



# **Codex Seven HACCP Principles**

**(Hazard Identification , Risk  
Assessment & Management)**

# *Logic sequence for application of HACCP*



- Assemble the HACCP team
- Describe product
- Identify intended use
- Construct a flow diagram
- On-site verification of flow diagram

# *The seven (7) HACCP principles*



1. List all potential hazards, conduct hazard analysis, determine control measures
2. Determine CCPs
3. Establish critical limits for each CCPs
4. Establish a monitoring system
5. Establish corrective action for deviations that may occur
6. Establish verification procedures
7. Establish record keeping and documentation

# Principle 1



- **Conduct hazard analysis**

Identify hazard list and their acceptable levels in finished products. Prepare a list of steps in the process where significant hazard occur and describe the preventive or control measure for each hazard.

**An effective hazard identification program will help**

- Prevent injuries
- Protect the environment
- Improve business performance, image and reputation

# *Hazard identification*



Hazard identification has two key components

1. Identification of conditions in plant, process, or materials that are hazardous
2. Identification of specific undesirable consequences as a result of exposure to the hazard

Hazard identification is an essential step in the elimination or mitigation of workplace hazards

# *Key points for hazard identification*



- Work around the workplace and look at what could cause harm
- Ask your employees what they think
- Audit/Inspection reports
- MOC records
- Industry lessons learned
- Consult manufacturers instructions or data
- Benchmarking data

# *Role of human senses in hazard identification*



- **Vision**

90% of the hazards we encounter are visual. We cannot see at low levels of illumination or under high levels of illumination

- **Hearing**

Hearing is adversely affected by high levels of background noise

- **Touch, smell and taste**

Can warn us of a spill, a sharp object, or the release of a toxic chemical. But these senses are often imprecise

# *Definition of hazard*



- A biological, chemical or physical property that may cause the food to be unsafe for consumption by the consumer

Note : consumers may be humans, pets or livestock depending on the product & the goal to be achieved

**There are three types of hazards**



# 1- *Biological hazard*

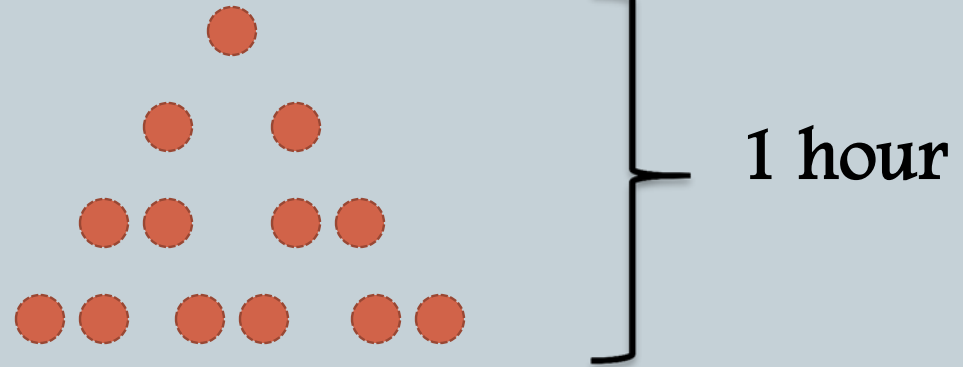


- Biological substances that pose threat to the health of living organisms, primarily humans
- **Examples**
  - Insects, rodents
  - microorganisms
- Micro organisms Can be useful or even essential
  - ✦ **Yeast in beer and bread**
  - ✦ **Lactic acid bacteria in yoghurt and cheese**

Food safety programs focus on pathogenic or dangerous micro-organisms, not all micro-organisms



- Grow by splitting in two



- To grow properly, micro-organisms need  
Available food, proper pH, temperature, time,  
suitable atmosphere, moisture ( $A_w$ )

## 2- *Physical hazards*



- Any potentially harmful extraneous matter not usually found in food
- Conditions for hazard generation must be accurately described e.g. size, shape
- **Examples**
  - Glass
  - Metal
  - Wood

### 3- Chemical hazard



- Any substance that can cause harm, primarily to people
- Chemicals can result in serious injuries if not properly handled
- **Examples**
- Agricultural Chemicals (e.g. pesticides, fertilizers)
- Secondary chemicals (e.g. lubricants, sanitizers)
- Mycotoxins (e.g. Aflatoxin)
- Toxic substances (e.g. lead, zinc)
- Allergens

## *Principle 2*

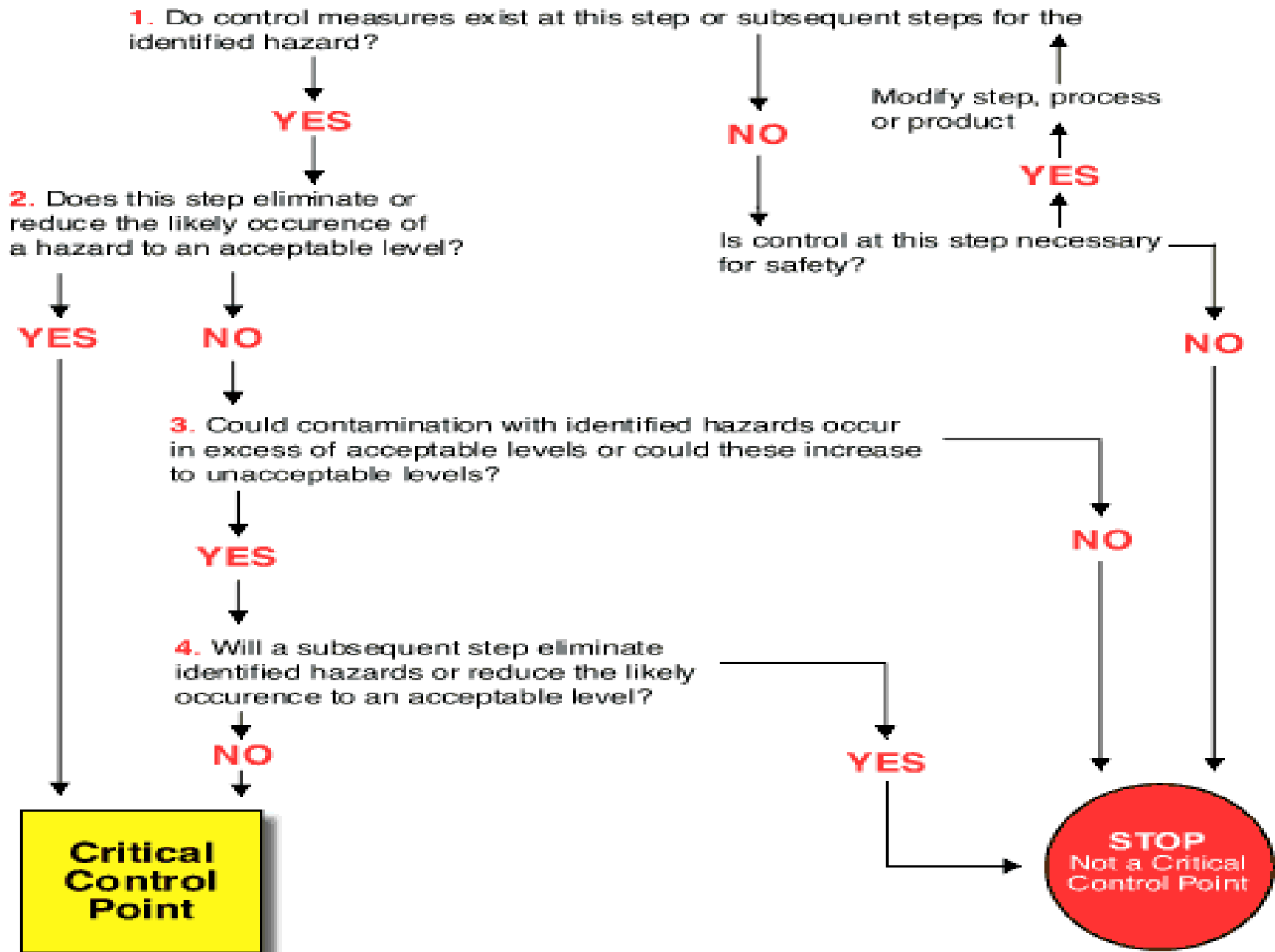


- Identification of critical control points

### *Critical control point*

The best point, step or procedure at which control can be applied so that food safety hazard can be prevented, eliminated or reduced to acceptable levels

# CCP Decision Tree



## ***Principle 3***



- Establish critical limits for preventive or control measures associated with each CCP

### **Critical limit**

A criteria that must be met for each preventive or control measure associated with a CCP

# *Types of critical limits*



- **Physical limits**

Time, Temperature, Weight, Brix

- **Chemical limits**

pH, moisture, salt, sugar, chlorine sanitizer level

- **Microbiological limits**

<6 power of 10 total plate count



# Principle 4



- Establish critical control point monitoring requirements
- Establish procedures for using the results to adjust the process and maintain control
- Purpose of monitoring
  - To identify when there is loss of control ( a deviation occurs at a CCP)
  - To provide written documentation of the process control system
  - To track the operation of the process

# *Why monitoring is important?*



- Know when CCP's are out of control
- Identify problems before they occur
- Pinpoint the cause of problems
- Part of verification

## Who, How and When to monitor

### Who

Trained

Unbiased

### How

Observation

Sight

Smell

### Measurement

Weight, Time

Temperature

### When

Online

Continuous

Discontinuous

Off-line

Discontinuous

# Principle 5



- When a deviation from a critical limit occurs, a corrective actions must be taken

## Corrective action

Procedures to be followed when a deviation or failure to meet critical limit occurs

## corrective action components

- To correct and eliminate the cause of the deviation and restore process control
  - Short term: e.g. Adjust heat or do inspection
  - Long term: root cause analysis & action to prevent reoccurrence e.g. equipment servicing or personal retraining
- To identify the product that was produced during the process deviation and determine its disposition
- Documentation in a separate file or traceable form is must

# *Principle 6*



- Establish procedures to verify that the FSMS system is working correctly

## **Verification – Definition**

The application of methods, procedures, tests and audits in addition to monitoring, to validate and determine compliance with the FSMS procedures, and/or whether the FSMS procedures need modification

# *Elements of verification*



- Validation
- PRP verification activities
- CCP verification activities
  - 1. Calibration of monitoring advices
  - 2. CCP record review
  - 3. Targeted sampling and testing
- FSMS system verification
  - 1. Audits
  - 2. Microbiological/ chemical end-product testing
- Regulatory agencies / third party

## ***Principle 7***



- Establish effective record-keeping procedures that documents the HACCP and food safety management system

# *What is risk*



- Risk is a combination of the severity of that harm and the likelihood that it will occur

OR

- Chances of occurrence of hazard

For example

- The hazard is electricity. The risk is that a worker might be electrocuted when exposed to inadequately insulated wires
- The hazard is caustic soda. The risk is that a worker might suffer a chemical burn if his skin is directly exposed during batch mixing operations

# ***Risk assessment & other terms***



- **Risk assessment**

Formal and informal techniques used to identify health, safety and environmental hazard and to develop controls to minimize, mitigate and/or eliminate them

- **Risk control**

Risk control is the reduction in the level of risk by applying suitable safety measures

- **ALARP**

To reduce a risk to a level, which is ‘as low as reasonably practicable’

- **Residual risk**

It is the risk which still remains after putting controls in place after carrying out a re-assessment of hazard severity and probability



# ***Risk assessment process***



- Risk rating = severity of harm  $\times$  likelihood of occurrence

| Severity      | Likelihood     |
|---------------|----------------|
| Insignificant | Rare           |
| Minor         | Unlikely       |
| Moderate      | Possible       |
| Major         | Likely         |
| Extreme       | Almost certain |

# Risk matrix



|             |                   | Likelihood |              |              |            |                    |
|-------------|-------------------|------------|--------------|--------------|------------|--------------------|
|             |                   | (1) Rare   | (2) Unlikely | (3) Possible | (4) Likely | (5) Almost Certain |
| Consequence | (1) Insignificant | Low        | Low          | Low          | Low        | Low                |
|             | (2) Minor         | Low        | Low          | Low          | Medium     | Medium             |
|             | (3) Moderate      | Low        | Low          | Medium       | Medium     | Medium             |
|             | (4) Major         | Low        | Medium       | Medium       | High       | High               |
|             | (5) Extreme       | Low        | Medium       | Medium       | High       | Extreme            |

# ***5 steps of risk assessment***



- 1. Identify the Hazards**
- 2. Identify anyone who might be affected**
- 3. Evaluate/ assess the risk**
- 4. Establish the controls**
- 5. Record the assessment & review**

# ***Risk management***



**Risk management is a three step process**

- 1. Hazard identification**
- 2. Risk assessment**
- 3. Risk control**

**Risk can be managed down by decreasing the severity or the probability of that hazard by using engineering controls**

# Reduction methods



- **Safety by design**

Elimination the hazard & risks involved in a process during the design stage

- **Elimination**

Deferring the activity or using some other low hazard option e.g. usage of water based solvents instead of chemical based solvents

- **Reduction**

Reducing the exposure with hazard e.g. reducing the time of exposure with the hazardous chemical

- **Isolation**

Limiting the hazard by creating a barrier between hazard & affected person e.g. working on pump by applying lock out & tag out on breaker



- **Control**

Controlling the hazard as its source e.g. placing the barrier or hood on a high sound machine to reduce the sound level

- **PPE**

Using PPE for affected persons e.g. using ear plug in high noise area

- **Discipline**

Issuing instructions to limit the exposure e.g. by fixing caution boards, area barrication

# *Reduction method examples*



## **Reducing severity**


- Installation of air bags in the vehicle
- Using safety nets while working at height
- Using low voltage tools
- Electrical circuit breakers & fire extinguish equipment's reduce the severity of fire damage

## **Reducing probability of occurrence**

- Using slip resistant mats at wet areas reduce probability of slipping
- Reducing the less corrosive material reduce the frequency of leaks
- Reducing the noise at source will reduce the frequency of ear plugs related violations
- ABS breaks reduce the probability of vehicle slipping

# Type of controls



| Control Types                 | Examples   | Increasing Reliability   |
|-------------------------------|--|--|
| Passive                       | Having a secondary containment around a tank or vessel that can contain the entire contents incase of leak |  |
| Active                        | Preventing a high level of tank by installing a high level alarm   |  |
| Administrative or procedurals | Preventing high level by assigning operator or developing SOP  |  |





Thank you