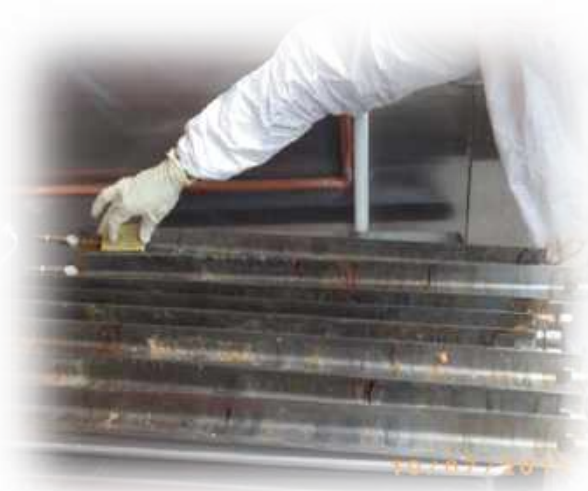




# Environmental sampling: a tool for solving outbreaks at the retail food level



# Acknowledgements

- California Food Emergency Response Team (CalFERT)
- Centers for Disease Control and Prevention (CDC)
- Tennessee Department of Health
- Metro Nashville Public Health Department
- Vermont Department of Health
- Maryland Department of Health
- New York Department of Health
- Iowa Department of Inspections and Appeals

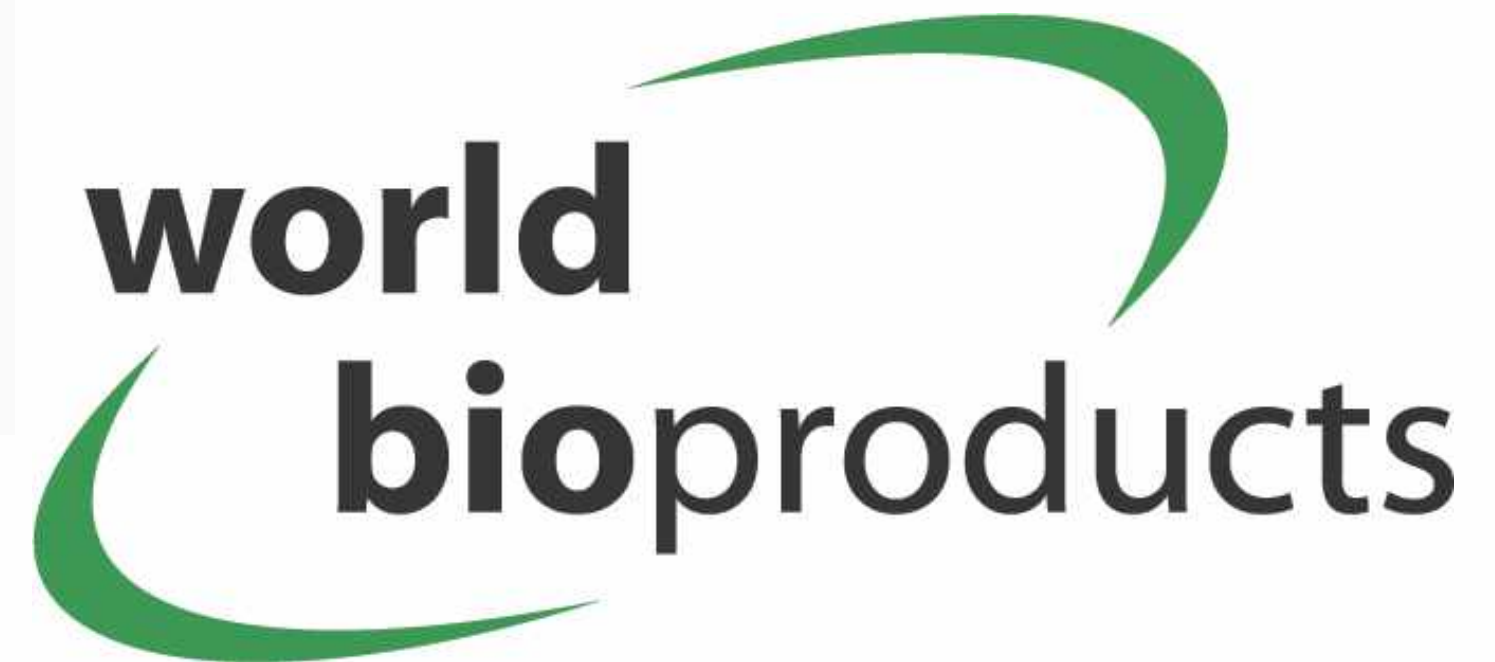




# SPONSORS



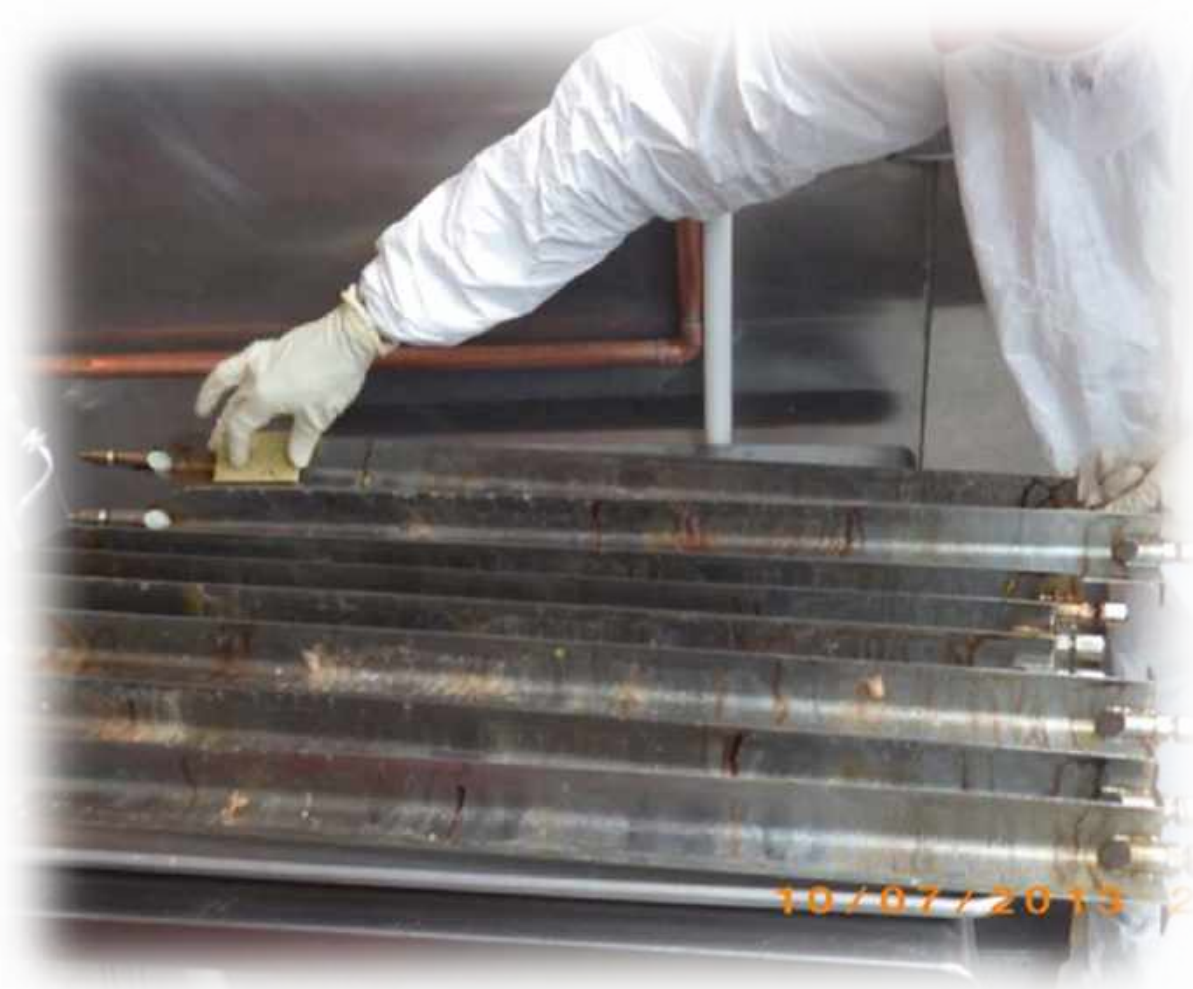
**Puritan®**  
Quality since 1919

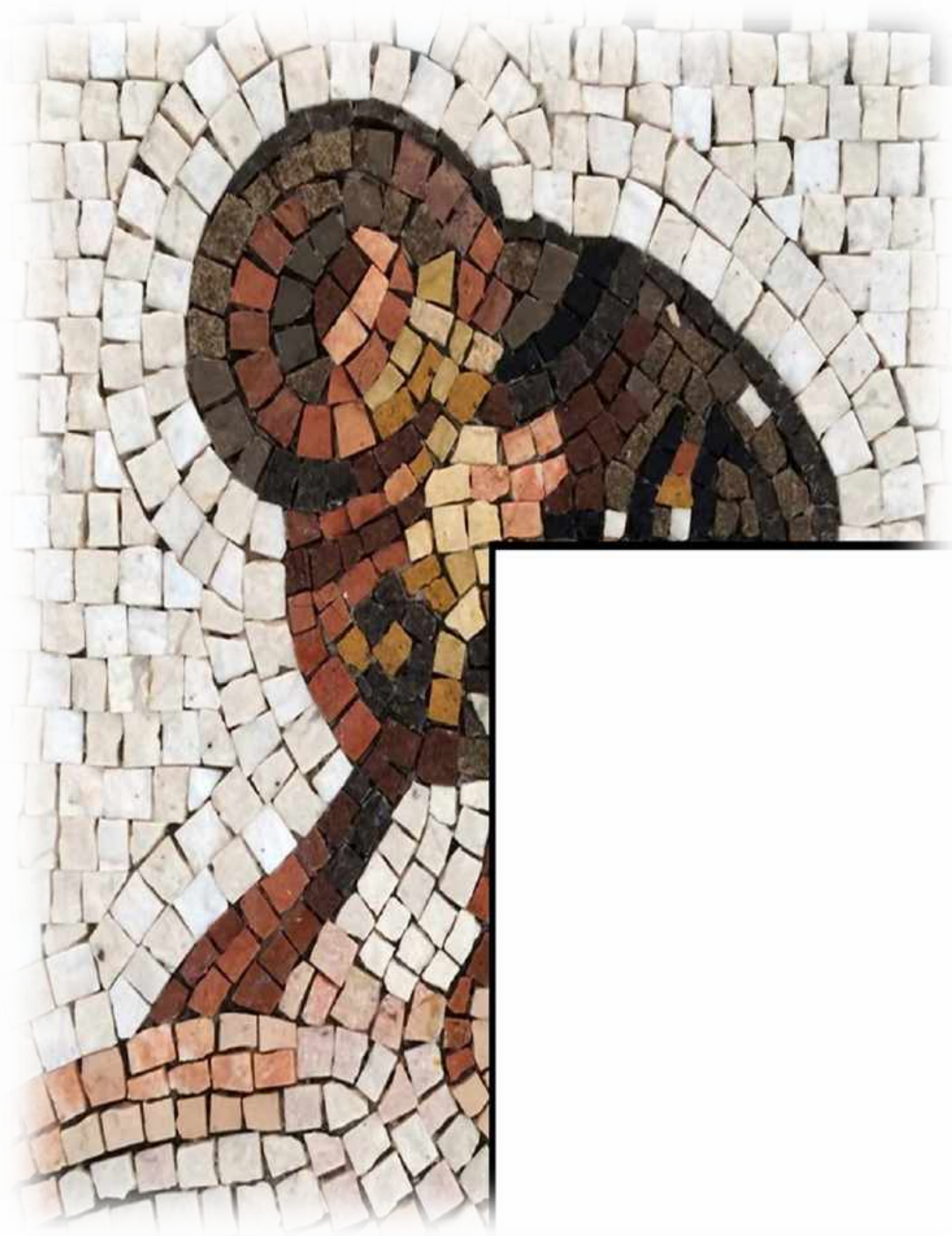


**HALYARD**



# Why Sample?





# Why Sample?

- To support other activities of your environmental assessment
- To support other activities of the outbreak investigation (epidemiology, clinical specimens)







# Types of sampling

- Food
- Human Specimen (Stool)
- Environmental





# When To conduct Environmental Sampling?

- **Ideally, immediately**
  - People are getting sick
- **To capture conditions as close as possible to those present at the time of case patient exposure**
- **If food is not available for testing**
  - Bacteria and viruses survive in the environmental for extended periods of time, long after food is no longer available



# Environmental Sampling



# Steps to conducting Environmental Sampling

## **Step 1: Planning and preparation**

- Coordination with laboratory

- Supplies

- Pre-planning with team

## **Step 2: Site visit**

- Walk through facility

- Interviews with management

- Interviews with employees

## **Step 3: Environmental sampling**

## **Step 4: Sampling wrap-up**

## **Step 5: Verification and delivery to laboratory**





# Step 1: Planning and preparation

- **Background**

- Where are you going?
- Why are you going there?
- What types of samples are you collecting?

- **Assign a lead person**

- Coordinate the team's activities and objectives
- Main contact for firm's management
- Most familiar with the investigation

- **Coordinate with laboratory**

- Estimate number of samples to be collected
- Types of samples
- Analysis requested
- Drop-off procedures
- Controls
- Chain-of-custody

- **Assign roles - sampler, assistant, and documenter**

- **Supplies in sufficient quantities**



[http://blogs.nasa.gov/earthexpeditions/wp-content/uploads/sites/257/2016/05/scienceteam\\_lobby1.jpg.jpeg](http://blogs.nasa.gov/earthexpeditions/wp-content/uploads/sites/257/2016/05/scienceteam_lobby1.jpg.jpeg)



# Planning and preparation

- Where are you going?
- Why are you going there?
- What types of samples are you collecting?



# Sterile Gloves

## Characteristics of gloves:

- No latex gloves
- Unpowdered
- Gloves for each separate hand





# How to Glove Up

- <https://www.youtube.com/watch?v=yIrqilC3YmY>



# Activity : Practice Aseptic Gloving



# Assign a Lead Person

- Coordinate the team's activities and objectives
- Main contact for firm's management
- Most familiar with the investigation



# Planning and Preparation

- Where are you going?
- Why are you going there?
- What types of samples are you collecting?



# Coordinate with Laboratory

- Timeline for sample arrival
- Estimate number of samples to be collected
- Types of samples
- Type of analysis requested
- Shipping or drop-off procedures
- Controls
- Chain-of-custody




# Coordinate with laboratory: Chain-of-custody

## Typically includes:

- General information
- Description of samples
- Relinquished by with signatures, times, and dates

Missouri Department of Health and Senior Services  
State Public Health Laboratory  
101 North Chestnut Street  
Jefferson City MO 65101  
573-751-3334  
www.health.mo.gov/lab



**Chain-of-Custody Record for Food Samples**  
NOTE: A completed Food Test Request Form must accompany each sample.

Collector's Name: \_\_\_\_\_ Collector's Signature: \_\_\_\_\_  
Agency Name: \_\_\_\_\_ Phone Number: (\_\_\_\_) \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
State: \_\_\_\_\_ Zip Code: \_\_\_\_\_



**Sample Information:**

Sample Description	Collection Point	Date Collected	Time Collected	Collector's Initials	LAB USE ONLY Lab Number

Relinquished by: Signature & Print Name	Received by: Signature & Print Name	Date:	Time:
Relinquished by: Signature & Print Name	Received by: Signature & Print Name	Date:	Time:
Relinquished by: Signature & Print Name	Received for Laboratory by: Signature & Print Name	Date:	Time:
Relinquished by: Signature & Print Name	Received for Testing Unit by: Signature & Print Name	Date:	Time:
Disposed of by: Signature & Print Name	Sent to Central Services (Samples to be autoclaved and placed in routine laboratory waste)	Date:	Time:

Method of Shipment (Circle): MSPHL Courier    Direct Delivery By: \_\_\_\_\_    Other: \_\_\_\_\_

EB FQM-16: Food Sample Chain-of-Custody Form  
Attached to EB FQM-16 Food Sample Management

Page 1 of 1    rev 1/12/2018 AM





# Assign Sampling Roles

2 or 3 person teams are strongly encouraged for aseptic sampling



# 3 - Member Team

## Sampler

- Wears hair restraint entire time
- Identifies specific sampling site
- Sanitize hands as needed
- Put on sterile gloves – change for each sample
- Collect sample and work with assistant to secure sample

## Assistant

- Sanitize hands
- Put on non-sterile or sterile gloves
- Prepare materials and assist the sampler with gloving – help them maintain aseptic technique
- Open and present sample collection tool(s) to sampler
- Ensure sample bag is identified properly for the sample being collected
- Open and present sterile bag to sampler
- Seal sample
- Place sample in appropriate storage container (usually ice chest for microbial samples)
- Dispose of trash

## Documenter

- Assist Assistant as needed
- Verify sample is appropriately labeled
- Photograph sample site
- Describe overall area to show relevance to food contamination
- Detail to show specific sampling site
- Log sample and photograph information
- Ensure team safety



# 2-Member Team

- minimum for aseptic sampling

## Sampler

- Same as a 3-Member Team

## Assistant + Documenter (2-in-1)

- Assistant will perform documenter duties
- Do not want to potentially contaminate the otherwise “sterile” sampler



# Supplies

**Ensure you have sufficient quantities**

- Sterile gloves
- Sterile bags
- Hairnets and beard nets
- Lab coats/Tyvek suites
- Sponges and swabs
- Sample cooler



# Sterile Bags



# Hairnets and Beard Nets





# Lab Coat/Tyvek Suits (Recommended)



# Sponges and Swabs



Pre-printed weather resistant labels with key information such as: sample number, establishment name, line for sample location description, and other ID information.



# Sample Cooler With Ice Packs



*Consider bubble wrap or other materials to ensure samples do not come into contact with ice packs.*





# Camera or Cell Phone with Camera



*Pictures assist greatly when identifying exactly where positive samples are found.  
Check that date is correct!*



# Activity 1: Plan Manager/Employee Discussion

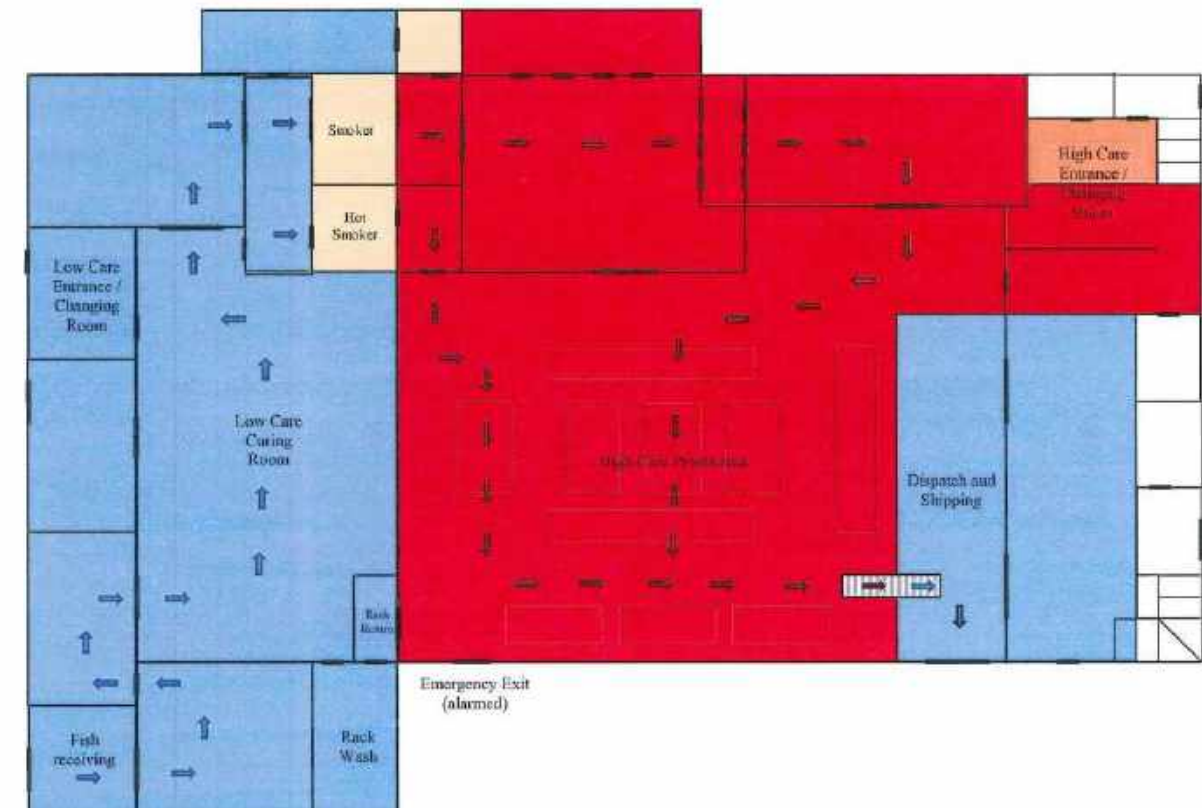
Use the scenario provided to discuss among your table the questions for Activity 1



# Step 2: Site Visit

- Conduct a walk-through - observe and map operations (flow diagram)
- Identify sampling areas where food is exposed and processed
- Determine the “processing zones” - from highest risk to lowest risk for contamination
- Consider where the bacteria or virus is most likely found

Main Building showing Product Flow (not to scale)



# What Does the Team Look For?

- What factors most likely contributed to the outbreak?
- How did the outbreak occur?
- Identify immediate and long-term steps to reduce the risks





# Sampling Locations

- Areas that trap food, debris, and moisture
- Areas difficult to reach, clean, and sanitize
- Wet areas that dry out for long periods
- Areas where activities may spread contamination
- Restrooms (specially with Norovirus)





# What Areas Are Highest Risk?



# Zone Concept



## Zone 4 – Distant Surfaces

- Hallways
- Bathrooms



## Zone 3

- Walls
- Phones



## Zone 2

- Exterior of equipment
- Carts
- Ventilation
- Surfaces that support zone 1 surfaces (table under a cutting board)



## Zone 1 – Direct Food Contact

- Slicers
- Mixers
- Utensils
- Trays
- Racks
- Work tables
- Gloves



# Step 3: Environmental sampling

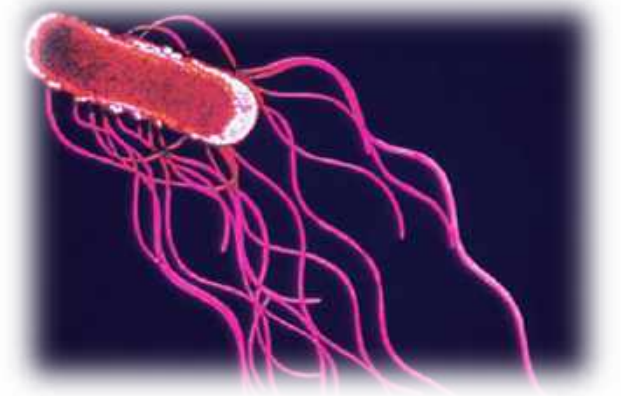


## Listeria monocytogenes

- Zone 1 and 2
- Look for areas that are wet and hard to clean
- Prefers moist environments
- Not particularly heat resistant
- Grows at temperatures as low as 32 degree F (refrigerator)
- Grows often in moist environments that are not regularly or easily cleaned and sanitized

## Salmonella

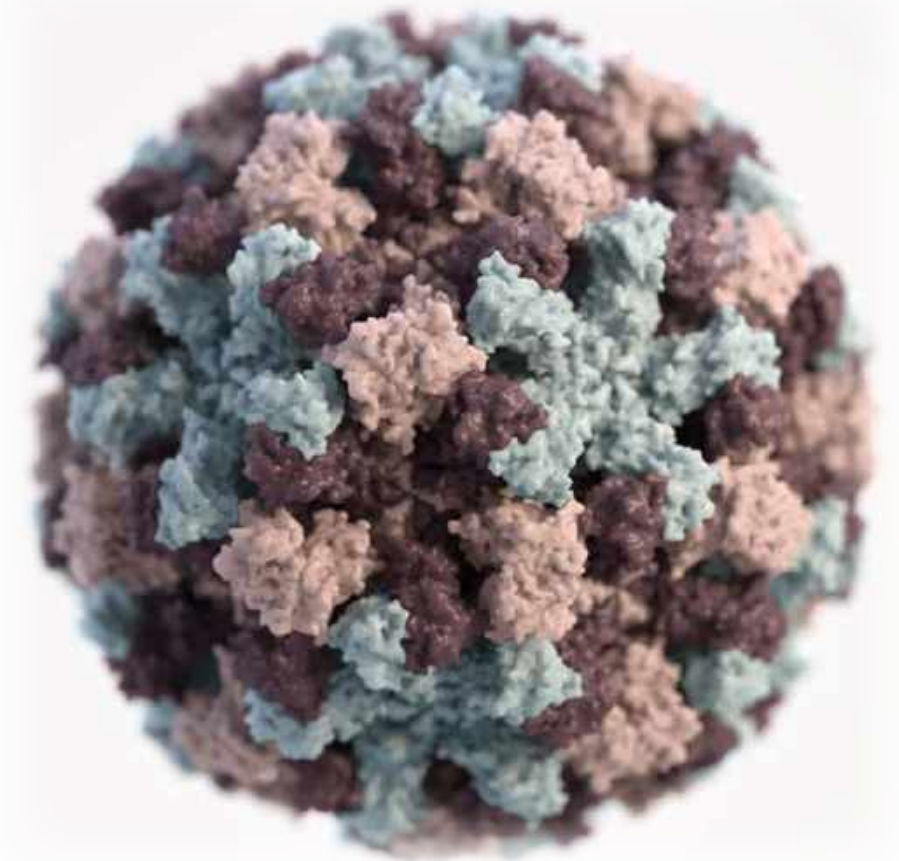
- Zones 2, 3, and 4
- Look for areas that are hard to clean, have residue, and are dry for long periods of time but get exposed to occasional moisture.
- Focus on Zone 2.





# Norovirus Sampling

- Areas where known ill employees worked (Zone 1, 2, or 3)
- Areas where employees or customers may have vomited or had loose stool movements such as restrooms (Zone 4)
- Heavily influenced by interviews with management and workers



# Using Swabs and Sponges





- <https://vimeo.com/272484035>





- <https://vimeo.com/272669573>





# Environmental Sampling locations



# Refuse Area/ Loading Dock



# Supply Room





# Supply Room



# Equipment Storage





# Equipment Storage



# Equipment Storage



# Walk-In Cooler



# Walk-In Cooler





# Walk-In Cooler





# Walk-In Cooler



# Dish Room

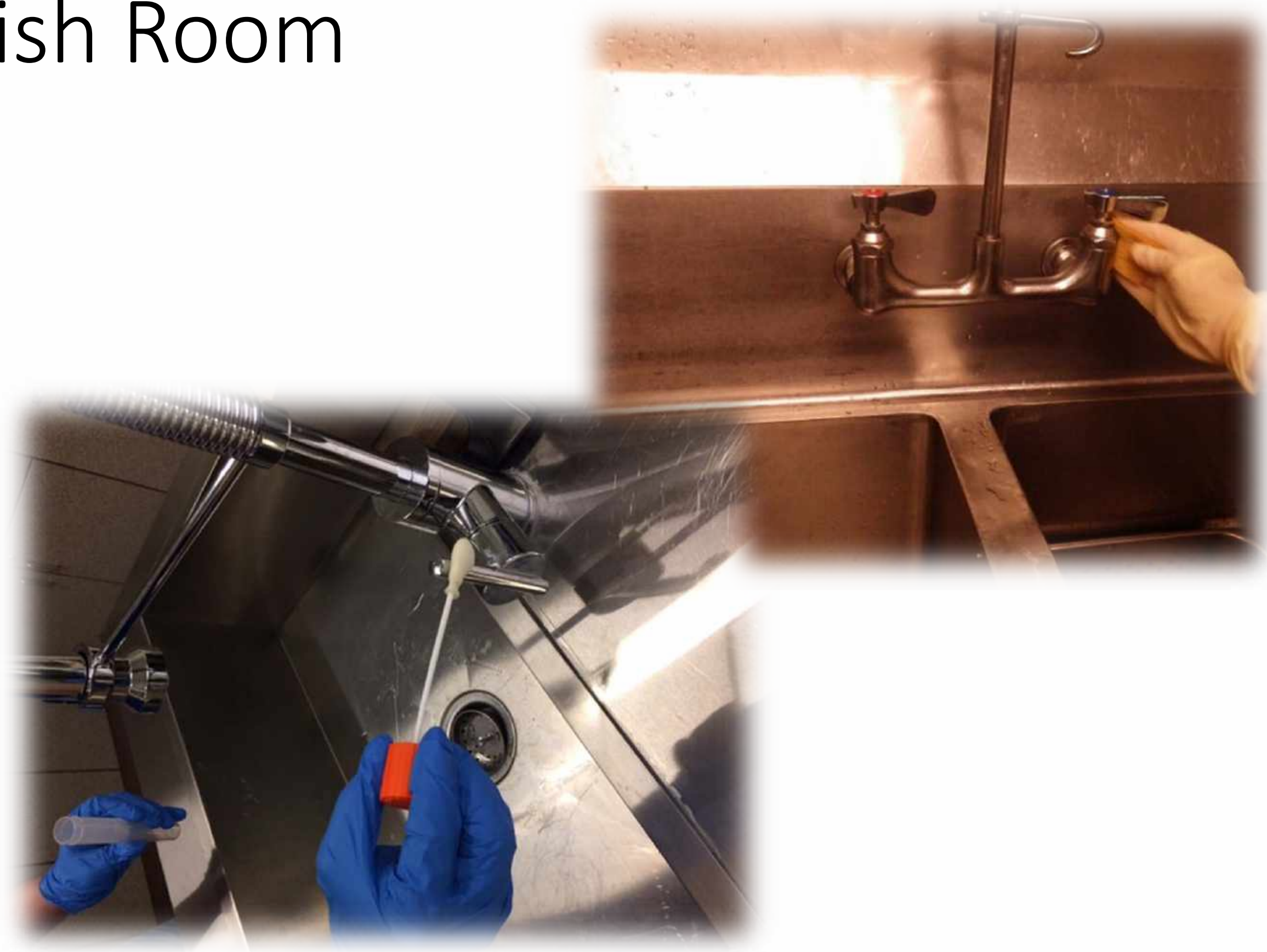


# Dish Room





# Dish Room





# Dish Room



# Food Prep Area





# Food Prep Area



# Food Prep Area





# Food Prep Area



# Food Prep Area



# Food Prep Area



# Food Prep Area





# Butcher Area



# Butcher Area – Band Saw

- Cover



- Look Inside!





# Butcher Area – Cutting Board

Oh Look, a Cutting Board!



What's Underneath?



# Kitchen Area





# Kitchen Area



# Kitchen Area



# Kitchen Area



# Kitchen Area





# Kitchen Area



# Kitchen Area



# Kitchen Area





# Kitchen Area





# Kitchen Area



# Kitchen Area



# Kitchen Area





# Kitchen Area





# Service Area



# Service Area





# Serving Area



# Serving Area





# Service Area





# Slicers





# Service Area





# Customer Area





# Customer Area



# Customer Area





# Customer Area



# Customer Area





# Customer Area



# Customer Area



# Customer Area





# ACTIVITY 2: Plan sampling locations

Use the scenario provided to discuss among your table the questions for Activity 2



# Documentation/Sampling Log

- **Detailed descriptions of observations**

- Time
- Temperature
- Activities at time of inspection
- Name/position of employees

- **Facility layout**

- **Clear photographs**

- Show Food Safety significance and exactly what was sampled
  - Usually take 2 photos per sample

- **Sample numbering convention**

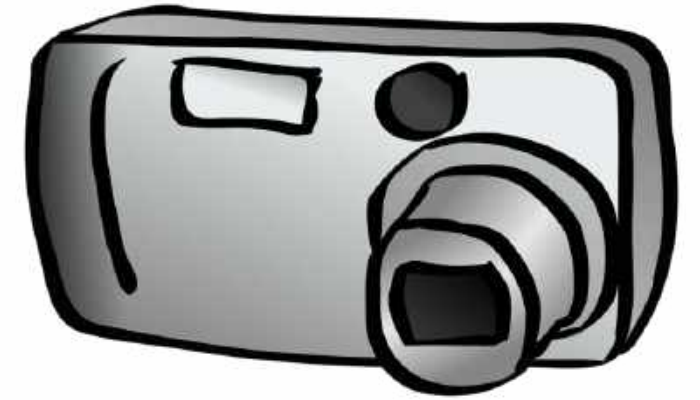


[http://www.foodsafetynews.com/files/2014/12/restaurantinspector\\_406x250.jpg](http://www.foodsafetynews.com/files/2014/12/restaurantinspector_406x250.jpg)



# Tips on photos

- Be cognizant of trade secrets and brands, avoid as much as possible
- Photos may become evidence and a public record
- Try to take photos that orient the viewer to the where the photo is taken and clearly depict what the photo is meant to show
- Photos can assist when positive samples are found in helping to identify exactly where the sample was taken
- Document carefully the photo number/name
- If a date/time are recorded on each photo, ensure they are correct





# Good Practices for Sampling

- Dress appropriately and wear clean clothing
- All participants should thoroughly wash hands
- Use sterile gloves for aseptic sampling
  - If using swab or sponge-on-a-stick, change gloves when dirty or changing areas at minimum
  - If using a sponge with direct gloved-hand contact to sponge, change with each sample.
  - Use non-sterile gloves for assistant
- Sample from “cleanest” to “less clean” areas
- Ensure separation from the samples and ice packs (such as with a few layers of bubble wrap)



# Good Practices for Sampling

- Prepare sample labels and forms in advance
- Properly close and seal all samples
- Take and dispose off all the trash you generate



# Step 4: Wrap-Up

- Complete any necessary paperwork
- Discuss inspection findings/concerns with the firm's representatives



<http://www.bls.gov/ooh/images/15579.jpg>





# Step 5: Verification and Delivery

- Verify sample count and numbering
- Package samples appropriately to prevent breakage and leakage during transport and ensure proper temperature
- Properly label and seal samples
- Complete and start Chain-of-Custody forms
- Store samples in a manner to protect sample integrity
- Notify laboratory of incoming samples
- Ship or hand-deliver samples



<http://www.adfs.alabama.gov/Images/Toxicology/Properly%20Sealed%20kit.JPG>



# Follow up on the findings

- Obtain results from the laboratory
- Contact establishment and discuss findings
- Discuss preventive controls
- Determine if any regulatory action is needed



<http://www.azdhs.gov/assets/images/features/academic-health.jpg>



# Field experience

**Please pick up a supply bag and proceed to the sampling site**







# **ASSOCIATION OF FOOD & DRUG OFFICIALS**