Section 3-4: Principle 2: Identify Critical Control Points

Asia-Pacific Economic Cooperation
FSCF Food Safety Cooperation Forum
PTIN Partnership Training Institute Network
THE WORLD BANK
MICHIGAN STATE UNIVERSITY

Principle 2: Identify Critical Control Points

Section Overview

The second principle of HACCP is to identify the Critical Control Points (CCPs) in the process. This step also is sometimes referred to as the "Stop Sign" of the process, because the CCPs in the process are those steps which are essential to food safety.

The following topics will be discussed in this section:

- Definition and preliminary considerations
- CCPs for hazard control: examples
- Assessment of control measures
- CCP decision trees
- CCPs and hazard control: other considerations
- CCPs in the ISO 22000 food safety standard
- CCPs versus PRPs and Operational PRPs
- Documenting CCPs

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Learning Objectives

At the conclusion of this section, the learner will be able to:

- define “Critical Control Point” and describe the general process for determining CCPs in a HACCP plan,
- discuss examples of CCPs that can prevent or eliminate a hazard or reduce a hazard to an acceptable level,
- describe the appropriate use of CCP decision trees in developing a HACCP plan,
- define an Operational Prerequisite Program (oPRP) and describe how it differs from a regular prerequisite program and from a CCP, and
- discuss options for categorizing and recording CCPs in a HACCP plan.

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Definition and Considerations

A Critical Control Point is "a point or step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level."

CCPs are identified only after the completion of the hazard analysis (HACCP Principle 1). Any attempts by the HACCP team to identify CCPs without the benefit of a thorough hazard analysis often results in the identification of more CCPs than is necessary.

CCPs represent the steps in the process where a hazard can be controlled and control at this step is essential to ensure food safety.

CCP decision trees can be useful tools to help in the identification of CCPs. The use of decision trees will be discussed later in this section.

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CCPs for Hazard Control – Prevention

As stated previously, CCPs are a point of control that is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

The following are examples of possible CCPs where hazards could be prevented.

- Introduction of a hazard can be prevented by control at receiving step (e.g. by requiring a supplier declaration or certificate of analysis prior to receipt).
- A chemical hazard can be prevented by control at an ingredient addition or blending step (e.g. properly formulating products that contain preservatives or vitamins that could be hazardous if present at high concentrations).
- Pathogen growth in a finished product can be prevented by control at formulation or ingredient addition step (e.g. pH adjustment or addition of preservatives)
- Pathogen growth can be controlled by chilling, refrigerated storage or freezing.

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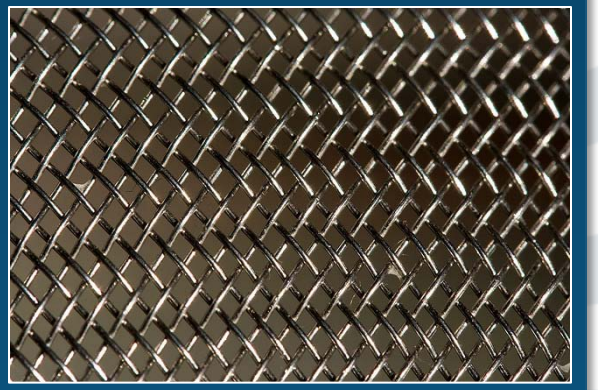
CCPs for Hazard Control – Elimination

The following are examples of possible CCPs where hazards could be eliminated.

- Bacterial pathogens and parasites can be killed during heat treatment or UV light treatment of foods.
- Anasakis (a nematode parasite) in fish can be killed by freezing (-20°C for 7 days).
- Metal fragments can be detected by a metal detector and eliminated by removing the contaminated product.
- Physical hazards of all types can be eliminated from liquid products such as clear juices or drinks by filtering through a sieve having a sufficiently small mesh size. [Screens are routinely used in-line in liquid processing equipment such as pasteurizers.]



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CCPs for Hazard Control – Reducing a Hazard to an Acceptable Level

The following are examples of possible CCPs where hazards could be reduced to acceptable levels.

- The occurrence of foreign objects can be minimized by manual sorting and automatic collectors.
- The chemical hazards patulin (a mycotoxin produced by *Penicillium expansum* and some other molds) can be reduced by processes such as culling, brushing and washing apples prior to juice extraction.

Photo: Leslie Bourquin

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Assessment of Control Measures

To identify the CCPs in the process, the HACCP team must carefully assess the control measures identified during the hazard analysis. During this assessment, the HACCP team must:

- Identify control measures or combination of control measures capable of preventing, eliminating or reducing these food safety hazards to acceptable levels.
- Review each of the control measures with respect to its effectiveness against the identified food safety hazards.
- Categorize control measures as to whether they are managed by Prerequisite Programs, or need to be managed through the HACCP plan (i.e. as CCPs).

While there likely are several points in the process where hazards can be controlled to some extent, there are likely to be only a few steps where loss of control will result in the production of a potentially unsafe food. Those steps are the CCPs in the HACCP plan.

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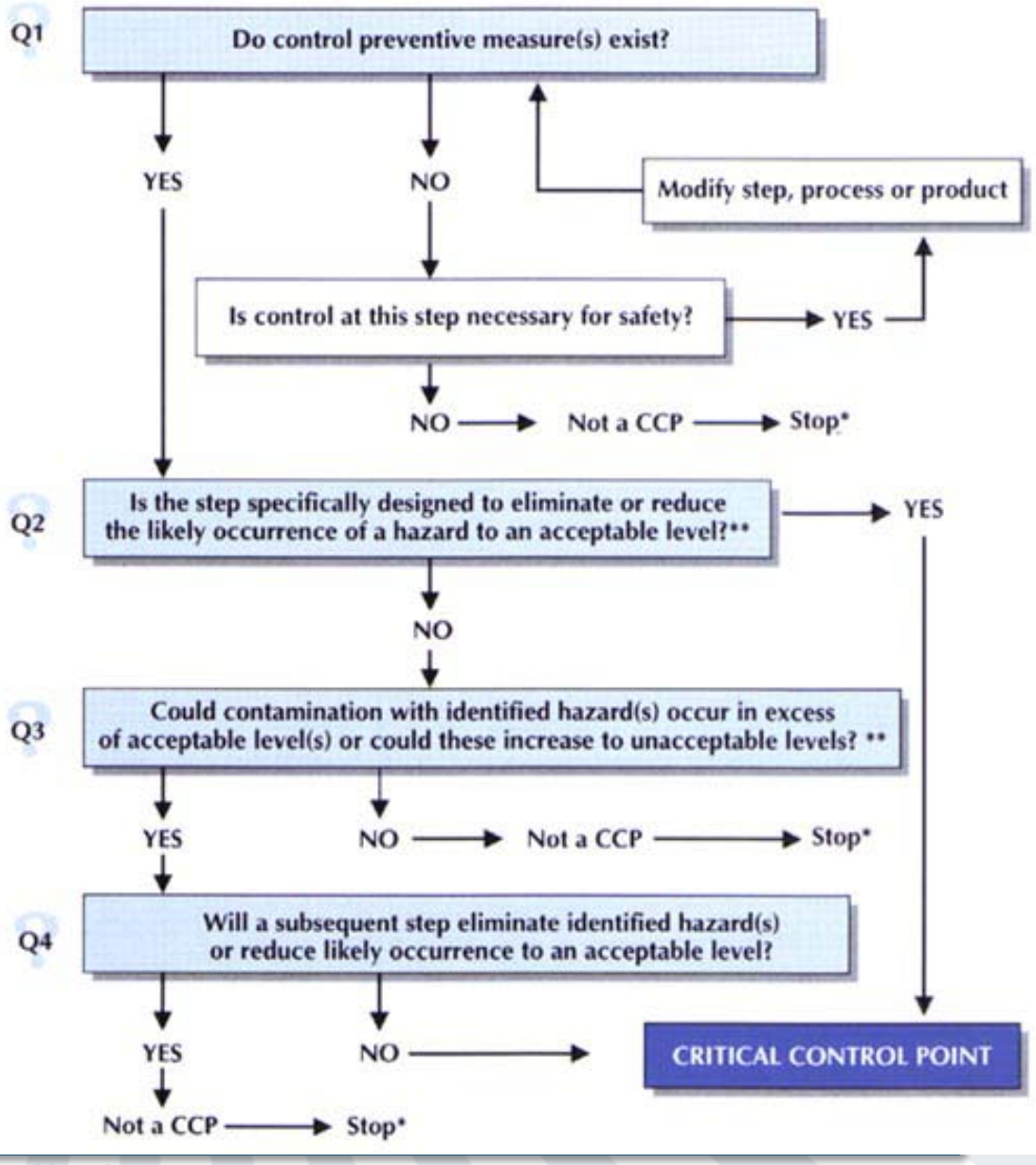
CCP Decision Trees

The HACCP team can use CCP Decision Trees to assist in evaluation of each of the steps where food safety hazards can be prevented, eliminated, or reduced to acceptable levels. An example of a CCP decision tree is on the right (Source: FAO).

Do NOT use the CCP Decision Tree before completing the hazard analysis. Doing so may result in identifying CCPs that are not essential to controlling product safety.

Strictly following a CCP decision tree sometimes results in a decision that common sense says is incorrect. Therefore, the HACCP team should use CCP decision trees with caution.



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CCPs and Hazard Control: Other Considerations

The number of CCPs required to control all significant food safety hazards depends on the product and process. Too few CCPs may not allow for adequate control of food safety hazards, whereas identifying too many CCPs may overburden the HACCP plan.

- A common saying among practitioners in the field is "If everything is significant (i.e. a CCP), then NOTHING is significant." This refers to the fact that you cannot effectively manage too many CCPs in a single process. It is important to focus on those steps that are essential for food safety.

A single hazard may require control by multiple CCPs.

- Example: Acidification and thermal processing of fruit purees to control *Clostridium botulinum* growth and toxin formation.

Multiple hazards may be controlled by a single CCP.

- Example: Vegetative pathogenic bacteria and parasites in apple juice can be controlled by the same thermal process. [This also generally applies to the ability of thermal processes to control vegetative pathogenic bacteria and protozoan parasites.]

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CCPs are Product- and Process-Specific

As stated previously, the hazard analysis conducted by two establishments producing the same product may differ considerably. Likewise, CCPs identified by firms producing the same product may be different due to heterogeneity in:

- Facility layout
- Formulation
- Process flow
- Equipment
- Ingredient selection and suppliers
- Sanitation and other prerequisite programs, and
- Other factors

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ISO 22000 Food Safety Standard

ISO 22000 is a food safety standard developed by the International Organization for Standardization. ISO 22000 was designed to be compatible with the ISO 9001 series of standards and is the preferred food safety standard for some food companies operating in international commerce.

The ISO 22000 standard fully incorporates HACCP principles as described by the Codex Alimentarius Commission. However, ISO 22000 also includes a new category of hazard control – Operational Prerequisite Programs (oPRPs).

The definition of an Operational Prerequisite Program (oPRP) is :

- A prerequisite program identified by the hazard analysis as essential in order to control the likelihood of introducing food safety hazards to and/or the contamination or proliferation of food safety hazards in the product(s) or in the processing environment.

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CCPs versus PRPs (and oPRPs)

Critical Control Points are:

The points of absolute control in the HACCP system.

Steps in the food process which must be under control to produce a safe product.

An intervention used when the hazard has a high probability of existing and the risk level to the consumer is high.

Prerequisite Programs are:

The generic controls in any type of food operation.

Applied in all types of food operations to maintain a hygienic environment to reduce the food safety risk.

In operation at all times.

The foundation of HACCP.

Able to affect end product safety if not included in the food safety management system.

NOT specific to one step in the process and DO NOT CONTROL a specific hazard.

Operational PRPs (ISO 22000) are:

Specific to a food operation and are determined after doing the hazard analysis.

Essential because the hazard analysis has shown that they are necessary to control specific food safety hazards.

Typically not focused on a specific source of the hazard.

Used to reduce the likelihood that products and/or processing environment will be exposed to hazards or will be contaminated and that hazards will proliferate.

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Documenting CCPs

The identified CCPs and the rationale for their selection must be recorded by the HACCP team. These become part of the overall records for the HACCP plan.

Methods for identifying or designating CCPs in HACCP plans can vary, as there is no established convention. Some options are:

- Sequential numbering
  - CCP #1, CCP #2, CCP #3
- Sequentially within hazard category
  - CCP P1, CCP B1, CCP C1
- By process step name
  - Oven, Packaging, Chill

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