



INDUSTRY HANDBOOK *FOR* SAFE PROCESSING OF NUTS

EXECUTIVE SUMMARY

Foodborne illness due to *Salmonella* contamination of low-moisture foods including nuts has re-emerged as a significant problem for the food industry. Two U.S. outbreaks of *Salmonella enterica* serotypes Tennessee and Typhimurium infections traced to peanut butter in 2006-2007 and 2008-2009, respectively, have once again highlighted the problem of *Salmonella* contamination. Both were extensive countrywide outbreaks, and each caused illnesses in more than 600 persons across more than 40 states. In April 2009, millions of pounds of pistachios were recalled because of concerns of *Salmonella* contamination. Pistachios were not historically linked to disease outbreaks and thus not associated with pathogen contamination.

On a global level, a number of outbreaks associated with low-moisture products including nuts have been documented in the last several decades. Foods implicated in these outbreaks included chocolate, infant cereals, milk powder, powdered infant formula, peanut butter and other peanut-containing products, snacks, raw almonds, and toasted oats cereal. In May 2007, the Grocery Manufacturers Association (GMA) formed a *Salmonella* Control Task Force, which developed a guidance document for the control of *Salmonella* when manufacturing low-moisture foods. The guidance is applicable to various products that include, but are not limited to, peanut butter, cereals, dry protein products (such as dried dairy products, soy protein, rice protein), confections (such as chocolate), snacks (such as corn chips), spices, animal feeds (both ingredients and finished products), pet foods and pet treats.

To specifically assist the nut industry, GMA launched a second initiative in April 2009, targeted at building upon the *Salmonella* guidance for low-moisture foods and developing a comprehensive handbook for peanut and tree nut shellers, hullers, processors and manufacturers. The GMA Nut Safety Task Force was comprised of a number of GMA member companies and members from nearly 10 other trade associations, including the American Peanut Council, the Peanut & Tree Nut Processors Association, the American Council for Food Safety & Quality, the American Peanut Shellers Association, the National Pecan Shellers Association, the Administrative Committee for Pistachios, the California Pistachio Research Board, the Western Pistachio Association, the California Walnut Board and the Almond Board of California. The comprehensive manual, *Industry Handbook for Safe Processing of Nuts*, includes four chapters. It also includes 15 appendices and three addenda: *Industry Handbook for the Safe Shelling of Peanuts*, *Good Agricultural Practices for California Pistachio Growers*, and *Good Agricultural Practices for Almond Growers*.

Each chapter in the Handbook is divided into a number of sections, providing detailed guidance in topics covering management responsibility, food safety plan including process validation, segregated hygiene area assessment and environmental monitoring, allergen

control, other preventive controls including prerequisite programs, and principles of equipment design.

Management Responsibility

Each firm should establish, document, and maintain a food safety management system as a means of assuring that all materials conform to recommendations in this Handbook and applicable regulatory requirements. Authorities and accountabilities for food safety should be clearly defined and communicated. Management reviews of the food safety system should be conducted at a defined frequency. The firm should have documented procedures and designated, trained personnel in place for managing food regulatory agency inspections and contacts. Communication in the supply chain is critical when events occur that could impact food safety and firms should notify their affected customer base in a timely manner.

Food Safety Plan

A commonly used framework for a food safety plan is the Hazard Analysis and Critical Control Point (HACCP) system. HACCP provides a systematic approach to prevent, eliminate, or reduce to an acceptable level food safety risks. The seven HACCP principles should be applied as appropriate to address potential biological, chemical, and physical hazards associated with peanuts and tree nuts. The seven principles include: conduct a hazard analysis; determine the critical control points (CCPs); establish critical limits; establish monitoring procedures; establish corrective actions; establish verification procedures; and establish record-keeping and documentation procedures. Each principle is defined and examples of its implementation and documentation, such as CCPs to eliminate *Salmonella*, are provided in this section and in an appendix.

A cross-functional team comprised of quality assurance, operations, and technical specialists familiar with food safety and the manufacturing operation should be formed to develop a food safety plan. It is recommended that all nut products and/or processes have a food safety plan, such as a HACCP plan developed according to the principles and application guidelines defined by the National Advisory Committee on Microbiological Criteria for Foods (NACMCF) or Codex. The HACCP guidelines described in this section are intended to help create common criteria for assessing hazards and identifying CCPs across shelling/hulling, processing, handling, or manufacturing to assure the safety of nuts (including peanuts and tree nuts) and nut products.

Process Validation

Processors use various technologies to process tree nuts and peanuts including oil roasting, dry roasting, blanching, propylene oxide and ethylene oxide (approved for certain nuts), steam pasteurization, hot water pasteurization, and combinations of these. Associated with each process and production facility are minimum requirements that must be maintained to ensure product safety.

Processors should defer to legal requirements for the appropriate log reduction for *Salmonella* (if such requirements exist) or determine the appropriate log reduction for *Salmonella* by scientific studies. To be effective, the process must consistently deliver a minimum degree of lethality that is appropriate for the target organism, typically *Salmonella*, as demonstrated by a process and product-specific validation study. Experiments should be conducted to validate the log kill in each piece of equipment for each nut type. There are two types of validation studies: 1) an inoculation challenge study of the process with the appropriate *Salmonella* strains or an appropriate surrogate organism, and 2) measurement of the physical delivery of the process in operation. This section provides guidelines and examples for minimum elements of a validation study, including description of the process,

data collection, validation guidelines, lethality computation, study report requirements, and scientific basis. Shellers/hullers providing raw nuts as a non-ready-to-eat ingredient may not have a CCP to eliminate *Salmonella* in their process. However, they should have prerequisite programs in place to prevent *Salmonella* growth and minimize contamination.

Segregated Hygiene Area Assessment and Environmental Monitoring

A facility segregated area assessment is done to determine risk and necessary control measures to prevent or minimize the spread of contamination from raw areas and other potential sources to process areas located after the lethality step. The processor should identify and segregate areas within the facility based on an assessment of where products, traffic (including personnel and equipment), or the environment could be a potential source of microbial contamination. The Primary *Salmonella* Control Area (PSCA) in a nut handling facility is the area where handling of ingredients and product requires the highest level of hygiene control. Various control measures should be implemented to minimize or prevent PSCA cross contamination, which may include structural separation and other barriers, optimized traffic patterns, adequate filtration of the air handling system, and effective (dry) sanitation. Evaluate and verify segregated area programs periodically to assure effectiveness and compliance to hygiene requirements.

A comprehensive Pathogen Environmental Monitoring Program (PEMP) is designed to verify the effectiveness of *Salmonella* control programs. Routine environmental monitoring for *Salmonella* is conducted on non-product contact surfaces, with samples taken primarily in the PSCA under normal operating conditions. Testing of product contact surfaces may be done under certain circumstances, such as commissioning of new equipment upon installation and as part of corrective actions for an environmental positive. Pathogen monitoring sites are categorized into four sampling zones based on proximity to process equipment. Risk levels inherent to the product and process determine the sampling frequency and locations within a facility. An official or validated method should be used for testing. This section provides detailed guidelines for sampling procedures and methods consistent with standard industry practices, and provides examples of corrective action procedures in response to positive *Salmonella* findings in the plant environment.

Allergen Management

The facility should have an effective program in place to evaluate, identify, and control food allergens to assure that specific allergens are not inadvertently incorporated as an undeclared component of any product. A robust, thorough, and comprehensive allergen management program has three main components: avoiding allergens, having allergen controls to minimize the potential for inadvertent cross-contact by undeclared allergens, and label controls.

While some allergens are unavoidable because the allergen is a key component of the product, other allergens can be avoided. Where possible, allergens should be “designed out” of the product. This may be achieved by avoiding allergens in initial formulations or reformulation to remove allergenic ingredients.

Nut processors should have an allergen control program to ensure that there are no allergens in a specific finished product other than those declared on the label. Additionally, processors should have controls to ensure that allergens contained in ancillary ingredients are managed to prevent cross-contact with products that do not declare these allergens on their labels. Various individual programs that, when brought together, make up an allergen control program. These programs represent a variety of ways to help manage allergens and reduce risk to the product and consumers.

Minimizing cross-contact during product changeover from an allergen-containing product to one containing a different allergen profile is dependent on effective sanitation practices to deliver a safe and properly labeled consumer product. Effective sanitation practices are important in preventing cross-contact issues. Cleaning methods should take into consideration the form and amount of the target allergen, the equipment, the plant structure, and other risks. Sanitation can be accomplished either by wet cleaning, dry cleaning, flushing, or a combination of methods.

Other Preventive Controls Including Prerequisite Programs

A number of prerequisite programs should be in place and fully functioning for a food safety system such as HACCP to perform effectively. The Handbook includes a list of key prerequisite programs, besides the preventive controls described in the sections above, which should be considered for peanut and tree nut operations. These prerequisite programs provide operating conditions conducive to the implementation of a food safety plan. They are intended to keep low-risk potential hazards from becoming serious enough to adversely impact the safety of the product.

Shellers, hullers, processors and manufacturers of different nut commodities may have different processes and unique features in their operations. However, they all have similar concerns regarding such topics as facility design, personnel practices, sanitation, pest control, control of extraneous matter, and training issues. The Handbook provides detailed guidelines to address these topics as well as other programs including maintenance controls, raw material and product controls, corrective and preventive actions, and laboratory operations. While not all aspects for every topic are applicable to all segments of the nut industry, each operation may evaluate the recommendations in this section and use them in a manner where they can choose those aspects that will best serve their individual operations. Collectively, well functioning prerequisite programs provide a broad and firm foundation to help ensure hygienic practices throughout a facility.

Principles of Equipment Design and Installation

In order to ensure adequate cleaning and sanitizing, equipment used for nut processing should meet basic sanitary design principles. This section provides guidance on ten principles of sanitary equipment design and installation for low-moisture foods, including peanuts and tree nuts. Equipment should be constructed to be cleanable, including the use of materials compatible with the product, the facility environment, and sanitation methods. All parts of the equipment should be readily accessible. There should be no stagnant product or liquid build-ups. Hollow areas of equipment should be avoided or permanently sealed. All parts of equipment should be free of niches. During normal operations, the equipment should perform so it does not contribute to unsanitary conditions or the harborage of bacteria. Human/machine interfaces should be designed to ensure product and other residues do not penetrate or accumulate in or on the enclosures or interfaces. Equipment design should ensure hygienic compatibility with other equipment and factory systems. Equipment for raw and processed products should be separated wherever possible. Equipment and personnel at installation should meet hygiene and sanitation requirements.

This Handbook has been designed as a tool chest of guidance material for all of the nut industry to utilize in developing stronger food safety measures and programs relevant to their sector of the business. A cross section of the nut growing, shelling and processing industry has been involved in development of the handbook, which promotes understanding of the role of each segment plays in nut safety. This Handbook is an evolving document, and therefore, can only benefit from further comment/input from shellers, hullers, processors, manufacturers and other interested stakeholders who use it.