CALIFORNIA DAIRY
INNOVATION
CENTER
REAL
CALIFORNIA
MILK
Food
Safety
&
Quality
CHEMCO
UNIVERSITY

Luke Vincent – Chemco Products

BS Chemistry
CSU, Fresno (1995)

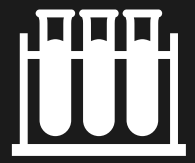
Chemical Waste Management
Choice Chemical (Hydrite)
Milk Specialties (Actus)

21 CFR 117 – cGMP & Controls
29 CFR 1910 – OSHA Standards
40 CFR 260 – Hazardous Waste
49 CFR – DOT Shipments
Pasteurized Milk Ordinance
OSHA PSM
EPA RMP
SARA & TRI Reporting

Cal Title 8 – Cal OSHA
Cal Title 22 – DTSC
California Health & Safety Code
Cal ARP
Cal ARB – GHG Reporting
Cal ARB – Toxic Hotspots
SJVAPCS – Permitting
HMBP

Better Process Controls*
Chemical Batching & Reactions
Food Processing & Sanitation
Detergent Formulations
HACCP*
HazCat Classification Training*
Hazwoper Technician*
ISO 9001 Lead Auditor*
OSHA 30 hr*
PCQI*
Regulatory Compliance
SQF
Water Treatment

*Certifications



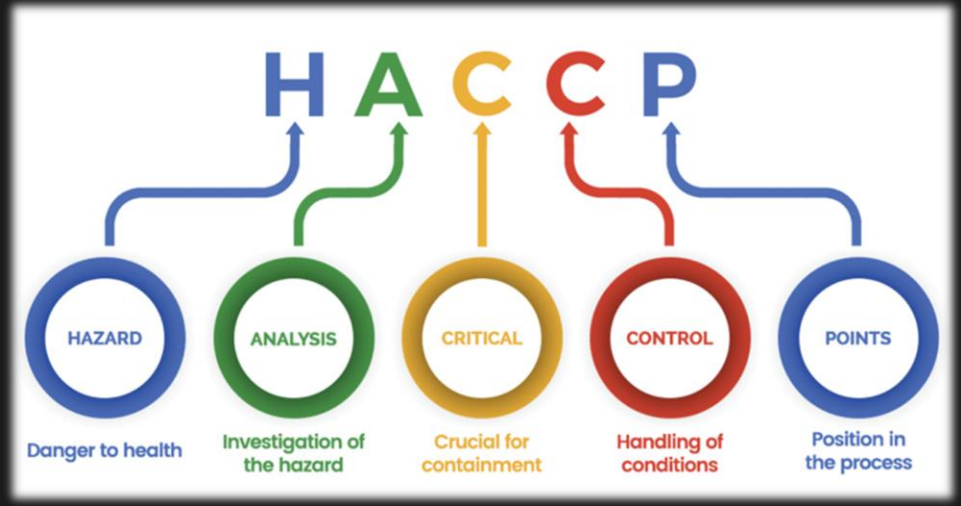
Food Quality & Safety

HACCP	• CP vs CCP
Food Safety Modernization Act	• Preventative Controls for Human Food
Pasteurized Milk Ordinance	• CDFA - Milk & Dairy Food Safety Branch
Food Defense Plan	• Prerequisite Programs • Environmental Monitoring and Auditing
Sanitation Program	• Verification vs Validation

Hazard Analysis Critical Control Points

- Systematic and preventative approach to food safety. Originated in 1960's in coordination with NASA, US Army, and Pillsbury to ensure safe food for space missions.
  - Focus on identifying critical control points in production
  - Became the foundation of modern food safety

- FDA Mandated HACCP for two specific categories of food production
  - Juice & Juice Products (21 CFR 120)
  - Fish & Fisheries (21 CFR 123)



Seven Principles of HACCP

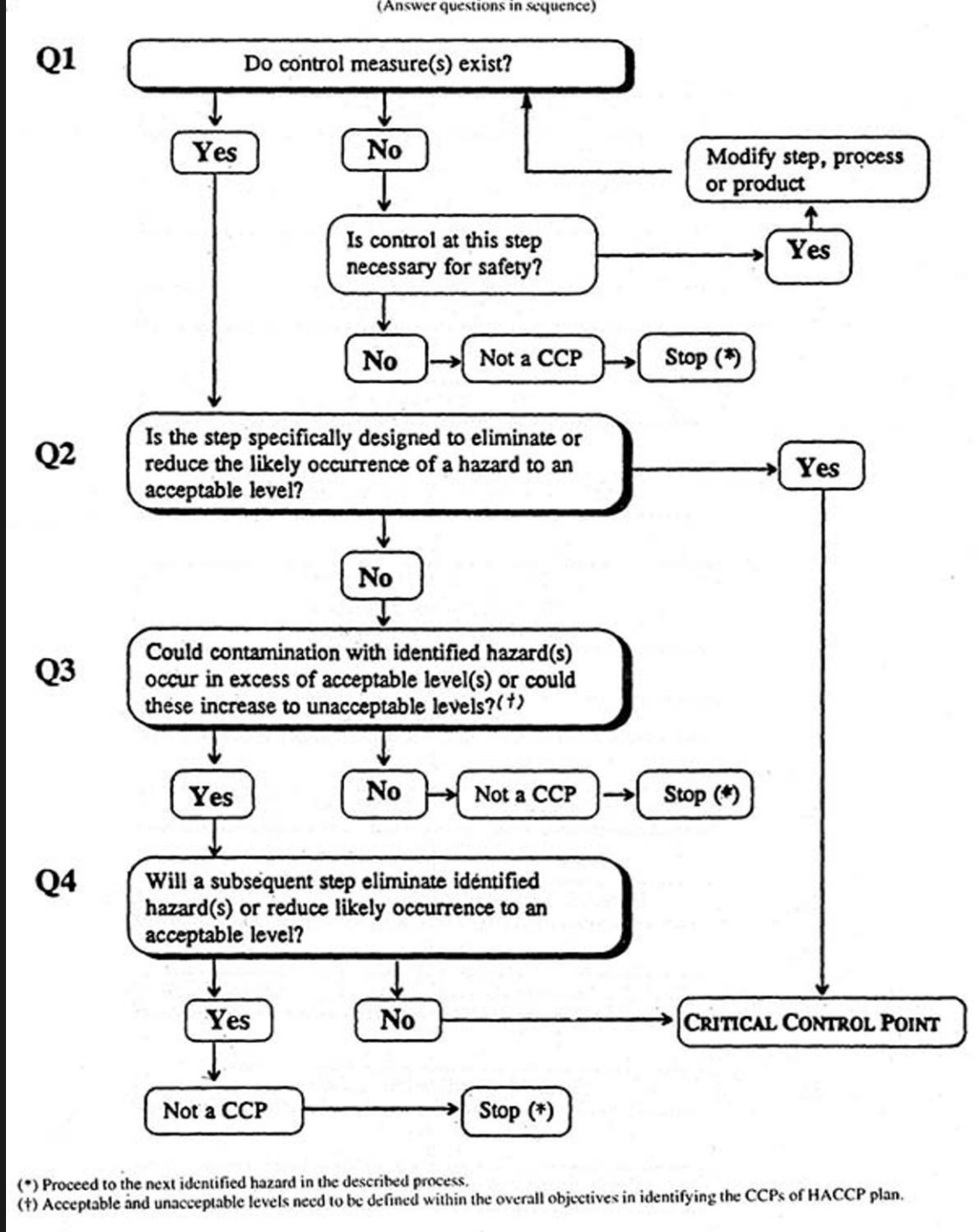
1. Conduct hazard analysis – biological, chemical, or physical
2. Critical Control Points – point in the process where control is essential to prevent, eliminate, or reduce hazards to acceptable levels.
3. Critical Limits – measurable boundaries for each CCP
4. Monitoring – how CCP's monitored during production
5. Corrective Actions – actions to take if outside acceptable limits
6. Verification – how to evaluate HACCP system is working as intended
7. Record Keeping

Critical Control Point

Is control is essential to prevent, eliminate, or reduce hazards to acceptable levels?

Quality Control Point (QCP or CP)

Manufacturing related issue that makes poor quality product.



Food Safety Modernization Act

- FDA changed course from reacting to prevention contamination.
  - Applies to most food manufacturers (21 CFR 117)
  - Requires facilities to register with the FDA (FD&C Act Sec 415)

- Key Elements to FSMA
  1. Written food safety plan
  2. Hazard analysis – identify and evaluate known or “reasonably foreseeable” biological, chemical, radiological, physical hazards, and supply chain.
  3. Preventative controls – process, allergen, sanitation, and supply chain
  4. Recall plan – documented procedure and system testing
  5. Current Good Manufacturing Practice – cGMP 21 CFR 117 Sub B

Preventative Controls – Qualified Individual

- FSMA requires a qualified individual (PCQI)
  - Needs training or experience developing a food safety system
- Responsible for:
  1. Preparing food safety plan
  2. Validating controls are adequate for hazards identified
  3. Review monitoring and corrective action records
  4. Reevaluate program every three years or when significant changes occur
- In person or web-based training available
  - HACCP – 8 to 10 hours
  - PCQI – 22 to 24 hours

HACCP vs FSMA

Feature	HACCP	FSMA Preventive Controls
Regulation	21 CFR Parts 120, 123	21 CFR Part 117
Scope	Juice and seafood only	Most registered food facilities
Supply chain controls	Not required	Required for hazards controlled by suppliers
Qualified Individual	HACCP-trained individual	PCQI (Preventive Controls Qualified Individual)
Recall plan	Not explicitly required	Required for each hazard
Allergen controls	Not specifically addressed	Explicitly required as a preventive control category

Pasteurized Milk Ordinance

Grade A PMO – 2023 REVISION

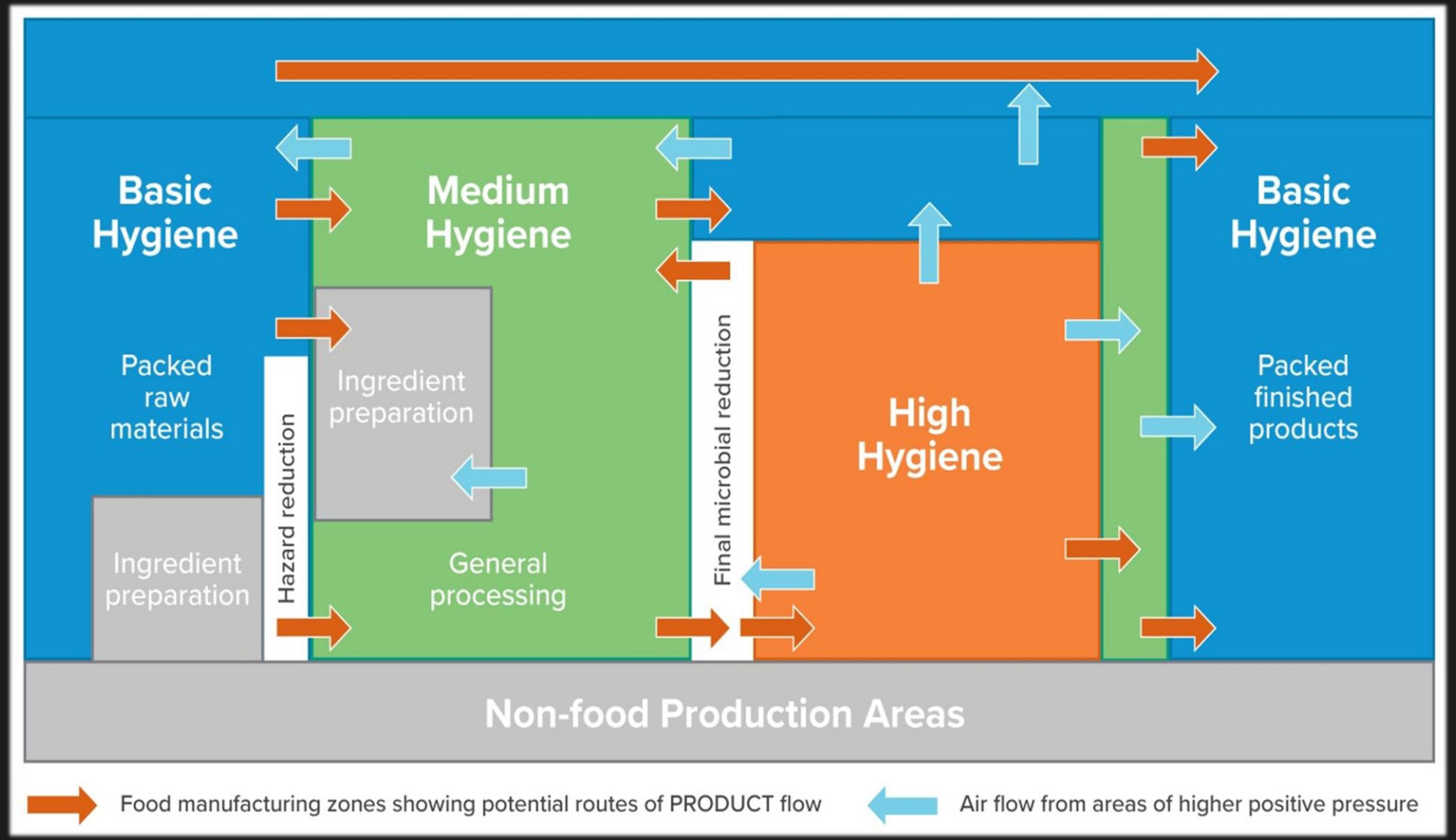
Defining “milk” and certain “milk products”, “milk producer”, “pasteurization”, etc.; prohibiting the sale of adulterated and misbranded milk and/or milk products; requiring permits for the sale of milk and/or milk products; regulating the inspection of dairy farms and milk plants; the examination, labeling, pasteurization, ultra-pasteurization, aseptic processing and packaging, retort processed after packaging, fermented high-acid, shelf-stable processing and packaging and distribution and sale of milk and/or milk products; providing for the construction of future dairy farms and milk plants; the enforcement of this Ordinance; and the fixing of penalties

Simply stated – HACCP for Milk since 1924

Food Defense Plan

Build a Strong Foundation!

Zones & Process Flow



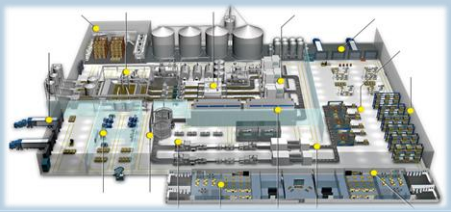
Building Your Program

Sanitation

- Environmental Monitoring
- Product Quality
- Color Coded Programs
  - Bucket & Brush
  - Hard Hat
  - Uniform
- CIP Verification
- CIP Validation

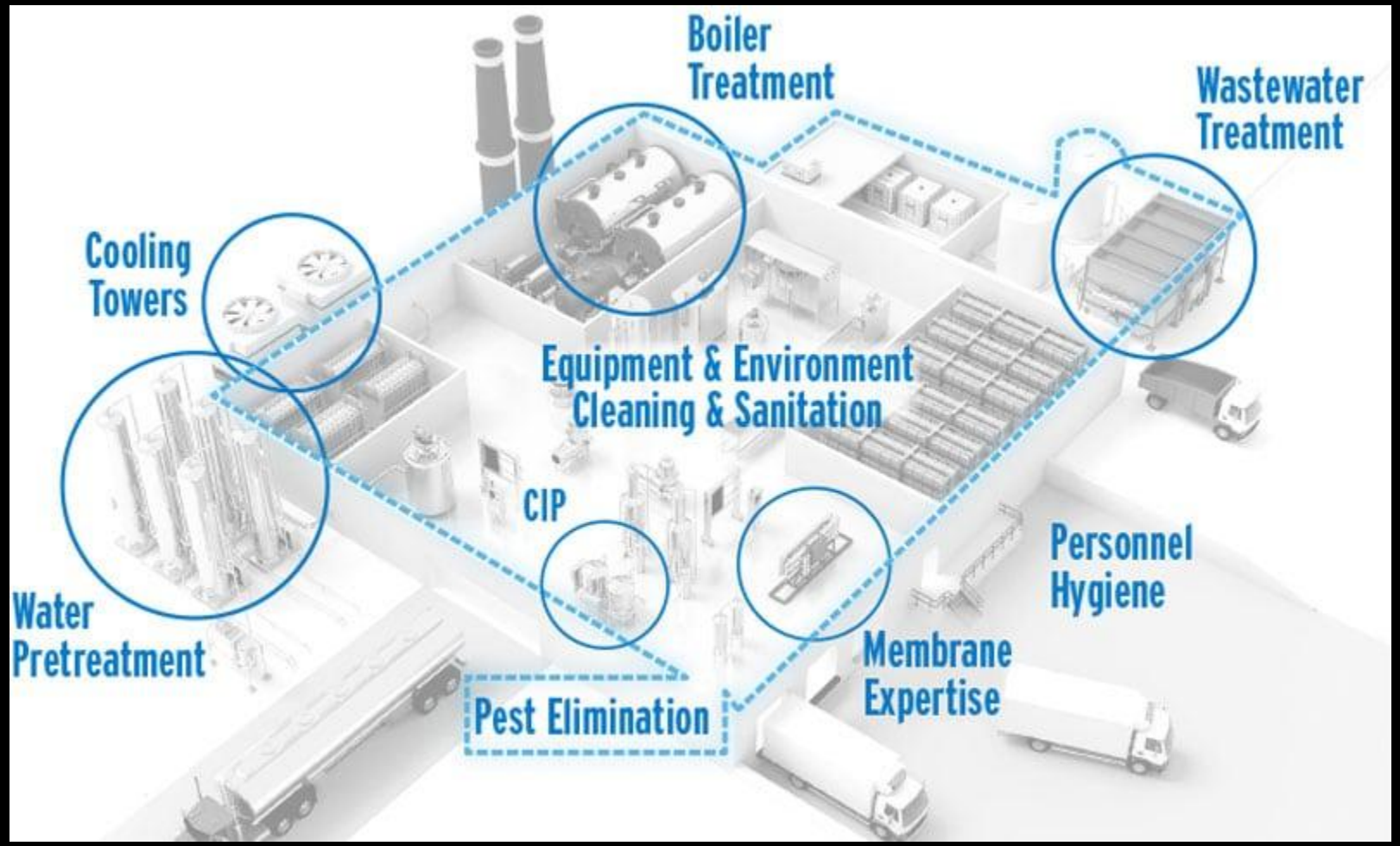
Facility

- Sanitary Design
- Flooring & Drains
- Traffic Patterns
- Air Handling
- Water
  - Quality
  - Volume
- Boiler & Towers



Training

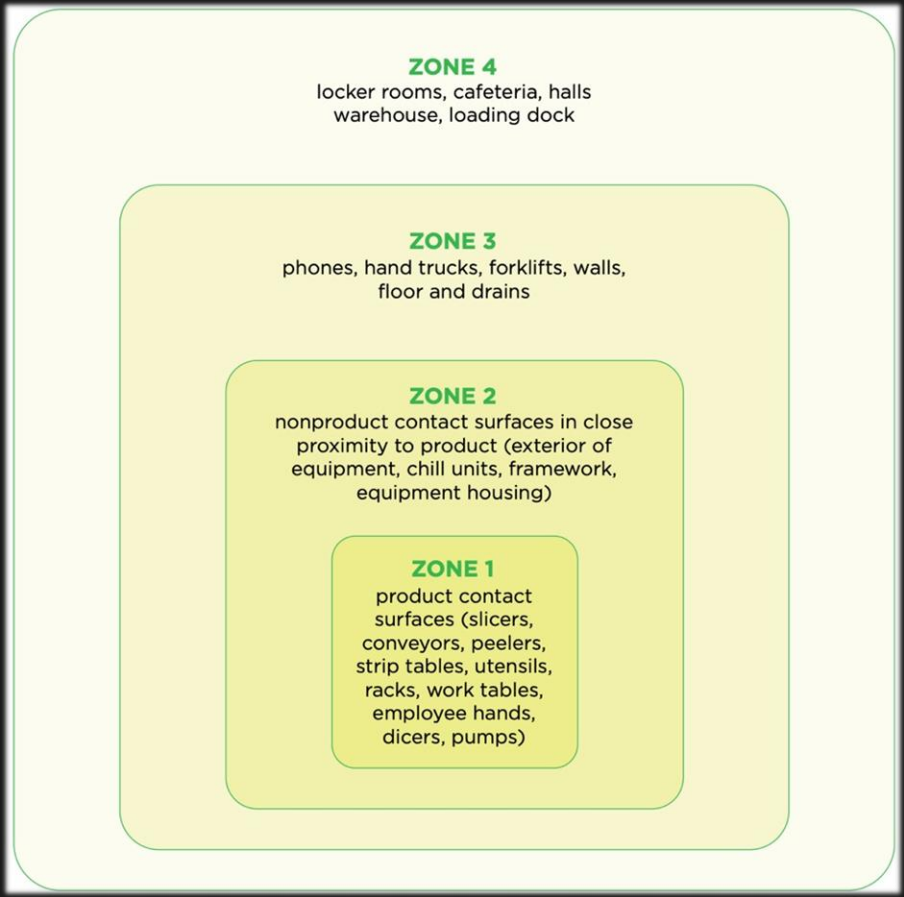
- Food Defense Plan
- PM Program
- Facility cGMP
- Employee Observations



CHEMCO UNIVERSITY

Building Your Program

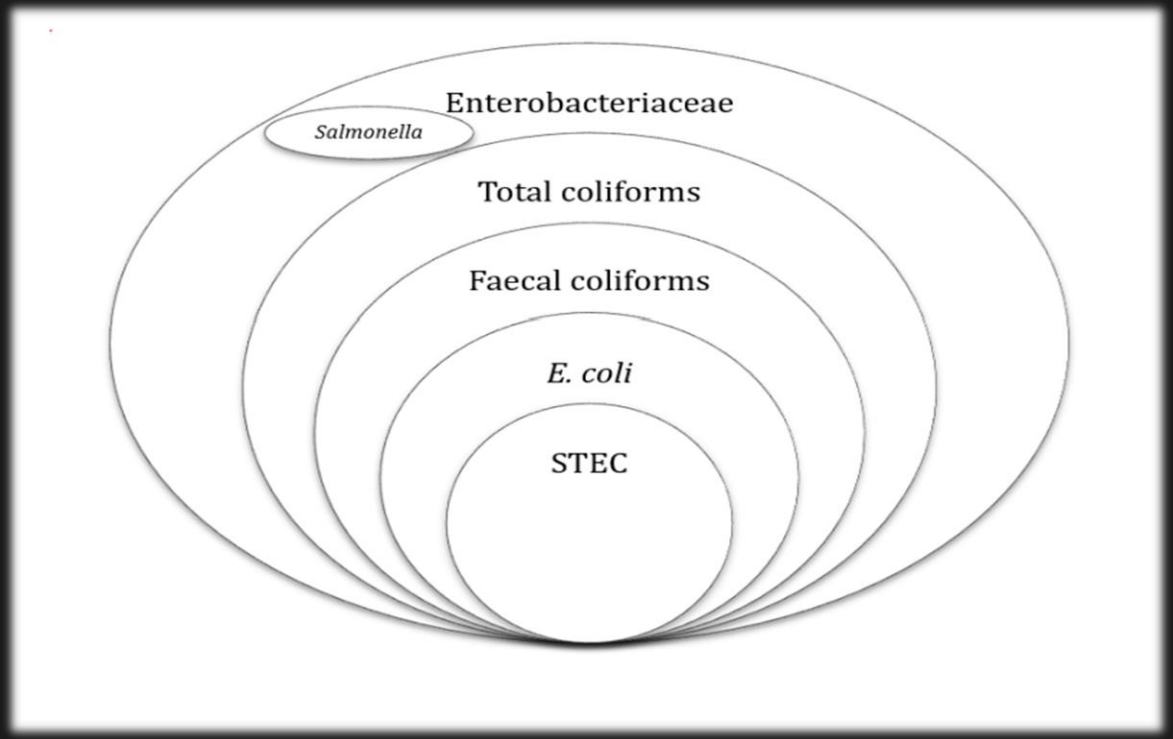
Zones & Process Flow



- Zone 1 – Direct Product Contact Surface
  - Surfaces where food product is exposed to the environment before final package closure
  - Test for appropriate indicator organisms (Listeria Species, APC, Enterobacteriaceae)
    - Pathogens not directly tested. Positive test would result in an immediate recall.
  - Daily or weekly depending on risk
    - Number of samples depends on facility size and risk
- Program Validation
  - Periodic testing of pathogens and allergens
  - APC, ATP, indicator organisms

Indicator vs Pathogen

Enterobacteriaceae	Coliform	E Coli
Indicator	Indicator	Pathogen



Zone 2 & 3

- Zone 2 – Non-Product Contact Surface (Adjacent to Zone 1)
  - Equipment exteriors, control panels, buttons & switches, overhead fixtures, tools
  - Test for appropriate indicator organisms (Listeria Species, APC, Enterobacteriaceae)
    - Can test for pathogens
  - Weekly
  - Number of samples depends on facility size and risk

- Zone 3 – Non-Product Contact Surfaces in Open Processing Areas
  - Floors, walls, ceilings, drains, hoses, cleaning equipment, aid handlers, carts, trash cans, sink areas
  - Test for appropriate indicator organisms (Listeria Species, APC, Enterobacteriaceae)
    - Can test for pathogens
  - Weekly
  - Number of samples depends on facility size and risk

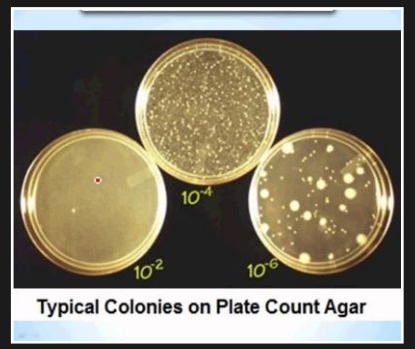
Zone 4

- Zone 4 – Support Facilities, Not in Open Processing Area
  - Bathrooms, locker room, break room, hallway, warehouse, loading dock, maintenance shop
  - Test for appropriate indicator organisms (Listeria Species, APC, Enterobacteriaceae)
    - Can test for pathogens
  - Monthly to Quarterly
  - Number of samples depends on facility size and risk

Environmental Monitoring

Sample Methods

SPC



- Simple, quantitative, versatile
- Time consuming
- Anaerobic difficult

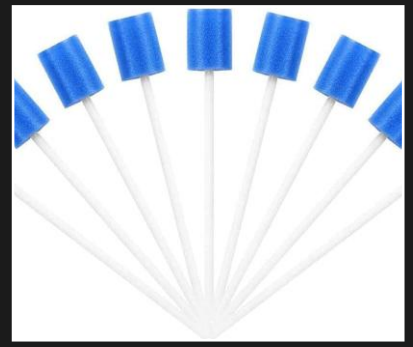
ATP

- Speed, real time, sensitive
- Interferences, not specific, limited detection

Petrifilm

- Ease of use, versatile, Identify colonies
- Shelf life, cost, temperature sensitive

Sponge

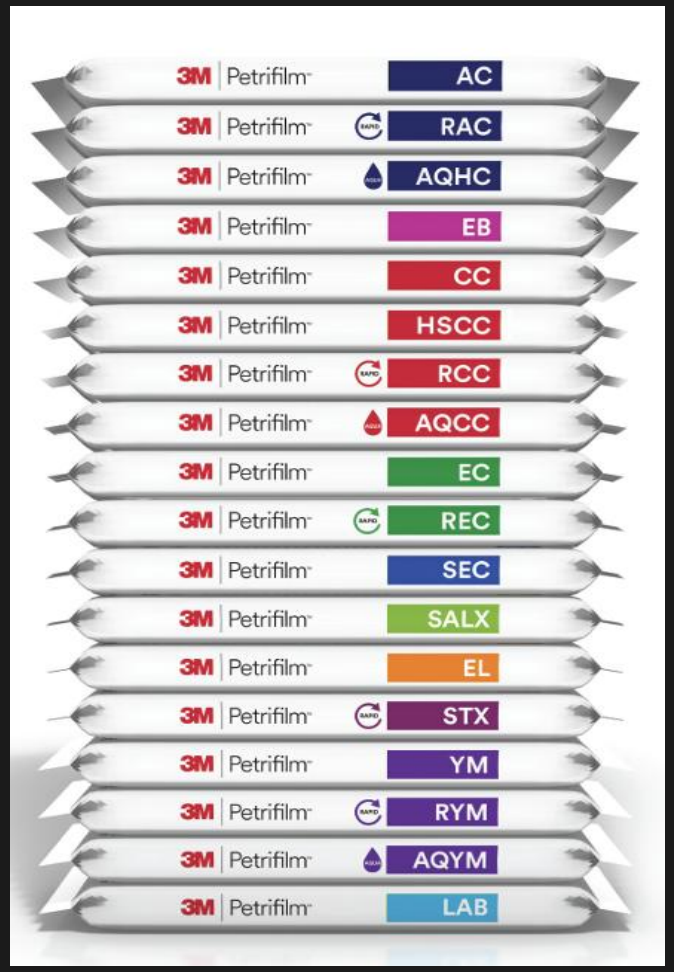


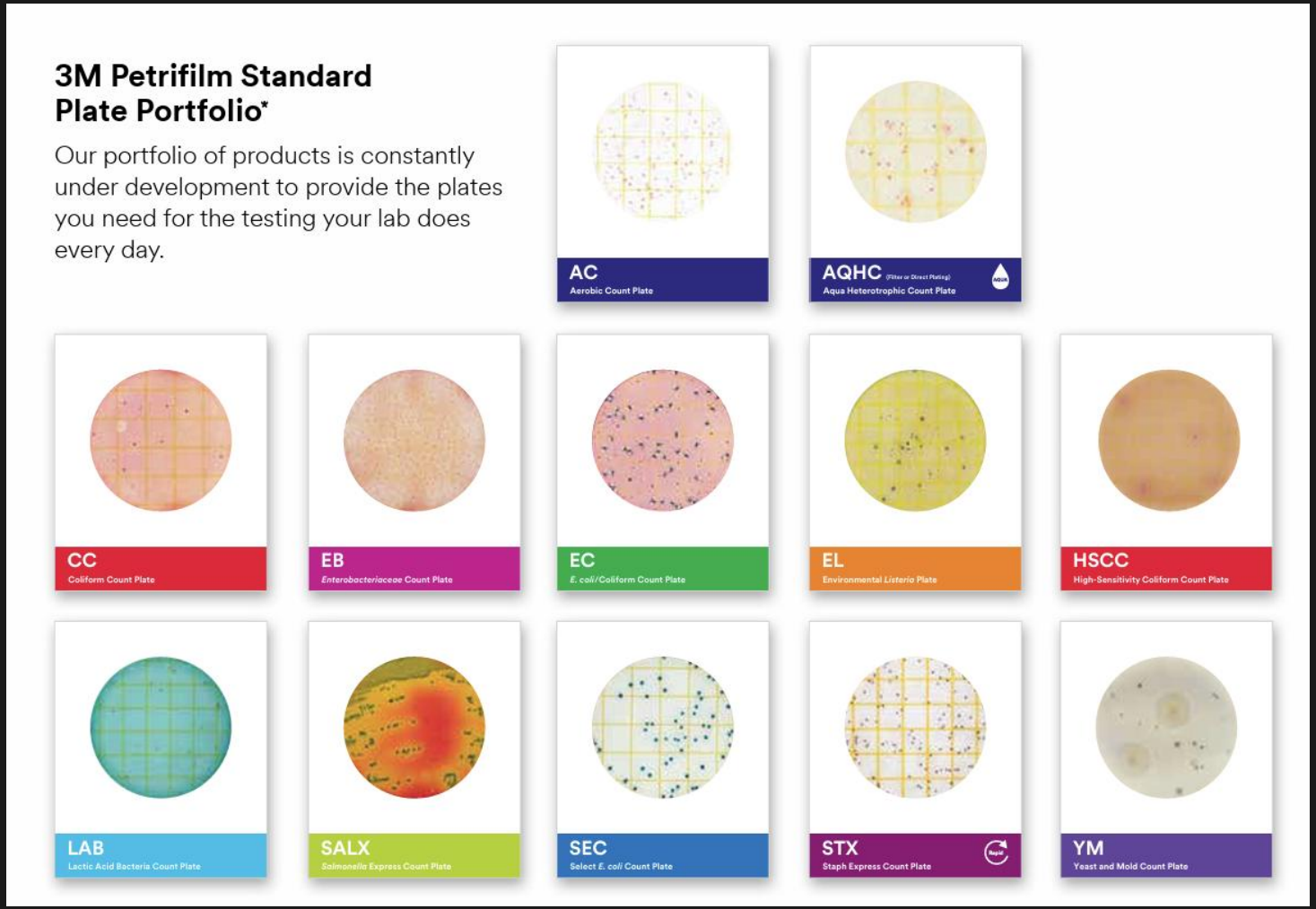
- Ease of use, effective sample collection
- Potential contamination, material limitations

Air

- Active & Passive
- Yeast & Mold
- Equipment, sampling plan, limited organisms

Petrifilm


3M Petrifilm AC
3M Petrifilm RAC
3M Petrifilm AQHC
3M Petrifilm EB
3M Petrifilm CC
3M Petrifilm HSCC
3M Petrifilm RCC
3M Petrifilm AQCC
3M Petrifilm EC
3M Petrifilm REC
3M Petrifilm SEC
3M Petrifilm SALX
3M Petrifilm EL
3M Petrifilm STX
3M Petrifilm YM
3M Petrifilm RYM
3M Petrifilm AQYM
3M Petrifilm LAB


3M Petrifilm Standard Plate Portfolio*
Our portfolio of products is constantly under development to provide the plates you need for the testing your lab does every day.
AC
Aerobic Count Plate
AQHC
Aqua Heterotrophic Count Plate
CC
Coliform Count Plate
EB
Enterobacteriaceae Count Plate
EC
E. coli/Coliform Count Plate
EL
Environmental Listeria Plate
HSCC
High-Sensitivity Coliform Count Plate
LAB
Lactic Acid Bacteria Count Plate
SALX
Salmonella Express Count Plate
SEC
Select E. coli Count Plate
STX
Staph Express Count Plate
YM
Yeast and Mold Count Plate

Master Sanitation Schedules

HYGIENE FOOD SAFETY

MASTER CLEANING SCHEDULE

Cleaner Name_____
Cleaner Name_____

SECTION: DISHWASH AREA

Area to be cleaned	Frequency	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Dishwasher exterior	3							
Dishwasher interior	7							
Dishwasher descale (check if scaled)	as required							
Receiving area surfaces & shelves	7							
Prewash basin, spray & taps	7							
Exit table	7							
Drying racks	2							
Shelves for clean items	1							
Table legs and supports	4							
Hard to reach floor areas	3							
General floor areas	7							
Walls	2							
Ceilings (clean if visibly dirty)	as required							
Lights (clean if visibly dirty)	as required							
Drains	3							

Cleaning and Sanitizing Record *Template*

Name and address of farm: _____

List the date, time, tool or equipment name, and method for each cleaning or sanitizing activity.

Date	Time	List Tools/equipment	Cleaned and/or sanitized?	Method used	Cleaned By (Initials)

Reviewed by: _____ **Title:** _____ **Date:** _____

Daily Verification

Daily Sanitation Control Record with all 8 Key Sanitation Areas

Daily Sanitation Control Record						
Report Date:			**Firm Name:**			
Line 1: Raw seafood (not ready-to-eat) **Line 2: Ready-to-eat**			**Firm Address:**			
Sanitation Area and Goal	**Pre-Op Time**	**Start Time**	**4 Hour Time**	**8 Hour Time**	**Post-Op Time**	**Comments and Corrections**
1) Safety of water (See Monthly Sanitation Control Record) • Back Siphonage – Hose (S/U)*						
2) Condition and cleanliness of food contact surfaces (See Monthly Sanitation Control Record) • Equipment cleaned and sanitized						
Line 1: (S/U)						
Line 2: (S/U)						
• Sanitizer Strength Sanitizer Type _____ Strength _____ ppm						
Line 1: (ppm)						
Line 2: (ppm)						
• Allergen cross-contact controls performed during each production changeover (S/U)						
• Gloves and aprons clean and in good repair						
Line 1: (S/U)						
Line 2: (S/U)						
*S = Satisfactory / U = Unsatisfactory						

Sanitation Area and Goal	**Pre-Op Time**	**Start Time**	**4 Hour Time**	**8 Hour Time**	**Post-Op Time**	**Comments and Corrections**
3) Prevention of cross-contamination (See Monthly Sanitation Control Record)						
• Hands, gloves, equipment, and utensils washed/sanitized after contact with unsanitary objects (S/U)						
• Employees working on raw products, wash and sanitize hands/ gloves/outerwear before working with cooked products (S/U)						
• Unpackaged cooked products separated from raw products (S/U)						
• Allergenic ingredients are clearly labeled during storage and production (S/U)						
• Production is scheduled to prevent allergen cross-contact						
4) Maintenance of hand washing, hand sanitizing, and toilet facilities						
• Hand washing and hand sanitizing stations adequate						
Line 1: (S/U)						
Line 2: (S/U)						
• Hand sanitizing station Sanitizer Type _____ Strength _____ ppm						
Line 2: (ppm)						
• Toilets clean, properly functioning, and adequately supplied (S/U)						
5) Protection from adulterants and 6) Labeling, storage, and use of toxic compounds						
• Product protected from contamination and allergen cross-contact (S/U)						
• Cleaning compounds, lubricants, and pesticides labeled and stored properly (S/U)						
7) Employee health • Employees do not show signs of medical problems (S/U)						
8) Exclusion of pests • Pests excluded from processing area (S/U)						
S = Satisfactory / U = Unsatisfactory						
Signature or initials _____ Date _____						

Annual Validation

Chemco Products Company

Service Report

CIP 7001

Tuesday, December 23, 2025 19:23 PST

Customer

Report Number:

Recorded By:

MAIN PLANT - CIP 7001

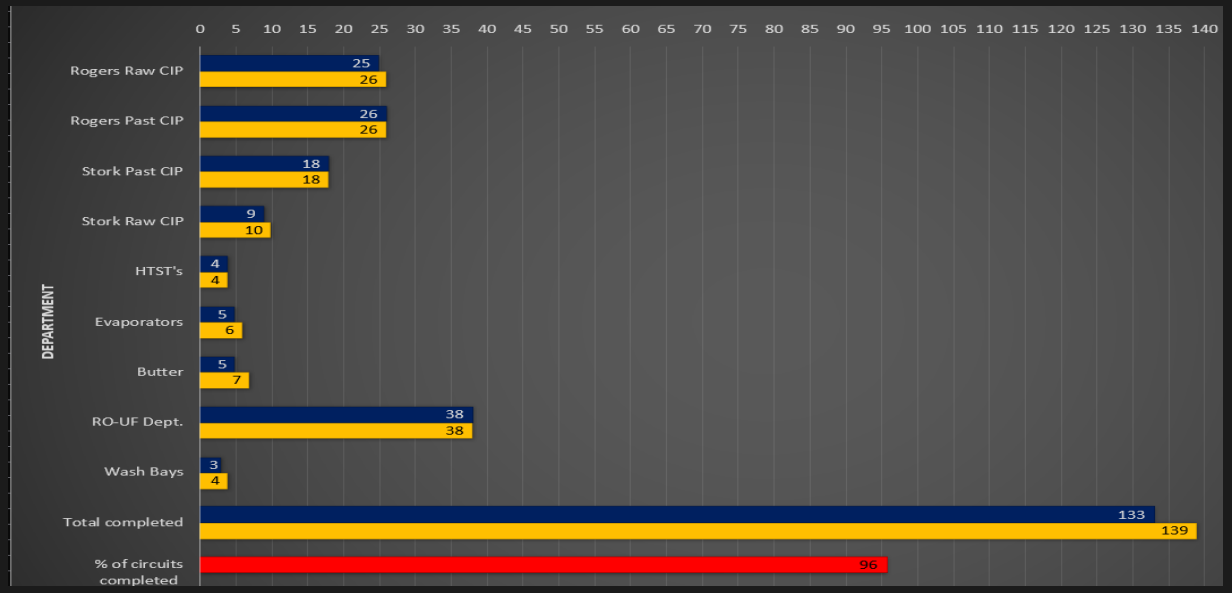
Test	CT 4			
Operator	Albert			
Time	10:00			
CIP System ID	7001			
Soil	cream			
Flow Rate (gpm)	140 140 min			
Valve Pulse	Good			
Agitator	On			
Spray Pattern / Sheeting	Good			
Pre-Rinse Clarity	Clear			
Alkaline Wash, Concentration (ppm)	960 640 - 1120			
Alkaline Wash, pH	> 11.0			
Alkaline Wash, Temperature (F)	144 140 - 160			
Alkaline Wash, Post Rinse, pH	9 9.5 max			
Sanitizer, Concentration (ppm)	120 105 - 195			
Manually Cleaned Items	yes			
Visual Inspection	Pass			

CT 4 Online

Manually Cleaned Items

silo door, door gasket, sample port

DEPARTMENT / SYSTEM	CIRCUIT / EQUIPMENT	Date	DEPARTMENT / SYSTEM	containment	Date
CIP #6001	RT-1	1/28/2025	CIP #7002	CS/BM #1	1/27/2025
	RT-2	1/8/2025		CS/BM #2	1/17/2025
	RT-3	1/31/2025		CS/BM #3	2/5/2025
	RT-4	7/30/2025		CS/BM #4	1/15/2025
	RT-5	1/28/2025		CS/BM #5	1/8/2025
	RT-6	1/14/2025		CS/BM #1 line	1/27/2025
	RT-7	1/14/2025		CS/BM #2 line	1/17/2025
	RT/BM 1	1/30/2025		CS/BM #3 line	2/5/2025
	RT/BM 2	2/5/2025		CS/BM #4 line	1/15/2025
	RT/BM 3	4/9/2025		CS/BM #5 line	1/8/2025
	Evap feed line 6	2/10/2025		PCT #1	2/7/2025
	Stork Evap feed line 7	2/10/2025		PCT #2	1/15/2025
CIP #6002	Cream receiving line 4	2/13/2025		DCT #1	9/10/2025
	COW water Tk #1	2/3/2025		DCT #2	9/11/2025
	COW water Tk #2	6/24/2025		DCT #1 w/ wet side	2/20/2025
	COW water Tk #3	10/14/2025		DCT #2 w/ wet side	4/4/2025
	COW water Tk #4	1/17/2025		Permeate Tank	1/29/2025
	COW water Tk #5	5/22/2025		RO #7 Concentrate Tank	5/29/2025



Impacts of Foodborne Illness

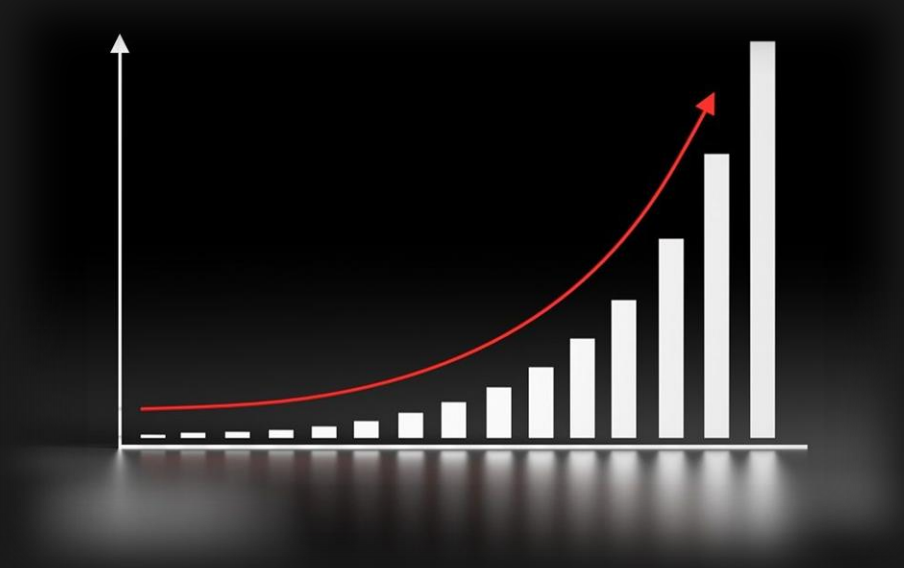
- Each year, about 48 million Americans get sick from foodborne diseases
- Leading to 128,000 hospitalizations and 3,000 deaths.
- Majority of illnesses are mild and often go unreported, making it challenging to identify the exact costs associated with them.

The estimated total cost of foodborne illness was approximately **$74.7 billion**. This figure includes medical treatment costs, lost productivity, and other related expenses. (2023)

Basic Microbiology

- Organisms found in soil, water, and air
- Some can grow in extreme environments
- Need food, water, and a nice home
- Exponential Growth

- 30 Minute Growth – Exponential
  - 0 min – 1,000 per gram
  - 30 min – 2,000 per gram
  - 1 hour – 4,000 per gram
  - 5 hours – 1,000,000 per gram



➢ One gram of fecal material contains approximately 100 billion bacteria, along with millions of viruses, archaea, and other microorganisms.

Consequences of a Recall?

- Notifying Customers
- Replacing Defective Product
- Managing Public Relations
- Financial Loss
- Damage to Reputation
- Legal Liabilities

Date	Brand Name(s)	Product Description	Product Type	Recall Reason Description	Company Name
12/09/2025	Lucky Foods	Lucky Foods brand Cinnamon Powder 40g, best before date 15.09.2027, packaged in a vacuum or modified atmosphere 40g pouch with a brown label	Food & Beverages	Potential to be contaminated with elevated levels of lead	TBC Distribution Corporate
12/09/2025	Grandma Belle's	Tomato Basil Soup	Food & Beverages	Potential or Undeclared Allergen – Undeclared Milk	Lil' Turtles
12/05/2025	Wegmans	Deluxe Mixed Nuts Unsalted (34 oz tubs and 11.5 oz bags)	Food & Beverages	Product may be contaminated with Salmonella	Mellace Family Brands California, Inc.
12/03/2025	Bonnihill Farms	BeefiBowls Beef Recipe gently cooked frozen dog food, 16 oz. chubs	Animal & Veterinary, Contaminants, Animal Feed, Food & Beverages, Contaminants, Animal Feed	Potential foreign plastic contamination	Fromm Family Foods
12/02/2025	Vetoquinol	FOLLTROPIN Injectable Kits for Cattle	Animal & Veterinary	Presence of particulate matter	Vetoquinol USA
12/02/2025	Ritz	Peanut Butter Cracker Sandwiches	Food & Beverages, Allergens	Potential or Undeclared Allergen – Undeclared Peanut	Mondelez Global LLC
11/26/2025	Ambriola, Locatelli, Member's Mark, Pinna, and Boar's Head	Cheese	Food & Beverages, Foodborne Illness	Potential to be contaminated with Listeria monocytogenes	The Ambriola Company
11/26/2025	Prairie Farms	Fat Free Milk	Food & Beverages, Contaminants	May contain food-grade cleaning agents	Prairie Farms
11/26/2025	Choceur	Bark candy with nuts and fruit	Food & Beverages, Allergens	Undeclared pecans and wheat	Silvestri Sweet, Inc.
11/26/2025	Locatelli	Grated Pecorino Romano Cheese	Food & Beverages, Foodborne Illness	Potential presence of Listeria monocytogenes.	Wegmans Food Markets, Inc.

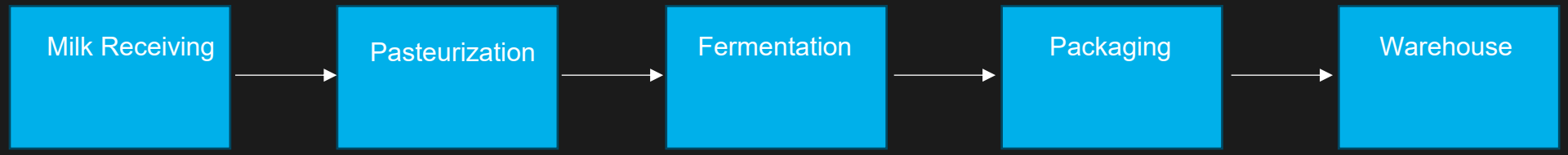
Cost by Pathogen

PATHOGEN	MEAN NUMBER OF CASES	MEAN TOTAL COST (IN BILLIONS)	MEAN PER-CASE COST
Salmonella spp., nontyphoidal	1,027,561	$17.1	$16,668
Norovirus	5,461,731	$2.97	$543
Campylobacter spp.	845,024	$11.3	$13,405
Listeria monocytogenes	1,583	$3.96	$2,504,296
Clostridium botulinum	55	$0.116	$2,101,818

Let’s check the health of our program!

Build Our HACCP Plan

- Step #1 – Gather our team (Operators, Quality, Maintenance, EHS)
- Step #2 – Simple flow diagram of the process



- Step #3 – Hazards associated w/ each step – Biological, Physical, Chemical
  - Raw Milk
    - Biological – Microbial issues w/ both spoilage organisms & pathogens
    - Chemical – Antibiotics
    - Physical – Extraneous material

Build Our HACCP Plan

- Step #3 – Hazards associated w/ each step – Biological, Physical, Chemical
  - Pasteurization
    - Biological – Microbial issues w/ both spoilage organisms & pathogens
    - Chemical – CIP Chemicals
    - Physical – Extraneous material
  - Fermentation
    - Biological – Starter culture
    - Chemical – Sugar, pH Buffers, Stabilizers
    - Physical – Extraneous material
  - Packaging
    - Biological – Spoilage organisms
    - Chemical – Bottle sanitizer
    - Physical – Extraneous material
  - Warehouse
    - Biological – Spoilage organisms
    - Chemical – None
    - Physical – Extraneous material

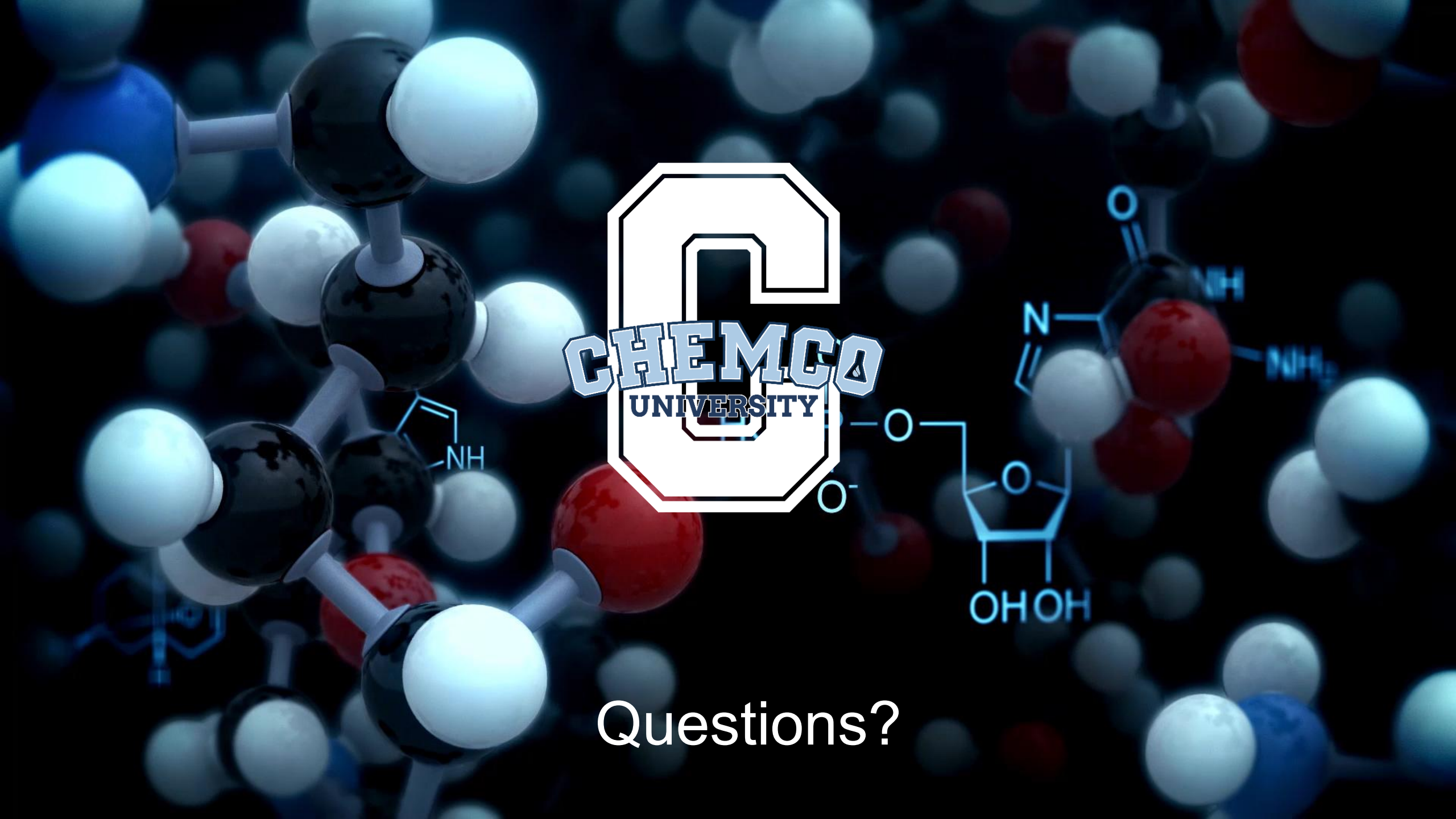
Build Our HACCP Plan

- Step #4 – Critical Control Points
  - Antibiotics
  - Pasteurization
  - Fermentation (QCP)

- Step #5 – Critical Limits
  - Antibiotics
    - Negative
  - Pasteurization
    - 161 F for 15 min
    - 165 F to 170 F
  - Fermentation
    - Process timing

Build Our HACCP Plan

- Step #6 – Monitoring
  - Temperature charts, data logging
- Step #7 – Record Keeping
- Prerequisite Programs
  - GMP
    - Uniform Policy
    - Hand Washing
    - Master Sanitation Schedule
  - Foreign Material
  - Glass & Brittle Plastics
  - Allergen
  - Supplier Verification



Questions?