining what you would expect to see, hear, feel, or learn from brief inquiry. To help prepare you to 'know again' (recognize) items that have 'accident potential'.

Development of this project brought to light the fact that many safety tools are introduced with the assumption that foremen and supervisors have a skill in recognizing accident potential.

Our Target is 'accident potential' situations - NOT all situations, and NOT just those that are obviously HAZARDS. Learn to recognize - know again - things (conditions) and acts (behavior) that represent the shaded area.



Accident Potential Recognition - is not hazard hunting

The word HAZARD - signals that an evaluation has already been made - the use implies a decision it is serious enough to warrant special attention and corrective action.

Clues are situations which when evaluated may identify situations that are hazardous or not hazardous.

Narrow view or depth of consideration - BUT broaden the subject areas and operations we are reviewing.

Situation Running — Accident Potential?

Running - how fast?
kind of surface?
objects in aisle?
length of run?
carrying a load?

Major topic areas for this course -

SITE AND STRUCTURES

OPERATING MACHINERY AND EQUIPMENT

MATERIALS

ENERGY

Frayed electric cord - obvious accident potential and a serious hazard - must be recorded

Discipline to record the less obvious

Do not focus on one specific potential

Clues to Accident Potential - no evaluation of the potential in this course ----

Individuals NEW to the Safety field CAN learn to recognize clues to Accident Potential.

Recognize - to know again

Again - requires prior experience

Recognition - not limited to seeing

Helmsman - senses direction of wind

Feel temperature changes

Snap of a twig

Impedence to conversation

Sudden movement

Posture

Acceleration

Reciprocating or revolving

Step back and observe the big picture

Look for unsafe behavior as well as things

Use all senses

- Eyes - motion or over balance or irritation
- Ears - pressure and noise changes
- Skin - temperature extremes and irritants
- Body - changes in work level

Clues may be subtle - degrees or levels of intensity

- water depth or disturbance
- cloud color
- smell of burning
- filtering out smell and sound

Step back and observe the big picture

Look for unsafe behavior as well as things

Use all senses

Eyes - motion or over balance or irritation

Ears - pressure and noise changes

Skin - temperature extremes and irritants

Body - changes in work level

GOAL - identify Accident Potential <u>before</u> loss occurs.

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 3 Length - 50 Minutes

LESSON TITLE - - Walk-around (practice)

PURPOSE

To test the trainee's ability to see the "Big Picture" before studying the 80 clues to Accident Potential Recognition.

OBJECTIVE - -

Given a prescribed commercial or industrial site, the trainee will walk through the area and record the Accident Potentials as he sees them.

SCOPE - -

1. Instructions for walk-around
2. Instructions for recording of observations
3. The walk-around
4. Discussion of results in class

REFERENCES - - None

LESSON 3

FORM FOR ACCIDENT POTENTIAL RECOGNITION SURVEY

Accident Potential Survey by: _____

Date of Survey _____ Date of Report _____

Company _____ Report to _____

Plant _____ Location _____

Location	Recognized Accident Potential	Remarks

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 4 Length - 50 Minutes

LESSON TITLE - - Sites and Structures - General Site Characteristics

PURPOSE - -

Introduce 8 clues to Accident Potential relating to Site Characteristics.

OBJECTIVES - -

Given 8 clues relating to Site Characteristics, the student should be able to recognize the Accident Potential indicated by the clues.

SCOPE - -

Clues 1 - 8

1. Complex traffic patterns
2. Undesirable landscaping or vegetation
3. Questionable location of utilities
4. Neighborhood problems
5. Opportunities to fall
6. Unusual weather conditions
7. Discharge to the environment
8. Inadequate lighting

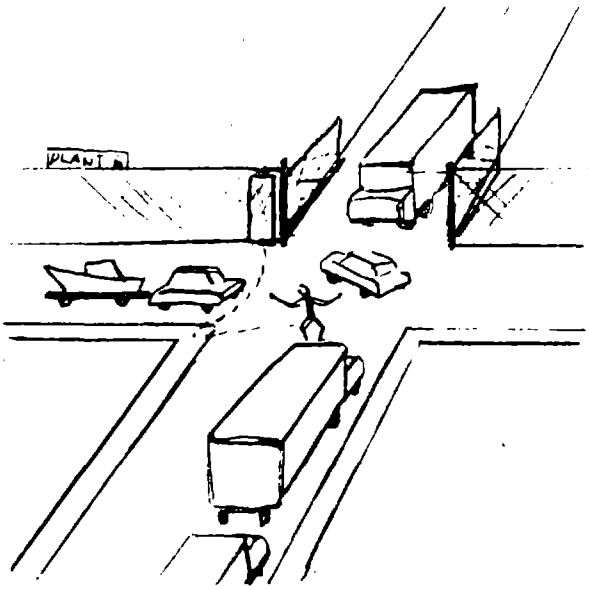
REFERENCES - - Reference list items 3 (Ch. 16), 5, 8, 9, 10, 19, 20.

LESSON 4

I. SITE AND STRUCTURES

GENERAL SITE CHARACTERISTICS

1. Complex Traffic Patterns



Land transportation

Air transportation

Water transportation

Motor vehicles

Rail cars

Foot traffic

Routing adjacent to site

Routing through site

Routing near tanks, etc.

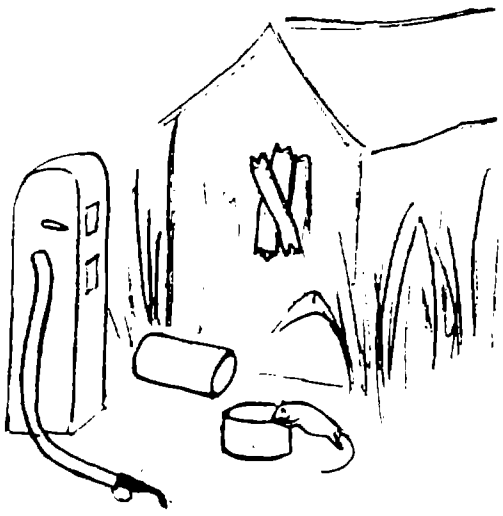
Intersections and crossings

Railroad sidings

Piers

Parking lots

2. Undesirable Landscaping and Vegetation



High grass and weeds

Heavy shrubbery

Grading

Exposure of wooden buildings

Exposure of fuel and flammables

Wild life

Potential for flooding

GENERAL SITE CHARACTERISTICS

3. Questionable Location of Utilities

Heat

Gas

Light and power

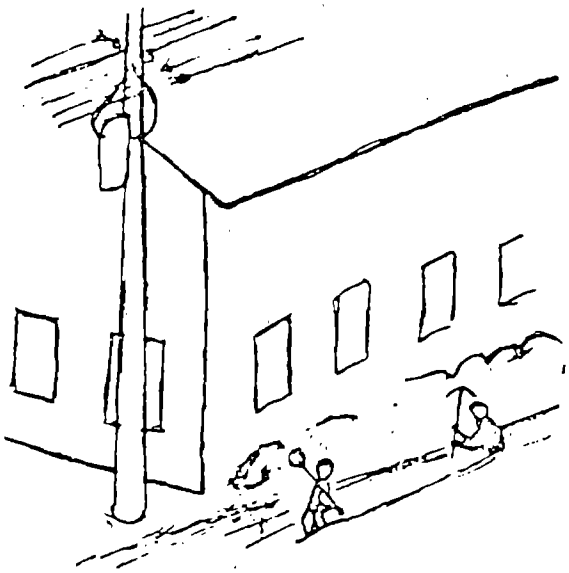
Transformers

Communications

Telephone

Overhead lines

Storage



4. Unusual Neighborhood Problems

Labor turnover

Issues

Tensions

Civil disturbances

Riots

Bomb scares

Neighboring plants

Community

I. SITE AND STRUCTURES

GENERAL SITE CHARACTERISTICS

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5. Opportunities to Fall

From Ground Level to Below Ground Level:

Holes

Depressions

Ditches

Streams

Ponds

Tanks

Excavations

Children

To Ground Level from Above:

Structures

Freight cars

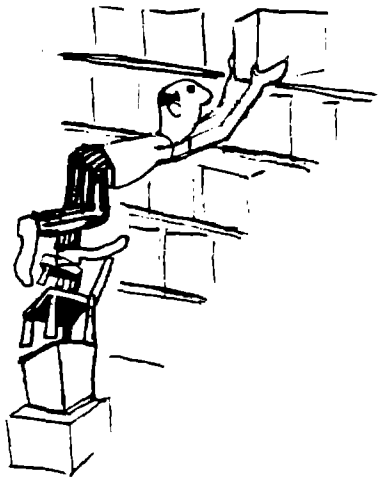
Roofs

Ladders

Platforms

Railings

Warnings



I. SITE AND STRUCTURES

GENERAL SITE CHARACTERISTICS

6. Unusual Weather Conditions

Temperature, high and low

Humidity, high and low

Geographical effects

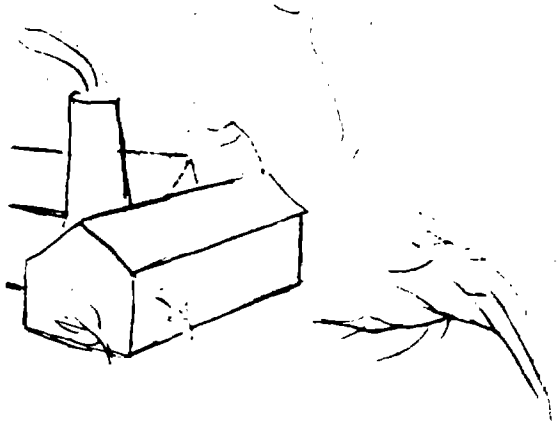
High winds, tornadoes, hurricanes

Electrical storms

Snow and ice

Inversion

Earthquakes



7. Discharge to the Environment

Air

Water

Ground

Visible fumes, smoke, dusts

Odors

Appearance of water

Destruction of vegetation

Noise

Skin sensitivity

Solid deposits on roof and ground

5 senses

GENERAL SITE CHARACTERISTICS

8. Inadequate Lighting

Standards

Inspect at night

Key areas:

Stairs

Docks

Parking lots

Plant gates

Perimeter fencing

Utilities

I. SITE AND STRUCTURES

KEY POINT SUMMARY

Clue 1 Complex Traffic Pattern

Clue 2 Undesirable Landscaping or Vegetation

Clue 3 Questionable Location of Utilities

Clue 4 Neighborhood Problems

Clue 5 Opportunities to Fall

Clue 6 Unusual Weather Conditions

Clue 7 Discharge to the Environment

Clue 8 Inadequate Lighting

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 5 Length - 50 Minutes

LESSON TITLE - - Site and Structures - Nature of Structures and Quality of Maintenance.

PURPOSE - -

To introduce 9 clues to Accident Potential relating to Nature of Structures and Quality of Maintenance.

OBJECTIVES - -

Given 5 clues relating to Nature of Structures and 4 clues relating to Quality of Maintenance the student should be able to recognize the Accident Potential indicated by the clues.

SCOPE - -

Clues 9 - 17

9. Large single area
10. Isolated structure
11. Special construction
12. Temporary structures
13. Recent change
14. Deterioration
15. Deformation
16. Evidence of poor housekeeping
17. Electrical repair problems

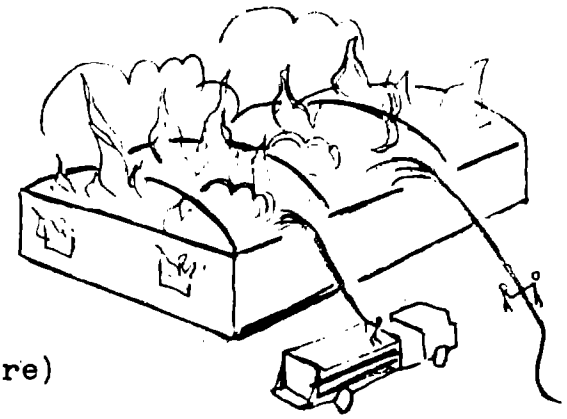
REFERENCES - - Reference list items 1, 3 (Ch. 16 & 44), 9.

LESSON 5

I. SITE AND STRUCTURES

NATURE OF STRUCTURES

9. Large Single Area



Undivided area

10,000 square feet or more

Distance to exit

Spread of fire

Roof collapse

"High rise" (3 stories or more)

Stairs

Vertical shafts

Chimney effect

10. Isolated Structures

Isolated by:

- Distance
- Dikes
- Fences
- Walls
- Security

Purpose of isolation

I. SITE AND STRUCTURES

NATURE OF STRUCTURES

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11. Special Construction

Heavy construction

Light construction

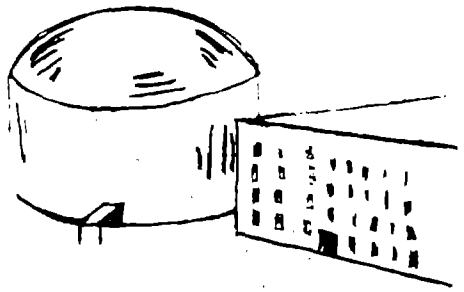
Unique design (dome, etc.)

Windowless

Retaining walls

Blasting mats

Fire resistant treatment of steel



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12. Temporary Structures

Inexpensive materials

Sheet metal

Plastic

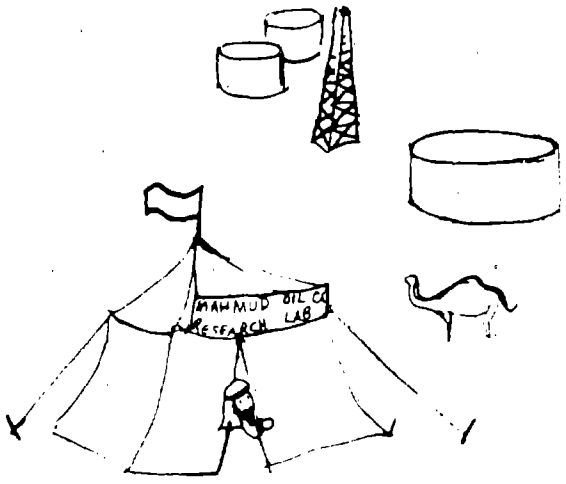
Plywood

Canvas

Scaffolding

Inadequate equipment

Why constructed?



I. SITE AND STRUCTURES

NATURE OF STRUCTURES

13. Recent Change

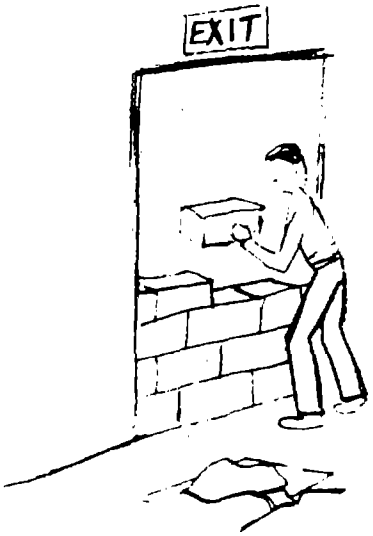
New appearance

Need for adjustments

Start-up problems

Disconnected Lines

Maintenance work



QUALITY OF MAINTENANCE

14. Deterioration

Abrasion

Wear

Leaks

Corrosion

Rusting

Scaling

Erosion

Rotting

Paint scaling

Building supports

Flooding

15. Deformation

Building supports bent

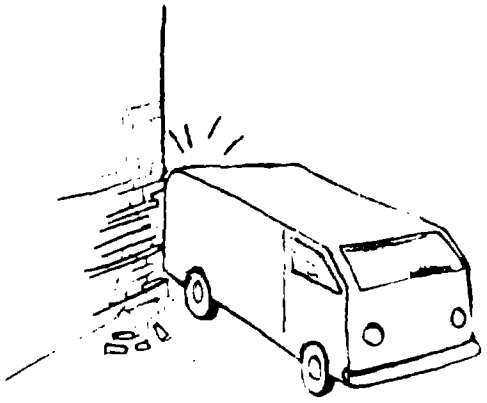
Corners of buildings

Sinking of earth

Tank tops distorted

Sagging

Dents in sheet metal



I. SITE AND STRUCTURES

QUALITY OF MAINTENANCE

16. Evidence of Poor Housekeeping

Cleanliness

Arrangement

Storage

Groundskeeping

Trash removal

Scrap accumulation

Unstable piling

Combustibles

Snow and ice removal

17. Electrical Repair Problems

Box covers removed

Control panel covers absent

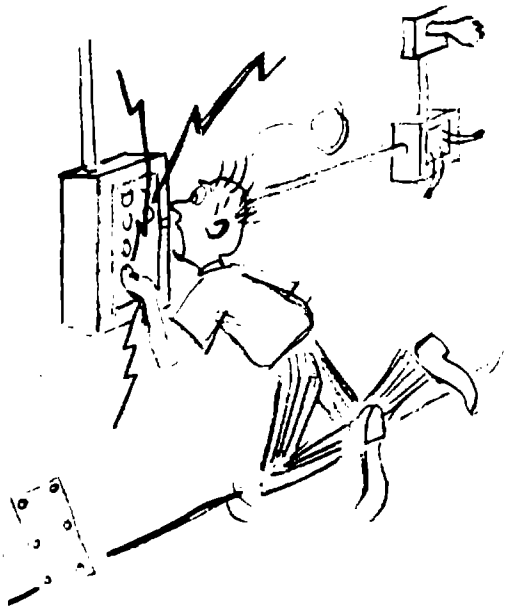
Broken bulbs

Frayed cords

Prongs damaged

Switch gear rooms

Sub stations



I. SITE AND STRUCTURES

KEY POINT SUMMARY

Clue 9 Large Single Area

Clue 10 Isolated Structure

Clue 11 Special Construction

Clue 12 Temporary Structures

Clue 13 Recent Change

Clue 14 Deterioration

Clue 15 Deformation

Clue 16 Evidence of Poor Housekeeping

Clue 17 Electrical Repair Problems

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 6 Length - 50 Minutes

LESSON TITLE - - Site and Structures Workshop

PURPOSE - -

Reinforce learning of 17 clues on Site and Structures by applying the clues to hypothetical problems.

OBJECTIVES - -

Given a variety of problems the student should be able to identify 80% of the applicable clues to Accident Potential Recognition.

SCOPE - -

1. Review clues 1 - 17 on Site and Structures
2. Discuss problems on Site and Structures listing clues
3. Discuss application of clues to problem situations described by member of the class
4. Quiz No. 1

REFERENCES - - Reference list items 1, 3, (Ch. 4).

ACCIDENT POTENTIAL RECOGNITION

I. SITE AND STRUCTURES

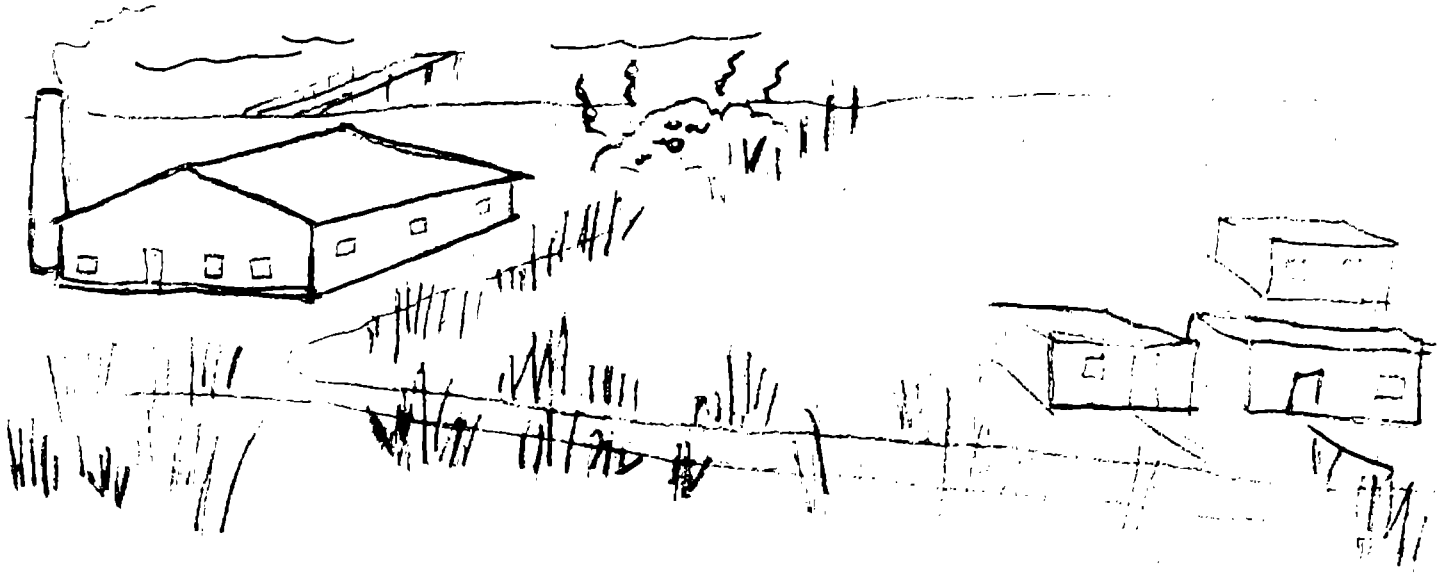
1. Complex traffic patterns
2. Undesirable landscaping or vegetation
3. Questionable location of utilities
4. Neighborhood problems
5. Opportunities to fall
6. Unusual weather conditions
7. Discharge to the environment
8. Inadequate lighting
9. Large single area
10. Isolated structure
11. Special construction
12. Temporary structures
13. Recent change
14. Deterioration
15. Deformation
16. Evidence of poor housekeeping
17. Electrical repair problems

I. Site and Structures - Problem for discussion

General Site Characteristics

You are approaching a shrimp packing plant at 8 a.m. to make a safety inspection. You have just passed a number of "low rent" homes and followed a narrow road lined by tall swamp grass and cattails. As you are inspecting the dock facilities, a workman tells you that a hurricane watch has been announced.

Which clues related to General Site Characteristics will you list for further study? Why?



I. Site and Structures - Problem for discussion

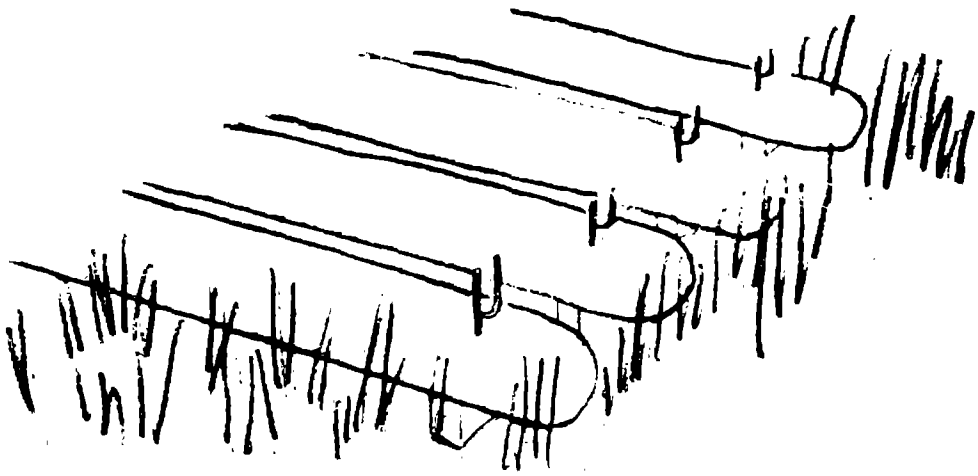
General Site Characteristics

A factory parking lot is situated over an area where utility pipe lines and cables are laid. Several manholes and junction rooms are under the area. Pre-cast concrete blocks are used to lay out the parking lot into proper rows. What clues to accident potential do you see?

I. Site and Structures - Problem for discussion

General Site Characteristics

Four horizontal propane tanks are located in an unpaved area. Grass is 3 feet high in August. List the clues to accident potential.

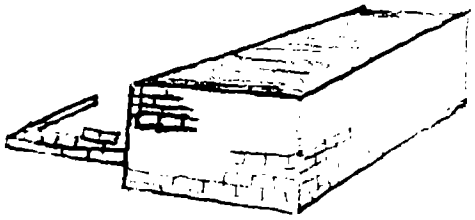


I. <u>Site and Structures</u> - Problem for discussion

Nature of Structures

About 50 feet from the end of a huge repair hanger at Metropolis Airport an addition is being made to a windowless 20' by 30' block structure.

What clues related to nature of structures do you list?

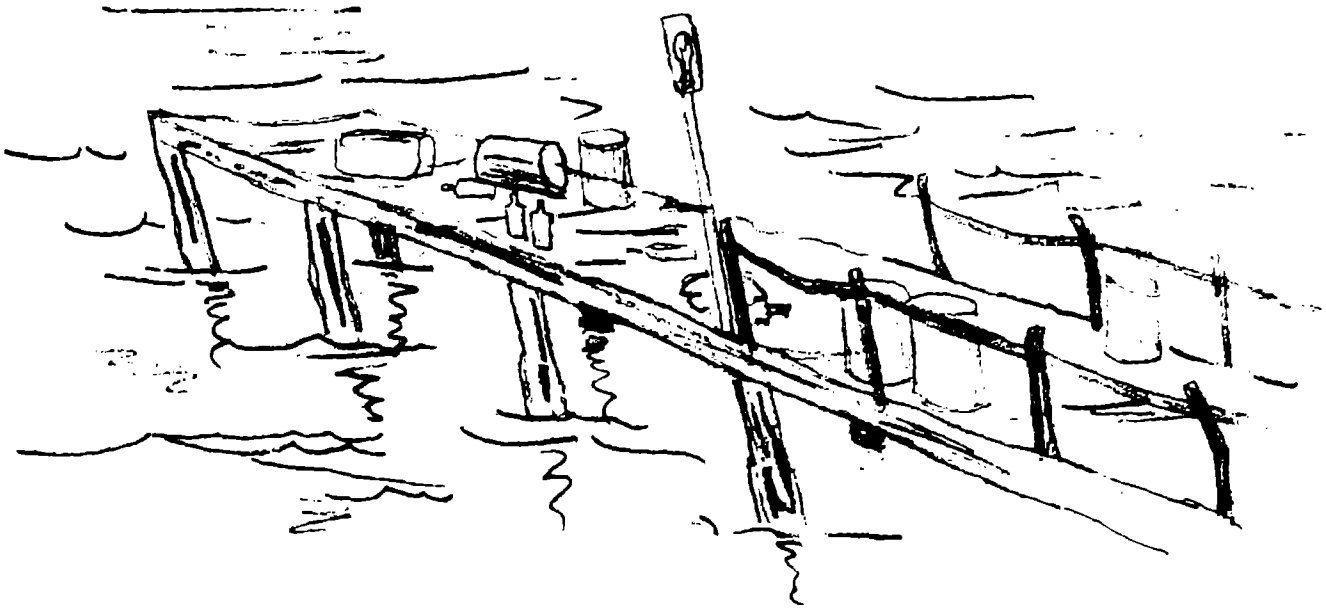


I. Site and Structures - Problem for discussion

Quality of Maintenance

The dock at the shrimp packing plant has rotting floor boards and rusty railings. The whole structure leans about 10^{o} from vertical and has an accumulation of engine parts, oil cans, fishing equipment, and beverage containers. The light standard also leans and the switch is inoperative.

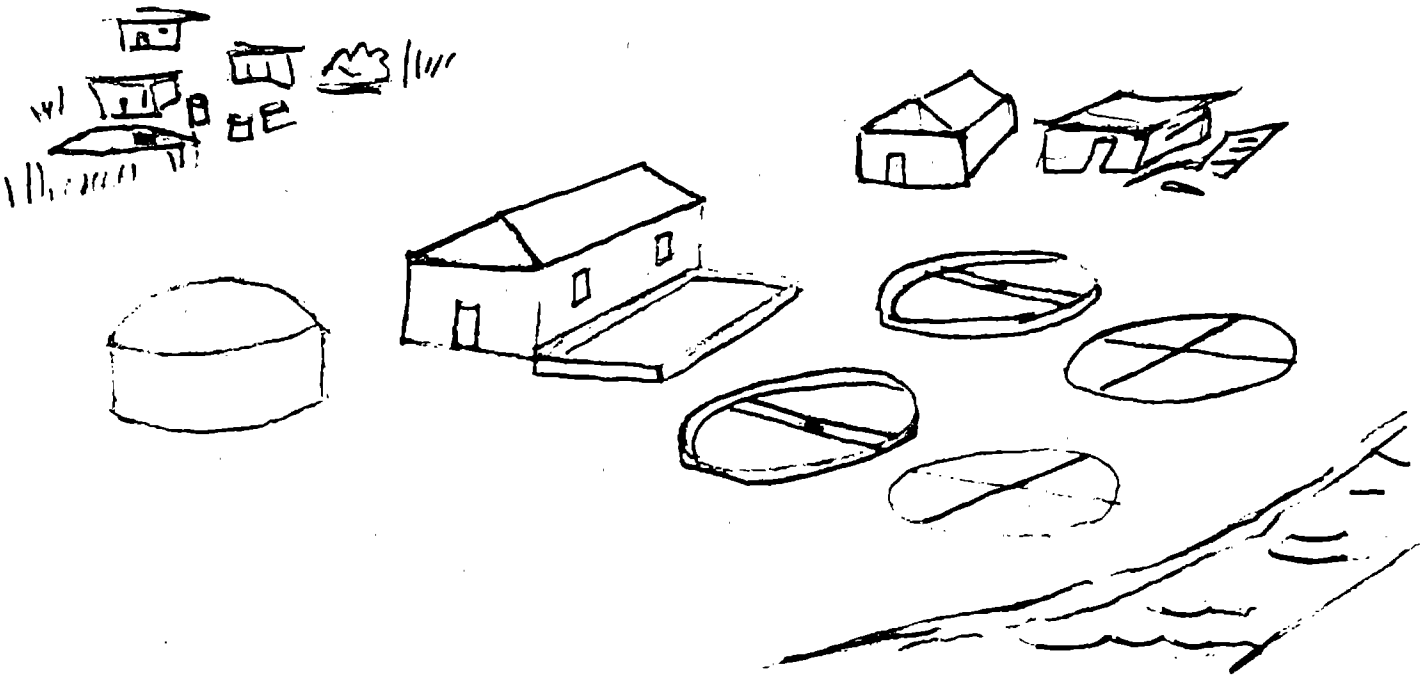
Name the clues related to quality of maintenance. What other clues are present?



I. Site and Structures - Problem for discussion

A municipal sewage plant is located on the bank of a swollen creek behind a slum area. A sheet metal building is being erected, presumably to replace a wooden shed that appears to be falling over. Broken bulbs are noted in half of the lighting fixtures.

What clues to site and structures do you list?



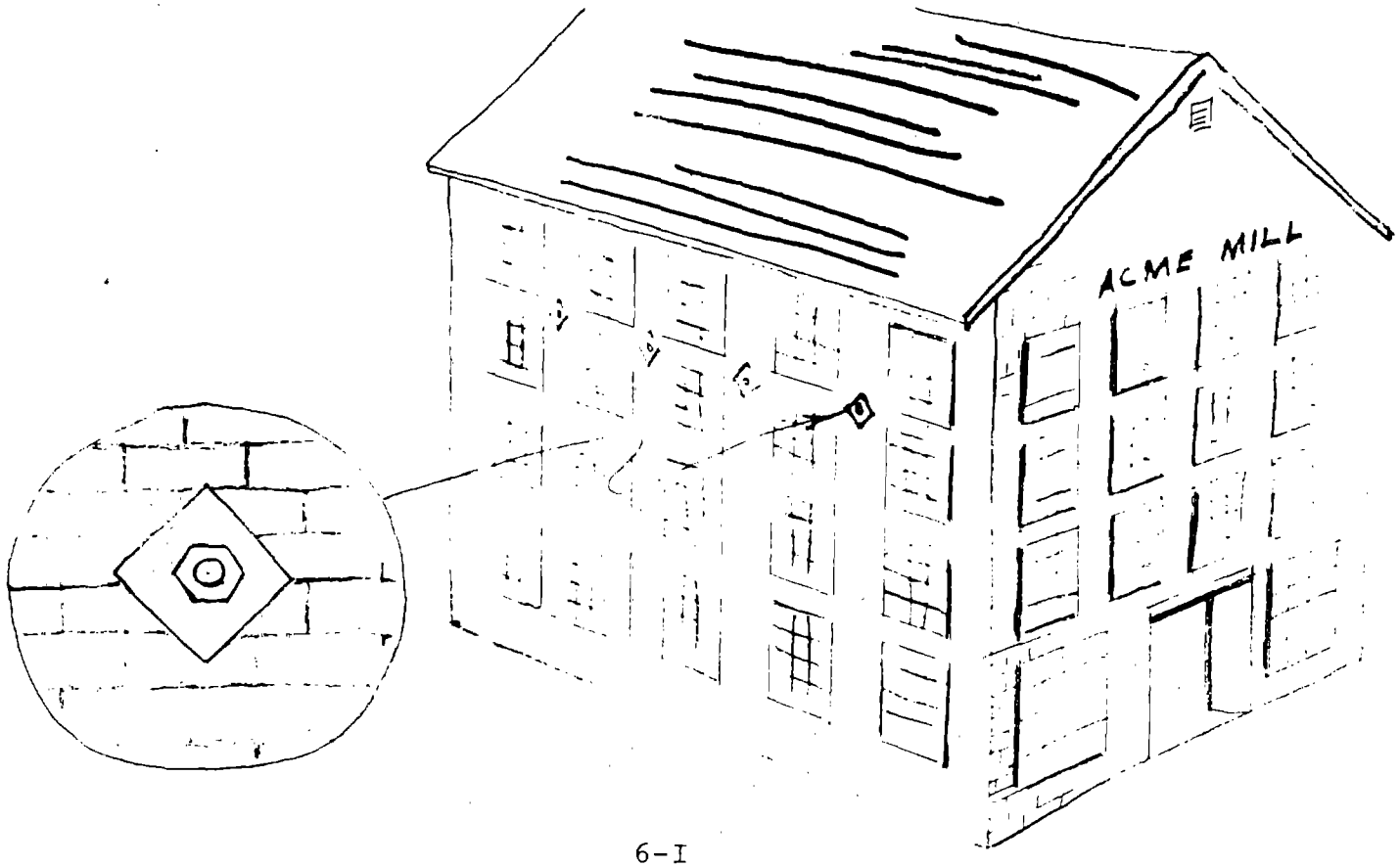
Quiz on SECTION I

1. List clues to accident potentials that could be present if a poorly lighted ramp is used by fork lift trucks in a busy warehouse area.

2. List 12 of the 17 clues to accident potential associated with Site and Structures.

3. Heavy electric wires on poles and on insulators attached to building walls supply 480 volts, 3-phase power to a chemical plant. Wires pass over pipe racks with one foot clearance and are within a foot of elevated walkways. Detail the accident potential clues.

4. Nuts and steel plates are on the ends of large rods extending through the wall of a 4 story brick mill building. What clues to accident potential do you list for further evaluation?



COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 7 Length - 50 Minutes

LESSON TITLE - - Operating Machinery and Equipment
Mechanical Action and Machine Controls

PURPOSE - -

Introduce 8 clues to Accident Potential relating to Mechanical Action and Machine Controls.

OBJECTIVES - -

Given 5 clues relating to Mechanical Action and 3 clues relating to Machine Controls, the student should be able to recognize the Accident Potential indicated by the clues.

SCOPE - -

Clues 18 - 25
18. Rotating motion
19. Reciprocating motion
20. In-running nip points
21. Cutting operations
22. Punching, shearing, forming
23. Inconvenient location of "start and stop"
24. Special control devices
25. Lock-out provisions

REFERENCES - - Reference list items 1, 3 (Ch. 29-32, 41), 6, 23.

LESSON 7

II. OPERATING MACHINERY AND EQUIPMENT

MECHANICAL ACTION

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18. Rotating Motion

Slow rotation

Smooth surfaces

Common rotating mechanisms

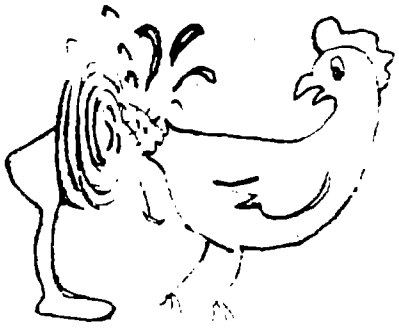
Location inside a case

Protruding parts

Household examples

Long rotating parts

Impact effects



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19. Reciprocating Motion

Transverse Motion

Striking action

Catching between

Shearing action

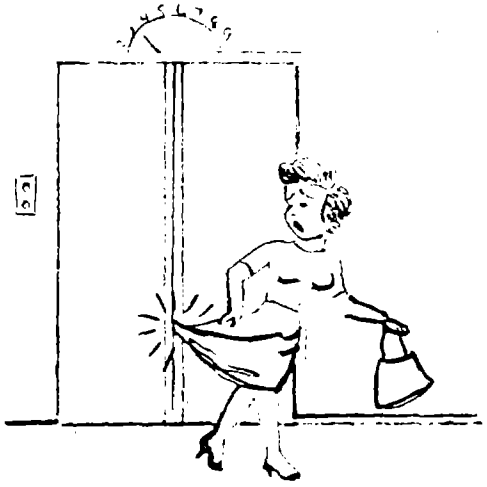
Examples:

Power presses and hammers

Steam engines

Stapler

Planing mill, etc.



II. OPERATING MACHINERY AND EQUIPMENT

MECHANICAL ACTION

---

20. In-running Nip Points

Two rotating objects

One rotating object- stationary part

Productive nip points, mills, callanders, etc.

Incidental nip points, chain and belt drives, gears

Other nip points (not in-running)

Point of operation

- -

21. Cutting Operations

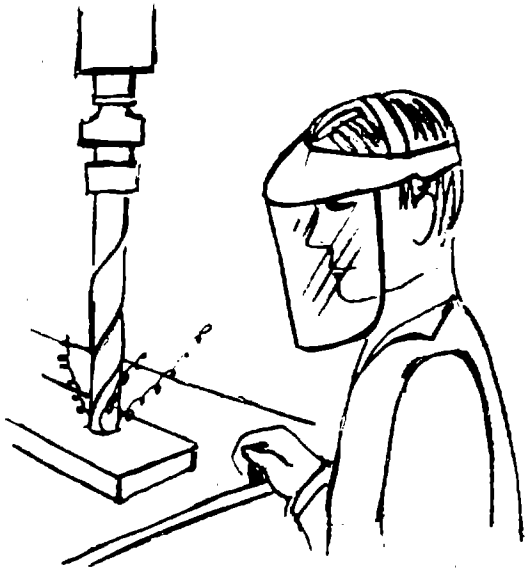
Cutting action

Chips formed

Examples

Point of operation

Flying chips



II. OPERATING MACHINERY AND EQUIPMENT

MECHANICAL ACTION

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22. Punching, Shearing, Forming

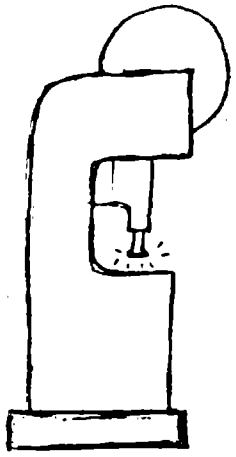
Actions

Point of operation

Material fed and removed

Operator location

Examples



II. OPERATING MACHINERY AND EQUIPMENT

MACHINE CONTROLS

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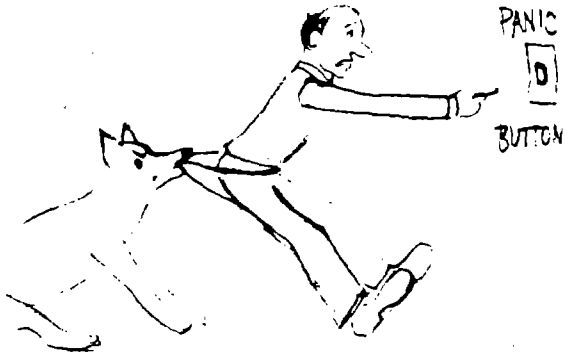
23. Inconvenient Location of "Start and Stop"

    Limitations of operator

    Multiple work stations

    Uniformity

    Emergency shut-off



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24. Special Control Devices

    Indications

    Two hand operation

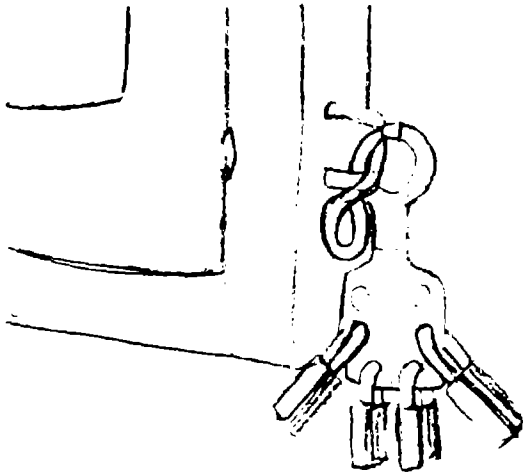
    Remote controls

- -

25. Lock-out Provisions

    Purpose

    Procedure



II. OPERATING MACHINERY AND EQUIPMENT

KEY POINT SUMMARY

Clue 18 Rotating Motion

Clue 19 Reciprocating Motion

Clue 20 In-running Nip Points

Clue 21 Cutting Operations

Clue 22 Punching, Shearing, Forming

Clue 23 Inconvenient Location of "Start and Stop"

Clue 24 Special Control Devices

Clue 25 Lock-out Provisions

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 8 Length - 50 Minutes

LESSON TITLE - - Operating Machinery and Equipment Special Equipment, Operator Stress, and Maintenance

PURPOSE - -

Teach 12 clues to Accident Potential relating to Special Equipment, Operator Stress, and Maintenance.

OBJECTIVES - -

Given 5 clues to Special Equipment, 5 clues to Operator Stress, and 2 clues to Quality of Maintenance, the student should be able to recognize the Accident Potential indicated by the clues.

SCOPE - -

Clues 26 - 37

26. Portable power tools
27. Powder actuated tools
28. Hand tools
29. In-plant vehicles
30. Heavy electrical equipment
31. Repetitive motion
32. Awkward working position
33. Physical overload
34. Noise exposure
35. Vibration exposure
36. Improvised guarding
37. Certificates of inspection

REFERENCES - - Reference list items 1, 3 (Ch. 10, 24, 27, 28, 29, 40), 6, 12, 26.

LESSON 8

II. OPERATING MACHINERY AND EQUIPMENT

SPECIAL EQUIPMENT

---

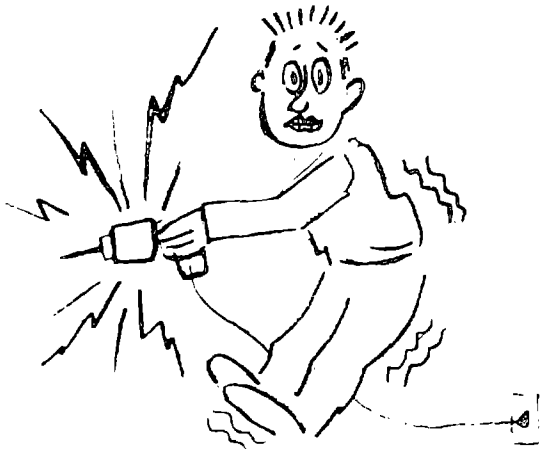
26. Portable Power Tools

Electric drills, saws, sanders, etc.

Shock potential

Grounding

Air hammers, grinders, wrenches



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27. Powder Actuated Equipment

Operation

Accident potential

Use

Storage

- -

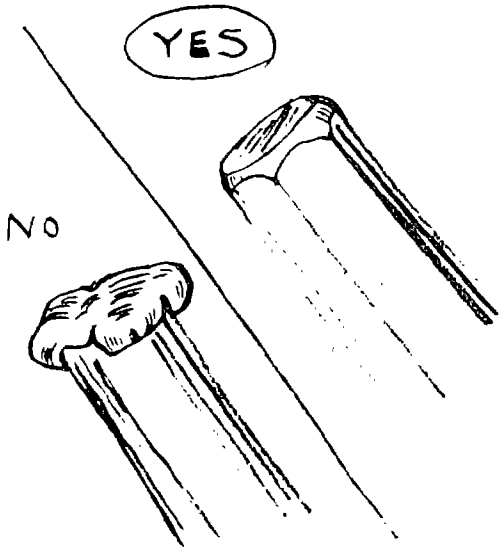
28. Hand Tools

Mechanic tools, such as:
hammers, pliers, screwdriver, saws,

Also, scythes, shovels, hose, axes

Consider the condition

Misuse of tools



II. OPERATING MACHINERY AND EQUIPMENT

SPECIAL EQUIPMENT

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29. In-Plant Vehicles

Fork trucks

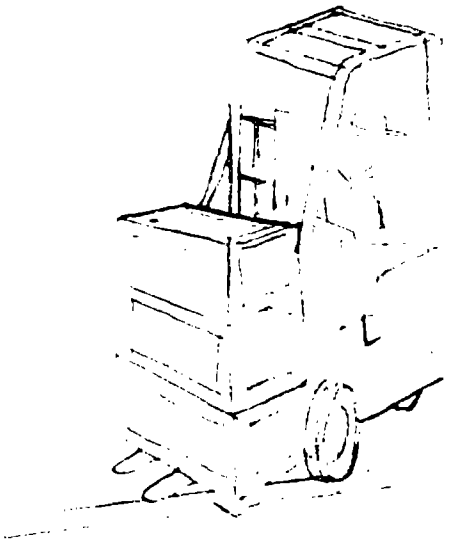
Tractors

Cranes

Safe procedures

Driver training

Driver licensing



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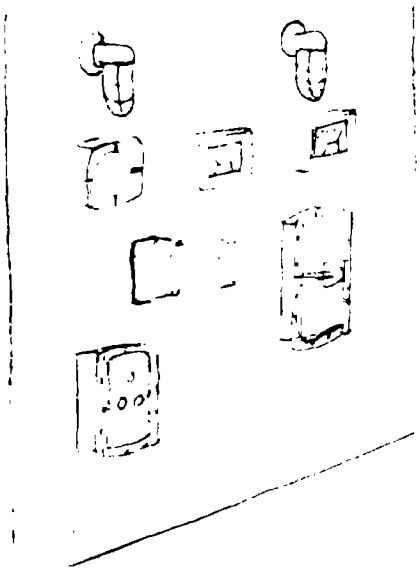
30. Heavy Electrical Equipment

High hazard areas

Explosion proof

Design

Meaning



II. OPERATING MACHINERY AND EQUIPMENT

OPERATOR STRESS

31. Repetitive Motions

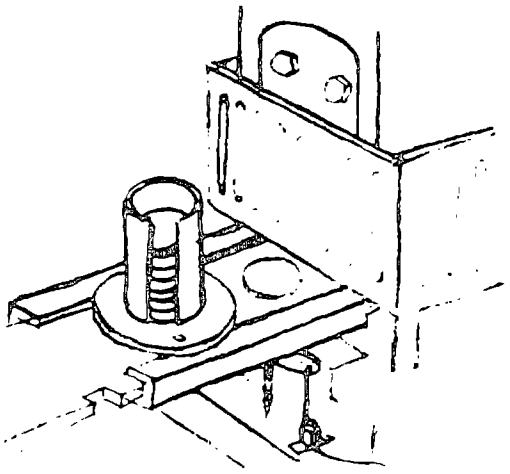
Machine speed

Automated feed

Examples

Use of hand tools

Effects



32. Awkward Body Motion

Lifting

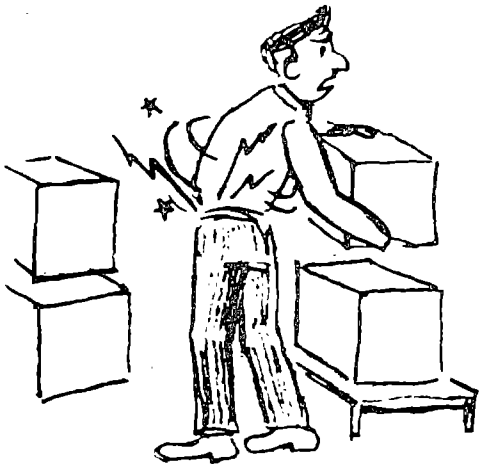
Twisting

Reaching controls, etc.

Table height

Adjustable chairs and tables

Effects



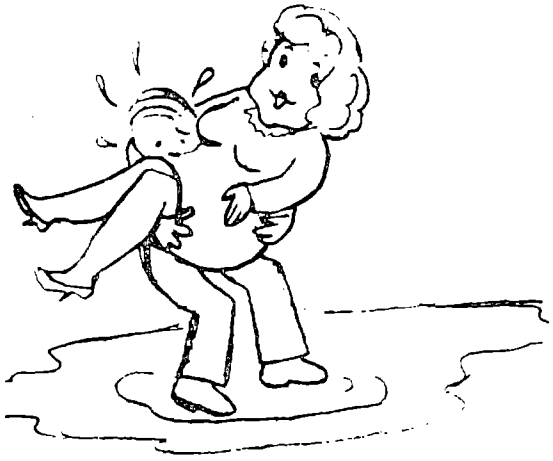
33. Physical Overload

Lifting

Variations in employees

Other operations

Straining



II. OPERATING MACHINERY AND EQUIPMENT

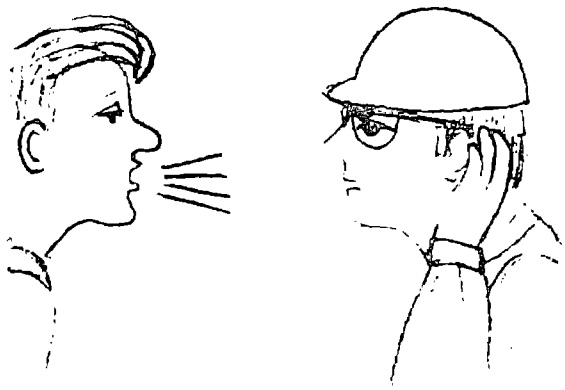
OPERATOR STRESS

34. Noise Exposure

Noise interferes with conversations and phone calls

Estimation of noise problem

Sources of noise



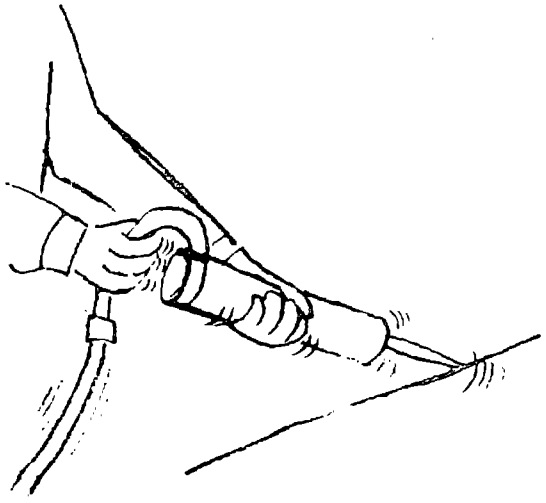
35. Vibration Exposure

Causes of vibration

Effects

Vibration causes noise

Indications



II. OPERATING MACHINERY AND EQUIPMENT

QUALITY OF EQUIPMENT MAINTENANCE

36. Improvised Guarding

Design

Condition

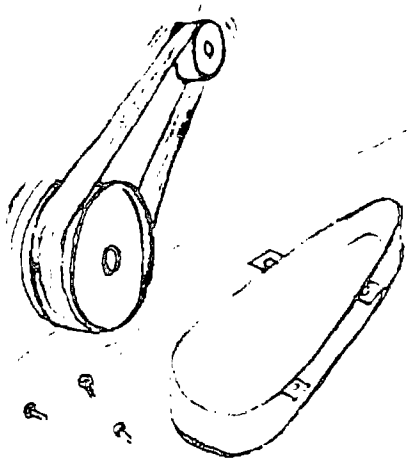
Improvised attachment

Missing fasteners

Broken or distorted guards

Removal

Implications



37. Certificates of Inspection

Boilers

Unfired pressure vessels

Elevators

Man lifts

Hoisting equipment

Inspections

Maintenance

Records

Certificates

II. OPERATING MACHINERY AND EQUIPMENT

KEY POINT SUMMARY

Clue 26 Portable Power Tools

Clue 27 Powder Actuated Equipment

Clue 28 Hand Tools

Clue 29 In-Plant Vehicles

Clue 30 Heavy Electrical Equipment

Clue 31 Repetitive Motions

Clue 32 Awkward Body Motion

Clue 33 Physical Overload

Clue 34 Noise Exposure

Clue 35 Vibration Exposure

Clue 36 Improvised Guarding

Clue 37 Certificates of Inspection

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 9 Length - 50 Minutes

LESSON TITLE - - Operating Machinery and Equipment Workshop

PURPOSE - -

Reinforce learning of clues 1 - 37, especially clues 18 - 37 on Operating Machinery and Equipment. The clues learned are applied to hypothetical problems.

OBJECTIVES - -

Given a variety of problem situations, the student should be able to identify 80% of the applicable clues to Accident Potential Recognition.

SCOPE - -

1. Review clues 18 - 37 on Operating Machinery and Equipment.
2. Discuss problems on Operating Machinery and equipment.
3. Discuss application of clues to problem situations described by members of the class.
4. Quiz No. 2.

REFERENCES - - Reference list items 1, 3 (Ch. 10, 24, 27-32, 40, 44), 6, 12, 23, 26.

ACCIDENT POTENTIAL RECOGNITION

I. SITE AND STRUCTURES

1. Complex traffic patterns
2. Undesirable landscaping or vegetation
3. Questionable location of utilities
4. Neighborhood problems
5. Opportunities to fall
6. Unusual weather conditions
7. Discharge to the environment
8. Inadequate lighting
9. Large single area
10. Isolated structure
11. Special construction
12. Temporary structures
13. Recent change
14. Deterioration
15. Deformation
16. Evidence of poor house-keeping
17. Electrical repair problems

II. OPERATING MACHINERY AND EQUIPMENT

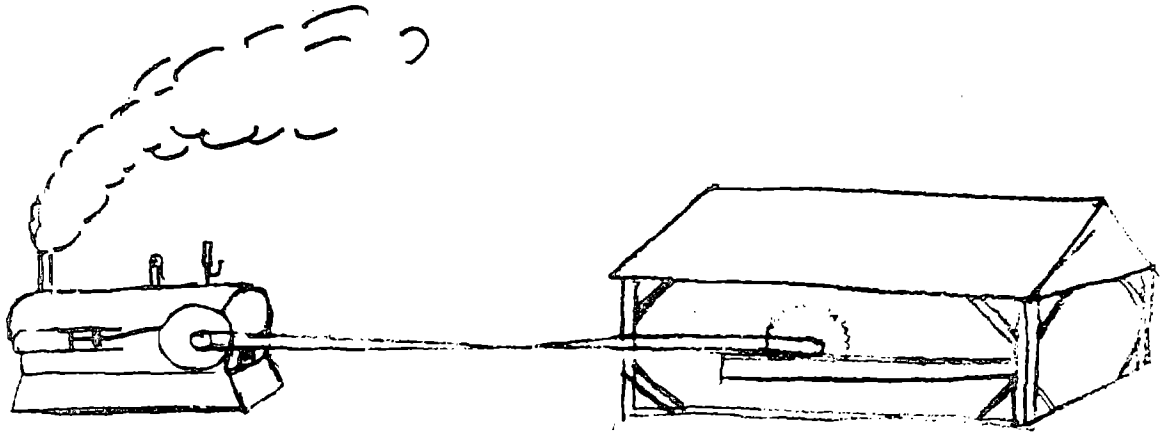
18. Rotating motion
19. Reciprocating motion
20. In-running nip points
21. Cutting operations
22. Punching, shearing, forming
23. Inconvenient location of
24 "start and stop"
24. Special control devices
25. Lock-out provisions
26. Portable power tools
27. Powder actuated tools
28. Hand tools
29. In-plant vehicles
30. Heavy electrical equipment
31. Repetitive motion
32. Awkward working position
33. Physical overload
34. Noise exposure
35. Vibration exposure
36. Improvised guarding
37. Certificates of inspection

II. Operating Machinery and Equipment - Problem for discussion

Mechanical Action

An ancient steam engine is used to drive a 48" diameter saw blade in a mill where logs are cut into boards. A long flat belt is used for power transmission.

What clues related to mechanical action would you list for further analysis? What other clues are present?

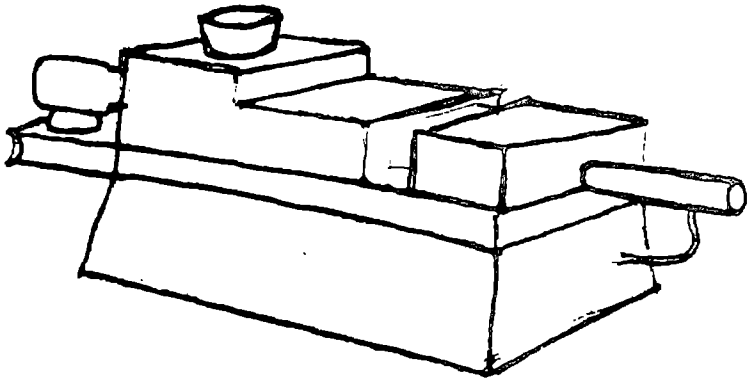


II. Operating Machinery and Equipment - Problem for discussion

Machine Controls

An extrusion press used to make plastic parts has hydraulically operated dies which open to eject the finished molded pieces. A mechanic changes the dies and then reaches over the machine to press the start button. The press closes and opens several times as he observes the clearances closely.

What machine control clues are obvious? What other clues are present?



II. Operating Machinery and Equipment - Problem for discussion

Special Equipment

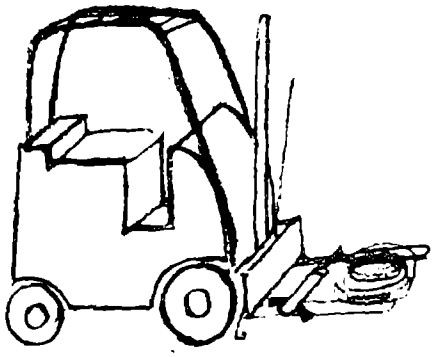
A portable electric drill fitted with a 3/8 inch drill bit is being used to drill holes in a masonry wall so that noise absorbing panels can be installed. List the clues to accident potential.

II. Operating Machinery and Equipment - Problem for discussion

Special Equipment

A fork truck delivers an air operated jackhammer to an area where a floor is to be broken up for replacement. The fork truck driver asks why the electric lights, switches, etc. are so big and bulky.

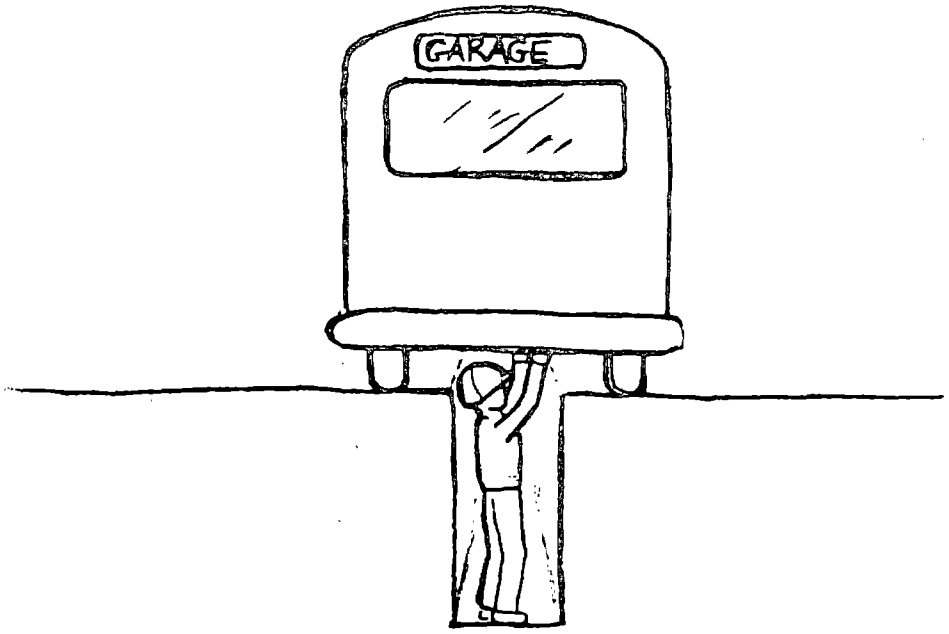
What clues related to special equipment do you see? What other clues?



II. Operating Machinery and Equipment - Problem for discussion

Operator Stress

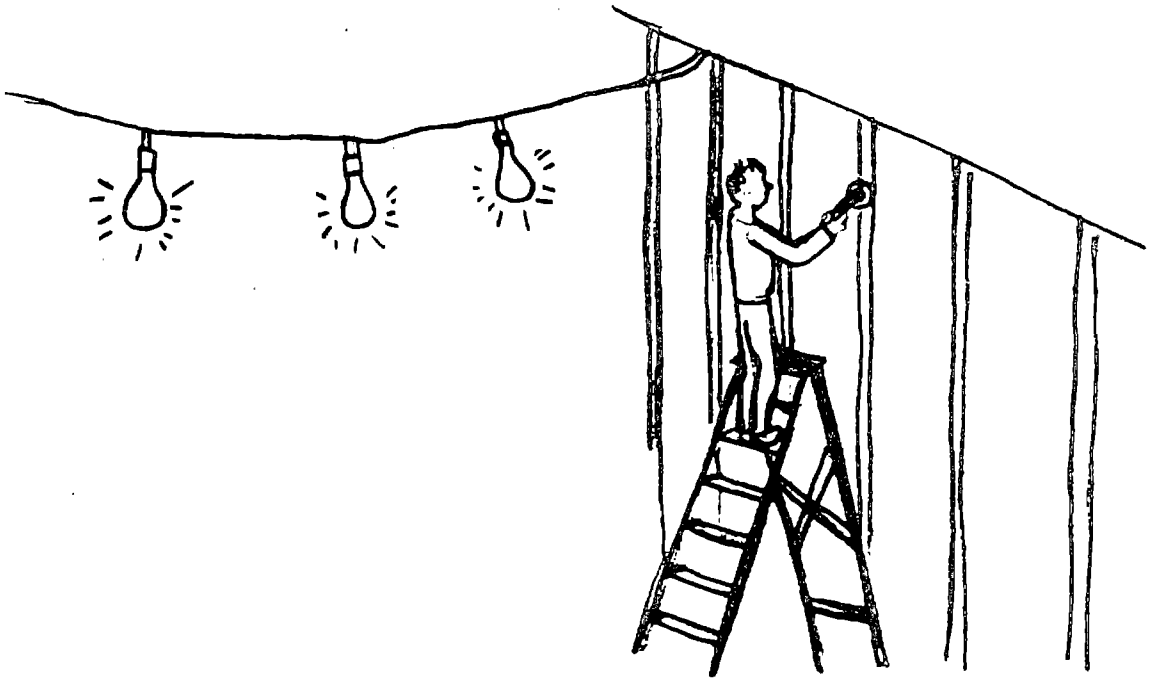
Men working in a pit under buses must reach overhead to perform service work such as oil changes, lubrications, brake adjustments, and replacement of worn or defective parts. What accident potential clues are associated with this work?



II. Operating Machinery and Equipment - Problem for discussion

Operator Stress

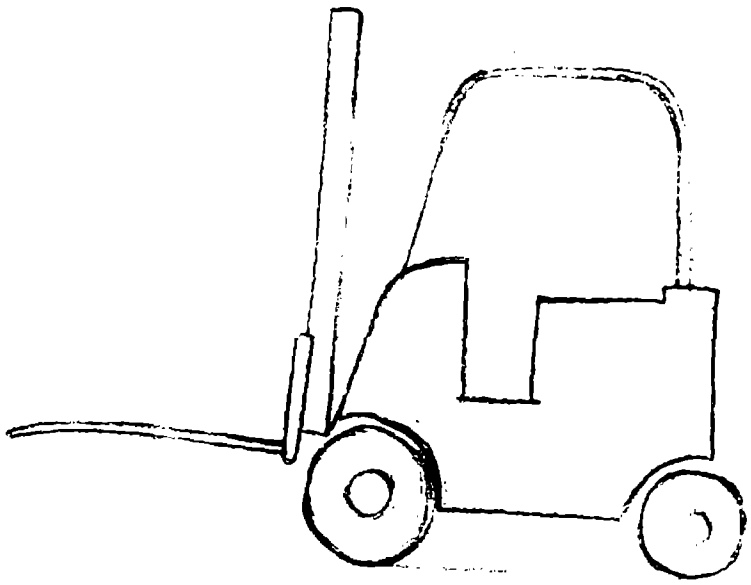
A powder actuated device is to be used for applying furring strips to masonry walls in a large building. Men are working on ladders to reach the 14 foot height. The only available light is a string of bare bulbs hung across the area. List the accident potentials you plan to evaluate and discuss with the contractor.



II. Operating Machinery and Equipment - Problem for discussion

Operator Stress

The forks on a lift truck extend about five feet from the mast and curve downward toward the extreme ends. What accident potential clues are indicated?



II. Operating Machinery and Equipment - Problem for discussion

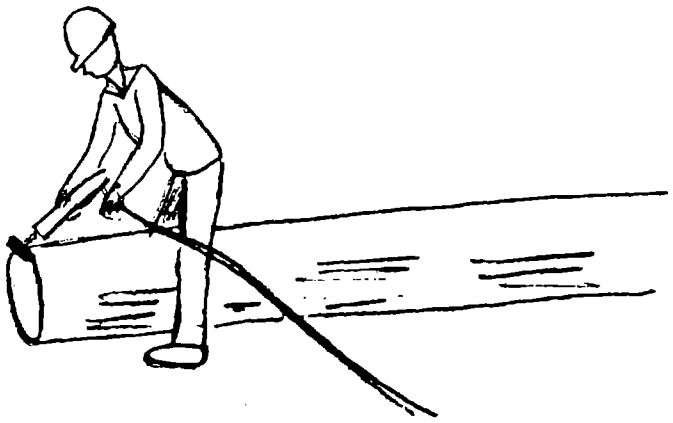
Operator Stress

A punch press, stamping out spoons from sheet metal, is fed manually. List the accident potentials during normal operation, during setup, during maintenance.

II. Operating Machinery and Equipment - Problem for discussion

Operator Stress

An employee is using an air operated portable 3" grinding wheel for beveling the ends of 12" pipe. The pipe is on the floor and must be rolled as grinding is done. Note the clues to accident potential due to operator stress.



II. Operating Machinery and Equipment - Problem for discussion

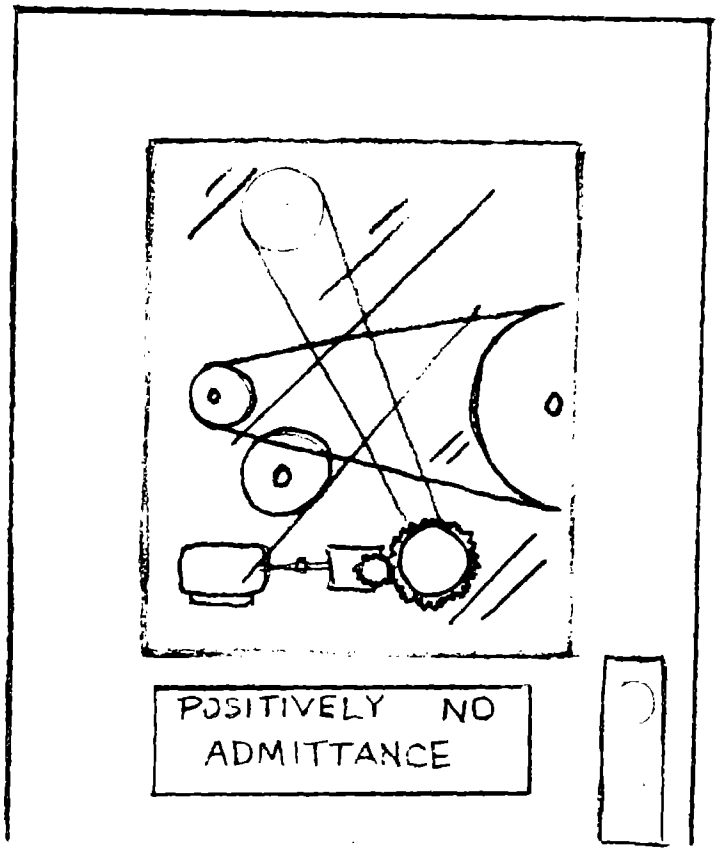
Quality of Equipment Maintenance

A freight elevator in constant use is subject to breakdowns and shows evidence of heavy use. You look for an inspection certificate but cannot find one. What are the clues to accident potentials?

II. Operating Machinery and Equipment - Problem for discussion

Quality of Equipment Maintenance

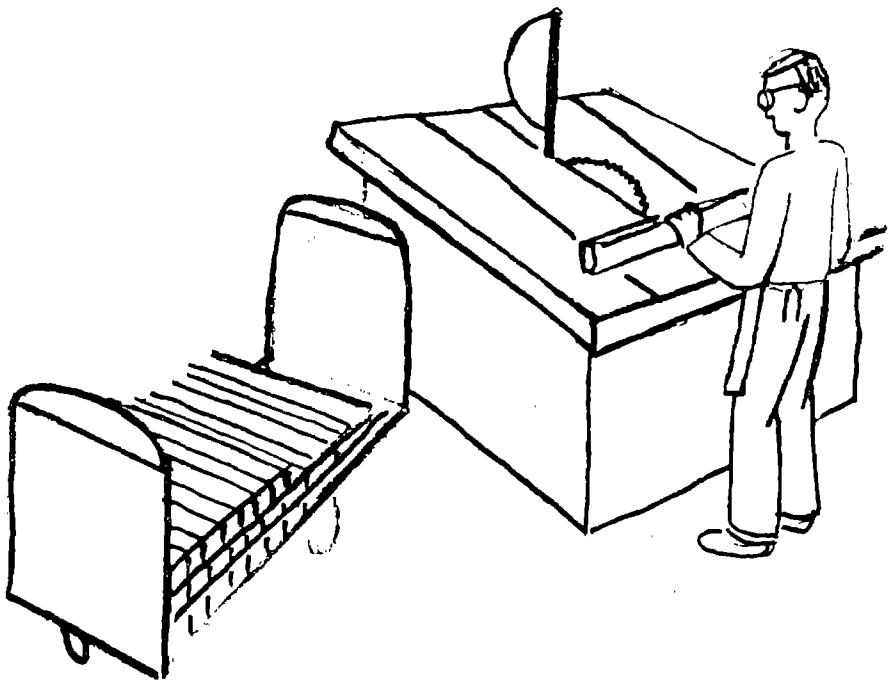
Unguarded belt drives and open rotating machinery is located in a securely locked room. Strict orders prohibit entry while the equipment is operating. What accident potential clues apply?



II. Operating Machinery and Equipment - Problem for discussion

Quality of Equipment Maintenance

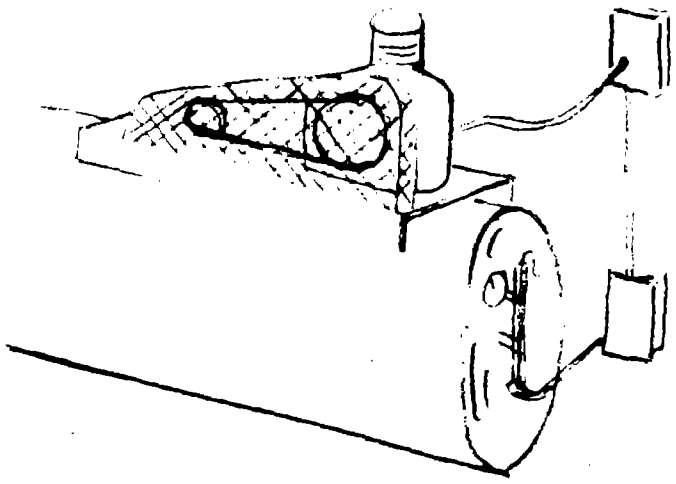
A man is using a table saw in a furniture factory to cut the ends off of 5000 pieces of wood. He is paid on a piecework basis. List the clues to accident potential.



II. Operating Machinery and Equipment - Problem for discussion

Quality of Equipment Maintenance

An air tank of 50 cubic feet capacity is supplied by a motor driven compressor. The design pressure of the tank is 240 psi and its 1¼" relief valve is set to pop at 225 psi. The pressure control valve starts the compressor at 190 psi and shuts it off at 200 psi. The system has been in use at a paper mill for 15 years. What are the clues to accident potentials?

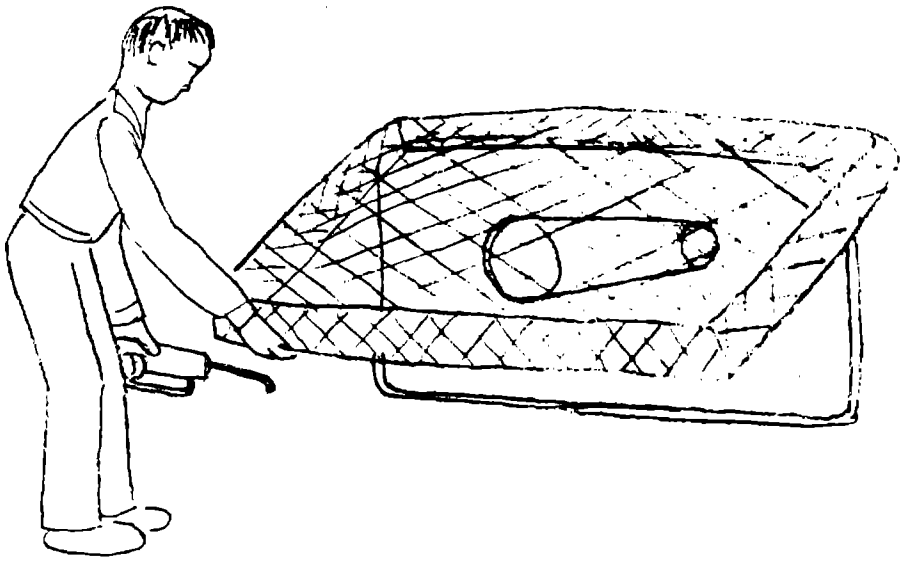


II. Operating Machinery and Equipment - Problem for discussion

Quality of Equipment Maintenance

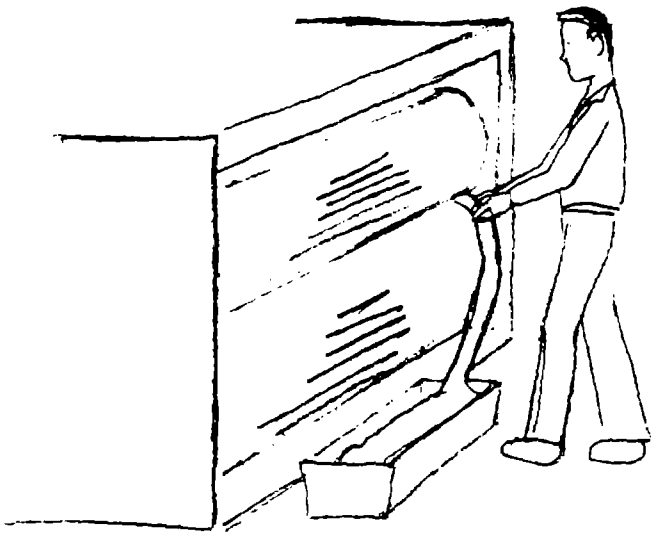
For convenience in lubricating weekly, an employee removed the wire mesh guard from a chain drive and secured it with an improvised wire hinge so that he could lift it easily.

What is the clue to quality of maintenance? What further implications are there? What other clues are present?



II. Operating Machinery and Equipment - Problem for discussion

A large calender in a plastics processing plant is being manually fed. The calender rolls are 48" long and 20" in diameter and are steam heated. The stationary guard has been removed and safety trip cables have been installed just inside the calender frame. What clues will you list?



Quiz on SECTION II

1. A freight elevator in constant use is subject to breakdowns and shows evidence of heavy use. You look for an inspection certificate but cannot find one. What are the clues to accident potentials?

2. What accident potentials would you consider in developing an operator training program for fork lift truck operators working in a grocery warehouse?

3. Give clues to accident potential associated with daily use of an air hammer for breaking up concrete paving.

4. List 15 of the 20 clues to accident potential relating to Operating Machinery and Equipment.

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 10 Length - 50 Minutes

LESSON TITLE - - Materials - Storage and Special containers

PURPOSE - -

Teach 12 clues to Accident Potential relating to Storage of Materials and Special Containers.

OBJECTIVES - -

Given 5 clues to Material Storage and 7 clues to Special Containers the student should be able to recognize the Accident Potential indicated by the clues.

SCOPE - -

Clues 38 - 49

38. Special room features
39. Isolation of materials
40. Questionable piling or stacking
41. Overcrowded conditions
42. Elaborate fire protection
43. Drums and barrels
44. Sacks and bags
45. Heavy construction or appearance
46. Small carrying and storage containers
47. Fixed tanks and bins
48. Awkward packaging
49. Gas cylinders

REFERENCES - - Reference list items 1, 3 (Ch. 16, 24,42), 7, 8, 9, 10, 14, 16, 25.

LESSON 10

III. MATERIALS

STORAGE

---

38. Special Room Features

Special floors

Curbing

Pits

Special wall features

Relief panels

Louvres and fans

Columns

Roof features

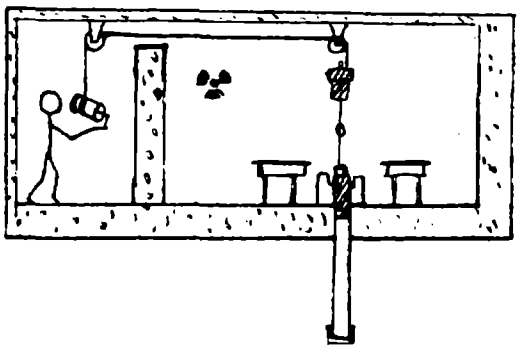
Vents

Locked doors

Heavy doors

Noise treatment

Explosion resistant cells



- -

39. Isolation of Materials

Roped off areas

Other enclosures

III. MATERIALS

STORAGE

---

40. Questionable Piling or Stacking

Raw material piling

Finished goods

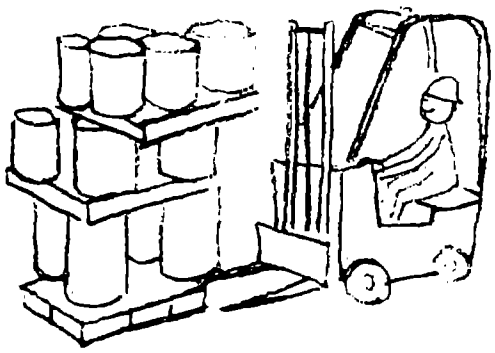
Unstable stacking

Falling materials

Fire exposure, spread

Proximity to critical equipment

Close to ceiling



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41. Overcrowded Conditions

Inadequate clearance for traffic

Blind intersections

Aisle blockage

Emergency routes blocked

STORAGE

42. Elaborate Fire Protection

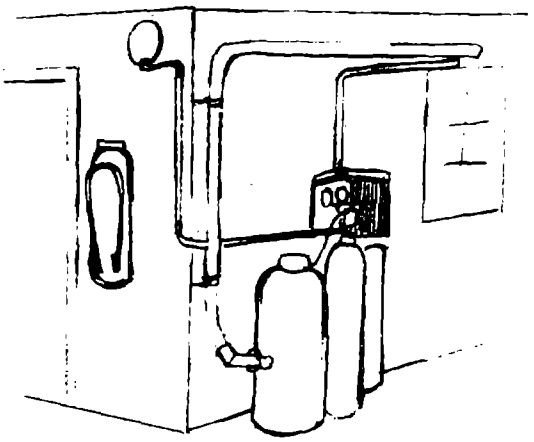
Indication of accident potential

Color coding

Fire detectors

Alarm boxes

Large extinguishers



III. MATERIALS

SPECIAL CONTAINERS

43. Drums and Barrels

Construction

Size

Contents

Handling

Filling and emptying

44. Sacks and Bags

Construction

Handling

Contents

Dust explosion potential

45. Heavy Construction or Appearance

Construction

Contents radioactive

Contents cryogenics

SPECIAL CONTAINERS

46. Small Carrying and Storage Containers

Many materials

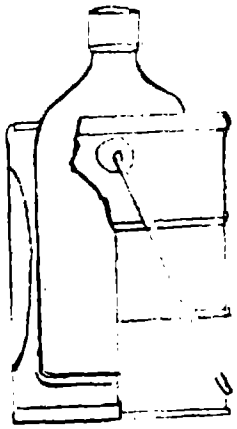
Specialized containers

Special packaging

Absorbent packing

Carrying buckets

Flammable liquid cans



47. Fixed Tanks and Bins

Contents

Material properties

Vessel entry

Falls into bins

III. MATERIALS

SPECIAL CONTAINERS

---

48. Awkward Packaging

Non-typical containers

Bundles

Stacking problems

Handling

Awkward shapes

---

49. Gas Cylinders

Portable cylinders

Clusters of cylinders

Large, fixed Cylinders

Handling

Identification

Color coding unreliable

Pressure represents accident potential

MATERIALS

KEY POINT SUMMARY

Clue 38 Special Room Features

Clue 39 Isolation of Materials

Clue 40 Questionable Piling or Stacking

Clue 41 Overcrowded Conditions

Clue 42 Elaborate Fire Protection

Clue 43 Drums and Barrels

Clue 44 Sacks and Bags

Clue 45 Heavy Construction or Appearance

Clue 46 Small Carrying and Storage Containers

Clue 47 Fixed Tanks and Bins

Clue 48 Awkward Packaging

Clue 49 Gas Cylinders

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 11 Length - 50 Minutes

LESSON TITLE - - Materials - Signs and Markings and Materials Handling

PURPOSE - -

Teach 8 clues to Accident Potential relating to Signs and Markings, also Materials Handling.

OBJECTIVES - -

Given 4 clues relating to Signs and Markings and 4 clues relating to Materials Handling, the student should be able to recognize the Accident Potential indicated by the clues.

SCOPE - -

Clues 50 - 57
50. Symbols
51. Legends
52. Color
53. No identification
54. Manual handling
55. Remote handling equipment
56. Transfer operations
57. Lifting and Hoisting

REFERENCES - - Reference list items 1, 3 (Ch. 16, 24-26), 15.

LESSON 11

III. MATERIALS

SIGNS AND MARKINGS

---

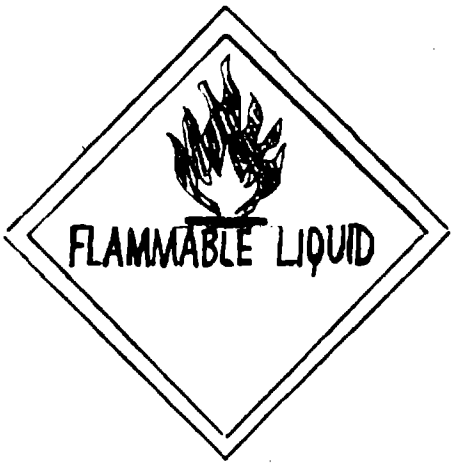
50. Symbols

Language barriers

Shipping labels

Symbols for:

- Flammables
- Poisons
- Corrosives
- Oxidizers
- Explosives
- Compressed gas
- Radioactive materials
- Biological agents
- Water reactive materials
- Laser beams
- Electricity
- Traffic



Numbers

NFPA diamonds

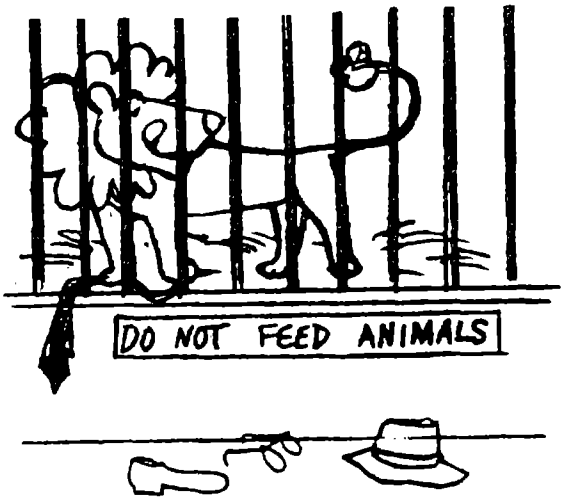
- - - - - - - - - - - - - - - - -

51. Legends

Alert - Danger, Caution

Precautionary labels

Names of contents



III. MATERIALS

SIGNS AND SYMBOLS

52. Color

Significance questionable

Red- stop, flammables, fire protection

Yellow- caution

Green- go, safety

Blue- notice

53. Absence of Identification

Complex system

Costly errors

Contents of containers unidentified

Tank contents

III. MATERIALS

MATERIALS HANDLING

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54. Manual Handling

Actions involved

Work difficult, strenuous, awkward

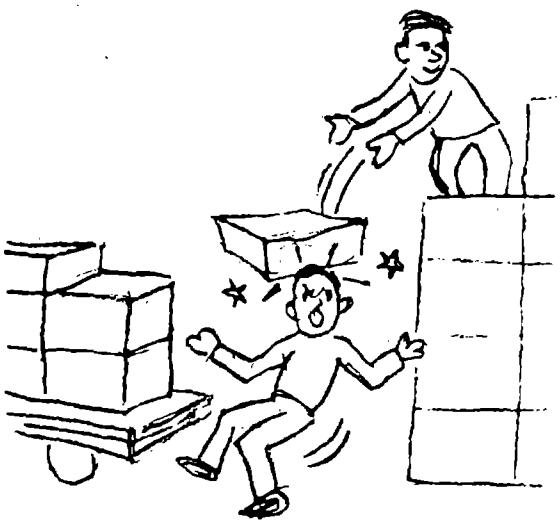
Shape of object

Weight

Carrying

Stairs, ramps, etc.

Injuries



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55. Remote Handling Equipment

Tongs for hot materials

Feeding devices for presses

Slave arms

MATERIALS HANDLING

56. Transfer Operations

Pile to pile

Room to room, etc.

Unpowered devices

- Carts
- Hand-trucks

Powered devices

- Fork trucks
- Earth movers
- Road vehicles

Conveyors

- Airveyors
- Belts
- Buckets
- Vibrators

Damage potential

Injury potential

Noise

MATERIALS HANDLING

57. Lifting and Hoisting

Gravity factor

Hoists

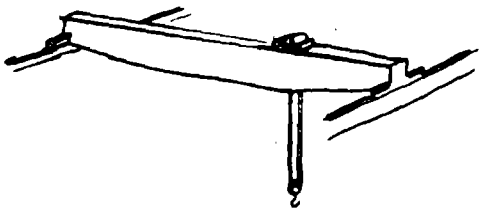
Cranes

Conveyors

Dropping

Striking

Improper placement



III. MATERIALS

KEY POINT SUMMARY

Clue 38 Special Room Features

Clue 39 Isolation of Materials

Clue 40 Questionable Piling or Stacking

Clue 41 Overcrowded Conditions

Clue 42 Elaborate Fire Protection

Clue 43 Drums and Barrels

Clue 44 Sacks and Bags

Clue 45 Heavy Construction or Appearance

Clue 46 Small Carrying and Storage Containers

Clue 47 Fixed Tanks and Bins

Clue 48 Awkward Packaging

Clue 49 Gas Cylinders

Clue 50 Symbols

Clue 51 Legends

Clue 52 Color

Clue 53 No Identification

Clue 54 Manual Handling

Clue 55 Remote Handling Equipment

Clue 56 Transfer Operations

Clue 57 Lifting and Hoisting

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 12 Length - 50 Minutes

LESSON TITLE - - Workshop on Materials

PURPOSE - -

Reinforce learning of clues 1 - 57, with emphasis on clues 38 - 57 on materials. Skill in using the clues learned thus far is developed by application in hypothetical problems.

OBJECTIVES - -

Given a variety of problem situations, the student should be able to identify 80% of the applicable clues to Accident Potential Recognition.

SCOPE - -

1. Review clues 38 - 57 on Materials.
2. Discuss problems on Materials.
3. Discuss application of clues to problem situations described by members of the class.
4. Quiz No. 3.

REFERENCES - - None

ACCIDENT POTENTIAL RECOGNITION

I. SITE AND STRUCTURES

1. Complex traffic patterns
2. Undesirable landscaping or vegetation
3. Questionable location of utilities
4. Neighborhood problems
5. Opportunities to fall
6. Unusual weather conditions
7. Discharge to the environment
8. Inadequate lighting
9. Large single area
10. Isolated structure
11. Special Construction
12. Temporary structures
13. Recent change
14. Deterioration
15. Deformation
16. Evidence of poor housekeeping
17. Electrical repair problems

II. OPERATING MACHINERY AND EQUIPMENT

18. Rotating motion
19. Reciprocating motion
20. In-running nip points
21. Cutting operations
22. Punching, shearing, forming
23. Inconvenient location of "start and stop"
24. Special control devices
25. Lock-out provisions
26. Portable power tools
27. Powder actuated tools
28. Hand tools
29. In-plant vehicles
30. Heavy electrical equipment
31. Repetitive motion
32. Awkward working position
33. Physical overload
34. Noise exposure
35. Vibration exposure
36. Improvised guarding
37. Certificates of inspection

III. MATERIALS

38. Special room features
39. Isolation of materials
40. Questionable piling or stacking
41. Overcrowded conditions
42. Elaborate fire protection
43. Drums and barrels
44. Sacks and bags
45. Heavy construction or appearance
46. Small carrying and storage containers
47. Fixed tanks and bins
48. Awkward packaging
49. Gas cylinders
50. Symbols
51. Legends
52. Color
53. No identification
54. Manual handling
55. Remote handling equipment
56. Transfer operations
57. Lifting and hoisting

III. Materials - Problems for discussion

Storage

A small metal building in a refinery is posted as follows:

Keep Out
Lead Tetraethyl
Authorized Personnel Only

What are the clues to accident potential?

Discussion of Special Room Features included the following:

Floors
Curbing
Walls
Ventilation
Fire protection on support columns
Roofs and ceilings

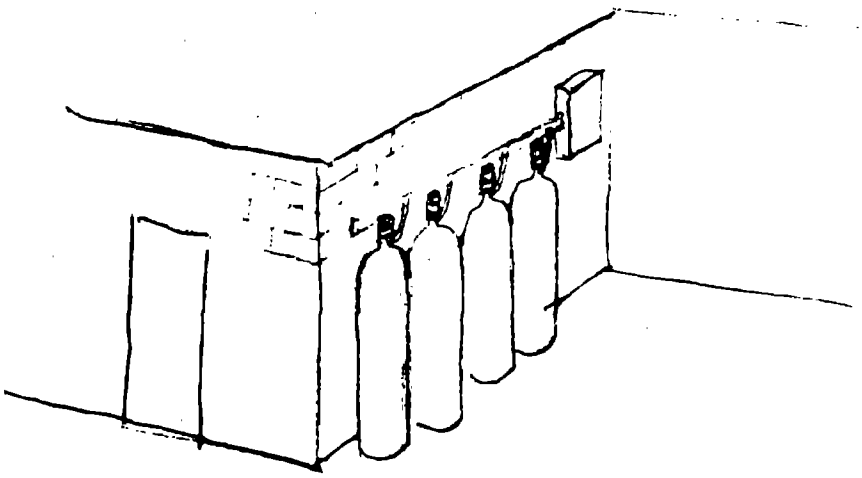
Name six other parts of the building that might furnish clues to accident potential.

III. Materials - Problem for discussion

Storage

In a furniture plant you see a concrete block walled room with a metal door. Outside the room you see four red cylinders attached to a piping manifold.

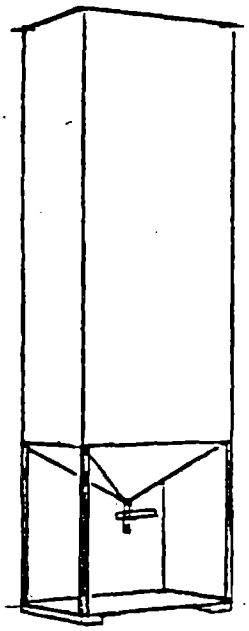
What accident potential clues related to storage to you observe? What others?



III. Materials - Problem for discussion

Special Containers

Large stainless steel portable bins are filled with a fine powder and moved by fork truck either to a warehouse or into a truck trailer for shipment. What accident potential clue do you see in operations with this type of container?



III. Materials - Problem for discussion

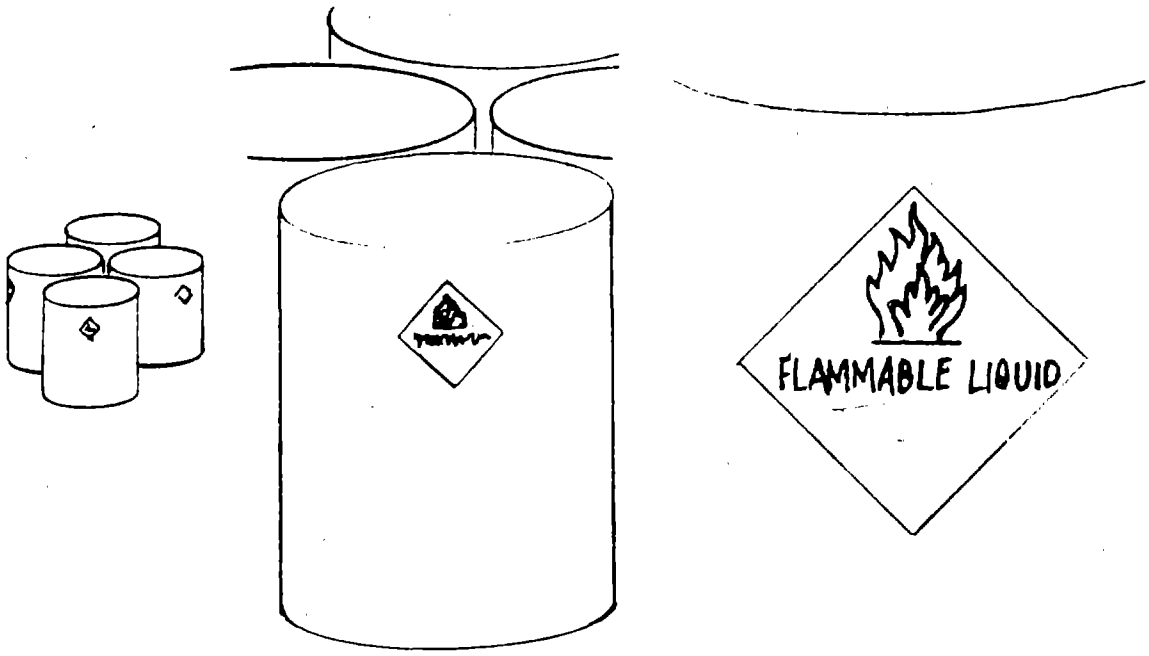
Special Containers

In a metal working plant you see 20 rusty drums in apparent disuse. A yellow plastic tape has been stretched around them. Clues?

III. Materials - Problem for discussion

Signs and Markings

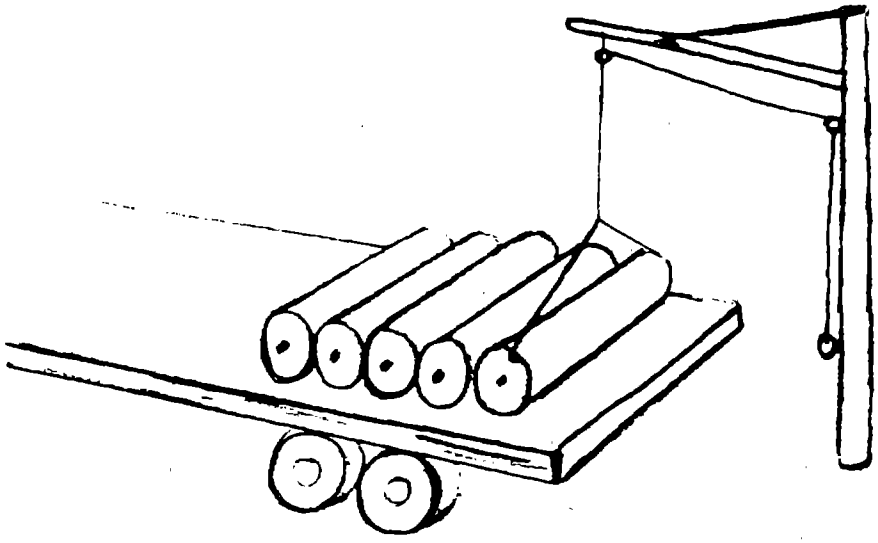
In a truck terminal you see a number of round 5 gallon cans with red diamond shaped labels. As you look closer you see a flame pattern in the upper corner of each label. When you are still closer you read FLAMMABLE LIQUID across the label. Similar cans in another area have no labels. How many clues are combined on this label? What are they? What other clues are present?



III. Materials - Problem for discussion

Materials Handling

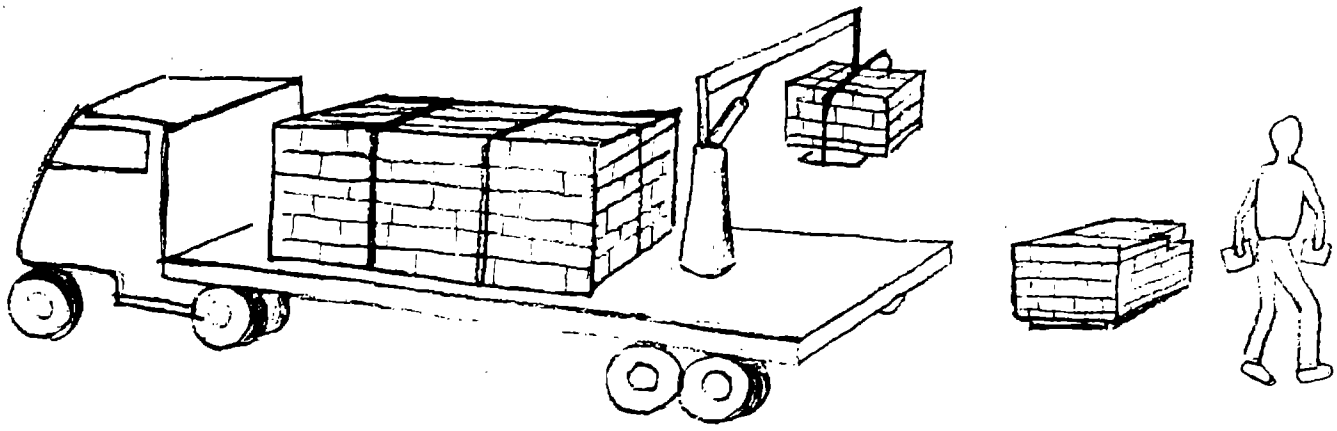
At a municipal water treatment plant you see a flat bed truck unloading some cylinders about 2 feet in diameter and 7-8 feet long. You aren't close enough to read the markings. What are the clues to accident potentials?



III. Materials - Problem for discussion

Materials Handling

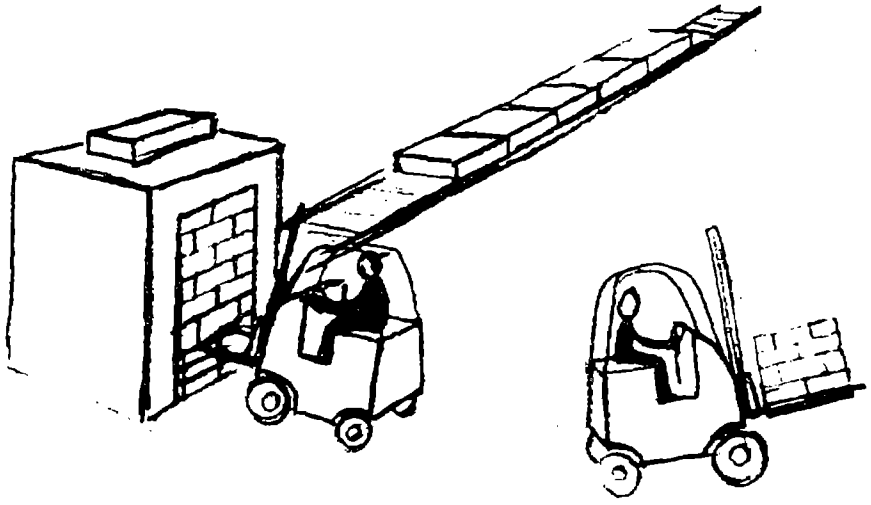
A special truck arrives at a building site with a load of cinder blocks on pallets. The driver unloads the blocks using a winch on the truck. Laborers carry the blocks to the masons. Identify the materials handling clues to accident potential. What other clues do you list?



III. Materials - Problem for discussion

Materials Handling

Cases of soft drinks in cans move by conveyor belt from the filling machine to an automatic pallet stacker. Filled pallets are moved to storage by fork trucks. A pallet is filled every eight minutes. What accident potential do you see?



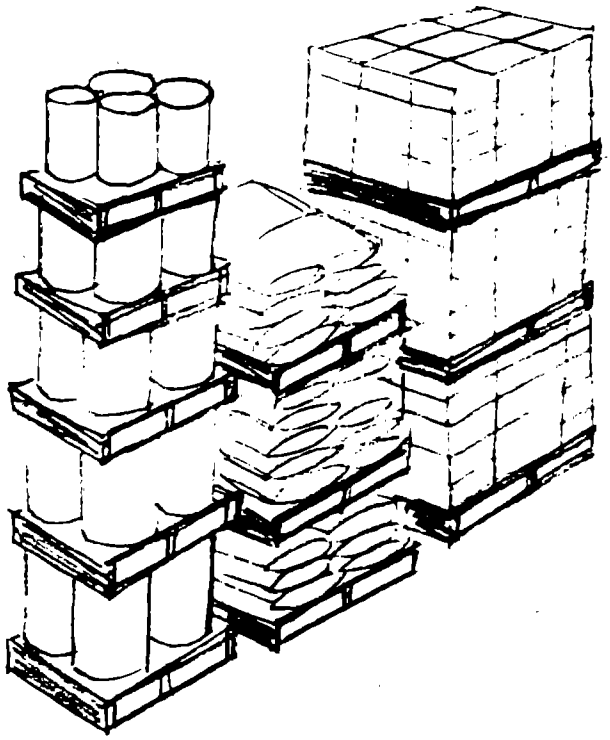
III. Materials - Problem for discussion

A storage facility for a large plant is to be given a thorough inspection. You have only a few minutes to walk through and identify accident potential prior to making a detailed proposal to do the survey. Identify accident potential clues with each of the following:

a. Mobile crane loading pipe on truck
b. Drums with red diamond shape labels
c. Large balled trees
d. Gas cylinders being unloaded with a fork lift
e. Man filling safety cans from drums under a shed
f. Tanks adjacent to property
g. Bags of cement on pallets stacked 5 tiers high

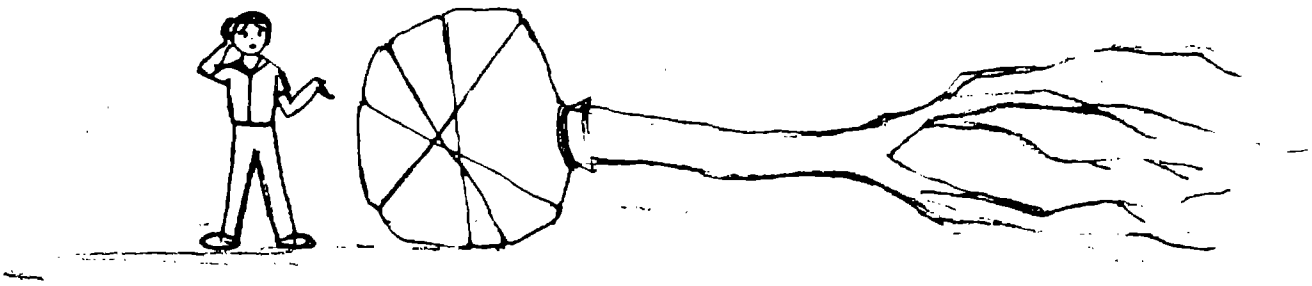
III. Materials - Problem for discussion

In a food processing plant warehouse you observe: Bags of starch and powdered sugar on pallets, stacked three pallets high; drums of vegetable oil on pallets, stacked five pallets high, three feet from ceiling joists; cartons of canned and packaged products on pallets, stacked three pallets high. What are the clues to accident potential?



III. Materials - Problem for discussion

A nursery has dug up a number of large trees and is preparing to deliver them to a customer and plant them. Root balls 6-8 feet in diameter must be handled carefully. What accident potential do you see due to this shape?



Quiz on SECTION III

1. A brewery warehouse is divided into two completely separate areas. A large room contains stainless steel vats in one end and pallets of metal kegs in the other end. In the second storeroom are empty kegs on pallets, burlap bags of hops and other dry materials, also on pallets, and a number of gas cylinders secured along the wall. A railroad hopper car is unloading grain by means of a conveyor just outside the building. What clues related to special containers do you observe? Name other clues applicable.

2. An agricultural chemical warehouse stores and ships daily hundreds of kraft paper bags filled with insecticides and other dry powders used by farmers. Some bags are on pallets but others are lined up on the floor. They are moved manually as well as by fork truck. What are the accident potential clues?

3. When you visit a large paper mill you see a dozen tanks 18 to 20 feet in diameter and about the same height. No markings on the tanks give clues as to contents. What clues to accident potential do you note?

4. List 15 of the 20 clues to accident potential relating to Materials.

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 13 Length - 50 Minutes

LESSON TITLE - - Energy - Electrical, Thermal, and Mechanical

PURPOSE - -

Teach 10 clues on Electrical, Thermal, and Mechanical Energy.

OBJECTIVES - -

Given 3 clues relating to Electrical Energy, 4 clues relating to Thermal Energy, and 3 clues relating to Mechanical Energy, the student should be able to recognize the Accident Potential indicated by the clues.

SCOPE - -

Clues 58 - 67
58. Abnormal amount of electrical equipment
59. Voltage signs and barriers
60. Sparking and arcing
61. Sensation of heat
62. Open flame
63. Heat evidence
64. Existence of low temperature
65. High velocity motion
66. Sharp and pointed objects
67. Heavy objects

REFERENCES - - Reference list items, 1, 3 (Ch. 33, 34, 36, 37, 41), 4, 8, 10, 13, 23, 24, 26.

LESSON 13

IV. ENERGY

ELECTRICAL ENERGY

---

58. Abnormal Amount of Electrical Equipment

Control panels

Hot plates

Motors

Conduits, cables

Overhead bus bars

Switchgear

Signal lights

Maintenance, testing

- -

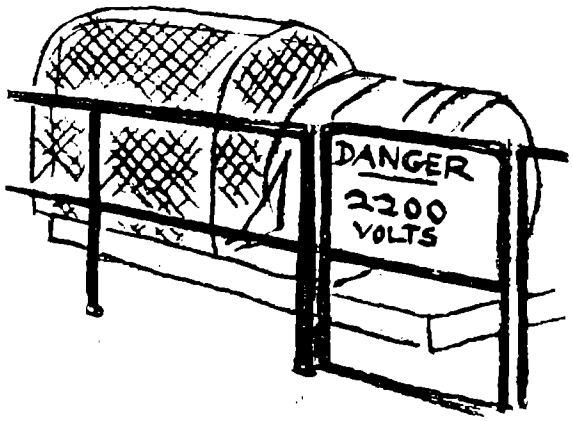
59. Voltage Signs and Barriers

Signs on equipment

Signs on rooms

Ropes and barriers

Locked rooms



ELECTRICAL ENERGY

60. Sparking and Arcing

Accidental shorts

Welding arc

Shields

Sliding contact arcs

Knife switch arcs

IV. ENERGY

THERMAL ENERGY

---

61. Sensation of Heat

Heat felt

Furnaces

Ovens

Reactors

Dryers

Acclimatization

Hot pipes

Perspiration

Injury

- -

62. Open Flame

Burners

Torches

Stoves

Burns

Flame-out problem

Ignition potential

IV. ENERGY

THERMAL ENERGY

63. Heat Evidence

Discoloration of metals

Charring of wood

Paint blistered

Cloth scorched

Fumes smelled

Composition altered

64. Existence of Low Temperature

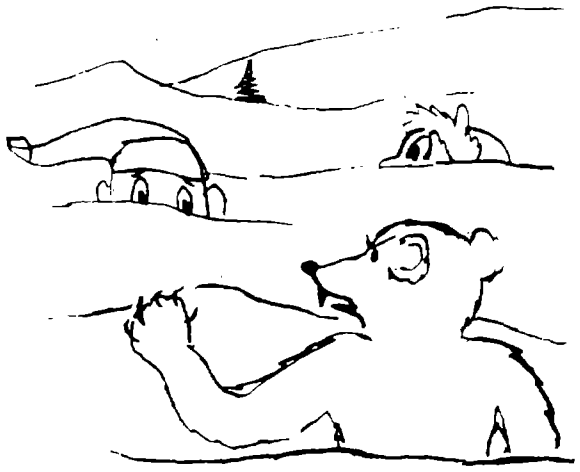
Frost

Gas leaks

Cold storage facilities

Construction

Door operation



MECHANICAL ENERGY

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65. High Velocity Motion

Small objects, high speed

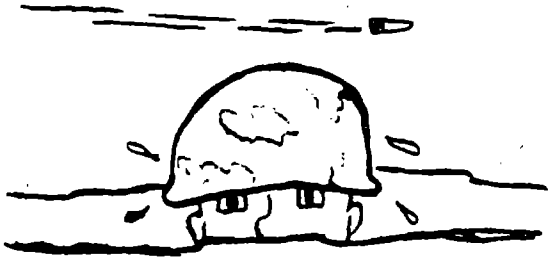
Sand blasting

Impact vs velocity

Flywheel

Grinding wheel

Wind propelled objects



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66. Sharp and Pointed Objects

Shape factor

Knives, chisels

Picks, punches, needles

Paper shears

Punch press dies

MECHANICAL ENERGY

---

67. Heavy Objects

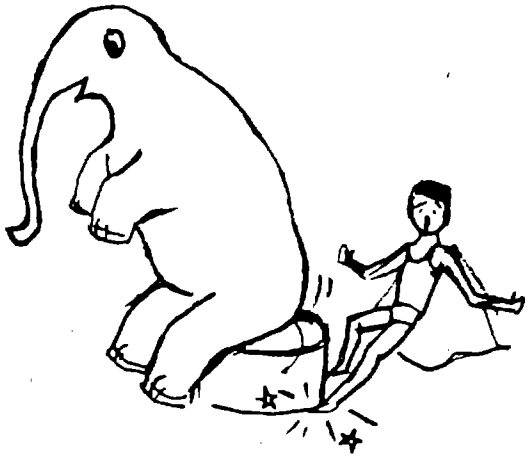
Weight factor

Potential to fall

Inertia effects

Man's weight

Combinations of energy factors



IV. ENERGY

KEY POINT SUMMARY A

ELECTRICAL

- Clue 58 Abnormal Amount of Electrical Equipment
- Clue 59 Voltage Signs and Barriers
- Clue 60 Sparking and Arcing

THERMAL

- Clue 61 Sensation of Heat
- Clue 62 Open Flame
- Clue 63 Heat Evidence
- Clue 64 Existence of Low Temperature

MECHANICAL

- Clue 65 High Velocity Motion
- Clue 66 Sharp and Pointed Objects
- Clue 67 Heavy Objects

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE OT PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 14 Length - 50 Minutes

LESSON TITLE - - Energy - Chemical, Radiation, and Operating Provisions

PURPOSE - -

Teach 13 clues on Chemical Energy, Radiation Energy, and Operating Provisions.

OBJECTIVES - -

Given 4 clues relating to Chemical Energy, 2 clues relating to Ionizing Radiation, and 1 clue on Non-Ionizing Radiation, the student should be able to recognize the Accident Potential indicated by the clues.

Given 6 clues relating to Operating Provisions the student should be able to recognize the Energy related Accident Potential indicated by the clues.

SCOPE - -

Clues 68 - 80

68. Personal irritation
69. Observable fumes, vapors, mists
70. Particle accumulation
71. Corrosion and deterioration
72. Special storage and containers
73. Unique measuring equipment
74. Unusual light
75. Existence of machine guarding
76. Existence of ventilation
77. Energy absorbing materials
78. Personal protective equipment
79. Operator reactions
80. Pressure relief devices

REFERENCES - - Reference list items 1, 3 (Ch. 19, 29, 36 - 39, 44), 4, 6, 7, 10, 11, 13, 20, 21, 22, 26.

LESSON 14

IV. ENERGY

CHEMICAL ENERGY

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68. Personal Irritation

Eyes water

Skin itches

Throat irritated

Respiratory difficulty

Odors

Lack of odor

Protective clothing or equipment

- -

69. Observable Fumes, Vapors and Mists

White stack effluent

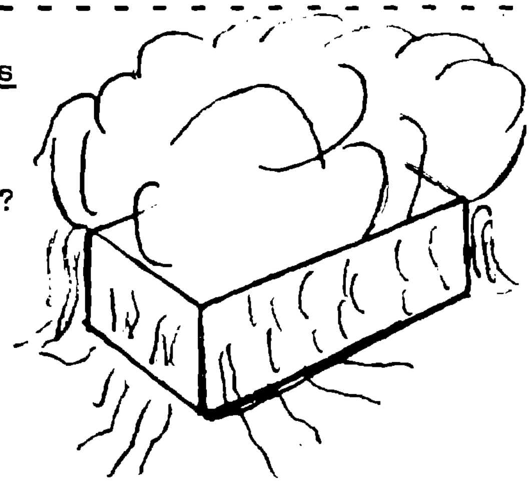
Water Vapor or accident potential?

Invisible discharge

Visual distortion

Open vats

Tank tops



CHEMICAL ENERGY

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70. Particle Accumulation

Dust in the air

Dust on surfaces

Explosion potential

Silica - lung effects

Toxic dusts

- -

71. Corrosion and Deterioration

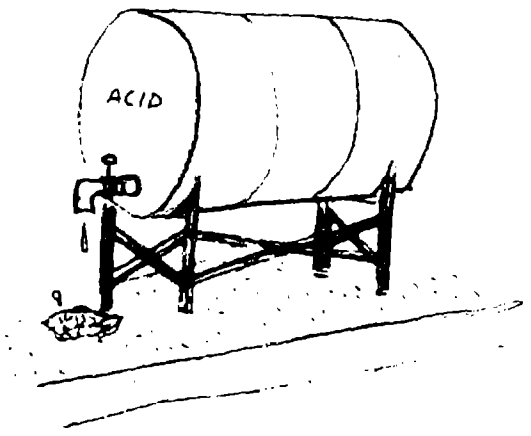
Chemical damage to materials

Corrosion

Stains

Action on paint

Evidence of spills



IONIZING RADIATION

72. Special Storage and Containers

Senses not responsive

Detected by instruments

Signs

Special construction, shielding

Heavy containers

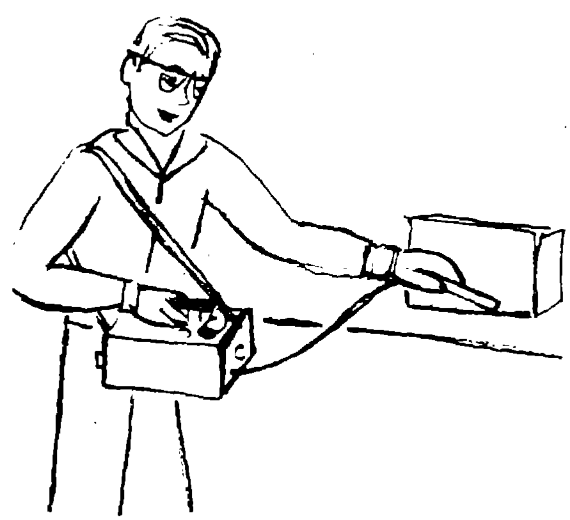
Remote handling devices

Special disposal

73. Unique Measuring Equipment

Thick identification badges

Fountain pin size instruments



NON-IONIZING RADIATION

74. Unusual Light

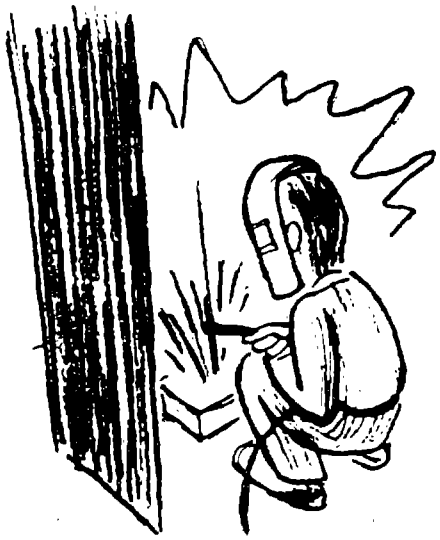
Infrared

Ultraviolet

Lasers

Masers

Microwaves



IV. ENERGY

OPERATING PROVISIONS

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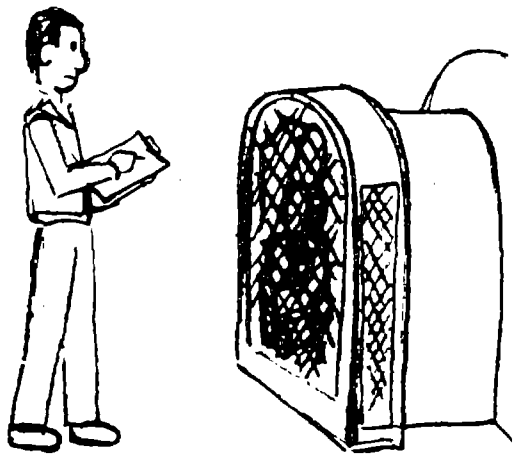
75. Existence of Machine Guarding



Saws

Other rotating equipment

Electrical equipment

Special tools

Insulating blankets and covers

Pipe covers

Splash shields

Lead shields for radiation

UV filters and screens

- -

76. Existence of Ventilation

Heat removal

Particle removal

Removal of toxic vapor, gas, dust

Removal of radioactive dusts

IV. ENERGY

OPERATING PROVISIONS

77. Energy Absorbing Materials

Blasting mats

Earth banks

Acoustical tile

Acoustical enclosures

Barricades against vehicle damage

Protective cages

78. Personal Protective Equipment

Eye protection

Face shields

Breathing apparatus

Gloves

Special clothing

Safety shoes

Ear protection

Thermal protection

Disposable clothing

OPERATING PROVISIONS

79. Operator Reactions

Perspiration

Electric contact

Heavy breathing

Eye irritation, rubbing

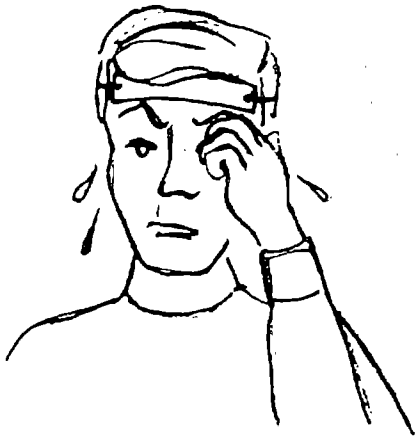
Skin irritation, scratching

Strain to hear

Reactions to cold

Drowsiness

Efforts to shield, compensate, or avoid



80. Pressure Relief Devices

Stored energy

IV. ENERGY

KEY POINT SUMMARY B

CHEMICAL

- Clue 68 Personal Irritation
- Clue 69 Observable Fumes, Vapors, Mists
- Clue 70 Particle Accumulation
- Clue 71 Corrosion and Deterioration

IONIZING RADIATION

- Clue 72 Special Storage and Containers
- Clue 73 Unique Measuring Equipment

NON-IONIZING RADIATION

- Clue 74 Unusual Light

OPERATING PROVISIONS

- Clue 75 Existence of Machine Guarding
- Clue 76 Existence of Ventilation
- Clue 77 Energy Absorbing Materials
- Clue 78 Personal Protective Equipment
- Clue 79 Operator Reactions
- Clue 80 Pressure Relief Devices

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 15 Length - 50 Minutes

LESSON TITLE - - Workshop on Energy

PURPOSE - -

Reinforce learning of clues 58 - 80. Skill in using the clues learned is developed by application to described situations.

OBJECTIVES - -

Given various problem situations the student should be able to identify 80% of the applicable clues to Accident Potential Recognition.

SCOPE - -

1. Review clues 58 - 80 on Energy.
2. Discuss problems on Energy.
3. Discuss application of clues to problems or situations described by class members.

REFERENCES - - Items cited in Lessons 13 and 14.

ACCIDENT POTENTIAL RECOGNITION

I. SITE AND STRUCTURES

1. Complex traffic patterns
2. Undesirable landscaping or vegetation
3. Questionable location of utilities
4. Neighborhood problems
5. Opportunities to fall
6. Unusual weather conditions
7. Discharge to the environment
8. Inadequate lighting
9. Large single area
10. Isolated structure
11. Special construction
12. Temporary structures
13. Recent change
14. Deterioration
15. Deformation
16. Evidence of poor housekeeping
17. Electrical repair problems

II. OPERATING MACHINERY AND EQUIPMENT

18. Rotating motion
19. Reciprocating motion
20. In-running nip points
21. Cutting operations
22. Punching, shearing, forming
23. Inconvenient location of "start and stop"
24. Special control devices
25. Lock-out provisions
26. Portable power tools
27. Powder actuated tools
28. Hand tools
29. In-plant vehicles
30. Heavy electrical equpment
31. Repetitive motion
32. Awkward working position
33. Physical overload
34. Noise exposure
35. Vibration exposure
36. Improvised guarding
37. Certificates of inspection

III. MATERIALS

38. Special room features
39. Isolation of materials
40. Questionable piling or stacking
41. Overcrowded conditions
42. Elaborate fire protection
43. Drums and barrels
44. Sacks and bags
45. Heavy construction or appearance
46. Small carrying and storage containers
47. Fixed tanks and bins
48. Awkward packaging
49. Gas cylinders
50. Symbols
51. Legends
52. Color
53. No identification
54. Manual handling
55. Remote handling equipment
56. Transfer operations
57. Lifting and hoisting

IV. ENERGY

58. Abnormal amount of electrical equipment
59. Voltage signs and barriers
60. Sparking and arcing
61. Sensation of heat
62. Open flame
63. Heat evidence
64. Existence of low temperature
65. High velocity motion
66. Sharp and pointed objects
67. Heavy objects
68. Personal irritation
69. Observable fumes, vapors, mists
70. Particle accumulation
71. Corrosion and deterioration
72. Special storage and containers
73. Unique measuring equipment
74. Unusual light
75. Existence of machine guarding
76. Existence of ventilation
77. Energy absorbing materials
78. Personal protective equipment
79. Operator reactions
80. Pressure relief devices

IV. Energy - Problem for discussion

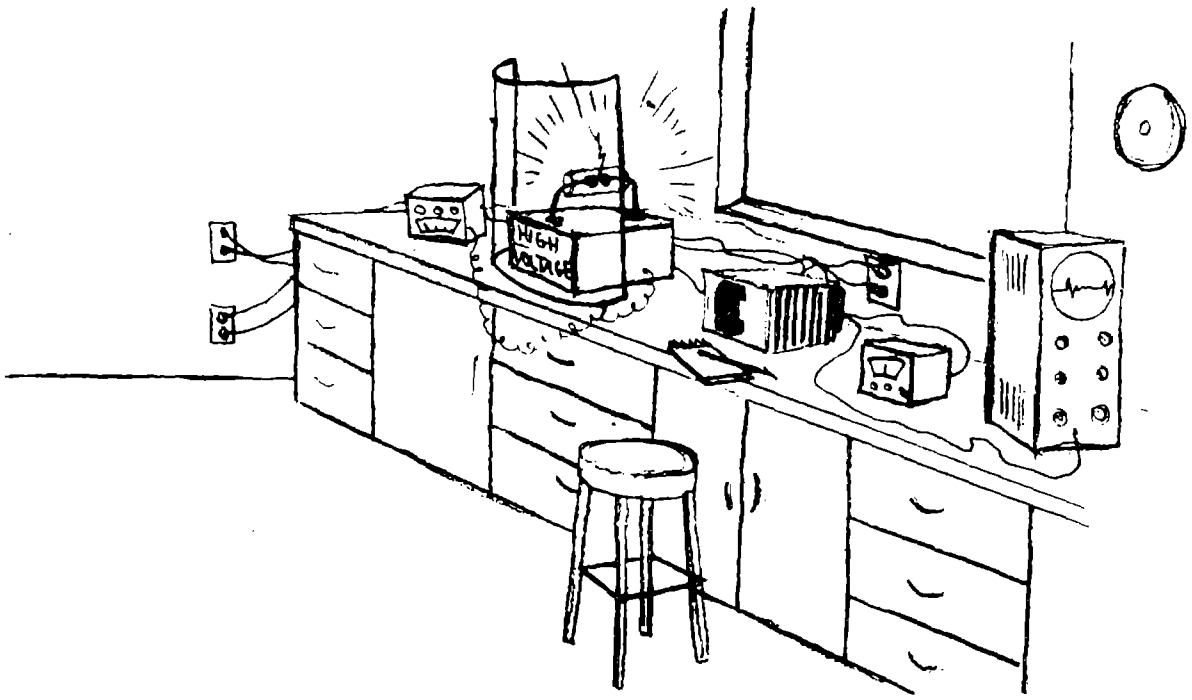
Electrical

A large exhibit hall is filled with booths, brightly lighted and containing numerous pieces of operating equipment and displays. Based on your recollection of such an exhibition, discuss the accident potential clues represented by the use of electrical energy.

IV. Energy - Problem for Discussion

Electrical

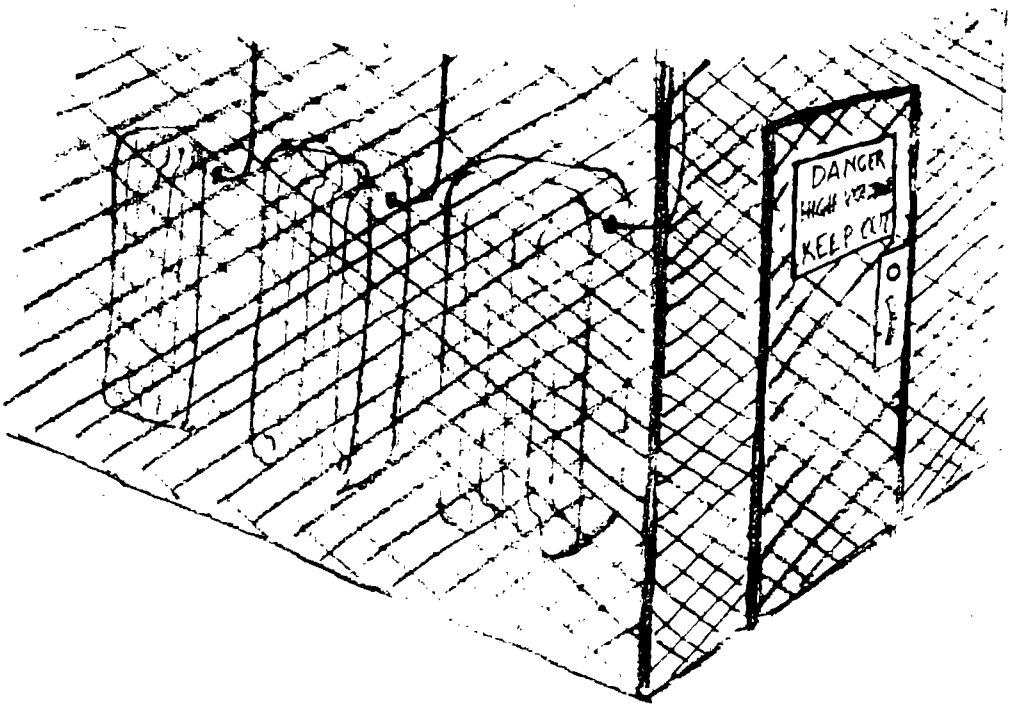
A research laboratory is filled with experimental electrical and electronic devices. A plastic shield surrounds a chamber labeled HIGH VOLTAGE. A warning bell rings and a bright flash is followed by a sharp report. What accident potential clues related to electrical energy do you perceive? What other clues?



IV. Energy - Problem for discussion

Electrical

A wire mesh cage surrounds a bank of transformers in the basement of a building. The door of the cage is locked and a sign reads, DANGER-HIGH VOLTAGE-KEEP OUT. What are the accident potential clues?



IV. Energy - Problem for discussion

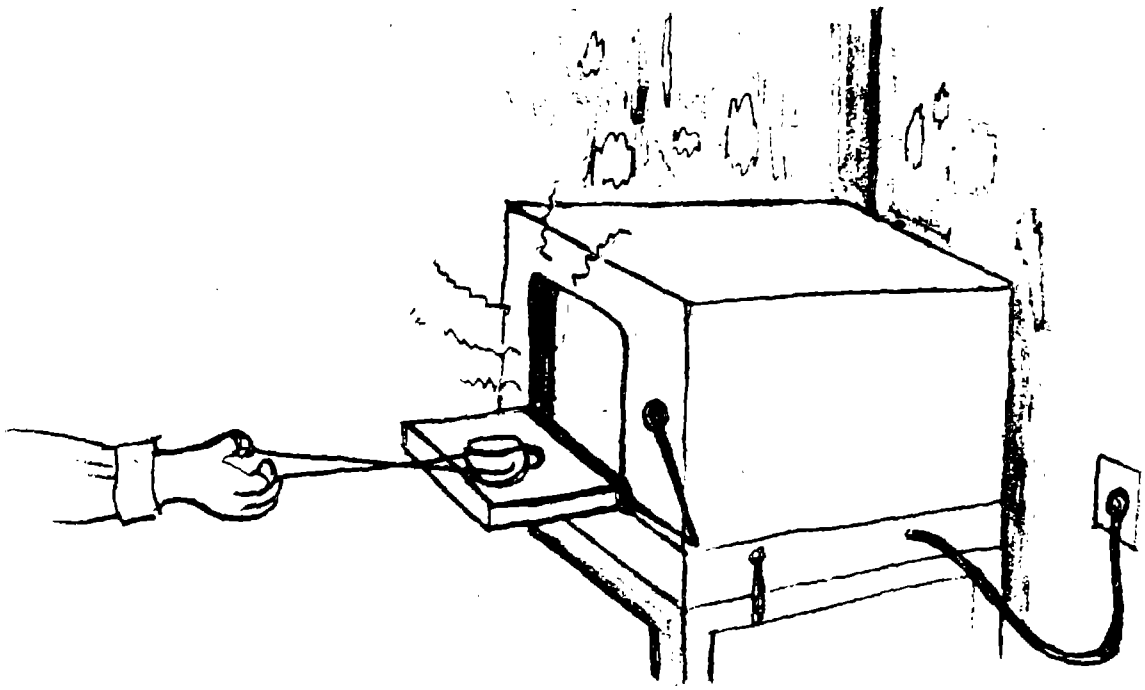
Thermal

A possible shortage of natural gas led to the installation of oil burners on the boilers. List the clues to accident potentials with the new installation.

IV. Energy - Problem for discussion

Thermal

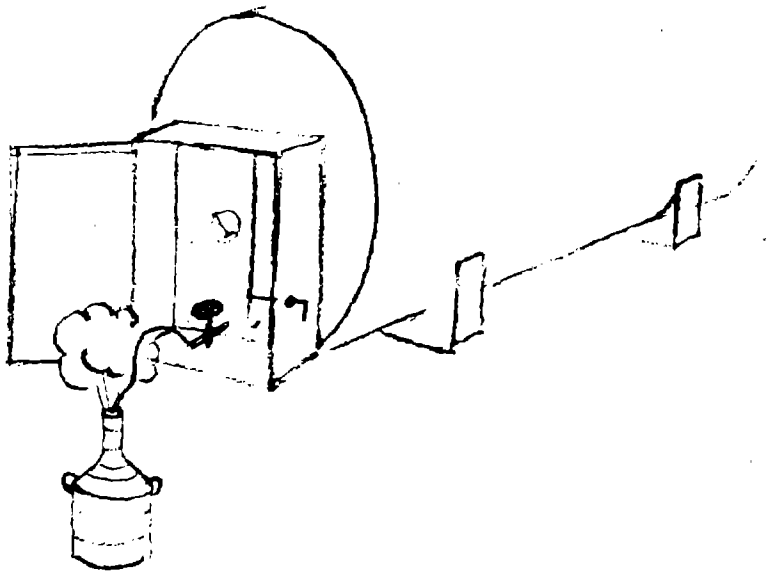
Paint is discolored and blistered on the wall and ceiling above an electrical ceramic kiln. Is there accident potential? What are the clues?



IV. Energy - Problem for discussion

Thermal

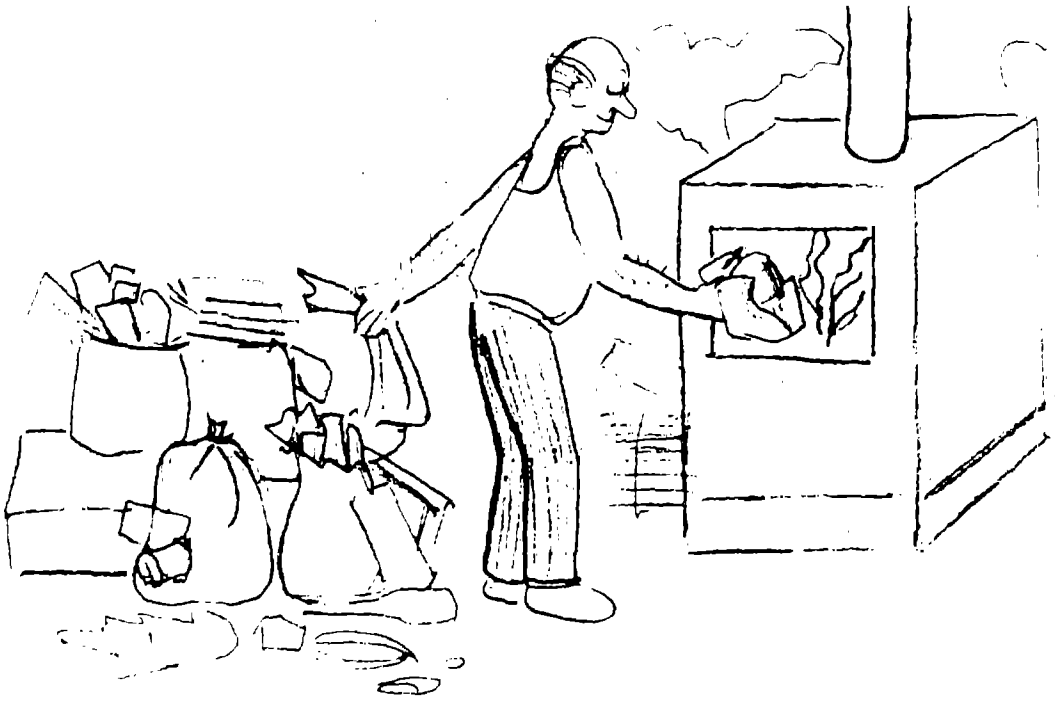
A laboratory uses liquid nitrogen at -196C (-320F) in cooling baths. The liquid is withdrawn from a special 150-gallon tank into a 5-gallon thermos-type container for transfer into the laboratory. It is withdrawn from this portable container for use in the test equipment. What accident potential do you see?



IV. Energy - Problem for discussion

Thermal

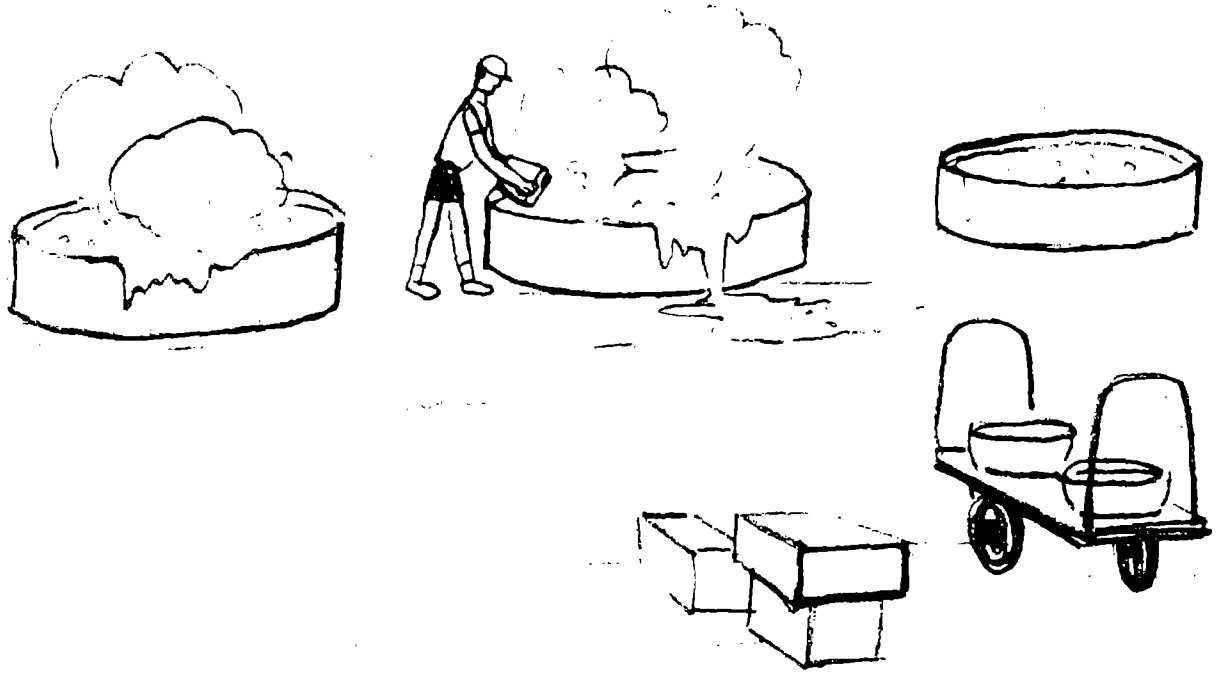
You trace a penetrating smokey odor to the incinerator in the basement of your apartment house where the custodian is burning a substantial accumulation of rubbish and scrap material. The room is extremely hot and the flue pipe is at dull red heat. List the accident potential clues to thermal energy. List other clues observed.



IV. Energy - Problem for discussion

Thermal

Large steam jacketed kettles are used in a food processing plant to cook various products. The temperature and humidity in the room are very high. What accident potential clues are seen?



IV. Energy - Problem for discussion

Thermal

A welder goes into a four foot diameter vessel as soon as its temperature has been lowered sufficiently to make a repair. List the accident potential clues.

IV. Energy - Problem for discussion

Mechanical Energy

A repair crew is driving rail spikes with sledge hammers. List the accident potential clues relating to mechanical energy. Other clues?

IV. Energy - Problem for discussion

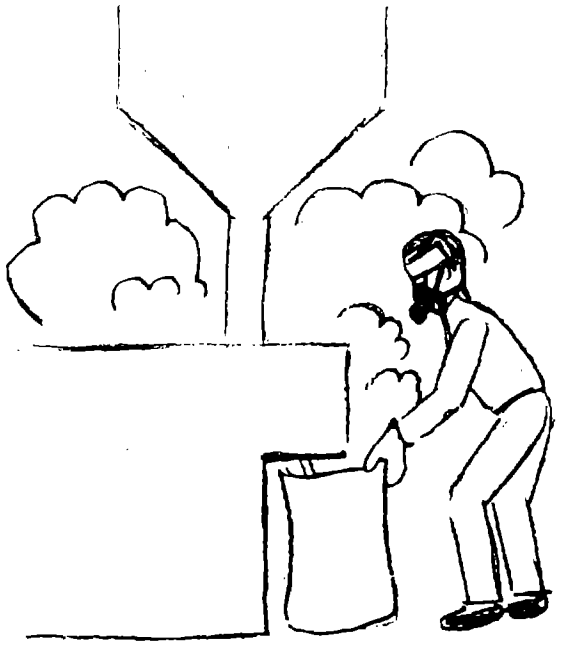
Mechanical Energy

In a railway yard trains are made up by starting freight cards down various stretches of track and allowing them to coast to the string of cars with which they are to be dispatched. Discuss the accident potential.

IV. Energy - Problem for discussion

Chemical

You are observing a bag filling operation in a plant that manufactures insecticides. You detect a pungent odor and see that the man filling the bags is wearing gloves and a respirator. Dust, emitted as bags are filled, can be seen on the floor and most other surfaces in the room. What are the clues to chemical energy accident potential? What other clues?



IV. Energy - Problem for discussion

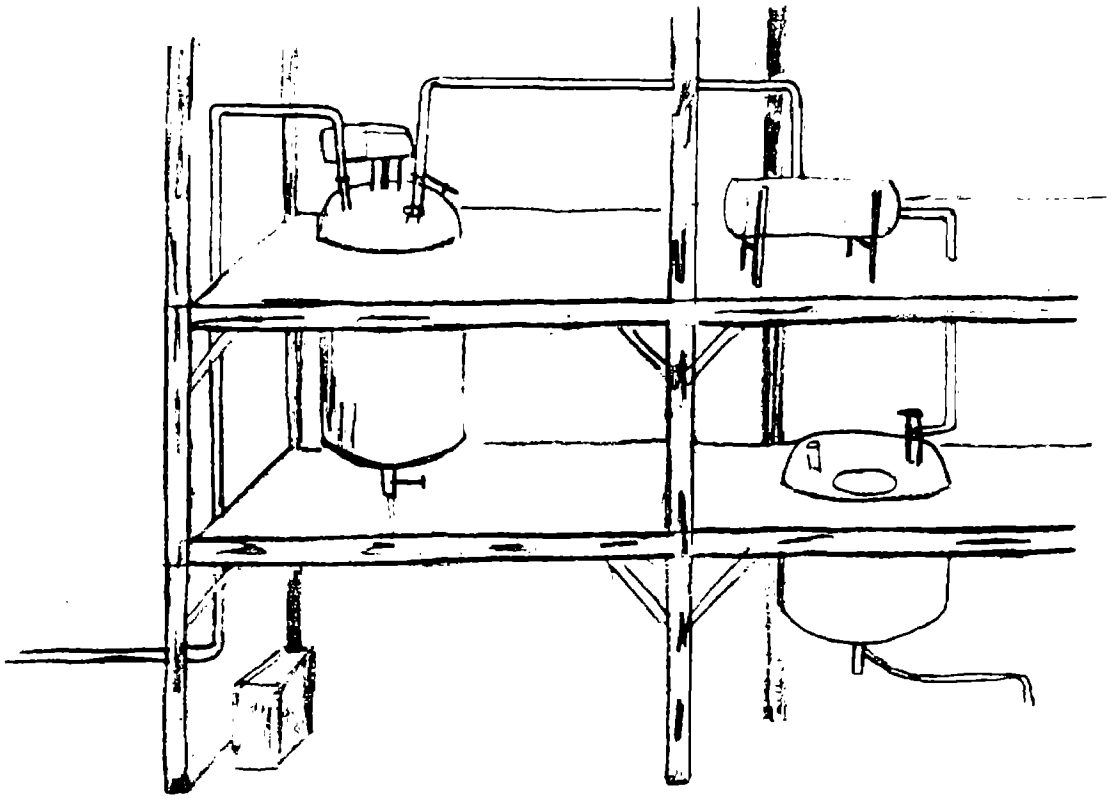
Chemical

Powdered coal is fed to the boilers of a power plant. In the room where crushers are operating you observe dust in the air rising from the crushers and also see accumulations on all horizontal surfaces, including structural steel members. Discuss the accident potential.

IV. Energy - Problem for discussion

Chemical

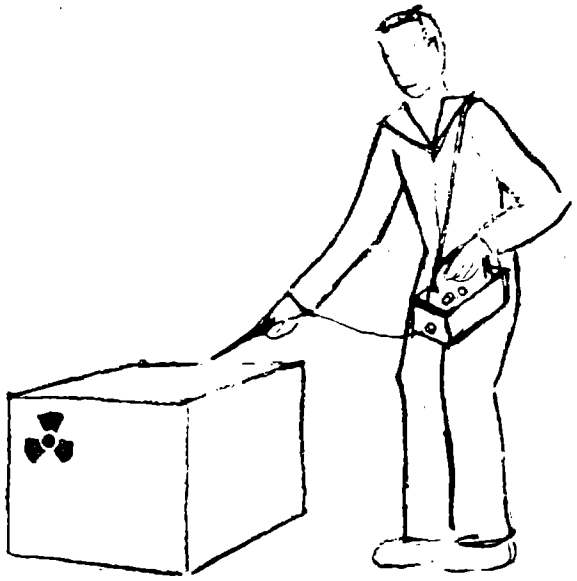
In a chemical plant there are a number of reactors and other processing equipment at various levels in a large room. You notice a faint pungent odor and then observe severe rusting of structural steel, electric conduit, instrument cases, and other steel. What accident potential clues are indicated?



IV. Energy - Problem for discussion

Ionizing Radiation

A man wearing white coveralls is passing an instrument over all surfaces of a heavy steel box. You see the nuclear label on the box and realize the instrument is a Geiger Counter. What are the clues to accident potential related to ionizing radiation. Others?



IV. Energy - Problems for discussion

Operating Provisions

You are attending a hockey game. List the clues to accident potential as related to operating provisions. What other accident potential clues do you see?

75-80. Air traffic control personnel complain of the severe pressure which often results in ulcers and other evidences of tension. What accident potential is indicated by these complaints?

FINAL EXAMINATION

1. List clues to accident potentials associated with locating plant utility lines:

   (a) 10 to 20 feet above ground on supports
   (b) Below ground
   (c) In a tunnel

2. A parked semi-trailer is used for storage of paper products. What are the clues to accident potential?

3. List the four major categories of clues to accident potential.

4. Automobile bodies are stamped out in a huge press that is about 30 feet high. Name the clues to accident potential.

5. A mechanic often must replace a 60 pound bearing well above his head. No lifting equipment is available. Discuss the accident potential.

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 16 Length - 50 Minutes

LESSON TITLE - - Course Review

PURPOSE - -

Reinforce learning of clues 1 - 80.
Clarify concepts on Accident Potential Recognition.

OBJECTIVES - -

Given the 80 clues taught in this course, the student should be able to recall them when confronted with stimuli in the form of problems and apply the clues correctly.

SCOPE - -

1. Review of clues 1 - 80.
2. Questions and answers on clues and their significance.
3. Practice Recognition of Accident Potential using problem situations described by class members.
4. (Alternate) Practice using problems from Student Manual or selected slides.

REFERENCES - - None

LESSON 16

PRINCIPLES OF

ACCIDENT POTENTIAL RECOGNITION

LIST OF CLUES

I. SITE AND STRUCTURES

GENERAL SITE CHARACTERISTICS

1. Complex Traffic Patterns
2. Undesirable Landscaping or Vegetation
3. Questionable Location of Utilities
4. Unusual Neighborhood Problems
5. Opportunities to Fall
6. Unusual Weather Conditions
7. Discharge to the Environment
8. Inadequate Lighting

NATURE OF STRUCTURE

9. Large Single Area
10. Isolated Structures
11. Special Construction
12. Temporary Structures
13. Recent Change

QUALITY OF MAINTENANCE

14. Deterioration
15. Deformation
16. Evidence of Poor Housekeeping
17. Electrical Repair Problems

II. OPERATING MACHINERY AND EQUIPMENT

MECHANICAL ACTION

18. Rotating Motion
19. Reciprocating Motion
20. In-running Nip Points
21. Cutting Operations
22. Punching, Shearing, Forming

MACHINE CONTROLS

23. Inconvenient Location of "Start and Stop"
24. Special Control Devices
25. Lock-out Provisions

SPECIAL EQUIPMENT

26. Portable Power Tools
27. Powder Actuated Equipment
28. Hand Tools
29. In-plant Vehicles
30. Heavy Electrical Equipment

OPERATOR STRESS

31. Repetitive Motions
32. Awkward Working Conditions
33. Physical Overload
34. Noise Exposure
35. Vibration Exposure

QUALITY OF EQUIPMENT MAINTENANCE

36. Improvised Guarding
37. Certificates of Inspection

III. MATERIALS

STORAGE

38. Special Room Features
39. Isolation of Materials
40. Questionable Piling or Stocking
41. Overcrowded Conditions
42. Elaborate Fire Protection

SPECIAL CONTAINERS

43. Drums and Barrels
44. Sacks and Bags
45. Heavy Construction or Appearance
46. Small Carrying and Storage Containers
47. Fixed Tanks and Bins
48. Awkward Packaging
49. Gas Cylinders

SIGNS AND MARKINGS

50. Symbols
51. Legends
52. Color
53. "No" Identification

MATERIALS HANDLING

54. Manual Handling
55. Remote Handling Equipment
56. Transfer Operations
57. Lifting and Hoisting

IV. ENERGY

ELECTRICAL ENERGY

58. Abnormal Amount of Electrical Equipment
59. Voltage Signs and Barriers
60. Sparking and Arcing

THERMAL ENERGY

61. Sensation of Heat
62. Open Flame
63. Heat Evidence
64. Existence of Low Temperature

MECHANICAL ENERGY

65. High Velocity Motion
66. Sharp and Pointed Objects
67. Heavy Objects

CHEMICAL ENERGY

68. Personal Irritation
69. Observable Fumes, Vapors, and Mists
70. Particle Accumulation
71. Corrosion and Deterioration

IONIZING RADIATION

72. Special Storage and Containers
73. Unique Measuring Equipment

NON-IONIZING RADIATION

74. Unusual Light

OPERATING PROVISIONS

75. Existence of Machine Guarding
76. Existence of Ventilation
77. Energy Absorbing Materials
78. Personal Protective Equipment
79. Operator Reactions
80. Pressure Relief Devices

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 17 Length - 50 Minutes

LESSON TITLE - - Walk-around B

PURPOSES - -

Test the trainees' ability to apply the 80 clues to Accident Potential taught in the course. Demonstrate to the trainee that the 80 clues help him to see the "Big Picture".

OBJECTIVES - -

Given a prescribed commercial or industrial site, the student will walk through the area and record Accident Potential in terms of the 80 clues as he recognizes them.

SCOPE - -

1. Instructions for Walk-around
2. Instructions for recording of observations
3. The Walk-around
4. Discussion of Accident Potential Recognized

REFERENCES - - None

FORM FOR ACCIDENT POTENTIAL RECOGNITION SURVEY

Accident Potential Survey by: _____

Date of Survey_____ Date of Report_____

Company_____ Report to_____

Plant_____ Location_____

Location	Recognized Accident Potential	Remarks

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 18 Length 50 Minutes

LESSON TITLE - - Applications of Accident Potential Recognition

PURPOSE - -

Demonstrate how Accident Potential Recognition is applied as a first step in Loss Control.

OBJECTIVES - -

Given examples where steps to Loss Control have been prescribed, the student will be able to see Accident Potential Recognition as the initial step leading to Hazard Recognition, Hazard Evaluation, Control Measures, and Control Evaluation.

SCOPE - -

1. Review of steps in the Loss Control Sequence
2. Discussion of selected Accident Potentials recognized in the Walk-around
3. Identification of Hazards in above situations
4. Selection of Controls for Hazards identified
5. Evaluation of Controls selected

REFERENCES - - None

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 19 Length - 50 Minutes Maximum

LESSON TITLE - - Final Examination

PURPOSES - -

Test ability of students to recall and apply clues 1 - 80. Measure degree of success in translating basic concepts.

OBJECTIVES - -

1. The student should be able to recall 80% of the clues taught in the course.
2. The student should know the 4 categories of clues.
3. Given a number of problem situations, the student should be able to recognize 80% of the clues to Accident Potential.

SCOPE - -

1. Conduct final examination covering the entire course
2. Collect examination answers for instructor review (student retains original copy).

REFERENCES - - None

LESSON 19

FINAL EXAMINATION

1. List clues to accident potentials associated with locating plant utility lines:
   (a) 10 to 20 feet above ground on supports
   (b) Below ground

2. A parked semi-trailer is used for storage of paper products. What are the clues to accident potential?

3. List the major categories of clues to accident potential.

4. Automobile bodies are stamped out in a huge press that is about 30 feet high. Name the clues to accident potential.

5. A mechanic often must replace a 60 pound bearing well above his head. No lifting equipment is available. Discuss the accident potential.

6. A crane uses an electromagnet to load steel plates, forgings, miscellaneous parts, and scrap onto trucks and railway cars. What clues to accident potential do you see?

7. Men unloading a truck are required to carry 100-pound bags of potatoes up a short ramp and place them in criss-cross patern on pallets. List the clues to accident potentials you see in this operation. What would be added if work continued in the rain?

8. In a shop where fire engines are manufactured a great deal of electric welding is used to assemble the custom body structures. Blue flashes and grey fumes are constantly seen. List the clues to accident potential.

9. An aircraft jet engine is being operated at full power on a test stand in a maintenance shop. What clues to accident potential do you note?

10. You enter a room where several large compressors are operating and the odor of ammonia is strong. Your eyes water and your nose and throat are irritated. What are the clues to accident potential here?

COURSE - - RECOGNITION OF ACCIDENT POTENTIAL IN THE WORK ENVIRONMENT DUE TO PHYSICAL AND ENVIRONMENTAL FACTORS.

LESSON PLAN - - Number 20 Length - 50 Minutes

LESSON TITLE - - Discussion of Examination and Course Closing

PURPOSE - -

Clarify any questions concerning examination or course content. Reinforce learning of the concept and clues.

OBJECTIVE - -

The final examination and subsequent discussion should give the student a clear understanding of the Accident Potential Recognition technique. The student should be able to use the 80 clues to enlarge his vision.

SCOPE - -

Discussion of answers to final examination
Discussion of questions relating to the course
Evaluation of course by students

REFERENCES - - None