

HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP)

Introduction

This deals with the hazard analysis critical control point (HACCP) system. Its principles and its practices for addressing the safety of foods produced food processing establishments. At a food plant that operates with the HACCP the system is comprised of the HACCP pre requisite programs, which apply to the entire establishment, and the HACCP plans, which apply to the foods produced at the establishment. The HACCP plan for a food is developed on the basis of the seven principles of HACCP.

Evaluation of the HACCP system

The evolution of the HACCP system during the second half of the 20th century, from its roots in the U.S. Space program to its present use for consumer foods worldwide, can be traced through several milestones. In addition, the evolution of the HACCP system can be traced through a series of formal recognition and adoption activities by the food industry, government regulatory agencies, and national and international scientific and professional organizations. Individuals and companies involved in the production, processing or placing on the market of foods have to ensure that their consumption is in no way damaging to the health of the final consumer. In the 1960s, work began in the USA to develop concept based on a logical principle: a concept to ensure systematic procedures when setting up preventive in-house control systems. The result of this work is the HACCP concept: Hazard Analysis Critical control Points. Its name points to two major areas covered by the concept the establishment of so - called critical control points based on initial hazard analysis. Critical control points are stages during production or processing which have significant influence on food safety and can, at the same time, be continuously controlled and monitored.

The systematic procedure for setting up a HACCP concept involves with **seven principles**.

1. Hazard analysis within the complete food production process right up to the final Consumer; estimation of the probability of the occurrence of each particular hazard.
- 2). Determination of the critical control points (CCPs)
- 3). Specification of limits, adherence to which ensures that the CCPs are under control
- 4). Establishment of a system for monitoring the CCPs
- 5). Specification of corrective action to be taken as soon as monitoring reveals that a particular CCP is no longer under control
- 6). Specifications of procedures to ensure that the optimum functioning of the HACCP system (verification)
- 7). Introduction of documentation recording all the stages necessary to the system

History of the implementation of HACCP

- Focus on preventing hazards from contaminating food
- Is based on sound scientific theorem
- Permits more effective and efficient government oversight, primarily ,Because the record keeping allows investigators to see how well a firm is complying with food safety laws over a period of time rather than how well it is doing on any given day.
- Places responsibility for ensuring food safety appropriately on the food manufacturer or distributor
- Helps food companies compete more effectively in the world market Processors that export fish and fishery products to above countries must conduct a hazard analysis to determine whether they have likely food safety hazards that they must control.

Following is a list of the steps in developing a **HACCP plan**.

Preliminary steps

- Product description
- Method of storage and distribution
- Intended use and consumer
- Flow diagram

Hazard analysis worksheet

- Identify the potential species related hazards
- Complete the hazards analysis sheet
- Understand the potential hazard
- Determine if the potential hazard is significant
- Identify the critical control point (CCP)

Development and implementation of GMPs an

HACCP prerequisite programs

All food plants need to develop and implement a program of GMPs to address food safety requirements. Food plants that develop and implement HACCP systems to address food safety also need to develop and implement the HACCP prerequisite programs. In the U.S., food plants identified within some food industry sectors, such as the meat and poultry sector, the juice processing sector, and the seafood sector, are required to operate with HACCP systems that include specific mandatory prerequisite programs that contain SSOPs. It is the responsibility of a food plant's senior management to develop, implement and maintain the appropriate food safety program, whether it is a GMP-based program or a complete HACCP system. The food plant's employees who are responsible for the food safety program must be

Familiar with the government regulatory requirements that apply to the operations at the plant. The activities for GMPs or the HACCP prerequisite programs that are developed at a food plant should be documented as

SOPs. In addition, where monitoring, inspection, or testing is carried out as part of the programs, records should be kept as evidence that these activities are actually performed. The documents and records that are used in these programs should be controlled in the same manner as documents and records are controlled in a quality system. The prerequisite programs should be developed as an integrated set of activities that address food safety requirements not specifically addressed by HACCP plans. In general, many of the activities which are included in GMPs program or in the HACCP prerequisite programs should be quite similar for most food plants, regardless of the type of processing that is carried out.

Therefore, it is possible to compile a generic list of topics which address the entire range of activities in a particular prerequisite program or a particular category of

GMPs. However, certain specific activities in this generic list might not be applicable to certain food plants, this depends on the specific type of processing that takes place in a

Particular food plant. In addition, in certain situations it is possible that a particular activity in a prerequisite program can be considered as a critical control point in an HACCP plan for a product at a particular food plant prerequisite

Common prerequisite programmed for HACCP

- Location
- Grounds
- Building exterior
- Building interior
- Design and layout
- Structures
- Glass
- Corners and joints
- Floors
- Windows and doors
- Lighting
- Ventilation
- Drains
- Pipes and hoses
- Access to premises
- Employee facilities
- Hand-washing stations
- Washrooms and change-rooms
- Lunchrooms and break-rooms
- Cleaning and sanitizing facilities
- Storage facilities
- Waste collection/storage facilities

- Water/steam/ice
- Sanitation and cleaning program
- Equipment cleaning and sanitizing
- Cleaned-in-place (CIP) equipment
- Cleaned-out-of-place (COP) equipment
- Utensils and food contact surfaces
- Master cleaning schedule
- Daily housekeeping
- Establishment cleaning
- Cleaning and sanitizing chemicals
- Cleaning tools and equipment
- Cleaning area
- Cleaning and sanitizing personnel
- Effectiveness of cleaning and sanitizing
- Processing equipment
- Design and installation
- Food-contact surfaces
- Installation
- Maintenance program
- Maintenance personnel
- Handling equipment
- Storage equipment
- Monitoring and monitoring equipment
- Calibration
- Personnel training
- Food safety training
- Technical training
- Training records
- Personal practices
- Personal hygiene
- Hand washing
- Eating and smoking
- Garment and work-wear
- Personal items
- Illness and injuries
- Visitors and non-company personnel
- Controlled access to premises
- Personal practices

Hazard evaluation

The second stage of the hazard analysis is the evaluation to determine which of the hazards that have been identified in the first stage of the hazard analysis are significant, and therefore need to be addressed in the HACCP plan for the product. The identified hazards must be considered for their *likely occurrence* and the *severity* of the risk that they present if they are not controlled. In assessing the *likely occurrence* of a hazard, the HACCP team needs to examine published information and data, and previous experiences on occurrence of the hazard in the product. In assessing *the severity* of the risk presented by a hazard, the HACCP team must address the severity of health consequences to consumers of the product, if the identified hazard is not controlled. In carrying out this stage of the hazard analysis, the HACCP team should take the following into account:

- The methods and procedures of preparation, handling, storage, and distribution of the product
- The effects of both short-term and long-term exposure of the product containing the hazard to the health of consumers.
- The people, including any particular groups (e.g., infants, pregnant women, the elderly)
- Who are likely to consume the product and the effect the hazard could have on the health of these individuals
- Information and data from previous reported incidents involving the occurrence of the hazard in the product, including the impact of the hazard on the health of consumers.

Biological hazards

Pathogenic microorganisms

Clostridium botulinum

Salmonella spp.

Pathogene

Escherichia coli

Listeria monocytogenes

Staphylococcus aureus

Clostridium perfringens

Viruses – Parasites

Chemical hazards:

Antibiotics – Cleaning and sanitizing chemicals

Hormones – Regulated food additives

Drugs – Allergens

Agricultural residues – Toxicants

Industrial pollutants

Physical hazards:

Glass – Stones

Wood – Bones

Hard plastic – Filth

Metal – Personal articles

Identification of control measures

As part of the hazard analysis the HACCP team must determine whether control measures for the hazards that need to be addressed in the HACCP plan are present in the process. If control measures for the hazard do not exist in the process, modification of the process may be required in order to institute a control measure, or some alternate measure should be used to

Address the hazard.

Determine the critical control points (CCP)

With the information obtained from the hazard analysis step, the HACCP team must then determine the points at which there will be control of the hazards that present unacceptable risks; this will establish the CCPs of the HACCP plan. A useful tool for the determination of whether a raw material or process step is a CCP is the CCP decision tree. Examples of CCP decision trees have been proposed by Codex alimentations and by the NACMCF. The CCP decision trees consist of a set of either three or four questions, which are asked in a particular sequence for each identified hazard so that the point of control of that hazard within the HACCP plans, can be determined.

Establish critical limits for each CCP

The HACCP team must establish critical limits which will serve as the criteria for accepting or rejecting a raw material or ingredient that is a CCP, or a semi-finished or finished product that is obtained at a process step that is a CCP. A critical limit is commonly a maximum value of a parameter that must not be exceeded or a minimum value of a parameter that must

Be reached at a CCP. At a CCP, the critical limits must be respected for the hazard to be prevented, eliminated or reduced to an acceptable level, and therefore for the product obtained at the CCP to be acceptable. If the critical limits at a CCP are not respected, the product obtained at the CCP will not be acceptable.

Control measures for biological hazards:

- Thermal processing to eliminate pathogens
- Frozen storage to prevent pathogens
- Use of preservatives to prevent pathogens
- Testing for the presence of pathogens
- Control measures for chemical hazards:
- Formulation control of regulated food additives
- Testing for the presence of antibiotics
- Testing for the presence of pesticide residues
- Control measures for physical hazards:
- Filtering or screening to remove foreign objects
- Detection and removal of metal contaminants

For each of the CCPs that have been determined, the HACCP team must establish the monitoring procedures which will be used to monitor or measure the parameters at the CCP to determine whether the critical limits are being respected. Monitoring can also reveal whether a trend toward loss of control at the CCP is developing so that appropriate action can be taken to prevent loss of control before it actually occurs. It is essential that the monitoring procedures be reliable; if the monitoring procedure involves a measurement, the reliability of the method used should be known. Visual inspection and physical and chemical measurements are frequently used as monitoring procedures. In some situations Codex Alimentarius Critical Control Point Decision Tree can be used

Question 1: Do preventive control measures exist?

- If the answer is yes, go to Question 2.
- If the answer is No, is control at this step necessary for the safety of the
- Product?
- If the answer is No, this step is not a CCP; proceed to the next identified
- Hazard in the process
- If the answer is Yes, modify the steps in the process or the product,

And return to start of Question 1.

Question 2: Is this step specifically designed to eliminate or reduce the likely Occurrence of the hazard to an acceptable level?

- (a) If the answer is yes, this step is a CCP
- (b) If the answer is No, go to Question 3.

Question 3: Could contamination with the identified hazard(s) at this step, Occur in excess of acceptable level(s) or could these hazards increase to Unacceptable level(s)?

- (a) If the answer is yes, go to Question 4
- (b) If the answer is No, this step is not a CCP; proceed to the next identified Hazard in the process.

Question 4: Will a subsequent step eliminate the identified hazard(s) or reduce the likely occurrence to acceptable level(s)?

- (a) If the answer is Yes, this step is not a CCP; proceed to the next identified Hazard in the process
- (b) If the answer is No, this step is a CCP

Maintenance of the HACCP system

After an HACCP system has been developed and implemented, it must be maintained effectively on a continuous basis. This means that the monitoring procedures, the corrective action procedures (when required), the verification activities, and the record-keeping at each CCP, and for all the HACCP plans in the HACCP system, must operate continuously, and in exactly the manner as they were initially developed and implemented. Any change in any of these activities should only take place after the HACCP coordinator has been informed and has approved the change. For any significant change to the existing HACCP plan activities, the HACCP team should evaluate the change using the same guidelines and principles that were used in the development of the HACCP system. The HACCP team should determine whether the HACCP plan for a product needs to be modified after each of the following.

- The intended use of the product has changed.
- There is a change in one or more raw materials, ingredients, or Packaging materials used for preparing the product.
- There is a change in the process for preparing the product.
- There is addition, replacement or modification of equipment used in the process.

If any of the above changes affect the existing CCPs in the HACCP plan for a product, the HACCP plan should be reviewed to determine whether modifications are required for the critical limits, monitoring procedures, corrective action procedures, verification procedures, and recording-keeping and documentation procedures.

