HACCP Planning for Specialized Processes

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UNIVERSITY OFFICE OF CULINARY EDUCATION

June 12, 2012
Processes to be Reviewed

• Reduced Oxygen Packaging
• Thermal processing of
  – high acid
  – low acid
  – acidified foods
Reduced Oxygen Packaging

Topics

- Reduced oxygen packaging methods
- Advantages/risks
- Primary controls:
  - temperature
  - types of food packaged
  - shelf life
  - sanitation

- Packaging
- Labeling
- HACCP Plan requirements
- Training
Learning Objectives

1. Understand the advantages and risks of reduced oxygen packaging (ROP) and thermally processed foods.

2. Know which bacteria present the greatest risks in ROP and thermally processed foods and why.

3. Know the elements of a HACCP plan.

4. Know the regulatory requirements for sous vide and thermally processed foods.
What is Reduced Oxygen Packaging?

Food in a package with less oxygen than in air (21%)
Types of Reduced Oxygen Packaging (ROP)

- Vacuum packaging
- Modified Atmosphere Packaging (MAP)
- Controlled Atmosphere Packaging (CAP)
- Sous Vide
- Cook Chill

Focus will be on vacuum packaging and sous vide
Advantages of ROP

- Extends shelf life
- Slows the growth of spoilage organisms
- Prevents color changes
- Prevents shrinkage and moisture loss
- Convenience
- Portion control
What’s the Hazard?

Bacteria that grow in an environment without oxygen

- *Clostridium botulinum*
  - Forms spores that cannot be killed by cooking
  - Produces a powerful neurotoxin that can be fatal
- *Listeria monocytogenes*
  - Grows at temperatures down to 32°F
  - A concern in ready-to-eat foods (cheese) as a result of cross contamination
Clostridium botulinum (C. bot)

Types of C. bot

- **Proteolytic group (break down proteins)**
  - A, some types of B and F
  - **Reservoir:** Soil
  - **Source of spore:** Vegetables, Meat, Poultry

- **Nonproteolytic (do not break down proteins)**
  - E and some types of B and F
  - **Reservoir:** Oceans and lakes
  - **Source of spore:** Seafood
Botulism Facts/Statistics

Average of 145 cases reported each year in the US

- 15% are foodborne
- 65% are infant botulism
- 20% are wound

Hospitalization: Close to 100%

Treatment for foodborne: Antitoxin & supportive care often requiring a ventilator if respiratory paralysis

Death rate: 3-5% if treated

Infective dose: a few nanograms
Botulism Audio Track

Botulism Audio Track.wmv

(audio file posted separately)
Conditions that inhibit *C. botulinum* germination, growth and toxin formation favorable for growth

- Temperatures below 50°F (all but type E)
- Temperatures below 38°F (type E)
- pH below 4.6
- Water activity below .89
- Salinity (4-5%)

Note:

- Spores are killed at temperatures between 240 and 250°F
- Toxin is killed at boiling temperatures for 10 minutes
Foods Associated with Botulism

Under processed
meats
low acid fruits and vegetables
fish

Foods in an anaerobic environment that are temperature abused (baked potatoes, garlic in oil, herb infused oils)
Outbreaks Associated with Botulism

- Chopped garlic in oil
- Carrot juice (2006-6 ill and hospitalized, 1 death) Lapse in refrigeration during transport or storage was suspected.
• Castleberry’s Hot Dog Chili Sauce (2007-8 ill, all hospitalized) Chili sauce was under processed
  http://www.cdc.gov/botulism/botulism.htm

• Potato soup (2011-2 ill, both hospitalized)
  Label indicated keep refrigerated but left out unrefrigerated by consumers
  http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6026a5.htm?s_cid=mm6026a5_w

Recall for under processing:
Listeria Facts and Statistics

- Mortality rate: 15-30%
- *Number of cases annually (US): 800
- Reservoir: Soil and water
- Hardy: Salt tolerant, persists in manufacturing environment, can grow at refrigeration temperatures

Source: Bad Bug Book, 2nd edition
Foods Associated with Listeria

• Ready to eat-refrigerated foods
• Hot dogs and deli meats
• Soft cheeses
• Uncooked meats and vegetables
• Raw (unpasteurized) milk
Listeria Outbreaks

- 2011: 146 ill, 30 deaths, 1 miscarriage in 28 states
  Source: Whole cantaloupes-Jensen Farms, Colorado
  [link](http://www.cdc.gov/listeria/outbreaks/cantaloupes-jensen-farms/092711/index.html)

- 2002: 54 ill, 8 deaths, and 3 fetal deaths in 9 states were found to be associated with consumption of contaminated turkey deli meat.
Listeria Recalls

2012- Imported boneless ham

2011- Oven roasted chicken breast
Criteria for ROP Without a Variance

• Control growth and toxin formation of *C. bot.* and growth of Listeria

• Have a HACCP plan that contains information in 8201.14 (D) of Food Code (see slides 59 and 60) plus the following:
  – Identifies food to be packaged
- Requires packaged food to be kept at 41°F or less (or other temperatures specified in the Food Code for fish, cook chill, or sous vide) and meets one of the following criteria:

Is a food with high level of competing organisms
  - Raw meat or poultry (beef, pork, chicken) or raw vegetables

Is a hard cheese (Colby, cheddar, Swiss)

Is a meat or poultry product cured at a USDA regulated processing plant

Has a low pH (below 4.6)

Has a low water activity level (below .91)

Is fish ONLY if frozen before, during and after packaging

Is another food processed according to the sous vide and cook-chill regulations
- Labels food with the following information
  maintain food at 41°f or below
  discard food within 14 days of packaging
- Limits refrigerated shelf life to no more than 14 days of packaging except time maintained frozen.
- Includes SOPs
- Describes training program
Primary Controls

- Temperature
- Types of Food Packaged
- Shelf Life
- Sanitation
Temperature

- Keep cold at 41°F or less
- Minimize time out of refrigeration during processing
Shelf Life

- Restricted to reduce risk of pathogens
- Dependent on type of ROP
  - raw meat and poultry: 14 days
  - cheese (allowed): 30 days or manufacturer’s use or sell by date, whichever comes first
  - sous vide foods: 72 hrs or 30 days based on refrigeration temperature (see slides 42 and 43)

Note: Increase in shelf life increases the risk of *Listeria* growth
Sanitation Standard Operating Procedures (SSOP’s)

Written Procedures

• Cleaning and sanitizing of food contact surfaces.
• Cleaning and operation of equipment.
• Cleaning of non-food contact surfaces and facilities.
• Instructions for use of sanitation chemicals.
Additional Standard Operating Procedures (SOPs)

- Proper Personal Hygiene (Employee practices)
- Steps for preparing and storing foods
  - Monitoring temperatures
  - Preventing cross contamination
- Pest Control (Addressed in JWU’s Gold Standard for Food Safety manual)
Storage: Foods & Packaging Materials

• Keep potentially hazardous food at 41°F or less.
• Store food to prevent cross contamination.
• Store packaging materials in a sanitary manner.
**Assembly & Packaging**

- Use the vacuum packaging machine according to manufacturer’s instructions.
- Limit time out of refrigeration by packaging in batches.
Packaging

- Designated area for ROP
- Separate raw from ready-to-eat
  - Physical barrier
  - Timing of operations
- Check the packages for:
  - Tight seal
  - Tight vacuum
Packaging Materials

- Plastic films must be approved for ROP food packaging
- Different types of films can provide barriers to water, oxygen, flavors, odors
- Other properties: toughness, brittleness, impact resistance
Finished Product Storage

- ROP packaged food must be stored at 41°F or less
- Monitor and record the temperature in all storage units
- Check products daily for faulty seals, puffy packages
- Outdated products must be discarded
Flow Diagram
Vacuum Packaging Raw Meat/Poultry

Receiving-Storeroom
↓
Storage (Refrigerate at 41°F or below)
↓
Preparation-Cutting/Fabrication
↓
Vacuum Packaging
↓
Labeling
↓
Storage (Refrigerate at 41°F or below or freeze)
↓
Discard 14 days after packaging
Sous Vide
What is Sous Vide?

- Cooking technique developed by George Pralus in France in the mid 1970’s to reduce shrinkage and waste when preparing foie gras.
- French translation for sous vide is “under vacuum”.
- Process by which food is sealed in airtight plastic bag and cooked in water bath at low and constant temperature.
Advantages to Sous Vide

- Prevents shrinkage and moisture loss
- Prevents color changes
- Can reach even temperature throughout food (Same temperature at center as at the surface)
- Preserve aroma and texture and preserves or enhances flavor.
- Develop new textures
- Produce consistent product
- Minimize waste as allows for the advanced preparation of controlled portions
Equipment for Sous Vide Process

- Vacuum packaging machine
- Circulating immersion water bath
Types of Sous Vide Cooking

Direct Cooking
   Immediate consumption

Indirect Cooking
   Cooling & storage for later use
Sous Vide Direct Cooking Process (for immediate consumption)

Receiving
↓
Storage
↓
Preparation (trim, season)
↓
Vacuum packaging (remove air)
↓
Cooking (Water bath) (CCP)
↓
Open vacuum package (CCP)
↓
Finish (by traditional cooking method: oven or searing on top of stove)
↓
Service (Consumer Advisory for Undercooked proteins) (CCP)
Sous Vide Indirect Cooking Process (for storage)

1. Receiving
2. Storage
3. Preparation (trim, season)
4. Vacuum packaging (remove air)
5. Cooking (Water bath) (CCP)
6. Cooling (CCP)
7. Labeling (CCP)
8. Refrigeration (CCP)
9. Reheating (CCP if will be hot held)
10. Serving
Sous Vide Fruits and Vegetables Process: Does this process provide all needed information?

- Prepare a solution for sous vide (sugar syrup or vinegar infused with herbs and/or spices)
- Place solution in bag with fruits (i.e. apples, pineapple slices, mango slices, strawberries, banana, fig halves, pears, peaches, apricots, plums)
- Vacuum seal
- Cook in a warm water bath (temperature to be determined by density of fruit)
- Open vacuum and reserve for service
Sous Vide Regulatory Requirements

Cooking
Cooling/Refrigeration
Temperature monitoring
Labeling
Cooking

Cook to temperature requirements in the Food Code

- Poultry: 165°F for 15 seconds.
- Whole muscle meats: 145°F for 15 seconds
- Seafood: 145°F for 15 seconds

Note: “Dwell times of greater than 6 hours in the 50°F to 130°F range should be viewed as especially hazardous”

<table>
<thead>
<tr>
<th>Item</th>
<th>Under Pressure Temp of Water Bath °C</th>
<th>Under Pressure Time in Water Bath min</th>
<th>Temperature of Product when Removed from Water Bath °F</th>
<th>Doneness</th>
<th>Finish Cooking Temp °F</th>
<th>Finish Cooking Time min</th>
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</thead>
<tbody>
<tr>
<td>Duck Breast</td>
<td>60</td>
<td>25</td>
<td>130</td>
<td>W</td>
<td>165</td>
<td>9</td>
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<tr>
<td>Cod Loin</td>
<td>61</td>
<td>16</td>
<td>123</td>
<td>W</td>
<td>145</td>
<td>8</td>
</tr>
<tr>
<td>Chic Breast</td>
<td>60</td>
<td>18</td>
<td>127</td>
<td>W</td>
<td>166</td>
<td>5</td>
</tr>
<tr>
<td>Chicken Quarter</td>
<td>60</td>
<td>18</td>
<td>118</td>
<td>W</td>
<td>167</td>
<td>5</td>
</tr>
<tr>
<td>Pork Tenderloin</td>
<td>60</td>
<td>30</td>
<td>127</td>
<td>W</td>
<td>159</td>
<td>20</td>
</tr>
<tr>
<td>Sirloin Steak</td>
<td>54</td>
<td>20</td>
<td>120</td>
<td>R</td>
<td>130</td>
<td>10</td>
</tr>
<tr>
<td>Sirloin Steak</td>
<td>48.8</td>
<td>20</td>
<td>120</td>
<td>MR</td>
<td>135</td>
<td>12</td>
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<tr>
<td>Sirloin Steak</td>
<td>48.8</td>
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<td>14</td>
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<tr>
<td>Sirloin Steak</td>
<td>48.8</td>
<td>20</td>
<td>120</td>
<td>MW</td>
<td>160</td>
<td>15</td>
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<tr>
<td>Tuna Steak</td>
<td>59</td>
<td>13</td>
<td>120</td>
<td>MR</td>
<td>136</td>
<td>12</td>
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<td>Tuna Steak</td>
<td>48.8</td>
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<td>149</td>
<td>14</td>
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<tr>
<td>Tuna Steak</td>
<td>48.8</td>
<td>13</td>
<td>120</td>
<td>W</td>
<td>156</td>
<td>16</td>
</tr>
<tr>
<td>Foie Gras 1.5″ thick **</td>
<td>83.3</td>
<td>1.5</td>
<td>120</td>
<td>R</td>
<td>136</td>
<td>1.5</td>
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<tr>
<td>Foie Gras 2″ Roll **</td>
<td>83.3</td>
<td>2</td>
<td>125</td>
<td>Served Cold</td>
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<tr>
<td>Lamb Loin **</td>
<td>60.5</td>
<td>35</td>
<td>120</td>
<td>MR</td>
<td>130</td>
<td>4</td>
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<tr>
<td>Salmon Filet **</td>
<td>68.3</td>
<td>15</td>
<td>123</td>
<td>W</td>
<td>145</td>
<td>3</td>
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<tr>
<td>Shrimp 16/20 P/D **</td>
<td>65</td>
<td>7</td>
<td>120</td>
<td>W</td>
<td>145</td>
<td>3</td>
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<td>Scallops large **</td>
<td>65</td>
<td>2</td>
<td>120</td>
<td>M/W</td>
<td>140</td>
<td>2</td>
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<tr>
<td>Lobster tail **</td>
<td>63.3</td>
<td>25</td>
<td>145</td>
<td>W</td>
<td>145</td>
<td>2</td>
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<tr>
<td>Carrots **</td>
<td>85</td>
<td>90</td>
<td>175</td>
<td>W</td>
<td>Tender</td>
<td>2-3</td>
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<tr>
<td>Beets **</td>
<td>85</td>
<td>90</td>
<td>175</td>
<td>W</td>
<td>Tender</td>
<td>2-3</td>
</tr>
</tbody>
</table>

** Denotes new items

R = Rare
MR = Medium Rare
M = Medium
MW = Medium Well

Developed by Chef Frank Terranova

Revised 2-17-09 SMW

~vised 6-20-2011jfk
Cooling/Refrigeration

Cooled to 41°F in the sealed package from 140°F to 70°F in 2 hrs and 140°F to 41°F in a total of 6hrs. and

1. Cooled to 34°F within 48hrs of reaching 41°F and held at 34°F for no more than 30 days from packaging or
2. Cooled to 34°F within 48hrs. of reaching 41°F and then held at 41°F or less for no more than 72 hrs. (3 days) or
Cooling/Refrigeration continued

• Cooled to 38 °F or less within 24hrs of reaching 41 °F and held for no more than 72hrs or

• Held frozen with no shelf life while frozen until consumed or used.
Temperature Monitoring

- Refrigeration units(s) must have an electronic system that continuously monitors time and temperature
- The electronic system must be visually examined twice daily to ensure is functioning properly
Labeling (for Storage)

- Product name
- Date packaged
- Use by date (Not required by the food code, but important to make sure discarded within required time frames: see slides 44 and 45)
Hazard Analysis Critical Control Points (HACCP)
7 steps

1. Hazard Analysis
2. Critical Control Points
3. Critical Limits
4. Monitoring
5. Corrective Actions
6. Recordkeeping
7. Verification
Hazard Analysis

• Hazards in food can be biological, chemical or physical

• Main hazards of concern for vacuum packaged foods are biological:
  
  Clostridium botulinum
  
  Listeria monocytogenes
**Critical Control Points**

**Sous Vide**

- Time in vacuum package
- Temperature
  - Cooking
  - Cooling (Indirect)
  - Cold holding
Examples for Indirect Cooking for Storage

- Packages labeled with required information (see slide 47).
- Use by dates do not exceed storage date for the specific food or process.
- Use by date does not exceed the manufacturer’s “sell by” or “use by” date.
- Maximum refrigeration temperature of 41°F.
Monitoring

• Labels of a sampling of finished products checked for required information at end of each session.

• Temperatures of refrigeration units and sample product checked.
Corrective Actions

• Products exceeding 41°F held pending evaluation of time/temperature exposure (Indirect cooking only)

• Corrective actions recorded in corrective actions log (product held in vacuum package longer than 1.5 hrs is discarded)

• Cause of deviation from critical limits determined
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Product</th>
<th>CCP</th>
<th>Deviation</th>
<th>Corrective Action</th>
<th>Disposition of Product</th>
<th>Responsible Person</th>
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<tbody>
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Reviewed by_____________________________________________ Date:_____________ Revised 2-9-09 SMW
Verification Activities

Food safety liaison checks the following during inspections:

- Cleanliness of vacuum packaging equipment and designated area for vacuum packaging
- Time and Temperature Logs
- Refrigeration Logs
- Corrective Actions Log
- HACCP plan reviewed each trimester and modified as necessary.
Record Keeping

• Comprehensive Food Safety Log
  - Time Under Vacuum
  - Cooking Temperature
• Thermometer Calibration Logs
• Corrective Actions Log
• Training Log
**HACCP Activity**

__1. Critical Control Point__

A) Calibrate thermometer

__2. Monitoring Frequency__

B) Written procedures for how to clean

__3. Corrective Action__

C) Temperature logs

__4. Records__

D) Refrigerated storage of 41°F or less

__5. Verification of instruments__

E) Check temperature of refrigeration unit twice daily

__6. SSOPs__

F) Discard product
Training

Everyone using ROP must receive training on the following:

• Overview of ROP
• Pathogens of Concern
• HACCP plan for specific type of ROP

Training will be documented in the training log
HACCP Plan Requirements

• Categorization of types of PHF/TCS foods
• Flow diagram by specific food or category type
• Identifying CCPs and providing the following:
  – Ingredients, materials and equipment used in the preparation of the food
  – Formulations or recipes describing methods and procedural controls that address food safety concerns
• Food employee and supervisory training plan addressing food safety issues
HACCP Plan Requirements cont.

• Standard operating procedures clearly identifying:
  – Each CCP
  – Critical limits
  – Method and frequency for monitoring and controlling each CCP by the food employee designated by the person in charge (PIC)
  – Method and frequency for PIC to routinely verify food employee is following SOPs and monitoring CCPs
  – Action to be taken if critical limits for each CCP are not met
  – Records to be maintained by PIC to shop HACCP plan is properly operated and managed

• Additional scientific data or other information as required by the regulatory authority showing that food safety is not compromised
## Reduced Oxygen Packaging HACCP Plan Summary (Sous Vide)

(Approved 8/23/2011 by the Rhode Island Dept. Of Health, Office of Food Protection)

<table>
<thead>
<tr>
<th>Critical Control Points (CCP)</th>
<th>Hazard Description</th>
<th>Critical Limits for each Control Measure</th>
<th>Monitoring</th>
<th>Corrective Action</th>
<th>Verification Activities</th>
<th>Record-keeping Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opening of vacuum package</strong></td>
<td>Presence of Clostridium botulinum</td>
<td>Vacuum packaged product opened within 1½ hours of vacuum packaging. (Vacuum packaged, cooked, package opened)</td>
<td>Time</td>
<td>Discard product if time from vacuum packaging product to opening package exceeds 1½ hours.</td>
<td>● Chef Terranova reviews time log for each batch &amp; visually checks lab to ensure any remaining vacuum packaged product is discarded.</td>
<td>Time log (See Comprehensive Log Sheet)</td>
</tr>
<tr>
<td><strong>Cooking</strong></td>
<td>Presence of vegetative pathogens (E.coli, Salmonella, Vibrio, etc.)</td>
<td>Chicken: 165°F (15 sec) Pork and seafood: 145 (15 sec); fruits and vegetables 135°F for 15 seconds</td>
<td>Internal Temperature</td>
<td>Continue cooking process for chicken and pork.</td>
<td>● Cooking and thermometer calibration logs and menus reviewed weekly by Linda Kender</td>
<td>Corrective actions log</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Take temp. with calibrated digital thermometer (see SOP)</td>
<td>Each batch(2 temps per batch)</td>
<td>● Signed and dated HACCP plan reviewed &amp; modified monthly or as necessary by Susan Wallace</td>
<td>Thermometer calib</td>
</tr>
<tr>
<td>Critical Control Point (CCP)</td>
<td>Hazard Description</td>
<td>Critical Limits for each Control Measure</td>
<td>Monitoring</td>
<td>Corrective Action</td>
<td>Verification Activities</td>
<td>Record-keeping Procedures</td>
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</tr>
<tr>
<td>Consumer Advisory</td>
<td>Presence of pathogens (E.coli, salmonella, campylobacter, parasites etc.)</td>
<td>MENU CONTAINS Consumer Advisory for undercooked fish, duck and whole muscle meat &amp; beef cuts</td>
<td>CHECK Menus for the presence of advisory</td>
<td>Visually review menu</td>
<td>Each laboratory session when process is used</td>
<td>Add consumer advisory to menu</td>
</tr>
</tbody>
</table>
# HACCP Plan Summary Form

<table>
<thead>
<tr>
<th>Critical Control Point (CCP)</th>
<th>Hazard Description</th>
<th>Critical Limits for each Control Measure</th>
<th>Monitoring</th>
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</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>What</td>
<td>How</td>
<td>Frequency</td>
<td>Who</td>
</tr>
</tbody>
</table>

## Notes
- **Critical Control Points (CCP)**
- **Hazard Description**
- **Critical Limits for each Control Measure**
- **Monitoring**
  - What
  - How
  - Frequency
  - Who
- **Corrective Action**
- **Verification Activities**
- **Record-keeping Procedures**
What Is a Variance from the Food Code?

Food Code Definition of Variance:

“Variance means a written document issued by the regulatory authority that authorizes a modification or waiver of one or more requirements of this Code if, in the opinion of the regulatory authority, a health hazard or nuisance will not result from the modification or waiver.”
Specialized Processes Requiring a Variance from the Regulatory Authority

- Smoking for food preservation rather than flavor enhancement
- Curing food
- Using food additives such as vinegar
  - for food preservation rather than for flavor enhancement
  - to render a food to be non PHF/TCS
Specialized Processes Requiring a Variance from the Regulatory Authority

• Packaging a food using ROP except where growth of and toxin formation by C. botulinum and growth of L. monocytogenes are controlled (see 3-502.12 of the Food Code)
• Preparing food by another method that is determined by the regulatory authority to require a variance
Note: 3-201.12 of the Food Code states “Food in a hermetically sealed container shall be obtained from a food processing plant that is regulated by the food regulatory agency that has jurisdiction over the plant.”
What Must be Included in a Variance Request?

- Statement of the proposed variance of the Code requirement citing relevant Code section numbers.
- Analysis of the rationale for how potential public health hazards and nuisances addressed by the relevant code sections will be alternatively addressed by the proposal.
- HACCP plan containing the required information as listed in section 8-201.14 of the food code.
Options for Addressing Public Health Hazards for Variance Requests

- Have a process authority review and sanction the proposed process
- Cite scientific studies that show the modified process is safe
- Conduct microbiological challenge studies
Regulations for Low Acid and Acidified Thermal Processing

• Code of Federal Regulations (CFR) 21 CFR 108
  Emergency Permit Control

• Code of Federal Regulations (CFR) 21 CFR 113
  Thermally Processed Low-Acid Foods
  Packaged in Hermetically Sealed Containers

• Code of Federal Regulations (CFR) 21 CFR 114
  Acidified Foods
Regulations for thermally processed low acid and acidified foods packaged in hermetically sealed containers are designed to prevent public health problems from commercially canned foods.

The pathogen of concern for these foods is *Clostridium botulinum*. Listeria is not a concern as it is not a spore former and is killed by cooking temperatures.

Note: Facilities that process low acid and acidified foods are required by the FDA to have a process authority.
Who is a Process Authority?

US Code of Federal Regulations, 21CFR113.83 (FDA Low Acid Canned Foods - LACF) states “Scheduled processes for low-acid foods shall be established by qualified persons having expert knowledge of thermal processing requirements for low-acid foods in hermetically sealed containers and having adequate facilities for making such determinations.”

“The scheduled process shall be established by a qualified person who has expert knowledge acquired through appropriate training and experience in the acidification and processing of acidified foods.”
The regulations require that operators of processing and packaging systems be under the operating supervision of a person who has attended and successfully completed appropriate instruction prescribed by FDA. Regulations for thermally processed meat and poultry products (9 CFR 318.300 and 381.300) and thermally processed low acid animal foods (21 CFR 507 and 508) include similar training requirements.
Sec. 114.10 Personnel.

All operators of processing and packaging systems shall be under the operating supervisions of a person who has attended a school approved by the Commissioner for giving instruction in food handling techniques, food-protection principles, personal hygiene and plant sanitation practices, pH controls and critical factors in acidification, and who has been identified by that school as having satisfactorily completed the prescribed course of instruction. The Commissioner will consider students who have satisfactorily completed the required portions of the courses presented under 108.35 and part 113 of this chapter before March 16, 1979, to be in compliance with the requirement of this section.
Better Process Control Schools

Code of Federal Regulations Definition of a Commercial Processor

“Commercial processor includes any person engaged in commercial, custom, or institutional (church, school, penal, or other organization) processing of food, including pet food. Persons engaged in the production of foods that are to be used in market or consumer tests are also included.”
Q & A for FDA Registration and Process Filing
Requirements for Acidified and Low Acid Canned Foods

http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/AcidifiedLow-AcidCannedFoods/EstablishmentRegistrationThermalProcessFiling/Instructions/ucm125810.htm
Process Authority Assistance

- [http://extension.psu.edu/food-safety/entrepreneurs/process-authorities/list-of-authorities](http://extension.psu.edu/food-safety/entrepreneurs/process-authorities/list-of-authorities)
Food Product Process Review

Processed Food Exempted from Code of Federal Regulations for Thermally Processed Low Acid and Acidified Foods by Definition

- Jams and Jellies using standardized recipes from National Center for Home Food Preservation (www.uga.edu/nchfp)
- Processed foods that will be kept under refrigeration (must be labeled)
Non Acidified Foods Exempt From AF & LACF Regulations by Definition continued:

- Water activity 0.85 or below.
- Acid foods, pH 4.6 and below.
- Fermented foods, pH reduced by bacteria, not addition of acid or acid foods.
Is your product an “acidified-low acid food”?

• http://ucfood safety.ucdavis.edu/files/26307.pdf
Resources

• 2009 FDA Model Food Code
  http://www.fda.gov/Food/FoodSafety/RetailFoodProtection/FoodCode/FoodCode2009/

• Bad Bug Book, 2\textsuperscript{nd} Edition
  http://www.fda.gov/downloads/Food/FoodSafety/FoodborneIllness/FoodborneIllnessFoodbornePathogensNaturalToxins/BadBugBook/UCM297627.pdf

• Code of Federal Regulations