



REVISED SEPTEMBER 2017

## Commercial Processing Example: Hot Smoked Salmon, Reduced-Oxygen Packed

**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* (4<sup>th</sup> Edition, 2011) and additional information available since the 2011 edition. It was produced by the National Seafood HACCP Alliance (SHA) strictly as an example for training. This Model does not represent a specific requirement or recommendation from FDA. Keep in mind that this model may not apply to all situations.

### Narrative

<b>Company</b>	ABC Smoked Fish Company, Anywhere, USA
<b>Acceptable Market Name</b>	Atlantic salmon - <i>Salmo salar</i>
<b>Source of Fishery Product</b>	Farm-raised salmon purchased from primary processors
<b>Describe the Food Product</b>	Hot smoked salmon
<b>Method of Receiving, Storage and Distribution</b>	Raw salmon are received and stored frozen. Finished smoked products in vacuum packages are stored and distributed refrigerated ≤40°F.
<b>Finished Packaging Type</b>	Smoked salmon in vacuum pack (reduced oxygen packaging)
<b>Intended Use and Consumer</b>	Cooked ready-to-eat smoked product, to be consumed by the general public.

### Description of Process

**Receive and Storing frozen salmon** – Frozen headed and gutted salmon are received from primary processors. After receipt, frozen salmon are moved into a storage freezer set at -10°F until needed for processing.

**Receive and Storing dry ingredients** – Salt and sugar are received from approved vendors in 50 pound containers. Salt and sugar are stored in original containers in dry storage area.

**Thaw** - Salmon is thawed in raw processing room in tanks with continuously flowing cold water for up to 2 hours. Process room temperature is between 50°F and 70°F.

**Fillet/Trim** - Employees fillet, trim and sort thawed salmon by size in the raw processing room. A uniform size will be sorted to suit the validated brining and smoking process. This operation takes less than one hour.

**Brine** – Up to 50 pounds of fillets, no larger than 5 pounds each, are placed into a tank. 50 gallons of brine solution that has a minimum 60° salinometer reading is added. Each batch is brined for at least 24 hours under refrigeration in a dedicated cooler at ≤ 40°F. This is the pre-determined batch process formulation that is needed to reach the required water-phase salt level of 3.5% in the finished product. No additional ingredients or food

additives are used with this product other than salt or sugar in the brine.

**Drain**- Brined fillets are rinsed with ambient temperature water and then placed onto stainless steel racks for draining and surface drying prior to smoking. This step occurs in a designated refrigerated cooler and takes approximately one to two hours.

**Hot Smoke/Cook** - After draining, the racks are rolled into the smoker. The fish are processed through a pre-programmed drying, smoking and cooking cycle for approximately six hours to achieve an internal temperature, using three probes, of 145°F for 30 continuous minutes in the thickest fillet located at the coolest spot in the smoker.

**Cool** - After smoking, the racks are removed from the smoker and allowed to cool at ambient temperature between 50°F to 70°F for up to 30 minutes. The racks are moved into a designated refrigerated cooler. The product is not handled until the next day when product temperature is 40°F or less.

**Vacuum Pack/Weigh/Label** - Racks of chilled smoked salmon are removed from the cooler and the smoked fillets are individually placed into pre-labeled packages.

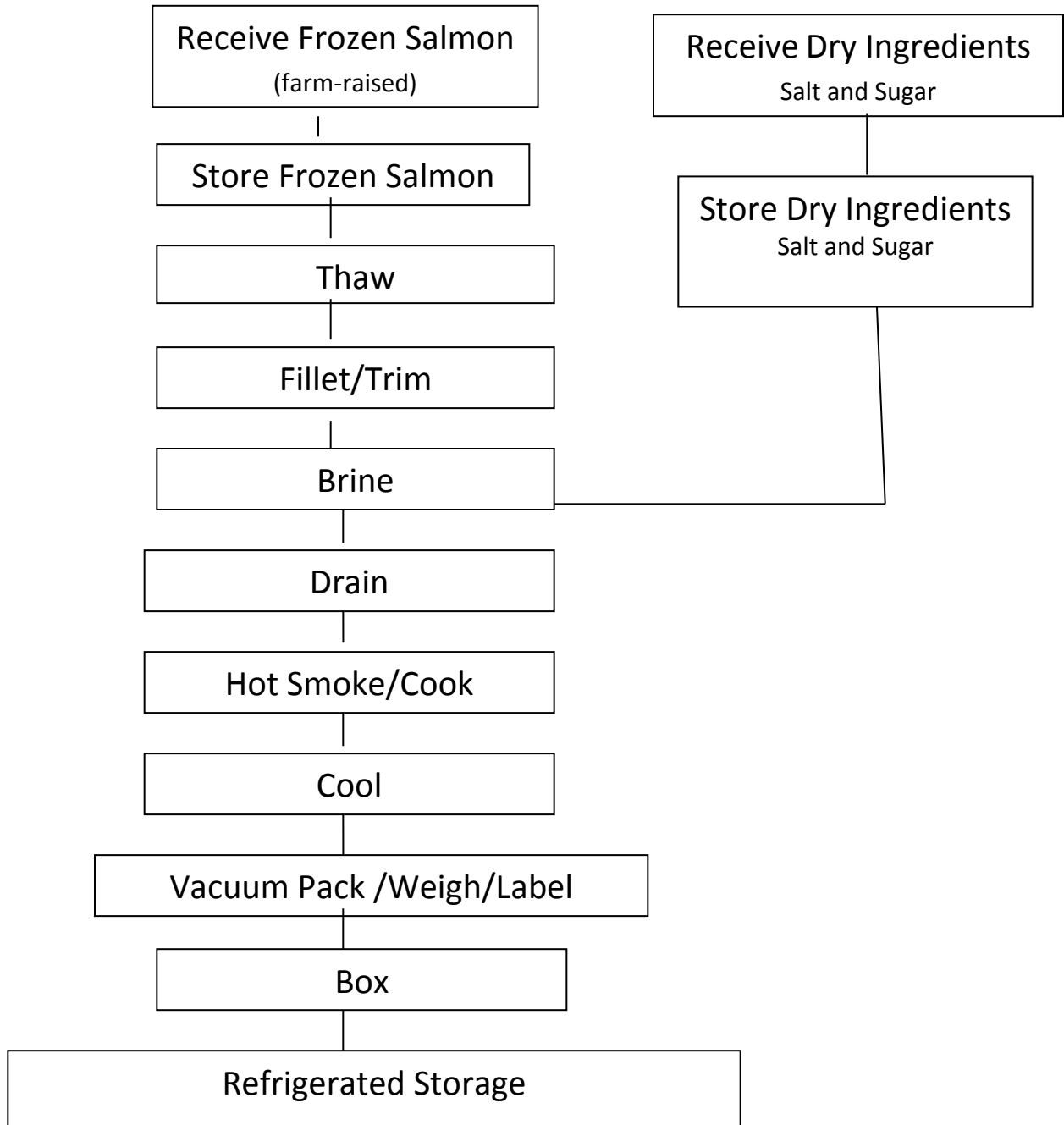
The packages are vacuum sealed. This step takes less than 30 minutes.

distribution. Finished packaged product may remain in refrigerated storage up to 48 hours before distribution

**Box** – Packages of smoked fish are placed into 25-pound master boxes. These boxes are palletized.

**Finished product refrigerated storage** – Pallets of packaged smoked fish are stored in a cooler at ≤ 40°F until

## Reduced Oxygen Packed Hot Smoked Salmon Process Flow Diagram



## Commercial Processing Example: Hot Smoked Salmon

**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 Smoked Fish Company																					
	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
<b>Common Name:</b> <i>Salmon (farm-raised)</i> <b>Market Name:</b> <i>Salmon</i> <b>Scientific Name:</b> <i>Salmo salar</i>			√			√				√				√			√			√		

**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) and 3-4 (process-related) in the FDA *Hazards and Controls Guidance* (2011 edition). 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 9 potential hazards that that are species (Table 3-2) or process-related (Table 3-4). Each potential hazard must be addressed in the Hazard Analysis, but 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, chapter 5)
2. Environmental Chemicals (species-related, chapter 9)
3. Aquaculture Drugs (species-related, chapter 11)
4. Pathogenic bacteria growth – temperature abuse (process-related, chapter 12)
5. Pathogenic bacteria survival through cooking and pasteurization (Hot Smoking; process-related, chapter 16); *Notice footnote no. 1* for Table 3-4, page 74 in the FDA Guidance implies hot smoking fits the “Finished Food Product” category for cooked seafood, and the hot smoke/cook step controls bacteria growth.
6. *C. botulinum* Toxin (process-related, chapter 13)
7. Food Allergens (process-related, chapter 19)
8. Food Additives (process-related, chapter 19)
9. Metal Inclusion (if used in packaging) – (process-related, chapter 20)

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

## Hazard Analysis Worksheet

<b>Firm Name:</b> <i>ABC Smoked Fish Company</i>	<b>Product Description:</b> <i>Hot smoked salmon in reduced oxygen package</i>
<b>Firm Location:</b> <i>Anywhere, USA</i>	<b>Method of Storage &amp; Distribution:</b> <i>Refrigerated at ≤ 40°F</i>
	<b>Intended Use &amp; Consumer:</b> <i>Ready-to-eat product to be consumed by general public without further cooking</i>

(1) Processing Step	(2) List all potential <b>food safety hazards</b> that could be associated with this product and process.	(3) Is the potential food safety hazard <b>significant</b> (introduced, enhanced or eliminated) at this step? <b>(Yes or No)</b>	(4) <b>Justify the decision</b> that you made in column 3	(5) What <b>control measure(s)</b> can be applied to prevent this significant hazard?	(6) Is this step a <b>Critical Control Point?</b> <b>(Yes or No)</b>
<b>Receive Frozen Salmon</b>	Parasites	No	Not reasonably likely to occur in frozen salmon; prior freezing assured to kill parasites		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely in frozen salmon		
	Pathogenic bacteria survival through cooking	No	Cooking occurs later in process		
	<i>C. botulinum</i> toxin	No	Not reasonably likely to occur in frozen salmon		
	Undeclared Food Allergens	Yes	Salmon is a major food allergen	Finished product label applied at vacuum pack/ weigh/label step will identify fish market name (salmon).	No
	Food Additives	No	No additives are used in primary or secondary processing		
	Metal inclusion	No	Not likely to occur at this step; not likely source		
<b>Receive Dry Ingredients (Salt and Sugar)</b>	Parasites	No	Not reasonably likely to occur in ingredients		
	Environmental chemicals	No	Not reasonable likely to occur in ingredients		
	Aquaculture drugs	No	Not reasonably likely to occur in ingredients		

(1) <b>Processing Step</b>	(2) List all potential <b>food safety hazards</b> that could be associated with this product and process.	(3) Is the potential food safety hazard <b>significant</b> (introduced, enhanced or eliminated) at this step? <b>(Yes or No)</b>	(4) <b>Justify the decision</b> that you made in column 3	(5) What <b>control measure(s)</b> can be applied to prevent this significant hazard?	(6) Is this step a <b>Critical Control Point?</b> <b>(Yes or No)</b>
<b>Receive Dry Ingredients</b> (Salt and Sugar) (continued)	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur in ingredients		
	Pathogenic bacteria survival through cooking	No	Cooking occurs later in process		
	<i>C. botulinum</i> toxin	No	Not reasonably likely to occur in dry ingredients		
	Undeclared Food Allergens	No	Salt & sugar are not food allergens		
	Food Additives	No	No additives are used		
	Metal Inclusion	No	Not likely to occur at this step; not likely source		
<b>Store Frozen Salmon</b>	Parasites	No	Eliminated during prior freezing		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely in frozen salmon		
	Pathogenic bacteria survival through cooking	No	Cooking occurs later in process		
	<i>C. botulinum</i> toxin	No	Not reasonably likely to occur in frozen salmon/not in a ROP at this step		
	Undeclared Food Allergens	Yes	Salmon is a major food allergen	Finished product label applied at vacuum pack/weigh/label step will identify fish market name (salmon).	No
	Food Additives	No	No additives are used in primary or secondary processing		
	Metal inclusion	No	Not likely to occur at this step; not likely source		

(1) <b>Processing Step</b>	(2) List all potential <b>food safety hazards</b> that could be associated with this product and process.	(3) Is the potential food safety hazard <b>significant</b> (introduced, enhanced or eliminated) at this step? <b>(Yes or No)</b>	(4) <b>Justify the decision</b> that you made in column 3	(5) What <b>control measure(s)</b> can be applied to prevent this significant hazard?	(6) Is this step a <b>Critical Control Point?</b> <b>(Yes or No)</b>
<b>Store Dry Ingredients</b> (Salt & Sugar)	Parasites	No	Not reasonably likely to occur in dry storage		
	Environmental chemicals	No	Not reasonably likely to occur in dry storage		
	Aquaculture drugs	No	Not reasonably likely to occur in ingredients		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur in ingredients		
	Pathogenic bacteria survival through cooking	No	Cooking occurs later in process		
	<i>C. botulinum</i> toxin	No	Not reasonably likely to occur in dry ingredients		
	Undeclared Food Allergens	No	Salt and sugar are not food allergens		
	Food Additives	No	No additives are used		
	Metal Inclusion	No	Not likely to occur at this step; not likely source		
<b>Thaw</b>	Parasites	No	Eliminated during prior freezing		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur during processing time below 70°F (FDA Guidance, p. 234)		
	Pathogenic bacteria survival through cooking	No	Cooking occurs later in process		
	<i>C. botulinum</i> toxin	No	No reduced oxygen package at this step		

(1) Processing Step	(2) List all potential <b>food safety hazards</b> that could be associated with this product and process.	(3) Is the potential food safety hazard <b>significant</b> (introduced, enhanced or eliminated) at this step? <b>(Yes or No)</b>	(4) <b>Justify the decision</b> that you made in column 3	(5) What <b>control measure(s)</b> can be applied to prevent this significant hazard?	(6) Is this step a <b>Critical Control Point?</b> <b>(Yes or No)</b>
<b>Thaw (cont)</b>	Undeclared Food Allergens	Yes	Salmon is a major food allergen	Finished product label applied at vacuum pack/weigh/label step will identify fish market name (salmon).	No
	Food Additives	No	No additives are used in primary or secondary processing		
	Metal Inclusion	No	Not likely to occur at this step; not likely source		
<b>Fillet/Trim</b>	Parasites	No	Eliminated during prior freezing		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur during processing time below 70°F (FDA Guidance, p. 234)		
	Pathogenic bacteria survival through cooking	No	Cooking occurs later in process		
	<i>C. botulinum</i> toxin	No	No reduced oxygen package at this step		
	Undeclared Food Allergens	Yes	Salmon is a major food allergen	Finished product label applied at vacuum pack/weigh/label step will identify fish market name (salmon).	No
	Food Additives	No	No additives are used in primary or secondary processing		
	Metal Inclusion	No	Not reasonably like to occur with handheld utensils/knives (FDA Guidance, p. 386)		

(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)
<b>Brine</b>	Parasites	No	Eliminated during prior freezing		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processor		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processor		
	Pathogenic bacteria growth – temperature abuse	Yes	Pathogens could grow if time/temperature abuse occurs	Brining will occur in refrigeration at 40°F or less	Yes
	Pathogenic bacteria survival through cooking	No	Cooking occurs later in process		
	<i>C. botulinum</i> toxin	Yes	<i>C. botulinum</i> toxin could form in finished product which is in a reduced oxygen package	Brine to achieve 3.5% water phase salt in finished products as a hurdle to <i>C. bot.</i> toxin production	Yes
	Undeclared Food Allergens	Yes	Salmon is a major food allergen	Finished product label applied at vacuum pack/weigh/label step will identify fish market name (salmon).	No
	Food Additives	No	No additives are used in primary or secondary processing		
	Metal Inclusion	No	Not likely to occur at this step; not likely source		
<b>Drain</b>	Parasites	No	Eliminated during prior freezing		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Pathogenic bacteria growth – temperature abuse	No	<i>S. aureus</i> toxin and growth of other pathogens unlikely to occur because of short time at this step.		



(1) <b>Processing Step</b>	(2) List all potential <b>food safety hazards</b> that could be associated with this product and process.	(3) Is the potential food safety hazard <b>significant</b> (introduced, enhanced or eliminated) at this step? <b>(Yes or No)</b>	(4) <b>Justify the decision</b> that you made in column 3	(5) What <b>control measure(s)</b> can be applied to prevent this significant hazard?	(6) Is this step a <b>Critical Control Point?</b> <b>(Yes or No)</b>
	Pathogenic bacteria survival through cooking	No	Cooking occurs later in process		
	<i>C. botulinum</i> toxin	No	No reduced oxygen environment at this step		
	Undeclared Food Allergens	Yes	Salmon is a major food allergen	Finished product label applied at vacuum pack/weigh/label step will identify fish market name (salmon).	No
	Food Additives	No	No additives are used in primary or secondary processing		
	Metal Inclusion	No	Not likely to occur at this step; not likely source		
<b>Hot Smoke/ Cook</b>	Parasites	No	Eliminated during prior freezing		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Pathogenic bacteria growth – temperature abuse	Yes	Pathogens could grow if time/temperature abuse occurs	Establish cooking procedures (to internal temp. of at least 145°F for 30 min) to kill pathogens.	Yes
	Pathogenic bacteria survival through cooking	Yes	Proper hot smoking (cooking) required to eliminate pathogens	Establish cooking procedures (to internal temp. of at least 145°F for 30 min) to kill pathogens.	Yes
	<i>C. botulinum</i> toxin	Yes	<i>C. botulinum</i> toxin could form in finished product which is in a reduced oxygen package	Cook to internal temp. of at least 145°F for 30 min as a hurdle with brining to prevent <i>C. botulinum</i> Type E	Yes
	Undeclared Food Allergens	Yes	Salmon is a major food allergen	Finished product label applied at vacuum pack/weigh/label step will identify fish market name (salmon).	No
	Food Additives	No	No additives are used in primary or secondary processing		
Metal Inclusion	No	Not likely to occur at this step; not likely source			

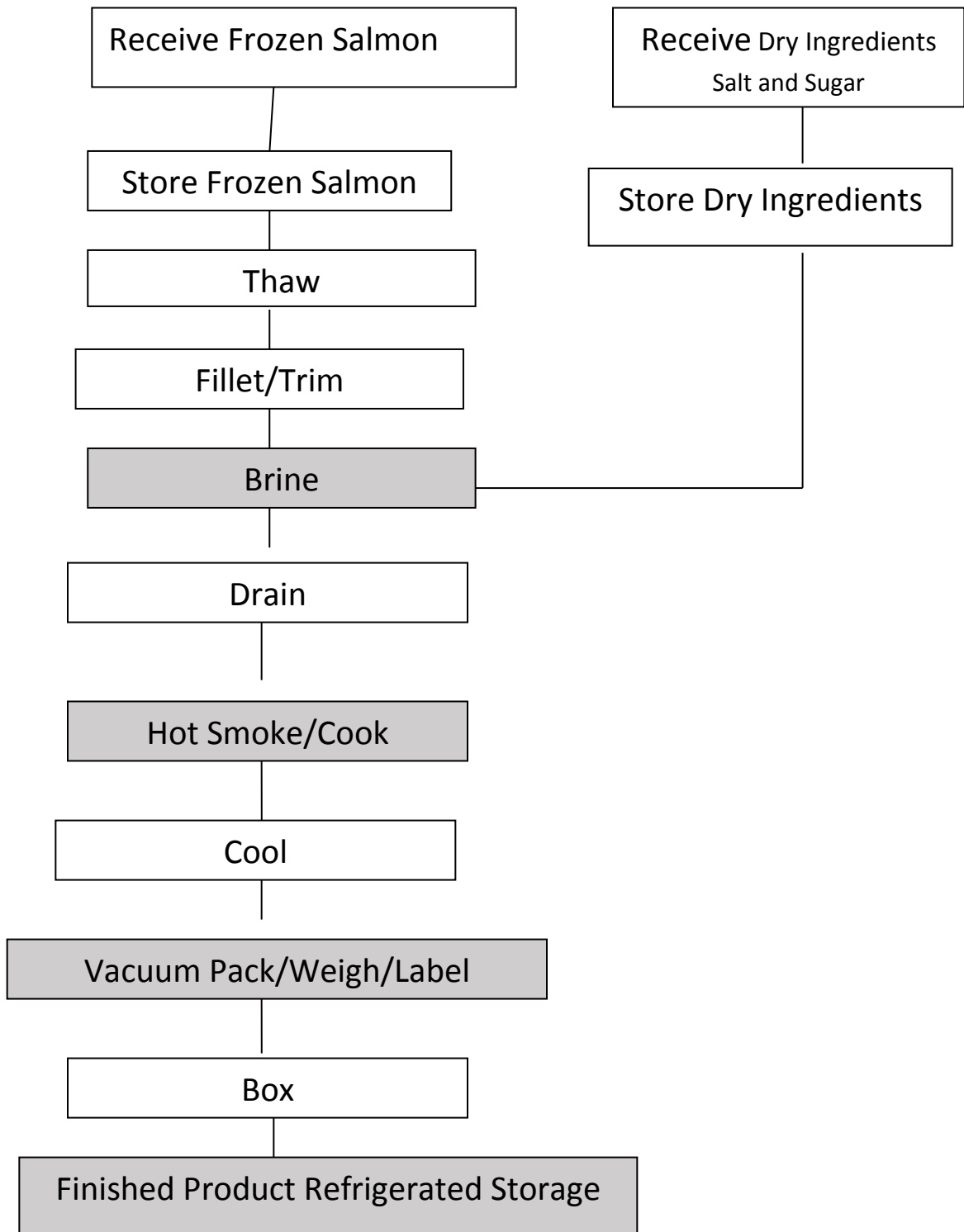
(1) <b>Processing Step</b>	(2) List all potential <b>food safety hazards</b> that could be associated with this product and process.	(3) Is the potential food safety hazard <b>significant</b> (introduced, enhanced or eliminated) at this step? <b>(Yes or No)</b>	(4) <b>Justify the decision</b> that you made in column 3	(5) What <b>control measure(s)</b> can be applied to prevent this significant hazard?	(6) Is this step a <b>Critical Control Point?</b> <b>(Yes or No)</b>
<b>Cool</b>	Parasites	No	Eliminated during prior freezing		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Pathogenic bacteria growth – temperature abuse	No	Pathogens eliminated at smoke/cook step; insufficient time for growth in cooler; and re-contamination controlled by SCPs.		
	Pathogenic bacteria survival through cooking	No	Prior hot smoking (cooking) step eliminated pathogens		
	<i>C. botulinum</i> toxin	No	No reduced oxygen package at this step		
	Undeclared Food Allergens	Yes	Salmon is a major food allergen	Finished product label applied at vacuum pack/weigh/label step will identify fish market name (salmon).	No
	Food Additives	No	No additives are used in primary or secondary processing		
	Metal Inclusion	No	Not likely to occur at this step; not likely source		
<b>Vacuum Pack/ Weigh/Label</b>	Parasites	No	Eliminated during prior freezing		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur due to short time at this step; re-contamination controlled by SCPs		

(1) <b>Processing Step</b>	(2) List all potential <b>food safety hazards</b> that could be associated with this product and process.	(3) Is the potential food safety hazard <b>significant</b> (introduced, enhanced or eliminated) at this step? <b>(Yes or No)</b>	(4) <b>Justify the decision</b> that you made in column 3	(5) What <b>control measure(s)</b> can be applied to prevent this significant hazard?	(6) Is this step a <b>Critical Control Point?</b> <b>(Yes or No)</b>
	Pathogenic bacteria survival through cooking	No	Prior hot smoking (cooking) step eliminated pathogens		
	<i>C. botulinum</i> toxin (Note: some states require a label statement that product must be kept below 38°F. In this situation this step would be a CCP for this hazard.)	No	Not reasonably likely to occur due to short time at this step and prior brining and hot smoking steps provided additional barrier for <i>C. botulinum</i> growth		
	Undeclared Food Allergens	Yes	Salmon is a major food allergen	Labels applied at this step must contain the market name "Salmon"	Yes
	Food Additives	No	No additives are used in primary or secondary processing		
	Metal Inclusion	No	Not likely to occur at this step; not likely source		
<b>Box</b>	Parasites	No	Eliminated during prior freezing		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Pathogenic bacteria growth – temperature abuse	No	Not reasonably likely to occur due to short time at this step		
	Pathogenic bacteria survival through cooking	No	Prior hot smoking (cooking) step eliminated pathogens		
	<i>C. botulinum</i> toxin	No	Not reasonably likely to occur due to short time at this step and prior brining and hot smoking steps provided additional barrier for <i>C. botulinum</i> growth		
	Undeclared Food Allergens	No	Already controlled at labeling step		
	Food Additives	No	No additives are used		
	Metal Inclusion	No	Not likely to occur at this step; not likely source		

(1) Processing Step	(2) List all potential <b>food safety hazards</b> that could be associated with this product and process.	(3) Is the potential food safety hazard <b>significant</b> (introduced, enhanced or eliminated) at this step? <b>(Yes or No)</b>	(4) <b>Justify the decision</b> that you made in column 3	(5) What <b>control measure(s)</b> can be applied to prevent this significant hazard?	(6) Is this step a <b>Critical Control Point?</b> <b>(Yes or No)</b>
<b>Finished Product Refrigerated Storage</b>	Parasites	No	Eliminated during prior freezing		
	Environmental chemicals	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Aquaculture drugs	No	Already controlled by primary processor; not reasonably likely to occur at secondary processing		
	Pathogenic bacteria growth – temperature abuse	Yes	Time/temperature abuse could allow pathogens to grow if product is re-contaminated	Store product in cooler at temperature at 40°F or below	Yes
	Pathogenic bacteria survival through cooking	No	Prior hot smoking (cooking) step eliminated pathogens		
	<i>C. botulinum</i> toxin	Yes	<i>C. botulinum</i> toxin could form in finished product which is in a reduced oxygen package exposed to excessive time and temperature abuse	Although prior brining and hot smoking steps provided additional barrier for <i>C. botulinum</i> growth, the product should be stored in cooler at temperatures at 40°F or below to provide an additional hurdle to growth for <i>C. botulinum</i>	Yes
	Undeclared Food Allergens	No	Already controlled at labeling step		
	Food Additives	No	No additives are used in primary or secondary processing		
	Metal Inclusion	No	Not likely to occur at this step; not likely source		

## Reduced Oxygen Packed Hot Smoked Salmon Process Flow Diagram

*Shaded steps are Critical Control Points*



## HACCP Plan Form

Firm Name <i>ABC Smoked Fish Company</i>	Product Description <i>Hot smoked salmon in reduced oxygen package</i>
Firm Location <i>Anywhere USA</i>	Method of Storage & Distribution <i>Refrigerated at ≤40° F</i>
	Intended Use & Consumer <i>Ready- to-eat product to be consumed by general public without further cooking</i>

<b>Critical Control Point (CCP)</b>		<b>CCP 1: BRINE</b> (Brining time, brine concentration and amount of fish are based on a pre-determined validation study that demonstrates that this batch process will result in a minimum water phase salt concentration of 3.5% in the final finished product.)
<b>Significant Hazard(s)</b>		<ol style="list-style-type: none"> <li>1. <i>C. botulinum</i> toxin</li> <li>2. Pathogenic bacteria growth- temperature abuse (<i>S. aureus</i> toxin formation)</li> </ol>
<b>Critical Limits for each Control Measure</b>		<ol style="list-style-type: none"> <li>1. Minimum brining time of 24 hours ; 50 gallons of brine with a minimum 60° salinometer reading at start of process; and No more than 50 pounds of fish fillets not larger than 5 pounds added to brine tank</li> <li>2. Fish are brined in refrigeration at a temperature of 40°F or less</li> </ol>
<b>Monitoring</b>	<b>What</b>	<ol style="list-style-type: none"> <li>1. Start and end time in brine; Volume of brine and degrees salt; and Weight of largest fillet and total weight of fillets put in brine tank</li> <li>2. Cooler temperature</li> </ol>
	<b>How</b>	<ol style="list-style-type: none"> <li>1. Visual check of time; Visual scale reading; Fill to pre-measured mark; and salinometer</li> <li>2. Continuous recording thermometer</li> </ol>
	<b>When</b>	<ol style="list-style-type: none"> <li>1. Each batch at the start of the brine process</li> <li>2. Continuous with visual check once per batch</li> </ol>
	<b>Who</b>	Brine Manager
<b>Corrective Action</b>		<ol style="list-style-type: none"> <li>1. <b>IF</b> Brining time is not met; <b>THEN,</b> Hold in brine until 24 hours is reached Add more salt and mix until salinometer reads 60°; Divert fillets &gt; 5 pounds to another batch process. Remove fillets until weight is 50 lbs. or less; Move brine tanks to another cooler and fix cooler or adjust thermostat. Retrain involved staff.</li> <li>2. Determine safety of product based on time and temperature exposure</li> </ol>
<b>Verification</b>		<ol style="list-style-type: none"> <li>1. Quarterly lab analysis to verify that finished products have 3.5% water phase salt; Daily accuracy check of scale; and Annual calibration of scale</li> <li>2. Check accuracy of thermometer before initial use and then daily, and then annual calibration. Brine validation study used to develop brine recipe &amp; time Weekly review of brine logs, and corrective action records.</li> </ol>
<b>Records</b>		Brine Logs Temperature recording chart with visual checks Brine Validation Study Training Records Accuracy check and calibration records; AND; corrective action records.

<b>Signature:</b>	<b>Date:</b>
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## HACCP Plan Form

<b>Firm Name</b> <i>ABC Smoked Fish Company</i>	<b>Product Description</b> <i>Hot smoked salmon in reduced oxygen package</i>
<b>Firm Location</b> <i>Anywhere USA</i>	<b>Method of Storage &amp; Distribution</b> <i>Refrigerated at ≤40° F</i>
	<b>Intended Use &amp; Consumer</b> <i>Ready- to-eat product to be consumed by general public without further cooking</i>

<b>Critical Control Point (CCP)</b>		<b>CCP 2: HOT SMOKE/ COOK</b>
<b>Significant Hazard(s)</b>		Pathogenic bacteria growth and survival <i>C. botulinum</i> toxin
<b>Critical Limits for each Control Measure</b>		Internal fish temperature at least 145°F for at least 30 continuous minutes
<b>Monitoring</b>	<b>What</b>	Internal fish temperature at the thickest portion of three fish Time fish are at target internal temperature
	<b>How</b>	Continuous temperature recording device with three temperature probes
	<b>When</b>	Continuous with visual check of recording chart for each batch
	<b>Who</b>	Smoker operator
<b>Corrective Action</b>		<b>IF</b> proper time and internal temperature is not reached, <b>THEN</b> re-cook at 145°F for 30 minutes or destroy batch and adjust or repair equipment. Retrain involved staff.
<b>Verification</b>		Weekly review of monitoring and corrective action records Check accuracy of temperature recording device before initial use and before each batch. Calibrate recording device annually
<b>Records</b>		Time and Temperature Recording Chart and Smoker Log Training Records Accuracy check and calibration records; AND; corrective action records.

<b>Signature:</b>	<b>Date:</b>
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## HACCP Plan Form

<b>Firm Name</b> <i>ABC Smoked Fish Company</i>	<b>Product Description</b> <i>Hot smoked salmon in reduced oxygen package</i>
<b>Firm Location</b> <i>Anywhere USA</i>	<b>Method of Storage &amp; Distribution</b> <i>Refrigerated at ≤40° F</i>
	<b>Intended Use &amp; Consumer</b> <i>Ready- to-eat product to be consumed by general public without further cooking</i>

<b>Critical Control Point (CCP)</b>		<b>CCP 3: Vacuum Pack/Weigh/Label</b>
<b>Significant Hazard(s)</b>		Undeclared Food Allergens
<b>Critical Limits for each Control Measure</b>		All product labels will contain "Salmon" in the ingredient list
<b>Monitoring</b>	<b>What</b>	Labels on finished product
	<b>How</b>	Visual check of labels
	<b>Frequency</b>	A representative number of packages from each lot
	<b>Who</b>	Packing supervisor
<b>Corrective Action</b>		<b>IF</b> the label does not have 'salmon' in the ingredient list <b>THEN</b> Re-label any improperly labeled product and modify labeling procedures as appropriate. Retrain involved staff
<b>Verification</b>		Weekly review of monitoring and corrective action records
<b>Records</b>		Label Check Report Training Records

<b>Signature:</b>	<b>Date:</b>
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## HACCP Plan Form

<b>Firm Name</b> <i>ABC Smoked Fish Company</i>	<b>Product Description</b> <i>Hot smoked salmon in reduced oxygen package</i>
<b>Firm Location</b> <i>Anywhere USA</i>	<b>Method of Storage &amp; Distribution</b> <i>Refrigerated at ≤40° F</i>
	<b>Intended Use &amp; Consumer</b> <i>Ready- to-eat product to be consumed by general public without further cooking</i>

<b>Critical Control Point (CCP)</b>	<b>CCP 4: Finished Product Refrigerated Storage</b>	
<b>Significant Hazard(s)</b>	Pathogenic bacteria growth – temperature abuse <i>C. botulinum</i> toxin	
<b>Critical Limits for each Control Measure</b>	Cooler temperature is 40°F** or less	
<b>Monitoring</b>	<b>What</b>	Cooler temperature
	<b>How</b>	Continuous recording thermometer with visual checks
	<b>Frequency</b>	Continuous with visual check of recording chart once a day
	<b>Who</b>	Cooler Manager
<b>Corrective Action</b>	<b>IF</b> cooler temperature is above 40°F, <b>THEN</b> move product to another cooler or ice and hold for evaluation. Adjust or repair cooler as necessary. Evaluate product safety by determining cumulative exposure temperature and time above 40°F.  Destroy if necessary.  Retrain involved staff.	
<b>Verification</b>	Weekly review of monitoring and corrective action records.  Calibrate temperature recorder once per year  Check accuracy of time temperature recorder daily.	
<b>Records</b>	Cooler Temperature Log and time temperature recording chart Training Records Accuracy check and calibration records; AND; corrective action records.	

<b>Signature:</b>	<b>Date:</b>
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**\*\* Instructors Note:** The Corrective action strategy for finished product cooler storage that is provided in this model is based on Table A-2 of the FDA *Hazards Guide*. For germination, growth and toxin formation for *C. bot* Type E and nonproteolytic Types B & F the maximum cumulative exposure at 38-41°F is 7 days and from 42-50°F is 2 days. For example, < 1 hour at < 50°F is less than 2% of maximum cumulative exposure for the life of the product.

## HACCP Plan Form (*landscape format*)

<b>Firm Name</b> <i>ABC Smoked Fish Company</i>	<b>Product Description</b> <i>Hot smoked salmon in reduced oxygen package</i>
<b>Firm Location</b> <i>Anywhere USA</i>	<b>Method of Storage &amp; Distribution</b> <i>Refrigerated at ≤40°F</i>
	<b>Intended Use &amp; Consumer</b> <i>Ready-to-eat product to be consumed by general public without further cooking</i>

Critical Control Point (CCP)	Significant Hazard(s)	Critical Limits for each Control Measure	Monitoring				Corrective Action	Verification	Records
			What	How	When	Who			
<b>CCP 1: BRINE*</b>  Brining time, brine concentration and amt of fish are based on a pre-determined validation study that demonstrates that this batch process will result in a minimum water phase salt concentration of 3.5% in the final finished product.	<i>C. botulinum</i> toxin	Minimum brining time of 24 hrs;  50 gallons of brine with a minimum 60° salinometer reading at start of process; and  No more than 50 lbs of fish fillets not larger than 5 pounds added to brine tank	Start and end time in brine;  Volume of brine and degrees salt; and  Weight of largest fillet and total weight of fillets put in brine tank	Visual check of time;  Visual scale reading;  Fill to pre-measured mark; and  Salinometer	Each batch at the start of the brine process	Brine Manager	<b>IF</b> Brining time is not met; <b>THEN</b> , hold in brine until 24 hrs is reached  Add more salt and mix until salinometer reads 60°; Divert fillets > 5 lbs to another batch process. Remove fillets until weight is 50 lbs. or less; Move brine tanks to another cooler and fix cooler or adjust thermostat.  Retrain involved staff.	Quarterly lab analysis to verify that finished products have 3.5% water phase salt;  Daily accuracy check of scale; and  Annual calibration of scale	Brine Logs  Temperature recording chart with visual checks  Brine Validation Study  Training Records  Accuracy check and calibration records; AND; corrective action records.
	Pathogenic bacteria growth-temperature abuse ( <i>S. aureus</i> toxin formation)	Fish are brined in refrigeration at a temperature of 40°F or less	Cooler temperature	Continuous recording thermometer	Continuous with visual check once per batch		Determine safety of product based on time and temperature exposure	Check accuracy of thermometer before initial use and then daily, and then annual calibration.  Brine validation study used to develop brine recipe and time  Weekly review of brine logs, and corrective action records.	

Critical Control Point (CCP)	Significant Hazard(s)	Critical Limits for each Control Measure	Monitoring				Corrective Action	Verification	Records
			What	How	When	Who			
<b>CCP 2: Hot Smoke/Cook</b>	Pathogenic bacteria growth and survival  <i>C. botulinum</i> toxin	Internal fish temperature at least 145°F for at least 30 continuous minutes	Internal fish temperature at the thickest portion of three fish  Time fish are at target internal temperature	Continuous temperature recording device with three temperature probes	Continuous with visual check of recording chart for each batch	Smoker operator	<b>IF</b> proper time and internal temperature is not reached, <b>THEN</b> re-cook at 145°F for 30 minutes or destroy batch and adjust or repair equipment.  Retrain involved staff.	Weekly review of monitoring and corrective action records  Check accuracy of temperature recording device before initial use and before each batch.  Calibrate recording device annually	Time and Temperature Recording Chart and Smoker Log  Training Records  Accuracy check and calibration records; AND; corrective action records.
<b>CCP 3: Vacuum Pack/Weigh/Label</b>	Undeclared Food Allergens	All product labels will contain "Salmon" in the ingredient list	Labels on finished product	Visual check of labels	A representative number of packages from each lot	Packing supervisor	<b>IF</b> the label does not have 'salmon' in the ingredient list <b>THEN</b> Re-label any improperly labeled product and modify labeling procedures as appropriate.  Retrain involved staff	Weekly review of monitoring and corrective action records	Label Check Report  Training Records
<b>CCP 4: Finished Product Refrigerated Storage</b>	Pathogenic bacteria growth – temperature abuse  <i>C. botulinum</i> toxin	Cooler temperature is 40°F** or less	Cooler temperature	Continuous recording thermometer with visual checks	Continuous with visual check of recording chart once a day	Cooler manager	<b>IF</b> cooler temperature is above 40°F, <b>THEN</b> move product to another cooler or ice and hold for evaluation. Adjust or repair cooler as necessary. Evaluate product safety by determining cumulative exposure temperature and time above 40°F.  Destroy if necessary.  Retrain involved staff.	Weekly review of monitoring and corrective action records.  Calibrate temperature recorder once per year  Check accuracy of time temperature recorder daily.	Cooler Temperature Log and time temperature recording chart  Training Records  Accuracy check and calibration records; AND; corrective action records.

**\*\* Instructors Note:** The Corrective action strategy for finished product cooler storage that is provided in this model is based on Table A-2 of the FDA Hazards Guide. For germination, growth and toxin formation for *C. bot* Type E and nonproteolytic Types B & F the maximum cumulative exposure at 38-41°F is 7 days and from 42-50°F is 2 days. For example, < 1 hour at < 50°F is less than 2% of maximum cumulative exposure for the life of the product.