FSHN05-03

Guidance for Processing SMOKED SEAFOOD *in Retail Operations*

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Credits

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Background

This guidance has been prepared in response to a notable increase in on-site retail processing (manufacturing) of foods traditionally processed in controlled plant environments. Such retail processing can involve, but is not limited to acidifying, smoking, drying, fermenting, curing, reduced oxygen packaging, and other operations that are traditionally done at a food manufacturing plant level. The key distinction for processing as related to this guidance is that the processing occurs on-site in the retail setting.

This guidance is intended for retailers and regulatory personnel to help understand the controls to implement in a retail operation in order to process and sell safe food products. It can be referenced in developing considerations for **variances** for any exception or special provision to state or local food safety or sanitary codes. It addresses those special variances required by the FDA Food Code which may require HACCP plans for those jurisdictions that have adopted those portions of the FDA Food Code. In addition, it also applies to regulatory oversight and/or approval for regulatory overlap that may occur between the states' processing requirements and the state or local retail food safety and sanitary codes. This guidance assumes retail compliance with applicable retail food codes, prerequisite standard sanitary operations procedures, and labeling requirements specified in 21 CFR 101. This guidance is not intended to replace or duplicate existing regulations, but it does offer a reference for more uniform practices.

Disclaimer

This guidance is not a binding set of requirements. The information provided in the guidance are recommendations based on current science, commercial experience and practical considerations as assembled by the assigned committees and reviewed by a variety of selected experts and the Project Steering Committee. Use of these recommendations would likely result in retail processing practices that are acceptable to the pertinent authorities for food safety. Retail compliance and enforcement will remain within the interpretations and decisions of the pertinent state and local regulatory authorities.

Product Description

This recommended guidance is for processing smoked seafood (hot or cold smoked) either as a whole item or in portions, and packaged for display in refrigerated cases for public sale. Related terminology:

Air Packaged - food-packaging technique in which air exchange in a package is not restricted by a seal or non-permeable film, and air has not been removed by a manual or mechanical activity.

Approved source - a source that has been determined to conform to principles, practices, and standards that protect public health.

Brine - water that is saturated or nearly saturated with salt. Typical brines may contain other additives. Sodium chloride (common house salt) has a saturation point of around 37% in water at 32°F (0°C).

Brining or Wet Brining - is the process or processing step where seafood is placed in a brine solution, under refrigerated temperature, for a predetermined period of time to increase the levels of water phase salt and improve product sensory characteristics.

Cold Smoked Seafood - seafood that has been produced by subjecting the product to mild heat and smoke to achieve a partial coagulation of the proteins. (Oven/smoker temperature not to exceed 90oF (32.2°C) for a drying and smoking period that does not exceed 20 hours; or oven/smoker temperature not to exceed 50°F for a drying and smoking period not to exceed 24 hours).

Dry Salting - the processing step involving the salting of seafood by applying a layer of salt or a dry mixture of salt plus other ingredients to increase the salt content of the seafood prior to the smoking process.

Hermetically sealed package - a package designed and intended to prevent entry of microorganisms (e.g., double seamed cans, glass jars with special lids, heat sealed plastic bags or containers).

Hot Smoked Seafood - smoked seafood that has been produced by subjecting it to heat during the smoking process to coagulate the proteins throughout the seafood (Product internal temperature must be maintained at a continuous temperature of at least 145°F (62.8°C) for a minimum of 30 minutes).

Identifiable source - can include the name and address of the immediate supplier and the actual source or location of the supplies.

Potentially hazardous food - means a food that is natural or synthetic and that requires temperature control because it is in a form capable of supporting the rapid and progressive growth of infectious or toxigenic microorganisms or the growth and toxin production of *Clostridium botulinum*. Potentially hazardous food includes an animal food that is raw or heat-treated, shell eggs, or a food of plant origin that is heat-treated or consists of raw seed spouts, cut melons, and garlic-in-oil mixtures that are not modified in a way that results in mixtures that do not support growth as specified in this definition.

Reduced Oxygen Packaging (ROP) - packaging that reduces the normal amount or proportion of oxygen (21%) found in air such that it creates anaerobic conditions that favor the growth of *C. botulinum.*

Seafood - fresh or saltwater finfish, crustaceans, other forms of aquatic animal life (including but not limited to alligator, frog, aquatic turtle, jellyfish, sea cucumber, and sea urchin and the roe of such animals) other than birds or mammals and all mollusks, where such animal life is intended for human consumption.

Smoked Seafood - ready-to-eat seafood product that has been produced either through cold or hot smoking process involving the burning of wood, sawdust or other material, or immersed or sprayed with a smoke flavored solution to change the flavor and color characteristics.

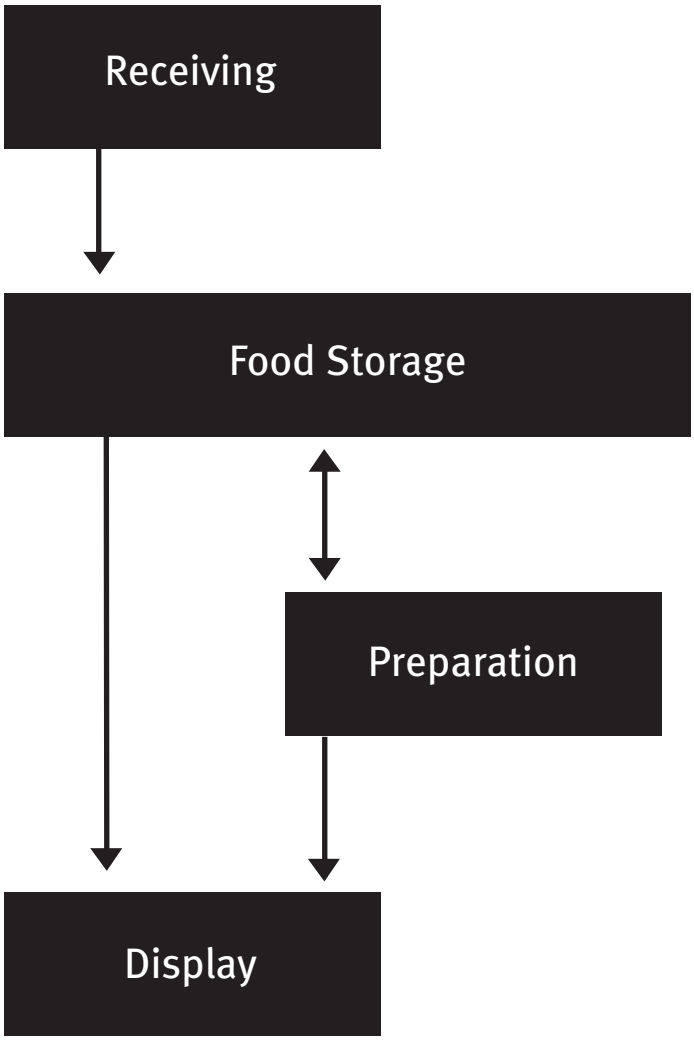
Water Activity (aw) - a measure of the free moisture in a product determined by the ratio of the water vapor pressure in any food to the water vapor pressure of pure water at the same temperature. Water activity is usually measured with water activity meters. Likewise, private labs can measure water activity during the validation of the brining process.

Water Phase Salt (wps) - a measure of the amount of salt in the seafood product relative to the product's moisture or percent salt (sodium chloride) multiplied by 100 and divided by percent salt plus percentage moisture.

$$\% \text{ wps} = \frac{\% \text{ salt X } 100}{\% \text{ salt} + \% \text{ Moisture}}$$

(The percent salt in the finished product is determined in the official method described by *Official Method of Analysis of AOAC International, 16th edition*, 1999 Method 35.1.19)

Flow Diagram of Operations



Receiving

All food is obtained from an identifiable, approved source(s). All supplies and ingredients must be from licensed and/or previously recognized (by the company) suppliers, operating in accordance with applicable food safety requirements. Identifiers can include the name and address of the immediate supplier and the actual source or location of the supplies. In addition, shellfish (shellstock and shucked products) must have a proper shellfish tag or certification number. Traceability of the food source can be important in assessing food safety, i.e., approved harvest waters, prior handling conditions, and duration and methods of transport. **No seafood from a recreational fisherman or other non-approved sources is used in the smoked seafood operations.**

All seafood, including fish, shellfish, and crustaceans must come from a source that can provide evidence (if requested) that they have implemented a valid HACCP plan to control all relevant food safety hazards and processing records to demonstrate that specific hazards have been controlled. Evidence for such a source can include a letter of guarantee from the supplier that indicates where and how the HACCP information can be obtained. The HACCP information and/or records and prior agreements with the seafood supplier provide controls to prevent potential problems due to parasites, elevated histamine levels, and other seafood safety concerns (Appendix 1 - Food Safety Hazards).

All potentially hazardous foods are delivered below 41°F (5°C) with the exception of shellfish, eggs and milk (below 41°F/5°C) or solidly frozen. A calibrated thermometer is used to monitor the internal and/or surface temperature of the incoming foods before acceptance (Appendix 2 - Calibrations).

Retail establishment actively manages a program for routine inspection of incoming products for approved sources, product condition and temperature as necessary, integrity of packaging and proper label information, and documents product acceptance or rejection with dates, times and the person in decision, plus any necessary comments.

Food Storage

Food storage should be in appropriate temperature control units (walk-in coolers, refrigerators or freezers) capable of maintaining proper product temperatures. All potentially hazardous foods (PHF) should be maintained at 41°F (5°C) or less and it is recommended that frozen items be stored at 0°F (-18°C) or less. The foods may include raw ingredients or finished products. These types of foods may be stored in separate units or segregated with adequate protection to prevent cross-contamination within the same unit. Display counters are not considered storage units and should not be used to store raw ingredients or finished products prior to actual display.

The storage unit(s) is clean and orderly.

Products are contained and/or covered protection.

Once removed from the original (identifiable) container, products and ingredients are marked for identity and dated to show how long they have been in storage.

Ready-to-eat items and items ready-for-display are segregated from raw products or products that require further handling or processing.

Products are not stacked without adequate support and means of prevention of any leakage between products.

Drippage is prevented into or on raw and packaged products from condensation, cooler pan leaks or other wet sources.

Products are stored above the floor (approx. 6 inches) and away from walls and the ceiling. Storage includes containers, shelves, supports, pallets or other materials that do not absorb water and can be easily cleaned.

The schedule for product rotation should use a 'first-in first-out' (FIFO) rule.

Refrigeration unit(s) have the capacity and are operating correctly to assure that potentially hazardous foods are maintained at 41ºF (5ºC) or below or preferably at or below 38ºF (3.3ºC).

Frozen storage unit(s) have the capacity and are operating correctly to assure the frozen foods are maintained solidly frozen, preferably at /or below ooF (-18ºC).

If frozen storage is used for parasite controls, the product must remain in the freezer for at least 7 days if stored at -4ºF (-20ºC) or below or for 15 hours if frozen and stored at -31ºF (-35ºC) or below or 24 hours if frozen at -31ºF (-35ºC) or below until solid and then stored at -4ºF (-20ºC) or below.

Routine monitoring for proper refrigerated storage unit temperatures involves using a continuous time-temperature recording device or by periodic checks with a calibrated thermometer. Temperature should be monitored at a location that is representative of the conditions in the entire storage unit. All temperature recording devices and thermometers are calibrated periodically or as needed (Appendix 2 - Calibrations). When storage conditions above 41°F (5°C) are detected, an evaluation is conducted of all PHF stored in the unit. The evaluations will record considerations for the actual temperature of the products and duration of exposure, and determine if whether or not specific seafood safety hazards such as elevated histamine and/or pathogen growth have been prevented. All suspect product is discarded.

Frozen products are thawed under refrigeration at/or below 41ºF (5ºC). Thaw in a manner that prevents cross-contamination with other refrigerated foods. If more rapid thawing is necessary, the products are placed in clean flowing water no warmer than 70°F (21°C) **only until thawing is complete.** Once product is thawed and before exceeding 41°F (5°C), it should be processed or returned to proper refrigerated storage. Packaging is recommended to protect the product from direct contact with the thaw water. If thawing requires direct contact of water with the food, the procedure should be conducted in a clean and sanitized sink or container that is designated and dedicated to this operation. Thawing is not conducted in standing water, at room temperature or in running water warmer than 70°F (21°C) or at room temperature.

Preparation – Raw Material

The work area, facilities and utensils should be designated or dedicated for the seafood smoking operations. If it is necessary to share workspace and facilities, a schedule of operations, personnel traffic, product traffic and cleaning practices must be developed to prevent potential cross-contamination of the ready-to-eat smoked seafood products.

Standard Operating Procedures for basic sanitation and food safety are used and documented daily (Appendix 5 - Daily SOP Check List).

All fish to be smoked should be free of viscera (gutted) prior to brining and smoking. Fish that have been gutted and cleaned prior to delivery to the retail establishment should be used if possible. If fish are eviscerated onsite, it should be done in a segregated area separated from other processing operations. Fish should be eviscerated with minimal disturbance of gut contents and the body cavity should be thoroughly washed in a designated area and manner that will not contaminate other food handling areas.

Fillets knives, cutting boards, and other food contact surfaces are cleaned and sanitized routinely to prevent product contamination.

The preparation schedule should be arranged to prevent the exposure of potentially hazardous foods for more than 4 hours outside of refrigeration.

Preparation – Brining

Dry salting is a practice used by some smoked seafood manufacturers, but it is not recommended for retailers due to the difficulties in validating and standardizing the process to consistently achieve the proper water phase salt levels in the finished product.

A validation study must be completed to establish an adequate brining procedure that specifies all of the parameters (such as the size of fish, amount of fish, amount of brine or salt, concentration of brine or salt, and the soaking or contact time) necessary to achieve the targeted water phase salt level in the finished product. Records that document the process validation procedure including data from trials, lab results and the brining schedule developed from these results must be kept on file in the retail establishment where smoking is conducted.

Records (manual or electronic) must be kept showing that all parameters in the validated brining procedure were met for each batch of seafood processed (Appendix 4 - Smoked Seafood Brine Record).

The brining procedure for each type of smoked seafood must ensure a proper water phase salt (wps) level in the finished product (after drying and smoking) of:

20.0% wps or higher in the edible portion for shelf-stable products based on maximum salt level for growth of Staphylococcus aureus (Fish and Fisheries Products Hazards & Control Guidance: Third edition, June 2001 FDA);

3.5% wps or higher in the edible portion for hot or cold smoked seafood products to be reduced oxygen packaged (ROP). All smoked seafood product packaged under reduced oxygen conditions in the retail setting must be solidly frozen prior to be packaged,

3.0% wps or higher in the edible portion for ROP products when 100-200 ppm nitrite are present in the finished product. Nitrites can only be used for salmon, shad, sable fish and chubs in accordance with FDA regulations (21 CFR 172.175 & 21 CFR 172.177). During brine preparation only pre-weighed packaged nitrites should be used and nitrite usage records must be kept, or;

2.5% wps or higher in the edible portion for air packed hot or cold smoked products.

The brining process should be carried out under controlled temperature. The temperature of the brine should not exceed 60°F (15.6°C) at the start of brining. If the brining time exceeds 4 hours, brining must take place in a refrigerated area. If the process uses dry salting, the product needs to be placed under refrigeration after salt is applied. NOTE: **Dry salting is not recommended** because it is not consistent and difficult to control in terms of food safety.

Do not mix different seafood species in the same brine tank or container. It is extremely difficult to standardize a process when a wide range of sizes or different species are brined in the same batch.

Brine should not be reused unless a validated procedure has been developed to treat the brine to eliminate microorganisms that could contaminate the product.

Preparation – Smoking / Drying

The smoking and drying steps are critical in the process to eliminate bacterial pathogens or reduce the potential for pathogens to grow, and/or prevent the formation of toxins in reduced oxygen packaged products. One of the following specific time and temperature combinations must be met during the smoking/drying step to ensure finished product safety.

For hot smoked seafood, the product must be continuously heated, to achieve an internal product temperature of at least 145°F (62.8°C) for at least 30 minutes. The internal product temperature should be obtained by inserting a calibrated thermometer into the center of the thickest portion of three or more of the largest fish in the batch and the coldest reading used to determine that the time temperature combination has been met. Records (manual or electronic) showing that the internal temperature reached a minimum temperature of 145°F (62.8°C) for at least 30 minutes shall be kept for each batch of seafood.

For cold smoked seafood the temperature of the smoking chamber must either 1) not exceed 90°F (32.2°C) during a drying and smoking period that does not exceed 20 hours, or 2) not exceed 50°F (10°C) for a drying and smoking period that does not exceed 24 hours. A calibrated temperature-recording device must be used to document that these time and temperature limits have not been exceeded. Records documenting the results of this monitoring should be kept for each batch of seafood processed.

Preparation – Cooling

Product must be cooled from 135°F (57.2°C) to 70°F (21°C) or less within 2 hours of the smoking process and from 70°F (21°C) to 41°F (5°C) or less within 4 hours. Total cooling time shall not exceed 6 hours from start of cooling.

Cooling should occur in refrigerated storage units maintained as described in the preceding section for the Storage processing step.

Preparation – Packaging

Minimize the amount of time that smoked seafood products are out of temperature control (above 41°F (5°C)) during packaging and labeling.

No bare hand contact with the finished product. Single use gloves should be clean and sanitized prior to use to prevent cross-contamination. Proper hand washing is necessary.

Use packaging material, such as wrapping film and trays that are clean and approved for the particular process.

Finished packaged products that can be purchased by consumers must comply with all federal and/or state labeling requirements. **Vacuum or reduced oxygen packaged products** that can be purchased by the consumer must have a label statement advising consumers to keep the product refrigerated at all times, preferably with a target temperature of 38°F (3.3°C) or below (required in some states) (Appendix 3 - Product Labels).

Vacuum or reduced oxygen packaging (ROP) is permitted in retail operations only if the seafood is solidly frozen before packaging and held frozen during storage and display. A packaging process that removes or reduces the air (and oxygen) from the package can create conditions for the growth of certain bacteria (particular strains Clostridium botulinum) that can produce toxins if the product is held at typical refrigeration temperatures.

Display

Display involves holding the finished products in temperature control units for a specified duration and condition for public sale. Retail preparation and display introduces more prolonged storage that must be controlled and monitored to assure product safety before consumption.

The display unit maintains the smoked seafood products at or below 41°F (5°C), preferably at 38°F (3.3°C) or below.

Product is rotated to assure FIFO movement of product. Out-of-date product is discarded.

Appendices

1. Food Safety Hazards
2. Calibrations
3. Product Labels
4. Smoked Seafood Brine Record
4. Daily SOP Check List

Appendix 1 Food Safety Hazards – ROP Seafood

The following information and list of fish species with potential seafood safety hazards is based on FDA's "Fish & Fisheries Products Hazards & Controls Guidance" available in third edition (June 2001) from <www.ifasbooks.ufl.edu> or by phone 800-226-1764. The retail processing of sushi must assure the use of proper controls to prevent, eliminate or reduce these potential hazards. The controls are often a shared responsibility between the supplier and retailer.

FISH:

The list of potential fish hazards includes live parasites, elevated histamine, and the natural toxin, ciguatera. The listing is by common names of certain related fish species. Retailers should consult the FDA Hazards Guide for the specific fish species in question. Species listed with concerns for live parasites would require freezing either by the supplier or retailer prior to serving a raw ready-to-eat food such as sushi.

	parasites	histamine	ciguatera	no hazard
Amberback		√	√	
Anchovy		√		
Bass, Sea	√			
Bluefish		√		
Cobia	√			
Cod	√			
Halibut	√			
Herrings	√	√		
Jacks	√	√	√	
Mackerels	√	√		
Mahi-Mahi		√		
Marlin		√		
Monkfish	√			
Mullet	√			
Perch, Ocean	√			
Pompano			√	
Rockfish	√			
Sablefish	√			
Salmon	√			
Sardine		√		
Scad	√			
Shad		√		
Rainbow Trout	√			
Tuna - small*	√	√		
Tuna - large*		√		
Turbot	√			
Wahoo		√		

*For tuna, the concern for parasites is distinguished by species. The larger tunas (yellowfin, bluefin, blackfin, bigeye, and albacore) do not present a significant parasite problem that would require freezing prior to use in smoked seafood. Smaller species may have to be frozen prior to cold smoking.

CRUSTACEANS (Shellfish):

Crab, Lobster and Shrimp - typically supplied as previously cooked items that are subject to bacterial cross-contamination after cooking. Retailers should question the processing procedures, and post-processing conditions and sanitation records prior to selecting a supplier. Retailers need to prevent cross-contamination in the retail setting to when these products are exposed to the retail storage, processing or the display.

MOLLUSK (Shellfish):

Clams, Oysters and Mussels - must be harvested from approved waters and handled by certified dealers that maintain harvest tags or labels on the products to identify the product harvest locations and dates. Retailers must check for the tags or label information on all deliveries of shellstock or shucked meats (meat removed from the shell). These tags must be stored in the retail establishment for 90 days after the original tagged container is empty.

Biological

Hazard: Clostridium botulinum

Problem: *Clostridium botulinum* can grow under conditions in which oxygen is eliminated or reduced and form toxins that affect the human consumer. *C. botulinum* toxins are extremely lethal if consumed. *C. botulinum* type E, is the type most commonly found in seafood which can germinate and grow at temperatures above 38°F (3.3°C). ROP is only allowed in retail when the seafood is solidly frozen before packaging and the finished product is held in frozen storage.

Controls: Temperature control is the most effective way of preventing toxin formation. It is recommended that all smoked, reduced-oxygen-packed seafood be maintained at a maximum temperature of 0°F (-18°C) or below.

Hazard: Listeria monocytogenes

Problem: *Listeria monocytogenes* has been linked to foodborne illness related to ready-to-eat foods including smoked seafood. Listeriosis may affect the elderly and immune-compromised individuals as well as pregnant women causing death or stillbirth.

Controls: Implementing effective sanitation procedures and strictly following Good Manufacturing Practices (GMPs) are the most effective controls for preventing *Listeria monocytogenes* contamination in ready-to-eat foods. Increasing the awareness of all processing employees via routine training can help to ensure that the *Listeria monocytogenes* controls are implemented properly. Raw and cooked products need to be kept separate to prevent cross-contamination. It is recommended to periodically sample product and test areas of the processing environment likely to become contaminated with *Listeria monocytogenes* to identify problems and ensure that controls are effective. The Smoke Seafood Working Group of the National Fisheries Institute and the National Food Processors Association recommends in the *Listeria monocytogenes* Control Manual to follow a five-step system for an effective *L. monocytogenes* control. These five elements include specific sanitation and goods manufacturing practice (GMP) controls for Listeria, training of plant personnel, environmental monitoring and testing, refrigeration of finished products below 38°F (3.3°C) from production to consumption, and raw material controls. These recommendations are also recognized by AFDO in their “Cured, Salted and Smoked Fish Good Manufacturing Practice” manual.

Hazard: Parasites

Problem: Consumption of certain raw or under cooked seafood that may contain 'live' parasites that are naturally found in certain fish and could infect consumers.

Controls: Freezing or cooking (hot smoking) of the fish or seafood product before consumption. Seafood is properly cooked when it reaches an internal temperature of 145°F (63°C) for 15 seconds. The hot smoking process, which requires that the fish reach an internal temperature of 145°F (62.8°C) for 30 minutes, is sufficient to kill parasites. Freezing to kill potential parasites requires frozen storage at -4°F (-20°C) or below for 7 days (total time), or freezing at -31°F (-35°C) or below until solid and stored at -31°F (-35°C) or below for 15 hours, or freezing at -31°F or below until solid and stored at -4°F (-20°C) or below for 24 hours.

Hazards: Bacterial and Viral Pathogens

Problem: Certain bacteria, i.e., *Salmonella, Listeria* and *Vibrio spp*. and certain viruses, i.e., Hepatitis A, noroviruses and others, can contaminate and, in the case of bacteria, grow on ready-to-eat smoked products due to previous handling of the ingredients.

Controls: Assure ingredients come from approved sources, monitor condition of incoming products, maintain and monitor proper temperatures and time in storage and preparation, practice proper hygiene, and monitor SOP's for sanitation.

Chemical

Hazard: Histamines

Problem: Certain fish are prone to develop an elevated histamine content, the result of bacterial degradation of histidine, if they are thermally abused after harvest and during further handling. They can cause temporary illnesses in some people following consumption of the raw or cooked fish. Once histamine has been created in the fish smoking or any other process cannot eliminate it.

Controls: Ensure proper handling time and temperatures that provide immediate and proper refrigeration or freezing of the fish as evident in a suppliers HACCP program, and continuing refrigeration or frozen storage until consumed. Retailers should examine each fish or fish portions carefully for signs of thermal abuse or initial decomposition. Questionable fish and fish with a temperature in excess of 41°F (5°C) should be rejected.

Hazard: Ciguatera

Problem: A natural toxin that can accumulate through the normal food chain of certain fish that can cause illness in some consumers when the fish is eaten raw or cooked.

Controls: Do not use certain fish species when harvested from known or designated areas that are problematic for ciguatera. The original producer or supplier's HACCP program should prevent the harvest and use of such fish. Potential problems cannot be detected by sensory judgments of the raw or cooked fish.

Hazard: Nitrites

Problem: Nitrites in foods can become toxic if overused.

Controls: Only use pre-weighed, pre-packaged portions of curing salts and follow the manufacturer's instructions in the preparation of the brine to prevent overuse. All storage and use of curing salts, nitrites, should be monitored and recorded.

Temperature Monitoring Devices – Thermometers

Many types of thermometers and temperature recording devices are readily available for use in food handling operations. We recommend thermistors, thermocouples and infrared thermometers with either a digital or analog readout. All of these instruments are acceptable for use in the food processing operations as long as the operator understands how they are used and if they are calibrated for proper readings.

The method and frequency of calibration for thermometers will depend on the use and temperature range where the equipment is used. In the absence of manufacture's recommendations, thermometers should be calibrated at least once a month with more frequent calibrations when the instrument is physically abused or if the readings are questionable.

Temperature Monitoring Devices (TMD) - Calibration Procedures (options):

a. TMD's can be calibrated against a thermometer certified by the National Institute of Standards and Technology (NIST) by simply comparing both units at two preset temperatures (hot and cold).

b. TMD's can be calibrated using an ice-water slush. Insert the temperature probe into a mixture of ice and water slush and stir (2-3 min) until the thermometer stabilizes. The probe should be at the center of the container. The thermometer should read 32±1°F (0±1°C). Adjust accordingly or discard and replace the faulty thermometer.

c. Hot point calibration is used when monitoring temperatures higher than room temperature (e.g., cooking temperatures). Heating blocks or boiling water can be used for this calibration. When using the boiling water procedure, the probe is placed inside a container with boiling water until the thermometer stabilizes (2-3 min). The probe should be at the center of the container. The thermometer should read 212±1°F (100±1°C) or appropriate temperature according to elevation (Table 1 - Altitude to Boiling Point of Pure Water Relationship). Adjust accordingly or discard and replace the faulty thermometer.

d. A combination of the procedures b and c is recommended for a more accurate calibration of thermometers used to monitor a wide range of temperatures.

Altitude to Boiling Point of Pure Water Relationship

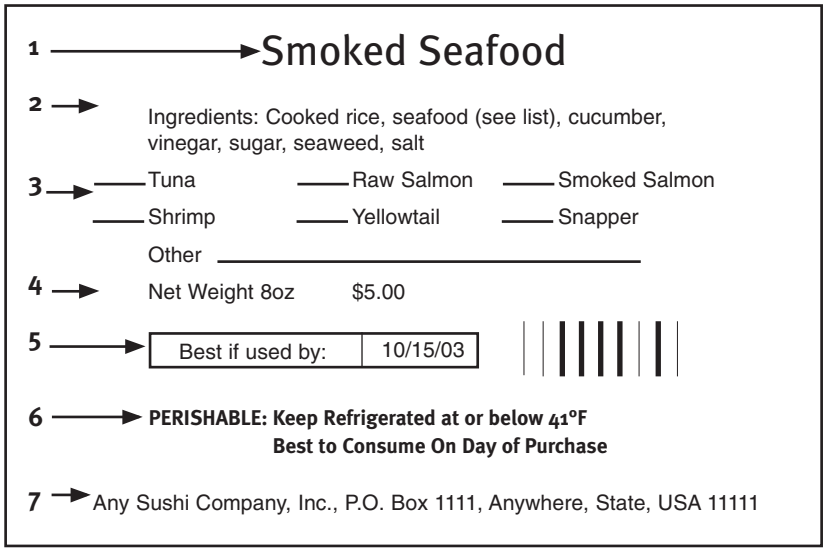
Feet Above Sea Level	Boiling Point (°F)
0	212
500	211
1,000	210
1,500	209
2,000	208
2,500	207
3,000	206
3,500	205
4,000	204
4,500	203
5,000	203
6,000	201
7,000	199
8,000	197
10,000	194
12,000	190
14,000	187

Source: Thermometer Calibration, food safety webpage, University of Nebraska Cooperative Extension (https://food.unl.edu/thermometer-calibration-information-and-measuring-ph-meat)

Appendix 3 Product Labels

All smoked seafood product sold through display in a retail setting must be in compliance with applicable state food code requirements and contain information pursuant to the requirement of 21 CFR 101. In addition, information on the product label that informs the consumer on proper handling to prevent potential food safety problems is recommended (i.e., “PERISHABLE KEEP REFRIGERATED AT 38°F OR BELOW - BEST IF CONSUMED ON DAY OF PURCHASE”). The label must identify specific seafood present and whether or not it is raw.

1. Identify specific seafood present.
2. Product ingredients listed in descending order by the amount in the food.
3. Seafood type in the product.
4. Net weight.
5. Lot and/or date code the product.
6. Include perishable food statement to instruct consumer on handling and storage (i.e., “PERISHABLE: KEEP REFRIGERATED. BEST IF CONSUMED ON DAY OF PURCHASE”).
7. Company name and address.



Disclaimer: This label is simply provided as a guide. Retailers should consult with their local authorities to assure compliance with more immediate requirements in their region.

Labeling - Consumer Advisories

Certain states may require use of consumer advisories either as part of the label, information and/or in signs posted about the cold smoked product display. The cautionary message is intended for persons with weakened immune systems that are at more risk from potentially hazardous foods such as raw or under cooked seafood. State authorities should be consulted for compliance.Typical wording in advisories state, “Consuming raw or undercooked foods of animal origin may increase your risk of foodborne illness, especially if you have a certain medical condition or reduced immunity.”

Appendix 4

Smoked Fish Brine Record

Company Name _____

Company Address _____

Batch Process Log _____

Date:			**Product type:**		
Batch or Lot Code:			**Type of Smoking:** **Hot** **Cold**		
Brine formulation #:			**Brining process#:**		
Amount of Salt added or Salometer reading:			**Amount of Product added:**		
Number of nitrite packages used:			**Brine / Product ratio:**		
	Initial	**Final**		**Initial**	**Final**
Brine Temperature			**Brining time**		
Hot **Start Time** _____ **Time when 145°F (62.8°C) reached** _____ **End Time** _____			Cold **Start Time** _____ **Oven Temp** _____ **End Time** _____ **Oven Temp** _____		
Operator's signature:					
Reviewed by:			**Review date:**		

This particular form is not mandated but it does indicate information that should be recorded to demonstrate an appropriate process for food safety. Different and additional forms can be used to record the same information.

Note: Attach time temperature logs for the smoking/drying cycle for the batch(s) corresponding to this record.

Appendix 5 Daily SOP Check list

Store Name/Number: _____ **DATE:** _____

Storage	**Time/Temp**	**Time/Temp**	**Time/Temp**	**Time/Temp**
Refrigerators (°F / Time)	°F	°F	°F	°F
Freezers (°F / Time)	°F	°F	°F	°F
Display	**Time/Temp**	**Time/Temp**	**Time/Temp**	**Time/Temp**
Display temperature (°F / Time)	°F	°F	°F	°F
Clean and Orderly. Food in good condition and properly labeled.				
	SOP CHECK LIST			
Work Area	**Comments**			
Orderly; Clean and Sanitized tables, countertops and sinks. Orderly, all work surfaces cleared. Clean floor and drains				
Proper storage and labeling of chemicals and cleaning items				
Wet and dry trash separate and removed from work area.				
All utensils, pots, pans, bowls, cutting boards, cooking or heating equipment properly cleaned and sanitized.				
Thermometer and recorder available and calibrated				
Personnel				
Personnel Health, hand-washing practices, glove use, clean and well maintained outer garments, proper hair covering and no jewelry.				
Food Storage				
All food protected, dated and labeled properly Refrigerators and freezers clean, orderly and operating correctly.				
	Pre-Op	**Time**	**Post-Op**	**Time**
Employee Initials				
Manager Review				

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Notes:

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