



Food and Agriculture Organization
of the United Nations

HACCP – STEP 9, PRINCIPLE 4

MONITORING CRITICAL CONTROL POINTS

FAO Good Hygiene Practices (GHP) and
Hazard Analysis and Critical Control Point
(HACCP) Toolbox for Food Safety

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Technical note for readers

This PDF file has been designed for use of handheld mobile devices in horizontal view.

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**MONITORING
CRITICAL
CONTROL POINTS**

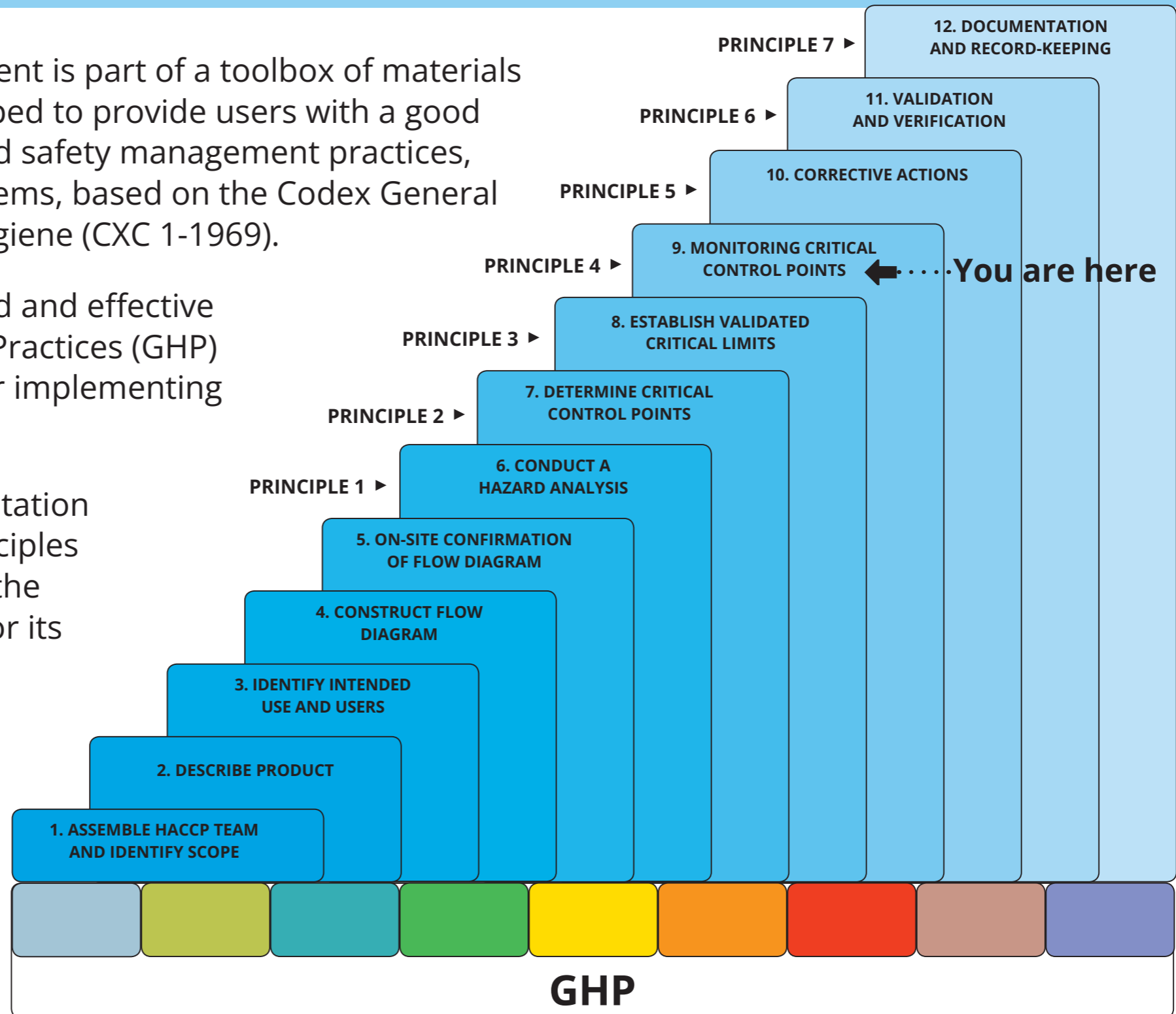
INTRODUCTION

This guidance document is part of a toolbox of materials and has been developed to provide users with a good understanding of food safety management practices, including HACCP systems, based on the Codex General Principles of Food Hygiene (CXC 1-1969).



Well established and effective Good Hygiene Practices (GHP) set the foundation for implementing a HACCP system.

This graphic representation shows the seven principles of HACCP along with the 12 successive steps for its application.



CONTEXT

CCPs are **monitored** through a scheduled measurement or observation of a CCP relative to its critical limits. The monitoring method and frequency should make it possible to detect any failures before they fall outside the established critical limits, so that affected products can be isolated and evaluated in a timely manner. Where possible, CCPs should be monitored continuously (e.g. temperature recording chart). For observable critical limits (e.g. pump settings) where continuous monitoring is not possible, the frequency of monitoring should be appropriate to the deviation and be sufficient to limit the amount of product affected by a deviation.

The personnel monitoring CCPs should be properly trained for the task and be capable of addressing any deviations. The monitoring data and records should be reviewed and evaluated by a designated person with the knowledge and authority to carry out corrective actions when needed.

Learning objectives

This document provides guidance on how to:

- design and establish an effective monitoring system;
- determine what needs to be monitored, how and how often;
- understand how to collect data and how to deal with the challenges of collecting data; and



- **document this step as part of the HACCP plan.**

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Principle 4: Establish a system to monitor control of CCPs

Codex definitions:

Control: (noun) The state wherein correct procedures are being followed and any established criteria are being met. (verb): To take all necessary actions to ensure and maintain compliance with established criteria and procedures.

Control measure: Any action or activity that can be used to prevent or eliminate a hazard or reduce it to an acceptable level.

Monitor: The act of conducting a planned sequence of observations or measurements of control parameters to assess whether a control measure is under control.



HACCP STEP 9

Monitoring

Monitoring is the scheduled measurement or observation of a critical control point (CCP) relative to its critical limits. That is, it is the act of carrying out a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control.

Purpose of monitoring critical control points

Monitoring provides the food business with accurate records enabling them to demonstrate that the CCP and the process is in control and operating according to the HACCP plan.

According to National Advisory Committee on Microbiological Criteria for Foods (1997), monitoring of CCPs serves three major purposes:

- it is a means to determine if there is a loss of control and if a deviation has occurred at a CCP (in which case, appropriate action must be taken);
- it tracks the operation and provides information on whether there is a trend towards loss of control, enabling action to be taken to bring the process back into control before a deviation occurs; and
- it provides documented records for use in verification procedures and audits.

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Establishing a monitoring system for each CCP

Monitoring procedures are established to detect loss of control at the CCP. To do this, they must accurately measure the chosen factors that control the CCP. They should be simple, provide quick results, detect deviations from specifications or critical limits (loss of control) and provide this information in time for corrective action to be taken.

Responsibility for monitoring should be clearly defined, and individuals must be adequately trained in the monitoring procedures for which they are responsible. They must also fully understand the purpose and importance of monitoring. They should have ready access to the monitoring equipment or tools, be unbiased and accurately report the monitoring activity results.

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Things to consider

- Monitoring should ideally provide quick results – in time to make adjustments to ensure control of the process and prevent the violation of critical limits.
- When monitoring results indicate a trend towards loss of control at a CCP, necessary process adjustments should be taken, where possible.
- Adjustments should be made before a deviation occurs.
- Data derived from monitoring must be evaluated by a designated person possessing the knowledge and authority needed to carry out corrective actions when needed.
- When it is not possible to monitor a critical limit on a continuous basis, the monitoring interval must be established such that it will reliably indicate whether the hazard is under control.

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Design of monitoring system

There are four questions that need to be answered in planning the monitoring procedures:

- What will be monitored? (Usually this refers to a measurement or an observation.)
- How will critical limits and preventive measures be monitored? (For example, by observation or use of instruments.)
- When will the monitoring be conducted? (This refers to the frequency of monitoring, be it continuous or intermittent, but in real time.)
- Who will conduct the monitoring? (This must be someone who is qualified and who has the necessary authority.)



Monitoring procedures for each CCP should be recorded as part of the HACCP plan.

(See Supporting documents for templates and examples).

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What will be monitored?

Monitoring entails measuring a characteristic of the product or of the process to determine compliance with a critical limit. Examples include measurements of:

- ➔ time or temperature of a thermal process
- ➔ humidity in a storage environment
- ➔ cold-storage temperatures
- ➔ pH and aw levels

The purpose of monitoring is to determine if there is loss of control or a deviation (failure to meet a critical limit).

Monitoring may also entail observing whether a control measure at a CCP is being implemented. Examples of such control measures include:

- visual examination (for example, examining seals in a canning operation);
- the use of metal detectors to detect metal in products;
- the use of detectors to examine glass containers for defects or cracks; and
- the verification of vendor's certificates of analysis.

HACCP STEP 9

Even when a processes is operating within critical limits, monitoring results may indicate that it is trending towards a deviation. This information allows the operator time to make any process adjustments needed to keep the process operating within the critical limits.

As such, any deviation from a critical limit should be detected and reported as quickly as possible to allow corrective action to be taken in order to limit the amount of product that is adversely affected.

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How are critical limits and preventive measures monitored?

Effective monitoring depends on the proper selection and calibration of measuring equipment. The equipment used for monitoring CCPs varies depending on the attribute being monitored.

Examples of monitoring equipment include:

- ➔ thermometers
- ➔ clocks
- ➔ scales
- ➔ pH meters
- ➔ water activity meters
- ➔ chemical analytical equipment

Monitoring equipment should undergo periodic calibration or standardization as necessary to ensure it is functioning accurately. However, the variability of the equipment should be considered in setting critical limits.

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Monitoring procedures should provide rapid (real-time) results and should not involve lengthy analytical procedures.

For this reason, microbiological testing is rarely effective for monitoring CCPs. Furthermore, large sample sizes would be needed to find microorganisms at levels that could cause illness. Instead, physical and chemical measurements (of factors such as pH, aw time and temperature) are preferred, as they can be taken rapidly and are often related to the microbiological control of the process.

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Monitoring frequency: continuous

Monitoring can be continuous or non-continuous. Where possible, continuous monitoring is preferred. Many types of physical and chemical factors can be monitored continuously.

Examples of continuous monitoring include:

- measuring the time and temperature of a pasteurization or retorting process;
- checking each package of frozen, mechanically chopped spinach with a metal detector; and
- monitoring container closures on glass jars using a dud detector.

For continuous monitoring to be effective, monitoring results must be reviewed periodically and action must be taken when appropriate.

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Monitoring frequency: non-continuous

Where non-continuous monitoring is the chosen system, monitoring frequency should be determined on the basis of historical knowledge of the product and process. When problems are detected, monitoring frequency may need to be increased until the cause of the problem is corrected.

The following questions will help to determine the correct monitoring frequency:

- How much does the processing parameter that is being monitored normally vary?
- How close is the operating limit to the critical limit?
- How much product is the processor prepared to risk if there is deviation from the critical limit?

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Who will monitor?

In developing the HACCP plan, careful consideration should be given to assigning responsibility for monitoring. Individuals assigned to monitor CCPs may include:

- line personnel
- equipment operators
- supervisors
- maintenance personnel
- quality assurance personnel

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Individuals responsible for monitoring

The individual responsible for monitoring a CCP must:

- be adequately trained in the CCP monitoring techniques;
- be unbiased;
- fully understand the importance of CCP monitoring;
- have ready access to the processing step or CCP to be monitored;
- accurately report each monitoring activity;
- have the authority to take appropriate action as defined in the HACCP plan; and
- immediately report any critical limit deviation.

It is important that the individual responsible for monitoring immediately report all unusual occurrences and deviations from critical limits to ensure that process adjustments are made and corrective actions are taken in a timely manner.

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Record-keeping

Record-keeping and trend analysis constitute integral parts of monitoring and reporting systems. All records and documents associated with monitoring CCPs must be signed or approved by the individual(s) conducting the monitoring and by a responsible reviewing official(s) within the food business. Monitoring records must be made available for review by regulatory authorities.

HACCP STEP 9

Data collection

Since monitoring is a data collection activity, the individuals responsible for monitoring must understand how to collect data. Generally, designing data collection (monitoring) activities involves the following ten steps:

1. Ask the right questions. The questions must relate to the specific information needed. (Otherwise, it is very easy to collect data that are incomplete or that answer the wrong questions.)
2. Conduct appropriate data analysis. What analysis must be conducted to get from raw data to the comparison against the critical limit?
3. Define where to collect the data.
4. Select an unbiased data collector.
5. Understand the needs of the data collector, including special environment requirements, training and experience.
6. Design simple but effective data collection forms. Check to see that the forms are self-explanatory, record all appropriate data and reduce opportunity for error.

cont.

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7. Prepare data-collection instructions.
8. Test the forms and instructions and revise as necessary.
9. Train data collectors.
10. Audit the data collection process and validate the results. Management should review and approve (sign) all data collection forms.



For additional information, please consult the **Further reading** section accessible from the [SECTION LANDING PAGE](#).

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Challenges in recording monitoring results

A recurring challenge is to ensure that monitoring results are recorded appropriately. Many food businesses encounter difficulties with decreasing diligence in recording how a CCP is operating.


When such challenges arise, the HACCP team will need to determine why the staff is not complying with the required recording activities.



Things to consider

- complicated instructions or other reading requirements that staff cannot comply with due to language barriers or unclear written texts;
- insufficient space on forms to record all observations;
- no forms or pens/pencils are available in the CCP area;
- short-staffed operations (insufficient personnel or time to record the readings); and
- fear of punishment on the part of staff if things go wrong.

EXERCISE: FOOD SAFETY FOR THOUGHT

<p>This is the little “game” we created. This will apply to all HACCP steps, except the intro.</p>	<p>GHP PROGRAMMES </p> <ul style="list-style-type: none"> <li data-bbox="990 615 1511 711">1. INTRODUCTION AND CONTROL OF FOOD HAZARDS <input type="checkbox"/> <li data-bbox="990 748 1511 844">2. PRIMARY PRODUCTION <input type="checkbox"/> <li data-bbox="990 880 1511 977">3. ESTABLISHMENT - DESIGN OF FACILITIES AND EQUIPMENT <input type="checkbox"/> <li data-bbox="990 1013 1511 1109">4. TRAINING AND COMPETENCE <input type="checkbox"/> <li data-bbox="990 1146 1511 1242">5. ESTABLISHMENT MAINTENANCE, DISINFECTION, AND PEST CONTROL <input type="checkbox"/> <li data-bbox="990 1279 1511 1375">6. PERSONAL HYGIENE <input type="checkbox"/> <li data-bbox="990 1412 1511 1508">7. CONTROL OF OPERATION <input type="checkbox"/> <li data-bbox="990 1545 1511 1641">8. PRODUCT INFORMATION AND CONSUMER AWARENESS <input type="checkbox"/> <li data-bbox="990 1678 1511 1774">9. TRANSPORTATION <input type="checkbox"/> 	<p>Please explain your choices.</p>
<p style="text-align: center;">9. MONITORING CRITICAL CONTROL POINTS</p>		
<p>GHP are fundamental to the successful application of HACCP.</p> <p>Think of a food operation that you are familiar with, and select those GHP elements that you feel are most relevant for the application of HACCP step 9.</p>		

MONITORING CRITICAL CONTROL POINTS

KEEP READING

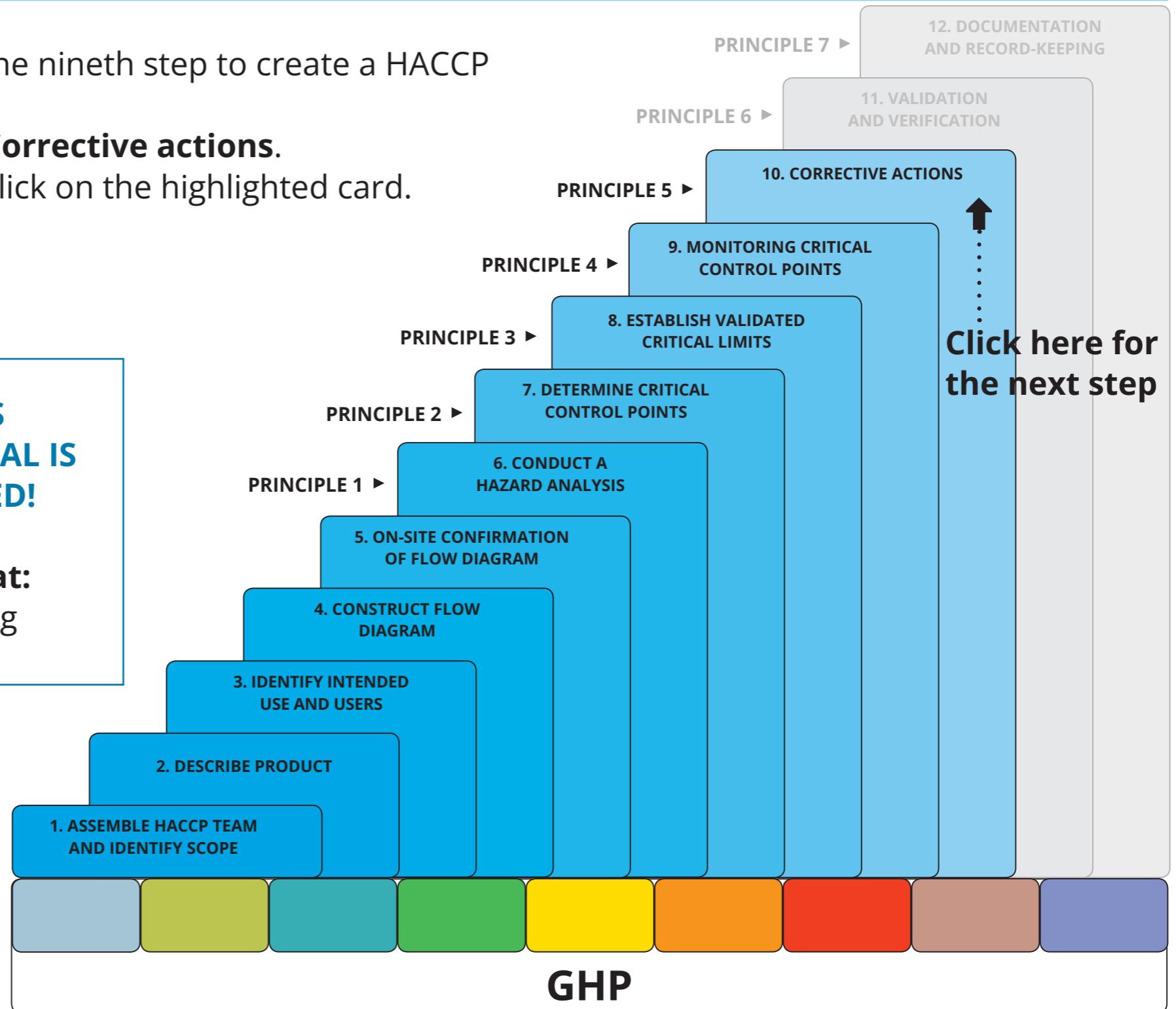
You have completed the ninth step to create a HACCP system.

The next step will be **Corrective actions**.

To continue reading, click on the highlighted card.

FEEDBACK ON THIS GUIDANCE MATERIAL IS ALWAYS WELCOMED!

Please contact us at:
food-quality@fao.org



KEEP READING

[GHP and HACCP Toolbox for Food Safety](http://www.fao.org/good-hygiene-practices-haccp-toolbox)

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