Egg Products Hazards and Controls Guide

Food Safety and Inspection Service

United States Department of Agriculture

September 9, 2020

Table of Contents

Introduction

FSIS developed this Guide to help FSIS personnel conduct a systematic evaluation of processes used in the production of egg products. The Guide identifies relevant process steps, lists potential hazards for each of these process steps, and cites controls frequently used by processors to address these hazards. Using this Guide, FSIS personnel should be able to verify more effectively that an egg products plant's food safety system is adequately identifying and controlling the hazards associated with its operations.

This Guide should be used with the following principles in mind:

- This Guide is **not** intended to suggest where Critical Control Points (CCPs) should be incorporated in a plant's HACCP system.

- The statement "no common hazard" in the Guide is based on the information that is currently available and may change based on research or outbreak and recall investigations. Unforeseen hazards and the results of HACCP system reassessments may also identify a possible hazard in a process step where none was previously identified.

- The potential hazards listed may not be the only possible hazards for a particular process step.

- The entries in the "Frequently Used Controls" column are not the only valid controls that plants may include in their HACCP systems for a particular hazard.

- A set of suggested general and process-specific verification questions are included in this Guide after each process step listed. These questions are intended to guide FSIS personnel when evaluating a plant's HACCP system and specifically its process steps and to trigger additional questions. It is important for FSIS personnel to realize that these questions are not meant to be all-inclusive, but to provide examples of the types of questions that may arise when verifying the adequacy of a plant's HACCP system and regulatory compliance.

This Guide should also be useful to plant personnel, particularly those in small and very small plants. However, the potential hazards and frequently used controls listed in this Guide are neither the only possible hazards nor the only applicable process controls available to a plant operator. Each plant must design its HACCP system to address those hazards that are reasonably likely to occur in its own specific production processes.

The Guide consists of the following major sections:

- Quick reference table of process steps in alphabetical order for the most common process steps in the production of egg products;

- General verification questions for most process steps; and

- A listing of individual process steps with currently identified potential hazards and frequently used controls.

Quick Reference Table of Process Steps in Alphabetical Order by Product Category

Process Steps	Page No.	Raw/NRTE	RTE Not Shelf Stable	RTE Shelf Stable
Blending of dry ingredients into dried egg product	19			•
Breaking and separating of eggs	10	•		
Classification and sorting, candling, and transfer of shell eggs	8	•		
Defrosting	12	•	•	
Desugaring/fermentation	15	•	•	
Egg washing/sanitizer	9	•		
Formulation/mixing/ homogenization/ reconstitution of dried product	13	•	•	
Freezing	20	•	•	
Heat treatment of dried egg whites	17			•
Liquid egg cooling and holding	11	•	•	
Packaging/repackaging	22	•	•	•
Pasteurization	14		•	
Receiving and storage of packaging materials and non-egg ingredients	7	•	•	•
Receiving and storage of raw/NRTE liquid egg products	5	•		
Receiving and storage of RTE egg products (liquid/dried)	6		•	•
Receiving and storage of shell eggs prior to use	4	•		
Rework	18	•	•	•
Shipping	24	•	•	•
Sifting of dried egg products	21		•	•
Spray/pan drying (yellow/white)	16			•
Storage, handling and loading of egg product after packaging and prior to shipping	23	•	•	•

Suggested General Verification Questions for Most Process Steps

The following set of general questions should be used by FSIS personnel when evaluating and assessing the adequacy of a plant's hazard analysis and its decision making for each process step relative to potential hazards, controls for identified hazards, monitoring and recordkeeping. This Guide also includes more specific questions for each process step under the *Process Steps, Potential Hazards, and Frequently Used Controls* section that FSIS personnel can use to assist with their evaluation of the adequacy of a plant's HACCP system.

- Has the plant included this process step in its flow chart and hazard analysis?
- Does the plant have a prerequisite program that addresses this process step?
- Has the plant identified any hazards associated with this process step?
- Is this process step a CCP?
- Is the plant following procedures to eliminate or reduce any identified hazard?
- Can the plant support that the hazard is not reasonably likely to occur (NRLTO)?
- Did the plant validate the control methods, including preventive measures and prerequisite programs, for this hazard?
- Does the plant have in-plant validation data for 90 calendar days to support that the control is working as intended? (**NOTE**: The documentation for in-plant validation from small and very small establishments may contain data from greater than 90 calendar days if a request is granted in writing by the district office for additional calendar days to gather records to cover at least 13 production days.)
- Is the plant following all procedures (i.e., prerequisite or other programs) identified in its hazard analysis?
- Does the plant maintain records associated with this process step?
- Do records contain information that indicates a reassessment of the hazard analysis is necessary?
- Are records made available to FSIS?
- Is the equipment used clean, sanitary, and well maintained?

Process Steps, Potential Hazards, and Frequently Used Controls

Process Step	Potential Hazards	Frequently Used Controls
Receiving and storage of shell eggs prior to use **Note**: Shells eggs intended for breaking must be transported and stored at or below 45°F ambient temperature beginning 36 hours after time of lay (21 CFR 118.4(e)).	Biological—Presence and outgrowth of *Salmonella* (interior and exterior of egg)	• Pre-harvest: Eggs handled by the source plant or farm in a manner that minimizes the possibility of pathogen contamination or outgrowth prior to acceptance (e.g., quality assurance programs, letters of guarantee, product temperature tracking, and delivery verification systems). • Proper sanitation of equipment (e.g., egg conveyor systems or containers/flats) for in or off-line systems to reduce contamination. • Shell eggs held at temperatures for durations that will minimize pathogen growth if contamination is present. This includes the time and temperature held prior to receipt by the processor.
	Chemical—Residues (e.g., pesticides, antibiotics)	• Residue control or approved supplier program.
	Physical—No common hazard	

Suggested verification questions:

1. Are shell eggs received held under refrigeration?
2. Are the shell eggs stored in a manner that protects them from environmental contamination?
3. How does the plant ensure residues are not present in shell eggs above legal tolerances?

Process Step	Potential Hazards	Frequently Used Controls
Receiving and storage of raw/NRTE liquid egg products	Biological—Presence and outgrowth of *Salmonella*	• Product properly handled prior to acceptance (e.g., letters of guarantee, product temperature records). • Proper receiving temperatures that will minimize pathogen growth. • Maintain package and product integrity.
	Chemical—Allergens, residues (e.g., pesticides, antibiotics)	• Letters of guarantee; approved supplier program. • Proper storage to prevent cross-contamination of allergen-free products. • Separate equipment. • Allergens properly identified in the ingredients statement on the finished product label.
	Physical—Foreign material (e.g., metal, plastic, rubber)	• Visual inspection; proper storage; sieves, filters.

Suggested verification questions:

1. Are raw/NRTE liquid egg products received and held under refrigeration to preclude the growth of pathogens?
2. Is container integrity maintained to protect the raw/NRTE liquid egg products from environmental contamination such as dust, moisture, or other physical contaminants?
3. Does the plant address foreign material in its HACCP system?
4. Does the plant receive inedible egg products? If yes, are they handled in a manner that ensures adequate segregation and are inventory controls maintained?
5. Does the plant maintain communication with its suppliers concerning formulation changes or its suppliers' allergen control programs?
6. If the finished product contains non-egg allergens, does the final product label declare these allergens?
7. How does the plant ensure residues are not present in raw/NRTE liquid egg products above legal tolerances?

Process Step	Potential Hazards	Frequently Used Controls
Receiving and storage of RTE egg products (liquid/dried)	Biological—Potential for contamination with *Listeria monocytogenes* and *Salmonella* in post-lethality exposed RTE egg products	• Proper sanitation (e.g., separation of raw and RTE product, product or environmental testing). • Product handled in a sanitary manner during storage and processing (e.g., product temperature, minimize cross-contamination). • Keep product at time/temperature combinations that will minimize pathogen growth. • Maintain package and product integrity; letters of guarantee.
	Chemical—Allergens, residues (e.g., pesticides, antibiotics)	• Letters of guarantee; approved supplier program. • Proper storage to prevent cross-contamination of allergen-free products. • Separate equipment. • Allergens properly identified in the ingredients statement on the finished product label.
	Physical—Foreign material (e.g., metal, plastic, rubber)	• Visual inspection; proper storage; sieves, filters.

Suggested verification questions:

1. Are the RTE egg products (liquid) received held under refrigeration or frozen to preclude the growth of pathogens?
2. Is container integrity maintained to protect these types of egg products from environmental contamination such as dust, moisture, or other physical contaminants?
3. Does the plant have a sanitation program to address *Listeria monocytogenes* and *Salmonella* in the post-lethality exposed environment?
4. If the product contains non-egg allergens, does the final product label declare all allergens?
5. Does the plant address foreign material in its HACCP system?
6. Does the plant have controls to prevent cross-contamination of RTE egg products with raw (i.e., unpasteurized) product?
7. Does the plant maintain communication with its suppliers concerning formulation changes or its suppliers' allergen control programs?
8. How does the plant ensure residues are not present in RTE egg products above legal tolerances?

Process Step	Potential Hazards	Frequently Used Controls
Receiving and storage of packaging materials and non-egg ingredients	Biological—Contamination with pathogens (e.g., *Salmonella* or *Listeria monocytogenes*)	• Letters of guarantee. • Packing materials and non-egg ingredients are transported and stored in a manner that ensures product integrity and proper conditions are maintained. • Dry goods are protected from pests and environmental contamination.
	Chemical—Allergens	• Letters of guarantee; approved supplier program. • Proper storage to prevent cross-contamination of allergen-free products. • Separate equipment/tools (e.g., shovels) for products containing allergens. • Allergens properly identified in the ingredients statement on the finished product label.
	Physical—Foreign material (e.g., metal, plastic)	• Visual inspection for foreign material. • Protect packaging materials from environment.

Suggested verification questions:

1. Are materials and ingredients guaranteed by the manufacturer?
2. Are materials and ingredients protected from environmental contamination, e.g., are containers kept closed, properly identified and properly stored in acceptable storage areas?
3. Does the plant maintain communication with its suppliers concerning formulation changes or its suppliers' allergen control programs?
4. If the finished product contains non-egg allergens, does the final product label declare all allergens?
5. For non-egg ingredients added post-lethality, can the plant support the safety of these ingredients (i.e., free of pathogens and unintended allergens) for each lot of product?

Process Step	Potential Hazards	Frequently Used Controls
Classification and sorting, candling, and transfer of shell eggs	Biological—Presence of *Salmonella*	• Restricted or ineligible eggs are properly segregated; eggs with strong odors are candled and broken separately, and then assessed for acceptability. • Soiled eggs are segregated for resorting and rewashing. • Proper cleaning of the transfer room equipment and effective Sanitation Standard Operating Procedures (Sanitation SOPs). • Protections from environment.
	Chemical—No common hazard	
	Physical—No common hazard	

Suggested verification questions:

1. Are shell eggs sorted and classified into categories as required in 9 CFR 590.510?
2. Are shell eggs having strong odors or eggs received in cases having strong odors candled and broken separately to determine acceptability?
3. Are ineligible and restricted shell eggs properly segregated?
4. Are candling devices designed to adequately determine the interior condition of shell eggs?
5. Are containers, shell egg conveyors, and floors constructed in a manner to allow thorough cleaning and disinfection?

Process Step	Potential Hazards	Frequently Used Controls
Egg washing/sanitizer	Biological—*Salmonella* survival	• pH of wash water/concentration of sanitizer is monitored, recorded, and maintained at a level to maximize bactericidal effect on exterior of shell. • High-temperature wash water, maintain temperature differential between wash water and internal shell egg temperature. • Wash water quality maintained to minimize cross contamination of product. • Equipment operating properly (e.g., spray nozzles, brushes, pumping system, continuous reservoir over flow). • Proper personal hygiene in place.
	Chemical—Inappropriate use of egg washing or sanitizing agent	• Egg washing compounds are safe and effective under the conditions of use; used according to the intended use specified in FSIS Directive 7120.1. • Equipment is operating properly (e.g., sanitizer spray nozzles, pumping system). • Sanitizers are used according to the intended use specified in FSIS Directive 7120.1.
	Physical—No common hazard	• Protections from environment are in place.

Suggested verification questions:

1. Is egg washing equipment kept in good repair and operated in a manner to ensure eggs are free of visible contaminants after washing?
2. Are cleaning compounds used in the wash water or egg shell sanitizers, safe and effective, under the conditions of use per FSIS Directive 7120.1, *Safe and Suitable Ingredients Used in the Production of Meat, Poultry and Egg Products*?
3. Does the plant have supporting documentation for the critical operating parameters[1] (to include pH, temperature, concentration, and duration of contact) of the wash water or egg shell sanitizer?
4. Is there a functional, adequate exhaust system in use to reduce odors?

[1] Critical operational parameters are the specific conditions that the intervention must operate under in order for it to be effective. For more information see *FSIS Compliance Guideline HACCP Systems Validation*.

Process Step	Potential Hazards	Frequently Used Controls
Breaking and separating of eggs	Biological—Presence and outgrowth of *Salmonella*	• Sanitation SOPs address proper cleaning and sanitation of room and equipment. • Proper personal hygiene and practices are in place. • Proper air movement to allow for organoleptic inspection of broken eggs for wholesomeness. • Use of sanitizers, frequency of equipment cleaning, and control of room temperature adequate to inhibit growth of pathogenic bacteria on food contact surfaces. • Ineligible eggs are prevented from entering the breaking room; line speed is adjusted to maintain process control.
	Chemical—Cleaning chemicals and sanitizers	• Sanitation SOPs address proper cleaning, sanitation, and use of cleaning chemicals/ compounds.
	Physical—Foreign material (e.g., egg shell fragments)	• Liquid egg pumps and shell filters working properly. • Breaking equipment is properly adjusted to minimize shell fragmentation.

Suggested verification questions:

1. Does the egg breaking room have adequate lighting for visual inspection?
2. Is ventilation in the egg breaking room adequate to prevent product adulteration, control odors, and control condensation to provide for adequate organoleptic inspection?
3. Are eggs that are ineligible for breaking (e.g., dirty, rots, moldy eggs, etc.) prevented from entering the breaking room?

Process Step	Potential Hazards	Frequently Used Controls
Liquid egg cooling and holding	Biological—Raw/NRTE products—outgrowth of *Salmonella*; RTE products—cross-contamination from raw products and outgrowth of pathogens (*Salmonella* and *Listeria monocytogenes*)	• Maintain product at time/temperature combinations that minimize pathogen growth.
	Chemical—No common hazard	• Maintain protection from environment.
	Physical—No common hazard	

Suggested verification questions:

1. Do liquid cooling units have sufficient capacity to cool all liquid eggs?
2. Are liquid egg holding tanks or vats equipped with suitable thermometers and agitators?
3. Are RTE liquid holding silos only vented back into a processing room for RTE product?

Process Step	Potential Hazards	Frequently Used Controls
Defrosting	Biological—Raw/NRTE products—outgrowth of *Salmonella*; RTE products—cross-contamination from raw products and outgrowth of pathogens (*Salmonella* and *Listeria monocytogenes*)	• Control environment. • Time and temperature.
	Chemical—No common hazard	• Maintain protection from environment.
	Physical—No common hazard	

Suggested verification questions:

1. Are defrosting tanks kept in good repair and constructed of material(s) that facilitate thorough cleaning?
2. Is each container of frozen eggs checked for condition and odor just prior to being emptied into crusher or receiving tank?
3. Are crushers and other equipment used in the defrosting operation dismantled at the end of each shift and washed, rinsed, and sanitized?
4. Is the process performed at temperatures that preclude pathogen growth?

Process Step	Potential Hazards	Frequently Used Controls
Formulation/mixing/ homogenization/reconstitution of dried product	Biological—Outgrowth of pathogens in raw products (e.g., *Salmonella)*; contamination from equipment or ingredients in RTE products	• Maintain product at time/temperature combinations that minimize pathogen outgrowth in raw products. • Sanitation SOPs address proper cleaning and sanitation of room and equipment. • Ingredients are acceptable under conditions of use (e.g., letters of guarantee). • Proper personal hygiene. • Good manufacturing practices and proper processing procedures (e.g., ingredients are properly weighed, labeled, and stored). • Dusting of dried product is minimized.
	Chemical—Cross-contamination with allergens	• Allergens properly identified in the ingredients statement on the finished product label. • Products containing allergens are processed and stored separately from allergen-free products.
	Physical—No common hazard	

Suggested verification questions:

1. Does the plant's Sanitation SOPs or other program address the potential for cross-contamination of pathogens in RTE products?
2. Are ingredients being used in the actual formulation in amounts that agree with the plant's documented formulation for the particular product?
3. Is reworked product included in product formulations? If yes, see rework process step.
4. Are all ingredients being used in actual formulation included in product formula and listed in descending order of predominance that agrees with the ingredient statement on the approved label for the product?
5. Are products that contain allergens processed and stored in a manner to prevent cross-contamination of allergen-free products?

Process Step	Potential Hazards	Frequently Used Controls
Pasteurization	Biological—Survival of pathogens (e.g., *Salmonella* or *Listeria monocytogenes*), due to insufficient time/temperature lethality treatment	• Effective and validated time/temperature combinations to destroy pathogens. (**Note**: *Listeria* may become heat-resistant in some products and require an increased time/temperature combination to achieve lethality). • pH of product maintained to maximize efficacy of lethality treatment. • Processing aids (e.g., hydrogen peroxide) are used in accordance with approved methodology. • Equipment maintained and operating properly. • Proper cleaning procedures in Sanitation SOPs.
	Chemical—No common hazard	• Protection from environment.
	Physical—No common hazard	

Suggested verification questions:

1. Is the temperature of liquid egg product continuously and automatically recorded during process?
2. Are holding times and temperatures adequate?
3. If ready-to-eat (RTE) pasteurized egg products are processed using a validated process, are verification activities included as part of the permanent record?
4. Are pasteurized products sampled and analyzed for the presence of pathogens per 9 CFR 590.570? Are records of pathogen testing maintained for the products?

Process Step	Potential Hazards	Frequently Used Controls
Desugaring/fermentation	Biological—Outgrowth of *Salmonella* and other bacteria during fermentation due to elevated processing temperatures	• Proper cleaning procedures, visual inspection, and effective Sanitation SOPs. • Proper incubation temperature. • Letters of guarantee from suppliers of culture.
	Chemical—No common hazard	• Sanitation SOPs address proper cleaning, sanitation, and chemical use.
	Physical—No common hazard	• Equipment maintained and operating properly.

Suggested verification questions:

1. Does the plant conduct microbiological testing of ingredients?
2. Does the plant conduct microbiological testing of finished products?
3. Are cultures used at manufacturer's recommended levels?
4. Are product temperatures monitored throughout the process?

Process Step	Potential Hazards	Frequently Used Controls
Spray drying o Yellow (RTE) o White (raw/NRTE) **Note**: egg whites can be spray or pan dried	Biological—Potential for contamination with *Listeria monocytogenes* in RTE products	• Continuous discharge to prevent accumulation of powder in dryer. • Spray or pan-dry parameters are within specifications (e.g., vacuum, temperature, humidity). • Proper cleaning procedures, visual inspection, and effective Sanitation SOPs. • Proper maintenance of equipment.
	Chemical—No common hazard	
	Physical—Foreign material contamination (e.g., metal)	

Suggested verification questions:

1. Are drying room facilities and equipment sufficient to preclude adulteration of product?
2. Does the plant control/prevent the buildup of product residues inside the dryer chambers?
3. Does the plant's Sanitation SOPs or other program address the potential for cross-contamination of pathogens in RTE products?

Process Step	Potential Hazards	Frequently Used Controls
Heat treatment of dried egg whites	Biological—Survival of *Salmonella*	• Effective and validated time/temperature combinations to destroy pathogens. • Adequate spacing of product to allow heat penetration and air circulation.
	Chemical—No common hazard	
	Physical—No common hazard	

Suggested verification questions:

1. Are dried egg whites that have been heat treated in the dry form sampled and analyzed for the presence of *Salmonella*? Is the sample collected from the center of the package?
2. Does the plant have a valid method for ensuring that the location for monitoring accurately reflects all product in the room?
3. Are records of pathogen testing maintained for the products?

Process Step	Potential Hazards	Frequently Used Controls
Rework	Biological—Raw/NRTE products—outgrowth of *Salmonella*; RTE products—cross-contamination from raw products and outgrowth of pathogens (*Salmonella* and *Listeria monocytogenes*)	• Maintain product at appropriate temperatures to control growth of microorganisms. • Lotting program; effective Sanitation SOPs. • Proper personal hygiene and adherence to established processing procedures.
	Chemical—Allergens	• Proper cleaning procedures, visual inspection, and effective Sanitation SOPs. • Separate equipment. • Allergens are properly declared on the finished product label.
	Physical—Foreign material contamination (e.g., metal and other physical contaminants)	• Proper maintenance of equipment. • An appropriate screening procedure.

Suggested verification questions:

1. Are egg products to be used for rework properly stored to preclude pathogen growth and contamination?
2. Are there any hazards associated with rework that are different than hazards associated with the product it is being added to?
3. Does the plant have any additional controls for reworked product (i.e., length of time in storage, results of examination when received)?
4. Does the plant conduct microbiological testing of reworked product?
5. Are all ingredients of the reworked product declared on the label of the finished product, and are they listed in the correct order of predominance?
6. If the finished product contains non-egg allergens, does the final product label declare all allergens?
7. Does the reworked product include returned product (e.g., rejected tanker loads), and if so, does the establishment have a procedure for ensuring the safety of the product?

Process Step	Potential Hazards	Frequently Used Controls
Blending of dry ingredients into dried egg product	Biological—Contamination with pathogens from ingredients (e.g., *Salmonella* and *Listeria monocytogenes*)	• Letters of guarantee. • Non-egg ingredients are acceptable for intended use. • Proper cleaning procedures and effective Sanitation SOPs.
	Chemical—Allergens	• Established formulation and mixing procedures for restricted ingredients (e.g., silicon dioxide, silicoaluminate, monosodium phosphate). • Ingredients and chemicals separated, properly labeled, and stored in designated areas. • Allergens are properly declared on the finished product label.
	Physical—Foreign material (e.g., equipment parts/pieces)	• Proper maintenance of equipment for proper functioning (e.g., flow meters, pumps, scales).

Suggested verification questions:

1. Is blending done in a room separate from other processing operations to prevent cross-contamination of other processing areas?
2. Is all blending and packaging equipment constructed without open seams and of materials that can be kept clean and that will have no deleterious effect on the product?
3. Are blending facilities sufficient to preclude adulteration of product to include post-lethality contamination, if applicable?
4. If the finished product contains non-egg allergens, does the final product label declare all allergens?

Process Step	Potential Hazards	Frequently Used Controls
Freezing (liquid products)	Biological—No common hazard	• Product is frozen (i.e., time/temperature). • Freezer equipment kept in good condition and properly functioning.
	Chemical—No common hazard	• Proper maintenance of equipment (e.g., pipes, valves maintained to prevent ammonia leak).
	Physical—No common hazard	

Suggested verification questions:

1. Are freezing rooms clean and free of objectionable odors?
2. Are containers stacked so as to permit circulation of air around the containers?
3. Are the egg products stored in a manner that protects them from environmental contamination?

Process Step	Potential Hazards	Frequently Used Controls
Sifting of dried egg products	Biological—Contamination with *Listeria monocytogenes* in RTE products	• Proper cleaning procedures and effective Sanitation SOPs.
	Chemical—No common hazard	
	Physical—Foreign material (e.g., screens or parts of broken equipment)	• Maintenance and proper functioning of equipment (e.g., sifter screens are in place and in good repair).

Suggested verification questions:

1. Are sifters of such material and construction to facilitate thorough cleaning and to ensure that their use will not cause the adulteration of product during processing to include post-lethality contamination, if applicable?

Process Step	Potential Hazards	Frequently Used Controls
Packaging/repackaging	Biological—Contamination with *Salmonella* and *Listeria monocytogenes* in post lethality exposed RTE products at time of packaging	• Adequate packaging material. • Good employee hygiene and product handling procedures. • Use of HEPA filters and UV lights on packaging equipment. • Maintenance of packaging equipment and proper sealing of finished product containers. • Proper sanitation of packaging equipment (e.g., spray nozzles) and implementation of Sanitation SOPs. • Package integrity maintained.
	Chemical—Allergens; packaging not appropriate for direct product contact	• Letters of guarantee from manufacturer. • Proper cleaning procedures, visual inspection, and effective Sanitation SOPs. • Separate equipment to prevent cross-contamination by allergens from another formulation. • Allergens are properly declared on product labeling.
	Physical—No common hazard	

Suggested verification questions:

1. Are direct contact packaging materials backed by the supplier's letter of guarantee?
2. Are packaging materials properly stored and protected from environmental contamination?
3. Are the plant's Sanitation SOPs sufficient to prevent direct contamination and adulteration of egg product in the post-lethality environment?
4. Are egg products handled in a manner that prevents contamination with pathogens and allergens?
5. Does the plant conduct microbial testing of repackaged lots?
6. If the finished product contains non-egg allergens, does the final product label declare these allergens?

Process Step	Potential Hazards	Frequently Used Controls
Storage, handling and loading of egg product prior to shipping o Liquid/Refrigerated o Frozen o Dried	Biological—Contamination and outgrowth of pathogens during storage and loading of tankers (e.g., *Salmonella* and *Listeria monocytogenes*)	• Maintenance of product at appropriate temperatures to control growth of microorganisms. • Maintenance of refrigeration and freezer equipment and rooms. • Sanitation SOPs address cleaning and sanitizing of bulk containers (i.e., tankers). • Separate equipment used for RTE and raw/NRTE liquid egg products.
	Chemical—No common hazard	• Maintenance of package integrity. • Sanitation SOPs address finished product handling (e.g., cleaning and sanitizing tankers and transport vehicles).
	Physical—No common hazard	

Suggested verification questions:

1. Are egg products properly refrigerated and not held in areas without refrigeration? If the product is held in areas without refrigeration, does the plant provide supporting documentation for the time and temperature that the product is held?
2. Are liquid-refrigerated/frozen/dried egg products protected from environmental contamination such as dust, moisture, or other physical contaminants?
3. Does the plant address cleaning and sanitizing of tankers in their Sanitation SOPs?
4. Does the plant's Sanitation SOPs or other program address the potential for cross-contamination in post-lethality exposed RTE egg products?

Process Step	Potential Hazards	Frequently Used Controls
Shipping	Biological—Outgrowth of pathogens during transport (e.g., *Salmonella* and *Listeria monocytogenes*)	• Monitor product temperatures during transport. • Ensure refrigeration units in transport vehicles, if present, are working properly.
	Chemical—No common hazard	• Maintain package integrity.
	Physical—No common hazard	

Suggested verification questions:

1. Are egg products properly refrigerated and not held in areas without refrigeration? If the product is held in areas without refrigeration, does the plant provide supporting documentation for the time and temperature that the product is held?
2. Are egg products protected from environmental contamination such as dust, moisture, or other physical contaminants?