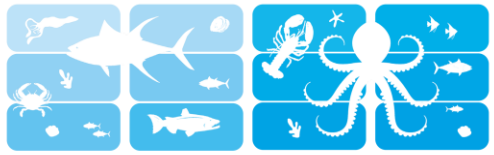
Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

TRAINING ON THE IMPLEMENTATION OF HACCP FOR FISHERIES AND AQUACULTURE



HAZARD ANALYSIS AND CRITICAL CONTROL POINT

AN INTRODUCTION

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Food Safety and Quality – Food and Agriculture Organization of the UN

HAZARD ANALYSIS AND CRITICAL CONTROL POINT (HACCP)

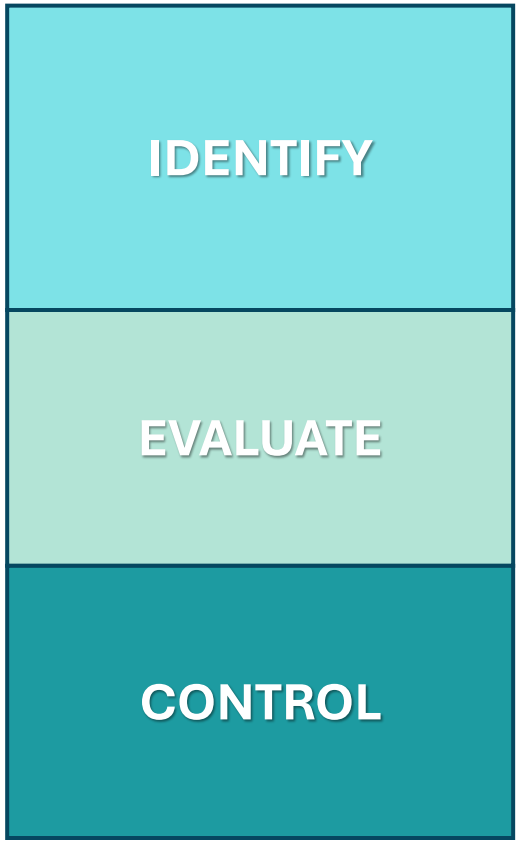
- HACCP is a science-based system that aims to prevent food safety problems from occurring rather than having to react to non-compliance of the finished product.
- The HACCP system accomplishes this by the identification of specific hazards and the implementation of control measures.
- An effective HACCP system should reduce the reliance on traditional end-product testing.

BASIC DEFINITIONS

Hazard: a biological, chemical or physical agent in or condition of food with potential to cause adverse health effect.

Hazard analysis and critical control points: A system which identifies, evaluates and controls hazards which are significant for food safety.

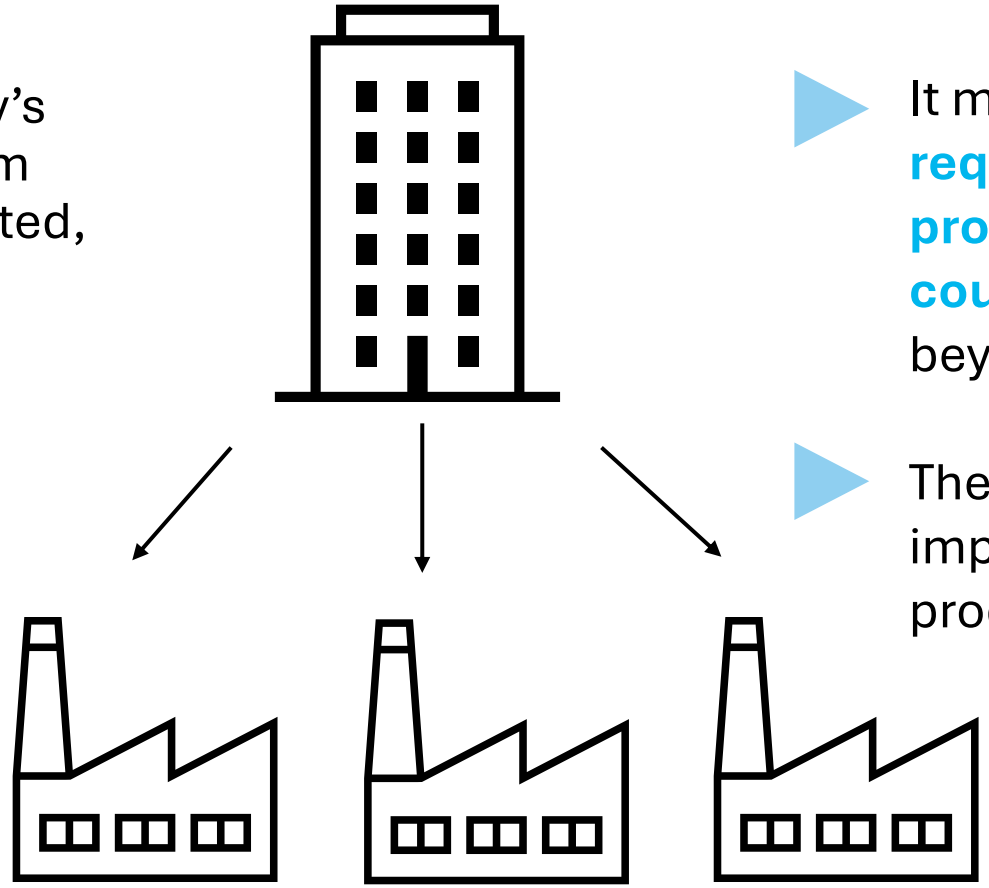
Hazard analysis: The process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan.



HACCP SYSTEM

- The basis of the company's food safety control system shall be a fully implemented, systematic and comprehensive HACCP system, **based upon the Codex Alimentarius principles**.

3 ≠ HACCP SYSTEMS

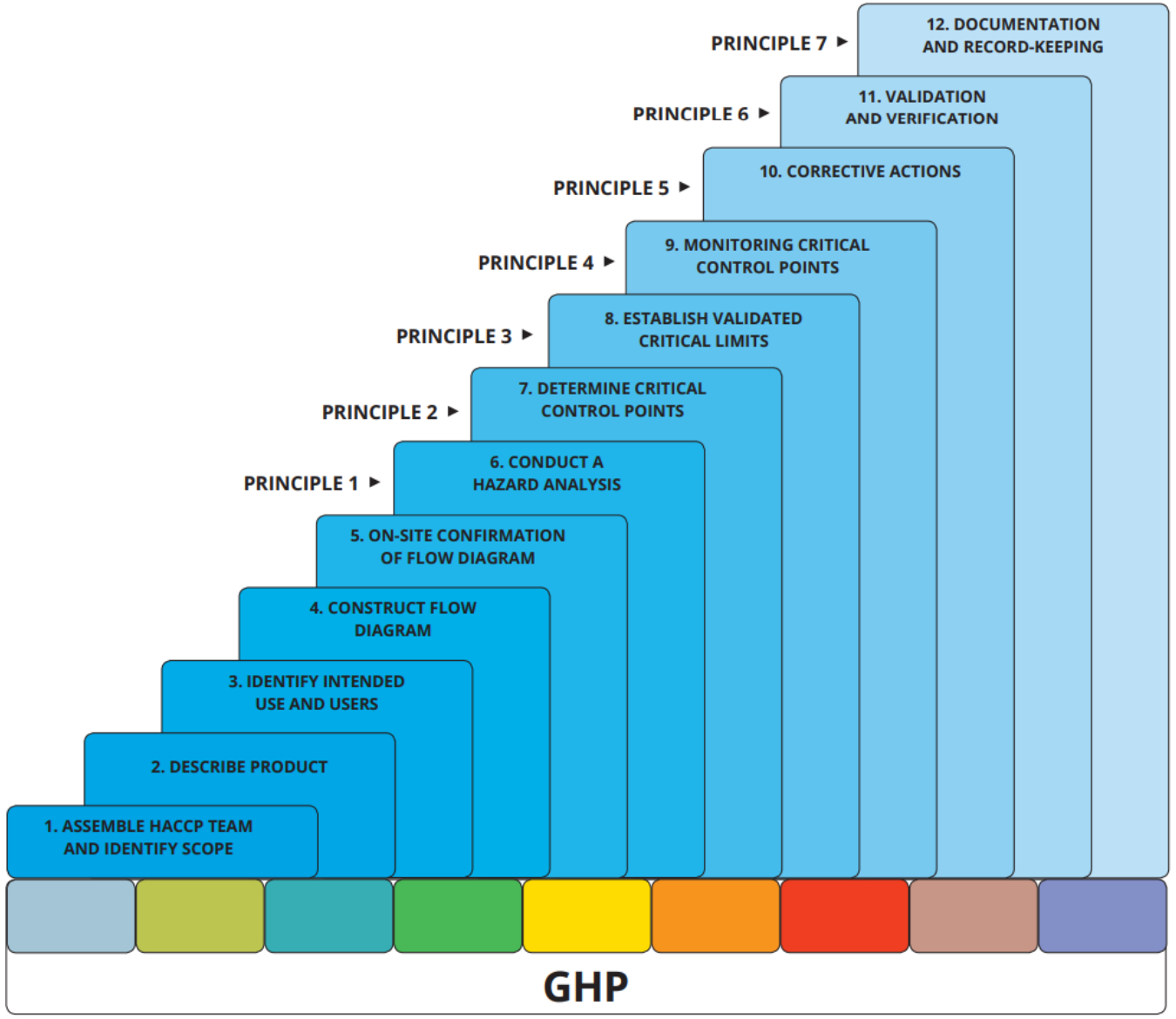


- It must consider any **legal requirements of the production and destination countries** which may go beyond such principles.
- The HACCP system shall be implemented at each production site.

HACCP SYSTEM

- The HACCP system shall **cover all raw materials, products or product groups as well as every process** from goods into dispatch, including product development and product packaging.
- The company shall ensure that the HACCP system is **based upon scientific literature, or technical verified specifications** relating to the manufactured products and procedures. This shall be **maintained** in line with new technical process development.
- HACCP system shall be **reviewed** and necessary changes shall be made when any modification is made in the product, process or any step.

STEPS IN THE APPLICATION OF HACCP



ASSEMBLE A HACCP TEAM

- The HACCP team must be multidisciplinary and include operational staff.

- Personnel appointed as HACCP team members must have specific knowledge of HACCP, product and process knowledge and the associated hazards. Where competent knowledge is not available, external expert advice shall be obtained.

- The HACCP team must have strong senior management support

ASSEMBLE A HACCP TEAM

The HACCP team:

- decides upon the potential hazards of relevance to the process and product;
- ensures that the identified hazards are effectively controlled;
- defines whether there are any critical control points (CCPs);
- establishes systems of monitoring and verification;
- establishes an effective system of documentation;

ASSEMBLE A HACCP TEAM

THE HACCP TEAM NEEDS A COORDINATOR

- One team member should be responsible for
  - selecting the team that will develop the HACCP system;
  - planning and coordinating all projects and meetings;
  - ensuring that a systematic approach is used;
  - distributing the work and responsibilities among team members;
  - ensuring targets are set and met; and
  - representing the team before management;
- This project coordinator must have
  - a clear understanding of HACCP; and
  - the authority to convene meetings and ensure that targets are set and met.

ASSEMBLE A HACCP TEAM

THE HACCP TEAM MUST SET CLEAR GOALS WITH DEADLINES

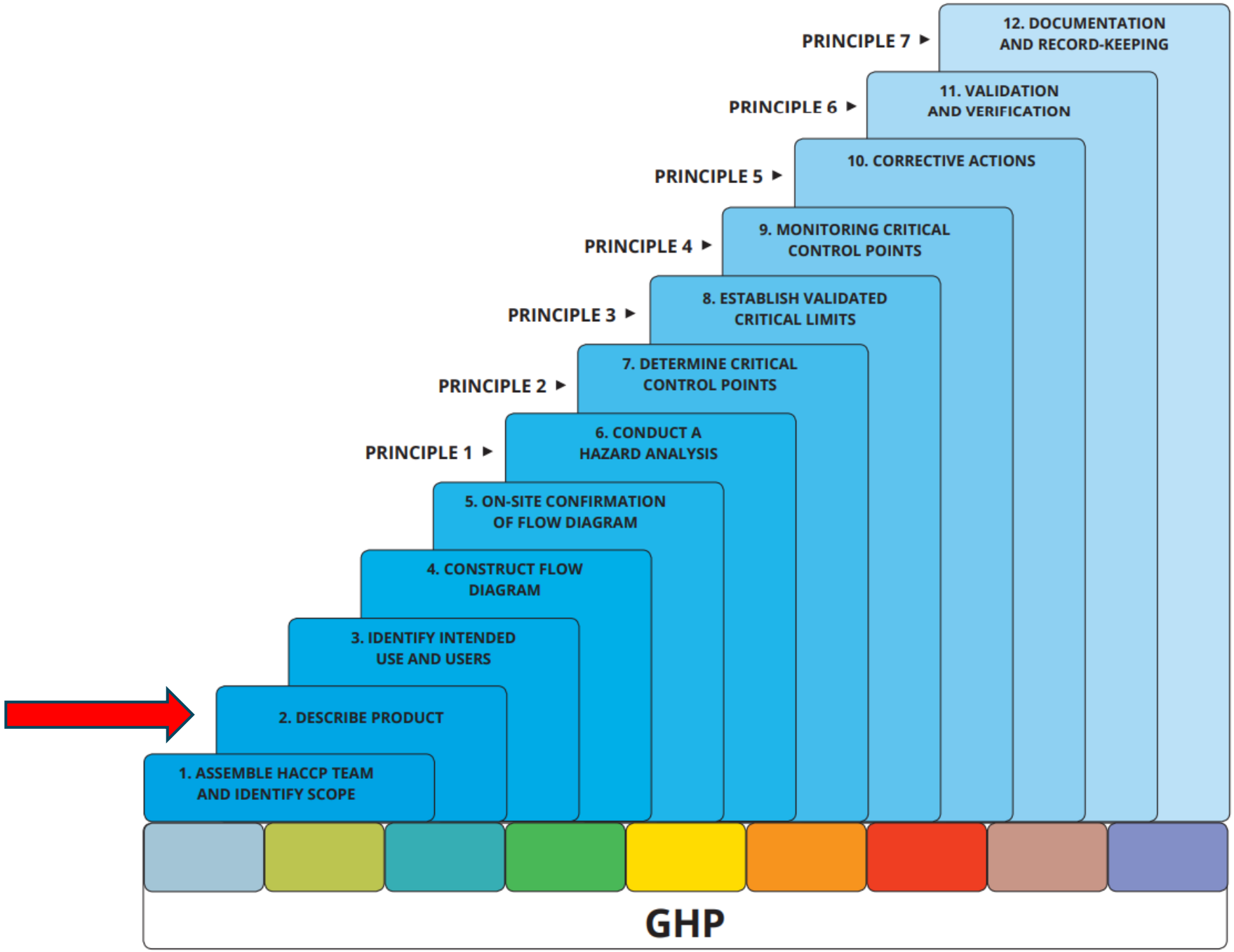
Only clear goals that need to be achieved within a defined time frame will be effective in improving food safety.

EXAMPLES ARE:

1. Hazard analysis completed within next 3 months;
2. HACCP-relevant documents developed and in use within next 6 months;
3. Verification of HACCP system implemented after one year;

ASSEMBLE A HACCP TEAM

Personnel involved in daily processing activities have invaluable know-how.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PRINCIPLE 3
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PRINCIPLE 2
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4. CONSTRUCT FLOW DIAGRAM
3. IDENTIFY INTENDED USE AND USERS
2. DESCRIBE PRODUCT
1. ASSEMBLE HACCP TEAM AND IDENTIFY SCOPE
GHP

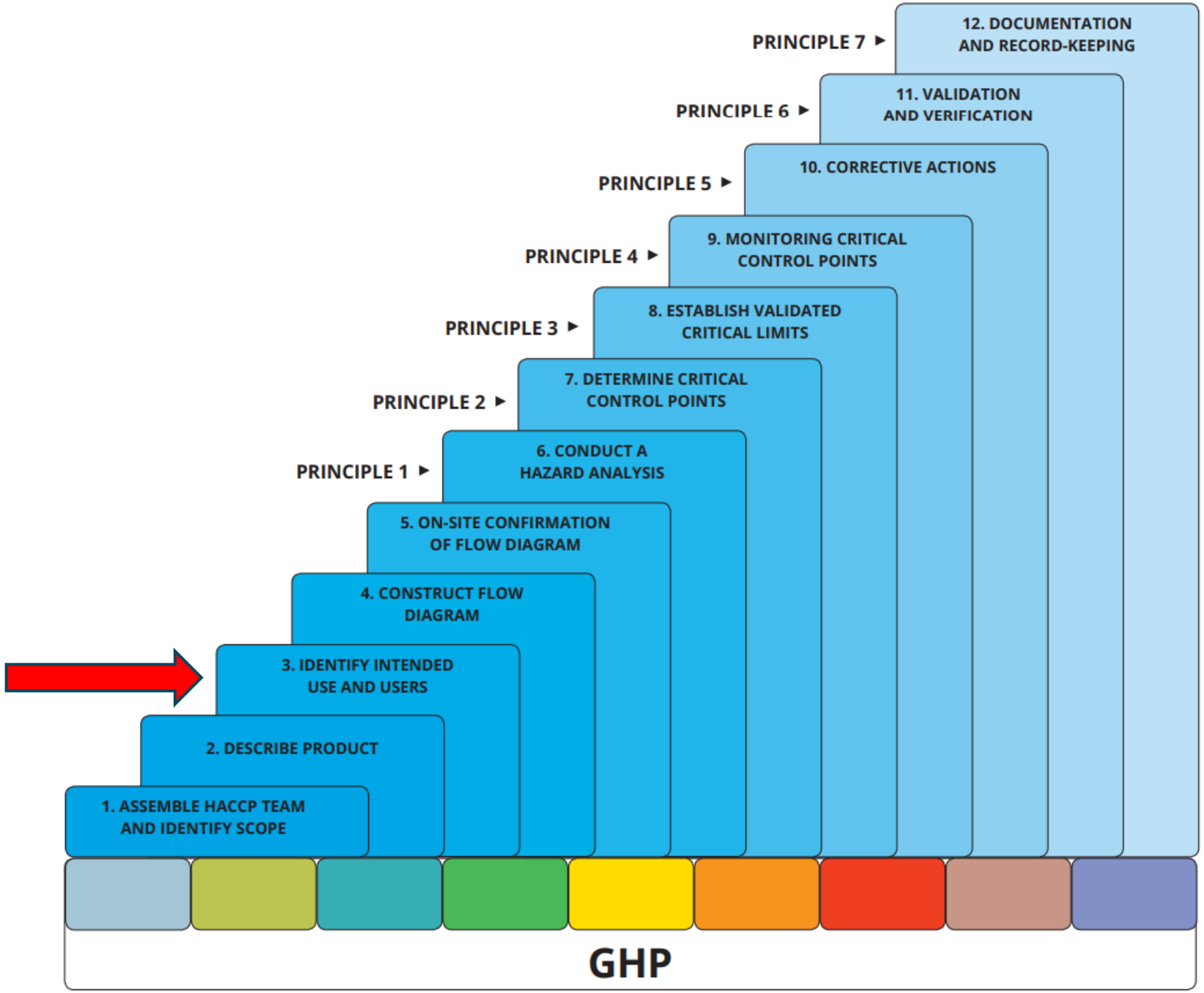
DESCRIBE THE PRODUCT

The description of the product must include:

- Species, method of production and origin
- physical, organoleptic, chemical and microbiological parameters
- composition
- packaging
- durability (shelf life)
- methods of treatment
- legal requirements for the food safety of the product
- conditions for storage, method of transport and distribution

It will facilitate the identification of potential hazards or defects

	Objective	Example
Product name(s)	Identify the species and method of processing.	Canned tuna in salted water
Source of raw material	Describe the origin of the fish.	Yellowfin tuna caught by purse seine in the Gulf of Guinea Whole brine frozen
Important final product characteristics	List characteristics that affect product safety and essential quality, especially those that influence microbial flora.	Compliance with Codex Standard for canned tuna and bonito; "low-acid" food; can-seal integrity
Ingredients	List every substance added during processing. Only ingredients approved by the official agency having jurisdiction may be used.	Water, salt
Packaging	List all packaging materials. Only materials approved by the official agency having jurisdiction may be used.	Container in coated chromium steel, capacity: 212 ml; total net weight: 185 g; fish weight: 150 g Traditional opening
How the end product is to be used	State how the final product is to be prepared for serving, especially whether it is ready to eat.	Ready to eat
Shelf-life (if applicable)	State the date when the product can be expected to begin to deteriorate if stored according to instructions.	3 years
Where the product will be sold	Indicate the intended market. This information will facilitate compliance with target market regulations and standards.	Domestic retail market
Special labelling instructions	List all instructions for safe storage and preparation.	"Best before the date shown on label"
Special distribution control	List all instructions for safe product distribution.	None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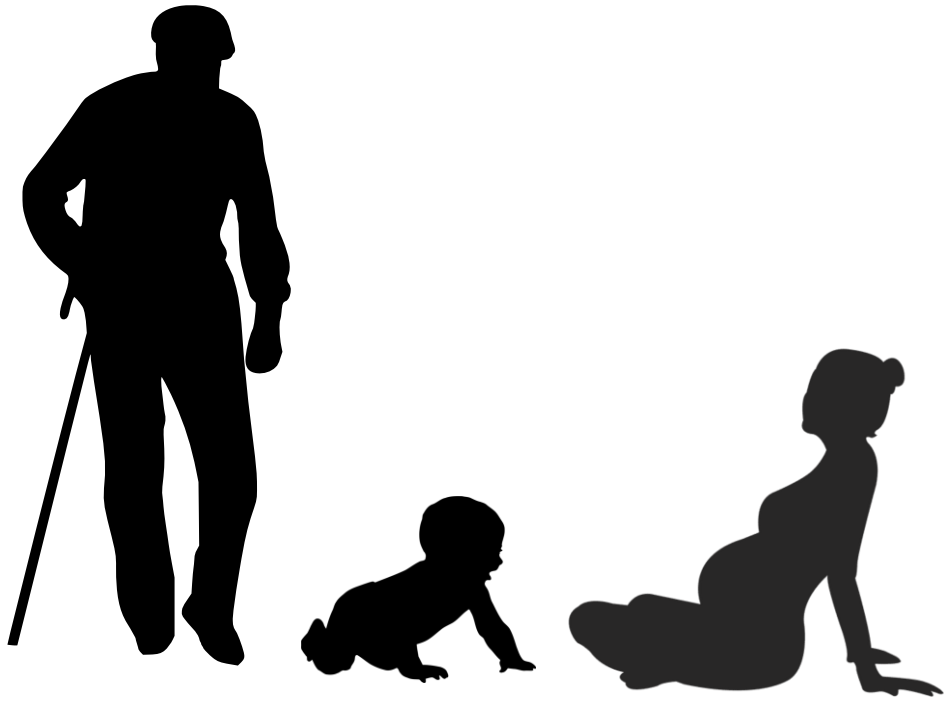
IDENTIFY INTENDED USE

The intended use of the product shall be described in relation to the expected use of the product by the end consumer, taking into account vulnerable groups of consumers such us:

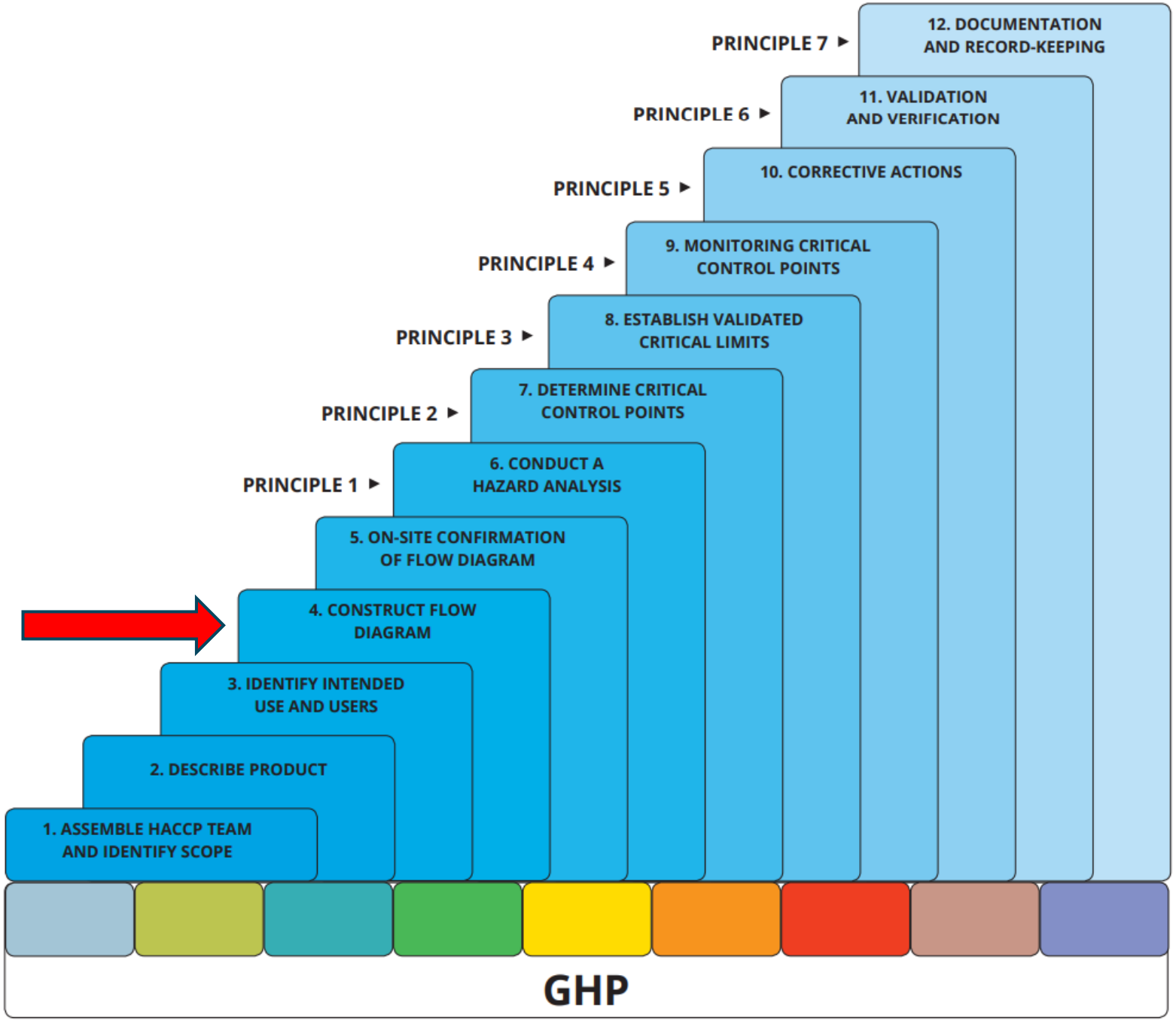
- infants, the elderly, pregnant women;
- immunocompromised individuals;
- under- or malnourished individuals;
- individuals with allergies; and
- people who cannot understand the language on the packaging or are unfamiliar with the type of food.



IDENTIFY INTENDED USE

Considerations when understanding the intended use:

- How will the product be used or consumed, displayed and stored?
- Who will the product be distributed to?
- Will other products be mixed with the product?
- Can users or consumers misunderstand the intended use of the product?
- Which precautionary safety measures might prevent mishandling or unintended use of the product?
- How can downstream users and consumers be better informed about the safety of a food product?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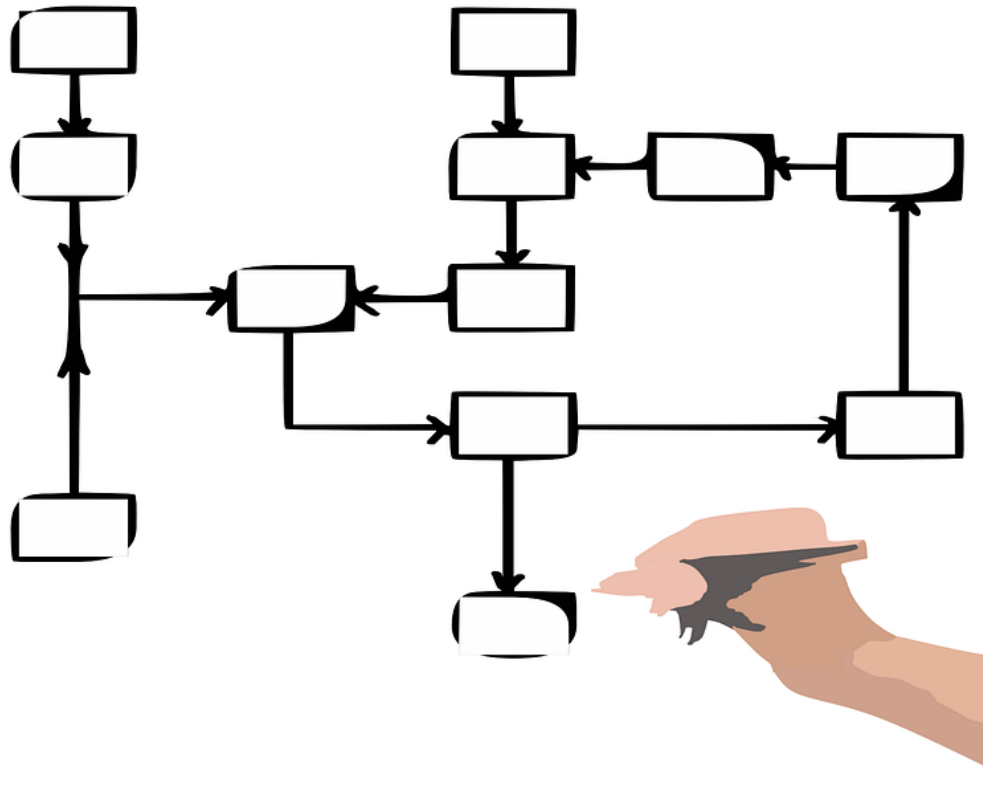
CONSTRUCT FLOW DIAGRAM

After having described the product and acquired a good understanding of its intended use, the HACCP team will now need to describe each step of a production process in a detailed and systematic way.

The resulting description is called a **flow diagram.**

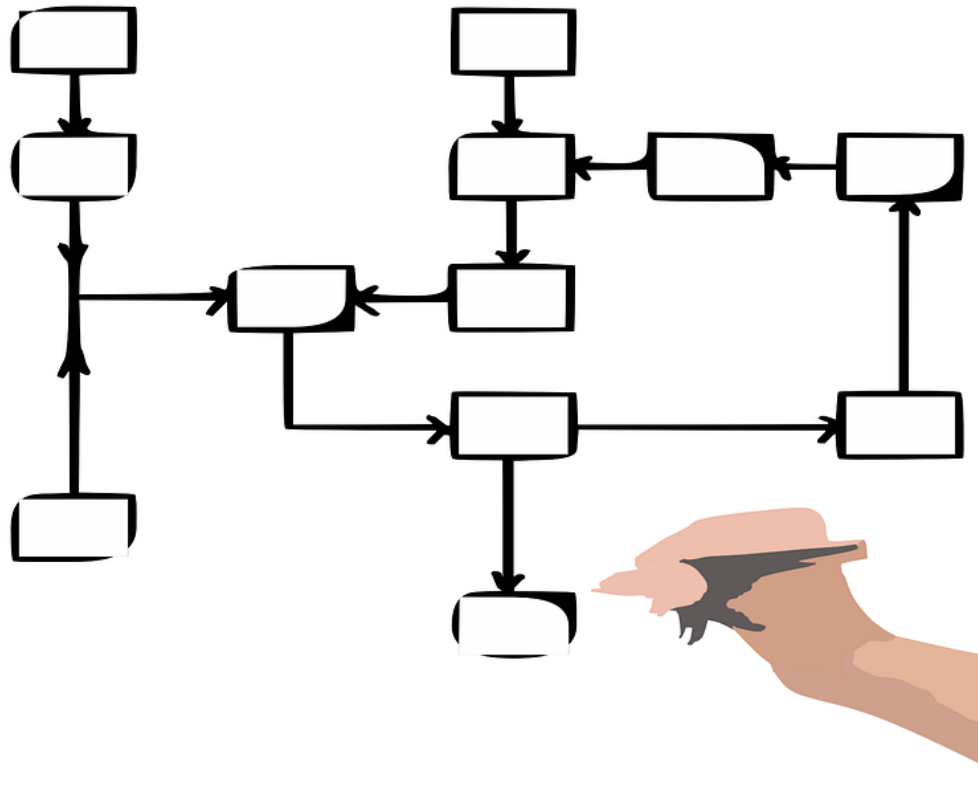


CONSTRUCT FLOW DIAGRAM

A flow diagram shall exist for each product, or product group, and for all variations of the processes and sub processes (including rework and reprocessing).

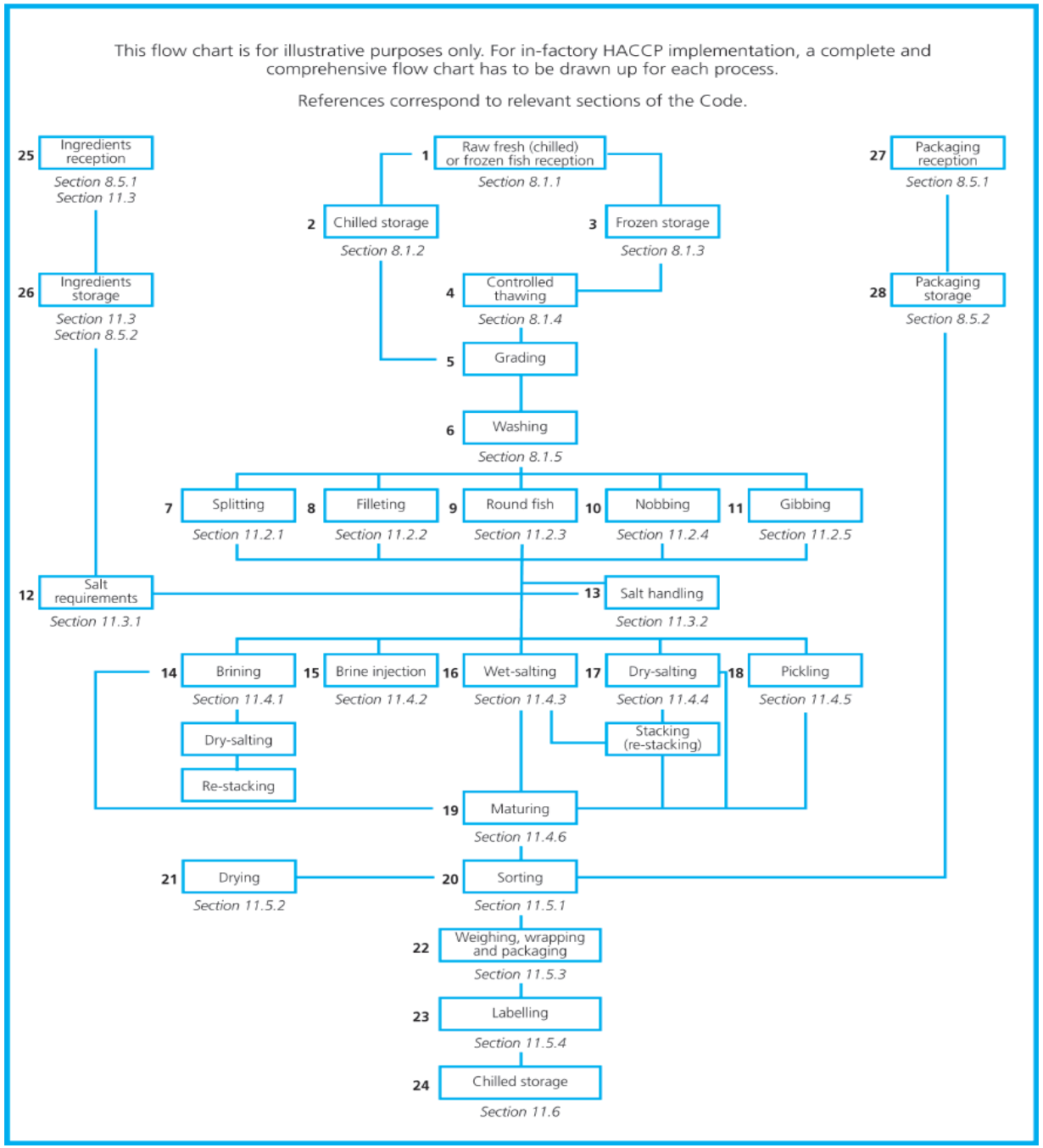
The flow diagram shall be dated, and clearly identify each CCP with the number assigned to it.

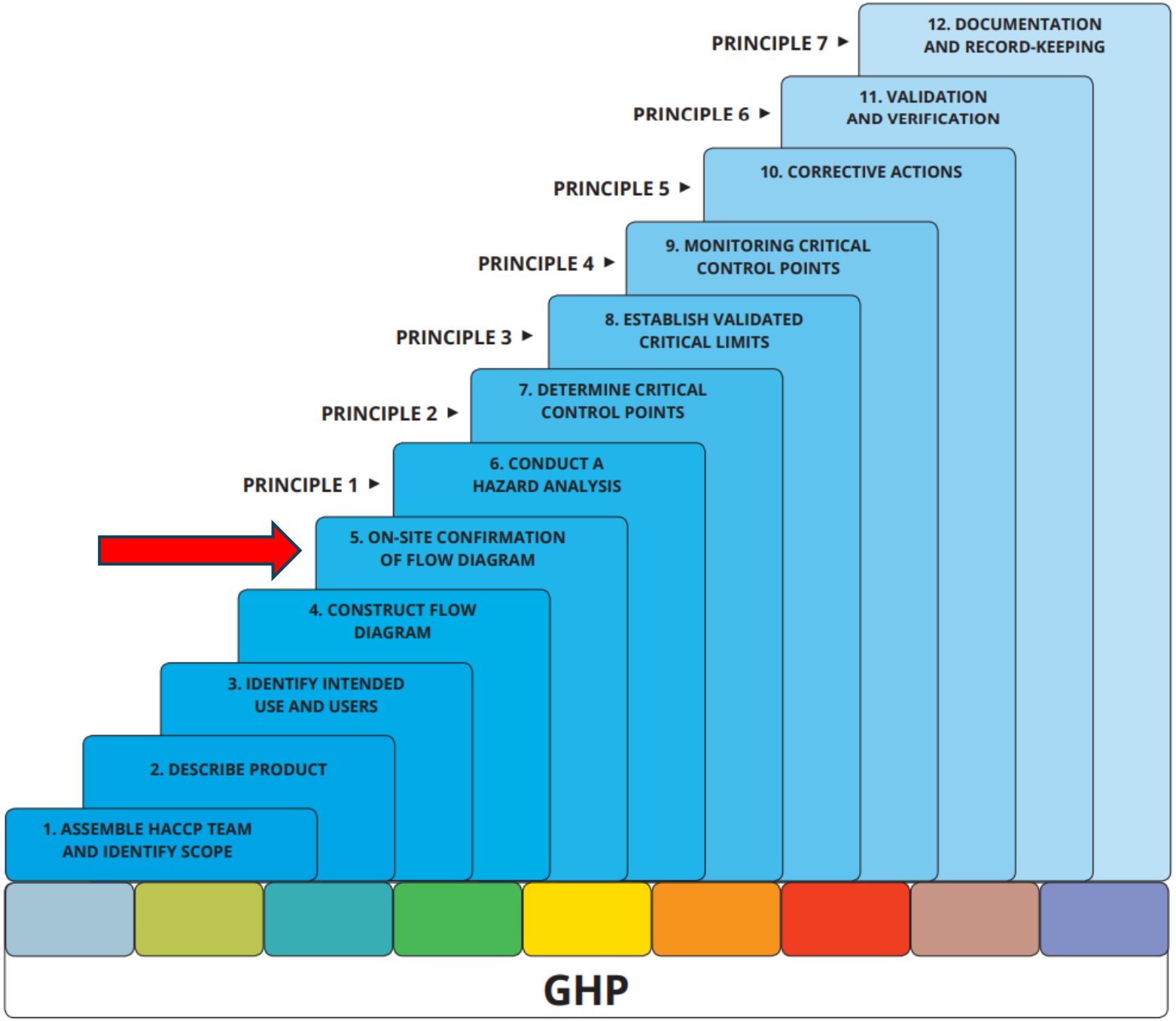
In the event of any changes the flow diagram shall be updated.



FLOW DIAGRAM

EXAMPLE OF FLOW CHART OF A SALTED AND DRIED SALTED FISH PROCESSING LINE

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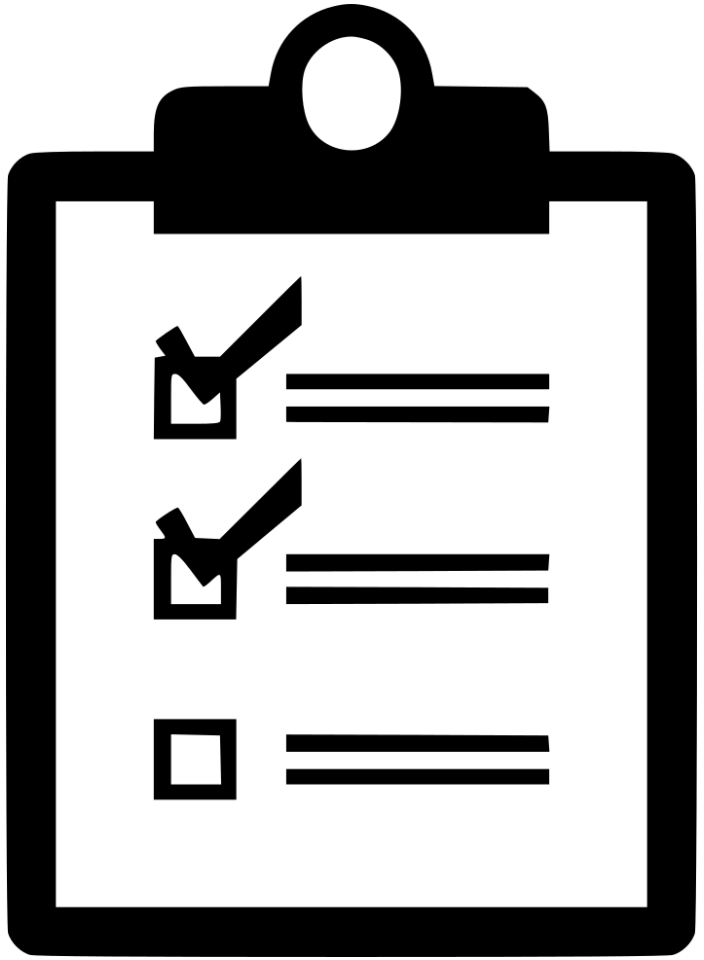
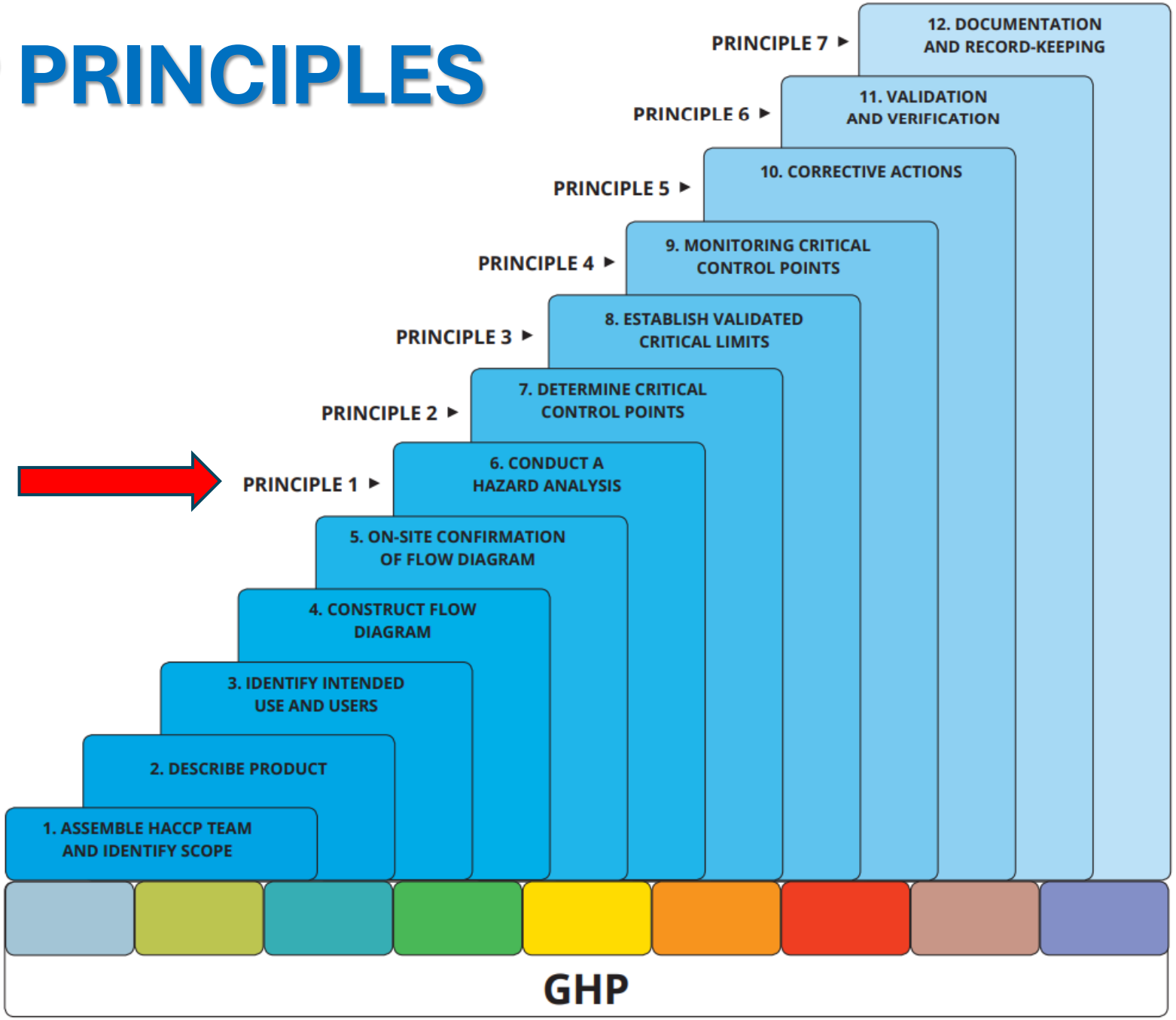
ON-SITE CONFIRMATION OF THE FLOW DIAGRAM

The HACCP team shall verify the flow diagram, by on-site checks, at all operation stages.

Amendments to the diagram shall be made, where appropriate.



HACCP PRINCIPLES

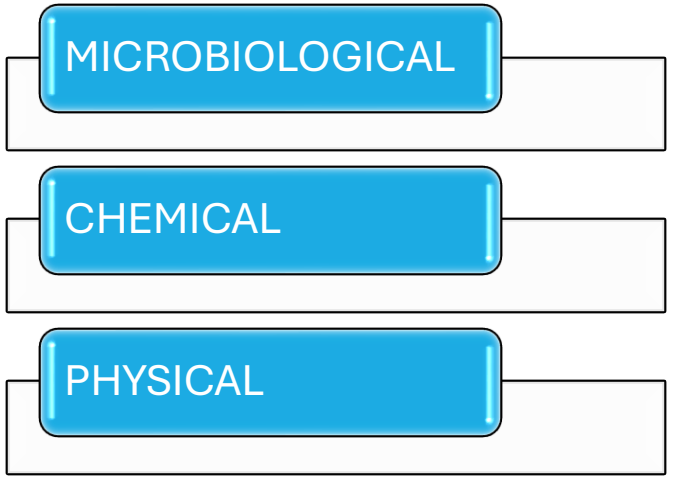


P1. HACCP: CONDUCT HAZARD ANALYSIS

The purposes of hazard analysis are to **identify** all food safety hazards linked to the product and process at each step, to **determine their significance** and to assess whether **control measures** for those hazards are available at each step.

Defect analysis serves the same purpose for potential quality defects.

Hazards identification



P1. HACCP: CONDUCT HAZARD ANALYSIS

Determine the significance of hazards

One of the most important activities that must be performed in a processing facility as part of the food safety management system is to determine if an identified hazard is significant.

The two primary factors that determine whether a hazard is significant for HACCP purposes are **probability** of occurrence of an adverse health effect and the **severity** of the effect.

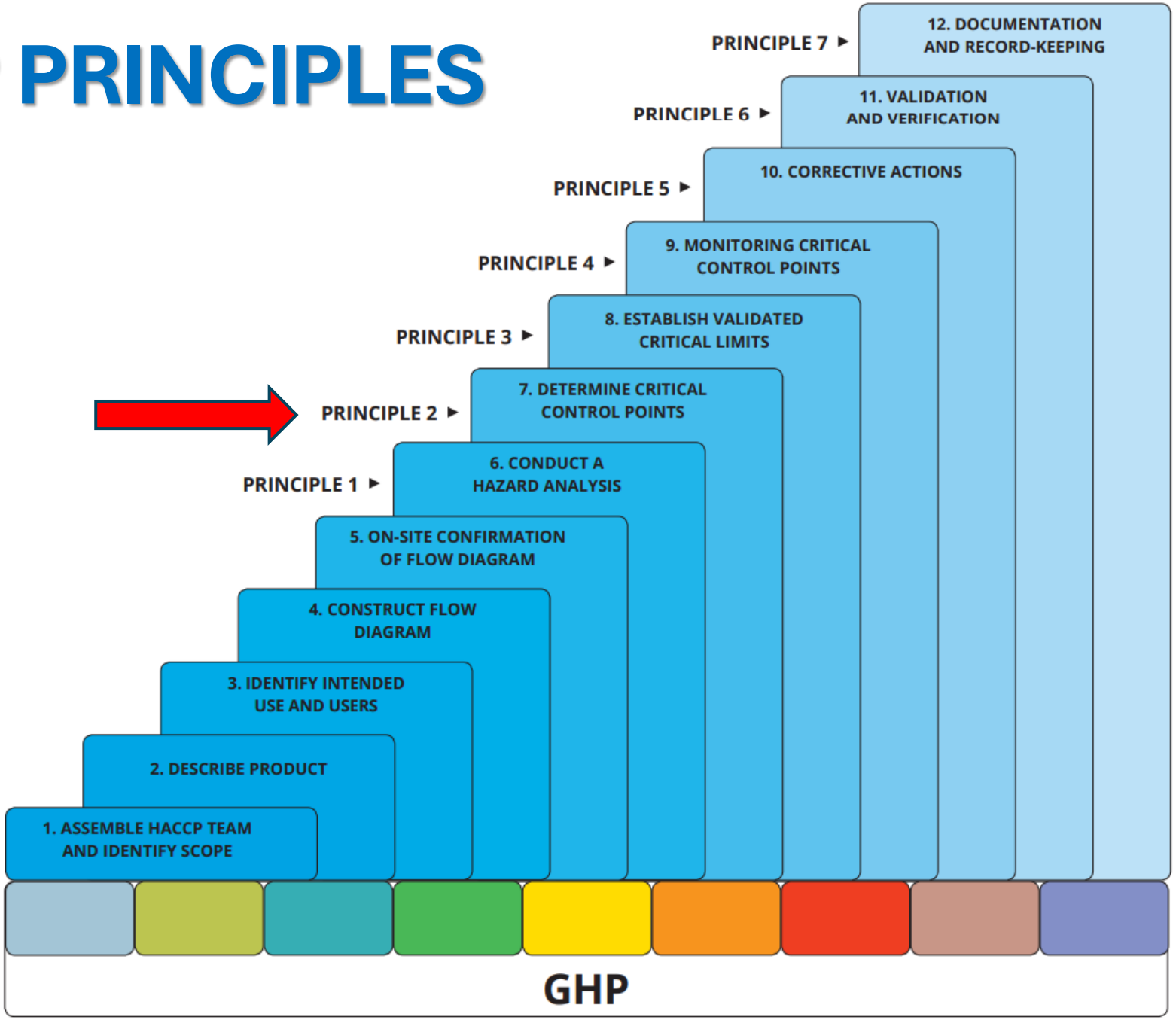
- A hazard that has a **high severity of effect**, such as death from ***Clostridium botulinum* toxin**, may impose a socially unacceptable risk at **very low probability** of occurrence and thus warrant the application of HACCP controls.

P1. HACCP: CONDUCT HAZARD ANALYSIS

An example of the significant hazard survival of *C. botulinum* at the step of heat processing for canned tuna

Processing Step	Potential hazard	Is the potential hazard significant?	Justification	Control measures
12. Heat processing	*C. botulinum* viable spores	Yes	An insufficient heat processing may result in survival of *C. botulinum* spores and, therefore, possibility of toxin production. A product must be commercially sterile.	Ensure adequate heat applied for proper time at retort.

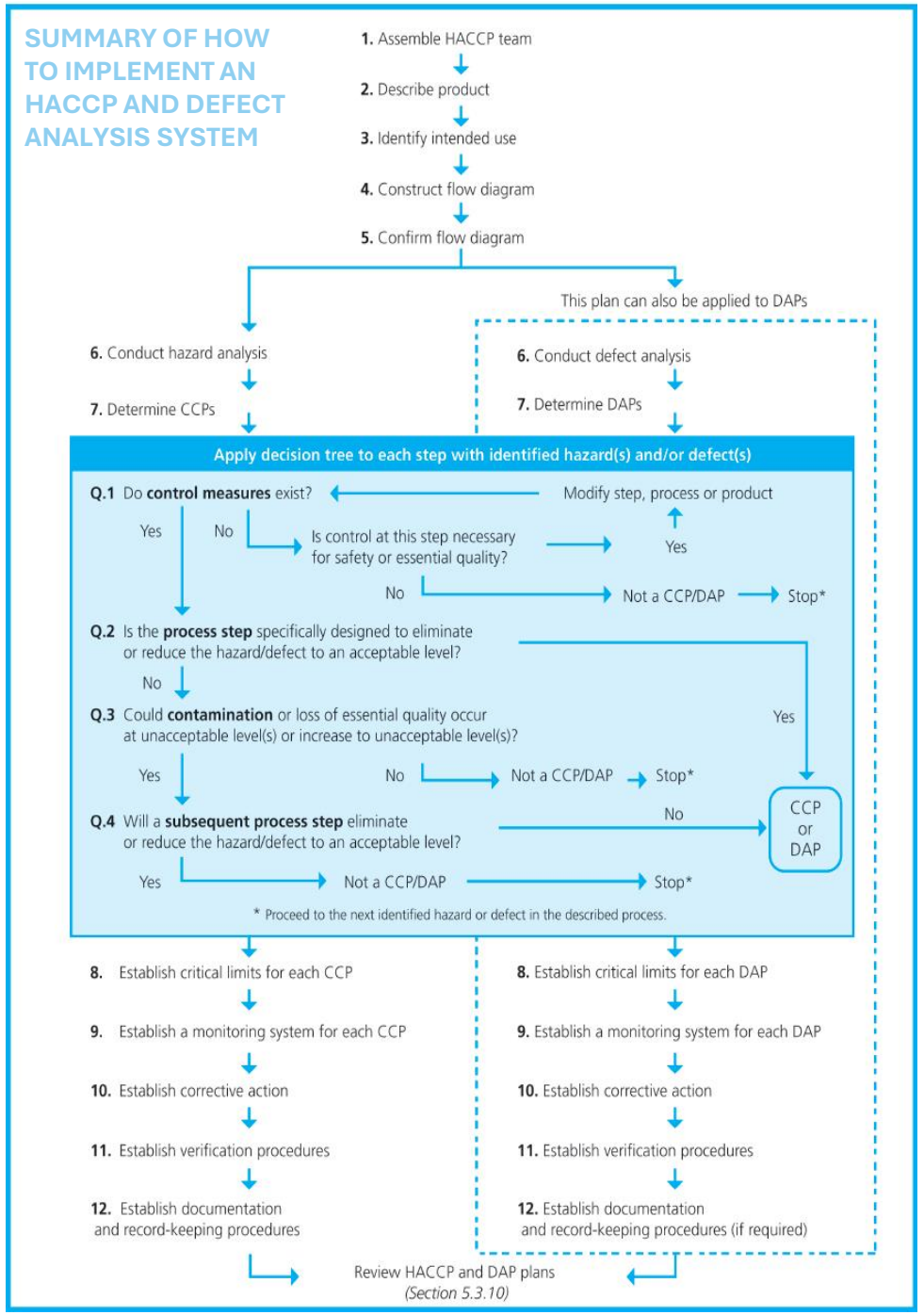
HACCP PRINCIPLES



P2. HACCP: DETERMINE CRITICAL CONTROL POINTS

The Codex decision tree is a tool that can be applied to the determination of critical control points (CCPs). Using this decision tree, a significant hazard or defect at a step can be assessed through a logical sequence of questions.

Where CCPs have been identified at a step, that point in the process must be controlled to prevent, reduce or eliminate the likely occurrence of the hazard to an acceptable level.

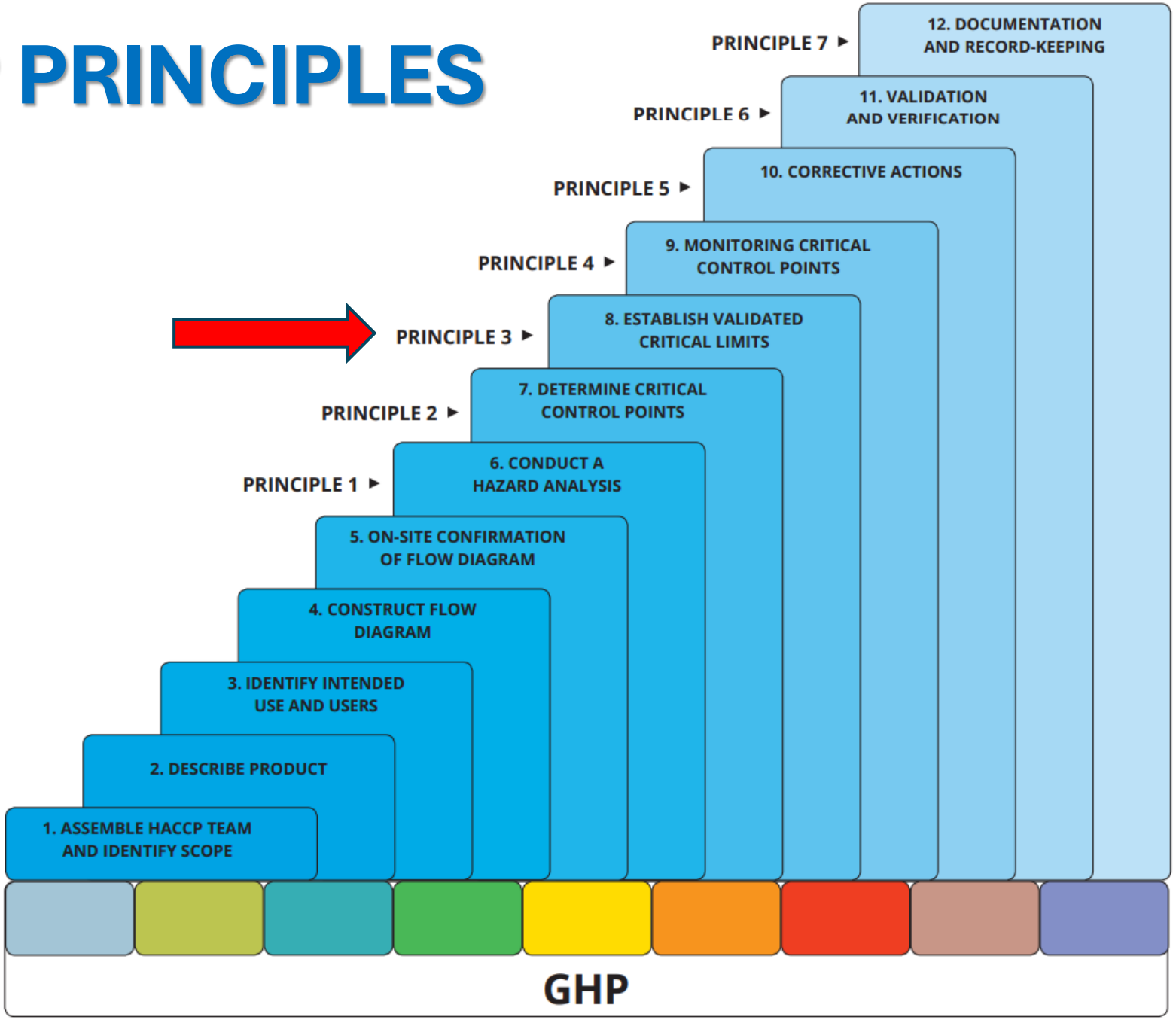


P2. HACCP: DETERMINE CRITICAL CONTROL POINTS

A schematic example of a hazard analysis with corresponding control measures and the application of the Codex decision tree for the determination of a critical control point

Processing Step No. 12 Heat processing		Application of Codex decision tree			
Potential hazards	**Control measures**				
C. botulinum viable spores	Ensure adequate heat applied for proper time at retort.	**Q1:** Do control measures exist? **If yes** – go to Q2. **If no** – consider whether control measures are available or necessary within the process. Proceed to next identified hazard.	**Q2:** Is the step specifically designed to eliminate or reduce the likely occurrence of *C. botulinum* to an acceptable level? **If yes** – this step is a CCP. **If no** – go to Q3.	**Q3:** Could contamination occur in excess of acceptable levels or could this increase to unacceptable levels? **If yes** – go to Q4. **If no** – not a CCP.	**Q4:** Will a subsequent step eliminate or reduce the hazard to an acceptable level? **If yes** – not a CCP. **If no** – CCP. *What about consideration of a previous step?*
		A: Yes, a heat processing procedure (schedule, method) is clearly defined.	**A:** Yes, this step was specifically designed to eliminate spores.		
		Decision: Processing Step No. 12 Heat processing is a **critical control**			

HACCP PRINCIPLES

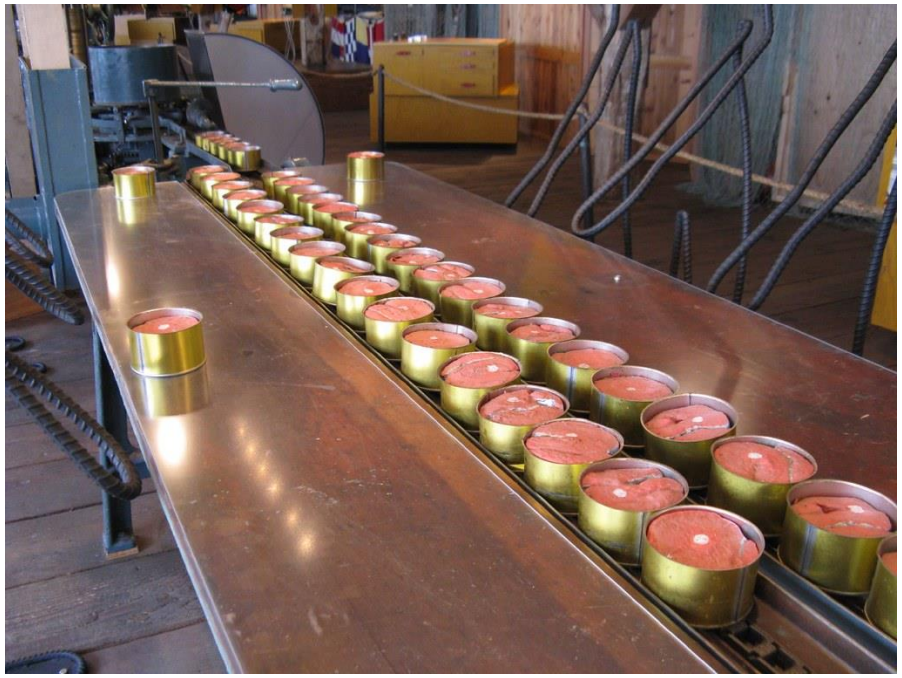


P3. HACCP: ESTABLISH CRITICAL LIMITS

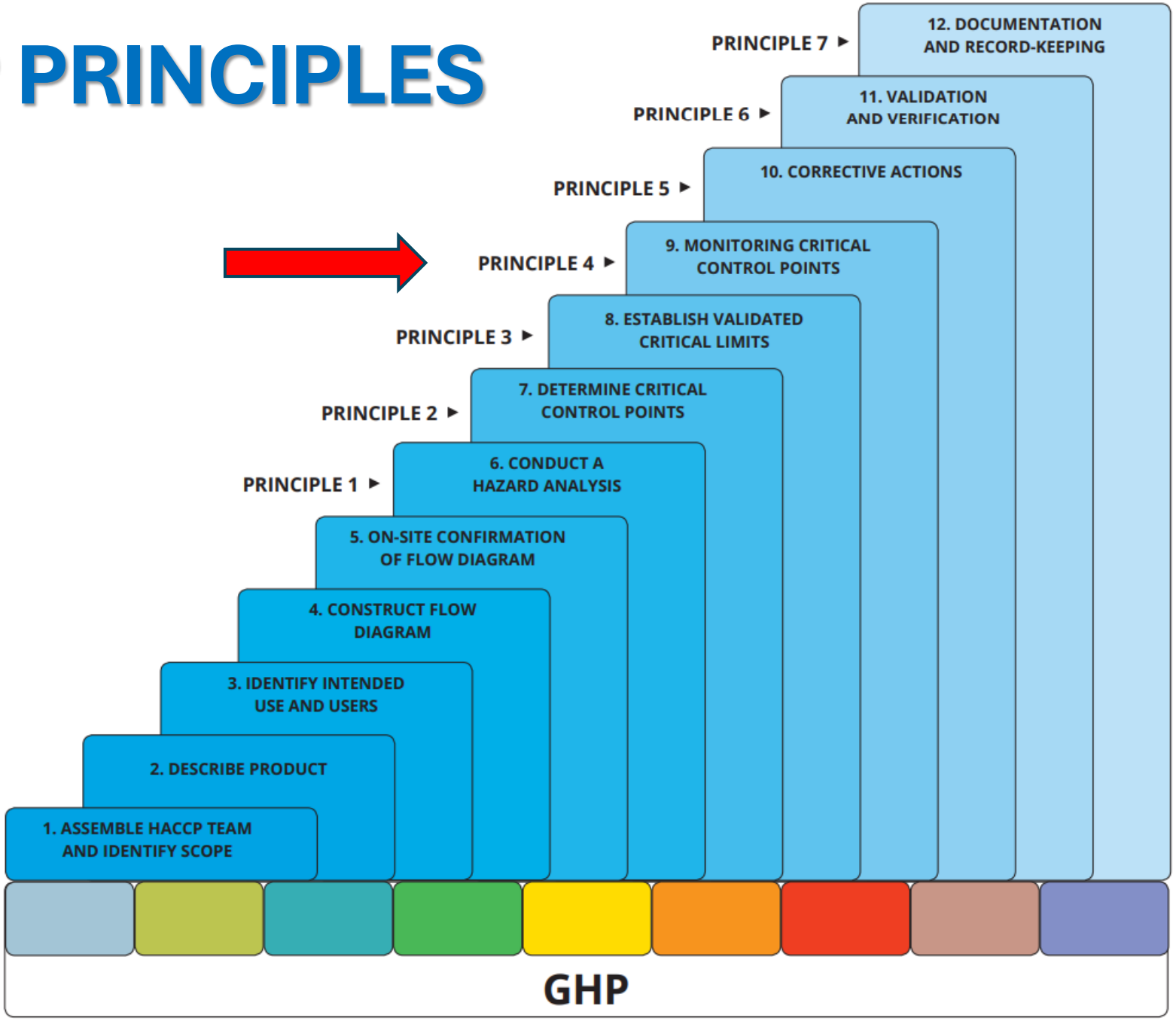
For each CCP, critical limits for the control of the hazard must be specified.

The establishment of critical limits should be based on scientific evidence and validated by appropriate technical experts to ensure their effectiveness.

CCP: heat treatment to eliminate the presence of *Clostridium botulinum* spores in canned tunna, critical limit 121°C



HACCP PRINCIPLES



P4.HACCP: ESTABLISH MONITORING PROCEDURES

Any monitoring system should detect loss of control at a CCP relative to its critical limit.

The monitoring activity of a CCP should be documented.

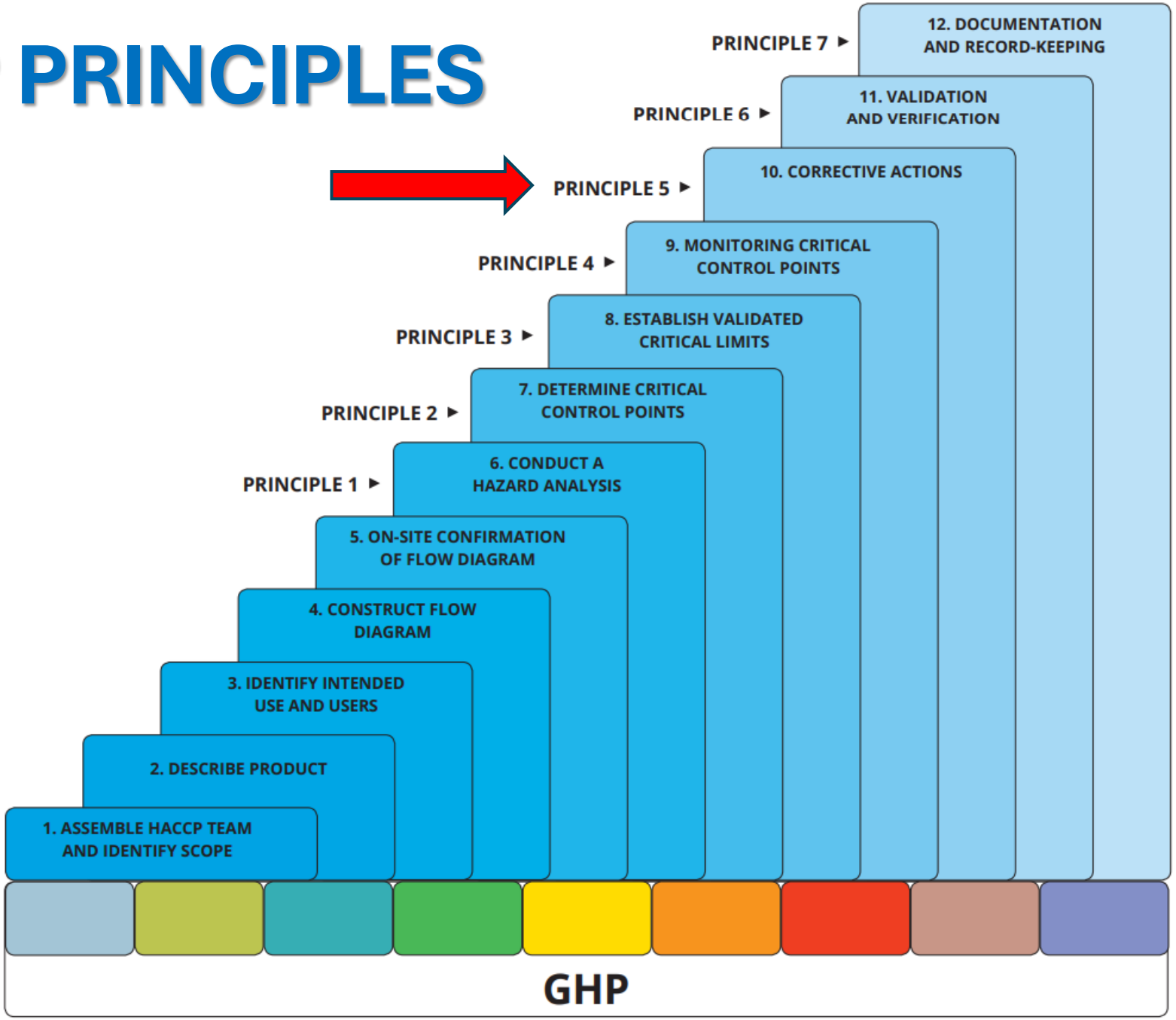
Considerations include optimizing the number of individuals performing the measurement and selection of appropriate methods that will produce rapid results (e.g. time, temperature and pH).

For CCPs, records of monitoring should be acknowledged and dated by a responsible person for verification.

CCP
Processing Step No. 12: Heat processing
Hazard: *Clostridium botulinum* viable spores

Critical limit	Monitoring procedure	Corrective action	Records	Verification
Those specific parameters associated with heat processing	**Who:** Qualified person assigned to heat processing **What:** All parameters **How:** Checks of sterilization schedule and other factors **Frequency:** Every batch	**Who:** Qualified personnel **What:** Personnel retraining New heat processing or batch destruction Corrective maintenance of equipment Hold product until safety can be evaluated **Who:** Appropriate trained personnel	Monitoring records, corrective action records, product evaluation records, calibration records, validation records, audit records, HACCP plan review record	Validation, finished product evaluation, internal audit, review of records, calibration of machinery (may be a prerequisite), review of HACCP plan, external audit

HACCP PRINCIPLES



P5. HACCP: ESTABLISH CORRECTIVE ACTION

An effective HACCP plan is **anticipatory** by nature and it is recognized that corrective action may be necessary from time to time.

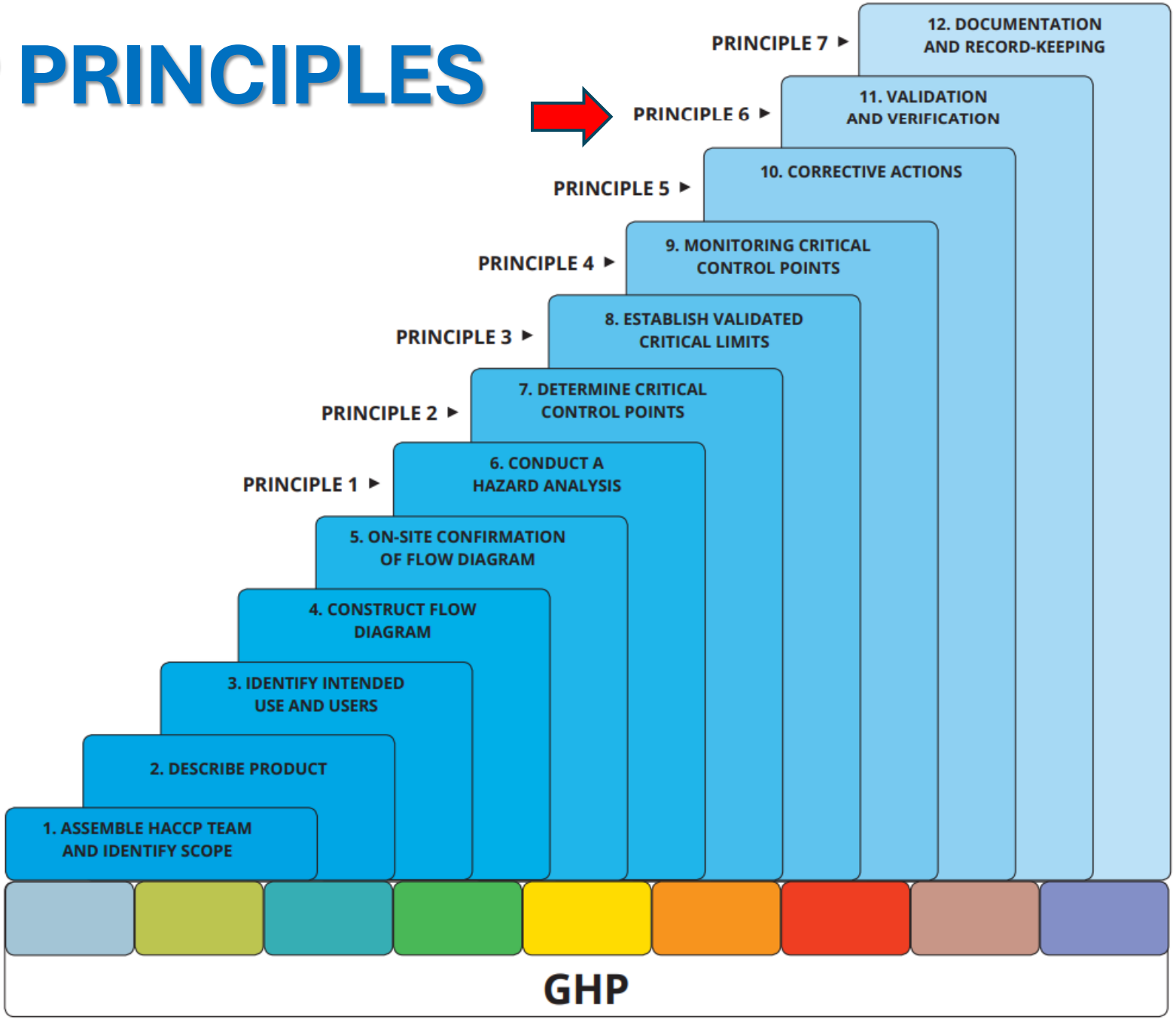
A documented corrective action programme should be established to deal with instances where the critical limit has been exceeded and loss of control has occurred at a CCP.

CCP
Processing Step No. 12: Heat processing
Hazard: *Clostridium botulinum* viable spores

Critical limit	Monitoring procedure	Corrective action	Records	Verification
Those specific parameters associated with heat processing	**Who:** Qualified person assigned to heat processing **What:** All parameters **How:** Checks of sterilization schedule and other factors **Frequency:** Every batch	**Who:** Qualified personnel **What:** Personnel retraining New heat processing or batch destruction Corrective maintenance of equipment Hold product until safety can be evaluated **Who:** Appropriate trained personnel	Monitoring records, corrective action records, product evaluation records, calibration records, validation records, audit records, HACCP plan review record	Validation, finished product evaluation, internal audit, review of records, calibration of machinery (may be a prerequisite), review of HACCP plan, external audit

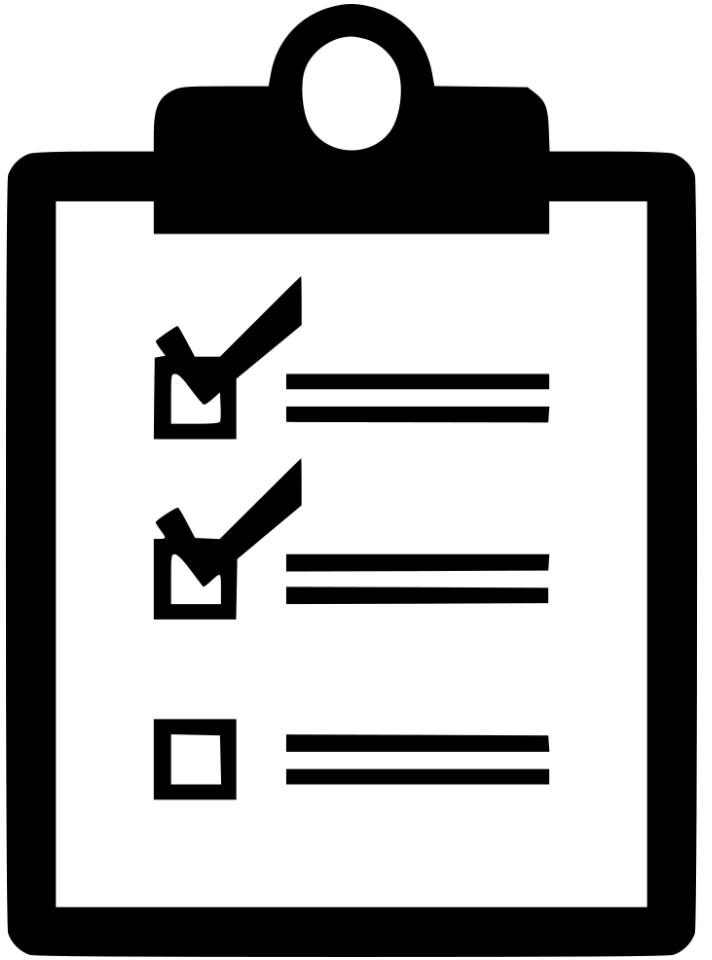
BE PREPARED FOR THE WORSE

HACCP PRINCIPLES



P6. HACCP: ESTABLISH VERIFICATION PROCEDURES

A processing facility should establish a verification procedure carried out by qualified individuals, to periodically assess if the HACCP plan is adequate, implemented and working properly. This step will help determine whether CCPs are under control.



P6. HACCP: ESTABLISH VERIFICATION PROCEDURES

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Processing Step No. 12: Heat processing
Hazard: *Clostridium botulinum* viable spores

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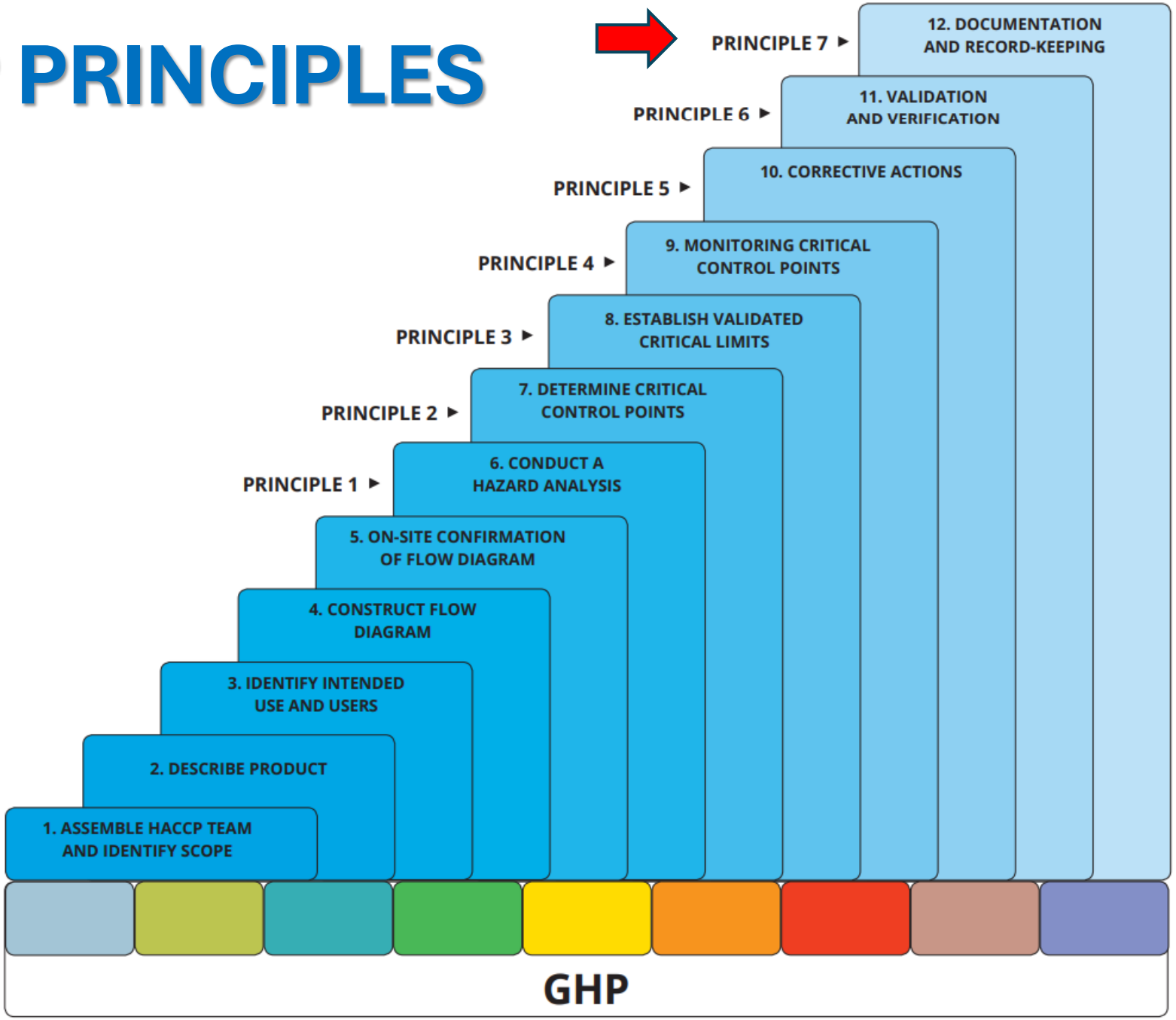
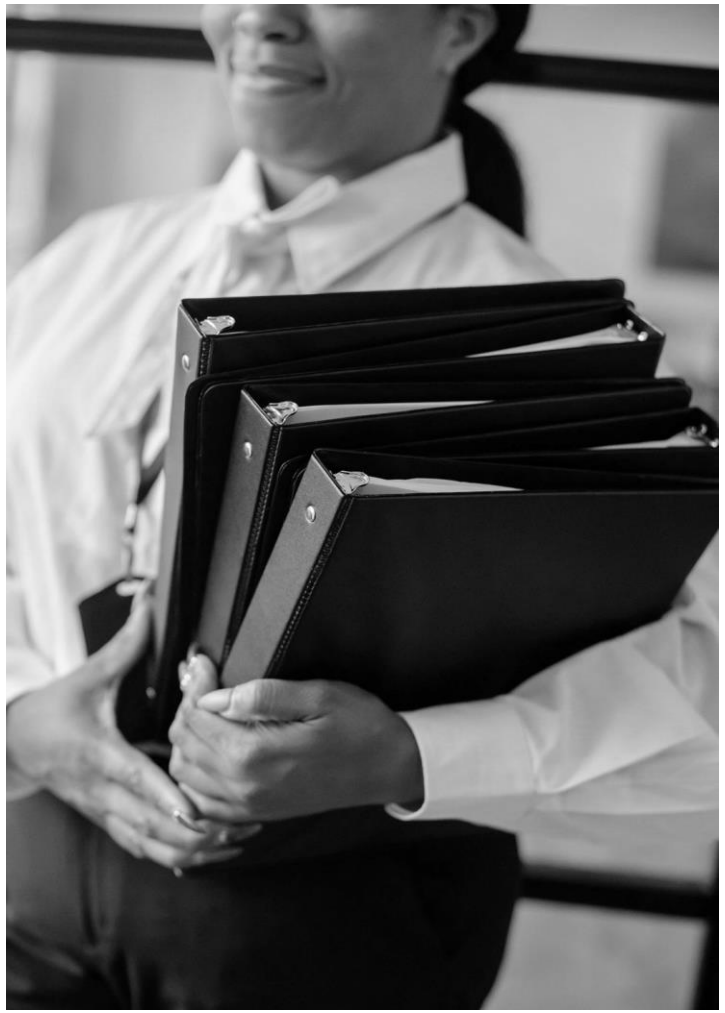


P7. HACCP: ESTABLISH DOCUMENTATION AND RECORD-KEEPING PROCEDURES

Documentation may include hazard analysis, CCP determination, critical limit determination, and procedures for monitoring, corrective action and verification.

A current, accurate and concise record-keeping system will enhance the effectiveness of a HACCP programme and facilitate the verification process.



P7. HACCP: ESTABLISH DOCUMENTATION AND RECORD-KEEPING PROCEDURES

CCP
Processing Step No. 12: Heat processing
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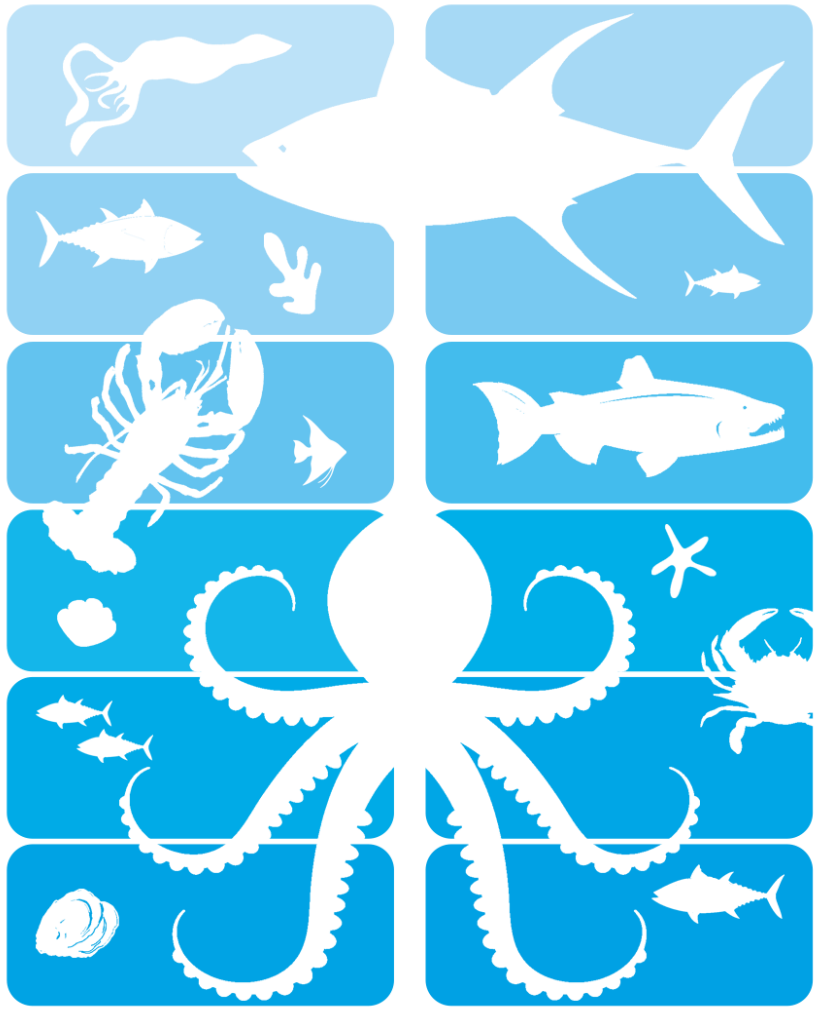
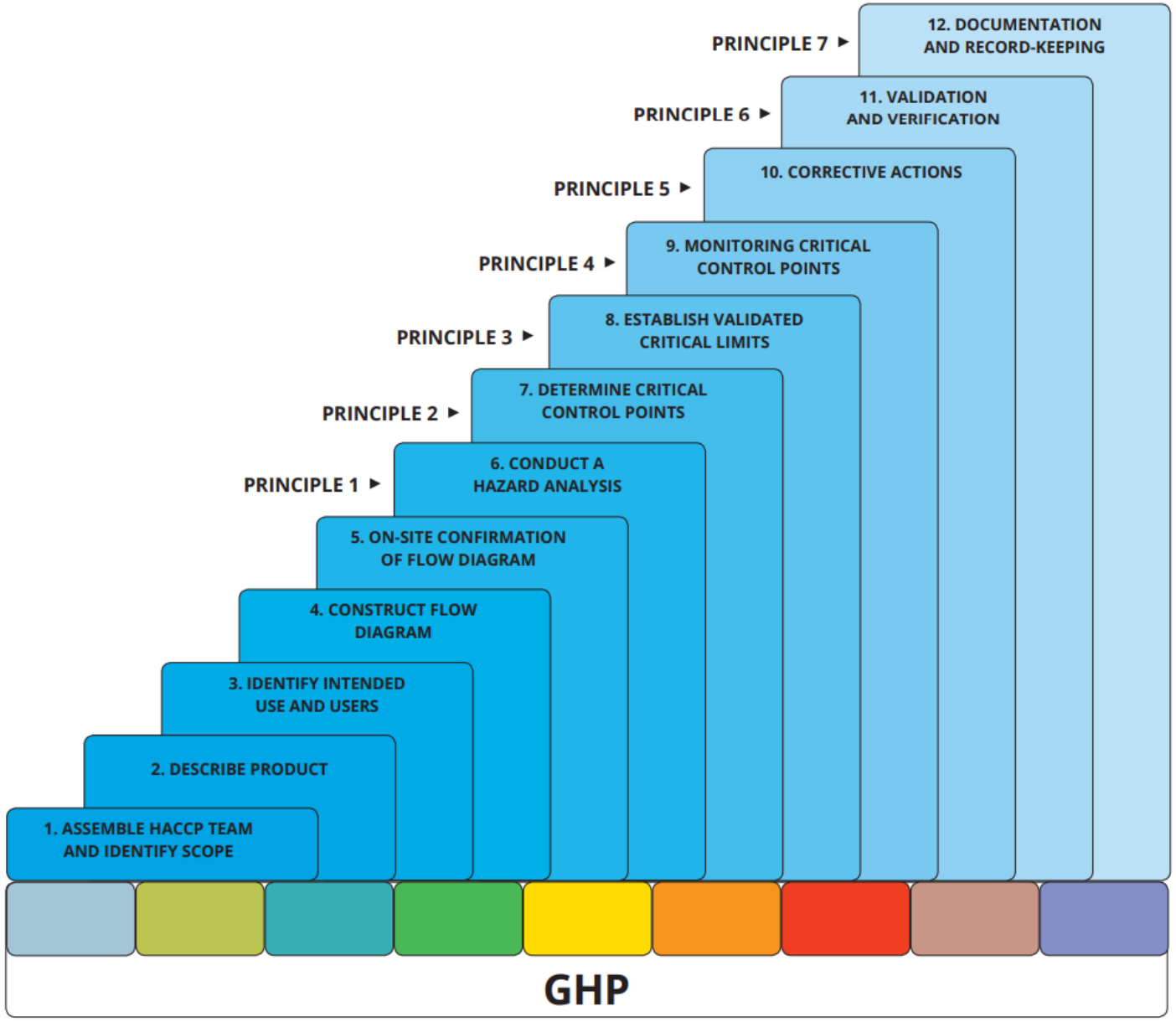
Critical limit	Monitoring procedure	Corrective action	Records	Verification
Those specific parameters associated with heat processing	**Who:** Qualified person assigned to heat processing **What:** All parameters **How:** Checks of sterilization schedule and other factors **Frequency:** Every batch	**Who:** Qualified personnel **What:** Personnel retraining New heat processing or batch destruction Corrective maintenance of equipment Hold product until safety can be evaluated **Who:** Appropriate trained personnel	Monitoring records, corrective action records, product evaluation records, calibration records, validation records, audit records, HACCP plan review record	Validation, finished product evaluation, internal audit, review of records, calibration of machinery (may be a prerequisite), review of HACCP plan, external audit



Thank you.


PRINCIPLE 7
12. DOCUMENTATION AND RECORD-KEEPING
PRINCIPLE 6
11. VALIDATION AND VERIFICATION
PRINCIPLE 5
10. CORRECTIVE ACTIONS
PRINCIPLE 4
9. MONITORING CRITICAL CONTROL POINTS
PRINCIPLE 3
8. ESTABLISH VALIDATED CRITICAL LIMITS
PRINCIPLE 2
7. DETERMINE CRITICAL CONTROL POINTS
PRINCIPLE 1
6. CONDUCT A HAZARD ANALYSIS
5. ON-SITE CONFIRMATION OF FLOW DIAGRAM
4. CONSTRUCT FLOW DIAGRAM
3. IDENTIFY INTENDED USE AND USERS
2. DESCRIBE PRODUCT
1. ASSEMBLE HACCP TEAM AND IDENTIFY SCOPE
GHP