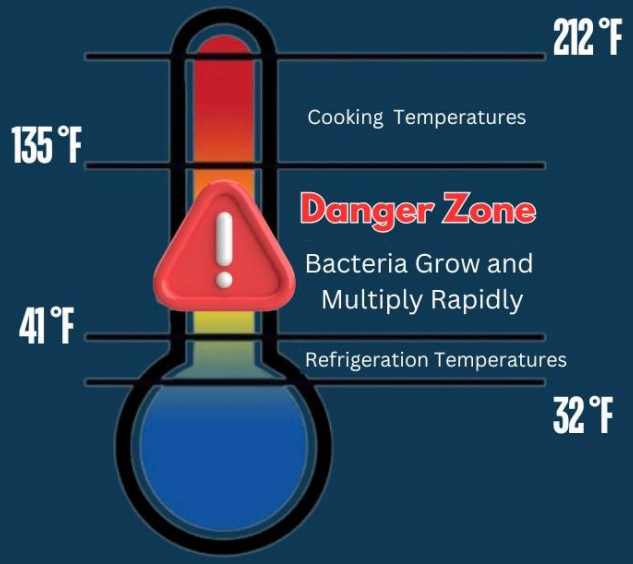
Cooling Food Safely:

Newton's Law of Thermodynamics
and
Turning a Hot Mess into a Safe Success.

$$T(t) = T_{env} + (T_0 - T_{env})e^{-kt}$$

Agenda

- The importance of Proper Cooling
- Signs of Improper Cooling
- Effective Methods of Cooling
- Engaging Staff on Cooling Practices
- Best Practices and Takeaways



Importance of Proper Cooling

- Foodborne illness (FBI)/bacterial growth
- The Danger Zone (TDZ), Why rapid cooling is critical
- Regulatory Requirements

Clostridium perfringens

- Symptom onset: 8-12 hours
- Symptoms: watery diarrhea, nausea, abdominal cramps; fever is rare
- Duration: 24-48 hours

Common Foods:

- Meat (beef, pork, lamb)
- Poultry (chicken, turkey, duck)
- Gravies, sauces, soups
- Casseroles (Lasagna, Mac & Cheese, Shepard's Pie)

Bacillius cereus

Emetic (vomiting)

- Symptom onset: 1-6 hours (as soon as 30 minutes)
- Symptoms: sudden onset of severe nausea and vomiting
- Duration: 24 hours
- Common foods: temp-abused starches

Diarrheal

- Symptom onset: 10-16 hours
- Symptoms: abdominal cramps, watery diarrhea, nausea
- Duration: 24-48 hours
- Common foods: meats, stews, gravies

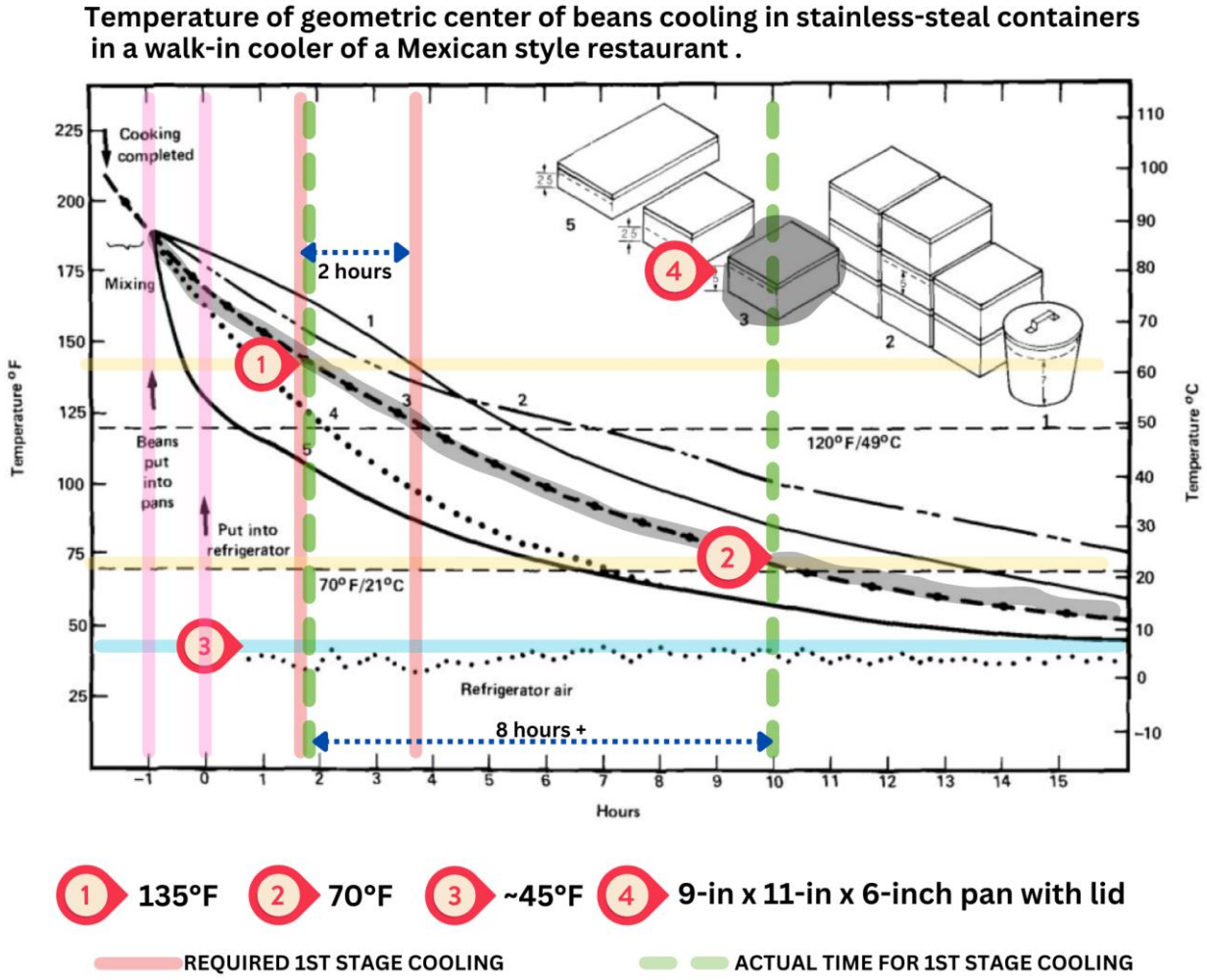
SIGNS OF IMPROPER COOLING

Root Causes:

- No Monitoring/ Verification

- Lack of proper Training

- Inadequate Refrigeration and/or Equipment



Mexican-style Foodservice Operations: Hazard Analyses, Critical Control Points and Monitoring

Frank L. Bryan and Charles A. Bartleson

U.S Department of Health and Human Services, Public Health Services, Centers for Disease Control

July 1984

Spore Formers: Cooling Pathogens of Concern

The goal in proper cooling to prevent bacterial growth. Spore forming bacteria can survive the cooking process and proliferate during the cooling step.

Clostridium perfringens bacteria
CDC image library

Bacillus cereus bacteria
CDC image library

Blast Chillers

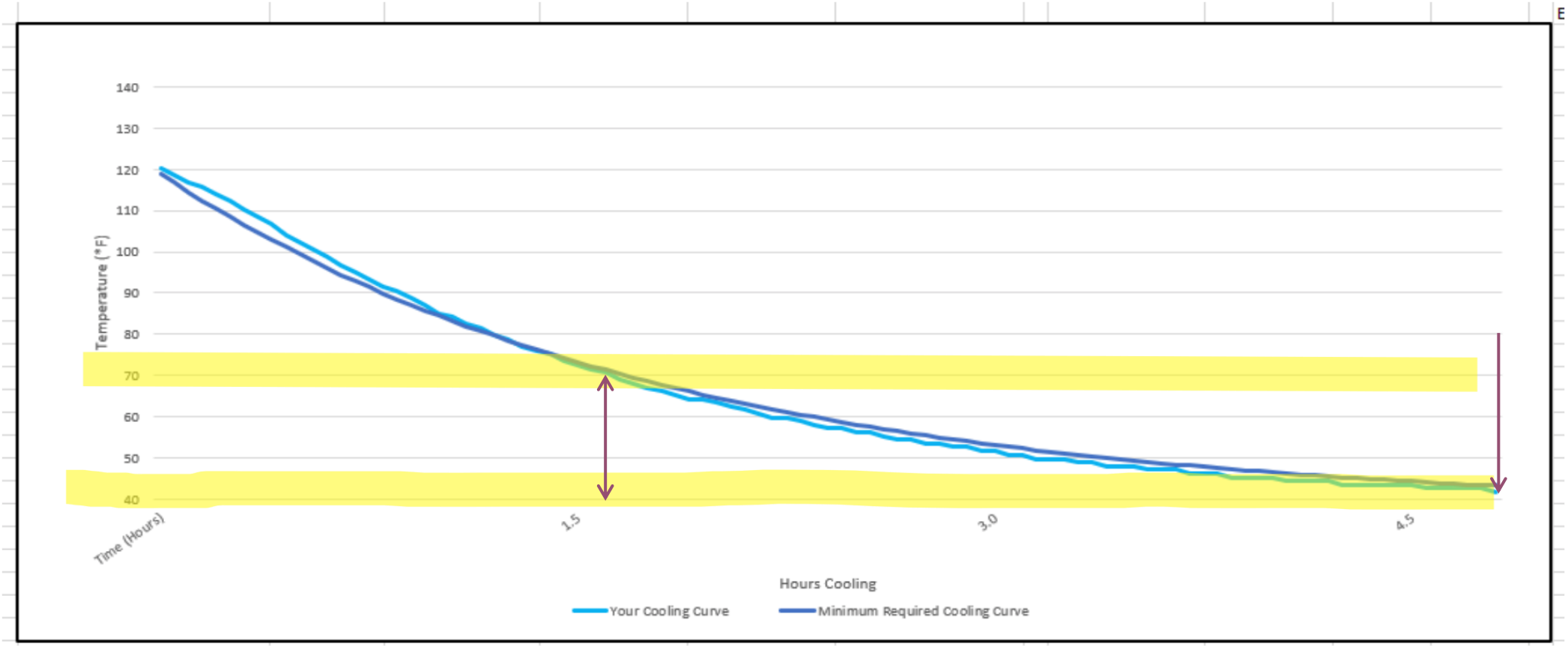
- Ice as an ingredient
- Shallow Pans

Effective Methods

- Cut into smaller portions
- Ice Water Bath
- Ice Wands

A group of food safety advocates are working to amend the FDA Food Code 3-501.14 to include an option to cool TCS foods at a depth of 2inches or less, uncovered, and refrigerated, without time and temperature monitoring.

Corn Chowder, 2 in uncovered plastic pan



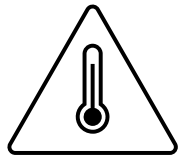
Engaging Staff on Cooling Practices

- Explain the "Why”
- Interactive Demonstrations
- Visual Aids and Signage

Takeaways

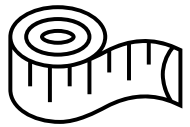
- Develop standard operating procedures (SOPs) for cooling.
- Regular staff training and monitoring and verification to ensure procedures are followed.
- Foster a food safety culture emphasizing cooling compliance.

BEST PRACTICES



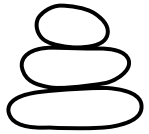
The Thermodynamics of Stainless Steal and Plastic

- Stainless Steel = ~14–16 W/m·K
- Plastic = ~0.1–0.5 W/m·K)



If adequate refrigeration space is available shallow pan cooling is the easiest method to ensure foods are properly cooled.

Stir or mix foods like soups, stews, and sauces to help decrease temperatures faster.



Avoid stacking or covering foods until they have been properly cooled