FOOD SERVICE SERGEANT'S RESPONSIBILITIES TO EVALUATE SANITATION, SAFETY, NBC, ENERGY, AND FIRE PREVENTION PROCEDURES

THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT
ARMY CORRESPONDENCE COURSE PROGRAM
FOOD SERVICE SERGEANT’S RESPONSIBILITIES TO EVALUATE SANITATION, SAFETY, NBC, ENERGY, AND FIRE PREVENTION PROCEDURES

Subcourse Number 6198
EDITION A

United States Army Combined Arms Support Command
Fort Lee, Virginia 23801-1809

5 Credit Hours

Edition Date: September 1991

SUBCOURSE OVERVIEW

This subcourse is designed to teach you how to perform the food service sergeant’s responsibilities to evaluate sanitation, safety, NBC, energy, and fire prevention procedures. Contained within this subcourse is instruction on how to evaluate the sanitation program in a dining facility and at a field kitchen; evaluate conduct of subsistence protection and decontamination procedures; and develop and initiate safety, energy, and fire prevention programs.

There are no prerequisites for this subcourse.

This subcourse reflects the doctrine which was current at the time it was prepared. In your own work situation, always refer to the latest publications.

The words "he," "him," "his," and "men," when used in this publication, represent both the masculine and feminine genders unless otherwise stated.

TERMINAL LEARNING OBJECTIVE

TASK: You will perform the food service sergeant’s responsibilities to evaluate the sanitation program in a dining facility and at a field kitchen, evaluate conduct of subsistence protection and decontamination procedures, and develop and initiate safety, energy, and fire prevention programs.
CONDITIONS: You will have information from AR 11-27, AR 385-10, AR 420-90, FM 3-4, FM 8-34, FM 10-23, FM 10-25, TM 10-415, and TB MED 530.

STANDARDS: You will perform the food service sergeant's responsibilities to evaluate sanitation, safety, NBC, energy, and fire prevention procedures in accordance with AR 11-27, AR 385-10, AR 420-90, FM 3-4, FM 8-34, FM 10-23, FM 10-25, TM 10-415, and TB MED 530.
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The passing score for this subcourse is 70%.
LESSON

EVALUATE SANITATION, SAFETY, NBC, ENERGY, AND FIRE PREVENTION PROCEDURES

MOS Manual Tasks: 101-524-4112
101-524-4132
101-524-4135

OVERVIEW

TASK DESCRIPTION:

In this lesson, you will learn to evaluate sanitation, safety, NBC, energy, and fire prevention procedures.

LEARNING OBJECTIVE:

TASKS: Evaluate sanitation, safety, NBC, energy and fire prevention procedures.

CONDITIONS: You will be given information from AR 11-27, AR 385-10, AR 420-90, FM 3-4, FM 8-34, FM 10-23, FM 10-25, TM 10-415, and TB MED 530.

STANDARDS: Evaluating sanitation, safety, NBC, energy and fire prevention procedures will be in accordance with AR 11-27, AR 385-10, AR 420-90, FM 3-4, FM 8-34, FM 10-23, FM 10-25, TM 10-415, and TB MED 530.

REFERENCES: The material contained in this lesson was derived from the following publications:

AR 11-27.
AR 385-10.
AR 420-90.
FM 3-4.
FM 8-34.
FM 10-23.
FM 10-25.
TM 10-415.
TB MED 530.
INTRODUCTION

As the food service sergeant, you are responsible for evaluating sanitation, safety, NBC, energy, and fire prevention procedures. Your mission is to determine if these procedures are being correctly followed both in garrison and in the field. Never underestimate the importance of your task. As an experienced soldier, you know that in the area of sanitation alone, foodborne disease often presents a greater danger to our troops than the enemy.

PART A - DINING FACILITY AND FIELD KITCHEN SANITATION PROGRAMS

1. Review the Sanitation Program.

   a. Sanitation Program Goals. The goal of the Food Service Sanitation Program is the prevention of illness. The objectives are to protect food from contamination and to minimize the effects of contamination.

   b. Iceberg Theory of Foodborne Disease Outbreak Reporting. Only ten percent of the disease outbreaks are actually reported. An outbreak is an illness in two or more people from the consumption of the same adulterated food stuff, or one case of botulism.

   c. Food Service Facility Manager Responsibilities. You must:

      o Ensure that personnel are trained in the principles of food service sanitation.

      o TB Med 530 describes the sanitation requirements in dining facilities. Ensure that TB Med 530 is available for use by all food service personnel and that they comply with all provisions of the bulletin.

      o Maintain a clean, sanitary food service facility. Also, ensure that the equipment, and utensils are kept clean and sanitary.

      o Supervise your employees' personal hygiene practices.

      o Ensure the sanitary storage, preparation, transportation, and serving of food.

      o Ensure that equipment is maintained and replaced at regular intervals.

      o Attain nationally recognized certification in applied food service sanitation.
d. Definitions. The following terms are important to your understanding of the sanitation principles.

(1) **Accessible.** Accessible refers to equipment which is capable of being exposed for the purpose of cleaning and inspection, using simple tools such as a screwdriver, pliers, or an open-end wrench.

(2) **Adulterated Food.** Food is considered adulterated if any of the following conditions apply:

- If it bears or contains any poisonous or deleterious substance in a quantity that may render it hazardous to health.
- If it bears or contains any added poisonous or deleterious substance for which no safe tolerance has been established, or in excess of such tolerance if one has been established.
- If it consists in whole or in part of any filthy, rotten, or decomposed substance, or if it is otherwise fit for human consumption.
- If it has been processed, prepared, packed, or held under unsanitary conditions whereby it may have become contaminated with filth or rendered hazardous to health.
- If it is in whole or in part the product of a diseased animal or an animal which has died other than by slaughter.
- If its container is composed in whole or in part of any poisonous or deleterious substance that may render the contents injurious to health.

(3) **Carrier.** A person who carries an infectious agent in his body, but shows no sign of disease.

(4) **Cleaning.** The physical removal of food residues, ingredients, and other soiling materials.

(5) **Cross Contamination.** The transfer of harmful microbes from one food to another by direct or indirect contact.

(6) **Infection.** A disease caused by a living organism which has invaded the body and begun to multiply.
(7) Intoxication. A disease caused by consuming toxins in foods. Toxins can be the wastes of micro-organisms, chemical toxins, or natural toxins found in plants and animals.

(8) Perishable. A food that may spoil.

(9) Potentially Hazardous. Potentially hazardous foods are capable of supporting the rapid growth of harmful microbes.

(10) Readily Accessible. Refers to the equipment which is exposed or is capable of being exposed, cleaned, and inspected without the use of tools.

(11) Safe Temperature. As applied to potentially hazardous foods, safe temperature is an internal product temperature of 45°F (7°C) or below, or 140°F (60°C) or above.

(12) Sanitization. Sanitization is the bactericidal treatment of clean surfaces of equipment and utensils by an approved process. This process provides the sufficient latent heat or concentration of chemicals for an adequate period of time to reduce the bacterial count, including pathogens, to a safe level and leave no toxic residues.

(13) Spoilage. A decrease in the edible quality of a food because of improper handling or natural aging. This results in changes in flavor and odor.

(14) Temperature Danger Zone. An internal product temperature ranging from 45°F (7°C) to 140°F (60°C).

2. Identify the Enemy - Micro-organisms that Cause Contamination.

You must be able to identify the hazards and types of microorganisms which cause contamination. The following paragraph discusses the various causes of contamination in food.

a. Hazards to Food Safety. There are three types of hazards which cause contamination. These are described below.

(1) Biological Hazards. Biological hazards to food safety are bacteria, viruses, parasites, and naturally occurring toxins in fish or plants.

(2) Chemical Hazards. Chemical hazards to food safety are pesticides, food additives, and toxic metals such as lead, zinc, cadmium, antimony, tin, and copper. Toxic metal poisoning is usually caused when a toxic metal comes in contact with an acid food.
(3) Physical Hazards. Physical hazards to food safety include the intentional or accidental contamination of food with items such as glass chips, metal fragments, or wood splinters.

b. Major Groups of Micro-organisms. The five major groups of micro-organisms are bacteria, molds, yeasts, viruses, and parasites. Of the confirmed foodborne disease outbreaks in one year, approximately 68% were caused by bacteria; 20% were caused by biological toxins; 3.8% were chemical in origin; 3.2% were caused by viruses; and 4.5% had a parasitic origin.

(1) Bacteria. Bacteria are single-celled plants that come in a variety of shapes and reproduce by a process known as binary fission. Bacteria can cause foodborne infections, food borne intoxications, and food spoilage.

(a) Growth Requirements. Bacteria can live under various conditions but require six conditions for growth. These are:

- Moisture.
- Nutrients.
- Temperature.
- Atmosphere (pH range of 4.5 to 11.0).
- Time.

(b) Growth Rate. Bacteria colonies can double in size every 15 to 20 minutes following a three to four hour lag phase.

(c) Special Characteristics. When deprived of the growth requirements, some bacteria can form spores which make them resistant to high heat and humidity.

(2) Molds. Molds are multiple-celled fungi that produce a furry growth when growing in a colony.

(a) Reproduction. Molds form a reproductive body called a spore.

(b) Impact. Molds can cause spoilage in a wide range of foods. Some molds produce toxins, including aflatoxin. Aflatoxin may cause cancer in humans.
(c) Special Characteristics. Molds grow in fuzzy looking colonies; often they are brightly colored. Also, molds grow in a wide range of temperatures and humidity.

(3) Yeasts. Yeasts are single-celled fungi that reproduce by budding.

(a) Impact. Yeasts do not cause foodborne disease, but they are an important cause of food spoilage in high moisture, sugar containing foods.

(b) Special Characteristics. Yeasts can grow in a wide variety of environments, even in high acid foods like fruit juice. Yeasts reproduce by a process called budding. Yeasts aid in leavening bread and in fermenting beer, sauerkraut, and other products.

(4) Viruses. Viruses are infective agents that are smaller than other types of micro-organisms. They require a living cell for multiplication.

(a) Impact. Viruses can cause a variety of infections, including colds and infectious hepatitis.

(b) Special Characteristics. Viruses are the smallest of all living forms. They have no nucleus or cell wall. They cannot grow in food, but food acts as a carrier for infective viruses particles.

(5) Parasites. Parasites are animals or plants which live on or in an organism of another species (the host). Parasites obtain nutrients from the host's body.

(a) Impact. Parasites (trichina) cause a very serious, painful disease called trichinosis.

(b) Special Characteristics. Trichina can contaminate pig, bear, and walrus meat.

(c) Control. To control trichina, ensure that your personnel cook the infected meats to 150°F. Prevent cross-contamination between raw meat and other food items.

(c) Bacteria that Most Frequently Cause Foodborne Disease. The bacteria that cause most cases of foodborne disease are salmonella, staphylococcus, clostridium perfringens, and botulism.
(1) **Salmonella.**

(a) **Sources.** The primary sources of salmonella bacteria are the digestive tracts of humans and animals. Common contaminated food items are poultry, cracked eggs, and meat.

(b) **Symptoms.** The major symptom is gastroenteritis after 6 to 48 hours, resulting in disease by infection.

(c) **Control.** To control salmonella, guard against cross-contamination. Also, control it by ensuring that contaminated foods are cooked well, enforcing strict personal hygiene standards for food handlers, and not allowing foods to thaw at room temperature.

(2) **Staphylococcus.**

(a) **Sources.** The primary source of staphylococcus is the food handler, especially the hands, nose, mouth, and infected cuts.

(b) **Symptoms.** The major symptom is severe gastroenteritis after one to six hours, resulting in disease by intoxication.

(c) **Control.** To control staphylococcus, enforce strict personal hygiene and ensure that potentially hazardous foods (PHFs) are kept below 45°F. Once the toxin is formed, it is broken down by normal cooking temperatures.

(3) **Clostridium Perfringens.**

(a) **Sources.** The primary sources of clostridium perfringens are soil, the intestinal tracts of animals and humans, and fresh meats.

(b) **Symptoms.** The major symptom is gastroenteritis after 8 to 22 hours, resulting in disease by infection and intoxication.

(c) **Control.** To control clostridium perfringens, do not try to cook hot foods in great bulk. Ensure that foods are reheated to at least 165°F. Also, prevent cross-contamination and ensure that hot foods are kept above 140°F. The spore form is resistant to high heat and humidity.

(4) **Clostridium Botulinum.**

(a) **Sources.** The primary source of botulism poisoning is soil. Foods primarily involved are vacuum-packed, low acid foods.
(b) Symptoms. The symptoms of botulism poisoning include a headache, dizziness, double vision, difficulty in swallowing, paralysis, and death.

(c) Control. To control botulism, do not use home-canned foods in dining facilities. Be sure to separate abnormal looking cans and turn them in. Botulism has no odor, color, or taste. However, it will be destroyed if boiled for 15 minutes.

3. Protection of Food to Prevent Foodborne Disease. You must protect all food from contamination, from dust, insects, rodents, unclean utensils, work surfaces, unnecessary handling, coughs and sneezes, flooding, drainage, overhead leakage, and other sources of adulteration. You must also protect potentially hazardous foods (PHFs) against conditions conducive to bacterial growth.

a. Sanitary Quality of Food. Obtain all foods from approved sources and follow these guidelines:

- Home-canned foods are prohibited for use in dining facilities.
- Ensure that manufactured milk products meet federal standards for quality.
- Dry milk and dry milk products must be made from pasteurized milk and milk products. Do not use dry milk products reconstituted in the dining facility as fluid milk and serve it to diners.

b. Basic Food Protection Measures. The minimum food protection measures include the following:

- Ensure that personnel practice good sanitation.
- Enforce high standards of personal hygiene.
- Ensure that personnel keep PHFs refrigerated or heated to temperatures that minimize the growth of pathogenic micro-organisms.
- Inspect all food products on arrival and prior to acceptance at the dining facility.
- Ensure that your personnel cook food thoroughly.
- Provide and use adequate personnel, facilities, and equipment.

c. Product Temperatures. Ensure that the product temperature is controlled to prevent disease, retain the food
quality, and to preserve nutrients. The temperature danger zone is 45°F to 14°F (internal product temperature). The cumulative time that foods may safely remain in the temperature danger zone must not exceed three hours. This principle assumes that the internal temperature is taken at the food item's geometric center.

d. Thermometers. Ensure that workers use only metal, stem-type, numerically-scaled indicating or digital thermometers accurate to ± 3°F (1.7°C). Only equipment and bimetallic thermometers are authorized. Ensure that workers sanitize the thermometers between uses. Zone thermometers, glass alcohol, or mercury thermometers are prohibited in dining facilities. Always know the characteristics of the thermometers used in your dining facility.

e. Basic Principles of Food Storage. Proper food storage minimizes contamination and improves shelf life. Ensure that personnel follow these guidelines for storing food:

- Store food items in clean, nontoxic, covered containers.

- Store food items in clean racks, six inches above the ground.

- Except for required automatic fire-protection sprinkler heads, do not store food under unpalatable water lines. Do not store food in toilet facilities.

- Whenever possible, store nonacidic bulk food, such as cooking oil, syrup, salt, or sugar in the original package or container. If a transfer is required, make sure that the storage containers are labeled with the common name of the food. For the storage of bulk flour, sugar, and other similar items, place clean, disposable food grade plastic liners in metal storage cans. The liners must meet National Sanitation Foundation requirements.

- Do not use galvanized metal cans to store wet food or beverages.

f. Refrigerated Storage. Proper temperature control is the most effective means for minimizing the risk of foodborne illness and reducing loss through spoilage. Provide adequate refrigeration equipment to maintain a temperature of 40°F (4°C) or below.
Rapidly cool PHFs to 70°F (21°C) within two hours and 45°F (7°C) within four hours by:

- in ice bath.
- Shallow pans or small containers.
- Prechilled pans.
- Circulating cold water.
- Short-term storage in the walk-in freezer.
- Immersing the container in cold, running water.
- Slicing or layering the solid product.
- Placing it in several refrigerators.
- Using small amounts of food.

Also, ensure the following:

- Transport potentially hazardous foods at internal product temperatures of 45°F (7°C) or below.
- Keep frozen food stored at 0°F (-18°C) or below. Storage at 10°F (-12°C) is acceptable for a maximum of seven days immediately prior to preparation or tempering.
- Protect ice from contamination. Ice for human consumption must be potable. Do not use ice that is used for cooling stored food and food containers for human consumption.
- Do not use wet storage.
- Cover all food stored in refrigerated units, except raw, hardskinned, fresh fruits and vegetables. Do not store raw or prepared foods directly on refrigerator shelves.

g. **Heated Storage.** During service, foods held at a warm (bacteria incubating) temperatures contributes to foodborne disease outbreaks. Provide enough conveniently located hot food holding equipment with indicating thermometers to ensure that food temperatures are maintained during holding. It may be impractical to install thermometers on equipment such as hot-food tables, steam tables, steam kettles, heat lamps, cal-rod units, or insulated food transport carriers. In these cases, a product
thermometer must be available to check internal product
temperatures. The internal product temperature of PHFs requiring
hot holding must be 140°F (60°C) or higher. Transported PHFs must
be preheated and held at a temperature of 140°F (60°C) or higher,
unless prechilled and held at any internal product temperature of
45°F (7°C) or below.

Ensure that hot holding equipment (steam tables, warmers, or other
food storage equipment) is not used for heating cold foods. Heat
transfer depends on the nature of the product and its size and
shape. Generally, heat transfer is more rapid through liquid
products than through solids.

h. **Food Preparation.** Only let qualified personnel prepare
food. They should prepare the food with the least possible manual
contact. Ensure that they use sanitary, disposable plastic gloves
when preparing food. Fresh fruits and vegetables grown in areas
where human excreta is used as fertilizer, or where gastro-
intestinal or parasitic diseases are expected to be prevalent,
should not be consumed raw except with the approval of the
installation medical authority (IMA). Thoroughly wash fresh fruits
and vegetables from other areas with potable water prior to
serving.

i. **PHFs.** Ensure that personnel follow the guidelines below
for cooking, tempering, and handling PHFs.

1. **Cook.** Ensure that PHFs are cooked to a minimum
internal temperature of 140°F (60°C), except that they should:
   - Cook poultry, stuffing, and stuffed meats to 165°F
     or above.
   - Cook pork to 150°F or above.
   - Cook beef to 145°F or above.
   - Cook leftovers to 165°F or above.

Personnel may use whole, uncracked eggs, pasteurized egg products,
and dry milk products for food preparation.

2. **Tempering.** Ensure that PHFs are tempered or thawed
only:
   - In designated tempered units operated at an air
temperature of 45°F (7°C) or less.
   - In refrigeration units operated at an air
temperature of 40°F (4°C) or less.
o As a part of the convection cooking process.

o In microwave ovens, if cooked immediately after thawing.

o When authorized by the IMA, under running, potable water of 70°F (21°C) or below.

(3) Additional Requirements. When possible prepare potentially hazardous foods from chilled ingredients.

o Keep manual contact to a minimum.

o Wash hands before contact with food, between handling raw and cooked products, and between contact with soiled items and food.

o Clean and sanitize all food contact surfaces after each use.

o Prepare PHFs as close to serving time as possible. Under certain circumstances, PHFs may be prepared for subsequent serving periods provided that the product is:

- Rapidly chilled to an internal product temperature of 45°F (7°C) within 4 hours.

- Identified as "PREPREPARED" and labeled with the date and time of preparation.

- Maintained in the appropriate refrigerated or frozen food environment continually following preparation.

o When the preceding criteria can be met, PHFs, other than sandwiches, may be prepared and held as follows:

<table>
<thead>
<tr>
<th>Internal Product Temperature</th>
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<td>45°F (7°C)</td>
<td>36 hours</td>
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<tr>
<td>40°F (4°C)</td>
<td>5 days</td>
</tr>
<tr>
<td>0°F (-18°C)</td>
<td>45 days</td>
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o Hold frozen, commercially-prepared filled pastries, bulk sandwich spreads, and chilled delicatessen-type salads and puddings under refrigeration for a maximum of 48 hours after thawing or opening.
j. Made to Order Sandwiches. Made to order sandwiches are those prepared for an individual diner for immediate consumption. The sandwiches may be prepared one hour before a mass feeding operation provided that they are maintained at safe temperatures and are protected from contamination. Ensure that personnel discard made to order sandwiches after 3 hours.

k. Prepared Sandwiches. Ensure that prepared sandwiches are individually wrapped and labeled. Do not use leftovers when preparing sandwiches. Advise workers against letting condiments come into direct contact with the sandwich ingredients. Ensure that workers do not rework, rewrap, remark, relabel, or treat sandwiches in any way to extend their shelf life. Follow these requirements for prepared sandwiches:

- Keep hot sandwiches above 140°F (60°C). The total time from start of preparation to serving should not exceed 5 hours.
- Frozen sandwiches should contain only bread, meat, and cheese. Store them at 0°F (-18°C). Serve frozen sandwiches within 60 hours after the removal from the frozen environment.
- Chilled sandwiches prepared from chilled ingredients with PHFs must be acidified to pH 4.5 or below. Store, transport, and serve them at 45°F (7°C) or below. Discard them after 60 hours.

l. Food Display and Service (Milk, Cream, Nondairy Creamer, and Condiments. Provide milk and cream in sealed containers of one pint or less in capacity. Milk and cream may be drawn by the diner from commercially-filled container that is stored in a mechanically refrigerated bulk milk dispenser. Provide cream, nondairy creamer, or whitening agents in individual serving containers. Provide condiments in individual serving packages, from individually portioned dispensers, or in original covered containers (catsup, mustard, or steak sauce).

m. Ice Dispensing. Dispense ice using scoops, tongs, or other ice dispensing utensils, or from an automatic, self-service ice machine. Store utensils in a continuous flow dipper well, on a clean dry surface, or in an approved clean sanitizing solution.

n. Display Units. Make sure that there are an adequate amount of display units to maintain the proper temperatures. Protect display units with sneezeguards. Refrigerated displays should have thermometers and maintain a temperature of 45°F (7°C) or below. Heated displays should maintain a temperature of 140°F (60°C) or higher. Wet displays are prohibited.
o. Leftovers. Leftovers are classified as PHFs or non-PHFs. Keep leftovers to a minimum.

(1) Non-Potentially Hazardous Foods. You can maintain non-PHFs as leftovers if they are protected from contamination.

(2) Potentially Hazardous Foods. You cannot keep PHFs, such as foods which are creamed, handled, or highly perishable as leftovers. Ensure that personnel follow these guidelines for other PHFs kept as leftovers:

- Label the leftovers with the product, date, and time.
- Maintain a temperature below 45°F (7°C) for 24 hours, or above 140°F (60°C) for five hours.
- Heat chilled leftovers to an internal temperature of 165°F (74°C) or above.
- Offer leftovers only once. Freezing leftovers is prohibited. Discard leftovers that are mixed with fresh food remainders after serving.

p. Transportation. During transportation, keep food and utensils in covered containers or completely wrapped or packaged to protect them from contamination. Ensure that food products are maintained in their original containers or wrappers if possible. Cover all vehicles. Thoroughly clean unsanitary vehicles before transporting food items.

q. Storage and Use of Poisonous and Toxic Materials. Ensure that only those materials that are normally used in a dining facility and which are listed in the United States Department of Agriculture (USDA) Publication 1373 are stored and used. The materials must also display an Environmental Protection Agency (EPA) registration number on the label. In addition, ensure that the following guidelines are followed:

- All containers should be undamaged and clearly labeled.
- Store containers in locked cabinets or in rooms clearly labeled and away from food storage or processing areas.
- Use containers according to the labeled directions.
- All pesticides, except pyrethrums and rismethrin, should be handled by dining facility engineers only.
First aid supplies, personal medications, and aspirins are prohibited in the food service facility.

4. **Food Service Personnel (Health and Sanitation).**

You must ensure that personnel are not infected, disease-free, and maintain personal cleanliness to prevent contamination.

   a. **Employee Health.** Employees who work when infected with diarrhea, fever, sore throats, colds, infected cuts, boils, etc., can contribute to foodborne disease outbreaks.

      (1) **Clearance from Installation Medical Authority.** No person can work in a food service facility unless they are cleared by the IMA. If a person displays any of the following conditions, he will not be cleared for work:

         - An infection with any communicable disease or identification as a carrier of a disease that can be transferred to food.
         - A boil, infected cut, or an acute respiratory infection.

      Personnel who have been referred for medical examinations should provide you with a written, signed statement delineating duty limitations, if any.

      (2) **Daily Inspection of Personnel.** You must inspect all personnel daily at the start of each work period. Refer those exhibiting signs of illness to the IMA. Direct special attention to "detailed" military personnel and to food service attendants who serve or handle food and sanitize equipment and utensils.

   b. **Medical Examinations.** The IMA may require periodic or pre-employment physicals (these are normally not required in the continental United States). You must place emphasis on personal hygiene, food sanitation, and disease control. Personnel absent from work because of a communicable disease must have a written clearance before returning to duty.

   c. **Personal Cleanliness.** Ensure that your personnel maintain a high degree of personal cleanliness. They are required to practice good hygiene during all work periods in the food service facility.

      (1) **Guidelines.** You must enforce the following guidelines for personnel cleanliness. Personnel cleanliness includes:
- Keeping the face clean and free of sores.
- Keeping fingernails short, and hands and nails free of dirt. Fingernail polish and makeup are prohibited.
- Body cleanliness.
- A clean mouth and clean teeth.

You are responsible for determining the adequacy and cleanliness of hair nets and restraints. They must effectively prevent hair (including facial hair) from entering food or falling onto food-contact surfaces. Do not let personnel wear jewelry other than a plain wedding band.

(2) Custodial Duties. Do not allow food handlers to perform custodial duties, except at the end of their shift.

(3) Uniforms. Except during field operations, all personnel in the food preparation area should be furnished and wear a clean, light-colored uniform daily. The uniform should easily show dirt. This includes dish washers and permanent food service attendants. This does not apply while stocking, packaging, or working the checkout. Detail personnel can wear clean, white aprons. Personnel performing custodial duties can wear round neck T-shirts.

d. Employee Practices. Ensure that employees only consume food in designated areas. Designate an employee dining area where the contamination of food, equipment, utensils, or other items needing protection will not occur. This requirement is not intended to prohibit recipe testing or the consumption of drinking water. Advise employees to use clean, sanitized utensils for recipe testing. They should discard the portions used for testing. Ensure that employees clean and sanitize utensils before reuse.

Do not permit the use of tobacco in any form in the food preparation, storage, or utensil washing area. Designate a tobacco use area. Advise personnel to wash their hands before resuming work after using tobacco. Post "No Smoking" signs in areas not designated for tobacco use. Also, post signs to remind personnel of the requirement to thoroughly wash their hands and exposed portions of their arms:

- At the beginning of the duty.
- After using the toilet facilities.
- After using tobacco.
o Between handling soiled and clean utensils and equipment.

o Between handling raw and cooked foods.

o After performing custodial duties.

o After handling garbage or trash.

e. Training. Ensure that all personnel get periodic, documented training in the practices and the principles of foodborne illness prevention. They should also get first aid training for choking. The educational programs, signs, and other instructional or directive material should be developed and presented in the native language of food service personnel. You must attend an approved, formal training program in food sanitation. This program should be taught by the IMA, using installation veterinary and preventive medicine personnel and hospital dietitians. The National Institute for the Food Service Industry (NIFI) course in "Applied Food Service Sanitation" is recommended.

5. Equipment and Utensil Sanitation.

The following paragraphs contain information on the sanitary standards and requirements for the equipment and utensils used in your facility.

a. Compliance with Standards. Compliance with the National Science Foundation (NSF) standards and criteria should be demonstrated by the display of NSF seal on the equipment. It can also be demonstrated by a listing in the NSF "Food Service Equipment" for the year the equipment was manufactured, or through the NSF's one time evaluation program. In addition, compliance can be demonstrated by certification from a recognized independent listing laboratory. The laboratory must be acceptable to The Surgeon General and the certification must state that the equipment or utensils meet applicable standards.

(1) Compliance with Testing Laboratories. Compliance with Underwriters Laboratories (UL) standards can be demonstrated by testing and approval by the Underwriters Laboratories, Inc., or by other independent testing laboratories that are acceptable to the Surgeon General. The Surgeon General certifies that equipment meets UL standards.

(2) Approval of the Surgeon General. Offshore procurement of foreign manufactured food service equipment for use in overseas areas is authorized provided that the equipment meets the sanitation standards that are acceptable to the Surgeon General.
b. Material Requirements for Multi-use Equipment and Utensils. Multi-use equipment and utensils must be constructed, maintained, and repaired with safe materials, including finishing materials.

(1) Requirements. The materials used must conform to the following requirements:

- They must be corrosion resistant and nonabsorbent.
- They must be smooth, easy to clean, and durable under normal conditions.
- Single-service articles should be made of clean, sanitary, and safe materials, and should not be reused.
- They should not contribute to the contamination or adulteration of food, or impart odors, color, or taste.

(2) Specific Materials. The materials used must conform to the following requirements:

- Solder should be approved by the National Science Foundation. It should be composed of safe materials, have a smooth finish, be corrosion resistant, and not leak out toxic materials under normal contact with food, cleaning, or sanitizing agents.
- You may use hard maple or other durable nonabsorbent wood that is listed by the NSF for cutting blocks, cutting boards, and baker's tables. Wood may also be used for salad bowls and for single-service articles such as chopsticks, stirrers, or individual ice cream spoons if it meets the criteria for materials listed above. All other use of wood is prohibited.
- You can use safe and nonabsorbent plastics, rubber, or rubber-like materials provided that the materials are:
  - NSF-listed.
  - Resistant under normal use to scratching, scoring, decomposition, crazing, chipping, and distortion.
- Of sufficient weight and thickness to permit washing and sanitizing under normal conditions.

- Do not use paint on a food contact surface. A sealing compound should be used to provide a water and vermin-tight seal. The sealing compound should be NSF-listed.

c. Design and Fabrication. All equipment and utensils, including plasticware should be designed and fabricated for durability under normal use. They should be resistant to denting, buckling, pitting, chipping, and crazing. Food contact surfaces should be easy to clean, smooth, and free of difficult to clean corners, crevices, open seams, cracks, or chips. The equipment should be designed so that lubricants cannot leak on food or, if that is not possible, only safe lubricants listed in the USDA Publication 1373 can be used.

(1) Thermometers. Only use thermometers of a metal, stem-type construction, designed for insertion into food, or numerically scaled cooking utensils, accurate to ± 3°F, in your dining facility.

(2) Tubing (Dispensing and Drainage). Tubing that is used to convey beverages, or beverage ingredients to dispensing heads can come in contact with stored ice. This is permissible provided that the tubing is fabricated from safe materials, and is grommeted at entry and exit points to preclude moisture from entering the ice machine or ice storage bin. Ensure that personnel keep tubing clean. Ensure that the drainage or drainage tubes from dispensing units do not pass through the ice machine or the ice storage bin.

(3) Sinks and Drain Boards. Ensure that sinks and drain boards are self-draining.

(4) Bulk Milk Dispensers, Multiservice Shipping, and Dispenser Containers, and Dispensing Tubes. Bulk milk dispensers, multiservice shipping and dispenser containers, and dispensing tubes must conform to the provisions of MIL-STD-175.

(5) All Food Contact Surfaces. Unless designed by the manufacturer and approved by the IMA for in-place cleaning, ensure that all food contact surfaces are accessible for cleaning and inspection:

- Without being disassembled.

- By disassembling without the use of tools.
By easy disassembling with the use of only simple tools, such as pliers, a screwdriver, or an open-end wrench.

(6) **Walk-in Freezers or Refrigerators.** Ensure that the floors of walk-in freezers or refrigerators are graded to drain into an opening that indirectly connects to the drain and is protected against the entrance of vermin. Ensure that floor drains are installed to prevent the backflow of sewage.

d. **Equipment Installation and Location.** Install equipment using the guidance that is provided in the NSF's "Manual on Sanitation Aspects of Installation of Food Service Equipment".

(1) **Areas of Unprotected Sewer or Water Lines and Open Stairwells.** Do not allow food service equipment to be located under unprotected sewer or water lines, open stairwells, or other potential sources of contamination. An exception is automatic fire protection sprinklers.

(2) **Table-mounted Equipment.** Table-mounted equipment must be sealed to the table or countertop, unless it is portable, or elevate the legs to provide at least a 4-inch (10cm) clearance between the table or counter and the equipment. Ensure that there is enough clearance to allow for the cleaning of adjacent equipment and areas.

(3) **Floor-Mounted Equipment.** Floor-mounted equipment should be sealed to the floor or installed on raised concrete or other smooth masonry in a way that meets all of the requirements for sealing and floor clearance. An exception is made for this if it is portable or easily moved. Ensure that floor-mounted equipment is elevated on legs with at least 6 inches (15cm) of space between the floor and the equipment. Ensure that the equipment is installed to allow for the cleaning of adjacent areas, or for other equipment requiring cleaning.

(4) **Aisles and Working Spaces.** Ensure that the aisles and working spaces between the units of equipment and walls remain unobstructed and of sufficient width. This allows employees to perform their duties readily without the contamination of food or food-contact surfaces by clothing or other personal contact.

e. **Cleaning and Sanitation of Equipment and Utensils.** Wash, rinse, and sanitize tableware after each use.

(1) **Kitchenware and Food Contact Surfaces.** Ensure that your personnel wash and sanitize kitchenware and food contact surfaces after each use and following any interruption in operation during which contamination may have occurred. Significant
items include cutting boards, knives, slicers, mixers, grinders, food preparation sinks, and frozen desert machines.

(2) Equipment and Utensils Used in Preparation of PHFs on a Continuous Basis. Ensure that equipment and utensils used on a continuous basis in the preparation of PHFs are washed, rinsed, and sanitized. This should be done at intervals throughout the day as established by the installation medical facility.

(3) Food Contact Surfaces of Grills, Griddles, and Microwave Ovens. Clean the food contact surfaces of grills, griddles, and microwave ovens at least once per operating shift.

(4) Deep Fat Fryers. Ensure that your personnel drain, fat strain, and clean the internal surfaces of deep fat fryers at the end of each day's use. They should clean the external surfaces daily. Personnel should cover deep fat fryers when they are not in use. Nonfood contact surfaces should be cleaned as needed.

(5) Sponge and Sponge-Type Cloths. Do not permit the use of sponge and sponge-type cloths in the dining facility. Single-use disposable towels are preferred. If reusable washing cloths are used, ensure that the cloths used for wiping spills on tableware are clean, dry, and used for no other purpose. Ensure that personnel frequently rinse cloths used for wiping food spills on kitchenware and food contact surfaces in a sanitizing solution. Cloths used for cleaning the nonfood contact surfaces of equipment (counters, dining tables, shelves) must be clean and used for no other purpose.

(6) Steel Wool and Steel Wool Pads. Do not allow employees to use steel wool or steel wool pads for cleaning food contact surfaces.

(7) Procedures for Manual Cleaning and Sanitizing. Use a three compartment sink supplied with adequate hot and cold potable running water for manual cleaning and sanitizing. For equipment and utensils that are small enough to clean in a sink, ensure that your shift conducts the following sequence of steps:

- Clean the sinks before use.
- Prescrape and presoak them in a separate sink.
- Wash them in the first sink in a hot detergent solution (110°-120°F or 43°-49°C).
- Rinse thoroughly in hot, clean water (120°-140°F or 49°-60°C).
Sanitize in the third sink following one of the following methods:

- Immersion for at least 1/2 minute in clean, hot water at a temperature of at least 170°F (77°C).
- Immersion for at least 1 minute in a chemical sanitizing solution containing at least 50 parts per million of available chlorine as a hypochlorite. The temperature should be of at least 75°F (24°C), but not more than 110°F (43°C).
- Immersion for at least 1 minute in a clean solution containing at least 12.5 parts per million of available iodine and having a pH not higher than 5.0, at a temperature of at least 75°F (24°C), but not more than 110°F (43°C).

Air dry them. Dish towel use is prohibited.

Guidance on mechanical cleaning and sanitizing is contained in MIL-HDBK-740. You can also use NSF approved, spray-type or immersion dishwashers for cleaning and sanitizing. Prewash and presoak equipment and utensils, and clean the dishwashing machine daily.

When the requirements outlined in the TB Med 530 cannot be met, follow emergency procedures, such as using single-service utensils and liquid concentrate sanitizing solutions. Keep these on hand at all times.

f. Handling and Storage of Equipment and Utensils. Advise your personnel on the correct ways to handle and store equipment and utensils, as stated below.

(1) General. After you clean and sanitize utensils and equipment, handle the items in a manner which prevents the contamination of food contact surfaces. Store cleaned and sanitized utensils and equipment 6 inches (15cm) above the ground in a clean, dry location that is protected from contamination. Invert glasses and cups, and cover or invert other utensils where applicable. Do not store equipment, utensils, or single service articles in toilet rooms or vestibules.

(2) Single Service Articles. Store single service articles 6 inches (15 cm) off the ground in a way to prevent contamination. Handle these articles in a way to prevent the
contamination of food contact surfaces. Individually wrap knives, forks, and spoons or insert them in holders to prevent contamination. Dispense straws in a sanitary manner, and ensure that they are not reused.

g. Maintenance and Replacement. Ensure that equipment is maintained and replaced in accordance with TM 10-415 and the manufacturer's guidance. The IMA may authorize existing non-NSF listed equipment. All new equipment and utensils must be NSF-approved.


If you cannot clean your dining facility properly, and allow product contamination from nonpotable water and vermin in the dining facility, you will not be able to prevent foodborne diseases.

a. Water Supply. You must have a sufficient amount of potable water at your food service facility.

   o Ensure that workers only use potable water for culinary purposes.

   o You must have both hot and cold water.

   o Potable water can be transported in a bulk water transport system constructed to protect water from contamination.

   o Bottled water is authorized if it is obtained from an approved source and is kept in the original container.

   o The steam for cleaning or disinfecting should be free of any materials or additives.

b. Sewage. All sewage, including liquid waste from food processing and cleaning must be disposed of through a sanitary sewage disposal system. Nonwater-carriage sewage disposal systems are prohibited for fixed food service facilities, but may be authorized by the IMA for use in conjunction with temporary or field facilities.

c. Plumbing. Ensure that plumbing is sized, installed, maintained, and operated in accordance with the applicable plumbing code required by DOD Construction Criteria Manual 4270.1-M.

   (1) Protection of Potable Water. No cross-connection between potable and nonpotable water supplies is allowed. Back siphon prevention is required for potable water systems.
o An air gap of at least twice the diameter of the water supply inlet is required.

o Devices must be installed to protect against backflow.

o There will be no direct connections between the sewage system and drains unless properly trapped.

o A hose should not be attached to a faucet unless backflow prevention is provided.

(2) Grease Traps. Ensure that grease traps are located so that they are accessible for servicing. In new construction or renovation, grease traps must be external to the building.

(3) Food Waste Grinders. Ensure that food waste grinders are designed, installed, and maintained in accordance with the current American Society of Sanitary Engineers standards and applicable plumbing codes. They must:

o have an adequate water supply and flow rate.

o not be connected to discharge through grease.

o be easy to clean and kept clean.

d. Toilet Facilities. Ensure that toilet facilities are conveniently located and accessible. Ensure that there are separate facilities for diners and staff. Toilet facilities must be constructed so that they can be easily cleaned. The doors should be tight-fitting, self-closing, and vermin-proof. Exhaust ventilation to the outdoors should be provided. Toilet facilities should not open directly into any food preparation, serving, or storage areas, or areas where utensils are washed. Ensure that workers keep toilet facilities clean, in good repair, and adequately supplied. Provide multilingual hand washing signs when appropriate. Ensure that toilet facilities meet these requirements:

o They are located throughout the food preparation and serving areas.

o The sinks are designated for hand washing only.

o Each toilet facility has hot and cold water through a mixing valve, soap in soap dispensers, and sanitary disposable towels, roller towels, or hot air dryers. Multi-use hand towels are prohibited.
e. Garbage and Refuse. Containers, including dumpsters, compactors, and compactor systems must be nonabsorbent, leakproof, easily cleaned, and insect and rodent proof. Ensure that personnel cover containers when not in use. Provide outside dumpsters with drains and plugs. Ensure that containers are cleaned on a regular schedule, as prescribed by the IMA. Dispose liquid waste through a sanitary sewer.

(1) Storage. Ensure that garbage and refuse are stored in vermin-proof containers. Do not allow unprotected plastic bags, wet-strength paper bags, or baled units to be stored outside. Workers should break down cardboard boxes before disposal. Internal garbage or refuse storage rooms should be easy to clean, vermin-proof, and adequate in size. Store outside containers on a smooth, durable, graded, and nonabsorbent surface. Ensure that your personnel keep the surrounding area clean.

(2) Collection and Disposal. Garbage should be collected at a frequency approved by the IMA. Ensure that all spillage resulting from collection is cleaned up.

f. Insect and Rodent Control. Because of the significant potential for contamination, you must use effective measures to minimize the presence of rodents, flies, cockroaches and other vermin at food service facilities.

(1) Three Part Program. The three part program for controlling roaches is to:

   o Keep pests out of the food service facility by pest-proofing the building.

   o Improve sanitation, thus depriving pests of food and shelter.

   o Establish a good eradication program.

(2) Roaches. It is very important that you control the roaches that may appear in your dining facility to prevent contamination. You must know their characteristics, how to detect them, and how to prevent them.

   (a) Characteristics. There are three types of roaches, the German, Oriental, and American cockroach. Each of these are described below:
o The German cockroach is approximately 1/2 inch in length and pale brown in color. It has 2 dark strips and can be found in any level in rooms. It is especially common in restaurants.

o The Oriental cockroach is approximately 1 inch in length, shiny, dark brown in color, and is normally found at floor level.

o The American cockroach is approximately 1 1/2 inches in length, reddish brown in color, and is found in open, wet areas (drains and sewers).

(b) Detection. To detect the presence of roaches:

o Turn on the lights at night and watch for the roaches to scurry away.

o Roaches give off a strong oily, musty odor from their glands.

o Look for evidence of roach feces.

(c) Preventing Infestation. Prevent cockroach infestation by eliminating their food sources through frequent and careful cleaning. Also prevent it by depriving roaches of shelter and hiding places, and of easy access to your dining facility.

(3) Rodents. You must also control and prevent rodents that may enter your dining facility to prevent contamination. Know their characteristics, how to detect them, how to prevent them, and how to kill them, as described below.

(a) Characteristics. There are two types of rats that may appear in your dining facility, the Norway rat, and the roof rat:

o The Norway rat (sometimes called a sewer rat, brown rat, barn rat, or wharf rat) is heavy, brown in color, and 7 to 10 inches long (excluding tail). It is found in every state.

o The roof rat is slender, 6 1/2 to 8 inches long (excluding tail) and is found in the South, the Pacific Coast, and Hawaii.
(b) Detection. You can detect the presence of rodents by these characteristics:

- Droppings that are up to 3/4 of an inch long and 1/4 of an inch in diameter.
- Grease marks (rubmarks) and runways may appear next to vertical surfaces.
- Tracks will appear on dusty surfaces. Use talc to test for rats.

(c) Preventing Infestation. To prevent rodent infestation:

- Keep rodents out of the dining facility. Check for loose fitted doors, decaying masonry, vents, and unsealed basement windows.
- Destroy their hiding places, such as crowded storage rooms, garbage storage areas, and areas along walls and under crates.
- Starve them through careful storage practices and proper cleaning.

(d) Methods of Killing. The methods for killing rodents and their disadvantages are as follows:

- Trapping is a safe, but slow.
- Poisoning is effective, but you must use it with caution.
- Only use gassing as a last resort, and it should be done by a professional exterminator. Never use gassing within 20 feet of a building.
- Ultrasonic devices have not proven effective and are prohibited.

(4) Preventing Infestation of Other Pests. In addition to roaches and rodents, other pests such as, cats, flies, and birds also may cause contamination in your dining facility. To prevent them follow these guidelines:

- Protect openings to the outside of buildings.
o Use electric flying insect control devices if they are UL-approved and located in a place which prevents contamination or does not cause an electrical shock hazard.

o To control birds:
  - Follow good sanitation practices.
  - Check for openings in screens, windows, doors, and vents.
  - Trap birds where it is legal.
  - Prevent roosting by using screens, repelling pastes, and electric wires.
  - Use a pest control operator, if he specializes in birds.

**g. Linens and Clothes Storage.** Ensure that personnel store clean linens and clothes to protect them from contamination. Provide an adequate supply of clean linens, coats, aprons, uniforms, cleaning cloths, and similar items. Ensure that soiled items are stored away from food storage or preparation areas in closed, nonabsorbent containers, or washable laundry bags until laundered.

7. **Construction and Maintenance.**

You must be familiar with construction characteristics and maintenance procedures.

a. **Floors.** Floors must be constructed of a smooth, durable, and nonabsorbent materials. Carpeting is authorized only in the patron dining and administrative areas.

  o Do not use sawdust, wood shavings, peanut hulls, or similar material as a floor covering. Use clean butcher paper or USDA approved sawdust substitutes in the meat shop.

  o Floor drains must be properly installed, trapped, and provided with a sump and protection grid. Use floor drains on graded and sealed floors.

  o In new construction or renovation, cover or seal the junctures between floors and walls.
Mats and duckboards, if used, must be designed and constructed for easy cleaning in accordance with NSF Standard 52.

b. Walls and Ceilings. You must keep walls and ceilings in good condition. This includes doors, windows, skylights, and similar closures.

- The construction materials of the walls, including nonsupporting partitions, wall-coverings, and ceilings, must be light-colored, nonabsorbent, and easy to clean. In new construction or renovation, glazed structural units are recommended for wall construction in areas subject to heavy soiling.

- The attachments should be finished and sealed with easy-to-clean surfaces.

- Exposed constructions should be easy to clean, maintained in good condition, and mounted to preclude vermin harborage.

c. Utility and Service Line Installation. Ensure that service and utility lines are designed to permit the proper cleaning of floors, walls, and ceilings. Utility and service lines and openings through horizontal and vertical surfaces should be sealed to prevent the passage of moisture or vermin. Exposed pipes must be six inches (15 cm) from the floor and one inch (2.54 cm) from the wall to allow for adequate cleaning.

d. Cleaning Facilities and Equipment. Clean the dining facility and equipment when the least amount of food is exposed. Clean spills up as they occur and perform general cleaning between shifts. Have your personnel use the duster method only to clean wood. Ensure that workers do not use lavatories, the food preparation area, and utensil sinks for cleaning floors and equipment, or disposing of liquid wastes. Store supplies to prevent contamination.

e. Lighting. Ensure that lights are permanently fixed and provide the following illumination:

- At all food preparation surfaces and at equipment or utensil washing work areas, 50 foot candles of light are required. Lights must be 30 inches from the floor and illuminate with 30 foot candles of light.

- The storage area, lavatories, and dining room require 20 foot candles of light.
o Walk-in refrigeration units require 10 foot candles of light.

Shield all light fixtures and heat lamps in food preparation and storage areas. Also, ensure that they have shatterproof bulbs.

f. Ventilation. Ensure that all areas are well ventilated to the outdoors. Locally vent individual equipment or cooking areas at an exhaust rate of no less than 100 linear feet per minute. Filters or other grease-extracting equipment must be readily removable for cleaning and replacement, if they are not designed to be cleaned in place. Use air ducts to prevent dust, dirt, vermin, and other contaminants from entering the dining facility.

g. Dressing and Locker Rooms. Provide dressing rooms and lockers to personnel. Do not allow personnel to use them for food preparation, storage, service, or for utensil washing.

h. Paint. Do not allow the use of lead-based paint in the dining facility.

i. Food Service Facility Premises. Ensure that the food service facility and attendant property are kept free of litter. Walking and driving areas should be surfaced and graded. Washing privately-owned vehicles on the premises is prohibited. In addition, ensure that these requirements are met:

o Ensure that food service operations are kept separate from living or sleeping quarters.

o Ensure that laundry facilities are approved by the IMA and used only for the washing and drying of linens, cloths, uniforms, and aprons used in the food service facility. Put laundry facilities in a separate area.

o Do not allow live animals in food service facilities, except for edible fish, crustacean, and shellfish from approved sources that are intended for consumption. Fish for display in aquariums are permitted provided that the food service personnel are not involved in the cleaning or maintenance of aquariums.

o You can allow guide dogs to accompany blind persons in dining areas. You can also allow military patrol dogs to accompany security or police personnel, but only as part of their official duties.

Ensure that your personnel follow these special requirements for field food service operations:

- Do not keep PHFs as leftovers.
- Refrigerate A-rations.
- Use only insulated food containers with inserts that are cleaned and sanitized, and preheated or prechilled.
- Discard PHFs in insulated containers after four hours.
- Use condiments in individual servings.
- Wash and sanitize in the field in accordance with MIL-HDBK-740.
- Use field expedient hand washing facilities at food preparation areas.
- Dispose of waste to prevent the attraction of insects and rodents.

a. Personal Hygiene. The safety of food depends mainly on the health and hygiene of the people who handle it. Everyone who works in the kitchen should maintain high standards of personal hygiene. You must enforce standards for personal hygiene.

(1) Health Cards. The IMA may require health cards (food handler certificates) for food service workers. A health card does not automatically mean that workers are disease-free. It is possible to have a good health examination one day and be sick the next day. In some parts of the world, health cards for workers are emphasized more than in the United States.

(2) Inspection. As a food service sergeant, you must inspect all food handlers at the beginning of each work day. Do not let anyone who has a cold, cough, sore throat, intestinal illness, cut, sore, or skin infection handle food. Send these people to the medical unit for an exam. Figure 1 provides a sample of a daily inspection checkoff list. Check each of these items daily for all cooks assigned to you.

(3) Food Service Operations. Food handlers may transmit germs by picking their nose, scratching, using the latrine, and by smoking. Tell all food handlers to wash their hands and the exposed portions of their arms after using the latrine, between tasks, and after breaks. Do not let workers clean garbage cans, sewers, drains, latrines, or grease traps during food preparation.
periods. Make sure that your workers are always clean and healthy. Do not let anyone handle food if you doubt their health.

b. Water Treatment. Normally, water used for cooking, preparing beverages, and dishwashing comes from a source that is approved by a medical authority. In an emergency, when no approved source of water is available, use whatever water can be found. Ensure that it is disinfected before using it for preparing food, drinking, or dishwashing. If the water is in a man-made container, such as a tank or pipe, first test it for previous disinfection.
(1) Testing for Chlorine. To test water for chlorine, you need a chlorination kit (NSN 6850-00-270-6225). Ensure that these steps are followed:

1. Determine the desired chlorine residual in parts per million. At the point of consumption, the water from a distribution point should have at least one part per million chlorine residual. When you must disinfect a raw water supply, the finished product should have 5 to 10 parts per million chlorine residual as directed by the medical authority.

2. Select the desired color comparison tube (marked 1, 5, or 10) based on the desired chlorine residual.

3. Place one test tablet in the color comparison tube cap, and crush it with the bottom of the test tablet bottle. Put the crushed tablet into the color comparison tube.

4. Flush the spigots of the water container being checked, and fill the tube to a point just below the color band.

5. Place the cap on the color comparison tube, and shake the tube until the test tablet is completely dissolved.

6. Compare the color shade of the water with the color band on the comparison tube. The water is safe to use if the color of the water is the same shade or darker than the color band on the tube. Disinfect the water if the color is lighter than the color band on the tube. If you do not have a chlorination kit, get the medical activity or water supply unit to test the water. If the water cannot be tested, disinfect it before use.

(2) Disinfecting Water in 5-Gallon Cans. You can disinfect water in 5-gallon cans using chlorine ampoules. To do so, ensure that these procedures are followed:

- Break the chlorine ampoule into the canteen cup. Hold the ampoule in both hands with the etch mark pointing toward the canteen cup and the thumbs behind the etch mark. Next, push the ampoule with thumbs.
Add water to the cup until it is about half full and stir until the ampoule dissolves. This makes enough solution for two 5-gallon cans.

Pour half of the solution into each of the two 5-gallon cans. Add water to the cans, close the tops, and shake the cans several times.

Wait 30 minutes before drinking the water.

(3) Disinfecting Water in 400-Gallon Trailers. You can disinfect water in 400 gallon water trailers using calcium hypochlorite. To do so, follow these procedures:

Add one mess kit spoonful (or 33 ampoules) of calcium hypochlorite to a 1/2 canteen cup of water. Stir for about one minute or until the water and calcium hypochlorite mix to a milky solution.

Put the solution in the water trailer. If possible, add the solution before filling the trailer with water. Adding the water will mix the solution. If the trailer is full before adding the chlorine solution, mix the solution either by stirring it with a clean pole or by towing the trailer for 10 minutes.

Test the water again to be sure that it has enough chlorine.

Wait and additional 20 minutes before drinking the water.

(4) Disinfect Water by Boiling. Ensure that personnel disinfect water temporarily, by boiling it in a suitable container. They should bring the water to a rolling boil and boil it for 15 seconds to ensure disinfection. Remember, boiling does not leave any residual disinfecting power, so ensure that workers store the water in a clean, covered container and use it as soon as possible.

c. Food Utensils and Mess Kits - Mess Kit Laundry Line. In the field kitchen, most dishwashing is done with a mess kit laundry. A mess kit laundry is a row of four 32-gallon corrugated steel cans. The first is a waste can. The other three contain immersion heaters. A group of four cans can handle mess kits and cooking utensils for up to 80 people. If you are serving more people, you must have either more laundries set up or have the water replaced during the operation. It is essential to properly clean and sanitize pots, pans, utensils, and mess
kits to keep them free of germs. Ensure that the mess kit laundry is set up about 15 meters (50 feet) from the kitchen. Use Hand-dishwashing compound (NSN 7930-00-2281-4731) for field dishwashing.

d. Ration Transport. Clean the trucks that carry rations and ice from the supply source to the kitchen with soap and water. Advise against putting rations on the bed of the truck. Put perishables in an ice chest and ensure that all other items are on dunnage. Cover the top, sides, and back of the trucks to keep out dirt. You should also keep rations protected from dirt and the weather before, during, and after unloading.

e. Garbage Disposal. Ensure that your personnel dispose of food waste, cartons, and cans often so that they will not cause odors and will not attract insects or rodents. In the field kitchen, ensure that the liquid and solid waste are disposed of properly. This should be done right away. During any FTX, however, you must first consider local policy on garbage disposal.

In some cases, arrangements may be made to backhaul garbage. Make sure that you are aware of the policy on garbage disposal in your area of operations. Regardless of which method of waste disposal is used, the cook is responsible for retrograding waste in plastic bags that are provided with T Rations. If A or B Rations are used, the waste still should be placed in plastic trash bags. Ensure that cooks make waste as small as possible by nesting paper plates, cups, and empty tray pack containers.

(1) Liquid Waste. Get rid of liquid waste in a soakage pit or trench. Each soakage pit or trench has a grease trap. The grease trap strains out solid matter, soap, and grease. The soil absorbs the liquid waste. Figure 2 shows how to build a grease trap and a soakage pit. If you expect to be at a site for less than two weeks, have one pit dug for every 200 diners. If you expect to stay at a site for two weeks or longer, have two pits dug for every 200 diners. Use each pit on alternative days. If the ground water level is close to the surface, or if there is rock or clay near the surface, have a soakage trench dug. Figure 3 shows how to build a soakage trench with a grease trap.

(2) Solid Waste. There are two methods for getting rid of solid waste in the field, burn it or bury it.

(a) Bury. If you will be at a site for less than one week, bury solid waste in pits and trenches. The pits and trenches must be at least 27 meters (30 yards) from the dining area. They must also be at least 27 meters away from any water source that is used for cooking or drinking. Use the garbage pit if you will be at a site for one day. If you are at a site from
two days to a week, use the garbage trench. Ensure that personnel flatten the cans and break up the boxes before they are buried. T Ration cans should be nested inside of each other. During peacetime, you must be aware of environmental regulations that prohibit burying trash.

Figure 2. Soakage Pit and Grease Trap.

Figure 3. Soakage Trench and Grease Trap.
(b) Incinerate. If you are at a site longer than one week, have personnel burn solid trash in an open incinerator. They should use an inclined (Figure 4), or cross-trench incinerator (Figure 5). Incinerators will not burn liquid waste, so soldiers must separate the liquid from the solid waste by straining the garbage. Ensure they strain it with a coarse strainer, such as an oil bucket, a can, or a 55-gallon drum with holes in the bottom. They should pour the liquid through a grease trap into a soakage pit or trench. Next, workers should burn the solids that are left. They must then bury or haul garbage that will not burn to a disposal site. Ensure that the field incinerators are at least 45 meters (150 feet) from the kitchen and dining areas so that the odors will not bother the cooks and diners. Be aware that incinerators make smoke, and this may allow the enemy to identify your position. Again, during peacetime you must abide by regulations which prohibit burning trash.

![Inclined Incinerator](image)

Figure 4. Inclined Incinerator.

9. Evaluating the Dining Facility or Field Kitchen.

The IMA will periodically evaluate your dining facility. It is important that you maintain health and sanitation standards to keep the facility running smoothly.

a. Medical Inspection of Food Service Facilities. Inspections of your food service facility are performed by the IMA or his representative. All areas of the dining facility will be included in the inspection. These are periodic, unannounced
inspections. Your food service facility is inspected as often as necessary to maintain adequate sanitation standards. Comprehensive inspections are usually more effective than more frequent walk-through inspections. The inspections should cover an entire period of food preparation, service, and cleanup. The inspection of civilian eating and drinking establishments that are frequented by army personnel may be conducted in conjunction with the appropriate civilian health authorities. When a civilian eating or drinking establishment is suspected of presenting a public health risk to personnel, a joint inspection is recommended. When the correction is not obtained by civilian channels, the IMA should recommend to the commander that the establishment be placed off limits.

Inspections of multiple shift operations should be made during all periods of meal preparation, service, and cleanup to determine if the procedures are conducted in a sanitary manner. Your facility will be inspected during each operating shift.

![Figure 5. Cross-Trench Incinerator.](image)

Normally the IMA schedules a portion of the inspections for after duty hours, including weekends. Unannounced inspections are made to observe personal hygiene practices, the temperatures at which foods are maintained, and food preparation techniques. They are also made to observe the facility and equipment cleanliness, the condition of vending machines, and to check dishwashing and refrigerator temperatures.

The philosophy of inspection is that far more is accomplished in an atmosphere of assistance than in one of enforcement. The IMA representative should always strive to establish a relationship of mutual respect between the food service facility and
preventive medicine professionals. It is imperative that every inspection is viewed as an opportunity for health education with supervisors and food handlers. Potential health hazard consequences and reasonable solutions should be addressed. Inspectors should place emphasis on those items which have a direct bearing on the prevention of foodborne illness, as opposed to the numerous other requirements. These requirements, although necessary for optimum food service, are of lesser public health significance.

It is impossible to delineate every discrepancy in the area of food service sanitation. Those items which, in the opinion of the inspector, constitute a potential health hazard, will be reported with suitable recommendations, even though they are not specifically addressed.

b. Self Inspection. You will not find sanitation defects unless you look for them. You and your first line supervisors should inspect frequently so that there will be no surprises during a medical sanitation inspection.

PART B - SUBSISTENCE PROTECTION AND DECONTAMINATION PROCEDURES.

1. Protection of Stored Food and Water in an NBC Strike Area.

You must ensure that food is protected from NBC (Nuclear, Biological, Chemical) contamination. Consuming contaminated food may cause illness, injury, or death. Some foods may be decontaminated and consumed. However, decontamination is often a difficult and time-consuming process.

a. Protection of Food and Equipment from Nuclear Contamination. The two types of nuclear contamination are induced radiation and fallout. Food is contaminated by induced radiation only if it is very close to a nuclear blast. Food may be contaminated by fallout miles away from the blast site.

Even though food cannot be protected from induced radiation, it is easy to protect it from fallout. Food that is packaged in cans or other sealed containers is not in danger of contamination by fallout as long as it remains packaged. Ensure that personnel protect foods that are not packaged in this way, such as fresh fruits and vegetables, and fresh meat, by putting them in sealed containers. Insulated food containers and refrigerators are excellent protection against fallout. Container express (CONEX) and other containers, vans and trucks with covered cargo beds offer some protection. If these types of protection are not available, ensure that a canvas tarp or plastic sheet is placed over the items. This will make the decontamination easier.
b. Protection of Food and Equipment from Biological Contamination. The two types of biological agents are germs and toxins. Germs are living things that are so small that they cannot be seen without a magnifying device. Good sanitation in preparing and serving food will reduce contamination by germs. Since germs may be spread by insects and rodents, insect and rodent control is especially important. Toxins are poisonous substances produced by germs and other organisms. To protect food from toxins, advise personnel to store it in sealed, airtight containers. Ensure that the containers are decontaminated before they are opened.

c. Protection of Food and Equipment from Chemical Contamination. Chemical weapons release toxic chemicals. Ensure that workers protect food from chemical contamination by placing it in sealed, airtight containers. The containers must be decontaminated before the food can be consumed. Figure 6 shows what protection various food-packaging materials offer against chemical agents.

<table>
<thead>
<tr>
<th>PROTECTION</th>
<th>VAPOR</th>
<th>LIQUID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td>Airtight, sealed glass bottles; metal cans and foils; wooden barrels; earth or sod; and covered chambers</td>
<td>Airtight, sealed glass bottles; metal cans and foils, and earth or sod</td>
</tr>
<tr>
<td>Good</td>
<td>Glass bottles, metal containers, waxed paper, multilayer bags, polyester, *PVF, nylon, *cellophane, **aluminized polythene</td>
<td>Glass bottles, metal containers, polyesters, *PVF, cellophane, **aluminized polythene, and sealed wooden barrels</td>
</tr>
<tr>
<td>Moderate</td>
<td>Wooden barrels, crates, cardboard, polythene, polypropylene, and PVC*</td>
<td>Cardboard, polythene, polypropylene, PVC, *waxed paper, and multilayer bags</td>
</tr>
<tr>
<td>Poor or None</td>
<td>Paper, canvas, and textiles</td>
<td>Paper, canvas, textiles, wooden barrels, and crates</td>
</tr>
</tbody>
</table>

*No protection against lewisite.  
**Wet cellophane offers no protection.

Figure 6. Degrees of Food-Packaging Materials Protection.
2. Inspection for and Detection of NBC Contamination.

You must teach your cooks to properly inspect and detect NBC contamination. The detection methods are described below.

a. Background. Food or water that is thought to be contaminated by nuclear fallout, biological, or chemical agents must be inspected. If the food or water becomes contaminated, do not allow consumption unless it is first decontaminated. Food or water that is free from contamination may be contaminated by contaminated personnel or equipment, so inspect personnel and equipment as well as food and water.

b. Detection Methods. It is essential that every soldier, especially if he is involved in food service, knows how to detect NBC contamination. Methods of inspecting food, water, personnel, and material for signs of NBC contamination are described below.

(1) Nuclear Contamination. The radiac meter of the AN/PDR-27 radiac set is used to monitor food, water, personnel, and material for possible contamination by induced radiation or fallout. This instrument, commonly known as a Geiger counter, is shown in Figure 7. To inspect food, personnel, or material for nuclear contamination, follow the step-by-step directions in the operator's manual. TM 11-6665-209-10 is the operator's manual for the AN/PDR-27J, L, and Q radiac sets. TM 11-6665-230-12 is the operator's manual for the AN/PDR-27R. The radiac set provides an audible signal when radiation is present. For low level radiation, the signal is detectable only through the earphones.

Read the meter to determine the level of radioactivity. Food is contaminated if it produces a reading greater than two times that of the surrounding environment in an uncontaminated area. The AN/PDR-27 radiac set is not sensitive enough to detect toxic levels of radioactivity in water, so use water only from an approved source.
(2) Biological Contamination. Most army units have no capability to detect the presence of biological agents in food. Your supporting medical unit is responsible for inspecting food for biological agents. Advise your personnel to inspect the food for obvious signs of spoilage, such as slime, discoloration, and odor. But they must always keep in mind that contaminated food may look, smell, and taste normal. If you suspect that food has been contaminated by biological agents, request a veterinary inspection. Use water only from an approved source to prepare food and for drinking. If no water from an approved source is available, disinfect the available water before using it.

**WARNING:** Disinfection is NOT effective against all agents. Use water from an unapproved source only when there is no alternative. Food and water may be contaminated by contact with sick food handlers or unsanitary equipment. As previously mentioned, ensure that you inspect food handlers at the beginning of every shift, and inspect the food service operation to ensure that proper sanitation practices are followed.
(3) Chemical Contamination. Chemical agents can contaminate food and food containers. Most chemical agents change the taste, smell, or appearance of food as shown in Figure 8. However, it is important to remember that food may become very poisonous without any change in appearance, taste, or smell. Ensure that personnel are equipped with the M8-series automatic chemical agent alarm (Figure 9) and the M156 chemical agent detector kit (Figure 10). The latter detects the presence of toxic chemicals in an area. Also, you should have chemical agent detector paper (ABC M8 and M9) that detects and identifies agents on food, containers, personnel, and equipment. The operating instructions for the chemical agent alarm are in TM 3-6665-225-12. The operating instructions for the chemical agent detector kit are in TM 3-6665-307-10. You can detect chemical agents in water with the M272 detector kit.

<table>
<thead>
<tr>
<th>AGENT</th>
<th>TASTE</th>
<th>SMELL</th>
<th>INFLUENCE ON</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenical Aerosols</td>
<td>Acid</td>
<td>Bad</td>
<td>Discolors meat and vegetables</td>
<td></td>
</tr>
<tr>
<td>Cyanogen Agents</td>
<td>Bitter</td>
<td>Bad</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Irritants</td>
<td>Acid</td>
<td>Bad</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Mustard</td>
<td>Bad</td>
<td>Bad</td>
<td>Discolors meat</td>
<td></td>
</tr>
<tr>
<td>Nerve Agents</td>
<td>Bad</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>N-Mustards</td>
<td>Bad</td>
<td>Bad</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Phosgene</td>
<td>Acid</td>
<td>None</td>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>

Figure 8. Signs of Chemical Contamination.

3. Decontamination and Disposal of Contaminated Food or Water.

a. Disposal. Do not discard large quantities of food or water that have been contaminated. Generally food and water in airtight containers can be consumed after the containers have been decontaminated. Discard unprotected food and water, except in extreme emergencies. Decontaminate unprotected food and water only when there is no practical alternative. If food preparation equipment or food service personnel have been exposed to NBC agents, they must be decontaminated with the M258-series decontamination kit and hot soapy water before the food is prepared. In some cases, decontaminated food must be disposed of.
Figure 9. M8 Series Automatic Chemical Agent Alarm.

Figure 10. M156 Chemical Agent Detector Kit with ABC M8 Chemical Agent Detector Paper.
b. General Decontamination. Figure 11 summarizes the methods of decontaminating food, personnel, and material. Dispose of food that cannot be decontaminated according to local laws or military regulations.

(1) Nuclear. Ensure that your people follow the correct procedures when decontaminating food and water that have been contaminated by radioactivity. These procedures are described below.

(a) Food. Except in rare cases of induced radiation, rations in cans or other sealed containers are not in danger of radiological contamination. Normally, the contamination is limited to the outer surface of the sealed containers. Decontaminate the outer surface by removing the outer packaging or by washing or scrubbing the container under uncontaminated running water.

CAUTION: Never open sealed containers until they have been decontaminated and the effectiveness of the decontamination has been tested.

Suspect that food is contaminated, until checked, if not protected in sealed containers. Discard contaminated food unless there is no practical alternative. If the unit commander determines that the food must be decontaminated, follow these procedures:

- Move all foods from the contaminated area to a clean area.
- Decontaminate potatoes and hardskinned fruits and vegetables by washing or scrubbing them under uncontaminated running water. Then, peel, scrape them and wash again.
- Check the running water in a creek or stream for contamination, since it may have come from a source in the fallout area.
<table>
<thead>
<tr>
<th>SURFACE OR MATERIAL</th>
<th>CHEMICAL</th>
<th>BIOLOGICAL</th>
<th>NUCLEAR</th>
</tr>
</thead>
</table>
| Mess gear and canned, bottled or protected by impermeable container. | • Immerse in boiling, soapy water for 30 minutes and rinse.  
• Immerse in boiling water for 30 minutes.  
• Spray with DS2.  
• Wash in hot, soapy water (just below boiling point), rinse and aerate. | • Wash with soap and water, then immerse in disinfectant solution (food service chlorine disinfectant or ½ canteen cup of household bleach for each 10 gallons of water).  
• Boil in water for 15 minutes.  
• Immerse in household bleach solution (½ gallon of bleach to 25 gallons of water) for 30 minutes, then rinse.  
• Immerse in HTH solution (½ pound to 25 gallons of water) for 30 minutes, then rinse.  
• Immerse in STB solution (1 pound STB to 25 gallons of water) for 30 minutes, then rinse. | • Wash with soap and water; rinse.  
• Brush or wipe contamination from surfaces and containers. |
| Food Canned, bottled, or protected by impermeable container; hard-skinned fruits and vegetables | • Same as for mess gear and canned rations.  
NOTE: MRE pouch can also be decontaminated with towelettes from the M258-series kit. | • Same as for mess gear and canned rations. | • Same as for mess gear and canned rations. |
| Metals (painted)2 Vehicles, weapons, and equipment | • DS2.  
• Wash with hot, soapy water (just below boiling point) and rinse.  
• Spray with slurry from power-driven | • Wash with detergent and high-pressure water stream.  
• Apply dechlorite. Leave on 30 minutes, then remove by washing with a stream of water. | • Brush or wipe.  
• Wash.  
• Use organic solvents, caustics (not on aluminum or magnesium surfaces), complexing agents (of small value on weathered surfaces), or abrasives. |

Figure 11. Decontamination of Specific Items.
<table>
<thead>
<tr>
<th>SURFACE OR MATERIAL</th>
<th>CHEMICAL</th>
<th>BIOLOGICAL</th>
<th>NUCLEAR</th>
</tr>
</thead>
</table>
| Decontamination     | Decontamination apparatus. Remove slurry from surface after one hour and oil surface.  
*Weather.  
*Aerate.  
*Towelettes from M258-series kit may be used for individual weapon decontamination. | *Steam clean, using detergent.  
*Use household bleach solution.  
*Use 2 percent peracetic acid. |                                                                 |
| Personnel           | *Use towelettes from M258-series kit on exposed skin known or suspected to be contaminated. | *Bathe with soap and hot water.  
*Use towelettes from M258-series kit. | *Brush or wipe from skin and hair.  
*Bathe with soap and hot water. |
| Fabrics             | Cotton  
•Immerse in boiling, soapy water for one hour (1 pound soap to 10 gallons of water), stir.  
•Use 5 percent solution of sodium carbonate for G-agents.  
•Immerse in boiling water for one hour.  
•Launder by standard methods.  
•Use slurry.  
•Weather (except for V-agents).  
•Woolen  
•Immerse in warm (100°F), soapy water for one hour or longer with light agitation; dry items slowly (fabric may shrink). | Cotton  
•Boil in water for 15 minutes.  
•Put in autoclave for 45 minutes at 123°C (253°F).  
•Immerse in 2 percent household bleach solution for 30 minutes and rinse immediately.  
•Launder (destroys or inactivates all but highly resistant spores).  
•Woolen  
•Launder (fabric may shrink). | Cotton and Woolen  
•Brushing (removes contaminated dust, but presents dust hazard to personnel).  
•Launder (most practical procedure; waste must be controlled; fabric may shrink). |
| Leather Boots, gloves, and other items | *Rub with hot, soapy water (just below boiling point), and rinse.  
*Immerse in soapy water | *Immerse in 2 percent household bleach solution, and rinse.  
*Immerse in 2 percent | *Brush  
*Flush with water or soapy water. |

Figure 11 (Continued). Decontamination of Specific Items.
<table>
<thead>
<tr>
<th>SURFACE OR MATERIAL</th>
<th>CHEMICAL</th>
<th>BIOLOGICAL</th>
<th>NUCLEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastics (opaque)</td>
<td><strong>Apply DS2 (may soften or damage some plastics).</strong></td>
<td><strong>Wipe with soap and water.</strong></td>
<td><strong>Wash with detergents.</strong></td>
</tr>
<tr>
<td>Insulation, telephones, and panel boards</td>
<td><strong>Wash with hot, soapy water (just below boiling point), and rinse.</strong></td>
<td><strong>Wipe with alcohol or household bleach.</strong></td>
<td><strong>Wipe with water.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Weather.</strong></td>
<td></td>
<td><strong>Wipe or brush.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Aerate.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics (transparent)</td>
<td><strong>Wash with hot, soapy water (just below boiling point), and rinse.</strong></td>
<td><strong>Same as for plastics (opaque).</strong></td>
<td></td>
</tr>
<tr>
<td>Eyepieces and airplane canopies</td>
<td><strong>Weather.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Aerate.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Blot off surface.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber (impermeable)</td>
<td><strong>Spray with DS2, and rinse after 30 minutes.</strong></td>
<td><strong>Same as for leather.</strong></td>
<td><strong>Brush.</strong></td>
</tr>
<tr>
<td>Aprons, suits, and other items</td>
<td><strong>Immerse in hot, soapy water (just below boiling point) for one hour; do not agitate. Rinse with clear water, and hang up to dry.</strong></td>
<td></td>
<td><strong>Scrub or flush with water or soapy water (just below boiling point) for one hour; do not agitate. Rinse with clear water, and hang up to dry.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>For G-agents, use 10 percent sodium carbonate solution, rinse, and aerate.</strong></td>
<td></td>
<td><strong>For G-agents, use 10 percent sodium carbonate solution, rinse, and aerate.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Apply hot, soapy water with brushes and rinse.</strong></td>
<td></td>
<td><strong>Apply hot, soapy water with brushes, and rinse.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Spray with slurry form power-driven decontamination apparatus. After a few minutes, wash off with clear water.</strong></td>
<td></td>
<td><strong>Spray with slurry from power-driven decontamination apparatus. After a few minutes, wash off with clear water.</strong></td>
</tr>
</tbody>
</table>

Figure 11 (Continued). Decontamination of Specific Items.
<table>
<thead>
<tr>
<th>SURFACE OR MATERIAL</th>
<th>CHEMICAL</th>
<th>BIOLOGICAL</th>
<th>NUCLEAR</th>
</tr>
</thead>
</table>
| Rubber (natural and synthetic) Gloves, boots | • Spray with DS2, and rinse.  
• Immerse in slurry solution for four hours, rinse, and aerate.  
• Immerse in boiling, soapy water for two to eight hours; do not boil more than four times a year.  
• Use towelettes from M258-series kit in emergencies.  
• Aerate. | Same as for leather.  | Same as for impermeable rubber. |
| Mask, facepieces, and other rubber articles coming in direct contact with the skin. | • Use towelettes from M258-series kit in emergencies.  
• Wash with warm (100°F), soapy water. | • Wash in warm (100°F), soapy water; rinse in clear water; and dry at room temperature.  
• Wipe with 2 percent peracetic acid, wipe off excess immediately, and aerate 10 to 15 minutes. | • Wipe or brush off.  
• Wipe off with water and detergent (avoid wetting mask filters). |
| Tires, hoses, mats, and insulation. | • Spray with DS2, and rinse.  
• Apply thick slurry, allow slurry to remain at least 30 minutes, then flush with clear water (may be left on tires).  
• Immerse in boiling, soapy water for two to eight hours; do not boil more than four times a year.  
• Aerate.  
• Weather. | • Use same methods used for chemical decontamination.  | • Same as for impermeable rubber. |

NOTES
1. The best method of decontamination in a given situation could be any of the methods listed for a particular surface. The order in which the methods are listed does not indicate that one is preferred over another.
2. DS2 may soften fresh paint.
3. DS2 is not recommended for woolen items.
4. Alkaline soaps neutralize G-agent vapors which are driven out of the rubber during boiling. Boiling reduces the hazard to personnel performing the decontamination operation if there is no alkaline soap. Rubber articles can still be decontaminated by boiling in water; however, the hazard to personnel is increased.

Figure 11 (Continued). Decontamination of Specific Items.
o Brush all visible dirt from meat and fish. Washing them is not recommended. A thin layer may be stripped from the surface of the meat or fish. After the outer layer is removed from the food, check it with a radiac set. If the dose-rate reading has become lower, the contamination was confined to the surface of the food. Clean the knife, and remove second layer. Continue the cutting away process, within reason, until the dose-rate reading is near that of the surrounding environment.

Since prepared food in open containers will probably be contaminated, bury or dispose of it as determined by designated medical personnel. Similarly dispose of radiologically contaminated wash water and trimmings. Foods that are contaminated by induced radiation can only be decontaminated by aging. Usually, this requires less than 14 days. Carefully monitoring these foods will determine the progress of radioactive decay during aging. However, food that has been contaminated by induced radiation probably will be made inedible by blast and fire damage.

(b) Water. If you suspect that your water is contaminated, contact the water supply specialist in charge of the water point that you use. Normally, this person is in your supporting supply and transportation company. He is responsible for quality control for potable water. If there is no approved source of water, you must inspect the available water as described above. Use springwater or well water in preference to groundwater. In an emergency only, decontaminate water that has been contaminated by a fallout. Filter water through successive layers of leaves, gravel, fine sand, and charcoal. Ensure that it is also disinfected before used.

(2) Biological. You should have your cooks decontaminate food containers that have been exposed to germs as shown in Figure 11. They should decontaminate containers that are contaminated with toxins like those that are contaminated with chemical agents. Advise personnel to decontaminate the threads of jars with screw caps before the caps are removed. Do not use water from unapproved sources for drinking or preparing food unless no other water is available. If you must use such water, ensure that it is disinfected. Food contaminated by germs can be made safe by peeling, paring or heating, as described below.

(a) Peeling and Paring. Decontaminate potatoes and hard-skinned fruits that can be peeled or pared. First disinfect the surface of the food by using disinfectant, bleach, hi-test
hypochlorite (HTH), or super tropical bleach (STB), as described in Figure 11. After disinfecting the surface, peel or pare, wash, and, if appropriate, cook the food before serving.

(b) Heating. Heat is the best way to decontaminate biologically contaminated food. Thorough cooking reduces contamination to a safe level. Have your cooks decontaminate foods by one of the heat methods in Figure 12. The type of food and the amount of contamination determines which procedure to use. Ensure that the heat completely penetrates the food for the time shown.

<table>
<thead>
<tr>
<th>METHOD</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooking</td>
<td>Cook items in a pressure-type cooker (autoclave) at 15 pounds pressure at 250°F for 15 minutes or cook in a low-pressure cooker at 228°F for one hour.</td>
</tr>
<tr>
<td>Baking</td>
<td>Bake items such as bread or related items in a preparatory stage for 40 minutes at 400°F. Bake meat at 325°F for about two hours.</td>
</tr>
<tr>
<td>Boiling</td>
<td>Boil certain items for at least 15 minutes as an expeditious method when no other method is available.</td>
</tr>
</tbody>
</table>

NOTE: Foods, such as butter and ice cream, will not withstand any of the above treatments, and they must be destroyed.

Figure 12. Heat Methods of Decontamination.

(3) Chemical. Decontaminate food containers that have been exposed to chemical agents as shown in Figure 11. FM 3-5 has more detailed guidance. You should discard food that is unprotected or poorly protected and that has been exposed to chemical agents, unless no other food is available. Foods with a low water content and a high fat content, such as butter, lard, ham, cheese, bacon, fatty meat, and fish, absorb mustard and nerve agents so strongly that decontamination is impossible. Discard these foods. Destroy food that is exposed to liquid agents (nerve and mustard) or arsenicals. In an emergency, other food may be decontaminated that has been exposed to chemical agents as described in Figure 11. Do not allow workers to try to decontaminate water that has been exposed to chemical agents. Seek help from your supporting water supply unit.

c. Field Bakery. If your bakery comes in contact with persistent chemical agents, it must be decontaminated before it is used to produce bread. Any bread made using chemically contaminated equipment will be poisonous. If you are working in a field bakery, use equipment that can detect and identify
chemical agents. The first action that you should take when chemical agents are present is to don your protective mask and sound the alarm. Next, evacuate all troops in the area. Ensure that the troops are decontaminated and treated if necessary. When the level of contamination has been established, your commander will determine whether the bakery must be moved to a new site. Your NBC noncommissioned officer (NCO) will test the bakery equipment to find out what type of agent has been used. If it is a persistent agent, follow the steps below.

(1) Don Protective Gear. All troops in the area must wear a protective mask with a hood, an overgarment, boots, and gloves.

(2) Decontaminate the Equipment. Follow these procedures to decontaminate the equipment:

  o Heat the oven to 500°F, and allow it to burn for at least two hours with the doors slightly open.

  o Wash any mud off the equipment with soapy water.

  o Wash the equipment with a strong (5 to 10 percent) hypochlorite bleach solution. Your NBC NCO should be able to get STB through normal supply channels. If STB is not available, substitute commercial liquid chlorine bleach or powdered chlorine bleach mixed with clear water.

  o Use the bleach solution to wash all surfaces that come in contact with dough, flour, water, or other ingredients. Then wash all surfaces that might be touched by the bakers. The bleach solution must stay in contact with the contaminated surfaces for at least 30 minutes. More than one application may be necessary.

  o Rinse the equipment with clean water after 30 minutes.

(3) Test the Equipment for Contamination Before Use. Call the NBC NCO to ensure that no trace of the agent remains. If the testing reveals that the items are still contaminated, ensure that those items are decontaminated again. Repeat the procedure until tests show that no agent is present.

(4) Lubricate the equipment. Submit a work order to your supporting maintenance unit for any required lubrication.

(5) Have Bread Tested. Bake a sample loaf of bread, and have it tested by a veterinary inspection team.
d. Resuming Operations. In general, food is not prepared or served in an environment contaminated by NBC agents. Field kitchens must be moved to uncontaminated areas and be decontaminated before food service operations are resumed.

(1) Striking and Loading. It is important to remember that striking and loading the field kitchen is more difficult and takes longer when the troops are wearing chemical protective clothing. In exceptional situations, it may be necessary to serve food in a contaminated environment.

(2) Methods of Feeding. The method of feeding troops in such an environment depends on the type and extent of contamination and on the availability of collective protective shelters. Troops in an area that is contaminated by chemical agents with no detectable vapor hazard, or in an area where they are under the constant threat of NBC attack, can be fed on a rotating basis. Feed about 25 percent of the troops at a time. The other 75 percent should remain masked. Take care at all times to avoid contaminating food. If the troops are in a contaminated area where there is also a vapor hazard, feed them inside a shelter equipped with an overpressure system. The overpressure system fills the shelter with pressurized air that has been filtered to remove NBC contamination. The XM20 simplified collective protection equipment includes a built-in overpressure system. Since this shelter has a limited capacity, you and the commander must plan to feed the troops in shifts. Entering and exiting this shelter is a complicated procedure. FM 3-4 describes how it is done.

PART C - SAFETY, ENERGY, AND FIRE PREVENTION PROGRAMS

1. Safety. You must ensure that the personnel in your dining facility are aware of the safety rules and follow them to prevent accidents.

a. General Responsibilities. You are responsible for accident prevention to the same extent that you are responsible for production and services. You must:

   o Maintain a safe and healthy workplace.

   o Ensure that personnel follow safety and occupational health rules and regulations.

   o Promptly evaluate and take action as required to correct the hazards that are reported by workers, or those identified by an accident investigation.

b. Personnel Handling Rations and Supplies. Handling rations and supplies is potentially hazardous to your soldiers.
You must be alert and look for potentially hazardous situations and conditions. You must also train your personnel in the proper methods for handling rations and supplies.

(1) **General Storeroom Safety.** Apply the following guidelines for storerooms.

- Do not store chemicals near food.
- Store containers by contents, size, and type.
- Use sturdy shelves and place heavy items on the lower shelves.
- Have the shelves low enough so that you can easily see the contents.
- Use a well-braced ladder to reach items on high shelves.
- Keep the aisles clear and the floor clean and dry.

(2) **Lifting and Moving.** Rations come in containers of many sizes, types, and weights. Teach your people the right way to lift heavy things. Below are some common sense precautions that you and your cooks should follow.

Lift heavy things by following these procedures:

- Get a good grip on the container, not on the metal bands or strapping.
- Get a firm footing, with your body weight even.
- Bend your knees, keep your back straight, and use thigh and shoulder muscles for lifting.
- Keep the load close to the body.
- Watch where you are going. Be Alert.
- Walk normally, and ease the load to a resting place.
- Stack rations the right way. Put heavy boxes on the bottom.
- Make sure that things you can trip on are out of the way.
o Wear work gloves when you open wooden cases. Take out all nails that protrude, and get rid of empty cases.

o Get help when you need it.

c. Personnel Preparing and Serving Food. You must provide OJT on safety rules for preparing and serving food.

(1) Common Accidents. Burns, collisions, and falls are common accidents in dining facilities. If workers are in a hurry while cooking or serving food, these accidents are more likely to occur. To avoid accidents in the food preparation area, ensure that workers take the following precautions.

(a) Burns.

o Refuel burners in the designated refueling area only. Never add fuel to the burner in the kitchen.

o Move burners to the designated lighting area before igniting them.

o Keep burners away from walls.

o Keep a fire extinguisher handy.

o Operate burners and ranges according to instructions in the operator's manuals.

o Turn handles of pots and pans toward the center or back of the range.

o Use hot pads when you handle something hot.

o Change steam table inserts carefully.

o Do not crowd the cooking area.

o Know where you are going to put a hot pot before you pick it up.

o Never stand in front of the range cabinet door when you open it.

o Do not slam the range cabinet door when you close it.

o Do not spill grease on open flames.
(b) Collisions and Falls. When workers hurry when preparing food they may bump into someone and cause them to spill hot food on themselves and others. Sometimes these spills may be small and not seen until someone slips and falls on them. Emphasize the following procedures to avoid collisions and falls:

- Do not run or hurry when you carry hot food.
- Clean up spills immediately.
- Keep footwear in good condition.
- Warn others when you are passing through with hot food.
- Always watch your step.
- Keep field range doors closed.
- Keep floors under, around, and behind appliances clean.
- Clean grease filters frequently.
- Leave doors between cooking and serving areas open, if the doors have no windows.
- Give a warning when passing servers.

(c) Knives. When preparing foods, cooks may use many different kinds of knives. Knives are the cause of many kitchen accidents, such as cuts and stab wounds. Ensure that your cooks use knives carefully. Ensure that the following rules are followed using knives:

- Keep knives sharp.
- Use the right knife for the job.
- Cut away from the body.
- Keep knives in racks when they are not being used or cleaned.
- Do not palm vegetables and fruits when you cut through them.
- Do not leave a knife or other sharp instrument lying on a worktable. It might become covered with vegetables or other foods and be a hazard to the person cleaning the table.

- Do not try to catch a falling knife; step back and let it fall.

- Do not leave knives lying around to be washed later. When you use them, clean them and put them back in the rack.

- Do not carry knives when your hands are full.

- Do not use knives to open cans.

- Do not soak knives. Remove them from the water immediately.

(d) Opening Tray Packs. You must also consider safety when opening T Rations, especially when workers use handheld can openers. Opening a tray pack with a hand-held can opener can result in a serious cut, because it leaves very sharp edges on the pans. Ensure that workers use mounted T Ration openers when possible. They should discard hand-held openers after several uses because they dull very quickly. Ensure that workers do not use knives or other sharp implements to open corners that the fully modified can opener misses. The P38 is included in each module for this purpose. Personnel should tilt heated swollen cans slightly to the right or left when opening. This prevents burns from juices that squirt from the pan.

(2) Other Equipment. Your people must be extra careful when using equipment. Never let them use equipment until they are trained to operate it. They should always follow the manufacturer's operating and maintenance instructions. Advise workers not to leave machinery running. Use all safeguards. If you think that equipment is not working correctly, have the engineers check it —do not tinker with equipment. Some general equipment hazards depend on the energy source. Some hazards associated with common sources of energy and safety precautions are as follows:

- Gas can cause explosions, fires, burns, and toxic fumes. To help prevent this, do not put flammable material near the flame. Air the room before you light the pilot.
Steam can cause burns and explosions. To help prevent this, make sure that the gages are working. Open the doors or lids as instructed.

Electricity can cause shock. To help prevent this, do not handle equipment with wet hands. Keep grease and water out of wiring. Unplug the equipment before you clean it. Do not stand on a wet floor when you operate equipment.

2. Accidents.

When accidents occur in your dining facility, you and your staff must be prepared to handle them. The information below describes how to deal with accidents.

a. Administering First Aid. It is important that soldiers know how to administer first aid. Soldiers may have to depend upon their first aid knowledge and skills to save their life, or the lives of other soldiers. They can also prevent permanent disability, and reduce long periods of hospitalization by knowing what to do, what not to do, and when to seek medical assistance. Anything that soldiers can do to keep others in good fighting condition is part of the primary mission to fight or to support the weapons system. Most soldiers are able to return to their units to fight and/or support primarily because they are given appropriate and timely first aid followed by the best medical care possible. Therefore, ensure that all soldiers know the following basics:

- Check for breathing. A lack of oxygen intake (through a compromised airway or inadequate breathing) can lead to brain damage or death in very few minutes.

- Check for bleeding. Life cannot continue without an adequate volume of blood to carry oxygen to tissues.

- Check for shock. Unless shock is prevented or treated, death may result, even though the injury would not otherwise be fatal.

(1) Evaluating a Casualty. After personnel thoroughly learn how to administer each of the life saving measures discussed above and other first aid procedures, they must know how to apply this knowledge. They may have to apply first aid instantly, or under adverse conditions. Any soldier who encounters an unconscious and/or ill or injured person must be able to carefully and skillfully evaluate the casualty to determine the measures required to prevent further injury or death. One of the cardinal principles of treating a casualty under combat or other adverse conditions is that, as the tactical
situation permits, or until the soldier is relieved by another individual, he must continue the evaluation and treatment. Ensure that your soldiers know the first aid procedures listed below.

Step one: Check the person for responsiveness by gently shaking or tapping him while calmly asking, "Are you okay? Next, perform one of the following:

- If the person is conscious, ask him to identify the location(s) of pain if he can, or to identify the area in which there is no feeling. If he has an airway obstruction, clear his airway.

- If he is unconscious, proceed to step two.

Step two: Check for breathing. Next, perform one of the following:

- If the person is breathing, proceed to step four.

- If the person is not breathing attempt to ventilate him. If an airway obstruction is apparent, clear the airway obstruction, then ventilate.

- After successfully clearing the person's airway, proceed to step three.

Step three: Check for pulse. If a pulse is present, and the person is breathing, proceed to step four, otherwise perform one of the following:

- If the pulse is present, but the casualty is still not breathing, start rescue breathing.

- If the pulse is not present, start cardiopulmonary resuscitation (CPR).

Step four: Check for bleeding. Look for spurts of blood or blood soaked areas of clothing. Also check for both entry and exit wounds. If the person is bleeding from an open wound, perform the needed first aid measures.

Step five: Check for shock. If signs/symptoms of shock are present, begin treatment immediately.

Step six: Check for fractures. Check for signs/symptoms of spinal injury, fractures of the limbs, and other body areas (e.g., shoulder or hip) and treat as necessary.
Step seven: Check for burns. Look carefully for reddened/blackened skin, or singed clothing. If burns are found, begin treatment.

Step eight: Check for possible head injury (concussion, skull fracture, etc.)

(2) Calling for Medical Assistance. When you evaluate/treat a casualty, seek medical assistance as soon as possible, but do not to interrupt treatment to seek assistance, because this may cause more harm than benefit to the person. If the situation permits, a second person may be sent to find medical assistance while the first person continues with the evaluation/treatment. The person may require intravenous infusion (IV). He therefore should be evacuated as soon as possible to the nearest medical treatment facility where an IV will be administered by medical personnel.

b. Reporting Accidents. Ensure that personnel know which accidents to report and which accidents that they should not report, as listed below.

(1) Reportable Accidents, Illnesses, and Injuries. Advise personnel to report events that result in one or more of the following:

- Injuries (fatal, or nonfatal) to an on- or off-duty military personnel.
- Injuries (fatal or nonfatal) to on-duty army civilian personnel, including nonappropriated fund employees, and foreign nationals that are employed by the army when incurred while performing duties in a work compensable status.
- Occupational injuries or illnesses (fatal or nonfatal) to army military personnel and army civilian employees, nonappropriated fund employees, and foreign nationals employed by the army.
- Injuries (fatal or nonfatal) or illness to non-army personnel, or any damage to non-army property as a result of army operations.

Also, ensure that your personnel report injuries that result in:

- A fatality, regardless of the time between the initial injury event and the death of the person.
- Permanent, total disability or permanent partial disability.
- A lost workday case, involving days away from work.
- A nonfatal case without lost workdays.

Be sure to report persons who are missing as the result of an accident or a fatality.

(2) **Nonreportable Occupational Illnesses and Injuries.** The following occupational illnesses and injuries need not be reported.

- **Nonoccupational diseases.** These include injuries that are associated with nonoccupational diseases, where the disease itself, not the injury, is the proximate cause of the lost time. For example, a minor cut suffered by a hemophiliac which results in time away from work.

- **Self-Inflicted Injuries.** These include suicides, suicide attempts, or voluntary self-inflicted injuries. For example, Russian roulette.

- **Criminal assault.** Injuries that result from criminal activity, where the intent to inflict injury was present. These cases include assault, rape, sodomy, murder under Article 118 UCMJ (but not negligent homicide), voluntary manslaughter, and attempts to commit any of these offenses. Also, injuries due to arson, unless they are incurred by personnel who are employed as firefighters, in which case the injury would be an occupational injury.

- **Prior-service injuries.** Injuries that are suffered before entry into service or employment, unless they are specifically aggravated by current tenure of service.
o Infective and parasitic diseases and poisonings. An illness caused by specific organisms and toxins (such as food-borne disease), unless the disease is directly related to or the result of the worker's employment. For example, hepatitis in an employee working with hospital instruments or involved in waste disposal processes would be considered an army accident. Acute respiratory diseases in employees, particularly in basic trainees, are not army accidents because of the inability to separate occupational from other environmental causes of these diseases.

o Strains. Strains are not reportable when they result from pre-existing musculoskeletal disorders or minimal stress or strain. An example is simple, natural, nonviolent body positions or actions, such as coughing or sneezing. These injuries are unrelated to accident-producing agents or environments normally associated with active participation in daily work or recreation.

o Hospitalization. Hospitalization of a person solely for observation and subsequent release.

o Escape from Custody. Injuries or fatalities to persons in the act of escaping from or eluding military or civilian custody or arrest.

o Death due to natural causes, unrelated to the work environment.

o Adverse Reactions. Adverse bodily reactions resulting directly from the use of alcohol or other drugs that are not administered by or under the direction of competent medical authority.

(3) Accident Classes. Accident classes are used to determine the appropriate investigative and reporting procedures for accidents. The various classes are listed and described below.

o Class A accident - An army accident in which the resulting total cost of property damage and personnel injuries or occupational illness is $500,000 or greater. Also, an injury or occupational illness that results in fatality or permanent total disability.
o **Class B accident** - An army accident in which the resulting total cost of property damage and personnel injuries or occupational illness is $100,000 or more, but less than $500,000. Also, an injury or occupational illness that results in permanent partial disability or the hospitalization of five or more personnel in a single occurrence.

o **Class C accident** - An army accident in which the resulting total cost of property damage is $10,000 or more, but less than $100,000. Also, an injury or occupational illness that results in a lost workday case.

o **Class D accident** - An army accident in which the resulting total cost of property damage is less than $10,000. Also, an injury or occupational illness that results in a lost workday/lost time case with 1 or more days of restricted work activity, or a nonfatal case without a lost workday or medical treatment.

3. **Tailoring the Safety Program.**

You must implement safety programs for personnel in your dining facility and tailor them to meet the requirements discussed below.

a. **Operational Procedures.** When conducting safety programs:

   o Ensure that the physical standards for your facility and equipment meet or exceed the safety and health standards that are established in the pertinent host government, and in Federal, State and local statutes, and regulations. The standards must also meet army regulations.

   o Ensure that practices and procedures that minimize accident risk are incorporated in regulations, directives, SOPs, special orders, training plans, and operational plans. Ensure that SOPs are developed for all operations entailing risk of death, serious injury, or property loss. Also, ensure that all personnel know how to recognize unsafe equipment and how to fix or replace it.

   o Develop and implement actions to meet the responsibilities contained in accident prevention plans of the headquarters, and to provide focus and continuity to safety program efforts.
- Post DD Form 2272 (Department of Defense Safety and Occupational Health Program) in all industrial workplaces.

- Do not initiate or support reprisal action against employees who identify hazards, raise safety concerns, or engage in authorized safety and occupational health activities. All Army personnel are protected from coercion, discrimination, or reprisals for participating in Army safety and OH programs. This includes:
  - Preserving individual anonymity of those submitting safety and health complaints when requested.
  - Ensuring a prompt, impartial investigation of allegations of reprisal.
  - Providing corrective action when the allegations are substantiated.
  - The right of an Army civilian to decline to perform an assigned task because of a reasonable belief, under the circumstances, that the task poses an imminent risk of death or serious bodily harm, and there is insufficient time for the person to seek effective redress through normal hazard reporting and abatement procedures.

- Establish specific plans to assure continuity of safety and OH program services during tactical operations or mobilization. These plans should address the mission definition, organizational concepts, and the staffing and operational procedures that are required to assure maximum safety function support to the combat mission. These plans should be developed by all organizations and commands having a combat or combat support mission, such as TOE units, depots, ammunition plants, and area support groups.

b. Formal Inspections. Safety inspections of your dining facility will be conducted at least annually. The goal of regular safety inspections of your facility is to identify high risk areas. By identifying these areas before accidents happen, accidents may be prevented.

The inspections will emphasize the use of interviews, operational reviews, performance testing, and similar techniques designed to detect high risks of both a behavior and environmental character. The Standard Army Safety and Occupational Health Inspection
(SASOHI) procedures will be used in inspections and surveys. You should have the appropriate diagnostic equipment, that is consistent with your mission, to collect the essential information for analysis.

c. On the Spot Corrections. Instead of letting unsafe conditions go unnoticed until accidents occur, or until a formal inspection detects them, you must ensure that unsafe conditions are corrected on the spot. Advise personnel to report unsafe conditions to their supervisor as soon as possible to expedite corrective actions. These reports can be submitted directly to unit safety personnel, installation safety offices, or other appropriate points of contact such as inspectors general. If these report channels are ineffective, commands will use the Army Employee Hazard Reporting System procedures.

d. Training and Evaluation. Ensure that you implement the following training and evaluation guidelines:

- Ensure that the job descriptions of personnel who perform safety or Occupational Safety and Health Act (OSHA) tasks in their jobs reflect their responsibilities.

- Ensure that the appropriate safety and occupational health training is provided. Provide all Active Army, Army National Guard (ARNG), U.S. Army Reserve (USAR), and Army civilian employees with the training and education necessary to achieve the skills listed below. This training, as a minimum, will be in accordance with subpart H, par 1960, title 29, Code of Federal Regulations (29 CFR 1960). Ensure that all personnel are trained to:

  - Recognize the hazards and accident risks associated with their duties and work environment, and to know the procedures necessary to control these risks and work safely.

  - Know their accident prevention related rights and responsibilities as outlined in relevant statutes and regulations.

  - Know the safety responsibilities of their leaders, supervisors, and commanders, as appropriate.

- Ensure that all supervisors and safety and occupational health (OH) staff personnel are provided with specialized training to enable them to properly
execute their safety and OH leadership and staff responsibilities.

- Ensure that safety education and promotional materials, such as posters, films, technical publications, pamphlets, incentive items, and related materials are used. Ensure that these tools are cost effective.

4. **Energy Conservation.**

   a. **Background.** The national security of the United States is affected by today’s energy availability. While national energy consumption continues to grow, the Army is reducing its usage through conservation practices and greater efficiency in management. The Army is concentrating on its goal of reducing energy consumption for existing buildings. Upgrading existing facilities and equipment, to include the Quick Return on Investment Program and the Energy Conservation Investment Program is expected to accomplish the reduction goal. By using the Army Food Service Energy Management (AFSEM) Program, energy can be reduced by 15 percent in dining facilities. It is evident that energy conservation becomes more critical and cost effective each year.

   Ensure that energy conservation programs are provided in your dining facility. Also ensure that personnel conserve energy consistently with the mission, readiness, health, and safety requirements of the command. The Installation Major US Army Reserve Command (MUSARC) Director of Engineering and Housing (DEH) will oversee and monitor energy conservation programs at the installation level. Ensure that you conserve energy by using one of the conservation plans below:

   - The local installation energy plan, endorsed with specific guidance for food service operation.
   - One of the three plans from the AFSEM Program Manual.

   Report on the plan that is selected by using DA Form 4811-R.

   You must implement and enforce the plan. Get active support and guidance from the installation commander's staff. They include the Director of Industrial Operations, the Director of Facilities Engineering, and the Food Advisor. Command support is vital to the effectiveness of the program.

   If one of the AFSEM plans is selected, no investment cost or capital expenditure is required. The main objective is to change attitudes, behavior patterns, operating techniques and schedules in order to reduce energy usage by at least 15 percent. Achieve
this objective through an action plan, adapted from industry, consisting of six steps. Restaurant owners using this plan have experienced savings averaging 25 percent over the previous year's energy usage without capital expenditures.

Your dining facility's staff will greatly affect your capability to effectively implement the AFSEM Program. If your facility is a Table of Organization and Equipment (TOE) consolidated facility, you will have little difficulty meeting the requirements of the program. However, if your facility is a Table of Distribution and Allowances (TDA) organization, you may be able to concentrate only on equipment items that use the greatest amount of energy to obtain a partial energy reduction. Initially the AFSEM Program will require commitment, but once personnel become familiar with it, the effort is reduced to a minimum.

b. AFSEM Action Plan. The action plan consists of six actions (sets of procedures) designed to change operating techniques/schedules in your dining facility in order to decrease energy consumption. Instructions and examples, as applicable, are provided in each action.

(1) Action 1: Introduce The Program. Action 1 is a set of procedures for introducing the program.

(a) Objectives. The objectives of Action 1 are to:

- Explain the program to management.
- Assign responsibilities to key personnel.
- Organize a team effort to carry out the program.

(b) Actions. The program is introduced at a scheduled menu board meeting. The purpose of this meeting is to inform key operating personnel of the importance of energy management and to review the AFSEM Manual.

The organization/unit commanders are invited to attend in order to gain command interest and support for the program. A representative from the Director of Facilities Engineering (DFAE) is also invited to attend and present an overview of the energy situation at the installation. Energy costs, rates, and conservation savings are stressed.

The commander gives an introductory statement, stressing command support and emphasizing the importance of the program. By this time, you should have received a copy of the AFSEM manual and had its contents reviewed with you.
Dates are assigned for the beginning of each action and are listed at the beginning of each action step.

During the meeting, Action 3 - Tracking Equipment Usage, is explained in depth because it is the most important. The present equipment usage, when the preconservation tracking is completed, determines the base for the energy reduction goal and future progress comparisons.

(2) **Action 2: Conduct the Equipment Maintenance Audit.**

Action 2 is a set of procedures used to ensure that the food service equipment is in good operating condition before continuing with the program.

(a) **Objectives.** The objectives of Action 2 are to:

- Conduct inspections of the dining facility and equipment.
- Correct equipment deficiencies.
- Initiate actions to replace equipment which is not economically repairable.

(b) **Actions.** Conduct an inspection of the dining facility and the food service equipment with a DFAE representative to make sure that the equipment is operating efficiently. This action is taken because energy costs are greater when equipment is not functioning properly. Use DA Form 3988-R (Dining Facility Equipment Replacement Record) as an equipment guide while making the inspection.

After the inspection, complete the Equipment Maintenance Check List (Figure 13). Then submit work orders to the DFAE to correct all equipment deficiencies noted during the inspection. Also report equipment with serious operating problems to the DFAE and the Food Advisor so that the necessary action can be taken to have it replaced.

(3) **Action 3: Track Equipment Usage.** Action 3 enumerates procedures for tracking the amount of time each piece of equipment is used daily and in converting this time to British Thermal Units (BTU's) per hour of consumption. Ensure that you follow the procedures and objectives below.
General
- Tighten all screws in electrical wiring connections, i.e., plugs on appliances, panels, junction boxes, final connections, etc., to obtain maximum efficiency
- Establish a cleaning and maintenance program or schedule

Ovens
- Calibrate thermostats
- Check gas/air mixture on gas oven
- Clean interior walls and elements to obtain maximum heat transfer
- Check and clean fan blades for convection ovens
- Check to ensure ovens and oven racks are level
- Adjust pilot light to lowest possible flame
- Check for tight fit of oven doors; adjust door hinges, gasket and molding
- Check gas pressure regularly to ensure proper combustion
- Check flue for proper draft or obstructions

Ranges
- Clean and adjust gas burners
- Clean and adjust pilot lights
- Check automatic burner, lighters and safety controls
- Lubricate gas valves

Fryers
- Inspect fat container for grease leaks
- Calibrate thermostat
- Clean and adjust gas burners
- Check safety pilot and solenoid
- Clean and adjust pilot light
- Check flue for proper draft or obstructions
- Lubricate gas valves

Griddle
- Calibrate thermostats
- Adjust pilot light to lowest possible flame
- Check air/gas mixture on gas griddles

Broilers
- Check and clean burner orifices on gas broilers
- Clean and adjust pilot lights
- Check air shutters to make sure air/gas mixture is correct
- Check ceramic and metal radiants for deterioration. If blackened or cracked, replace with new chips
- Check flue for proper draft or obstructions
- Lubricate valves

Refrigeration
- Replace worn or damaged compressor belts
- Check refrigerant level if short cycling or loss of temperature control is observed
- Clean fan, condenser fins and plates and blower coils
- Check gaskets and seals, and hinges on doors for tight fit and for leaks
- Defrost freezers when frost reaches ¼ inch
- Have automatic defrosters adjusted by trained technician
- Make sure thermostats are properly calibrated
- Lubricate hinges and latches (use mineral oil)
- Feel outside walls for cold spots that indicate insulation failure
- Reset defrost cycle so freezer will defrost during “off peak” (between 1800-0600) hours
- Check compressors for leaks and level of refrigerant
- Brush clean the condenser
- Check coils to see that they are not clogged with ice, dirt and grease
- Inspect and service all electric motors

Dishwashing
- Check spray nozzles, tanks and heater coils for lime deposits. Ream spray nozzles with a wire when deposits are visible
- Check temperature of final rinse. It should be 180°F

Instruction for use: this list is to be completed by the Food Service Sergeant and the DFAE representative, see Action 2. A work order should be prepared by the Food Service Sergeant and submitted to the DFAE for those items checked above requiring technical assistance in getting the equipment repaired and/or adjusted.

Figure 13. Equipment Maintenance Checklist.
Figure 13 (Continued). Equipment Maintenance Checklist.

- Check feed and drain valves and pumps for water leakage
- Check speed reducer on conveyor-type washers for proper lubrication
- Check insulation of water lines in recirculation loop
- Make sure power rinse on dishwasher is turning off automatically
- Check and adjust thermometers
- If there is no automatic fill with shut-off, provide squeeze-type valve to avoid wasting by overfilling

**Lighting**
- Wash walls and ceilings for maximum light reflection
- Reduce decorative lighting in dining room
- Clean all lamps and light fixtures
- When removing fluorescent lamps, have electrician disconnect primary side of ballast to avoid continued use of electricity by the ballast
- Replace several small wattage light bulbs with a large one
- Remove all unnecessary light bulbs
- For greater lighting efficiency change:
  a. Extended life lamps to standard life lamps
  b. Reflector flood lights to parabolic flood lights
  c. Older model fluorescent lights to high efficiency fluorescent lights
- Replace lamps installed more than two years because of decrease in light output
- Replace yellowed lenses or diffusers that decrease efficiency
- Remove some light bulbs in clustered fixtures or replace with bulbs of lower wattage

**Water**
- Replace washers in dripping faucets immediately
- Drain and flush hot water tanks every 6 months
- Check steam trap on steam water heater regularly
- Feel for hot spots on water heater to check insulation
- Have burner adjusted if exhaust is smoky, high in carbon dioxide, or stack is excessively hot
- Insulate all hot water pipes
- Lower water temperature for nonsanitizing areas
- Reduce water pressure at main intake valve if it will not affect equipment operation

**Heating, Ventilation, Air Conditioning (HVAC) System**
- Set thermostats to 65°F when heating, 78°F when cooling and lock in place
- Turn off heating and cooling in seldom used spaces unless there is danger of freeze damage
- Remove any obstructions from heating and cooling vents
- Replace caulking and weather stripping around doors, windows and ventilating units to close cracks
- Clean or replace, if necessary, all filters in exhaust hoods and HVAC system
- Inspect all heating and cooling air ducts and exhaust hoods for cleanliness, proper insulation and leaks
- Balance ventilation and exhaust systems to maintain minimum air turnover consistent with adequate ventilation and safety

Instruction for use: this list is to be completed by the Food Service Sergeant and the DFAE representative, see Action 2. A work order should be prepared by the Food Service Sergeant and submitted to the DFAE for those items checked above requiring technical assistance in getting the equipment repaired and/or adjusted.
(a) Objectives. This action is designed to:

- Measure the present energy usage in the dining facility.

- Establish a base figure against which future energy consumption figures can be compared.

(b) Actions. Materials needed for this action are as follows:

- Food Service Equipment List (Figure 14).

- Daily Summary of Equipment Usage Worksheet

- Weekly Summary of Equipment Usage Chart.

- Equipment BTU Rating List.

- 10 Equipment Usage Tracking Folders.

- Equipment Usage Tracking Worksheet.

List all food service equipment on the Food Service Equipment List by each work or functional area. See Figure 14 for a sample form. Below are the functional and work areas that should be included in the list:

- Kitchen Area.

- Dishwashing Area.

- Pot/Pan Area.

- Baking Area.

- Serving Area.

- Self-serving area.

- Storage Area.

- Dining Area.
<table>
<thead>
<tr>
<th>WORK AREA:</th>
<th>Manageable Equipment</th>
<th>Equipment Manageable with Technical Assistance</th>
<th>Self-Managing Equipment</th>
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<td>Equipment Description</td>
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Figure 14. Food Service Equipment List.
Identify the equipment in the dining facility as belonging to one of the three following categories and place a check in the proper column:

**Manageable Equipment.** The following items of equipment must be tracked daily:

- Broiler, conveyor.
- Cabinet, bun warming.
- Cabinet, dough proofing.
- Cabinet, food warming.
- Coffee maker.
- Ice cream shake maker.
- Ice cream soft serve.
- Kettle, steam jacketed.
- Lights.
- Machine, dishwashing.
- Coffee urn.
- Counter, cold food.
- Dispenser, beverage.
- Dispenser, dish tableware.
- Dispenser, plate tableware.
- Food warmer, infrared.
- Fryer, deep fat.
- Griddle.
- Grill, frankfurter.
- Heater, hot water retainer.
- Heater, hot water booster.
- Hood, exhaust.
- Ice cream, combination.
- Oven connection.
- Oven, pizza.
- Oven, stack.
- Pan, frying-braising.
- Prewash, silver, pump unit.
- Range, griddle top.
- Range, hot top.
- Sandwich unit.
- Steam Cooker.
- Table, hot food/steam.
- Toaster, conveyor.

**Equipment Manageable with Technical Assistance.** Examples of equipment that operate 24 hours a day are:

- Chiller, tap water.
- Dispenser, bulk milk.
- Dispenser, carbonated beverage.
- Dispenser, ice maker.
- Cabinet, frozen food.
- Cabinet, ice cream.
- Machine, ice making.
- Refrigerator, pass-through.
- Refrigerator, reach-in.
- Refrigerator, roll-in.
- Refrigerator, walk-in.

**Self-Managing Equipment.** This type of equipment is normally turned on only when in use.
o Dispenser, hot chocolate.
o Dispenser, ice.
o Dispenser, ice tea.
o Disposal, garbage.
o Filter, grease.
o Machine, cleaning and sanitizing.
o Machine, meat slicing.
o Machine, mixing.
o Machine, vegetable cutting and slicing.
o Machine, vegetable peeling.
o Opener, can.
o Oven, microwave.
o Toaster, pop-up.

List all manageable equipment on the Equipment Usage Tracking Folder for each work or functional area. Usage of this equipment is tracked daily during this action step and Action 6 - Tracking and Follow Up.

If it appears that self-managing equipment is not being properly operated or maintained, list the item on the tracking folder for the appropriate area.

If the equipment manageable with technical assistance can be eliminated by consolidating similar equipment, eliminate its use immediately. However, make sure that you list this equipment on the appropriate area tracking folder so that the 24-hour usage will be included in the base tracking period. Wait until an energy schedule is established to record the usage reduction for this category of equipment. This reduction will then be included in the reduced usage total.

Next, Assign a BTU rating to all items of food service equipment listed on the Equipment Usage Tracking Folder using the BTU Rating List.

Assign to key food service personnel (first cooks or shift leaders) of both shifts, in each work or functional area, the responsibility of tracking the time each piece of food service
equipment is turned on or off during their shifts. Write the names of the assigned individuals on the Equipment Usage Tracking Folder for the areas for which they are responsible.

Following this action, meet with food service personnel to review the following points:

- Because of rapidly rising costs of fuels and energy, there is a need to know when pieces of food service equipment are being used.

- Record on the Equipment Usage Tracking Worksheet the time those items of equipment listed on the Equipment Usage Tracking Folder are turned on and off.

- Equipment Usage Tracking Worksheet is inserted into the Equipment Usage Tracking Folder for this purpose. One worksheet is used for each day of tracking.

- Explain that the tracking time recorded for each piece of equipment must be accurate in order for this program to work.

Lastly, post Equipment Usage Tracking Folders in appropriate areas of the dining facility.

When the base for comparison of future tracking is completed, compare all tracking efforts/figures to this base to determine the rise and fall of energy used in the dining facility.

Calculate the energy reduction goal by multiplying the percentage of savings (15%), times the total BTU's of each functional area on the Weekly Summary of Equipment Usage Chart for the preconservation period.

Next, inform the organization commander of the results of the base tracking period and the initial energy reduction goal.

For the very few dining facilities that have separate utility metering, the procedures of Action 3 are somewhat different. The procedures consist of:

- Determining the energy usage for the preconservation period (1 work week) by daily reading of the utility meter(s) and calculating the daily usage.
Establishing the 15% reduction goal from the total energy usage calculated from the preconservation period.

Determining progress toward the established goal by continuing the daily reading of utility meter(s).

Following the remaining action steps in the AFSEM program as outlined.

(4) Action 4: Conduct the Kickoff Meeting. This action lists procedures for conducting the kickoff meeting. During this meeting, dining facility operating personnel are informed of the program, and the results of the preconservation tracking are discussed.

(a) Objectives. The aims of this action are to:

- Familiarize personnel with the action plan.
- Discuss the goal of reducing energy usage by 15%.

(b) Actions. Hold a kickoff meeting with all the food service operating personnel to introduce the AFSEM Program. The commander is invited to say a few words in support of the AFSEM Program and the energy reduction goal.

After the commander's statement, the following items should be discussed:

- The AFSEM Program is important to the Army's overall energy management efforts and will change dining facility operating methods and schedules in order to decrease energy consumption.
- The program depends on the involvement of everyone in the dining facility; a team effort is required.

Next, explain the AFSEM manual and address each action. Mention the details of the tracking procedures as outlined in Action 3. Inform the audience of the continuance of the weekly tracking until the 15% energy reduction goal is achieved. Point out that tracking will be reduced to 1 workweek per quarter once their goal is achieved.

Next, discuss the results of the preconservation base tracking period. Review the MBTU consumption in each of the work or
functional areas using the Weekly Summary of Equipment Usage Chart. Also, explain and translate the data recorded in the Energy Management Progress Chart.

Review the Energy Conservation Strategy Worksheet(s) for each work or functional area in the dining facility. Encourage discussion of these strategies and incorporate suggested ideas into the plan. The operating personnel should know the day-to-day operating procedures of the work areas.

Show and explain visual aids to be used in the program and touch on the supplementary information discussed in Chapter 3 of the AFSEM manual.

Lastly, distribute "Tips for Energy Savers" to all operating personnel in the dining facility.

After the meeting, attach the appropriate Energy Conservation Strategy Worksheet to the inside cover of the Equipment Usage Tracking Folder posted in each work or functional area.

(5) Action 5: Establish an Energy Schedule. Action 5 outlines the procedures for establishing an energy schedule, using the figures and usage patterns established during the preconservation tracking.

(a) Objectives. The purposes of this action are to:

- Determine the daily equipment on and off times.

- Record on and off times on decals displayed on the equipment.

(b) Visual Aids. Make sure that the following visual aids are displayed:

- The "Army Food Service Energy Management - A Commitment from your Food Service Sergeant" poster is displayed in the dining room.

- The "Turn Equipment On Only When Needed" poster is posted in the kitchen.

- "High Energy User" decals should be on convection ovens, ranges, fryers, dishwashing machines, etc.
"Limit it - Operating Hours" decals should be on light switches in food preparation areas, dishwashing areas, serving lines, dining rooms, etc.; hot/cold food tables; dishwashing machines; plate warmers; coffee urns; and all equipment whose use is dictated by serving hours.

"Keep Door Closed" decals should be on ovens, refrigerators, freezers, food holding carts/cabinets. When doors are opened frequently, cold air escapes and is replaced with warm air.

Establish an energy schedule for each piece of equipment, using as a guide, the on/off times recorded during the preconservation period. After the program has been implemented for several weeks, determine the early and late on/off times for breakfast, lunch, and dinner for each piece of equipment. Use a grease pencil to write these on/off times on the "Limit It Operating Hours" decal. When times have been adjusted on these decals, this means that the energy schedule has been established.

Continue to track energy use until the energy reduction goal, 15%, is achieved.

(6) Action 6: Tracking and Following Up. Action 6 specifies the procedures to be followed for tracking, adjusting, and following up on the established energy schedule.

(a) Objectives. Action 6 is designed to assure that:

- The levels of energy savings are reached.
- The levels of savings do not decline once the initial goal is reached.

(b) Actions. Continue to track energy use until the energy reduction goal of 15% is achieved. Also, continue to monitor energy use and plot progress on the Energy Management Progress Chart. Post this chart in a prominent area so that all food service personnel can witness the progress. Similarly, also post the Weekly Summary of Equipment Usage Chart to encourage energy awareness.

Next, adjust the established energy schedule for breakfast, lunch, and dinner, for each piece of equipment by changing the on/off time in the "Limit It - Operating Hours" decal.
Then consolidate or eliminate (if possible) the use of items
categorized as Equipment Manageable With Technical Assistance,
reduce the on time schedule, and simply turn equipment off whenever
possible.

Keep the organization commander and food advisor informed quarterly
on the progress of the program.

At the daily meeting of the cooks, proceed as follows:

- Review progress.
- Review goals.
- Share ideas; use the Supplementary Information
  as discussed in the AFSEM manual to train food
  service personnel.

After the energy reduction goal has been reached, limit tracking to
1 workweek per quarter. Also, review energy conservation strategy
worksheets during that week.

c. Additional Conservation Measures. Conservation means
getting the maximum use of available resources for the longest
period of time. It does not mean that you refrain from using
resources but rather, that you are to use them wisely and to avoid
wasting them. Use the information contained in this paragraph as a
guide to carry out the action plans for conservation.

(1) Conservation Measures for Cooking.

   (a) Preheat Only the Equipment That Will Be Used. In
order to apply this first energy management principle, you must
schedule food production requirements and cooks on as few pieces of
equipment as possible. Give some thought to the variety and
quantities of food to be cooked and the time required to cook each
of them. It may also be possible to prepare some foods requiring
short cooking cycles, such as gravies, on the same equipment after
cooking foods requiring longer cooking cycles.

Preheat cooking equipment not more than 15 minutes before use,
unless additional time is otherwise required. This principle will
greatly reduce energy consumption without affecting the final food
product. The preheat time may vary not only from one
manufacturer's recommendation to another but also some of the
different models of the same types of equipment. These preheating
times could be confusing and easily forgotten. The 15-minute
preheat time will be adequate in most cases.
(b) Save Energy During Slack Periods. During slack serving periods, a good energy management practice is to turn off the cooking equipment or set the controls back to a lower temperature.

Less than one-half of the energy is required to maintain an electric fryer at 200°F than at an operating temperature of 350°F. The time to recover from 200°F to 350°F is only 2 minutes for small fryers. If a food service operator has several fryers, leave one on, idling at operating temperature, set one back to 200°F, and turn the rest off. The same thing could be done with griddles, ranges, and convection ovens.

It would seem that it would require less energy to allow a griddle to idle at operating temperature than to allow it to cool and to preheat it again in an hour; however, this is not the case. It would take the average griddle 2 1/2 to 3 hours to cool down to room temperature from an operating temperature of 400°F.

Using a 36 inch, 12kw electric griddle (cooled down to room temperature) as an example, the energy savings is calculated as follows:

Savings = 1,808 watts/hour x 3 hours - 2,400 watthours (preheat time)
        = 5,424 watthours - 2,400 watthours
        = 3,024 watthours savings.

Making this calculation for the other types of cooking would produce similar results. The conclusion is that energy can be saved, and it would be a good management practice to turn off equipment anytime that doing so does not interfere with production requirements.

(c) Use Full Production Capacities. Cooking at full production capacity of the equipment means cooking full loads on every cooking cycle. It also means cooking one load right after another. This prevents wasting energy during the cooking cycle for maintaining part of the equipment, such as one-half of an oven cavity, idle at operating temperature.

It is good practice to load and unload equipment as fast as possible. This reduces the total time that equipment must be heated for each meal cooking period.

If foods requiring different temperatures are to be baked in the same equipment, one following the other, the foods requiring the lowest temperature should be cooked first, if practical. The question arises as to when it is practical to cook at full production capacity of equipment, one load right after another.
Foods cooked to order and foods that lose quality if held at any significant length of time in the finished state must be cooked to meet the demand. This may include such foods as fried and scrambled eggs, fried potatoes, pancakes, steaks, Texas toast, etc. It may not be practical to cook these foods at the full production capacity of the equipment. Fryers, griddles, and broilers are most often used to cook foods to order and foods with short finished life.

(d) Select the Appropriate Equipment Size. Selecting the correct size of equipment for each operation simply means using the small item only if small loads are to be cooked, rather than preheating a large one. In case of griddles, ranges, or ovens, use only the number of sections needed.

(e) Use Equipment Properly. Probably the greatest waste of energy in cooking, except for leaving equipment idling at operating temperature, is improper use of equipment. This is also a cause of insufficiently finished food products. Such products bring about further waste of energy because some of the foods must be thrown out and more foods need to be cooked.

To assure efficient heat transfer from hot plates and French plates of ranges and hearths of deck ovens, use only heavy flat-bottomed pots and pans. Pans that are bent or warped not only waste energy but also result in uneven finishing of the product.

On French plates, the pot should cover the entire surface of the plate and not extend over the edge of the French plate more than one inch.

Ovens are designed to accommodate standard size bake pans properly. When smaller ones are used, the oven is not being used to its full production capacity.

Proper loading and unloading of foods into or on equipment is important. Overloading the fryer basket so that part of the food is not submerged results throwing away part of the load or serving an inferior grease soaked product.

Placing pans too close to the sides, back, or front of ovens causes poor circulation of hot air in the cavity, resulting in improperly cooked foods, wasted food, and wasted energy.

Opening oven doors excessively or peeking frequently into the oven wastes heat and may result in poor quality product. Slow loading and unloading of ovens, especially convection ovens, causes not only waste of heat but may cool the oven down enough to cause a poor product.
Loading fryers before they are preheated can also result in a poor quality finished product.

An open damper on a deck oven allows hot air to escape out the back resulting in an excessive intake of cold air through the breather space at the front below the door. This causes the product to be unfinished at the front and overdone at the back of the oven. Never open dampers on deck ovens except when baking foods that contain an excessive amount of moisture, such as fruit pies and cobblers. A collection of moisture on the glass or at the top of the oven door indicates excessive moisture and the damper should be opened just enough to get rid of the moisture; one-fourth of the way open is usually enough.

Do not cook on a piece of equipment that was designed especially for some other function. For example, do not place a stockpot on a griddle instead of on a range. A griddle is not designed to be efficient in heating a stockpot; the hot top range is.

When specialized equipment can be used, it will do the cooking job more effectively than conventional equipment. Using steam-jacketed kettles or compartment steam cookers instead of stockpots on top of the range is a good example. Sometimes, bread and buns are toasted on a griddle rather than the more efficient toaster. Large quantities of hamburgers can be finished in a convection oven with less energy than cooking them on a griddle. Note however, that there may be a slight difference in the finished product when it is cooked in the alternative or specialized equipment. The method to select often depends on how you want the finished product to look and taste.

Microwave ovens are sometimes misused or misapplied in an effort to cook large quantities of food from raw to done state. Microwave ovens can be used most efficiently for reheating, and only occasional cooking from raw to done state of small quantities food toward the end of the serving period.

(f) Maintain and Clean Equipment Properly. Cooking equipment will use less energy if it is kept clean. Clean spillage and splatters as they happen throughout the day (CLEAN AS YOU GO). This will make the equipment easier to clean later. Burned-on spillage and food particles causes poor performance of the equipment and produces inferior or unacceptable products. For example, large spillage on the hearth of a deck oven will act as insulation and cause uneven transfer of heat to the bottom of a baking pan.

Particles of food that are burned onto the griddle may stick to the next load of food, causing it to be wasted. Excessive buildup of burned-on food particles on a griddle causes uneven heat transfer and produces unacceptable products. Unnecessary or
excessive cleaning by burning off the heating elements on fryers also wastes energy.

Keep grease in fryers clean. An electric portable grease filter is ideal for this use if one is available at the dining facility. Clean grease prevents a poor finished food product which in turn may require cooking more food. Keep fans on convection ovens clean to provide maximum air delivery and assure even heating throughout the oven cavity. It is also important to keep the breather space below the door on deck ovens clean. This allows for expansion of air when the oven is heated. If the door is forced open, the products will bake unevenly and precious energy will be lost.

Schedule cleaning of equipment so as not to require using additional energy in the cleaning process. For instance, if it is the type that is easier to clean when it is warm, clean equipment before it cools down.

The cooking surface of a griddle is easier to clean if it is cleaned before it cools much below 200°F. A cool oven is easier to clean if only a damp cloth or mild detergent is required. Convection ovens are most easily cleaned when they are cool enough to handle comfortably.

Do not burn off heating elements on fryers. It is important to allow the grease to cool down and drip off the elements before cleaning them. The fat may be strained any time after it cools enough to handle. Clean splatters and spillage from the exterior surfaces of the fryer anytime.

A range may be cleaned anytime after it is cool enough to handle. Since the range top operates at a temperature high enough to burn the hot plates clean, only the exterior surfaces need to be wiped with a damp cloth. To clean the range oven, follow suggestions for cleaning a deck oven.

To keep equipment from malfunctioning, fasten thermostat bulbs and capillary tubes properly in place. A loose thermostat bulb on a range or griddle will cause erratic heating. A visual inspection is usually sufficient to detect this problem. Thermostats should also be checked periodically with thermometers.

Because of expansion and contraction due to heating and cooling, heating elements sometimes become loose on griddles and ranges. It is not very easy to check these but the loose element problem can be easily recognized. On griddles and ranges for instance, the preheating will be slow and inefficient. Griddles may have hot and cold spots because of the insufficient transfer of heat. As a result of this, food, time, and energy is wasted.
(2) Conservation Measures for Refrigeration.

(a) Maintain Equipment. Ensure that the equipment below is maintained properly.

Ensure that door gaskets are clean and fit airtight. Use a dollar bill to test the effectiveness and reliability of door gaskets on refrigerators and freezers. In this test, place the bill on the refrigerator mullion and close the door on it. If the bill is held securely in place by the door gasket, it is considered to fit snugly enough. Administer the test for the entire length of the gasket. If it is not held securely, adjust or replace the door. In the absence of a bill, use a 3-inch x 5-inch card or other piece of paper. Visual inspections will sometimes reveal a worn or deteriorated door gasket. Maintain gaskets properly and keep them clean, and free of food particles. Level refrigerators and freezers so that doors fit correctly and close automatically from an open position.

Keep evaporator coils free of frost. Walk-in and some reach-in or roll-in refrigeration equipment use a bank of evaporator coils wrapped around the outside of the interior wall and pick up heat through the walls of the unit.

Ice or frost collected on the evaporator coils or the walls acts as an insulator for the coils and makes it more difficult for the refrigerant to pick up the heat from inside of the refrigerator or freezer. Some units automatically defrost every 24 hours. Others must be defrosted by turning the compressor off periodically. Perform defrosting when approximately 1/4 of an inch of frost or ice has accumulated on the coils and before circulation of air through the coils is hampered. Keeping foods in covered or sealed containers helps to prevent moisture from escaping from foods and reduces the amount of moisture that collects on evaporator coils.

Keep condenser coils free of dust, lint, or obstructions that tend to reduce air circulation. Condenser coils seem to attract dust and lint. Also, people usually stack boxes, cartons, and other items around the condenser coils of refrigerators and freezers. Remind your personnel not to make a habit out of this practice for this adversely affects air circulation. Anything that reduces air circulation around the condenser likewise reduces the efficiency of the unit, and thus, wastes energy. Fan blades that are dusty are also less efficient in delivering air through the coils.

Remove dust with a brush, but the best tool is a vacuum cleaner. A vacuum cleaner picks up dust for easy disposal, rather than scattering it around the kitchen and depositing part of it back to the coils.
(b) Locate Equipment Properly. Do not place refrigeration equipment near heat generating equipment. If there is no other alternative, shield the refrigerator to prevent or reduce the effect of the heat generating equipment. When refrigerators and freezers are located in a separate room or when the compressors and condensers are remotely located in a separate room from the kitchen, the room should have adequate ventilation and the air should circulate freely. If the condensers are located outdoors, shield them from the hot sun and keep them free from obstructions such as weeds or grass.

(c) Open and Close Refrigerator Doors Properly. When doors are opened, cold air escapes from the refrigeration unit and is replaced with warm, moist air. The warm air adds heat and the moisture increases frosting of the evaporator. To prevent this problem from occurring, avoid opening doors frequently and holding them open for long periods of time.

To eliminate frequent opening of doors, remove all foods that are needed for meal preparation at the same time. The same rule applies to placing foods into the units. Assemble foods on a cart or table near the door of the refrigeration equipment so that they can all be quickly loaded at the same time. Place foods in easily accessible areas for quick removal. Some foods can be identified more quickly if they are placed in see-through containers. Adequate lighting and clean lenses on lighting fixtures will help in finding desired foods more quickly.

(3) Conservation Measures for Ventilation. Ventilation conservation measures for exhaust design, the operation of fans, and filters, as described below.

(a) Design. Food service kitchens have a special ventilating system. A hood is placed over the cooking equipment to remove smoke, vapors, food odors, and heat generated by the cooking process. The design rates for airflow through the kitchen ventilating system are prescribed by regulations. These same rates are recommended by the National Fire Protection Association. They are: wall hood -100 cubic feet per minute (CFM)/square foot hood face; island hood -150 CFM/square foot hood face; shelf hood -200 CFM/foot (length of shelf).

Air must be brought into the kitchen to replace the large amounts of air that are exhausted. Some of this makeup air is brought in from the dining areas, but most of it is brought into the kitchen directly from the outside. The outside air may have to be heated in the winter and cooled in the summer. In some cases, the air is cooled with refrigeration equipment.
Heating and cooling of large amounts of makeup air wastes energy. This is especially true if the makeup air is cooled with refrigeration equipment.

Regulations prescribe the design criteria for ventilating equipment but do not govern their operation. Also, these regulations make no distinction between gas and electric equipment.

It is good sense not to ventilate the kitchen at full design rate when there is little or no cooking being done. Large ventilating systems may have more than one exhaust fan. Only the fans needed to remove the smoke, vapors, food odors, and heat generated at any one time need to be turned on. In case of a single fan system, a two-speed or three-speed fan can reduce the exhaust airflow.

The few energy management principles applicable to the kitchen ventilating systems are simple to apply. They are:

- Operate only the number of exhaust fans required to capture cooking vapors and smoke.
- Operate two-speed fans or three-speed fans at the lowest speed required to capture cooking vapors and smoke.
- Turn off fans when not needed.
- Keep filters clean to assure proper air flow through ventilating system.

(b) Operation of Exhaust Fans. Operate the ventilating system with the smallest number of fans which will capture all the cooking vapors and smoke. You can assume that the latent heat will also be captured and removed. The manner and location of the makeup air supply and the types and location of cooking equipment determine which fans provide the best ventilation. Determine this best by experimenting with operation of the system.

When forced makeup air is used for the kitchen, certain makeup fans should be interlocked electrically with certain exhaust fans. Thus, when a fan is turned off to reduce the amount of air exhausted, the makeup air will be reduced by the same amount. This should be checked at each dining facility.

Many single-fan ventilating systems do not have a two-speed or three-speed fan. Weigh the cost of changing the fan against the energy savings by operating the system at a lower ventilation
rate. Most of the savings would be in the heating and cooling of makeup air.

It makes sense to turn off exhaust fans when they are not needed to remove smoke and vapors or to keep the kitchen cool. The natural updraft through the ventilating hood will provide some ventilation for the kitchen. It may be enough to capture the smoke and vapors with limited cooking.

(c) Filters. When grease extractors are used in a ventilating system, there is no cleaning problem except for emptying the grease receptacle and wiping down the hood at the end of the day. Manufacturers of these grease extractors claim that the extractors will not accumulate enough lint, dust, and grease to require washing more than once or twice each year.

When filters are used (especially in older dining facilities), clean them as often as necessary. Although cleaning of the filters is a messy job, it is a simple operation. The filters may be removed and put through the dishwasher anytime the system is shut down. The frequency of washing filters depends on the cooking operation and may be necessary once a week or once a month.


You must establish an effective fire prevention program. An effective and meaningful program must have the following basic elements:

- Continuing fire prevention education for all personnel.
- Identification and elimination of fire hazards.
- Enforcement of fire regulations.
- Adequate fire protection for facilities and activities.
- The installation commander's strong support and emphasis on fire prevention.

a. Education/Training of Personnel. The objectives of fire prevention education are to motivate all personnel to:

- Adopt and practice fire-safe habits.
- Recognize and eliminate fire hazards in their work and living quarters.
- Learn how to report a fire.
o Use first-aid firefighting equipment.
o Learn evacuation procedures.
o Correct hazardous conditions when they are recognized.

If they cannot correct a problem, they should report the condition to their building fire wardens or the fire department.

The fire department gives fire prevention training, lectures, and demonstrations. They use visual aids and specialized lesson plans. The fire department gives this training for:
o Troop units.
o Occupants of family housing.
o Functional organizations.
o Social groups requesting the service.

Professionally prepared training aids may be acquired through:
o The audiovisual library.
o The National Fire Protection Association.
o Fire insurance and underwriting organizations.
o State and regional fire schools.
o Specialized industrial groups.

The week of October 9th, the anniversary of the great Chicago fire, is designated each year as the national "Fire Prevention Week". This week is designated by the President of the United States. You should take part in this nationwide effort to reduce the loss of life and property from fires. Section leaders are urged to participate in Fire Prevention Week through:
o Publicity.
o Education Programs.
o Demonstrations.
o Displays.
o Special events.
You may use fire drills that involve the response of fire trucks only if authorized by the installation fire marshall or fire chief. Use seasonal campaigns to stress hazards most common during particular seasons of the year. The installation fire department will provide fire prevention training and materials when requested.

b. Preparation for Inspections. The facility inspections are intended to ensure prompt correction of fire hazards. Inspectors can also incorporate these conditions into the dining facility's safety and occupational health hazard abatement plan.

The frequency of local fire prevention inspections are determined by one or more of the following factors: class of construction, building or area occupancy hazard, known fire loading, and the criticalness of normal activity. Suggested inspection frequencies are as follows:

- Weekly for extra hazardous occupancy facilities when the fire loading and ongoing activity present a high risk to life, safety, or severe fire potential.

- Monthly for aircraft parking aprons, hangers and docks, places of public assembly, engineer and vehicle maintenance shops, warehouses, hospitals, schools, child day care centers, commissaries, postal exchanges, and electronic data processing/computer activities.

c. Built in Protection Devices.

(1) Fire Protection Engineering. Sound fire protection engineering is required in all repair and construction projects. This limits fire spread and saves lives. Fire protection systems and construction features must comply with DOD fire protection policies, TM 5-812-1, and NFPA standards. Fire protection engineering considerations include:

- Facility design.
- Construction methods and materials.
- Siting.
- Installed fire extinguishing systems.
- Fire detection alarm systems.
- Water supplies.
- Utilities.
(2) Protection Systems. Ensure that automatic sprinkler systems, automatic smoke detector systems, and fire extinguishers are installed and maintained properly, as described below.

(a) Automatic Sprinkler Systems. DOD 4270.1 gives guidance for installing automatic sprinkler systems. Sprinklers should be installed in:

- Combustible buildings with the fire loss potential (buildings and content) of $1 million or more. Also, in buildings of less value when a fire may cause a serious interruption or loss of life. USAR centers are excluded from this requirement.

- Pier and wharf substructures of combustible construction and a fire loss potential of $1 million or more.

- Warehouse and storage buildings, regardless of construction type, with fire areas over 15,000 square feet, or for lesser fire areas when the fire loss potential is $1 million or more.

- Buildings or areas of buildings of noncombustible or fire-resistive construction that store moderate or large volumes of combustible materials, or that create a fire or explosion hazard.

- Storage and service areas in fire-resistance or noncombustible hospitals.

- Commercial, industrial, or technical buildings, places of public assembly, or other facilities that contain large amounts of combustible materials. This requirement applies to fire areas over 15,000 square feet, regardless of construction type. The requirement also applies for lesser fire areas when the fire loss potential is $1 million or more.
Special consideration will be given to installing automatic sprinklers in places where access by firefighters is difficult. Examples are buildings that are large or complex, windowless, or below ground.

Automatic sprinkler systems will have both local and transmitted waterflow alarm signals. The latter will be received at the fire department alarm center. When this is not possible, they may be received by a person who is continuously on duty. Impaired sprinkler systems, or other fire protection systems, will be given the highest priority for full restoration to service.

NOTE: Separate areas protected by automatic sprinklers from unsprinklered areas with partitions. These partitions must have a fire resistant rating of at least 1 hour and fire doors of a comparable rating at the openings.

(b) Automatic Smoke Detector Systems. You should have either Photoelectric or ionization type smoke detectors installed in your food service facility. Except for battery-powered smoke detectors, detectors should be permanently be wired to an electrical circuit without disconnect switches.

(c) Fire Extinguishers. Ensure that fire extinguishers are inspected at least weekly. Fire department personnel should also inspect them regularly. During these inspections, fire department personnel will note on DA Form 5381-R to show that the extinguishers have been inspected.
LESSON

Practice Exercise

The following items will test your knowledge of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

1. As you evaluate the sanitation program, you must be aware of both the standards and the sources of foodborne illnesses that make sanitation standards necessary. The primary source of staphylococcus, which produces severe gastroenteritis in its victims, is

   A. food handlers.
   B. soil and fresh meats.
   C. vacuum-packed, low-acid foods.
   D. poultry, cracked eggs and meat.

2. During food preparation, you are especially careful with PHFs. According to standards, potentially hazardous foods may be prepared for subsequent service provided the product is chilled to an internal product temperature of 45 degrees Fahrenheit within

   A. 2 hours.
   B. 3 hours.
   C. 4 hours.
   D. 5 hours.

3. The installation medical authority, or his representative, will perform periodic inspections. Which areas of the dining facility will be included in these inspections?

   A. Any areas you indicate a need for help in.
   B. All areas.
   C. Those areas cited in past inspections.
   D. Food service areas.

4. Biological contamination is suspected in your area. What actions should personnel take if water from an approved source is not available?

   A. Test for chlorine residue.
   B. Test the water for contamination.
   C. Look, smell and taste a small sample.
   D. Disinfect the water.
5. Chemical contamination is suspected in your area. Initially, personnel determine the chemical is mustard. This determination is based on discolored meat that smells bad and tastes

A. bad.
B. acid.
C. salty.
D. bitter.

Situation: You are observing soldiers in an environment suspected of biological contamination. Your goal is to evaluate decontamination procedures. Food service personnel choose heat as the best method of decontaminating any foods that can be cooked. Refer to this situation to answer Question 6.

6. Soldiers are preparing to bake a roast suspected of contamination. How long must the meat bake at 325 degrees Fahrenheit before decontamination is complete?

A. 1 hours.
B. 2 hours.
C. 3 hours.
D. 4 hours.

7. As part of the safety program, you ensure that all food service personnel are trained in the fundamentals of first aid. Soldiers should be able to make an initial evaluation of an unconscious, injured, ill or wounded person to prevent

A. the incident from occurring again.
B. lawsuits against the Government.
C. treatment that is unnecessary.
D. further injury or death.

8. Annually, or more often, your facility will undergo a formal safety inspection. The object of these inspections is to

A. evaluate the safety program.
B. find safety violations.
C. identify high risks.
D. report unsafe or unhealthful conditions.
### LESSON
### PRACTICE EXERCISE
### ANSWER KEY AND FEEDBACK

<table>
<thead>
<tr>
<th>Item</th>
<th>Correct Answer and Feedback</th>
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<tbody>
<tr>
<td>1.</td>
<td>A. food handlers.</td>
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<td></td>
<td>The primary source of staphylococcus is the food handler. The bacteria may be transferred from infected cuts or simply the hands, nose, or mouth of that soldier. (page 7, para 2c(2)(a)).</td>
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<td>2.</td>
<td>C. 4 hours.</td>
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<td>Normally PHFs are prepared as close to serving time as possible. However, PHFs may be prepared for subsequent serving periods under certain circumstances if the product is chilled to an internal temperature of 45 degrees Fahrenheit within four hours. (page 12, para 3i(3)).</td>
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<td>3.</td>
<td>B. All areas.</td>
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<td>Since it has been found that comprehensive inspections are more effective than more frequent walkthrough inspections, the medical authority will inspect all areas of the dining facility. (page 37, para 9a).</td>
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<td>4.</td>
<td>D. Disinfect the water.</td>
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<td>If the environment is biologically contaminated and water from an approved source is not available, soldiers should disinfect their water before using it. (page 42, para 2b(2)).</td>
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<td>5.</td>
<td>A. bad.</td>
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<td>Although it is not an accurate test, an initial determination to identify a chemical agent can be made by soldiers. Characteristically, mustard agents discolor meat and leave both a bad taste and smell. (page 43, Figure 8.).</td>
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6. B. 2 hours.

Heat is the best way to decontaminate biologically contaminated food. Although all food cannot be decontaminated with this method, roast baked at 325 degrees Fahrenheit for about two hours will be decontaminated. (page 51, para 3b.(2)(b)).

7. D. further injury or death.

Since the ultimate mission of the Army is to fight, soldiers are more constantly exposed to threatening situations. Food service personnel must be prepared to assist each other and other soldiers through basic first aid measures by preventing further injury or even death. (page 58, para 2a.(1)).

8. C. identify high risks.

The goal of regular safety inspections of your facility is to identify high risk areas. By identifying these areas before accidents happen, accidents may be prevented. (page 64, para 3b.)