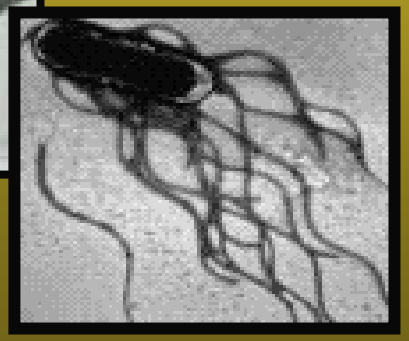
FOOD SAFETY & SANITATION

Fundamentals



ACES, Food Safety and Protection Div. (804)734-3369

Importance of Food Safety & Food Security

- Product tampering
- Sabotage of specific food groups or industries
- Attacks directed at a country's institutions, agencies, or departments who are in opposition to terrorist goals

How does contaminated food impact the fighting force?

Impact of Bioterrorism

- Impair unit readiness
- Lower morale due to loss of confidence in food
- Disrupt medical support system

GOALS of Army Food Service Sanitation Program...

To Prevent Foodborne Illnesses

Secondary: **To protect resources by reducing loss due to spoilage, infestation, or damage.**

Publications with Food Sanitation Guidelines

TB MED 530

- Applies to all food operations in garrison & field
- Includes vending, child care facilities, Reserve Components
- Outlines responsibilities

FM 10-23
FM 10-23-1
FM 10-23-2

} **Class I procedures in garrison & field**

FM 4-25.12 Field Sanitation Issues

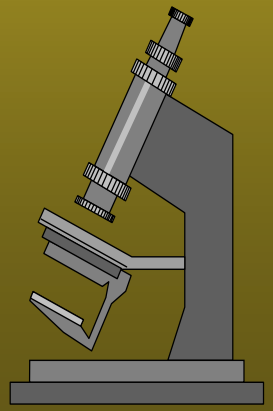
Food Service Sanitation Responsibilities

- **Installation Medical Authority (IMA)**
  Preventive Medicine
  - **facility sanitation issues & food handling processes**
- **Veterinary Activity**
  - **Specific food issues: procurement; damaged or spoiled products; food infestations; unfit disposition reports; determine wholesomeness**

- **Food Service Facility Managers**
- **Unit Commanders/FSO**

Food Safety Terms

- Foodborne Illness - Illness transmitted to humans via contaminated food or water.
- Foodborne Illness Outbreak (FBIO) - Laboratory confirmed incidence of illness involving 2 or more people that ate a common food and exhibit the same symptoms.



- **Contaminated -** The presence of harmful substances in or on food or water.

- **Cross-contamination -** The transfer of a harmful substance from one food to another by direct or indirect contact.
  - ➔ *EXAMPLE: cutting board & knife contaminated by raw chicken*
- **Temperature Danger Zone (TDZ) -** Temperature range where bacteria associated with foodborne illnesses can grow and reproduce rapidly.

Between 40° F and 140° F

- **Potentially Hazardous Foods (PHF) -** Foods that promote the rapid growth of bacteria.

Bacteria (Favorable Growth Factors)

What makes a food potentially hazardous?

FOOD — High Protein

ACIDITY — Neutral PH 4.6 -9

TIME — 4 Hours plus

TEMPERATURE — 40° F to 140° F

OXYGEN — Right Atmosphere

MOISTURE* — ≥ 0.86 aw_a

* Denied by dry and frozen foods*

Hazards to Food Safety

Infection
or
Intoxication

SPORES

TOXINS

Vegetative cells

Biological

(bacteria, parasites, viruses, fungi)

Chemical

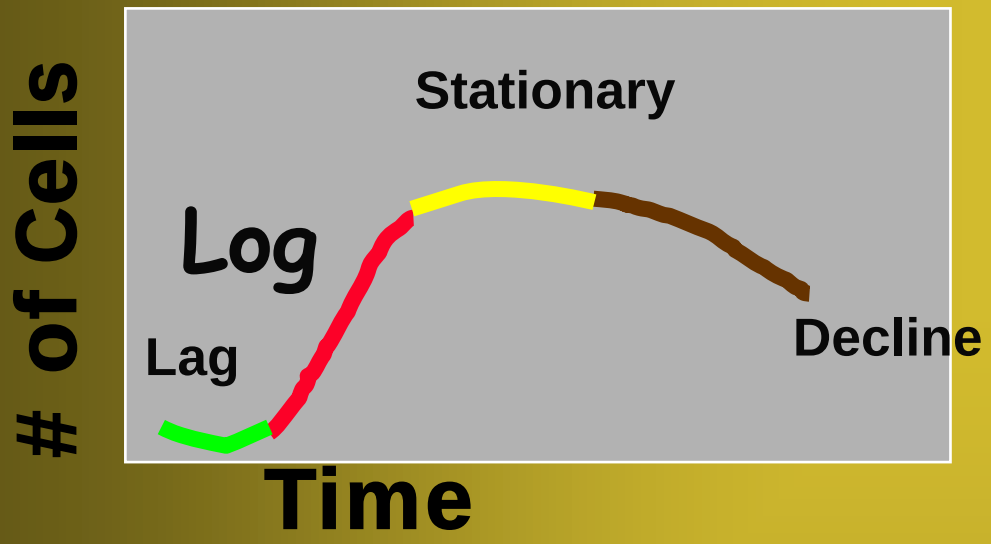
(pesticides, metal residues, detergents)

Physical

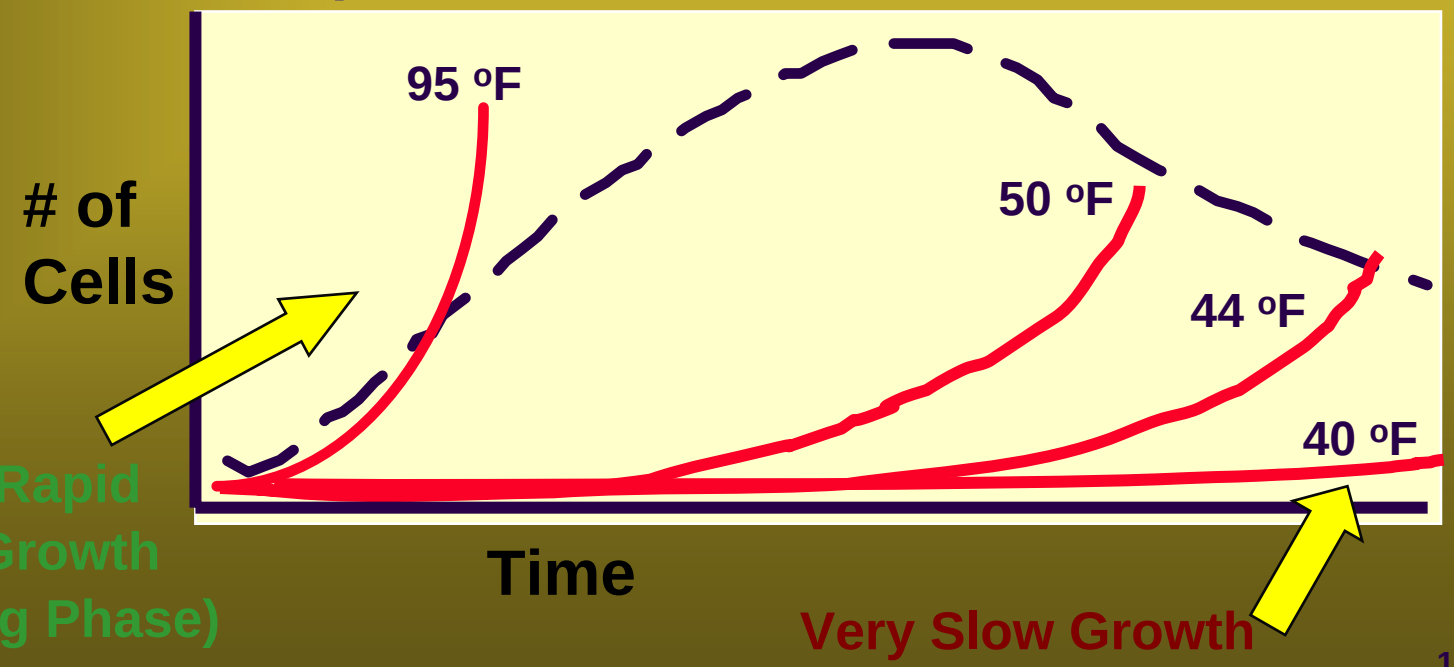
(metal shavings, bones, glass, etc...)

Bacterial Growth

Growth Phases

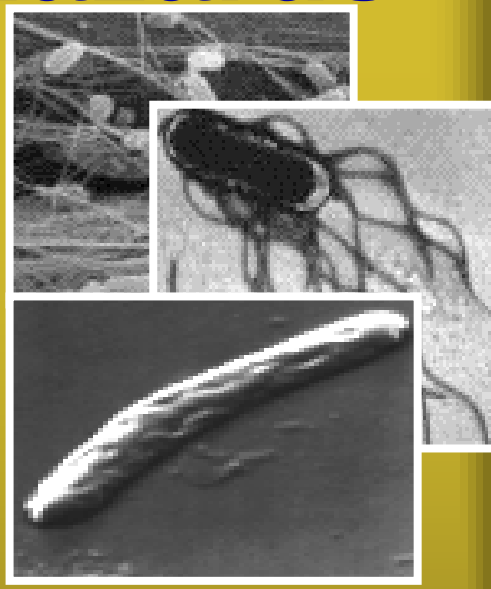


Temperature Effects on Bacterial Growth



Examples of Bacterial Hazards

Bacterial Infective Pathogens



- **Salmonella**
- **Shigella**
- **Escherichia coli**

Intestinal tract of animals; fecal contamination

Toxigenic Bacteria & Spore Formers

- **Staphylococcus aureus** — Human hair, skin, hands, nasal passages & throat
- **Bacillus cereus** — Soil & dust
- **Clostridium botulinum** — Foods of animal or vegetable origin; soil; water

Leading Causes of Foodborne Illness Outbreaks

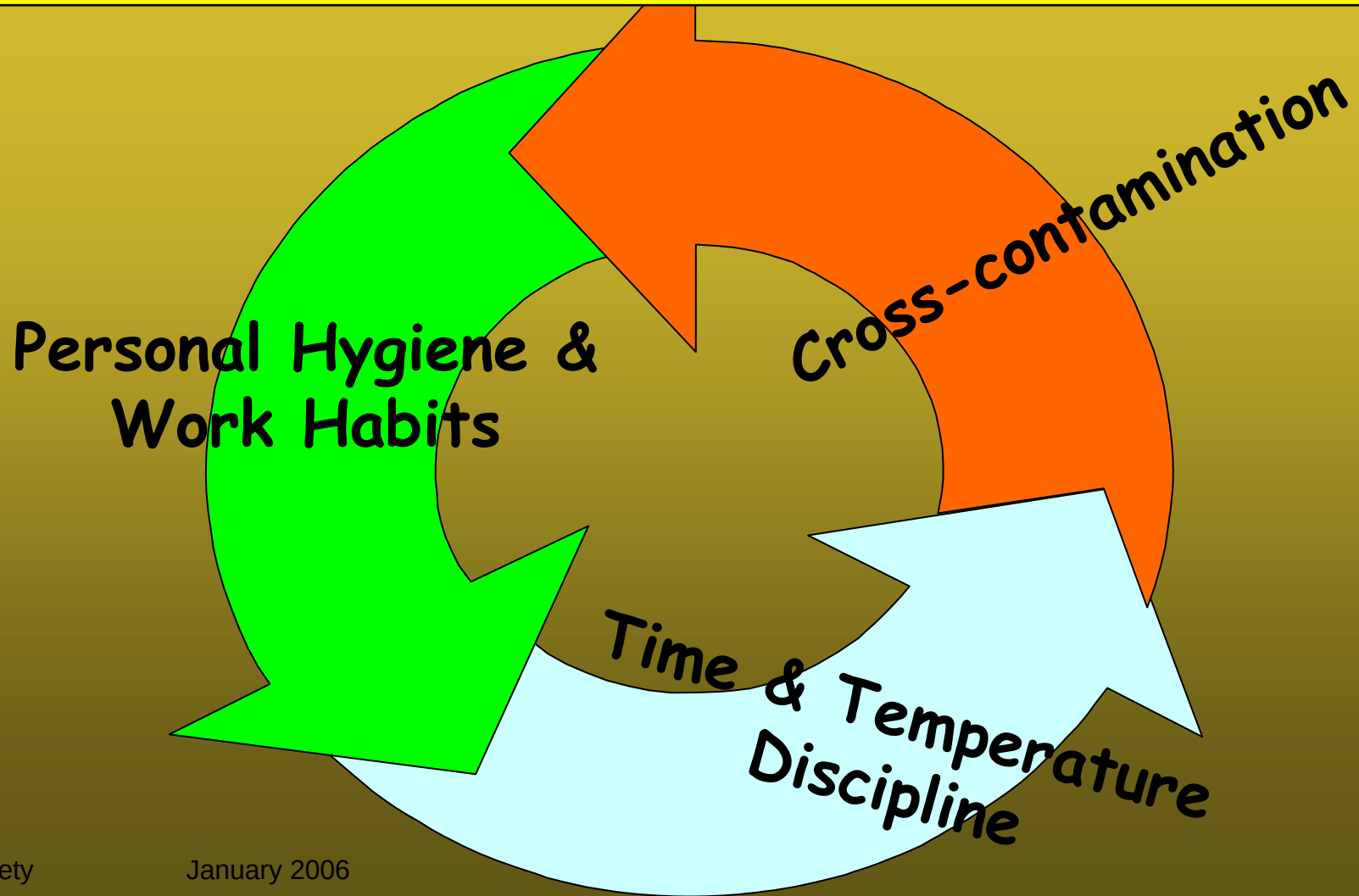
#1 -- FAILURE TO PROPERLY COOL FOOD

- Cross-contamination
- Inadequate re-heating
- Foods left in TDZ too long
- Raw, contaminated ingredients used without further cooking
- Foods prepared too far in advance
- Infected food handlers and poor work habits
- Failure to thoroughly heat or cook food

Layers of Protection

-- Risk Management Processes --

…Reduces the potential of a biological hazard making us sick.



Personal Hygiene & Work Habits

Hand-washing "...the single most important means of preventing the spread of infection." -CDC

Fecal-oral route

→ *bacterial & viral contamination*

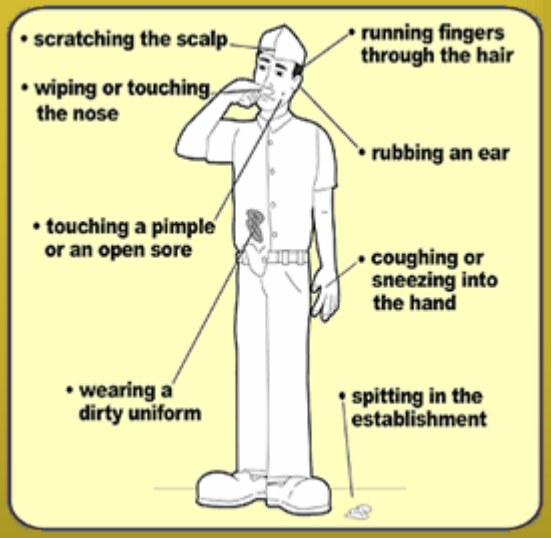
43% (44 soldiers) came from a single infantry unit

Saudi Arabia (1998): Food operations sergeant cross-contaminates food, resulting in 110 soldiers hospitalized for Salmonellosis.

Personal Hygiene & Work Habits

UNIFORM STANDARDS

- Adequate Hair Restraints
  - ➔ *Hat, Hairnet, Beard-net*
- No Jewelry (except)
  - ➔ *Plain wedding band*
  - ➔ *Medical alert bracelet/necklace*
- Fingernails
  - ➔ *Do not extend beyond fleshy tip of finger*
  - ➔ *Neatly trimmed & smooth*
  - ➔ *No false nails, polish, or nail ornaments*



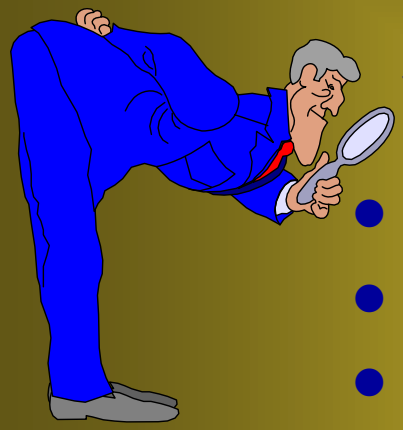
Time & Temperature Discipline

One of the critical factors in controlling bacteria in food is controlling temperature.

Bosnia (1996): Dining facility implicated in outbreak of Salmonella [~100 casualties].

...cooks prepared eggs that were held in an unrefrigerated CONEX for several days

Apply proper time & temp standards and minimize time in TDZ throughout the flow of food.



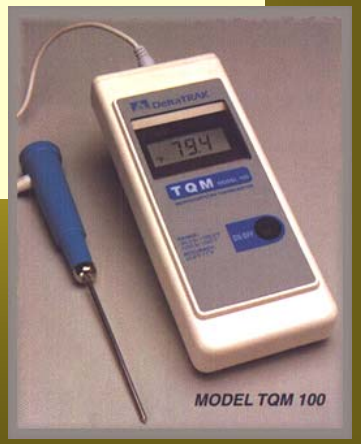
Spot check process with Thermometers

- **Receipt**
- **Storage**
- Thawing
- Prep
- Cooking
- Holding
- Serving
- Leftovers
- Cooling
- Re-heating

Key to food safety

→ ***Thermometers must be***

- **available**
- **calibrated ± 2 ºF**
- **sanitized**
- **appropriate**



THAWING

- In refrigeration unit set at 38° F
- As part of the conventional cooking process
- Microwave, followed by continuous cooking process
- Under potable running water $\leq$70° F

avoid contamination and minimize time in TDZ

Preparation and Cooking

- Max 4 hours in TDZ
- Use batch preparation and progressive cooking
- Food safety internal cooking temps:
  - ➔ ***poultry*** ***165° F***
  - ➔ ***pork, ground meats*** ***155° F***
  - ➔ ***roast beef, fish*** ***145° F***
  - ➔ ***leftovers*** ***165° F***

Nov 2002 (Afghanistan): 75 Army soldiers sick after eating undercooked stuffing from Thanksgiving Day meal.

Holding and Serving

- Protected from contamination
- Cold PHFs ≤40° F
- Hot PHFs ≥140° F
- Use thermometers to spot check
- Verify equipment settings and calibration
  - ➔ *work orders and follow-up, as necessary*

Leftovers

- Labeled
  - ➔ *(item name, date & time removed from service)*
- Holding
  - ➔ ***Cold: 24 hours***
  - ➔ ***Hot: next meal (5 hours)***
- Rapid cooling
  - ➔ *shallow pans, stirring, slicing, ice baths, refrigerating, etc..*
  - ➔ ***140° F to 70° F (within 2 hrs); then to ≤ 40° F (within 4 hrs)***
- Re-heat to 165°F within 2 hrs
- Freezing is prohibited

Sandwiches

- **Made-to-Order:**
  - ➔ ***May use leftovers***
  - ➔ ***Batch preparation 1 hr prior to service; dispose 3 hrs after preparation***

- **Pre-Pared Sandwiches:**
  - ➔ *Hot:* ***up to 5 hrs at 140 F***
  - ➔ *Frozen:* ***IAW Manufacture label; if prepared in DFAC, w/in 7 days when removed from freezer***
  - ➔ *Refrigeration:* ***IAW Manufacture label; 60 hrs if prepared in designated sandwich preparation area; 5 hrs if no designated preparation area***

Cleaning & Sanitizing

Dec 2002 (Kuwait City): 169 soldiers & marines suffer gastroenteritis (75 hospitalized) attributed to unsanitized food utensils.

Manual Sanitizing Standards

- Heat (water @ 171° F for 30 seconds)
- Chemical (IAW label), or

  Chlorine bleach
  - 100 ppm
  - water @ 75 °F
  - 15 seconds

2 Tb bleach to 4 gal water = 100 ppm solution

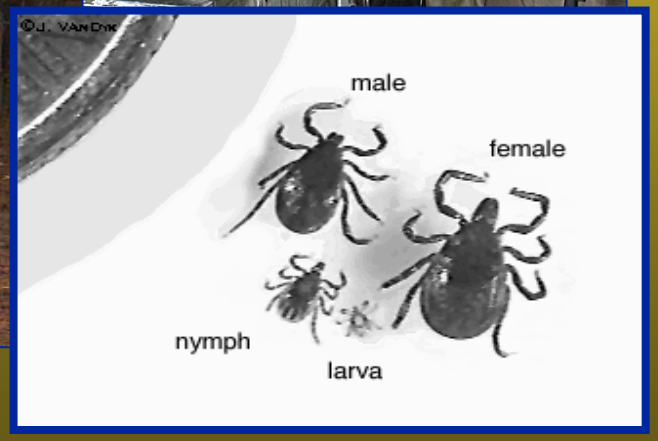
HACCP

Hazard Analysis Critical Control Point

A Prevention-Based Food Safety System

…a systematic approach to applying & enforcing Food Safety Standards.

PREVENTIVE MEDICINE
Concepts & Principles



INTRODUCTION

DNBI Ratio to Combat [3:1]

Operation Just Cause (Panama, 1989): heat injuries due to lack of acclimatization & shortage of drinking water

Haiti (1994): improper use of insect repellent contributed to a dengue fever rate of over 30% among hospitalized soldiers

Bosnia (1996): dining facility implicated in outbreak of Salmonella; cooks prepared eggs held in unrefrigerated CONEX for several days

Field Sanitation Team (FST) Concept

[AR 40-5, Chpt. 14]

- **Company Level**
- **1 NCO & 1 Enlisted Member (Highly motivated with time to perform duties)**
- Formal training (40 hrs) conducted by Preventive Medicine

Responsibilities: [FM 4-25.12]

Advise Commander:

- ✓ disinfecting water
- ✓ food sanitation
- ✓ personal hygiene
- ✓ waste management
- ✓ arthropod & rodent control
- ✓ injury prevention
- ✓ soldier training on PMM

Hygiene Issues

Operations Desert Shield/Storm(Saudi Arabia, 1990-91):
poorly controlled sanitation safeguards contribute to diarrheal disease (Shigella)

Considerations:

- shower & laundry frequency for cooks
- use of camouflage paint
- handwashing stations

Food Protection Issues

Considerations:

- Site Layout (latrines, garbage)
- Ration Tent
- Vermin Control

- **Time & Temperature Control for PHFs**
(cold storage; thawing; remote feeding)

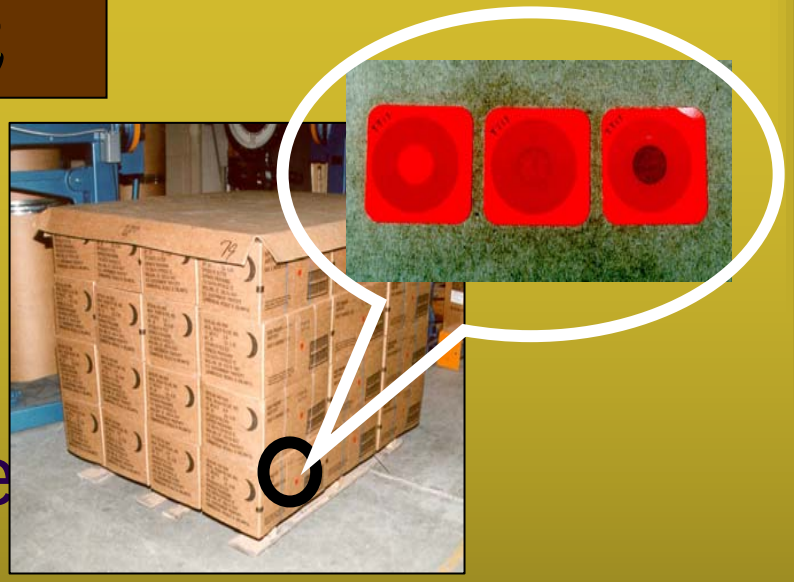
Ration Inspection

- **Inspect rations, supplements, & enhancements upon receipt**
- **Identify problems:**
  - ➔ ***package integrity***
  - ➔ ***wholesomeness***
  - ➔ ***contamination***

- **Examine TTI as quality indicator**

Time-Temperature Indicator (TTI)
-- *Heat Sensitive Label* --

On every case of MRE



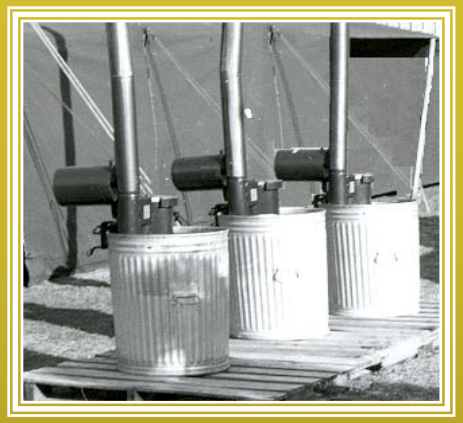
- Shelf Life of Rations
  - ➔ ***A Function of Storage Temp***
- Temperature Speeds Che
  Reactions

MRE Shelf Life = 36 mo. @ 80º F

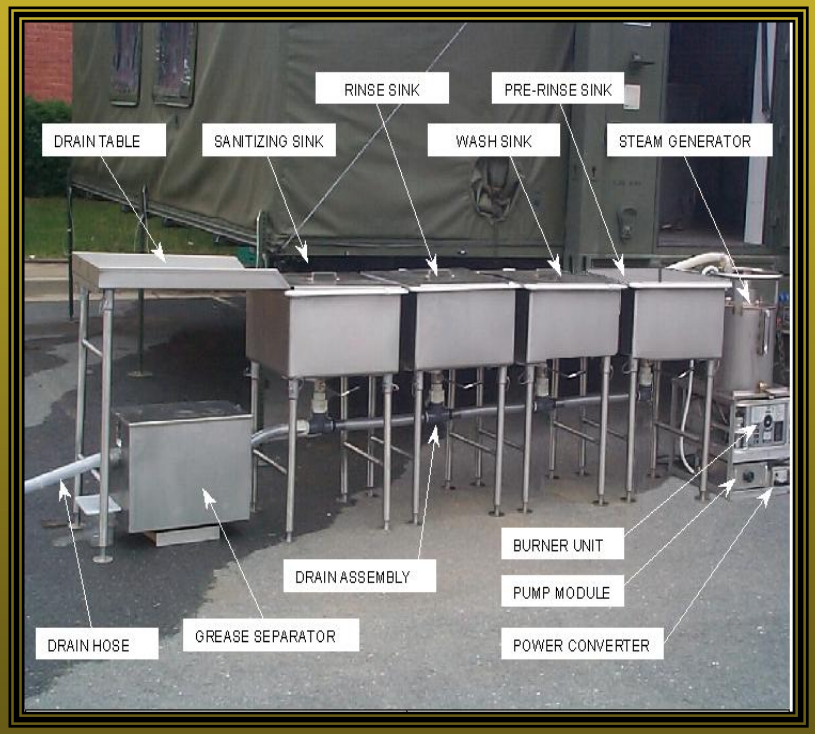
MRE Shelf Life = 6 mo. @ 100º F

MRE Shelf Life = 1 mo. @ 120º F

Equipment Cleaning & Sanitizing



Sanitation Evolution



Putting Food Safety in Perspective…

- UGR-H&S
  - ➔ ***92G & KCLFF, MKT or higher***
  - ➔ ***Semi-perishables***
  - ➔ ***Sanitation***
- UGR-A
  - ➔ ***92G & MKT or higher***
  - ➔ ***Perishables***
  - ➔ ***Refrigeration***
  - ➔ ***Sanitation***

POTABLE WATER

- Obtain water from approved source or fill point
- Chlorinate to 1 ppm
- Protect from contamination

Platoon suffers from bloody diarrhea after drinking water from 5-gallon cans filled from hose stored on latrine floor.

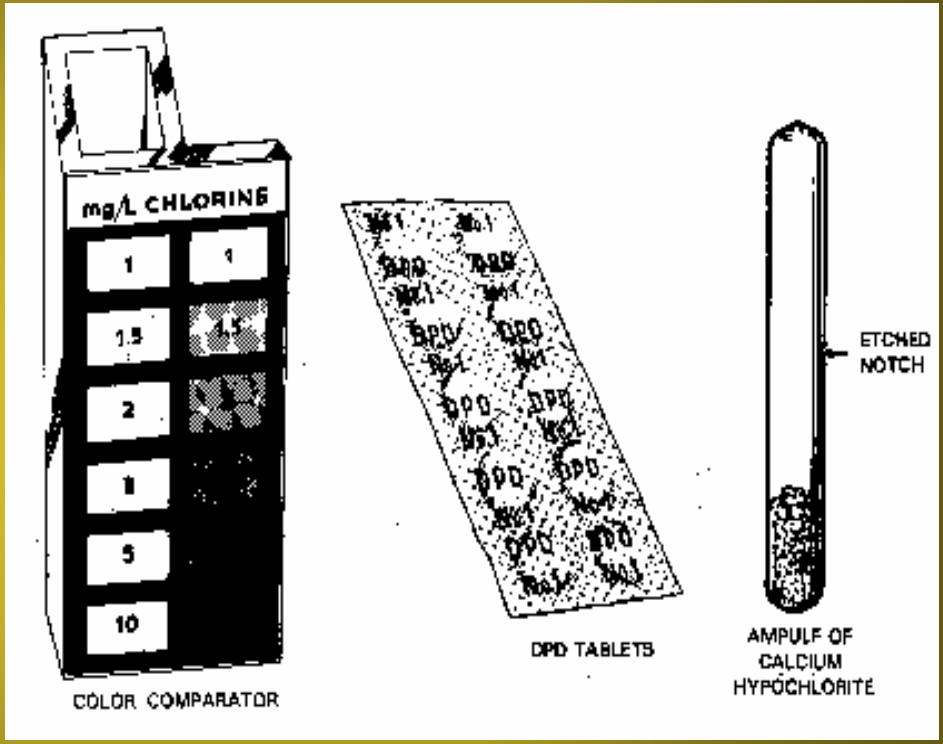
Inspect Water Trailer by PM

- Every 6 months in garrison *(when in use)*
- Before deployment or field exercise
- Quarterly
  - ***manhole cover***
  - ***drain plug***
  - ***interior***
  - ***spigots***

- Before Filling:
  - ***interior***
  - ***hose at fill point***
- After Filling:
  - ***manhole cover***

Chlorine Residual

- Chlorination Test Kit
  - ✓ step comparator
  - ✓ DPD #1 tablets
  - ✓ ampoules of calcium hypochlorite
- Heat Dissipates Chlorine
- 1-ppm Minimum Residual



Chlorinated water is your first barrier against contamination.

Steps to Chlorinate Water

1. **Reference FM 4-25.12**
2. **Add contents of ampoules or bulk HTH to water**
3. **Stir with clean stick**
4. **Wait 10 minutes**
5. **Check Chlorine Residual**
   - ➔ ***If ≥ 1-ppm – Wait 20 more minutes before releasing for consumption***
   - ➔ ***If < 1-ppm – add more chlorine solution to water and follow steps 3-5 until 1-ppm is reached.***

Actions for Storing Water Trailers

Residual water in tank promotes foul odors, bacterial growth, and rust during storage.

- **Remove drain plug**
- **Open spigots**
- **Prop manhole cover open (1/2 to 1 inch)**

Ventilation allows air circulation and drying.

SUMMARY

- Goal of Food Sanitation Program
- Publications
- Responsibilities
- Food Safety Terms
- Hazards to food
- Foodborne Illnesses
- Layers of Protection
- HACCP
- Field Safety Issues