REVISED September 2020

Commercial Processing Example: *Wild Salmon Sushi Rolls*

Example: This is a Special Training Model for illustrative purposes only. The SHA models are based on guidance contained in FDA's *Fish and Fishery Products Hazards and Controls Guidance* (4th Edition, 2020) and additional information available since the 2011 edition. This model was produced by the National Seafood HACCP Alliance (SHA) strictly as an example for training, and does not represent a specific requirement or recommendation from FDA. Keep in mind that this model may not apply to all situations.

Narrative

Company	ABC Sushi Rolls Company, Anywhere, USA
Market Name	Salmon (*Oncorhynchus kisutch*)
Source of Fishery Product	Wild caught salmon (frozen); purchased from another processor.
Describe the Food	Salmon sushi rolls (salmon, rice mixture and seaweed), chilled, packaged in oxygen permeable packaging,
Method of Receiving, Storage and Distribution	Salmon fillets are received frozen, thawed, stored under refrigeration and subsequently distributed under refrigeration.
Finished Packaging Type	Salmon sushi rolls are placed into plastic trays and covered by an oxygen permeable film.
Intended Use and Consumer	Salmon sushi rolls are an uncooked prepared product (ready-to-eat), to be consumed by the general public.

Description of Process

Receive frozen salmon - Frozen wild salmon (ocean-caught) fillets are received from primary processor. The primary processor freezes the salmon to a temperature of -4°F/-20°C or lower for more than 7 days to kill parasites as required by the company's product specifications. A statement is on file from the supplier verifying that all salmon shipped to the ABC Sushi Rolls Company has been processed according to the supplier's HACCP plan to eliminate (kill) parasites.

Frozen salmon storage - After receipt, the salmon is held in frozen storage (0°F or below) until it is removed for tempering prior to making sushi rolls. Product can remain in frozen storage for up to two weeks.

Preparing salmon- Frozen salmon fillets are brought to the preparation room, tempered for about 20 minutes prior to manually cutting into 1" strips. The preparation room temperature is 45°F (7.2°C).

Receive dry materials – Dry seaweed without added ingredients, vinegar, and 40lb-bags of rice are received from approved vendors that have met all company product specifications.

Dry Storage – Seaweed, vinegar and rice are stored in original containers in the dry storage area.

Cooking rice - Rice is removed from the dry storage area and taken to the rice cooking room where it is batch cooked in boiling water until done.

Rice acidification – Acidification is used to prepare rice with proper texture and to prevent growth of potential pathogenic bacteria, *Bacillus cereus*. The hot rice is immediately mixed in the cooker with vinegar to acidify to a pH of 4.3 or less. Mixing is done manually. Acidified rice is put into 5-gallon insulated containers to keep it warm (80-105°F or ~27-41°C) so it will roll better. The insulated containers are taken to the sushi prep room which is maintained at 45°F (7.2°C). The finished rice is allowed to equilibrate for at least 30 minutes before pH is tested.

Assemble nori, rice and salmon into rolls – The acidified rice, seaweed (nori) and salmon portions are assembled into sushi rolls in a process that takes less than two hours. The rice is formed into a sheet, the seaweed and salmon are placed on the rice and it is rolled together. Each roll takes about two minutes to assemble.

Cut rolls - The finished roll is manually sliced into approximately 1" round pieces, using a handheld unbreakable knife.

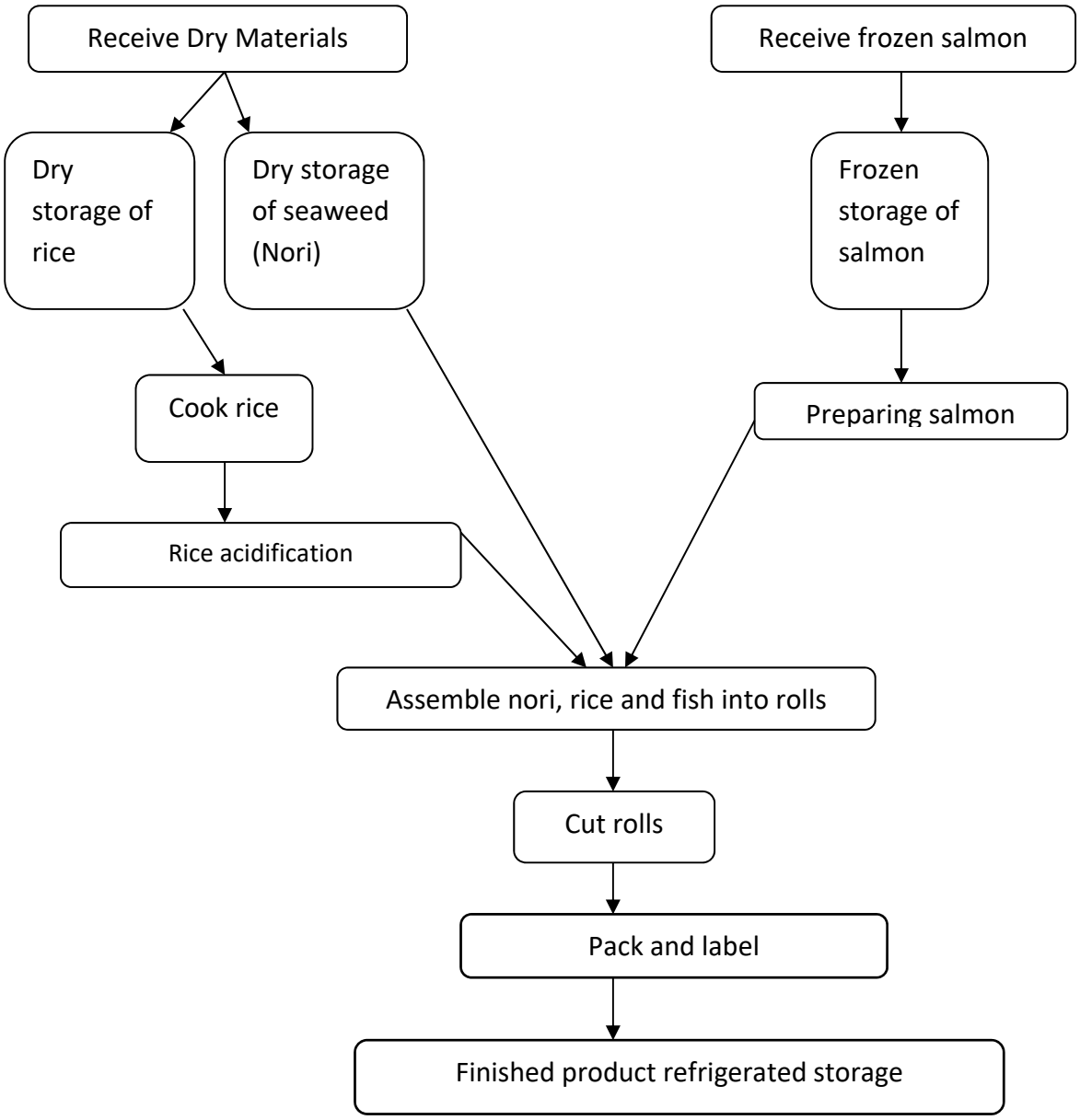
Pack and label - All pieces are placed into plastic trays with oxygen permeable film and labeled.

The **total process time** after rice is cooked through the Pack and Label step is no more than 2 hours in refrigerated room 45F (7.2C).

Finished product refrigerated storage - The finished packaged sushi product is either placed directly on a refrigerated truck and shipped to the customer the same day or stored in a refrigerated cooler overnight at 40°F (4.4°C) or less for shipment the next day.

SPECIAL NOTE: No glassware or glass containers are used in processing the salmon, rice or sushi rolls.

Wild Salmon Sushi Rolls
Process Flow Chart



Commercial Processing Example: *Wild Salmon Sushi Rolls*

Example: For Illustrative Purposes Only. Models are based in current guidance contained in FDA's *Fish and Fishery Products Hazards and Control Guidance.* Keep in mind that this model does not apply to all situations.

Description	**Company:** ABC Sushi Rolls Company																						
Fish or Shellfish Species	Where Product Is Purchased			How Product Is Received				How Product Is Stored				How Product Is Shipped				How Product is Packaged		How Product Will Be Consumed			Intended Consumer	
	From Fisherman	From Fish Farm	From Processor	Refrigerated	Iced	Frozen	Shelf-Stable	Refrigerated	Iced	Frozen	Shelf-Stable	Refrigerated	Iced	Frozen	Shelf-Stable	Air Packed	ROP*	Raw to be cooked	Raw RTE*	Cooked RTE*	General Public	At Risk Population
Common Name: Salmon (wild) **Market Name:** Salmon **Scientific Name:** *Oncorhynchus kisutch*			√			√		√		√		√				√			√		√	

*ROP = Reduced Oxygen Packaging; *RTE = Ready-to Eat

Potential Food Safety Hazards: All potential food safety hazards based on the product description and processing flow diagram associated with this product and process are identified using Tables 3-2 (Species-Related Hazards) and 3-4 (Process-Related Hazards) in the FDA *Hazards Guide* (4th edition, 2020). Processors should be aware that additional guidance may be periodically posted on FDA seafood HACCP websites, and additional hazards not covered by this guidance may be relevant to certain products under certain circumstances.

The FDA recommendations indicate five potential hazards that that are species- or process-related. Each potential hazard must be addressed in the Hazard Analysis. Glass Inclusion as listed in the FDA Guidance Table 3-4 Process-related hazards was not included because no glassware or glass containers are used in processing the salmon, rice or sushi rolls.

1. Parasites (Species-Related Hazard, Chapter 5)
2. Pathogenic Bacteria Growth – Temperature Abuse – (Process-Related Hazard, Chapter 12) [**NOTE**: Although not specifically listed in the FDA tables for potential hazards, the specific pathogen of concern in cooked rice is *Bacillus cereus* which is controlled by rice acidification and should be included as a potential hazard for this particular product at the rice acidification processing step (mentioned in FDA Guidance on page 217)]
3. Food Allergens – (Process-Related Hazard, Chapter 19)
4. Food Additives (Food Intolerance Substances) – (Process-Related Hazard, Chapter 19)
5. Metal Inclusion (Process-Related Hazard, Chapter 20)

SANITATION CONTROL PROCEDURES (SCP) are monitored throughout all processing steps and the daily SCP records accompany the HACCP records.

Hazard Analysis Worksheet

Firm Name: *ABC Sushi Rolls Company*	**Product Description**: *Salmon sushi rolls in oxygen permeable packages*
Firm Location: *Anywhere, USA*	**Method of Storage & Distribution:** *Refrigerated at ≤ 40° F*
	Intended Use & Consumer: *Ready-to-eat uncooked prepared product, to be consumed by general public without further cooking*

(1) Processing Step	(2) List all potential food safety hazards that could be associated with this product and process.	(3) Is the potential food safety hazard significant (introduced, enhanced or eliminated) at this step? (Yes or No)	(4) Justify the decision that you made in column 3	(5) What control measure(s) can be applied to prevent this significant hazard?	(6) Is this step a Critical Control Point? (Yes or No)
Receive dry ingredients and packaging materials	Parasites	No	Not reasonably likely to occur in ingredients or packaging		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur in ingredients or packaging		
	Food Allergens	No	Not reasonably likely to occur in ingredients or packaging		
	Food Intolerance Substances	No	No additives used		
	Metal Inclusion	No	Not reasonably likely to occur at this step		
Dry Storage	Parasites	No	Not reasonably likely to occur in dry storage		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur in dry storage		
	Food Allergens	No	Not reasonably likely to occur in dry storage		
	Food Intolerance Substances	No	No additives used		
	Metal Inclusion	No	Not reasonably likely to occur at this step		
Receive frozen salmon	Parasites	No	Controlled by supplier with freezing		
	Pathogenic bacteria growth- temperature abuse	No	Not reasonably likely in frozen salmon		

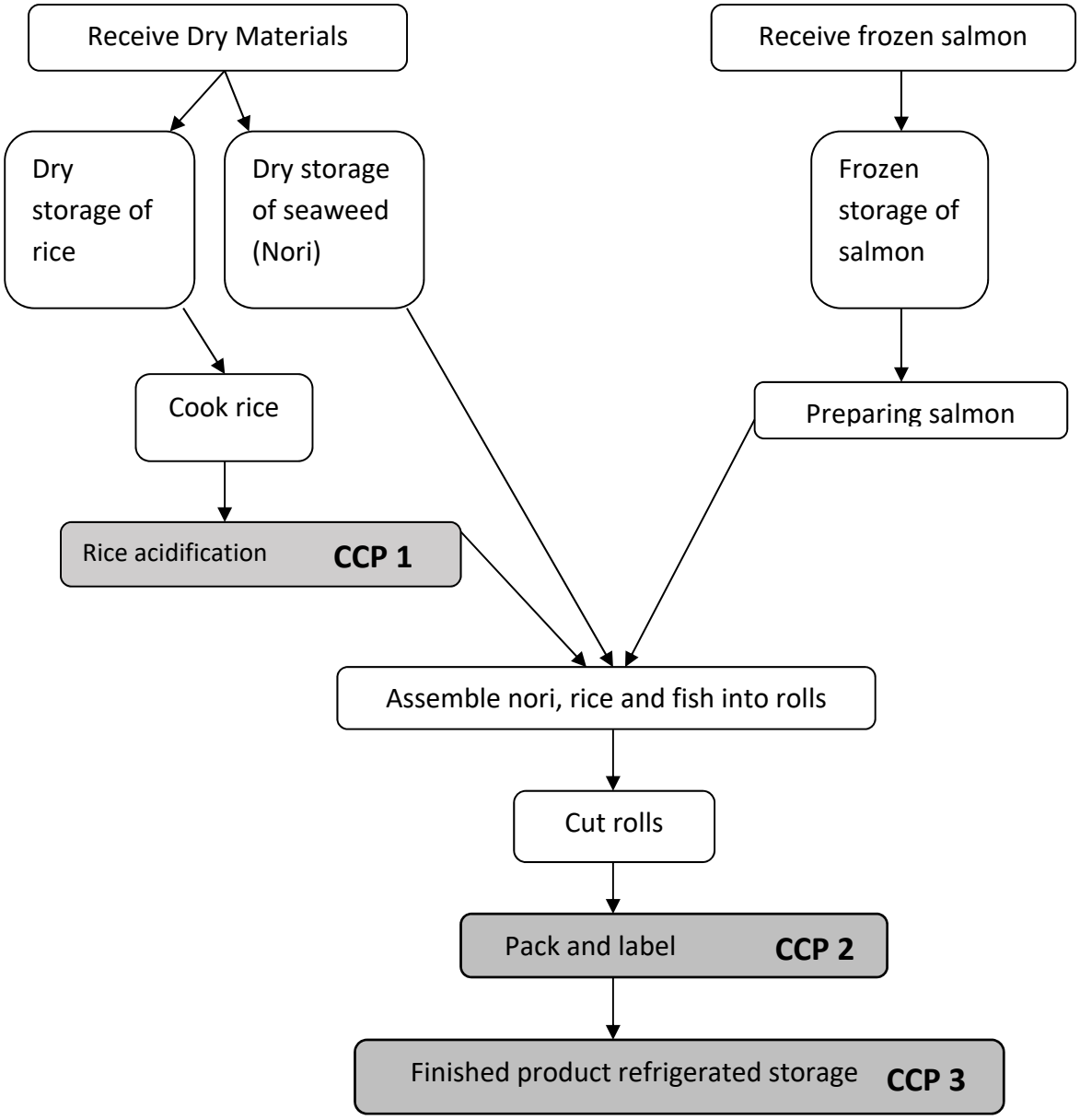
(1) Processing Step	(2) List all potential food safety hazards that could be associated with this product and process.	(3) Is the potential food safety hazard significant (introduced, enhanced or eliminated) at this step? (Yes or No)	(4) Justify the decision that you made in column 3	(5) What control measure(s) can be applied to prevent this significant hazard?	(6) Is this step a Critical Control Point? (Yes or No)
	Food Allergens	Yes	Salmon is a food allergen	Finished product label applied at pack and label step will identify fish market name (salmon).	No
	Food Intolerance Substances	No	No additives used		
	Metal Inclusion	No	Metal inclusion is not likely to occur at this step		
Frozen Storage	Parasites	No	Controlled by supplier with freezing		
	Pathogenic bacteria growth–temperature abuse	No	Not likely to occur in frozen salmon		
	Food Allergens	Yes	Salmon is a food allergen	Finished product label applied at pack and label step will identify fish market name (salmon).	No
	Food Intolerance Substances	No	No additives used		
	Metal Inclusion	No	Not reasonably likely to occur at this step		
Cook rice	Parasites	No	Not reasonably likely to occur in rice		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur during cooking		
	Food Allergens	No	Rice is not a major food allergen		
	Food Intolerance Substances	No	No additives used		
	Metal Inclusion	No	Not reasonably likely to occur at this step		
Rice acidification	Parasites	No	Not reasonably likely to occur in rice or acidified rice		
	Pathogenic bacteria growth – temperature abuse	Yes	*Bacillus cereus* could grow and form toxins if cooked rice is time-temperature abused	Rice acidification	Yes
	Food Allergens	No	Rice is not a major food allergen		

(1) Processing Step	(2) List all potential food safety hazards that could be associated with this product and process.	(3) Is the potential food safety hazard significant (introduced, enhanced or eliminated) at this step? (Yes or No)	(4) Justify the decision that you made in column 3	(5) What control measure(s) can be applied to prevent this significant hazard?	(6) Is this step a Critical Control Point? (Yes or No)
	Food Intolerance Substances	No	No additives used		
	Metal Inclusion	No	Not reasonably likely to occur at this step		
Preparing salmon	Parasites	No	Controlled by supplier with freezing		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur because of short time at this step in separate, chilled room		
	Food Allergens	Yes	Salmon is a food allergen	Finished product label applied at pack and label step will identify fish market name (salmon).	No
	Food Intolerance Substances	No	No additives are used		
	Metal Inclusion	No	Not reasonably likely to occur at this step		
Assemble nori, rice and fish into rolls	Parasites	No	Controlled by supplier with freezing		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur due to short time at this step in separate, chilled room		
	Food Allergens	Yes	Salmon is a food allergen	Finished product label applied at pack and label step will identify fish market name (salmon).	No
	Food Intolerance Substances	No	No additives are used		
	Metal Inclusion	No	Not reasonably likely to occur at this step		
Cut Rolls	Parasites	No	Controlled by supplier with freezing		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur due to short time at this step in separate, chilled room		
	Food Allergens	Yes	Salmon is a food allergen	Finished product label applied at pack and label step will identify fish market name (salmon).	No

(1) Processing Step	(2) List all potential food safety hazards that could be associated with this product and process.	(3) Is the potential food safety hazard significant (introduced, enhanced or eliminated) at this step? (Yes or No)	(4) Justify the decision that you made in column 3	(5) What control measure(s) can be applied to prevent this significant hazard?	(6) Is this step a Critical Control Point? (Yes or No)
	Food Intolerance Substances	No	No additives are used		
	Metal Inclusion	No	Not reasonably likely to occur at this step (using special cutting blades)		
Pack and Label	Parasites	No	Controlled by supplier with freezing		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur due to short time at this step in separate, chilled room		
	Food Allergens	Yes	Salmon is a food allergen	Finished product label applied at pack and label step will identify fish market name (salmon).	Yes
	Food Intolerance Substances	No	No additives are used		
	Metal Inclusion	No	Not reasonably likely to occur at this step		
Finished product refrigerated storage	Parasites	No	Controlled by supplier with freezing		
	Pathogenic bacteria growth – temperature abuse	Yes	Pathogens can grow in storage if rolls exposed to temperature abuse conditions	Time and temperature controls	Yes
	Food Allergens	No	Undeclared allergens not reasonably likely to occur; already controlled at the pack and label step.		
	Food Intolerance Substances	No	No additives are used		
	Metal Inclusion	No	Not reasonably likely to occur at this step		

Wild Salmon Sushi Rolls
Process Flow Chart

Shaded steps are critical control points



HACCP Plan Form

Firm Name *ABC Sushi Rolls Company*	**Product Description** *Salmon sushi rolls in oxygen permeable packaging*
Firm Location *Anywhere USA*	**Method of Storage & Distribution** *Refrigerated below 40°F (4.4°C)*
	Intended Use & Consumer *Ready-to-eat product, to be consumed by the general public without further cooking*

Critical Control Point (CCP)		**CCP 1: RICE ACIDIFICATION**
Significant Hazard(s)		Pathogenic bacteria growth – temperature abuse. (*Bacillus cereus)*
Critical Limits for each Control Measure		Equilibration time of acidification step is 30 minutes or more. pH of acidified rice is 4.3 or less
Monitoring	**What**	Time of acidification and pH of rice
	How	Clock and pH meter
	When	Each batch
	Who	Quality Control person
Corrective Action		**If** the equilibration time is not met, **then** the rice will be on hold until it reaches the 30-minute timeframe. Evaluate production procedures to prevent future recurrences. Retrain staff. **If** the pH is not 4.3 or less; **then** add more vinegar and re-check the pH; allow full equilibration time. Evaluate rice acidification formula to prevent future recurrences. Retrain involved staff.
Verification		Daily review of Acidification Batch Log and Corrective Action Reports; Perform accuracy checks and/or calibration for pH meter before each use. Validation study is on file that validates the equilibration time is 30 minutes or more to yield a stable pH of less than or equal to 4.3
Records		Acidification Batch Log; Corrective Action Reports; and pH Meter Calibration and Accuracy Log

Signature:	**Date:**

HACCP Plan Form

Firm Name *ABC Sushi Rolls Company*	**Product Description** *Salmon sushi rolls in oxygen permeable packaging*
Firm Location *Anywhere USA*	**Method of Storage & Distribution** *Refrigerated below 40° (4.4°C)*
	Intended Use & Consumer *Ready-to-eat product, to be consumed by the general public without further cooking*

Critical Control Point (CCP)		**CCP 2: PACK AND LABEL**
Significant Hazard(s)		Food Allergens
Critical Limits for each Control Measure		Labels on finished product packages include the market name "salmon" in the ingredient list.
Monitoring	**What**	Finished product labels
	How	Visual checks of ingredient list on finished product label
	When	Representative sample of finished product containers from each lot.
	Who	Packing Supervisor
Corrective Action		**If** the label does not have salmon in the ingredient list, **Then** segregate and re-label incorrectly labeled product Review and modify label procedures as necessary. Retrain involved staff.
Verification		Daily review of Packing Room Allergen Log and Corrective Action Reports due to higher risk nature of this raw ready-to-eat product
Records		Packing Room Allergen Log; Corrective Action Reports

Signature:	**Date:**

HACCP Plan Form

Firm Name *ABC Sushi Rolls Company*	**Product Description** *Salmon sushi rolls in oxygen permeable packaging*
Firm Location *Anywhere USA*	**Method of Storage & Distribution** *Refrigerated below 40°F (4.4°C)*
	Intended Use & Consumer *Ready-to-eat product, to be consumed by the general public without further cooking*

Critical Control Point (CCP)		**CCP 3: FINISHED PRODUCT REFRIGERATED STORAGE**
Significant Hazard(s)		Pathogenic bacteria growth – temperature abuse
Critical Limits for each Control Measure		Product is held at a cooler ambient air temperature of 40°F (4.4°C) or below
Monitoring	**What**	Cooler temperature
	How	Continuous time and temperature recorder and visual checks
	When	Continuous monitoring by the recorder with visual checks at least once per day
	Who	Cooler Manager
Corrective Action		**If** cooler temperature is above 40°F (4.4°C), T**hen** move product to another cooler or ice and hold for evaluation of total time and temperature exposure. Evaluate product safety by determining cumulative exposure temperature and time above 40°F (4.4°C). Determine product disposition based on safety evaluation. To regain control, adjust or repair cooler and retrain involved staff as necessary.
Verification		Weekly review of Cooler Temperature Recorder Chart; Daily Visual Check Record; and Corrective Action Reports. Calibrate time-temperature recorder once per year Check accuracy of time-temperature recorder daily.
Records		Cooler Time-Temperature Recorder Chart; Daily Visual Check Record; Corrective Action Reports

Signature:	**Date:**

HACCP Plan Form (*landscape format)*

Firm Name *ABC Sushi Rolls Company*	**Product Description** *Salmon sushi rolls in oxygen permeable packaging*
Firm Location *Anywhere USA*	**Method of Storage & Distribution** *Refrigerated below 40°F (4.4°C)*
	Intended Use & Consumer *Ready-to-eat product, to be consumed by the general public without further cooking*

Critical Control Point (CCP)	Significant Hazard(s)	Critical Limits for each Control Measure	Monitoring				Corrective Action	Verification	Records
			What	How	When	Who			
Rice Acidification	Pathogenic bacteria growth – temperature abuse. (*Bacillus cereus*)	Equilibration time of acidification is 30 minutes or more AND pH of rice is 4.3 or less	Time of acidification AND pH of rice	Clock AND pH meter	Each batch	Cooler Manager	**If** the equilibration time is not met, **then** the rice will be on hold until it reaches the 30-minute timeframe. Evaluate production procedures to prevent future recurrences. Retrain staff. **If** the pH is not 4.3 or less; **then** add more vinegar and re-check the pH after allowing full equilibration time. Evaluate rice acidification formula to prevent future recurrences. Retrain involved staff.	Daily review of Acidification Batch Log and Corrective Action Reports; Perform accuracy checks and/or calibration for pH meter before each use. Validation study is on file that validates the equilibration time is 30 minutes or more to yield a stable pH of less than or equal to 4.3	Acidification Batch Log; Corrective Action Reports; and pH Meter Calibration and Accuracy Log
Pack and Label	Food Allergens	Labels on finished product packages include the market name "salmon" in the ingredient list.	Finished product labels	Visual checks of ingredient list on finished product label	Representative sample of finished product containers from each lot.	Packing supervisor	**If** the label does not have salmon in the ingredient list **Then** segregate and re-label incorrectly labeled product Review and modify label procedures as necessary. Retrain involved staff.	Daily review of Packing Room Allergen Log and Corrective Action Reports due to higher risk nature of this raw ready-to-eat product	Packing Room Allergen Log; Corrective Action Reports

Critical Control Point (CCP)	Significant Hazard(s)	Critical Limits for each Control Measure	Monitoring				Corrective Action	Verification	Records
			What	How	When	Who			
Finished Product Refrigerated Storage	Pathogenic bacteria growth – temperature abuse	Product is held at a cooler ambient air temperature of 40°F (4.4°C) or below	Cooler temperature	Continuous time and temperature recorder and visual checks	Continuous monitoring by recorder with visual checks at least once per day	Shift Supervisor	**If** cooler temperature is above 40°F/4.4°C, **Then** move product to another cooler or ice and hold for evaluation for exposure. Evaluate product safety by determining cumulative exposure temperature and time above 40°F (4.4°C). Determine product disposition based on safety evaluation. To regain control, adjust or repair cooler and retrain involved staff as necessary.	Weekly review of Cooler Temperature Recorder Chart; Daily Visual Check Record; and Corrective Action Reports. Check accuracy of time-temperature recorder daily. Calibrate time-temperature recorder once per year	Cooler Time-Temperature Recorder Chart; Daily Visual Check Record; Corrective Action Reports

Signature:	**Date:**