



# **Control of Pathogens in Ready-To-Eat Seafood Products**

Introduction to Industry Manual

June 10, 2018

AFDO Seafood Committee



# Agenda

- Overview and History
- RTE Specific GMP & Sanitation Control Guidelines
- Training Plant Personnel
- Environmental Monitoring in Food Processing Areas
- Finished Product Labeling
- Non-Thermal Intervention Measures
- Q & A



# OVERVIEW AND HISTORY



# **READY-TO-EAT SEAFOOD PATHOGEN CONTROL MANUAL**

*(Listeria monocytogenes and Salmonella spp.)*

**READY-TO-EAT WORKING  
GROUP  
of the  
National Fisheries Institute**

April 2018

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**General Plant Sanitation**

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## Section 1

# **RTE SPECIFIC GMP & SANITATION CONTROL GUIDELINES**



# Purpose of Section

- GMPs and sanitation controls provide the foundation of an effective environmental control program
- Provides information to identify:
  - where problems are likely to occur
  - what improvements or changes need to be made.
    - process flow, facilities, procedures and equipment



# Section Covers

- General Considerations
- Processing Operations
- Sanitary Equipment Design Considerations
- General Plant Sanitation
- Personnel Hygiene





Product and equipment proximity to the floor can play an important part in avoiding contamination.



# Processing Operations

- CONTROL STRATEGY: Separating raw products from semi-finished and finished products as well as controlling traffic flow patterns are key to preventing cross-contamination.
- Key Control Measures and Potential Additional Measures are provided



## Section 2

# **TRAINING PLANT PERSONNEL**



# Purpose of Section

Effective Environmental Pathogen Control Programs require employees to understand role and expectations.



# Section Covers

- Basic training on RTE pathogens, hygiene, handwashing for all employees.
- Training for workers in exposed finished product areas.
- Training for personnel conducting cleaning and sanitation in exposed finished product areas.
- Training for personnel who conduct sampling.



# Handwashing

Foods can become contaminated when employees transfer pathogens from one location to another in your facility. Pathogens can be transferred from anywhere/anything your staff touch if not properly managed.



While there are many types of appropriate handwashing stations that exist, it is important that your staff fully understand the importance of washing their hands, when to wash and how to wash.



Figure 17



## Section 3

# **ENVIRONMENTAL MONITORING IN FOOD PROCESSING AREAS**





# Purpose of Section

Provide strategies to develop and implement an environmental monitoring program that will verify the effectiveness of control programs.





# Section Covers

- Environmental Monitoring Plan Risk Assessment, Design, Management
- Contamination Routes of *Listeria monocytogenes*
  - Introduction
  - Cross-contamination
  - Harborage
- Master Sampling Plan and Frequency
  - "Seek and Destroy"



# Section Covers

- Potential sources for *Listeria monocytogenes*

**Table 5.** Typical places where LM is present in seafood processing plants

Category	Description of Category	Potential Sources of <i>Listeria monocytogenes</i>
A	Ingredients	<ul style="list-style-type: none"><li>• Raw foods, such as:<ul style="list-style-type: none"><li>- Raw meat, poultry, and seafood</li><li>- Raw milk</li><li>- Raw produce</li></ul></li></ul>
B	Processing materials	<ul style="list-style-type: none"><li>• Compressed air</li><li>• Ice</li><li>• Brine solutions used in chilling refrigerated RTE foods</li></ul>
C	Contact surfaces for RTE foods	<ul style="list-style-type: none"><li>• Injection needles</li><li>• Slicers, dicers, shredders and blenders</li><li>• Worn stainless steel surfaces (scratches)</li><li>• Poor welding (rough) on stainless steel equipment</li><li>• Worn/cracked conveyor belts</li><li>• Fibrous and porous-type conveyor belts</li><li>• Filling and packaging equipment</li><li>• Belts, peelers, and collators</li><li>• Vacuum systems/tubes – where it is not possible to clean properly without special equipment (reverse drips from those tubes are commonly detected as a source of <i>Listeria</i> contamination)</li><li>• Machinery joined together without an open space in between (these areas are not possible to clean without regular dismantling)</li><li>• Circulating wash systems</li><li>• Transport containers, bins, tubs and baskets</li><li>• Utensils</li><li>• Gloves</li><li>• Maintenance or Contractors and their tools (cross-contamination)</li></ul>

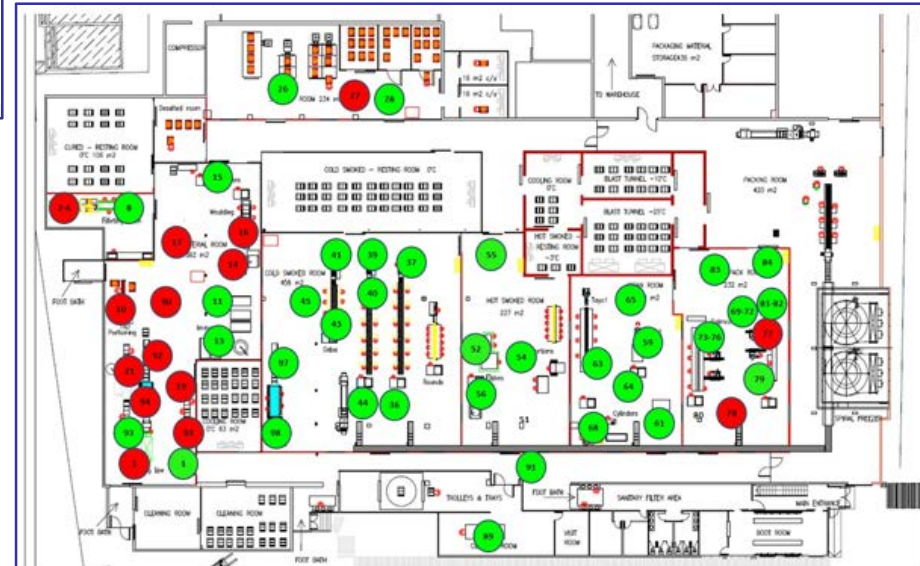


# Section Covers

## • Corrective Actions

**Table 6.** Examples of Corrective Actions when *Listeria* species are found in an environmental sample

	Non-Food Contact Surface		Food Contact Surface	
	Food supports growth	Food does not support growth*	Food supports growth	Food does not support growth*
<b>Routine sampling (Positive #1)</b>	<ul style="list-style-type: none"><li>• Clean and sanitize area with positive</li><li>• Retest during next production cycle</li></ul>	<ul style="list-style-type: none"><li>• Clean and sanitize area with positive</li><li>• Retest during next production cycle</li></ul>	<ul style="list-style-type: none"><li>• Clean and sanitize area with positive</li><li>• Retest during next production cycle</li><li>• Conduct comprehensive investigation</li></ul>	<ul style="list-style-type: none"><li>• Clean and sanitize area with positive</li><li>• Retest during next production cycle</li><li>• Conduct comprehensive investigation</li></ul>
<b>Follow up sampling (Positive #2)</b>	<ul style="list-style-type: none"><li>• Intensified cleaning and sanitizing (possibly including disassembly of equipment)</li><li>• Intensified sampling and testing</li></ul>	<ul style="list-style-type: none"><li>• Intensified cleaning and sanitizing</li><li>• Intensified sampling and testing</li></ul>	<ul style="list-style-type: none"><li>• Intensified cleaning and sanitizing (including disassembly of equipment)</li><li>• Intensified sampling and testing</li><li>• Hold and test product</li><li>• Reprocess, divert or destroy product on hold if there is positive product</li><li>• Comprehensive investigation</li></ul>	<ul style="list-style-type: none"><li>• Intensified cleaning and sanitizing (including disassembly of equipment)</li><li>• Intensified sampling and testing</li><li>• Consider hold and test</li><li>• Comprehensive investigation</li></ul>





# Example EMP for cold/hot smoked salmon

- Location (by Zones)
  - Number of samples
  - Frequency
  - Results
  - Corrective actions

## FOR EXAMPLE PURPOSES ONLY Environmental Monitoring Corrective Action Plan

Test Result	Zone 1 - FCS	Zone 2 - NFCS	Zone 3 - NFCS	Zone 4 - NFCS
<b>First Positive</b> <i>Listeria</i> species	Clean & Sanitize  Retest location 3 consecutive days  Conduct Root Cause Analysis  Note: Although not required, company should evaluate if finished product needs to be tested and go on hold.	Clean & Sanitize  Retest area next day to confirm eliminated  Consider increased testing in Zone 2, if getting positives in Zone 1 to determine vector routes	Clean & Sanitize  Retest next day to verify elimination  Consider increased testing in Zone 3 if getting positives in Zones 1 and 2 to determine vector routes	Clean & Sanitize  Retest at next month to verify elimination  Consider increased testing in Zone 4 if getting positives in Zone 3 to determine vector routes
<b>Second Positive</b> <i>Listeria</i> Species	Disassemble/ Deep Clean & Sanitize  Place product on hold and test for LM  Retest location 3 consecutive days  Repeat Root Cause Analysis  Product on hold destroyed or diverted if positive for LM	Deep Clean & Sanitize  Retest location at least 1 consecutive day  Conduct Root Cause Analysis	Deep Clean & Sanitize  Conduct Root Cause Analysis	Deep Clean & Sanitize  Retest to verify elimination
<b>Third Positive</b> <i>Listeria</i> species	Stop Production  Consider bringing in consultant  Intensive Cleaning and Sanitizing  Resume production with product hold and test  Retest location 3 consecutive days upon start up	Disassemble/ Deep Clean & Sanitize  Repeat Root Cause Analysis	Disassemble/ Deep Clean & Sanitize  Repeat Root Cause Analysis	Deep Clean & Sanitize  Conduct Root Cause Analysis



## Section 4

# **FINISHED PRODUCT LABELING**





## Labeling for Food Safety

- Handling statements
- Holding condition and temperature requirements
- Freezing or refrigeration may be needed to control pathogen growth



## Section 5

# **NON-THERMAL INTERVENTION MEASURES**





# Purpose of Section

- Provides options for raw fish treatments
  - Not all options have been approved for use with seafood
- Measures to reduce contamination levels could be applied by:
  - primary processor of the raw fish, and/or
  - secondary processor
- No single approved non-thermal measure or hurdle at a single step will provide a sufficient bactericidal effect to satisfy FDA's zero tolerance policy.



# Potential Control Measures

Measures	For Raw Materials	During Processing	For Finished Product
1) Chlorine	X		
2) Treating raw fish with calcium hydroxide (pH 12)	X		
3) Washing raw fish with water containing acidified sodium chlorite	X		
4) Skin removal before curing	X		
5) Peracetic acid	X		
6) Green tea	X	X	X
7) Bacteriocins (includes nisin)	X		X
8) Bacteriophages	X	X	X
9) Ozone	X	X	
10) Cetylpyridinium chloride (CPC)	X		
11) Fatty Acids	X		
12) Electrochemical brine tank treatment	X		
13) Electrolyzed water	X		
14) Higher pressure processing (HPP)			X
15) Ultraviolet (UV) pulse light		X	X
16) Irradiation			X
17) Competitive lactic acid bacteria			X
18) Sodium lactate			X
19) Packaging and Sodium Nitrite $\text{NaNO}_2$		X	X
20) Nitrates and Nitrites		X	
21) Essential Oils		X	

\*See specific section for regulatory approval information



- Manual is available at:

[www.aboutseafood.com/resources](http://www.aboutseafood.com/resources)

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**READY-TO-EAT WORKING  
GROUP  
of the  
National Fisheries Institute**

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# Thank you

Questions?

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