

# Avoiding the Risks with Sous Vide: Maricopa County's Approach



Eric Carlson REHS/RS, M.S., PCQI, SME  
HACCP/Variance Coordinator | Permitting  
Services





# Maricopa County Environmental Services Department



**Working with our community  
to ensure a safe and healthy environment**

## **VISION STATEMENT:**

As the recognized regional environmental leader, we will develop and foster innovative environmental health protection programs for the safety of our residents and their environment.

## **MISSION STATEMENT:**

The mission of the Environmental Services Department is to provide safe food, water, waste disposal and vector borne disease reduction controls to the people of Maricopa County so that they may enjoy living in a healthy and safe community.



# Introduction

## **Eric Carlson REHS/RS, M.S., PCQI, SME**

**Environmental Health Specialist | Permitting Services | Plan Review & Construction Program  
HACCP-Variance Coordinator**

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Working with our community  
to ensure a safe and healthy environment



Environmental Services  
Department

# HACCP/ Variance Coordinator

- MCESD- 10yrs (8yrs)
- SME for Special Processes/ HACCP
- ~1200 Reviews
- Cross trained in Plan Review and Foodborne Illness investigation
- FDA Recognized Thermal Processor Supervisor
- Preventative Controls Certification
- Applied MBA in Food Science
- Resident Food Scientist

# Overview:

- What is Sous Vide
- Discuss ROP and non-ROP Sous Vide
- Benefits and Risks
- HACCP and Sous Vide
- What to look for in the field
- Sous Vide Red Flags
- When a HACCP Plan is Required or a Variance is Required

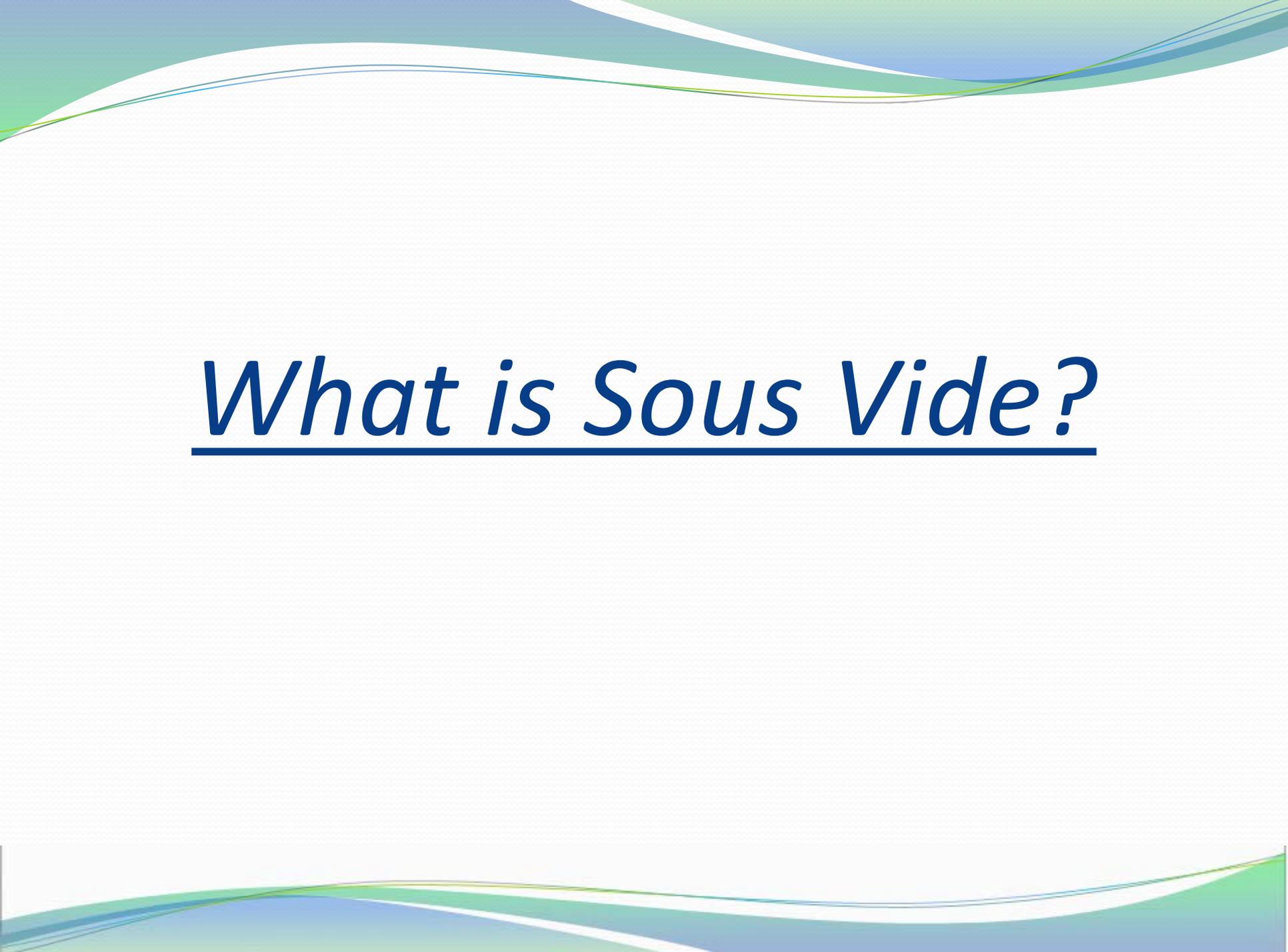
## Pop Quiz:

➤ Is Sous Vide Approved in Maricopa County?

Yes?

No?

Banned in New York City During the 90's



# *What is Sous Vide?*

## *Which are Sous Vide?*



## Which are ROP?



# Sous Vide- 2013 FDA Food Code

❖ Strict and Specific

❖ *Definition-*

- ❖ (e) Sous vide PACKAGING, in which raw or partially cooked FOOD is **vacuum packaged** in an impermeable bag, cooked in the bag, rapidly chilled, and refrigerated at temperatures that inhibit the growth of psychrotrophic pathogens.



## *Why the Difference?*

- ❖ Chefs think cooking not Code!!!
- ❖ Sous Vide is not the Vessel or the Package
- ❖ It's the equipment!!!
  - ❖ Recirculate
  - ❖ Water Bath
  - ❖ Combi Oven

# What does it mean to not be ROP?

## Benefits

- ❖ No HACCP Plan needed
- ❖ Fish are OK
- ❖ Treat as TCS within Code
- ❖ Recipe Flexibility
- ❖ Offsite Sales

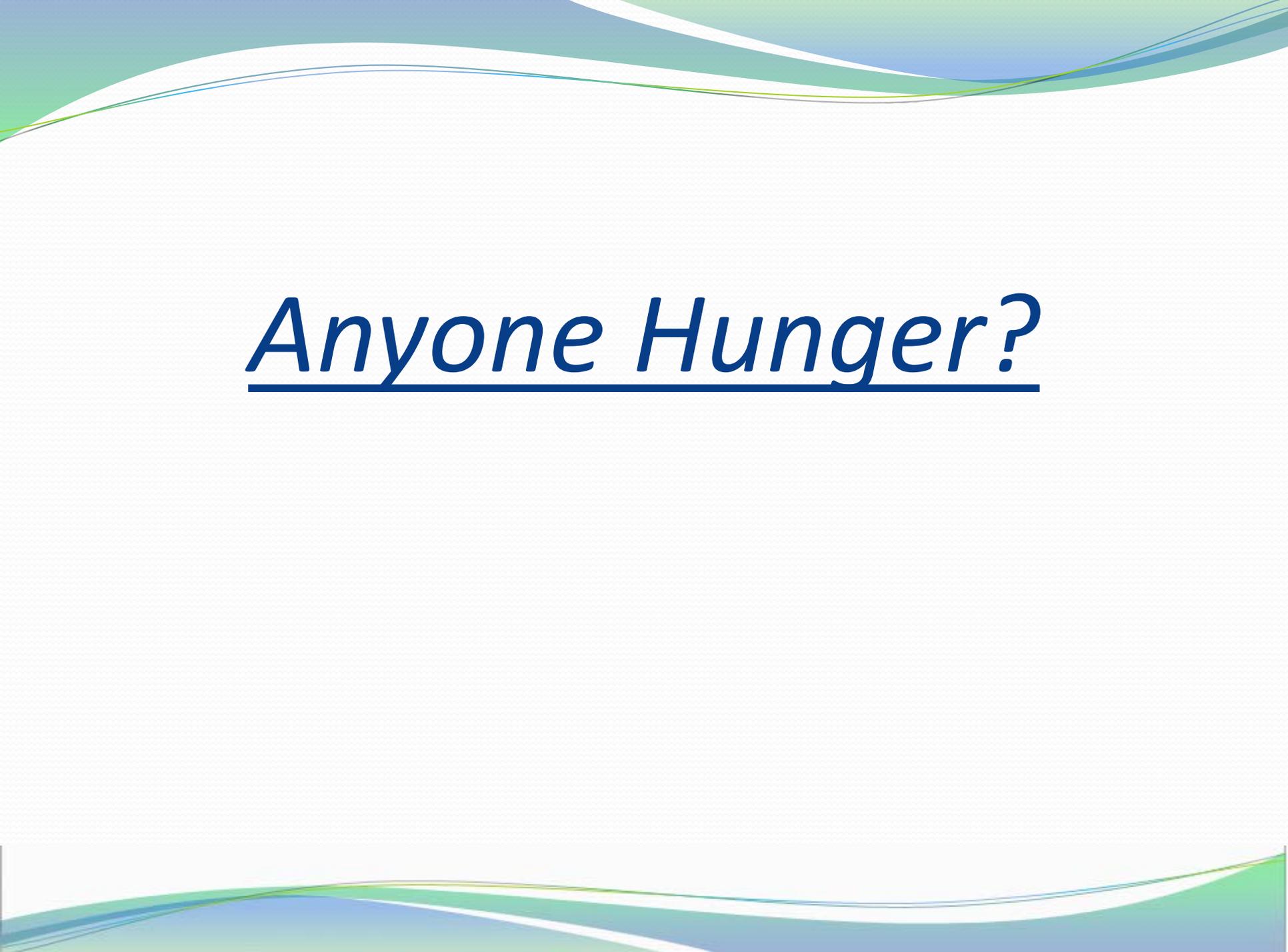


## Downsides

- ❖ It's not ROP!!!
  - ❖ Ziploc Bags are not ROP
  - ❖ Cling Wrap is not ROP
- ❖ Hazards exist

# ROP Benefits: Packaged vs. Unpackaged-

1. *Loss of extended shelflife potential*
  - a. 7 day shelf
2. *Loss of Protected status*
  - a. Walk-in Storage
    - i. Cross-Contamination Risk
    - ii. Store under raw chicken violation vs. gmp
3. *Reheating for Hot Holding*
  - a. Goes from 135°F to 165°F
  - b. Loss benefit of SV
4. **Partial Cooking- Non-Continuous Cooking**
  - a. Full cook temp
    - i. Foie Gras 140°F to 165°F



*Anyone Hunger?*

## FDA Risk Factors

The top five risk factors that most often are responsible for foodborne illness outbreaks are:

- Improper hot/cold holding temperatures of potentially hazardous food.
- Improper cooking temperatures of food.
- Dirty and/or contaminated utensils and equipment.
- Poor employee health and hygiene.
- Food from unsafe sources.

**How many are not reduced with ROP: Sous Vide?**

1

2

3

4

5

All

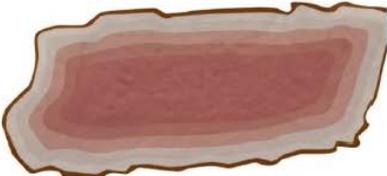


# Benefits: Batch Production



# Benefits: Consistency

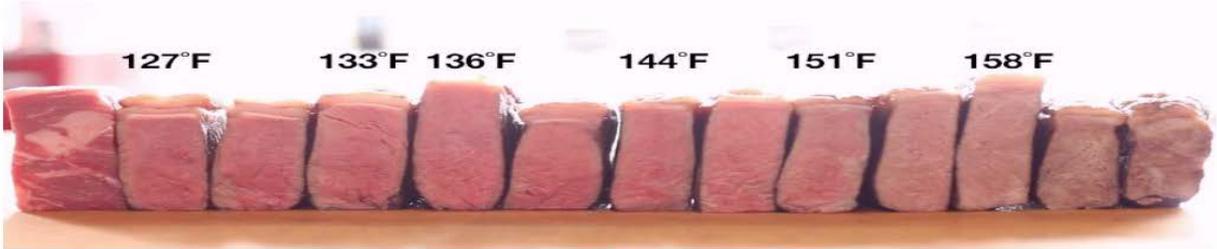
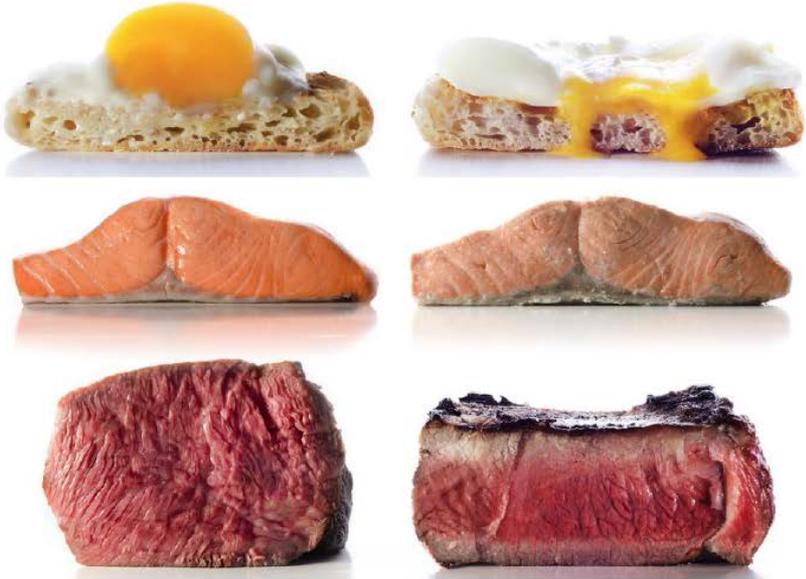
## Consistent Cooking



Large Temperature Gradient



Small Temperature Gradient



# Benefits: Huge Cost Savings

## Labor Reduction-

- ❖ Dacka System in Sweden- \$50 million over 10 years

## Equipment Savings-

- ❖ Smaller Start-up
- ❖ Smaller Footprint
- ❖ Reduced permitting ( no hood)

## Customer Sendbacks-

- ❖ Greatly reduced refires

Reason Sous Vide was developed!!!



## *Brief History of Sous Vide*

- 1799 Theorized
- Early 1960's- Nacha System: Stockholm, Sweden
- Late 1960's- AGS System: USA
- Fluery Michon- 1974 1<sup>st</sup> Commercial use of Sous Vide
- SNCF Railroad Co.- Ultra-High End Rail Cars
- Sous Vide as we know it Georges Pralus and Bruno Goussault

# Cost: The Real Reason Sous Vide was Developed

Chef Paulus in 1974 developed sous vide to reduce cooking loss with Foie Gras

- ❖ Renders down and condenses
- ❖ Up to 50% loss during traditional cooking
- ❖ SV about 14%, almost triples size
- ❖ \$50 lb raw- \$240 lb cooked

# Where's Waldo- Sous Vide Version!

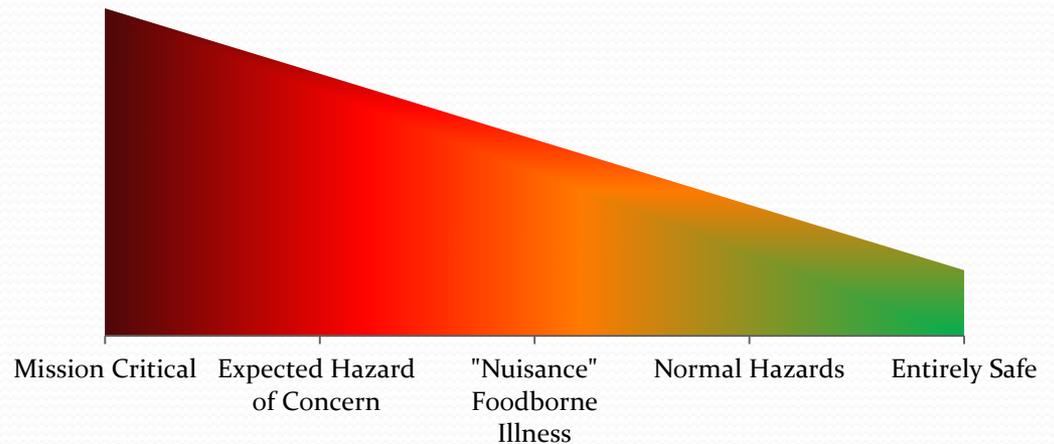




# Severity of Hazard/ Risk (ROP)-

- ❖ Mission Critical Foodborne Illness
  - ❖ Listeria
  - ❖ Botulism
- ❖ Expected Hazards of Concern
  - ❖ Salmonella
  - ❖ E. coli
  - ❖ Campylobacter j.
  - ❖ Trichinae
  - ❖ Scombroid
- ❖ “Nuisance” Foodborne Illness
  - ❖ Clostridium perfringens
  - ❖ Bacillus cereus
- ❖ Normal Hazards
  - ❖ Physical Hazards

## Hazard Severity Level



# Sous Vide- 2013 FDA Food Code

## ❖ Definition-

- ❖ (e) Sous vide PACKAGING, in which raw or partially cooked FOOD is vacuum packaged in an impermeable bag, cooked in the bag, rapidly chilled, and refrigerated at temperatures that inhibit the growth of **psychrotrophic pathogens**.

## ❖ Mission Critical

- ❖ Refrigeration storage temp growth
  - ❖ Botulism and Listeria- Main FDA Concern!!!
- ## ❖ Other Hazards are not psychrotrophic
- ❖ Temperature Abuse



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# Severity of Hazard/ Risk-

## ❖ Mission Critical Foodborne Illness

- ❖ Listeria
- ❖ Botulism



**True Failure**



## ❖ Expected Hazards of Concern

- ❖ Salmonella
- ❖ E. coli
- ❖ Campylobacter j.
- ❖ Trichinae
- ❖ Scombroid



**Cooking Failure**

## ❖ “Nuisance” Foodborne Illness

- ❖ Clostridium perfringens
- ❖ Bacillus cereus



**Cooling Failure**

## ❖ Normal Hazards

- ❖ Physical Hazards
- ❖ Chemical Hazards



**GMP Failure**

# The “48hr Exemption”

## ❖ 2013 FDA Food Code 3-502.12(F)

- ❖ (F) A HACCP Plan is not required when a FOOD ESTABLISHMENT uses a REDUCED OXYGEN PACKAGING method to PACKAGE TIME/TEMPERATURE CONTROL FOR SAFETY FOOD that is always:
  - ❖ (1) Labeled with the production time and date,
  - ❖ (2) Held at 5°C (41°F) or less during refrigerated storage, and
  - ❖ (3) Removed from its PACKAGE in the FOOD ESTABLISHMENT within 48 hours after PACKAGING.

## ❖ **Myth 2: You can do anything as long as less than 48hrs!**

- ❖ **Sorry, nothing from the Food Code is waived!**

# Food that work Well under the Exemption

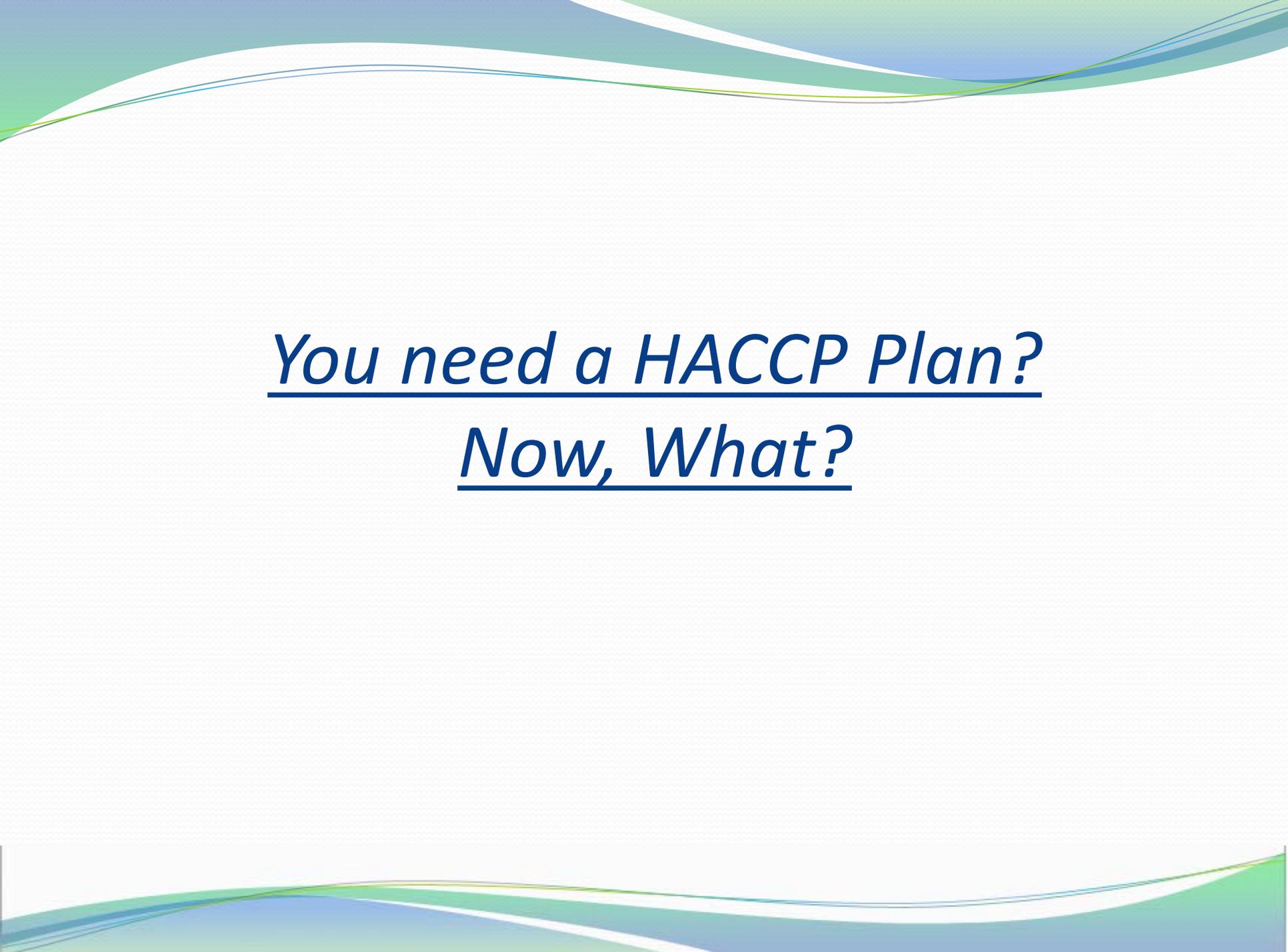


# HACCP Plan/ Variance Kicks-in-

## Deviation from the Food Code

- ❖ Shelflife >48hrs
- ❖ Undercooking in package- 3-401.11 (A, B, C)
- ❖ Offsite Sales
- ❖ Packaging of Fish- 3-502.12 (c)
  - ❖ Cooking of Fish in Package
  - ❖ Using 10K Bags for cooking

***All other aspects of the Food Code remain in full effect!***



*You need a HACCP Plan?*  
*Now, What?*

## Bottomline- Sous Vide Requirements -

1. List Food to be ROP'd
2. All Food to be Fully Cooked
3. No BHC with RTE Policy READY
4. Time/ Temperature parameters- Stored: 30 days at 34°F or 7 days at 41°F
5. Rapid, two tiered Cooling
6. Package Labeled with:
  1. The product name
  2. The date PACKAGED
  3. Labeled “ Maintain the FOOD at 41°F or below”
7. Designated work area and the method minimize cross contamination,
8. Minimize cross contamination
9. Cleaning SSOP FOOD-CONTACT SURFACES
10. Maintain accurate logs
11. Training program- Process and Equipment
12. Limit equipment use to Trained Staff only
13. No Offsite Sales
14. Continuously monitors time and temperature of walk-in with visually examined for proper operation twice daily
15. If transported off-site, then monitored temperatures during transportation

## Sous Vide Requirements – Five at a Time

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# USDA Alternate Cook Time-Temperatures

## TIME-TEMPERATURE TABLES FOR COOKING READY-TO-EAT POULTRY PRODUCTS

The 1999 FSIS final rule, Performance Standards for the Production of Certain Meat and Poultry Products, requires a 6.5 log<sub>10</sub> relative reduction (6.5 log<sub>10</sub> lethality) of *Salmonella* for cooked beef, roast beef and corned beef (9 CFR318.17). Appendix A in the compliance guidelines for this 1999 final rule, included two time-temperature (TT) columns in a table for roast beef, cooked beef and corned beef products. One column was for 6.5 log<sub>10</sub> and the other column was for a 7.0 log<sub>10</sub> relative reduction of *Salmonella* (**Attachment 1**). The TT column for a 7.0 log<sub>10</sub> relative reduction in whole beef products was included as a guide for those establishments that wanted to process these beef products to exceed the required minimum 6.5 logs for an additional measure of safety.

The 1999 final rule also established a performance standard for poultry that requires a 7.0 log<sub>10</sub> lethality of *Salmonella* in RTE poultry (9 CFR 381.150). The compliance guidelines for this rule provided one temperature each for cooking uncured poultry (160° F) and for cured poultry (155° F) to meet the performance standard. FSIS did not provide a time-temperature table for cooking poultry at temperatures lower than 160° F because there was inadequate research information at that time.

FSIS has been made aware that some users of the TT tables in Appendix A are under the impression that the TT column for a 7.0 log<sub>10</sub> reduction of *Salmonella* for cooked beef can also be used for cooking poultry to achieve a 7.0 log reduction in poultry and meet the performance standard. As a result, some establishments use the 7.0 log<sub>10</sub> meat TT column for cooking poultry. Establishments that have been applying the 7.0 log<sub>10</sub> column in the meat tables for cooking poultry could be undercooking their products. There is relatively greater risk of undercooking if the initial level of *Salmonella* in their raw product is high. Furthermore, studies have shown that there is a difference in bacterial resistance due to the type of product species. This could result in *Salmonella* positive products and foodborne illness. Currently, there is no information as to how many establishments use the 7.0 log meat TT tables for cooking poultry, nor is there information on actual instances of poultry products cooked at a time and temperature combination from the these tables that were inadequately cooked, resulting in *Salmonella*

- ❖ Everyone Heartburn!
- ❖ RTE defined as 7 log reduction *Salmonella*
- ❖ USDA target 160°F for uncured poultry
- ❖ What about lower temps longer cook times?

# Cook Temps Comminuted Meats (Non-Poultry)

**BEEF STEAK COLOR GUIDE**  
Degrees of Doneness

 <b>VERY RARE</b> Approx. 130°F, 55°C	 <b>RARE</b> Approx. 140°F, 60°C
 <b>MEDIUM RARE</b> Approx. 145°F, 63°C	 <b>MEDIUM</b> Approx. 160°F, 71°C
 <b>WELL DONE</b> Approx. 170°F, 77°C	 <b>VERY WELL DONE</b> Approx. 180°F, 82°C





 Agricultural Research Service

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Minimum Temperature °C (°F)	Minimum Time
63 (145)	3 minutes
66 (150)	1 minute
70 (158)	< 1 second (instantaneous)

## *What about Poultry?*

- ❖ FDA cook temp- 165°F for 10 secs.
- ❖ Can we cook longer at lower temperatures?
- ❖ Yes, we can!!!!
  - ❖ With a Variance
  - ❖ USDA validated and verified time- temperature

**What is the lowest cook temp for RTE Poultry???**

# What is the lowest cook temp for RTE Poultry?

❖ 155°F ?

❖ 145°F ?

❖ 130°F ?

❖ Lower !?!



*136°F ?!?*



## **Whoa, not so Fast There!**

- ❖ Restaurants are not USDA Processors
- ❖ True HACCP Based
- ❖ Meat Scientist Validated
- ❖ Expensive Equipment
- ❖ Highly Trained Staff

**What is your Comfort Level?**

Celsius	Fahrenheit	Beef Cook Time	Poultry 12% Cook Time	
-20 °C	-4			Bacterial Growth Stops / Parasite Destruction (7Days)
-10 °C	14 °F			
-9 °C	16 °F			
-8 °C	18 °F			
-7 °C	20 °F			
-6 °C	22 °F			
-5 °C	23 °F			
-4 °C	25 °F			
-3 °C	27 °F			
-2 °C	29 °F			Yesenia stops growing
-1 °C	31 °F			Listeria Growth Controlled
0 °C	32 °F			Freezing- Long Term Storage
1 °C	34 °F			Extended Shelflife for ROP: SV
2 °C	36 °F			
3 °C	38 °F			
4 °C	40 °F			
5 °C	41 °F			Salmonella, Vibrio, B. cereus growth stopped
6 °C	43 °F	D	D	
7 °C	45 °F	A	A	
8 °C	47 °F	N	N	
9 °C	49 °F	G	G	
10 °C	50 °F	E	E	USDA Danger Zone Ends
15 °C	59 °F	R	R	
20 °C	68 °F			
25 °C	77 °F	Z	Z	
30 °C	86 °F	O	O	Campylobacter
35 °C	95 °F	N	N	
40 °C	104 °F	E	E	USDA
45 °C	113 °F			Critical
50 °C	122 °F			Cooling
55.4 °C	130 °F	112 mins		<u>Lowest USDA Beef Cook Temp</u>
55 °C	131 °F	89 mins		Botulism, C. perfringens, Staph Toxin halted
56 °C	132 °F	71 mins		
58 °C	136 °F	28 mins	64 mins	<u>Lowest USDA Poultry Cook Temp</u>
60 °C	140 °F	12 mins	35 mins	
63 °C	145 °F	4 mins	14 mins	<u>MCESD Lowest Poultry Cook Temp</u>
65 °C	149 °F	85 secs	5.4 mins	
70 °C	158 °F	instant	27 secs	
72 °C	160 °F		17 secs	
75 °C	167 °F		10 secs	FDA Chicken Cook Temp
80 °C	176 °F			
85 °C	185 °F			SV Root Vegetables
90 °C	194 °F			Usually Max SV Temps
95 °C	203 °F			
100 °C	212 °F			What are you doing?
105 °C	221 °F			
110 °C	230 °F			Really, are you sure you're Sous Viding?
115 °C	239 °F			
120 °C	248 °F			Sterilization Temperature
175 °C	347 °F			UHT Temps

Note: Values are approximate and should be used only for guesstimation

## The Sous Vide Range

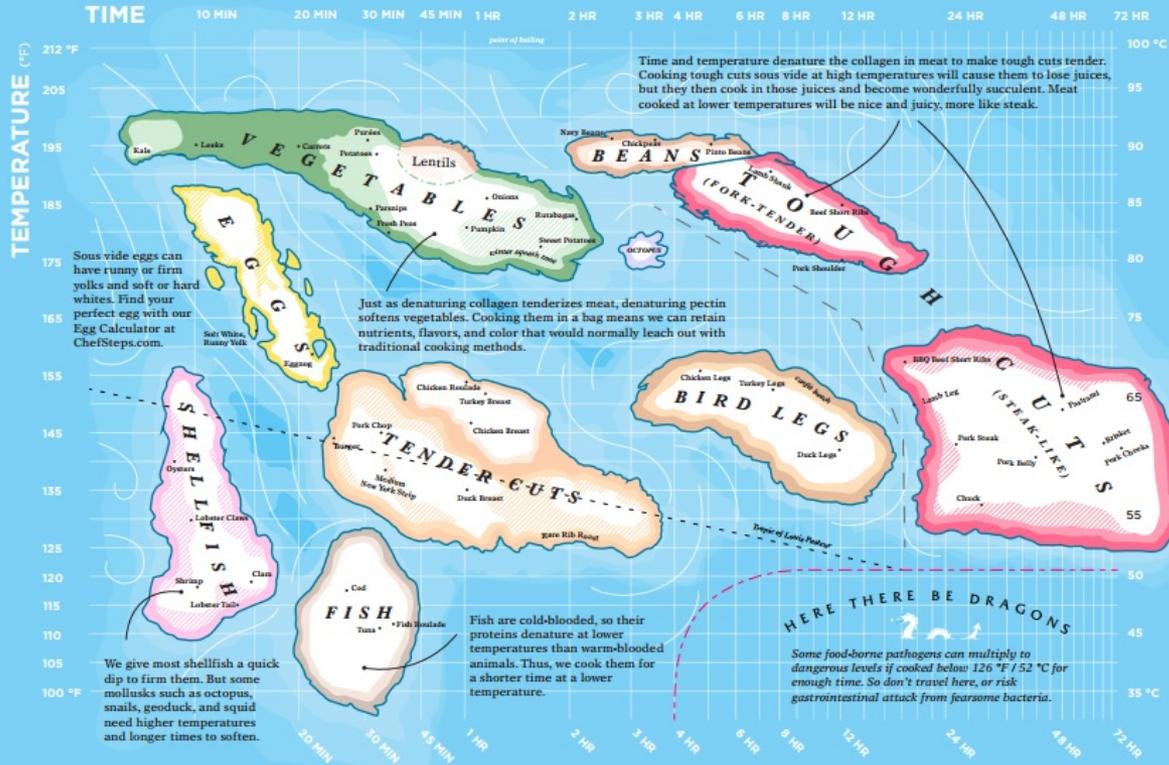
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# The Sous Vide World

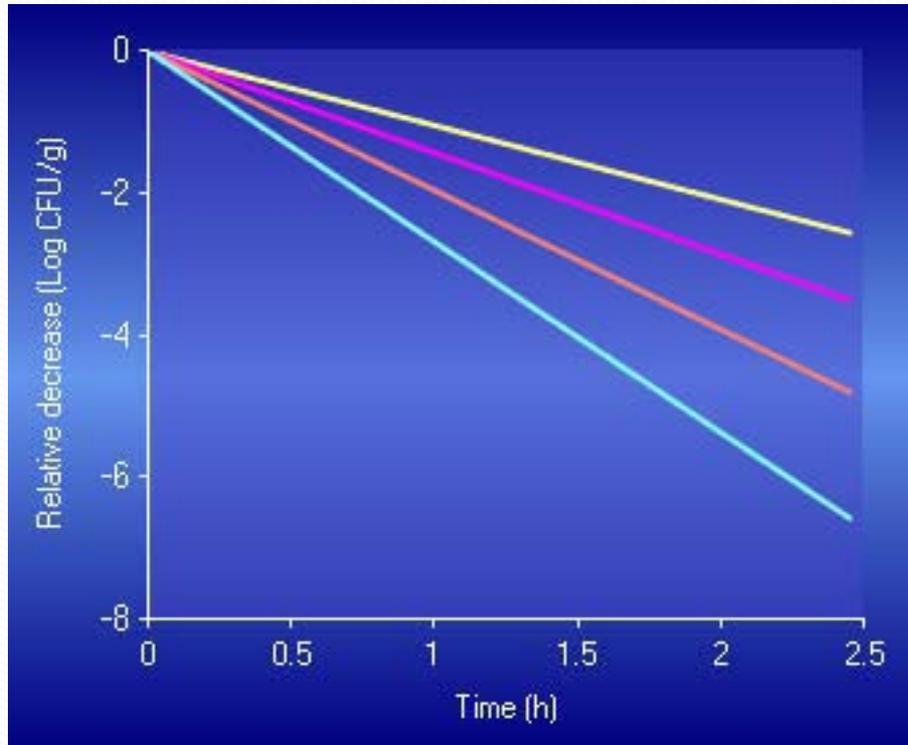
## A map of SOUS VIDE COOKING

The wide world of predictable deliciousness

We often associate sous vide with low-and-slow cooking, but times and temperatures are all over the map: steak cooks very differently than potatoes or fish do. The good news is that salmon won't cook terribly differently than halibut, and steaks and pork chops are about the same, too. Grouping foods by type allows us to visualize the Wide World of Sous Vide, where time and temperature determine location. Fish cook in cooler waters down south, while succulent braises can be found in the northeast, where cook times are longer. If it's vegetables you want, head up north, where temperatures are highest. Use this map when adapting traditional recipes for sous vide and when experimenting with new ingredients.



## The Difference 1°C Makes-



### Modeling Salmonella Death

- ❖ Pink 55°C
- ❖ Blue 56°C
- ❖ 1°C = 4 log Reduction in 2hrs
- ❖ USDA Goal for RTE: 7 logs

# Vacuum Packager



# Top 7 Red Flags-

1. Cooking below 130°F for 1+hrs
2. Poultry below 136°F
3. Shelflife past 7 days
4. Fish – no 10K bags
5. Cooking 6hrs+
  - Extended cook times- 24hrs+
  - Dataloggers
6. Large volume- Big Meat Blocks
7. Not enough refrigeration or dedicated cooling tanks.

## *When a HACCP Plan is required for Sous Vide:*

- Sous Vide is allowable if the process meets 2013 FDA Food Code
  - It is not Illegal or banned
  - It does not always require a HACCP Plan (48hr exemption)
- Not all Sous Vide cooking uses ROP (ex. Cling wrap and Ziploc style)
- An anaerobic environments is not always ROP
- Only Sous Vide ROP needs a HACCP Plan.
- Sous Vide ROP that requires a HACCP Plan must be:
  - Vacuum Packaged
  - Held for longer than 48hrs
  - Fully Cooked under 3-401 of the 2013 FDA Food Code
- A Food Code variance is required for Sous Vide ROP if:
  - Cooked to temperatures not listed in the Food Code
  - Seafood will be cooked
- Regardless of shelflife Seafood cannot be Sous Vide cooked without a variance

# Questions?

We expect this training to generate questions. To efficiently address these questions and provide clarification, email all your questions to [ecarlson@mail.maricopa.gov](mailto:ecarlson@mail.maricopa.gov).

Please include “**Laughlin Sous Vide**” in the subject line. The questions, corrections or clarification will be addressed in a follow-up FAQ.





**ACDEHSA Southwest Environmental Health Conference**  
**Topic: Avoiding the Risks with Sous Vide**

Wednesday February 1, 2017

Riverside Resort  
1650 S. Casino Dr.  
Laughlin, NV 89029



**Presenter- Eric Carlson**



**Plan Review & Construction Program**  
Environmental Health Division | Permitting Services  
Maricopa County Environmental Services Department