

BAKING UPDATE

HACCP and GMPs

Practical technology from Lallemand Inc., parent of American Yeast Sales, producers and distributors of Eagle® yeast, fresh and instant.



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GMPs and Prerequisite Programs

The basic requirements for sanitary operations of food manufacturing facilities are generally referred to as good manufacturing practices. These practices are defined as universal steps or procedures that control the operational conditions within a food establishment allowing for environmental conditions that are favorable to the production of safe food.

The FDA issued current Good Manufacturing Practices (cGMPs or GMPs) regulations (21 CFR 110) as minimum requirements for food manufacturers. The focus of the FDA's GMPs is to prevent food adulteration as defined in the Federal Food, Drug & Cosmetic Act, Sections 402(a)(3) and (4). GMPs carry the force of U.S. law, making it mandatory that all commercial food companies comply.

GMPs are prerequisites for HACCP. Prerequisite programs are the foundation of HACCP plans. Prerequisites include—

- Personnel:** Training, hygiene, and disease control
- Plant and grounds:** Construction; design; drainage; control of litter, waste, and weeds
- Sanitary operations:** Maintenance, sanitation, sanitizing chemicals, and pest control
- Sanitary facilities:** Water, plumbing, hand-washing, toilets, sewage facilities, and rubbish disposal
- Equipment and utensils:** Cleanable and sanitary design, installation, maintenance and calibration
- Production processes:** Sanitary control of food and raw materials during receiving, inspection, transporting, segregation, preparing, manufacturing, packaging and storage operations

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HACCP for the Baking Industry

HAZARD ANALYSIS and Critical Control Point (HACCP) is an internationally recognized system of ensuring food safety.

HACCP provides a scientifically based systematic approach to the identification, evaluation, and control of food safety hazards. This program identifies the critical steps in food or ingredient preparation where contamination is most likely to occur and then puts in place preventive controls to eliminate or reduce food safety hazards to acceptable levels. It is a proactive tool that focuses on preventive measures rather than end-product testing. HACCP focuses exclusively on assuring food safety and is not to be used for controlling less critical quality attributes since that could dilute its effectiveness.

HACCP plans are written documents based on seven HACCP principles that describe the procedures to be followed. Generic HACCP plans can be useful guides, but a HACCP system must be developed and customized to an individual company's specific processing and distribution conditions.

Successful application of HACCP requires the full commitment and involvement of management and employees. It is also critical to use a multidisciplinary team to develop the program, especially for conducting risk assessment and determining critical control points. The team should be trained in HACCP and include members with expertise in microbiology, production, engineering, chemistry, and food technology. Team contribution to describing the food and its uses and to verifying the pro-

cess flow diagram are important to ensure that critical product uses or process details are not omitted.

Hazard analysis focuses on three types of food safety hazards—biological, chemical, and physical—that are likely to cause illness or injury if not controlled. HACCP focuses on hazards instead of contaminants because many potentially hazardous agents may be commonly detected in very small quantities in food and not be harmful; it is their concentration that may cause the hazard.

Biological hazards include pathogenic bacteria (e.g., *Salmonella* spp., *Escherichia coli*), viruses (e.g., hepatitis), parasites, or natural toxins (e.g., aflatoxin). Microbiological hazards are the most important concern since they represent the greatest public health risk. These hazards are commonly caused by contaminated ingredients, improper cooling or heating, poor sanitation,

poor personal hygiene, and/or cross-contamination. An estimated 9,000 deaths and 33 million illnesses occur each year from foodborne causes. An objective of HACCP is to establish processes to inhibit or destroy microorganisms capable of causing foodborne illness. Controls may include temperature, pH, A_w , or osmotic agents.

Chemical hazards typically result from contamination from agricultural chemicals (e.g., pesticides, fertilizers), industrial chemicals (e.g., cleaners, sanitizers, lubricants, greases), natural toxicants or allergenic compounds (e.g., peanut proteins), heavy metals, and food chemicals (e.g., preservatives, acids, food additives). Con-

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DEVELOPING A HACCP PLAN

- **Assure that prerequisite programs (GMPs) are followed**
- [1] **Assess hazards and risks for the food**
- [2] **Determine critical control points (CCPs)**
- [3] **Establish critical limits at each CCP**
- [4] **Monitor each CCP**
- [5] **Take corrective actions for deviations**
- [6] **Audit the system to verify it works**
- [7] **Keep records to document that the system works**
- **Validate the HACCP Plan (team or third-party review)**

(Numbered items are the seven HACCP principals based on NACMCF, 1997)

HACCP HISTORY

The HACCP concepts were first developed in the 1960s to ensure the safety of food intended for the U.S. Space Program. The first regulatory use of HACCP began in 1973 when the FDA required HACCP for canned foods.

In 1985 the National Academy of Science recommended HACCP be required by industry and created the National Advisory Committee on Microbiological Criteria for Foods (NACMCF). In 1988 the International Commission for the Microbiological Specifications for Food (ICMSF) adopted the HACCP guidelines and established the internationalization of HACCP. The NACMCF developed the first standardized HACCP system in 1989 based on seven principles. The Canadian government established a Food Safety Enhancement Program (FSEP) in 1992 adopting the HACCP systems for food processing. The Canadian FSEP developed a HACCP manual that is recommended by the USFDA as an excellent HACCP resource. In 1993 the FDA applied HACCP to the Food Code, which regulates food service companies and retail food systems.

HACCP programs continue to evolve. Since revisions in 1997, the international HACCP systems of the UN/FAO Codex Alimentarius, the U.S. NACMCF, and the Canadian FSEP have become very similar, but not identical. The Codex HACCP system is considered the international model.

In the early 1990s several food companies began requiring their suppliers and vendors to adopt HACCP programs, a practice that is now common. Major U.S. regulatory mandates for HACCP were expanded in 1995 by the FDA for the fish and seafood industry and in 1996 by the USDA for the meat and poultry industry. Regulatory application of HACCP is rapidly increasing with new requirements expected for juices and egg products. In 1998, after an outbreak of *Salmonella* in toasted oat cereal, the Centers for Disease Control (CDC) recommended HACCP for the entire food industry, including the baking industry.

HACCP for the Baking Industry (Continued)


controls include segregation and proper storage of chemicals, testing and selection of raw materials, and proper cleaning practices.

Physical hazards include "extraneous materials" or "foreign objects" such as glass, metal, wood, insects, and stones. Manufacturing and distribution facilities should be designed to remove or eliminate these physical hazards or to prevent food from being contaminated with them. Common in-process controls include screens and sifters, magnets and metal detectors, and special equipment designed to detect and remove certain types of foreign objects based on size, shape, density and/or color or other optical properties.

Critical control point (CCP) is a step in the food process where control can be applied to prevent, eliminate, or reduce a food safety hazard to acceptable levels. CCPs include heating, cooling, sanitation procedures, packaging, and metal detection. Critical limits must be set for each CCP, such as maximum or minimum time, temperature, pH, salt content, or "no detection of metal fragments." Monitoring CCPs typically involves tracking and recording data pertaining to the critical limits of a CCP at designated times by designated individuals. Tools for monitoring include on-line recorders of times, temperatures, and pH;

electronic metal detectors, and microbiological testing. Corrective actions are procedures followed when a CCP deviation occurs. The procedures cover determining the cause and correcting it, disposing of any nonconforming product, and recording what has been done.


HACCP verification is the most important factor affecting its continuing effectiveness. Regular and frequent internal audits will determine if the HACCP system is continuing to work. HACCP system records generally include a summary of the hazard analysis, the HACCP plan, and records generated during the operation of the plan.

HACCP validation involves a scientific or technical review (or audit) to determine that the CCPs and their related critical limits are adequate to control the likely hazards for the food. Validation can be accomplished through a critical review of the HACCP plan by the company's HACCP team. Validation can also be done through independent third-party review. An example of this type of service is provided jointly by AIB International and Guelph Food Technology Centre. 


GMPs and Prerequisite Programs (Continued)

- ❑ **Warehousing and distribution:** Prevention of chemical, physical, microbial contamination and deterioration
- ❑ **Traceability and recall:** Manufacturing, shipping, and distribution procedures and records

Effective GMP/prerequisite programs will simplify HACCP plans and minimize the number of CCPs.

Just as GMPs are the basis of an effective HACCP program, HACCP is the critical food safety system supporting other quality systems, such as ISO 9000 and Total Quality Management (TQM). In fact, for the food industry, HACCP is the system of choice for management of food safety. As such, HACCP is a critical foundational element of an ISO or TQM quality system. 

ISO 9002 Certified

The Montréal yeast plant of Lallemand/American Yeast is certified ISO 9002. This is the first yeast manufacturing facility to receive the certification in North America and the first baking-industry-related certification granted by AIB International's affiliate, AIB Registration Services (AIBRS). 

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BAKING UPDATE

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