

THE UNITED STATES ARMY FOOD SAFETY, SECURITY, AND PROTECTION SYSTEM

by

GODFREY K. NKWANTABISA

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Major Professor
Daniel Y. C. Fung

Abstract

In the military, documenting the occurrence of foodborne illnesses is a challenge. During peacetime only about ten percent of all foodborne illnesses are reported or properly diagnosed. Between 1998 and 1999, the Army had documented over 800 cases involving food or waterborne diseases.

Service members are classified as highly susceptible when they are deployed or participating in extended field training exercises. Physical and emotional stress weakens the immune system, as does fatigue. These situations can be further aggravated by soldiers taking medications and/or exposed to exotic diseases or extreme environmental conditions. Thus it is very important for the United States Army to have a very good food safety, security, and protection system in place to maintain a readily deployable force.

The United States Army monitors food safety, security, and defense through an extensive network of multiple organizations within and outside the army by researching from the fields of microbiology, sociology, economics, bioterrorism, etc. This network monitors food procured by the army from the source to the consumer and maintains accountability throughout the process.

This report takes a look at the multiple organizations and the various strategies entailed in implementing food safety, security, and protection within the army and the entire Department of Defense. It emphasizes on some of the strategies that can be developed and applied in civilian establishments to improve the efficiency of the establishments. Such strategies include the implementation of the Prime Vendor System and the World Wide Web directory of sanitary approved sources which help to improve the ability to monitor the food with fewer personnel and also improve security and defense through solicitations and contracts.

These strategies have been so effective that they are being used not only for food but for general logistics.

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The content of this report has evolved primarily through the author's experience as a food inspector in the United States Army, a number of interviews and reviews conducted with some personnel of the Army Food Service, and media review in food safety and defense to analyze the United State Army's food safety, security, and defense. References are provided to facilitate future organizations who intend to adopt any part of this entire system.

Special thanks to my wife Ursula and children Bennie and Freda Nkwantabisa for the much needed emotional support they provided during this period.

Acronyms

ACES	- United States Army Center for Excellence, Subsistence
AT	- Anti-Terrorism
CCP	- Critical Control Point
CDC	- Centers for Disease Control and Prevention
CENTCOM	- U. S. Army Central Command
CFR	- Code of Federal Regulations
CGMP	- Current Good Manufacturing Practices
CONUS	- Continental United States
DeCA	- Defense Commissary Agency
DFARS	- Department of Defense Federal Acquisition Regulation Supplement
DIBBS	- DLA Internet Bid Board System
DLA	- Defense Logistics Agency
DLAD	- Defense Logistics Acquisition Directive
DLAD	- Defense Logistics Acquisition Directive
DoD	- Department of Defense
DSCC	- Defense Supply Center Columbus
DSCP	- Defense Supply Center Philadelphia
DSCR	- Defense Supply Center Richmond
FAR	- Federal Acquisition Regulation
FDA	- Food and Drug Administration
FIFO	- First In First Out
FPCON	- Force Protection Condition System
HDR	- Humanitarian Daily Rations
IDPO	- Indefinite Delivery Purchase Order
IMPS	- Institutional Meat Purchase Specification
ISP	- Installation Support Plan

MCW	- Meals Cold Weather
MEDCOM Pam	- Medical Command Pamphlet
MEDCOM Reg	- Medical Command Regulation
MIL-STD	- Military Standard
MRE	- Meals Ready-to-Eat
NAMP	- North American Meat Processors Guide
NCOIC	- Non-commissioned Officer in-charge
OIC	- Officer in-charge
OPRATS	- Operational Rations
PACE	- Procurement Automated Contract Evaluation
PHF	- Potentially Hazardous Food
PV	- Prime Vendor
QCP	- Quality Control Point
RFQ	- Request for Quotes
TB MED	- Technical Bulleting (Medical)
TG	- Technical Guide
TISA	- Troop Issue Subsistence Agency
TOTM	- Tailored Operational Training Meals
UGR	- Unitized Group Ration
USDA	- United States Department of Agriculture
VETCOM	- U. S. Army Veterinary Command

CHAPTER 1 - Introduction

Food safety has been of major concern internationally for decades. Interviews, research, conferences, and workshops are directed towards the production and storage of safe foods. While the food supply in the United States is one of the safest in the world, Centers for Disease Control and Prevention (CDC), estimates that 76 million people get sick, more than 300,000 are hospitalized, and 5,000 Americans die each year from foodborne illnesses (<http://www.cdc.gov/foodsafety/default.htm>). Food safety is of greater importance now than it has ever been. Business level, international trade, retail pressure and the ever increasing customer demands dictate that safe manufacturing, retail, and transport of food from sources to dinner plates be in place. Preventing foodborne illnesses and death remains a major public health challenge. Even though food safety involves physical, chemical, and microbial causes, recent trends have shown that microbial defects, especially, pathogenic bacteria has been a major problem in the food industry and has affected the industry to a very large extent.

Food protection or defense on the other hand had not even been a focus of discussion until the seminal event on September 11, 2001 in New York City in the United States of America (U.S.A.). After that day, a number of organizations have been formed in U.S.A. with the assistance of the Department of Homeland Security to take care of food defense. These cover both intentional and unintentional adulteration and contamination of food.

Organizations in the food sector will need to manage risk, demonstrate good corporate responsibility, and meet legal requirements if they are to remain competitive, protect their reputation, and enhance their brands. An effective food safety management system based on a proven standard is needed at all levels to ensure that safe food is being manufactured, distributed, and consumed. Furthermore, assessment and certification of the management system by an independent third party will optimize the food safety of the management system.

In lieu of all this, the United States Army (U.S. Army) had always been an organization that had taken food safety and defense or protection very seriously. It is statistically shown that the number of reported incidences of foodborne illnesses on Army Installations has declined over the past years. The U. S. Army food safety, security, and defense program pursues excellence by

integrating the actions of multiple organizations within and outside the Army to research from the fields of microbiology, sociology, economics, bioterrorism, etc. Even though gathering information from Military establishments to compile a report on food safety, security, and defense may be a clear case of “healthy worker’s bias”, it can never be over stated how effective the organization’s complex measures have been in the control of foodborne illnesses.

This report is to analyze the U.S. Army’s complex mechanism used in controlling food safety, security, and defense to ascertain which measures can be applied to other civilian organizations to improve food safety, security, and defense without affecting their socio-economic and behavioral situations. It is based on this author’s experience as a food inspector in the U. S. Army Veterinary Command (2003 to 2008), and interviews conducted with officials from other units or commands in the service that work as a team to accomplish the food safety, security, and defense for the Department of Defense (DoD). Areas that can be further improved or developed will be addressed.

CHAPTER 2 - Safety and Protection at Source

The U.S. Army monitors the safety and protection of its subsistence from the source to the consumer. Monitoring at the source is done by conducting sanitary audits themselves or with the help of accredited food monitoring organizations such as the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) in the manufacturing industries. Such audits are conducted with guidance from Department of Defense Standard Practice Sanitation Requirements For Food Establishments (United States Military Standards. 2002). This document is approved for use by all agencies of DoD.

The DoD is committed to the production and storage of food products in clean, sanitary food establishments in order to prevent the transmission of contaminants and foodborne diseases to members of the U. S. Armed Forces and their dependants. The requirements in this document are based on national food and drug regulatory requirements and others from professional societies.

These required documents are selectively applied herein to ensure that food establishments maintain a minimum set of sanitation standards. This minimum set of standards can be augmented by the required activities. This standard establishes the Current Good Manufacturing Practices (CGMP) requirements, as provided in Code of Federal Regulations (CFR), Title 21, Part 110 (revised April 1 2003) as basic sanitation standards for food establishments that supply subsistence. The standard also provides detailed commodity requirements in appendices. Food establishments in compliance with this standard will be listed in the Directory of Sanitarily Approved Food Establishments for Armed Forces Procurement (<http://vets.amedd.army.mil/dodvsa/index.html>).

1. Sanitary Audits

The various types of food establishments are grouped into various appendices in the United States Military Standards (2002) as shown later in this chapter. The audit shall consist of but not be restricted to an examination of the methods used to conduct background checks for employees, receive, handle, and store food, food ingredients, and/ or additives. The sanitation

audit shall be performed in the presence of management or a designated representative. Results of the audit shall be documented. All establishments are subject to laboratory testing. A sanitation audit shall be rated either "Acceptable" or "Unacceptable". A critical defect will result in an Unacceptable rating. Four or more major defects will result in an Unacceptable rating. The cumulative effect of multiple observations indicating an out-of-control process may require an upgrade to one major defect, due to the increased public health significance. Establishments receiving an "Unacceptable" Sanitation Audit Rating shall provide written confirmation of corrective actions taken.

The 7 sub-parts of United States Military Standards (2002) are:

- A. Personnel
- B. Building and Facilities
- C. Equipment and Utensils
- D. Raw Materials and Operations
- E. Defect Action Levels
- F. Hazard Analysis and Record Keeping
- G. Food Security

It is divided into 18 appendices that contain specific requirements related to the cited reference document but are not intended to be all-inclusive. These appendices are:

Appendix A – General requirements

Appendix B – Bakery

Appendix C – Manufactured Dairy Products

Appendix D – Fluid Dairy

Appendix E – Shell Eggs

Appendix F – Frozen Deserts

Appendix G – Ice

Appendix H – Sea Food

Appendix J – Pasteurized, Refrigerated Juices

Appendix K - Bottled Water/ Soft Drinks

Appendix L – Off Post Caterers and Civilian Restaurants

Appendix M – Slaughter and Fabrication of Fresh Meat Products in Overseas Areas

Appendix N – Dry Dairy Products

Appendix O - Slaughter and Fabrication of Poultry Products in Overseas Areas

Appendix P – Fresh-Cut Produce

Appendix R – Mushrooms

Appendix S – Vegetable Sprouts

Appendix T – Low Acid Canned Food

2. Approved Sources

This is a World Wide Web directory that lists all food establishments that have met the standards of the United States Military Standards (2002) and have been approved for procurement. All food establishments that want to sell or have any form of procurement contracts with DoD or any of its agencies will have to be inspected, approved and placed on the approved sources list prior to being accepted. The World Wide Web directory of sanitary approved sources is a dynamic document which constantly changes through the addition of new establishments and suspension and/ or deletion of previously approved establishments which have failed to maintain or meet standards.

The approved sources list is monitored by the U. S. Army Veterinary Command (VETCOM), from various regions in the world and access is granted to the general public based on the security concerns of the region. The various regions are as listed below.

- A. Continental United States (CONUS) and South America Directory
- B. Pacific Region Directory
- C. Europe Region Directory
- D. Korea Directory
- E. U. S. Army Central Command (CENTCOM) Directory - access for non-U. S. Army Veterinary Service Personnel.
- F. CENTCOM Directory - access for U. S. Army Veterinary Service Personnel.

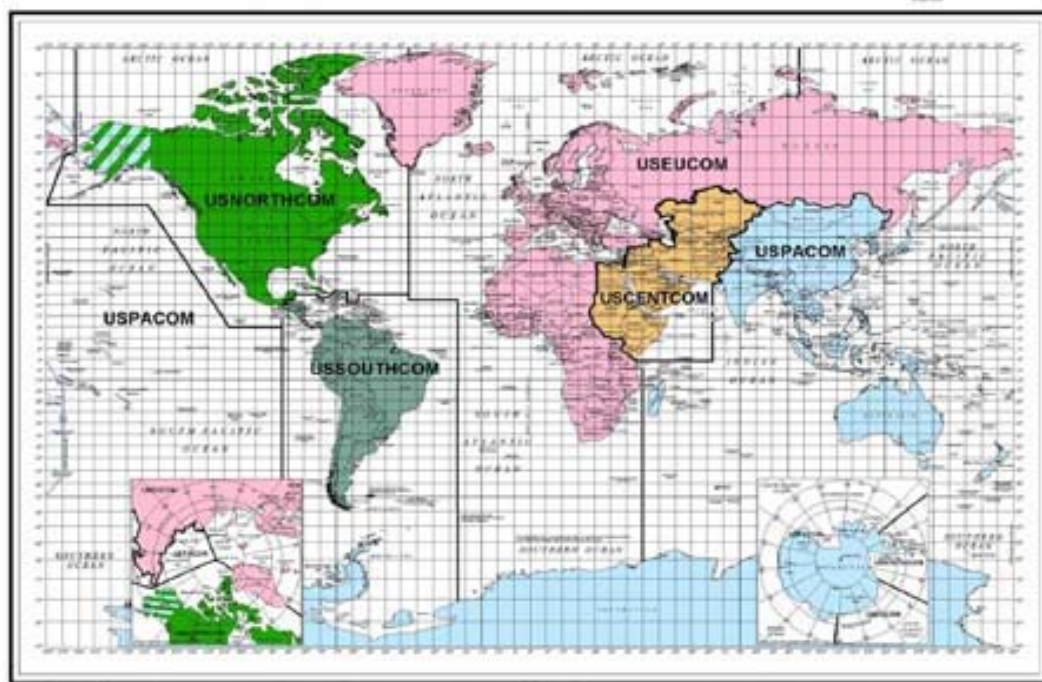
Some establishments inspected by accredited Federal organizations are accepted as Federal Approved Sources. A periodically updated publication of all such establishments will be provided to the Armed Forces Procurement Agency to be used in updating the approved sources

list.

The establishments listed in the publications below may serve as Federal approved sources for Armed Forces Procurement for the covered or coded products.

- A. Interstate Certified Shellfish Shippers List (ICSSL)
- B. Interstate Milk Shippers (IMS) List
- C. Dairy Plants Surveyed and Approved for USDA Grading Service
- D. USDC Approved List of Fish Establishments and Products
- E. Directory of Grading Offices and Plants Operating Under USDA Poultry and Egg Grading Programs
- F. Meat, Poultry and Egg Products Inspection Directory

Figure 2.1 Map Showing Commands Responsible for Approved Sources Directories (United States Department of Defense. 2007).



CONUS Directory – USNORTHCOM and USSOUTHCOM

Pacific Region Directory – USPACOM

European Region Directory – USEUCOM

Korean Region Directory – USPACOM

CENTCOM Directory - USCENTCOM

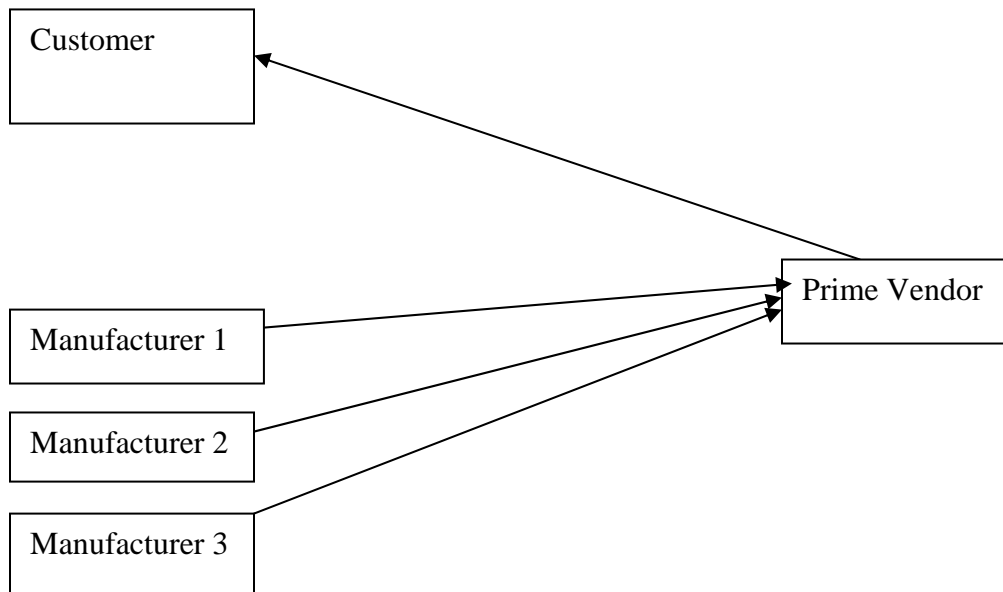
3. The Prime Vendor System

Considering how cumbersome it will be for U.S. Military establishments (Army, Airforce, Marines, Navy, etc.) to go around shopping from all the approved sources, they have come out with a program that restricts that kind of movement and establishes a single to few trade partners. This is called the Prime Vendor System (PVS). The Army Subsistence Program, managed by the Defense Subsistence Center Philadelphia (DSCP) in Pennsylvania, initiated a DoD Food Inventory Demonstration Project in fiscal year 1995. A copy of this document could be attained by requesting for it through DSCP by filling out appropriate forms on their webpage on <http://www.dscp.dla.mil/subs/index.asp>. This project evolved into Subsistence Prime Vendor (PV). Under this program, the contractor assumes responsibility for inventory, inventory management, and transportation and services the installation as much as it would any restaurant or other institution it supplies. Prime Vendor eliminates the layering of supplies at multiple echelons and shifts inventory, inventory management, transportation, and personnel costs from the U.S. Government to commercial firms. Prime Vendor programs take advantage of the experience of commercial vendors, whose profit-based business practices demand lean inventories and rapid deliveries. Prime Vendor initiatives allow the DoD to achieve significant annual savings and revolutionize logistics support of the retail customer. The Prime Vendor program offers numerous advantages. Troop issue subsistence activities on CONUS installations have seen their missions dramatically reduced with about 80% of them closed down. In October 1997 Army-operated on-post food distribution had ceased. Personnel served by the dining facility are now provided fresher products with brand names due to the implementation of the Prime Vendor program. This made traceability and product monitoring more possible as

compared to buying from a local market and also eliminated the issue of shortages since it is all addressed in the Prime Vendor contract.

Basically, the Prime Vendor is contracted to provide the installation with all or most of their subsistence. They do provide the outlets on the installation with an electronic or computerized catalogue through which the outlet makes orders. All items on the catalogue will have to be manufactured from establishments listed in the Directory of Sanitarily Approved Food Establishments for Armed Forces Procurement as described earlier in this chapter. They also provide a means of transporting the subsistence to the installation at the appropriate storage conditions. A contract is drawn between the Prime Vendor and the installation with mediation of DSCP. As part of the contract, a periodic audit or inspection will be done at the prime vendor's warehouse with the United States Military Standards (2002). If they fail the audit, they are suspended and may be deleted unless the defect is fixed within an allowable time frame. Thus the manufacturer is audited (approved source), and the distributor (Prime Vendor) is also audited. To ensure that there is sufficient supply of food, various items are required to be supplied over specific periods unless deemed to be changed by the installation. For instance, \$3 million worth of chicken breast fillet could be contracted for 5 years. Within that period all the installation needs to do is to put in the order and it will be delivered.

Figure 2.2 Basic Outline of Prime Vendor System



Even though the subsistence goes through all that stringent scrutiny to be listed on the approved sources list, it is not government owned until it is accepted at the destination. Any items rejected will have to be replaced within 24 hours or as specified by the contract.

Figure 2.3 Pictures of Some Prime Vendors.



i. Prime Vendor Contract

This is generated based on the Defense Logistics Agency (DLA) master solicitation. Vendors are encouraged to conform their delivery terms as closely as possible to the delivery days requested. This solicitation, called the DLA Master Solicitation for Automated Simplified Acquisitions is used for the solicitation of Request for Quotes (RFQ) and the award of Purchase Orders, for automated acquisitions for each of the Defense Supply Centers: Defense Supply Center Columbus (DSCC), Defense Supply Center Philadelphia (DSCP), and Defense Supply Center Richmond (DSCR). The DLA Solicitation for Automated Simplified Acquisitions is effective in May 2004 with the BSM Retrofit Release. Manual bidding was used prior to this.

Vendors are required to read provisions to understand the solicitation, evaluation and award process for acquisitions as of May 2004. Each provision is provided in full text in Part I of the Master Solicitation.

The DLA Master Solicitation for Automated Simplified Acquisitions is updated from time to time to reflect changes in law, regulation and acquisition policies and procedures. Updates to the DLA Master Solicitation for Automated Simplified Acquisitions can be identified by a date and revision number. The DLA Master Solicitation for Automated Simplified Acquisitions (Part 13) is structured in three Parts. Part I contains important information to vendors regarding a) the DLA Master Solicitation for Automated Simplified Acquisitions (Part 13), b) the DLA Internet Bid Board System (DIBBS) and c) the Procurement Automated Contract Evaluation (PACE).

Part II contains information regarding Indefinite Delivery Purchase Order (IDPO) Contract and applies when solicitation and resulting award does not specify a firm quantity of supplies (other than a minimum quantity) and provides for the issuance of delivery orders during the period of the contract. Coverage is for DLA orders for stock replenishment.

Part III contains the clauses, provisions or notices that apply to automated solicitations and orders, and is organized into Subparts A through E. Web links to the Federal Acquisition Regulation (FAR), the Department of Defense Federal Acquisition Regulation Supplement (DFARS), and the Defense Logistics Acquisition Directive (DLAD) and to each Center's clause list are provided in Part III. Clauses, provisions or notices are incorporated by reference when the full text is not provided, with the same force and effect as if set forth in full text, and made part of the solicitation or order as applicable

Subpart A contains the Federal Acquisition Regulation (FAR), the Department of Defense Federal Acquisition Regulation Supplement (DFARS), and the Defense Logistics Acquisition Directive (DLAD) clauses and provisions that are applicable to all solicitations and orders. These clause and provisions are identified as "Mandatory".

Subpart B contains the FAR, DFARS, and DLAD clauses and provisions that apply to acquisitions based on certain conditions, and provides instructions for the vendor to read to determine when a particular clause or provisions applies to a solicitation or order. These clauses and provisions are identified as "Conditional".

Subpart C contains the “Mandatory” and “Conditional” clauses and provisions that apply to solicitations and orders issued by the Defense Supply Center Columbus (DSCC). Instructions are provided for the vendor to read to determine when a particular “Conditional” clause or provisions applies to a solicitation or order.

Subpart D contains the “Mandatory” and “Conditional” clauses and provisions that apply to solicitations and orders issued by the Defense Supply Center Philadelphia (DSCP). Instructions are provided for the vendor to read to determine when a particular “Conditional” clause or provisions applies to a solicitation or order.

Subpart E contains the “Mandatory” and “Conditional” clauses, provisions and notices that apply to solicitations and orders issued by the Defense Supply Center Richmond (DSCR). Instructions are provided for the vendor to read to determine when a particular “Conditional” clause, provision or notice applies to a solicitation or order.

Automated solicitations will contain a site identifier that associates the solicitation to one of the Centers. The site identifiers for the Centers are: SPM4 (DSCR), SPM1, SPM2, SPM3, SPM5 (DSCP), and SPM7 (DSCC). Automated solicitations will also be identified by a “T” or “U” in the ninth position of the solicitation number.

Further information regarding the DLA master solicitation or the Internet Bid Board System (DIBBS) can be attained by e-mailing: dibbsBSM@dla.mil. Reference to frequently asked questions (FAQs) on DLA DIBBS can be attained at:

<https://www.dibbs.bsm.dla.mil/Refs/help/BSMDibbsHelp.htm> or phone 1-877-352-2255.

CHAPTER 3 - Transportation and Delivery

Transporting the subsistence to the installation is the responsibility of the Prime Vendor. It is incorporated into the contract, that the Prime Vendor delivers and replaces subsistence. Based on the contract, they may have up to 48 hours to replace any rejected subsistence, and are to ensure that the transportation provided meets safety, security, and protection demands. These will include specifications such as;

- A. Temperature requirements
- B. Sanitation
- C. No leaks or holes
- D. Seals
- E. Cleanliness
- F. Well arranged to meet aeration
- G. Good service records of fleet
- H. Background checks on employees or drivers
- I. Chain of custody (when needed)

1. Subsistence in Transit

With the Prime Vendor system, the vendor uses the order list and loads up his trucks or vehicles that is supposed to meet requirements mentioned above in this chapter, with no direct supervision from U.S. Army food inspectors. However, with subsistence made for military operations, commonly known as operational rations (OPRATS), there will be representatives at the facility to monitor the process from assembly to loading. The need for increased security is due to the food supply used in “field” environments where soldiers are under stress and be more prone to any physical, chemical, or microbial challenges. Both OPRATS facilities and Prime Vendors are required to provide a temperature tracking system that can indicate the temperature profile throughout the trip. This helps to detect if refrigeration was cut-off some time during the journey or not. Seals are put on the delivery trucks once they are loaded, and the seal number is

communicated to the receiver. In exception of the receiving authority, this seal can only be broken by a law officer and he is required to call the receiving authority after breaking it to inform them of the situation, and provide his name, badge number, and number on new seal that will be used to re-seal the conveyance. The receiver is notified when the delivery vehicle is supposed to leave and will only be called again if he could not leave on time or something verifiable had happened on the road to cause a delay.

2. Receiving

On arriving at the military installation, the driver will have to dismount from the vehicle. The delivery vehicle is then run through an x-ray system on a conveyor belt while the driver's documentation is being checked with records since every delivery driver will have to undergo a full background check and his records kept on file. Once all that is cleared, he then proceeds on his journey to the receiving facility, which will have been notified by gate security.

Receiving is one of the most important steps in food safety, security, and protection monitoring. A lot of emphasis is placed on safety at this point because this is the point that the government will accept full responsibility of this subsistence, and also will be termed a Quality Control Point (QCP) or Critical Control Point (CCP) in a regular food manufacturing industry. Three different organizations are responsible for inspecting the subsistence for receipt but only the receiving facility is responsible for accepting it. Some reports go as far as to DSCP.

On arrival at the receiving point, the driver hands in the invoice to the facility's personnel responsible for receiving. He will then quickly compare the invoice with his order and continue with his receipt. At this time, there is an actual food inspector on site to conduct a full receipt inspection as well. The food inspector is also available to make sure that the facility personnel are receiving the subsistence in the proper way and not just taking inventory. The seal is read and broken. Conveyance is open, recording thermometer checked, and all the basic steps of a receipt inspection are conducted in accordance with United States Army Medical Command Policies and Procedures, (United States Army Medical Command. 2006b), United States Army Veterinary Command Guidelines and Procedures, (United States Army Medical Command. 2006a), and Occupational and Environmental Health Food Sanitation, 30 October 2002 (United States Army Medical Command. 2002). This inspection at a minimum will have to cover all the basic steps of receipt inspections which will include but not be limited to;

- A. Check ambient temperature of conveyance (monitoring thermometer)
- B. Perform an olfactory check and check for unsanitary conditions.
- C. Confirm items delivered with items on invoice.
- D. Verify for quantity and identity
- E. Assess product quality (size, color, sweetness, firmness, smell, etc.)
- F. Check expiration dates (use-by, sell-by, expired, best-by, etc.)
- G. Measure product temperatures
- H. Confirm for accept/ reject numbers in accordance with SOP or contract.
- I. Reject or accept load and place in appropriate storage.
- J. Packaging material should also be inspected for foreign material and any form of contamination.
- K. Radioactive sensors may be used if there is need for any suspicion of radioactive materials.

Temperature defects of conveyance are not a definite reason to reject a load, however it is grounds to intensify the inspection and monitor more details, especially product temperatures. Sample sizes for inspections are determined by the appropriate regulations but can be manipulated at the discretion of the inspector. Accept/reject numbers are taken into consideration but once not owned by the government, it is more stringent. i.e. items already owned by the government may be accepted even if accept/reject numbers are not met and the issue involved is quality and not safety. Also it depends on the value of the product.

There are special requirements for the inspection of red meats, poultry, fresh fruits and vegetables in places like commissaries which have to hold these products for sale. Whole sale cuts or prime cuts of red meats and pork are inspected in accordance with the Institutional Meat Purchase Specification (IMPS). Poultry is inspected in accordance with the North American Meat Processors Guide (NAMP). Fresh fruits and vegetables are inspected in accordance with the United States Department of Agriculture Produce Guide (USDAPG). All these special inspections are conducted for grade and standards. They undergo the general inspection requirements mentioned earlier as well.

Receipt procedures vary slightly with OPRATS. These are conducted in accordance with DSCP Handbook 4155.2 Appendices A, B, C, E, F, G, H, J, K, L, and M. Each appendix is

updated as needed and there is no appendix D or I. A more detailed look at OPRATS will be provided later in the OPRATS chapter.

The receiving area must be protected from the sun, dust, rain, and snow. It must also be adequately lighted and ventilated, have proper drainage, and be kept sanitary at all times. Perishable subsistence, either chilled or frozen, deteriorates rapidly if it is not refrigerated. Perishable subsistence is affected much more than semi perishable by temperature and humidity fluctuations, air circulation, and unsanitary conditions. Most perishable items deteriorate or spoil due to the growth of bacteria, yeasts, and molds. The most important factor in retarding this action is proper temperature control.

Humidity in the storage area must also be controlled. Humidity, the amount of moisture in the air at a given temperature, is measured with a psychrometer. Air can absorb only certain amount of moisture at a given temperature; the higher the temperature, the more it can absorb. If the temperature is decreased or more moisture is added, excess water will condense and collect on the exposed surfaces of the building and the items in storage. If the humidity is too low, the air will extract moisture from the product and cause it to dry out, resulting in a loss of flavor and quality.

Proper air circulation is also important. Cool air carries heat away from stored products and prevents the condensation of moisture. Proper circulation also carries away the gases given off by fresh fruits and vegetables in their respiratory process. Circulation is adequate if the recommended temperature is uniform in all parts of the refrigerated area. To enhance the effectiveness of the receipt inspection, some basic items or tools are required. These may include but are not restricted to;

- A. Scales. These are used for determining net weight. They may be provided by the receiver or the food inspector. Currently available are electronic digital platforms, overhead rail, platform dial, or platform beam scales. Electronic digital platform scales are preferred. Capacity and graduation of the scale must ensure an accurate determination of net weight and must weigh in the lowest increment specified in the contract. When a scale is not being used, it must be stored in an accessible place and in such a way that its validity is not endangered. It must be checked periodically for accuracy in accordance with Federal, State, and Local regulations. A certificate verifying the accuracy of the scale should be

prominently affixed to the face of the scale each time it is checked by proper authorities and passed. Test weights should be available and should be certified as being accurate.

- B. Knife. This is used to cut the wrapping and packaging materials. It is issued to the inspector and should be kept clean and sharp, stored properly, and handled safely. When fabricated meat is inspected; wire or strap cutters are needed to open the containers.
- C. Boring or Piercing Instrument. This instrument is used to make a hole in both frozen and solid chilled products when taking the internal temperature. The hole prevents damage to the thermometer. The instrument may be an ice pick, drill bit, or a meat trier.
- D. Thermometers. These are used to determine the internal temperature of products and the opening temperature of carriers. They must be durable, easily sanitized, and kept in excellent condition. Examples of some commonly used ones are:
 - 1) Metal dial. This is a hermetically sealed dial thermometer that has a pointed stem approximately 5 inches (125 mm) long. The dial face is glass and the remainder is corrosion-resistant stainless steel. It measures temperatures from 00 to 250 °F (-17.78 to 121.11 °C), and has an accuracy of +/- 2.0 F.
 - 2) Glass stem. The stems vary in length from 5 to 11 inches (127 to 279.4 mm) and can be calibrated in either Fahrenheit or Celsius units over a variety of temperature ranges. Glass stems are less durable but more accurate than the metal dial type and are usually mounted in coolers, freezers, and water baths (open cookers). They are often used to check the accuracy of the metal dial thermometer. Glass stem thermometers vary in precision.
 - 3) Recording. This thermometer is used when a permanent, continuous record of temperature is needed. It is composed of a recording mechanism, recording paper, and a temperature-sensitive wire called a thermocouple.
 - 4) Electronic digital. There are various brands and models of electronic digital thermometers available on the market.

3. Installation Support Plan

The Installation Support Plan (ISP) is designed to assist the Installation Public Health Officials (IPHO), in making risk-based assessments of public health requirements and to wisely match existing resources against the entire spectrum of food safety, food security, animal

programs, and customer needs for a given installation. Basically, the ISP is an agreement between the Military Installation and the units responsible for public health, specifically food safety, security, and protection, on how much support the installation requires from them. These may include;

- A. Frequency of inspections
- B. Types of inspections
- C. Depth of inspections
- D. Training
- E. Force protection
- F. Committees
- G. Advisory

Once risk levels are assessed, variables to consider in the creation of the ISP include: availability of personnel and resources; expected degree of risk mitigation; time and distance constraints; availability of alternate civilian or military sources of services; surrounding public health infrastructure; civilian or military political considerations; and environmental decision making. If resources are not available to fulfill a requirement, a request is forwarded up the chain of command proposing a reallocation of resources.

Regardless of the ISP, the food inspectors at a minimum will meet the requirements in United States Army Medical Command (2006b). They will also take responsibility of handling food that pose as an imminent health hazard. Transportation and receipt also depends on if it is government owned (intra/inter-installation), or not (Prime Vendor to installation). When already government owned, conditions are less stringent as compared to that coming from civilian organizations. Each Installation Veterinary Officer in-charge (OIC) and non-commissioned officer (NCOIC) coordinates with the Installation Operation Center, or equivalent, to discuss the veterinary service's role in the installation anti-terrorism (AT) plan. An annex to the plan will be developed and instituted. Vulnerability assessments is performed only by individuals that possess, at a minimum, a current or approved interim Secret clearance. Food and Water vulnerability assessments is conducted in accordance with technical guide (TG) 188 and is done through coordination with the installation Preventive Medicine OIC in order to eliminate potential duplications of effort. During the planning process, personnel support requirements are identified as being required for the implementation of the host installation Force Protection

Condition System (FPCON) levels. Each branch and section complies with and support the host installation's AT plans. The leadership ensures that AT training is identified as a unit combat service support task and is an integral part of unit training plans. AT training is embedded throughout unit training plans and will be performance oriented and measurable.

CHAPTER 4 - Storage

Once the subsistence is received, it has to be stored appropriately until ready for use. Regulations and basis of storage depends on the type of storage. Storage can be grouped into 3 types;

- A. Prime Vendor warehouse
- B. Government warehouse
- C. Individual facility warehouse

Storage at the Prime Vendor warehouse was discussed in the safety and protection section. Government warehouses are places where subsistence owned by the government is stored for distribution. This is not restricted to military. There are government warehouses that are in locations nowhere near military installations and are usually for the National Emergency Preparedness Program. On the military side, these are known as the Troop Issue Subsistence Agencies (TISA). They are currently used mainly for the storage of OPRATS, since the prime vendor system has done away with mass storage. Such facilities are inspected in accordance with MIL-STD 3006A as described in the Safety and Protection as Source section.

Individual facility warehouses are monitored on quite a higher frequency, weekly or monthly, than the above mentioned facilities, yearly or quarterly. These usually do store both perishable and semi-perishable subsistence. They are inspected in accordance with United States Army Medical Command (2006b), United States Army Medical Command (2006a), Army Regulations (2006) and United States Army Medical Command (2002). The presence of semi-perishable subsistence in these facilities makes monitoring factors that affect storage life very important. These may include:

- A. Aging. Food deterioration due to aging is a continuous process that begins at harvest, slaughter, or manufacture and continues until the food is no longer serviceable. Good preservation and storage techniques merely reduce the rate of aging in these products.
- B. Microorganisms. The growth of bacteria, yeasts, and molds may cause gas, objectionable odors and flavors, and toxic substances.

- C. Environment. This may include the effect of temperature, light, chemical exchanges, humidity, and aeration.

1. Surveillance Inspection

Surveillance inspections are conducted on stored items very frequently. These inspections are made to determine if government-owned foods (to include dry pet food) are wholesome and suitable for further storage, shipment, issue, sale or consumption. These inspections are performed on a planned recurring basis for condition and serviceability. Walk-through inspections are performed for obvious defects, incorrect temperatures, infestation, faulty warehouse facilities, or other practices that may lead to deterioration. Sanitation deficiencies found may indicate a need for specific product surveillance inspection. Inspections are scheduled in accordance with the local ISP. It is daily for fresh fruit and vegetables. At this point, the subsistence is already Government owned so as much as safety is considered in conducting these inspections, economic value is also considered while conducting destructive inspections. It is ensured that proper storage techniques are used. These could include basic storage rules such as First In First Out (FIFO), arranging produce without having chemical reactions such as the effect of ethylene oxide to cause unnecessary ripening, using temperature monitoring charts, etc. Cleanliness and the use of dry dunnage will retard action by microorganisms and prevent insect and rodent infestation. In addition, the following practices are recommended:

- A. Subsistence items should be stored on dunnage or hung from clean rails.
- B. Unless otherwise specified in the contractual requirements, subsistence should be stored at least 12 inches (30 cm) from air ducts and ceiling-mounted blower units, at least 4 inches (10cm) from any wall, and with at least 24 inches (61 cm) between the top of the stack and the ceiling.
- C. All containers, including sample cases, should be properly closed and strapped, with packaging and packing materials in good condition.
- D. Different types of subsistence should be stored in separate areas. Products that easily absorb foreign odors, such as butter and shell eggs, must not be stored in the same area with fresh fruits and vegetables, or with cured and smoked meats.
- E. Eating, drinking, smoking, and tobacco chewing should be prohibited in storage areas.

2. Refrigeration Failure

Refrigeration failure has been a major concern to frozen or chilled food storage. Even when all the necessary steps to maintain adequate storage conditions are attained, refrigeration failure can still occur due to a power outage or a mechanical break down. At this point a determination will have to be made as to what to keep for continuous use and what to dispose of. This could be very costly and as such, a basic procedure has been put in place to salvage subsistence when this occurs. There are five basic steps involved in making disposition decisions of food items exposed to refrigeration failures.

Step 1 - Determine the length of time the food has been stressed at an ambient temperature of 6 °C/ 42.8 °F or greater.

Step 2 - Classify the temperature stressed food item as SAFE or RISK based on Table 4.1 (page 27) and Figure 4.1 (page 28). If the food item is a Risk item, then decide which RISK Group it belongs to.

Step 3 - Determine the product temperature.

Step 4 - Determine if the food item has exceeded its Time-Temperature Limit based on Table 4.2 (page 29).

Step 5 - Make disposition decision.

i. Estimating Time of Exposure

- A. The estimation of exposure time is for the ambient temperature and not the product temperature. This is a conservative safety factor that has been designed into the system. Refrigeration units should be equipped with electronic warning devices that not only trigger an alarm but also record the time when refrigeration failure occurs. When such devices are unavailable, one should assume the worst case scenario of refrigeration failure occurring which would be shortly after the last person has left the store (not including cleaning personnel).
- B. The time of refrigeration failure may be deduced from the stoppage of an electric clock or if it was a general blackout, by an inquiry of the electric company. Time-Temperature Indicators have been developed that can provide a good indication of the time that temperatures have exceeded the requirements. Record the estimated time of exposure.

ii. Classification of Foods

- A. Stressed foods will be classified as either SAFE or RISK food items. Determine if the food item is listed as a SAFE food by reviewing Table 4.1. For SAFE items, refrigeration is used to maintain quality, not control pathogen growth. Factors contributing to reduced microbial risk include low pH (acidic) and/or A_w (reduced availability of water). All items that have remained frozen are included in the SAFE list. Resale decisions concerning temperature stressed SAFE foods will be made by the retailer. Mark, tag, separate, or remove the SAFE foods.
- B. If the food is not listed as SAFE in Table 4.1, then go to Figure 4.1, Flow Chart
 - 1) for Classifying Foods Exposed to Refrigeration Failure to determine the risk level.
 - 2) Record RISK foods and their risk level.

iii. Determine Product Temperature

- A. Determine whether the refrigeration failure was due to a power outage or mechanical breakdown and note it. In a power outage, all electrical systems are off; a temperature gradient emerges with the bottom layer being the coldest. During a mechanical breakdown, when the fans and compressor are still working, the middle layer is the coldest portion of a lot. The top outermost packages will thaw faster than the internal packages, therefore lot arrangements may include--
 - 1) The removal of the outer packages or stacks from the lot to be discarded.
 - 2) The splitting of a lot into two or more smaller lots.
 - 3) Both (1) and (2).

Place priority on frozen items if the refrigeration failure total time is greater than 24 hours. Care must be taken to avoid cross-contamination between risk and safe foods.

- B. Locate the two warmest portions of a lot, which are usually the outer corners of the corner packages of the top layer; an exception is the occurrence of a mechanical failure in which the fans continually circulate the air around the lot. Take two temperature readings from the top layer and note the higher reading and time. Thermometer penetration should

be parallel to the surface of the sample but will not exceed 0.5 inch below the parallel surface.

iv. Determine if Food Has Exceeded Time-Temperature Limits.

A. Compare exposure times with the time-temperature limits (Table 2.4). The first column in Table 1 is the actual temperature of the RISK item and the next three columns are time limits for exposure to a refrigeration failure. If temperatures are taken in Fahrenheit and the temperature readings are between the temperatures in column 1, use the next highest reading. These provide the guideposts for deciding the disposition of RISK foods. Once the temperature has been determined, simply match (horizontally) that temperature with the appropriate RISK column to determine if the RISK item has exceeded the time limits. The concept of time-temperature limits estimates the level of exposure to refrigeration failures that one can allow before RISK foods become a microbial health risk. The FDA specifies only one time-temperature limit, to regard all potentially hazardous (RISK) foods as unacceptable if they reach above 5 °C/ 41 °F for over 4 hours. The FDA's guidance is stringent in that its implementation would result in the destruction of many items that would still be wholesome; however, the FDA's guidance is retained for RISK-3 category (chilled- ready-to-eat) items for reasons previously stated. The time-temperature limit concept is a more flexible guide in that it takes into consideration the following:

- 1) the various types of RISK foods involved and
- 2) the relationship of time and temperature in the growth response of pertinent pathogens in these RISK foods.

v. Make Disposition Decision

A. If the exposure times are within the time-temperature limits during a mechanical or power failure, then accept the whole lot for salvage. If the exposure times exceed the time-temperature limits during a mechanical failure when fans are on, then recommend condemnation of the top and bottom layers and take the temperatures of the second layer. Continue these procedures until all layers have been rejected or time-temperature limits are complied with. When a layer is found within the time-temperature limits, accept the

remaining lot. If the exposure times exceed the time-temperature limits when fans are not on, then reject and remove the top layer and continue to take temperatures of the new top layer (working from the top to bottom) until the lot is rejected or time-temperature limits are in compliance.

- B. Recommend condemnation of all RISK items that have exceeded the time-temperature limits. Reject all RISK 3 items if exposed to $> 6^{\circ}\text{C}/42.8^{\circ}\text{F}$ for 4 hours or more, unless these are raw flesh food (chilled or frozen), or unopened pasteurized dairy/egg products and do not show signs of spoilage. These products can be displayed under refrigeration (chilled/frozen) for a period of up to 24 hours. The packaging should include a highly visible label stating: **WARNING: TEMPERATURE STRESSED PRODUCT**. Instructions should also be placed at the display case explaining proper handling (keep refrigerated, wash hands and utensils after contact with them, avoid contact of item with cooked foods, **COOK THOROUGHLY** the same day of purchase).
- C. Refrigeration failure inspection will be documented and destroyed subsistence will be accounted for.

vi. Classifications of Foods Based on Microbial Risks.

- A. In terms of public health risks, the FDA classifies foods into two broad categories: those that support the growth of pathogens (potentially hazardous foods (PHF)) and those that do not (Retail Food Protection, FDA/Center for Food Safety & Applied Nutrition Hypertext updated by October 5, 2007). The PHFs are defined as those with pH values of >4.6 and A_w of >0.85 . This guide extends the utility of the FDA's definition of potentially hazardous foods, in order to facilitate the salvage of foods exposed to refrigeration failures.
- B. The guide provides a detailed listing and classification of chilled and frozen products to identify those products of minimal risk, and therefore can be salvaged. Thus, a classification scheme and products are listed and classified into two main groups, SAFE and RISK. Products under the category of SAFE foods generally do not allow growth of pathogens, but their degree of stability varies widely in terms of quality. These may include shelf-stable products that are displayed under refrigeration, for example, hard salami and canned ham labeled *refrigerate after opening*. Yogurt developed originally for

its stability at room temperature is kept refrigerated to maintain its quality. The guide does not extend beyond the public health risk to the consumer.

- C. Food exposed to refrigeration failures in any RISK category generally supports the growth of pathogens and are divided into two groups based on whether or not they are precooked and/or ready-to-eat (RTE). Those that are RTE are considered of higher microbial risk because of the absence of cooking (intervention step) immediately before consumption. Cold-tolerant bacteria cease to grow at freezing temperatures; one can readily obtain a conservative estimation of risk from *Listeria monocytogenes* with foods categorized as RISK-2. Chilled canned ham is the only product classified as RISK-1. Because of heat processing and the absence of recontamination, only spore forming *Clostridium botulinum* and *Bacillus cereus* are potential hazards. Items that have the highest potential microbial risk are ready-to-eat, chilled products (RISK-3). Because of the capability of certain pathogens such as *L. monocytogenes* to grow at refrigeration temperatures, it is not possible to determine at what point in time they have started to grow in RISK-3 items, exposed to refrigeration failures.
- D. The preparation or cooking of raw RISK foods right before consumption greatly reduces microbial hazards as long as proper sanitary practices are followed, and the food is fully cooked. Two subsets are identified among these raw flesh foods according to whether or not they are salted and/or cured. The main concern for products that are salted/cured (RISK-2) is the potential of *S. aureus* to grow and produce enterotoxins that are impervious to heat. In the absence of salting/curing (RISK-3), *Staphylococcus aureus* has difficulty in competing with the normal flora of raw flesh foods as discussed previously. For the sake of simplicity, the latter are included as a subgroup of RISK 3 category; The chilled salted/cured uncooked items are classified as a subgroup of RISK 2.
- E. Flesh Foods. Raw meat, poultry, and seafood are the most perishable of foods since they contain an abundance of nutrients and the moisture content required for growth of bacteria, enzyme actions, yeasts and molds. Because of their high growth rate, bacteria are the primary spoilage organisms and health threat. Vacuum packaging of chilled meats increase their shelf life by the reduction in oxygen content and a related increase in carbon dioxide. This set of conditions is especially effective in inhibiting the growth of the primary spoilage organisms, the pseudomonads. The addition of salt, which reduces

aw (water activity), also prevents the proliferation of spoilage organisms. Yeast and other bacteria are not as affected on some food items, such as sausage and bacon, and will eventually spoil these chilled foods. Lowering the pH of meats, as in fermented sausages, is effective in controlling the growth of spoilage organisms and some pathogens.

- F. Fruits and Vegetables. Although adequate in nutrients and moisture content, raw, unprocessed vegetables are attacked by only a few bacteria. Cooking and cutting destroy their resistance to microbial attack. The lack of B vitamins in fruits, and their low pH, prevents the growth of most microorganisms except the molds and yeast. Exceptions to the general acidity of fruits are the melons, which due to their lower acidity levels, allow enteric pathogens to grow.
- G. Dairy Products. Milk is an excellent growth medium for all types of microorganisms. Raw milk generally contains various species of microorganisms, but pasteurization temperatures eliminate all but the spore formers, and a few thermotolerants, such as the lactic acid bacteria. Post-pasteurization contamination may result in the growth of gram negative bacteria and reduction of shelf life. The low Aw and pH of most ripened cheeses results in a long shelf life. However, certain soft cheeses, especially the surface of mold-ripened cheeses, have a high enough Aw and pH to permit growth of pathogens.
- H. Bakery Products. The baking process destroys all but the spore formers in bread and cakes. The low Aw of the products inhibit most microorganisms except molds that eventually would spoil these products. Baked goods with meat or cream fillings would facilitate the growth of bacterial pathogens. Spoilage of fresh, refrigerated dough products is caused mainly by lactic acid bacteria.

Table 4.1 List of Safe Food (United States Army Medical Command 2006a)

Fruits and Vegetables	Dairy Display Items	Meat Items	Miscellaneous Items
Fruit, cut-up or sliced (except melons)	Cheese, processed	Bacon, dry cured	Dough, ready-to-bake
Fruit Salad	Cheese, ripened, hard or semi-hard	Bacon bits (refrigerate after opening)	Pastries, nondairy cream, custard or meat fillings
Fruit in syrup	Cream Cheese	Ham, canned (refrigerate after opening)	Pie crust
Fruit juices, concentrates, drinks	Dips, sour cream base	Pepperoni	Pizza, cheese, pepperoni, anchovy
Horseradish sauce	Pickled herring, shrimp	Salami, hard	Tortilla
Salad dressing	Lard	Sausages, fermented	Yeast, bakers
Salsa	Margarine	Fish, dried/salted	Frozen items not defrosted
Sauerkraut Vegetables, raw, chilled or frozen, excluding cut-up products and bean sprouts	Sour cream		
	Yogurt and butter		

Soft and semisoft cheeses are not considered “safe foods.” Soft/semisoft cheeses include Brie, Camembert, Feta, Hand, Neufchatel, Ricotta, Cambridge, Convalli, Little Dutch, Port du Salut, Bel Paese, Bondon, Coulommiers, Gerome, Petit Suisse, Romadur, Cottage Cheese, and Liptau.

Figure 4.1 Flow Chart for Classifying Foods Exposed to Refrigeration Failure (United States Army Medical Command 2006a)

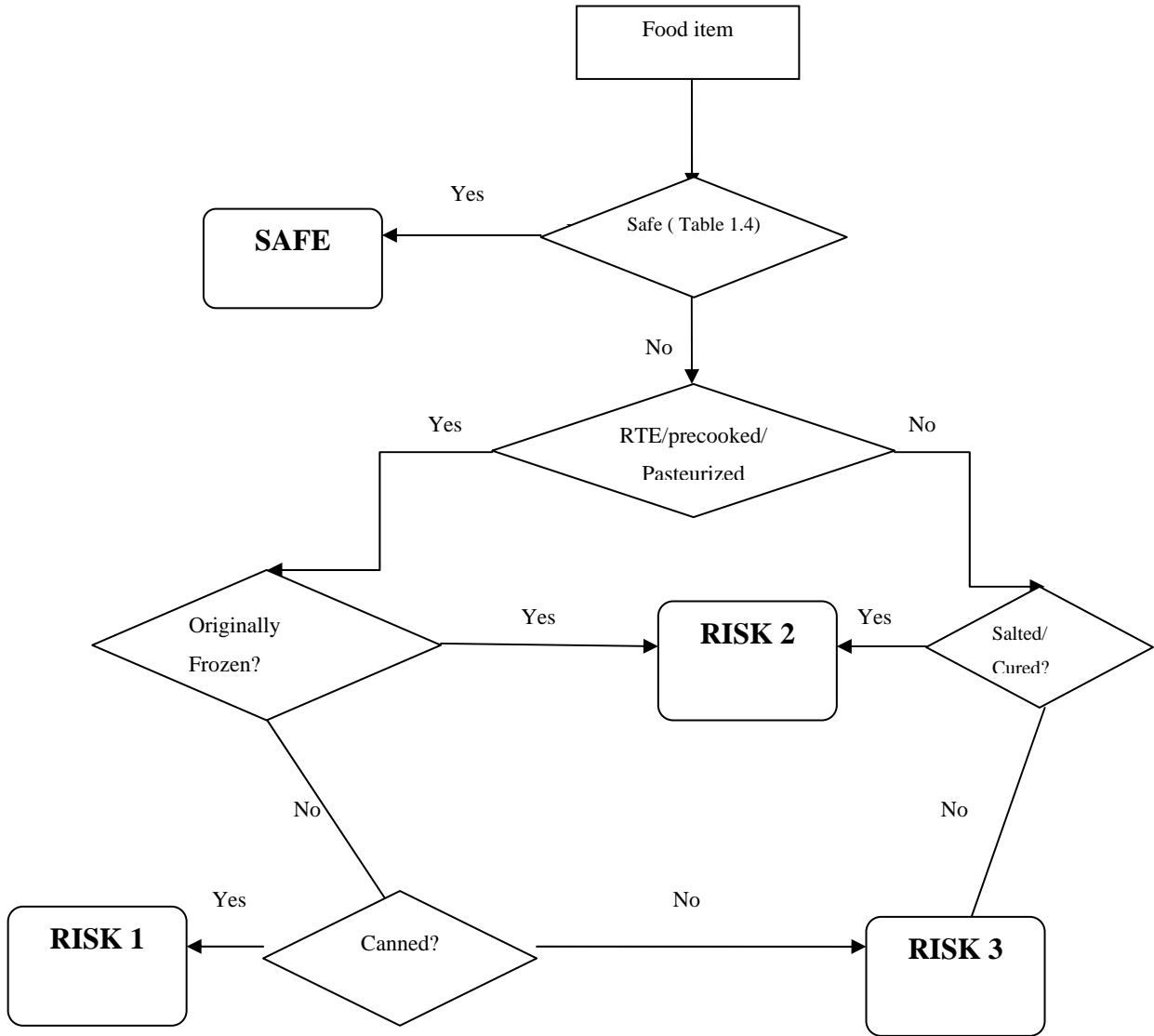


Table 4.2 Time-Temperature Limits (United States Army Medical Command 2006a)

Time-Temp Limits/ C/ F	RISK 1/ Hrs	RISK 2/ Hrs	RISK 3/ Hrs
6/ 42 (42.8)	72	72	4
7/ 44 (44.6)	72	72	4
8/ 45 (46.4)	72	48	4
9/ 47 (48.2)	72	29	4
10/ 50 (50.0)	72	24	4
11/ 52 (51.8)	59	18	4
12/ 54 (53.6)	47	15	4
13/ 55 (55.4)	39	12	4
14/ 57 (57.2)	31	11	4
15/ 59 (59.0)	29	9	4
16/ 61 (60.8)	26	7	4
17/ 63 (62.6)	24	7	4
18/ 64 (64.4)	21	6	4
19/ 66 (66.6)	19	5	4
20/ 68 (68.0)	17	5	4
21/ 70 (69.8)	15	4	4
22/ 72 (71.6)	13	4	4
23/ 73 (73.4)	11	3	4
24/ 75 (75.2)	9	3	4
25/ 77 (77.0)	7	3	4

All the numbers in brackets in column one of Table 1 are the actual degrees Fahrenheit values.

CHAPTER 5 - Preparation and Cooking

Preparation and cooking is a very critical point. This is a stage after which any microbial, chemical, or physical defects that are not corrected will be transferred to the consumer. It can be classified as a critical control point. This is mainly covered in the United States Army Medical Command 2002 and the US Army Adopted Food Code.

Essential preparation requirements include;

- A. Personnel being healthy, wearing appropriate attire (hair and beard nets, gloves, etc.), and applying all suitable food sanitation practices as seen in the above mentioned documents.
- B. Prepping food to standard with appropriate methods such as thawing, portion sizes, avoiding cross contamination, etc.
- C. Cooking food to the right temperature and composition.
- D. Ensuring there are no pests in the prep area
- E. Being extra careful with ready-to-eat foods and fresh fruits and vegetables.
- F. Equipment needed for use is ready and calibrated if necessary.

A recipe sheet is generated for each item on the menu and this provides step by step instructions on how to prep and cook, including utensils needed and required temperatures. Below are a couple of such sheets.

Table 5.1 Example 1 of Recipe (Preparation of Baked Pollock)

Nutritional Information

Calories: 166 Carbohydrates (G): 1 Proteins (G): 26 Fat (G): 6
 Cholesterol (MG): 72 Sodium (MG): 365

This entire prep stage is QCP. Thawing time and temperature of frozen fish, 24 hours at 10 C shall be monitored. Formulation and ingredient quantities shall also be part of this QCP. The temperature of the chiller shall also be monitored as CCP.

Processing Step	Ingredients	Quantity and unit of Measure	Weight
1	Fish, Pollock, Fillet, Raw, Alaskan, Skin	15 lbs	15 lbs
2	Lemon 40 count	¼ oz	1 oz
2	Margarine, All vegetable fats and oils, /lb print in wrapper	½ lbs	8 oz
2	Salt, Table, Iodized, 26 oz container, 24/ Case	0 oz	1 oz
2	Spice, Paparika, Ground, 1 lb,	0 oz	1 oz
4	Celery Naked 2 dozen	0 oz	

Processing Step	Process	Special instructions	Quality and Safety
1	Separate fillets or Steaks; Cut into 4 ½ oz portions. Arrange single layers of fish on lightly greased pans.	If flounder/ sole fillets are used, place fillets on 5 pans	Thawing of fish shall be in cooler not less than 24 hours at 10 °C.
2	Combine lemon juice,	2 lbs 4 oz lemons	None

	margarine, salt and paprika. Mix well. Drizzle $\frac{3}{4}$ cup mixture over fish in each pan.	A. P. (9 lemons) will yield 1 $\frac{1}{2}$ cups juice. 3 $\frac{3}{4}$ oz ($\frac{3}{8}$ cup) frozen lemon juice concentrate and 9 oz (1 $\frac{1}{8}$ cups) cold water may be used for juice.	
3	Bake 25 minutes or until lightly browned.	If flounder/ sole is used, bake 15 minutes or in 325 °F. Convection oven 7 minutes or high fan closed vent.	QCP/ CCP. Monitoring temperature and time.
4	Garnish with parsley before serving.	None	None

- Fish is done when it flakes easily with a fork.
- Baking time varies with the type of fish as mentioned in step 3.
- Other sizes and types of pans may be used.

END OF RECIPE

Table 5.2 Example 2 of Recipe (Preparation of Baked Macaroni and cheese)

Menu Number: 2

Portion Size: 50

Menu Display Name: Baked Mac & Chs

Menu Name: Baked Macaroni and Cheese

Menu Cost per Portion: \$0.49

Cost W/ Condiments: \$0.59

Nutritional Information

Calories: 359 Carbohydrates (G): 37 Proteins (G): 17 Fat (G): 16

Cholesterol (MG): 39 Sodium (MG): 721

Processing Step	Ingredients	Quantity and Unit of Measure	Weight
1	Water, boiling	3 gals	
1	Pasta, Macaroni, Elbow, 20 lb case,	4 lbs	4 lbs
1	Salt, table, iodized, 26 oz, 24/ case	1 1/3 tbs	1 oz
3	Water, warm	1 1/4 gals	
3	Milk, powder, nonfat, instant, 6/5 lbs,	1 1/4 qts	1 lb 1 oz
4	Water	1/2 qt	
4	Flour, wheat, general purpose, bleached, 10 lb bag,	3/4 qt	12 oz
5	Salt, table, iodized, 26 oz, 24/ case	1 2/3 tbs	1 oz
5	Spice pepper black ground 18 oz	2/3 tbs	
6	Cheese, cheddar, natural, mild	1 gal	4 lbs
9	Bread, white, fresh, sliced, pan baked, sandwich, enriched, 24 oz	3/4 qt	10 oz
9	Margarine, all vegetable fats and oils, /lb print in wrapper	3/4 cup	5 oz

Special Instructions:

- Sift flour before measuring.

- Melt margarine before measuring.
- Cheddar or American cheese may be used. Shred before measuring.

Processing Step	Process	Quality and Safety
1	Add macaroni slowly to boiling salted water; cook 8 to 10 minutes or until tender; stir occasionally to prevent sticking.	Temperature and time monitoring makes this stage QCP and CCP
2	Drain. Set aside for use in step 7.	
3	Reconstitute milk; Heat to just below boiling. Do not boil.	
4	Combine flour and margarine to make a smooth mixture. Add mixture to hot milk, stirring constantly.	Formulation. QCP
5	Add salt and pepper. Bring mixture to a boil; Reduce heat; Simmer 5 minutes or until thickened. Stir frequently to prevent scorching.	
6	Add cheese to salt; Stir only until smooth; Remove from heat.	
7	Combine sauce and macaroni; Mix well.	
8	Place about 3 ¼ gal mixture in each well-greased pan.	
9	Combine bread crumbs and melted margarine; sprinkle over mixture in each pan.	
10	Bake 25 minutes at 300 °F or until browned. If conventional oven.	Temperature monitoring – CCP. Color monitoring – QCP.

End of Recipe

An inspector will be present to monitor the entire process to ensure that the procedure is followed through.

CHAPTER 6 – Distribution and Customer Complaints

Distribution and customer complaints as used above is the procedure by which the food is given to the customer and also how feedback is received from the customer with regards to food safety. That is, either serving the prepared or cooked food or putting up the food for continued sale. Different regulations govern this based on who the customer is and what form the food is being presented. This could be divided into perishable foods sold in shoppettes and commissaries, delis, dining facilities and mobile food facilities. It could also be categorized into cooked/ prepared/ ready-to-eat foods, and semi-perishable foods. foods.

Foods that sold in the commissaries are governed by the Defense Commissary Agency (DeCA), regulations and directives, in collaboration with Veterinary Command (VETCOM) and DoD directives.

Sanitary inspections are conducted daily in these facilities using the US Army Adopted Food Code. This covers areas such as:

CHAPTER 1	PURPOSE AND DEFINITIONS
CHAPTER 2	MANAGEMENT AND PERSONNEL
CHAPTER 3	FOOD
CHAPTER 4	EQUIPMENT, UTENSILS, AND LINENS
CHAPTER 5	WATER, PLUMBING, AND WASTE
CHAPTER 6	PHYSICAL FACILITIES
CHAPTER 7	POISONOUS OR TOXIC MATERIALS
CHAPTER 8	COMPLIANCE AND ENFORCEMENT

This document was adopted from the U. S. Food Code which in turn was developed from the CODEX Alimentarius. Even though the product would have been through all the previously described safety procedures, this is the last place it is checked before it reaches the customer. Products at this point are inspected for obvious defects and also to ensure that handlers are using appropriate techniques in handling the food. It is ensured by inspectors that products with temperature requirements are met at the time of sale or issue. Use-by, sell-by, or expiration dates are also very important. Customers are periodically trained on food safety in commissaries and

shoppettes, and food safety brochures are issued to them as well. Personnel or food handlers undergo periodic refresher training on food safety. This is always documented.

In facilities where the food is presented in the cooked form for sale or issue, it is mostly presented in the buffet style and as such, inspectors and handlers ensure that holding temperatures are met and also that all sanitary measures are adhered to in accordance with the United States Army Medical Command 2002. Frozen deserts and other like items are also checked. Apart from temperatures, equipment like ice machines, ice cream vendors, etc, are inspected for molds and general cleanliness. All door ways to food facilities have doors that are maintained closed and air curtains to prevent or reduce the inflow of flies when open. These are all some requirements in both the US Army Adopted Food Code and the United States Army Medical Command 2002.

Even though food safety is tracked all the way from the source till this point that it gets to the consumer, consumers are allowed to return any products they find unsafe for any reason. This procedure is referred to as customer complaints. These are documented and assist in tracking common problems that could have not shown up during the entire inspection procedure. There are chances that a defective item might have missed the sampling process. This sometimes goes all the way to initiating recalls. A common example is a situation when two calculator keys were found in a bottled food. A customer found it and returned it. When the report was sent out to the source, a recall was initiated by the company because an employee had dropped a calculator accidentally during processing and could not get it out. This was revealed after an investigation during the customer complaint report. Majority of customer complaint cases however are a result of the customer mishandling the food and that is another reason why the use of food safety posters, brochures and training or education are implemented for our customers.

CHAPTER 7 - Evaluation

The army has a very effective “check the checker” system. There are inspectors at the facility level who are also checked on by those at the installation level. These are also checked at the battalion level, then brigade. They are in-turn monitored at the district, then the region, and the command level. There are also external evaluators checking from Washington DC. Facilities such as the hospitals have independent evaluating organizations like the American Health Association, Joint Commission on Accreditation of Healthcare Organizations, which are not specifically for food safety but incorporate it into their evaluation.

There is also another important organization, the US Army Center for Excellence, Subsistence (ACES), which also monitors and inspects facilities and actually ranks facilities in different categories including food safety. ACES mission is to;

- A. Assist in preparing the Quartermaster Corps for the conduct of its logistics support mission through effective and efficient leadership, training, and directorship of the Army Food Program.
- B. Train soldiers, civilians, and members of other services/countries in Army subsistence and food service for wartime, garrison, and field training, hands-on training, training as we fight and training to standard.
- C. Develop Army subsistence and food service concepts, doctrine, systems, force structure, and material requirements in wartime, garrison, and field training to include sustaining combat ready forces operating in both a joint and a combined environment to meet worldwide commitments.
- D. Ensure the Army Center of Excellence, Subsistence sustains, maintains, and optimizes available resources to carry out its mission.

The army has Food Analyses and Diagnostic Laboratories (FADL), also to evaluate food safety mainly in the area of microbial and chemical composition checks. The DoD Veterinary FADL protects the force, ensuring food safety, fitness for consumption, and contractual

compliance through microbiological, chemical, and toxicological testing of food and bottled water. The laboratory performs zoonotic and diagnostic testing of animal and human sera for Rabies, Brucellosis, Ehrlichiosis, Lyme Disease, and other vector-transmitted diseases. The lab also provides technical consultation to DoD on integrating laboratory testing and food safety into science-based inspection systems. Their mission is to provide premier force health protection through innovative, adaptive, timely and accurate testing of all food, water, and diagnostic submissions for DoD through a highly efficient and accredited institution now and in the future.

CHAPTER 8 – Operational Rations

OPRATS are a very big part of the DoD's food system. Like the saying goes, "an army moves on its stomach", and as such, it is imperative that any military operation has enough rations or subsistence to sustain the operation. Rations have come a long way from the days that soldiers had to move with tons of carts of food with inappropriate storage and safety measures to today where they are tailored to fit individual pockets and schedules and also not to forget the immense safety and storage procedures developed along with them. Even though they are usually tailored to nutritional needs of an operation, that may satisfy other needs such as religious or cultural needs. Operational rations are high-dollar value items with high visibility throughout the DoD. Operational rations are often used by other government agencies and by the State Department as a source of food during emergencies. Inspection of operational rations during all phases--at the assembly plants, upon receipt at installations, and during surveillance--is one of the army's inspection teams' top mission priorities. The performance of competent and timely operational ration inspections is crucial to DoD's, and to the Nation's, go-to-war and emergency response capability. Operational rations will be subjected to continual inspections and system quality evaluations from time of receipt to time of use or consumption.

There are many types of OPRATS and the mission or situation determines which type could be used. These are divided into two main categories. Individual rations – a packet will feed one person, and group rations – a module may feed up to 50 people. Individual tailored meals include but are not restricted to;

- A. Meals Ready-to-Eat (MRE)
- B. Tailored Operational Training Meals (TOTM)
- C. Passover Meals (Religious)
- D. Humanitarian Daily Rations (HDR)
- E. Meals Cold Weather (MCW)
- F. Survival Rations

G. Kosher Hallal

Group rations include but are not restricted to;

- A. Unitized group Ration heat and Serve (UGR-H&S)
- B. Unitized group Ration A (UGR-A)
- C. Unitized Group Ration B (UGR-B)
- D. Unitized group Ration E (UGR-E)

For the purpose of this report, the safety, protection and defense of MREs and UGR-As shall be used as examples for OPRATS. MRE means Meals Ready-to-Eat. UGR-A means Unitized Group Ration – A. Like all other subsistence procured by the army, OPRATS are monitored from assembly to consumption.

1. Meals Ready-to-Eat

MREs are currently contracted to Ameriquel, Evansville, IN, Sopacko, Mullins, SC, and Wornick, McAllen, TX. Contracts are used to ensure food security. The company will be able to honor a constant supply on demand within the terms and conditions, to include time of the contract. Even though these are civilian entities, army inspectors are stationed or embedded in these plants to inspect the products prior to assemble and purchase. MREs come in three components. A primary, secondary, and ancillary component. A primary component is one that when absent will make the meal nutritionally inadequate. A secondary component is any individual component that if unserviceable, will reduce the nutritional value of the meal but will not render the meal unfit. An ancillary component is any component that contributes little or no nutritional value to the meal and if unserviceable, will not cause the meal to be nutritionally deficient. MREs are covered or contained in a quadruple layered laminate flexible pouches that are also water proof. These are retorted to minimize the possible effect of microbial activity. All components are shelf stable and have a minimum shelf life of three years at an ambient temperature of 80 degrees Fahrenheit. All components are put together to make a complete meal or menu and they are enveloped and sealed in a waterproof plastic pouch which bears the menu number, name, producer and a clearly stamped code date. There are 12 menus or meals in a box and 2 boxes are considered a case. Each box contains a small red sticker, which is a time temperature indicator. It changes color based on the amount of time it has be exposed to extreme temperature and even though it does not mean the subsistence is bad, it gives a pretty good idea

what to expect in the box. The boxes are strong enough to be packed 4 high on a pallet, and 4 pallets high. It is ensured that non-retortable components have very low pH or very low water activity so it does not support the growth of microorganisms. If conditions permit, they are stored in climate controlled environments and this can hold these products for as long as 8 years (from the author's personal experience), with very little to no rancid or other chemical activity such as oxidation taking place. This is usually the first kind of meals issued in combat operations and can be the only meal for up to 60 days before they are supplemented with a hot meal.

At the listed assembly plants, army inspectors use sampling plans as specified in the American National Standards (2003). MREs are handled as a high security item since an approximation of the amount of soldiers can be determined from the amount of MREs ordered. They are tailored on request at the plant. Inspectors cover areas such as;

- A. Background check of workers and plant's method of employment
- B. Defects of cases
- C. Defects of flexible pouches and other containers
- D. Packaging, packing, markings, and labeling
- E. Texture, odor, flavor, and appearance changes

With the control of the pH, water activity and retorting, most of the defects found are mechanical or chemical. There are however very few at this point since the products are fairly new. The least defect found calls for a product rejection at this level since the product is not yet owned by the government. Once an ordered lot is cleared by the inspector, a copy of the inspection report is added to the lot and placed in a conveyance to be delivered to the ordering destination. This conveyance is sealed and a chain of custody sheet is signed by an inspector at the time of sealing and given to the driver. This chain of custody is signed by a uniformed law officer at all weight stations, recording name of officer, date, time, and weight of the conveyance. At the destination, the conveyance the seal is broken by an inspector and number matched to invoice number. Chain of custody form is signed and filed. A full receipt inspection is conducted in accordance with DSCP Handbook 4155.2 Appendix A. Once this inspection is passed, the rations are accepted by the receiving authority and an online inspection report is filed so that the exact amount of rations issued in the system can always be monitored.

Any unused rations from the initial request will be returned to the troop issue subsistence agency after the mission has been executed. This will be re-inspected for obvious defects and

tampering in accordance with DSCP Handbook 4155.2 Appendix A. All MREs that are kept in storage shall be inspected every six months at a minimum. This will ensure it is still safe to eat and also assists in checking accountability. If in storage and the shelf life is reached, an inspection will be conducted and if it is good, the shelf life will be extended for six months but the product will be inspected on a monthly basis until used or destroyed. When it is observed that a specific component is going bad for all menus, a special inspection is conducted on just the attributes of that component and if found to be bad, it is either substituted or the entire lot is discarded depending on the state and remaining shelf life of the other components.

2. Unitized Group Ration - A

UGR-As are similar to MREs in the sense that they are all rations, however, they do come in three boxes to form a module and there is a semi perishable component to it. It feeds fifty people and will require a kitchen with refrigeration to use. The contracts are currently awarded to only Ameriquel and the Wornick company. There are currently 12 breakfast modules, 10 lunch modules, and 12 dinner modules. They are assembled only on request and much more expensive than the previously mentioned rations. Due to price, storage, and preparation requirements, these are not used as frequently as MREs. Under combat conditions, they can only be used when an area is fully secured and storage facilities as well as kitchens are established. They are also heavy and bulky but the box is still designed to pack up three high on a pallet and four pallets high.

Apart from the assembly plant that a full inspection is done, at the destination, a non-destructive inspection is done due to cost. If any defect that can result in an imminent health hazard is found, then a destructive open package inspection will be conducted.

CHAPTER 9 – Conclusion and Recommendations

It can be concluded from the author's experience in the army food service and through his interviews, that the army or DoD as a whole does not do much different from the Food and Drug Administration and United States Department of Agriculture except that the ratio of inspectors to subsistence is extremely unmatched. This is what results in almost 85% of subsistence procured by DoD being inspected and about only 2% of subsistence being imported into the country being inspected by the FDA. It is also seen that logistics, to include personnel or man power is a problem on the civilian end where as comparatively this is not that much of an issue to DoD. All the different units such as Preventive Medicine, Veterinary Command and ACES, working together as a team to achieve a common goal as safe food, make it easier. The DoD has no choice than to invest into food safety, security, and defense, because without safe food, the army, air force, navy, marines, etc. will not be functional. Hence the building of laboratories as seen in the biosecurity laboratory at Kansas State University, and funding many other research projects.

The implementation of the Prime Vendor System eliminates the need of very large storage facilities and substitutes it with more deliveries. Should there be any large disaster that causes damage to a facility's storage area, less is lost due to less stores. This system ensures fresh food most of the time if not all the time. The on-line ordering system makes shopping easier. Contracting allows for long term planning for both the vendor and the customer. The Approved Sources database makes traceability better and assures the customer of receiving safe and quality products.

Army food inspectors, though know what to look for are not well versed with the microbiology and chemistry of the food they inspect. These are two very important aspects that will enable an inspector to make determinations as to if a product defect is just a quality defect or not. I recommend that a little more of basic microbiology and food chemistry should be included in the food inspection basic course curriculum. Also, food inspection units near or with access to any university laboratories should have a memorandum of understanding with the university to be able to use the facilities and also take relevant courses pertaining to their job.

Approved sources should be expanded to cover items that are supposed to be inspected by the FDA since the FDA does not inspect a lot of these items. In collaboration with the FDA and USDA, the approved source database could be expanded to cover the entire nation and exports.

Army food inspectors will have to team up and work with local health departments in towns next to military installations since most of their personnel tend to live on the local economy. Some of the local restaurants hosts up to about 1,500 soldiers per lunch period so that any form of food safety issues can be as devastating as it will be if it occurred on the installation itself.

Rapid testing methods should be encouraged and introduced especially in areas that are not easily accessible. E.g. Naval vessels.

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