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## THESIS

AN ANALYSIS OF DIRECT VENDOR  
SHIPPING OF MEDICAL MATERIAL  
TO OVERSEAS NAVAL MEDICAL ACTIVITIES

by

Gary H. Rakes

December, 1989

Thesis Advisor:

Thomas P. Moore

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An Analysis of Direct Vendor  
Shipping of Medical Material  
to Overseas Naval Medical Activities

by

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Submitted in partial fulfillment  
of the requirements for the degree of

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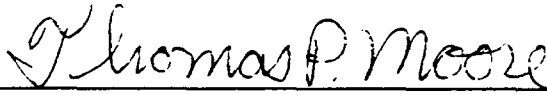
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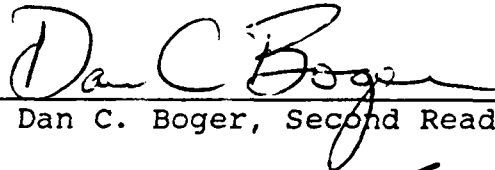


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**ABSTRACT**

The purpose of this thesis is to review selected methods for transporting direct vendor medical material to overseas medical activities and to determine if a problem exists with respect to lost, late, or frustrated medical shipments. The shipping of direct vendor medical supplies is a major concern for Navy medical material managers. Problems encountered in the transportation of this material can directly affect the mission of our overseas treatment facilities. This research describes selected methods of transporting direct vendor medical material and evaluates them for accuracy and timeliness. Based on this analysis, there appears to be a problem in the shipping of direct vendor medical supplies to Western Pacific area naval hospitals.



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## I. INTRODUCTION

### A. BACKGROUND

The need for timely receipt of medical supplies is crucial in the delivery of quality health care. In order to maintain the highest possible standard of medical care, military medical practitioners need to be assured that the supplies and equipment to treat their patients are there when needed. Richard G. Velton, Director of Transportation for Johnson and Johnson Hospital Services, states:

. . . one of the things we look for in selection of a carrier is the ability to respond to an emergency and pull out all the stops getting product - for example, critical and sometimes life or death product to an operating room at a hospital [Ref. 1].

Nowhere is this concern more prevalent than in an overseas military treatment facility. The luxury of locally procuring required medical supplies doesn't exist in most foreign countries because of their low standards of care and the near unavailability of state-of-the art supplies and medicines. Hence, the movement of medical supplies from United States vendors to overseas military medical facilities is of paramount importance.

An effective transportation system is a key component in fulfilling the mission of each overseas military hospital. In a thesis by Capt J.W. Cooper, Medical Service Corps, United

States Air Force, entitled "Resupply of Air Transportable Hospitals," an interview of 26 military medical logistics experts concluded that transportation was the primary limiting factor in the resupply of medical units [Ref. 2].

Seeing the importance of a reliable process for the movement of medical supplies, medical logisticians must ensure that the requirements for timely movement of direct vendor medical material are met and that we get the most out of the overseas transportation system.

#### **B. OBJECTIVES OF THE RESEARCH**

The movement of direct vendor supplies to overseas locations has been characterized as extremely unpredictable. According to a March 1989 article in Military Forum, the author states:

The United States could not meet its NATO commitments because of the status of the U.S. overseas transportation system [Ref. 3].

The unpredictable nature of this transportation pipeline is a major concern for all Navy activities and is critical in the treatment of Navy and Marine Corps beneficiaries. In this author's previous assignment as the Medical Supply Officer of an overseas hospital, comments such as "Why does it take so long to receive my order?" "Where is my order?" and "You mean they lost it again!" were frequently echoed by irate Navy medical personnel. The transportation of direct vendor supplies has been referred to as the "black hole" because when

supplies enter the system, you are never quite sure if they will ever come out.

In its mission of providing the best and most timely health care to our beneficiaries, the Navy Medical Department recognizes the importance of an efficient transportation system. We depend on the timely and accurate movement of medical supplies. Any deviation from accepted transportation standards could be life threatening in some cases.

Based on the above, the objectives of this research are:

1. To review the overseas transportation system to determine if a problem exists in the movement of direct vendor medical supplies to overseas locations and determine what may be done to correct the situation if a problem does exist.
2. To provide overseas medical supply officers with a better understanding of the methods and procedures in the movement of medical supplies directly from commercial vendors.

#### **C. RESEARCH QUESTION**

The primary research question is: Do problems exist with the shipping of direct vendor medical material to overseas Naval Medical Treatment Facilities (MTFs)?

Subsidiary research questions are:

1. Do shipments of direct vendor medical material arrive on time to overseas locations? late? or not at all?
2. What is the average time medical material spends in transit when shipped directly from commercial vendors through the U.S. Postal Service? from DoD transshipment activities? and DoD contractor transshipment activities?

3. Are the current methods of the overseas transportation efficient or appropriate for the movement of direct vendor medical items?
4. Does the average transit time for direct vendor medical shipments exceed the Uniform Material Movement and Issue Priority Standards (UMMIPS) time frames?

#### D. SCOPE OF THE THESIS

This research will concentrate on two of the most common methods used for shipping medical supplies from continental United States (CONUS) commercial vendors to overseas medical activity destinations. They are:

1. The Navy Expediting and Consolidation Program
2. The Military Postal Service

To be considered are the accuracy, timeliness and dependability of each of these methods of direct vendor delivery in order to determine their effectiveness in the movement of medical material.

Direct vendor medical material is comprised of non-standard supplies shipped directly from commercial vendors to the ultimate consignee. These supplies are necessary for the treatment of patients by naval medical practitioners in the execution of their duties. These medical supplies can be transported via air or surface transportation depending on the urgency of the material. Examples of these supplies are:

tongue depressors, syringes, lab reagents, pharmaceuticals, sterile gauze, and refrigerated medical vaccines. Shipments of medical material destined for non-medical activities such as Naval Supply Centers or Naval Supply Depots will not be discussed in this thesis, nor will shipments of medical equipment, administrative supplies or standard stock medical items. This thesis will only cover the shipping of medical material from commercial vendors during peacetime operations.

The feelings and reactions of overseas Navy Medical Material Managers to the overall Defense Transportation System (DTS) and the two methods of transporting direct vendor medical material will also be an important part of this research. The overseas Medical Material Manager's perception of the transportation service they received will have a direct impact in determining the overall effectiveness of the movement of medical supplies from commercial suppliers to overseas destinations.

#### **E. METHODOLOGY**

The methodology used for collection of research data for this thesis included a survey questionnaire, personal interviews, and a review of applicable literature and documentation. The questionnaire was sent to eight overseas Naval Hospitals:

1. U.S. Naval Hospital Yokosuka, Japan
2. U.S. Naval Hospital Okinawa, Japan
3. U.S. Naval Hospital Guam, Marianas Island
4. U.S. Naval Hospital Subic Bay, Republic of the Philippines
5. U.S. Naval Hospital Roosevelt Roads, Puerto Rico
6. U.S. Naval Hospital Guantanamo Bay, Cuba
7. U.S. Naval Hospital Naples, Italy
8. U.S. Naval Hospital Rota, Spain

Both open-ended and closed-type questions were used in the survey. The questionnaire is shown at Appendix A.

Interviews were conducted with personnel located at the Navy Material Transportation Office (NAVMTTO) Norfolk, Virginia; Military Traffic Management Command Military Air Traffic Coordination Unit (MTMC-MATCU); and the Joint Military Postal Activity Pacific San Francisco, California. Collection of transportation-related literature and information was obtained from the Naval Transportation School Oakland, California, the Naval Postgraduate School library, as well as the above mentioned activities.

Hypothesis testing was used to analyze the data collected by the questionnaires. Both the interviews and the questionnaires were instrumental in determining the extent of the transportation problems encountered in the movement of direct vendor medical supplies to overseas MTFs.

## **F. ORGANIZATION OF THE THESIS**

Chapter II describes the reasons for undertaking this study and explains the current circumstances surrounding the shipping of direct vendor medical material to overseas locations. It also provides a brief synopsis of the key players involved in defense transportation and their responsibilities.

Chapter III provides an overview of the two most common methods for movement of direct vendor medical supplies to overseas locations. This overview covers each method's history, purpose and transportation services provided.

Chapter IV describes the method of data collection for this research, its advantages and disadvantages, and the sampling procedures used. The chapter concludes with an overview of the techniques used to analyze the data collected.

Chapter V describes the data collected from the questionnaires and interviews and provides the basis from which the research question will be answered.

Chapter VI discusses the analysis and interpretation of the material in the previous chapter. Chapter VII summarizes the findings, draws conclusions, and presents recommendations concerning the shipping of direct vendor medical material to overseas Naval treatment facilities.

## **II. BACKGROUND**

### **A. CHAPTER OVERVIEW**

This chapter begins by discussing the importance of an efficient transportation system for the Department of Defense. It then illustrates the main reason for conducting a study on the movement of direct vendor medical material overseas and how this issue has developed into its current situation. It concludes by describing the key organizational components involved with defense material movement in order for the reader to understand the magnitude of the transportation system.

### **B. IMPORTANCE OF TRANSPORTATION ON DEFENSE**

There is general agreement that transportation and our national defense have traveled hand-in-hand since our country's beginnings. The United States must be capable of responding rapidly to Communist aggression and terrorist activities by moving people and required supplies to the areas of potential or actual conflict. Ocean, and more recently air, transportation has served as the vital pipeline for our national defense both in peacetime and war. The Defense Transportation System (DTS) acts as the crucial link in moving military supplies to our roughly 500,000 service members and their dependents overseas. In fiscal year 1987 alone, the



Department of Defense shipped almost 7.1 million measurement tons of supplies overseas (the equivalent of 284 million cubic feet of goods and services) to support U.S. troops [Ref. 3].

Without an efficient overseas transportation pipeline, the support that our forward deployed forces give to the United States is drastically reduced. Gerald M. Cople, Vice President and General Manager of the North America Pacific Division of Sea-Land Service Inc., expressed his concern on the importance of a valid DoD overseas transportation entity:

I was privileged to spend three years of my Sea-Land career observing this transportation link first hand. I was one of the first three people sent to Vietnam in 1967 to oversee Sea-Land's operations in support of the military. We transported everything from guns to butter, providing direct support to Cam Ranh Bay and shipping cargo south to Saigon and north to Que Nhon and Da Nang. It is difficult to appreciate the importance of such a transoceanic pipeline until you are in a foreign country 10,000 miles from home, surrounded by enemy troops and waiting for life saving supplies to arrive. I was there and saw American soldiers in the field and I certainly saw the need for efficient reliable service to support their mission. I left Vietnam with a profound respect for the importance of defense transportation and a strong awareness of the interrelatedness of the words defense and transportation [Ref. 4].

While the wartime importance of the transportation system is easily understood, the importance of the peacetime transportation pipeline is often overlooked. To achieve national security goals, our country must maintain overseas-based U.S. forces in a high state of readiness. Prepositioning of supplies and equipment to overseas locations in order to be ready for a national emergency is an important

peacetime mission of the DTS. The movement of supplies to conduct normal business operations can be extremely critical as well, as in the case of emergency medical supplies and repair parts.

Seeing the importance of the transportation system to our national security, the overseas pipeline must be as efficient as possible. Effective material support for U.S. forces stationed overseas can be this country's least expensive but most indispensable deterrent.

### **C. REASON FOR CONDUCTING RESEARCH**

Although there have been some studies on the transportation of military material, few if any have actually dealt with the shipping of direct vendor medical material to overseas locations. The author's interest in the subject of shipping medical material to overseas destinations first occurred with the assignment as a Materials Management Officer of an overseas Naval hospital. The need for a more effective transportation system became apparent when trying to receive medical supplies from U.S. commercial suppliers in a timely fashion. As a customer of this overseas transportation system, this author was constantly frustrated by the large amount of time it took to receive medical material once a purchase order had been submitted to a commercial vendor. During the assignment as the Medical Material Officer at Naval Hospital Yokosuka, Japan, from 1985 to 1988 the shipping times

for direct vendor medical material constantly exceeded UMMIPS time standards. Although not recorded exactly, transit times in excess of 90 days were common for most medical supply shipments originating from a CONUS source. Indeed, some shipments were never received at all.

For the supply department of an overseas hospital, the most frustrating aspect of the movement of vendor supplies to an overseas medical activity is the lack of control it has over the transportation process. Once you submit a purchase order or a requisition, you are essentially at the mercy of the transportation system. You do possess limited control by being able to use air versus surface transportation modes for priority shipments, but the transit times for air shipments are also unpredictable. This lack of control combined with the lack of transportation-related training for Medical Service Corps officers prior to assignment overseas, just magnifies the problem and causes constant dissatisfaction by medical personnel with the transportation system.

Any situation that causes vendor shipments to be lost or frustrated generates great concern in overseas medical personnel. In a letter from the Defense Logistics Agency (DLA) entitled "Correction of Marking/Labeling Discrepancies on Medical Direct Vendor Deliveries," the transportation director indicated that 170 shipments of medical material have been frustrated over an eight month period at Dover Air Force

Base, Delaware [Ref. 5]. Another letter from the Military Traffic Management Command Western Area Oakland, California stated:

The Military Air Traffic Coordinating Unit (MATCU), Travis Air Force Base is experiencing a continuing problem with vendor shipments of medical supplies [Ref. 6].

The Military Air Traffic Coordinating Unit, in response to an investigation concerning this problem, estimated that over a three month period, 125 Transportation Discrepancy Reports (TDRs) represented the typical volume of discrepant medical shipments transiting the aerial port over the past three to four years [Ref. 7]. This equates to approximately 500 TDRs annually.

Are these occurrences a symptom of a large problem in the shipping of vendor medical supplies overseas or are they just isolated events? The answer to this question is the thrust of this research.

#### **D. OVERVIEW OF DEFENSE OVERSEAS TRANSPORTATION COMPONENTS**

##### **1. Introduction**

The overseas transportation requirements for the Department of Defense are enormous. The mission of the transportation network in both peacetime and war is extremely critical. Cople's [Ref. 4] assessment of the interrelatedness between defense and transportation quoted in section B of this chapter demonstrates how important the transportation arm of the military is to the overall defense picture. In order to

determine if a problem exists in the movement of vendor medical supplies overseas, it is crucial that an understanding of the entire transportation process and its key players is obtained.

## **2. Composition**

The overseas transportation system is a multi-faceted entity composed of various levels of government and non-government activities. The following are the primary activities responsible for the planning and execution of overseas transportation requirements:

1. Directorate for Transportation Policy (Office of the Assistant Secretary of Defense Acquisition and Logistics)
2. Joint Chiefs of Staff
3. Defense Logistics Agency
4. U.S. Transportation Command
5. Military Airlift Command
6. Military Sealift Command
7. Military Traffic Management Command
8. Directorate, Transportation, Energy and Troop Support (ARMY)
9. Directorate of Transportation United States Air Force
10. Naval Supply Systems Command
11. Navy Material Transportation Office
12. Military Air Traffic Coordinating Units

Each of these activities is an important cog in the movement of supplies and equipment to U.S. troops around the world. Due to the specific nature of this thesis, this paper will focus our attention only on those activities involved in the movement of direct vendor medical supplies to overseas activities.

### **3. Military Airlift Command**

The Military Airlift Command (MAC) provides air transportation for the Department of Defense and other government agencies. MAC operates at 329 locations in 24 countries and is responsible for: aerial deployment; employment and redeployment of combat forces and their support equipment; logistical resupply of forces; aeromedical evacuation; presidential airlift; operational support airlift; aerial search, rescue and recovery; weather reconnaissance; and overseas tactical airlift [Ref. 8]. It also contracts commercial airlifts for DoD. MAC has an inventory of more than 1,000 aircraft consisting of both fixed wing aircraft and helicopters [Ref. 8].

In October 1988 as a result of the establishment of the U.S. Transportation Command (USTRANSCOM), MAC's assignment as a specified command ended. MAC currently falls under the umbrella of USTRANSCOM.

#### **4. Military Sealift Command**

The Military Sealift Command (MSC) is the single operating agency for ocean transportation for the Department of Defense. Its primary mission is to provide sealift for strategic mobility in support of national security objectives [Ref. 9]. MSC also provides direct fleet support to Navy units at sea.

In its role as the operating agency for DoD sealift, MSC relies exclusively on commercial carriers. In peacetime, it moves approximately nine million tons of dry cargo and 13 million tons of petroleum annually [Ref. 9]. For the period 1982-1989, the Navy will have spent over five billion dollars for charter and contract-operated ships, \$4.2 billion for breakbulk container service and another \$2.6 billion for the procurement of sealift enhancement features for a total of \$12 billion for services from the U.S. maritime industry [Ref. 9]. In its mission of shipping needed materials to U.S. troops, MSC ships operate in numerous places around the globe. MSC is also a component of the newly established USTRANSCOM.

#### **5. Defense Logistics Agency**

The Defense Logistics Agency (DLA) was established in 1961 and is responsible for the buying and distribution of common supplies such as food, clothing, fuel, medical, industrial, construction, electronics and general commodities. DLA buys, stores, and distributes 67% of the consumable supply

items used by the armed forces [Ref. 10]. In a typical year DLA traffic managers ship 915,000 tons of material to its defense customers stateside and overseas [Ref. 10]. Movement of all this material requires strict coordination between the various methods of defense and commercial transportation.

#### **6. Military Traffic Management Command**

The Military Traffic Management Command (MTMC) is the action agent for the Department of Defense for Traffic Management. MTMC provides three major services [Ref. 11]:

1. Traffic management
2. Operation of common-user terminals
3. Transportability engineering

This command also manages movement from home base, depots or factories to: CONUS destinations, MAC planes, MSC ships or commercial ocean carriers for shipment overseas.

In 1988, MTMC moved 15.9 million measurement tons of cargo through its terminals and spent approximately \$3 billion dollars [Ref. 11]. The management of defense traffic involves complete coordination to create an efficient movement of supplies, personnel and equipment all over the world. MTMC is the third and final component of the USTRANSCOM.

#### **7. Naval Supply Systems Command**

The Naval Supply Systems Command has the primary responsibility for providing supply support to U.S. Navy



forces worldwide. Its services include: supply operations, contracting, resale, printing, fuel, transportation, finance, food, security assistance and mobile fleet hospital support [Ref. 12]. Its responsibilities in the area of transportation include the development and implementation of Navy policies and procedures for the worldwide movement of Navy cargo. This includes the monitoring of MAC, MSC and MTMC for timeliness of service. The Naval Supply Systems Command is also responsible for providing technical guidance to Navy activities regarding traffic management and transportation.

#### **8. Navy Material Transportation Office**

The Navy Material Transportation Office's (NAVMTO) mission is to ensure that all Navy material moves within UMMIPS time frames at the lowest possible cost. In accomplishing this mission, NAVMTO administers the Navy contract Cargo Airlift System (QUICKTRANS); acts as air clearance authority for the Navy, authorizing movement of Navy material by air; provides shipment instructions for all fleet freight; provides technical direction, guidance and assistance in material transportation matters; and administers the Navy Expediting and Consolidation Program (NECP) [Ref. 13]. NAVMTO also acts as the Navy's liaison office with the DoD transportation operating agencies, MTMC, MSC and MAC.

## **9. Military Postal Service**

The Military Postal Service is not a part of the Defense Transportation System, but it plays an important part in the movement of DoD supplies to U.S. troops throughout the world. The Military Postal Service (MPS) acts as an extension of the U.S. Postal Service overseas. Its responsibilities and mission will be discussed in further detail in Chapter 3.

## **10. Military Air Traffic Coordinating Unit**

The Military Air Traffic Coordinating Unit (MATCU) is composed of a headquarters element located at Travis Air Force Base and eight subordinate units located throughout the United States and other allied nations. MATCUs act as the single point of contact between MAC and the shipping services on matters concerning air cargo traffic management coordination. They provide traffic management support to all overseas activities in connection with export movements. Some of their services include: tracing cargo in the airlift system when requested by an activity; worldwide authorization to schedule material shipments within the MAC system; and coordinating, expediting and monitoring special project cargo such as emergency medical supplies or time sensitive repair parts [Ref. 14]. The MATCUs are also concerned with frustrated cargo and are responsible for correcting individual shipment discrepancies.

## **E. SUMMARY**

The Naval Medical Department possesses almost no direct control over the transportation and movement of vendor medical supplies. We must depend on a variety of organizations within the Department of Defense to ensure that our medical supplies arrive on time from commercial suppliers and in a useable condition. The transportation system is one key component in ensuring timely health care to Navy and Marine Corps beneficiaries. A good understanding of the transportation process is critical to the overseas medical material manager. By gaining an understanding of this complicated and diverse system we can better assess the Department of Defense's ability to ship medical material to overseas Naval treatment facilities.

### III. TRANSPORTATION METHODS FOR OVERSEAS MEDICAL CARGO

#### A. INTRODUCTION

The Materials Management Department of an overseas Navy hospital is responsible for the timely acquisition of vendor medical supplies for its customers, i.e., doctors, nurses, etc. To satisfy this requirement, the Materials Management department relies on several alternatives for procurement of non-standard medical supplies. They are:

1. Requisitioning non-standard material through a depot-level stock source such as a NSD, NSC or DLA activity.
2. Placing delivery orders directly with commercial suppliers against Federal Supply Schedules.
3. Placing purchase orders directly with commercial vendors.

It is important to note that these procurement alternatives rely on an effective transportation system to move these supplies to their overseas destinations. This transportation pipeline becomes especially critical when dealing with urgently required medical supplies, as in the case of a life or death situation.

The transportation methods primarily used by overseas naval medical activities to receive direct vendor medical material are:

1. The Navy Expediting and Consolidation Program (NECP)
2. The Military Postal Service

The above methods will be the main focus of this chapter. The in-depth knowledge gained from a study of these methods will help the overseas Medical Material Manager understand the process of shipping direct vendor medical material overseas.

## **B. THE NAVY EXPEDITING AND CONSOLIDATION PROGRAM**

### **1. Background**

The Navy Expediting and Consolidation Program (NECP) was established on 12 February 1988 as a single Navy overseas transshipment entity and combined the Service Agent Material Expeditor Eastern Service (SAMEES), Service Agent Material Expeditor Western Service (SAMEWS), Navy Consolidation (NAVCON) East Coast, Navy Consolidation (NAVCON) West Coast, and Seavan Stuffing programs [Ref. 15]. The purpose of NECP is to:

. . . provide expedited handling of Navy fleet support cargo generated by all government procurement offices worldwide for material moving from CONUS vendors to ships and Naval overseas shore establishments; to consolidate high priority Navy air cargo for movement overseas by Military Airlift Command and commercial air; and to stuff seavans on the west coast for ocean carriage. All services that include receiving, consolidation, documentation, and/or shipping will be contractor provided to support this service [Ref. 16].

This contract requires a west coast and east coast facility located within a 20 mile radius of Travis Air Force Base Fairfield, California, and Naval Air Station Norfolk,

Virginia, respectively, in order to take advantage of military air assets [Ref. 16]. The current contract was awarded on 01 November 1988 to Logistics Operations, Inc., and the effective date of performance is 01 December 1988 to 01 December 1989 [Ref. 17].

## **2. Responsibility for Contractor Oversight**

The Navy Material Transportation Office (NAVMTO) has overall authority and responsibility for the management of the NECP. NAVMTO is also designated as the Contracting Officer's Technical Representative (COTR). Its major responsibilities include [Ref. 16]:

1. Authorizing the movement of Navy cargo by air, challenging the validity of airlift requirements and diverting material to lower cost modes when possible.
2. Arranging to supply the contractor with completed Government Bills of Lading (GBLs) for transshipment of cargo.
3. Requesting the purchasing offices to provide the NECP contractor with an advanced copy of each purchase order in which the contractor is designated as the receiving activity.
4. Visiting periodically the contractor's facilities to ensure contract compliance.
5. Providing the contractor with guidance to facilitate greatest use of the DTS.
6. Notifying the contractor of shipments requiring expedited handling.

In general, NAVMTO is responsible for ensuring the smooth day-to-day operation of the NECP contractor. This is

accomplished by NAVMTO personnel located near each contractor facility.

### **3. General Contractor Responsibilities**

The contractor responsible for the NECP will perform all transportation, consolidation and freight forwarding functions for movement of Navy-sponsored cargo. The contractor maintains 100% accountability and traceability from the time of receipt at its facility to receipt by either the ultimate consignee or the transshipment activity. Navy-sponsored cargo is defined as all air eligible (Transportation Priorities 1 & 2) and surface shipments (Transportation Priority 3) that require consolidation, expediting and documentation. The contractor provides these services for all Navy material received by their east coast and west coast facilities and is responsible for processing this cargo for delivery to Naval overseas shore activities and afloat units.

The contractor receives cargo from 0700 to 1700 Monday through Saturday and picks up material seven days a week, excluding holidays, from QUICKTRANS Norfolk and Travis Air Force Base [Ref. 16]. It also provides additional service after normal working hours to release high priority shipments when notified by the NAVMTO coordinator [Ref. 16]. Cargo is handled using a first in/first out priority order. Some of the contractor's general duties include [Ref. 16]:

1. Cargo processing and documentation
2. Expedited handling of priority material
3. Cargo bookings
4. Air cargo consolidation
5. Seavan stuffing consolidation
6. Cargo reworking (packing and packaging)
7. Over, short and damage shipment processing
8. Hazardous materials inspection/recertification
9. Frustrated shipment processing
10. QUICKTRANS pickup
11. Data processing functions

Not all material can be processed for overseas shipping by the NECP contractor. Some items require special handling and/or equipment to ensure timely and safe movement to overseas destinations. The following items are exempt from the NECP and cannot be processed by the contractor for overseas shipping [Ref. 16]:

1. Class A and B explosives
2. Shipments requiring transportation protected services
3. Temperature controlled items
4. Radioactive material requiring licensing from the Nuclear Regulatory Commission
5. Shipments with an aggregate weight of 10,000 pounds or more to a single consignee (except shipments for seavans on the west coast)



6. Classified material
7. Personal effects or household goods
8. Perishable and subsistence items
9. Cigarettes and alcoholic beverages
10. Foreign Military Sales items

All other items not specified are eligible for overseas processing by the NECP contractor. All eligible cargo must be processed within certain time standards as set forth in the NECP contract. Table I illustrates these processing times.

TABLE I NECP PROCESSING REQUIREMENTS

REQUIREMENTS	PROCESSING TIMES
AIR CARGO (TP1 & TP2)	24 HOURS
SURFACE CARGO (TP3)	05 WORKING DAYS
CHALLENGED CARGO RELEASED TO AIR	24 HOURS
CHALLENGED CARGO RELEASED TO SURFACE	05 WORKING DAYS
UNFRUSTRATE A SHIPMENT	24 HOURS
SHIPMENT STATUS REQUEST	08 HOURS
HAZARDOUS CARGO (TP1 & TP2)	24 HOURS
HAZARDOUS CARGO (TP3)	05 WORKING DAYS
EXPEDITED SHIPMENTS (999)	02 HOURS
ONWARD SHIPPING DATA IN COMPUTER	02 HOURS

#### 4. Material Movement Process

A shipment actually enters the NECP system upon receipt of an advanced copy of the purchase order or requisition document by the NECP contractor. This information is placed into the contractor's computer database as an incoming shipment. If an advance copy of the purchase order is not received, the cargo enters the system upon receipt from a commercial vendor through the United Parcel Service (UPS), the U.S. Postal Service, an independent freight forwarder, or a component of the DTS, i.e., QUICKTRANS. Once cargo is actually received, the contractor will process the item for movement through either air consolidation, seavan stuffing or turn-in to the government as unidentifiable frustrated cargo.

If the cargo does not have the appropriate shipping documents required to process it through the transportation system, the contractor is required to complete and/or prepare all pertinent shipping documents for overseas movement. Required shipping documents include [Ref. 16]:

1. Transportation Control and Movement Document (TCMDs)
2. DoD Military Shipping Labels (DD Form 1387)
3. Special Handling Data/Certification (DD Form 1387-2)

Upon completion of the appropriate documentation, the contractor will then book the cargo for either air or surface

transportation depending on the transportation priority. Transportation priorities one and two will be booked via on-line computer with NAVMTO Norfolk for movement by Military Airlift Command or commercial airline. Transportation priority three cargo will be booked for surface movement overseas by contacting NAVMTO Oakland when the seavan container is loaded and ready for release.

Frustrated shipments unable to be delivered will be stored in a contractor-designated area while an investigation is conducted. The contractor must unfrustrate these shipments within 24 hours [Ref. 16]. Shipments that cannot be unfrustrated will be turned back to the government as unidentifiable cargo.

Air consolidation shipments will be consolidated by the aerial port of embarkation on standard government furnished pallets in the desired daily pallet configuration, covered with polyethylene and secured to the pallets with nets. The contractor will then prepare a Transportation Control and Movement Document (TCMD) for the entire pallet, obtain airlift authority from NAVMTO and deliver the shipment to either the Navy Air Terminal Norfolk or the MAC terminal Travis Air Force Base. This delivery run will be performed at least once a day and not more than 24 hours from receipt of a package at the NECP facility [Ref. 16]. The air terminal personnel will then verify the cargo to ensure all

requirements have been met, i.e., proper packaging, appropriate documentation, etc. If all requirements have been met, the cargo is then loaded onto an airplane for delivery to the appropriate point of debarkation and final movement to the ultimate consignee. If all requirements have not been met, the cargo is then transferred to the Military Air Traffic Coordinating Unit for correction of shipper discrepancies. This normally delays the shipping process by approximately 10 hours.

The overseas air delivery process, from point of embarkation to point of debarkation, must be completed and delivered to the ultimate consignee within four to five days. The exact time depends on the location where the cargo is being transported.

Surface consolidation shipments will be loaded into a seavan container and consolidated by port of debarkation. Each container must be at least 80% of cubic capacity or 90% of maximum allowable weight [Ref. 16]. The contractor must move cargo out within five working days [Ref. 16]. Containers which are not full after the five working day period must obtain a waiver from NAVMTO to process as a less than truckload shipment. Upon closeout, a TCMD is generated for the seavan and the container is delivered to the Military Ocean Terminal Bay Area (MOTBA) in Oakland, California, for transshipment overseas. The east coast does not participate

in the seavan stuffing program. Ocean terminal personnel then verify the seavan container to ensure that all transportation requirements are complete. If all requirements have been met, the seavans are scheduled for shipment with the Military Sealift Command and loaded on commercial vessels for transportation to the point of debarkation. Upon arrival, surface transportation is then used to move the cargo to the consignee. This surface transportation process must be completed within 23 to 52 days depending on the ultimate destination.

These time frames for air and surface transportation are based upon the Uniform Material Movement and Issue Priority System (UMMIPS) standards in DoD Directive 4410.6. These standards specify the total time required for the movement, requisition and issue of government required material from the submission of a requisition until final delivery to the consignee. Table II illustrates these time standards.

TABLE II UMMIPS TIME STANDARDS

TIME SEGMENT	PRIORITY DESIGNATORS		
	01-03	04-08	09-15
REQUISITION SUBMISSION	01 DAY	01 DAY	02 DAYS
PASSING ACTION	01 DAY	01 DAY	02 DAYS
AVAILABILITY DETERMINATION	01 DAY	01 DAY	03 DAYS
STORAGE SITE PROCESSING	01 DAY	02 DAYS	08 DAYS
TRANSPORTATION HOLD	03 DAYS	06 DAYS	13 DAYS
OVERSEAS SHIPMENT-CARIBBEAN	04 DAYS	04 DAYS	38 DAYS
OVERSEAS SHIPMENT-EUROPE	04 DAYS	04 DAYS	43 DAYS
OVERSEAS SHIPMENT-WESTPAC	05 DAYS	05 DAYS	53 DAYS
RECEIPT TAKE UP	01 DAY	01 DAY	03 DAYS

**C. THE MILITARY POSTAL SERVICE**

**1. Background**

The Military Postal Service (MPS) has its origin in Title 39 and Title 49 of the United States Code. This organization was officially established under Public Law 91-375 on 12 August 1970 [Ref. 18]. The authority granted by section 406 of Title 39 states:

The Secretaries of Defense and Transportation shall make arrangements with the U.S. Postal Service to perform postal services through branch post offices established under the authority of this section [Ref. 18].

Duplication of postal services by the MPS and the United States Postal Service (USPS) is not authorized, but rather the MPS acts as an extension of the USPS in the transportation

of mail to, from, and between U.S. armed forces overseas. A military post office cannot be established in a location where a U.S Post Office exists.

The need for flexibility was noted during the establishment of the MPS organization. Therefore, the postal system was developed in a highly decentralized manner. Each military service's postal operation was configured individually in order to satisfy the needs of their particular service.

While maintaining each service's need for flexibility, a functional line organization was established on 05 May 1980 to improve the overall management of the MPS [Ref. 19]. This organization, under the responsibility of the Secretary of the Army, consists of a headquarters command called the Military Postal Service Activity (MPSA) located in Alexandria, Virginia; two joint service facilities called Joint Military Postal Activity - Atlantic (JMPA-A) and Joint Military Postal Activity - Pacific (JMPA-P) located in New York City and San Francisco respectively; Mail Control Activities (MCAs); and numerous overseas post office branches. The basic goals of this new organization were to improve mail service, achieve more efficiency, and eliminate overlapping and redundant services.

## **2. Mail Movement Responsibilities**

The mission of the MPS organization according to DODINST 4525.7 is to:

. . . transmit official and personal mail promptly, efficiently and economically in support of the defense mission and consistent with the required delivery date, security, accountability and class of mail [Ref. 20].

To achieve this mission, broad responsibilities have been assigned to each level of the organization. The responsibilities are discussed in the following sections.

### **a. Military Postal Service Agency (MPSA)**

The primary role of the MPSA is to coordinate with all MPS elements an integrated mail network by [Ref. 19]:

1. Issuing basic mail distribution procedures and policies.
2. Implementing a universal mail movement information system.
3. Coordinating standard postal net alert reporting.
4. Ensuring that a single executive agency MCA is designated at each mail terminal to perform specific mail management functions.

### **b. Joint Military Postal Activity (JMPA)**

The JMPA's primary role consists of managing military mail movement to and from military post offices and the gateways under its jurisdiction. The JMPA works closely with the individual postal activities and its daily functions include [Ref. 19]:



1. Providing liaison services for DoD components with local and regional post offices, customs officials, and commercial and military officials.
2. Providing detailed and timely instructions to local and regional USPS officials for processing, routing, and dispatching of MPS mail.
3. Gathering information provided by USPS and reporting on circumstances affecting mail movement to and from the CONUS gateways, identifying major problem areas and advance trends, and resolving these problems with USPS officials.

**c. Mail Control Activities (MCAs)**

These activities physically receive, dispatch, and process mail and act as the mail traffic manager for each mail terminal. The MCAs are comprised of Air Mail Terminals (AMTs) and Fleet Mail Centers (FMCs). Their functions include [Ref.19]:

1. Dispatching mail to the Military Post Offices seven days a week.
2. Maintaining inventory control of inbound mail to ensure all mail is accounted for.
3. Monitoring air carrier facilities to ensure mail is moved in accordance with established schedules.
4. Coordinating with JMPAs and other MCAs to ensure that the best possible mail service is maintained.
5. Coordinating incoming and outgoing mail movement with local land and air transportation resources.
6. Maintaining current carrier schedules and develop routing schedules for all military and commercial transportation.

7. Coordinating with carriers and advising them of mail generation volumes.
8. Monitoring registered mail shipments and transfers of mail.

**d. Military Post Offices (MPOs)**

These activities are responsible for the receiving, sorting, and dispatching of military mail in an overseas location or afloat unit. They perform the same duties as a U.S. Post Office except they handle mail for Armed Forces customers only. The MPOs are the most visible link of the MPS system.

**3. Mail Movement Procedures**

In order for cargo to be transported by the Postal Service, the package must be within certain size and weight standards. The standards set forth by the USPS are: 70 pounds or less and no longer than 108 inches in length and girth combined [Ref. 19]. Packages destined for overseas DoD facilities from CONUS vendors that meet these size standards can originate from any post office within the United States. Following this initial mailing, these packages are sent to one of the following General Mail Facilities (GMF):

1. New York
2. Seattle
3. San Francisco
4. Miami

These facilities are a component of the USPS and one of their responsibilities is to process FPO and APO mail to the overseas location.

Upon receipt of a piece of mail for a FPO or APO address, the mail is sent to the military mail section of the GMF. The mail is then separated by service of mail and destination and placed into color-coded bags. Oversize parcels (OSP) are consolidated separately. The use of color-coded mail bags distinguishes between the services of mail. Table III describes this color coding scheme and services of mail.

TABLE III SERVICES OF MAIL

SERVICE OF MAIL	COLOR CODE
EXPRESS MAIL	ORANGE AND BLUE
PRIORITY MAIL	ORANGE
MILITARY ORDINARY MAIL	NICKEL GRAY
SURFACE MAIL	WHITE

When a color-coded bag is filled, it is sealed, weighed and a location label is placed on the exterior indicating its overseas destination. The bags and OSPs are then placed in large tri-wall containers which consolidate material moving to the same general location. These tri-wall containers are then loaded into vans for movement to either

an Air Mail Terminal (AMT) or a Fleet Mail Center (FMC) depending on the class or service of mail.

Express, Priority and Military Ordinary Mail (MOM) are delivered by air aboard U.S. commercial carriers almost exclusively. Military and foreign air carriers may be used to supplement U.S. commercial carriers for locations where U.S. carriers do not operate. Fourth Class or surface mail is transported by surface commercial carrier as arranged by the Military Sealift Command.

The purpose of the CONUS AMT and FMC is to manage the mail traffic and schedule outgoing mail with the appropriate carrier. The AMT and FMC also prepares the transportation documentation required for air and surface shipments. This documentation includes [Ref. 19]:

1. Transportation Control and Movement Document (DD Form 1384) for sealift and military air transportation
2. PS Form 2900 for U.S. commercial airlift
3. PS Form 2942-A for foreign commercial airlift

These forms accompany the cargo to the overseas military mail facility at the point of debarkation. Upon arrival, the cargo is verified by personnel at the overseas AMT or FMC and then dispatched by land transportation to the local military post office for delivery to the consignee.

The transit times of military mail must also comply with the UMMIPS standards illustrated in Table II. The JMPA

is responsible for monitoring the transit times for transportation of mail from the AMT or FMC to the overseas destination.

## IV. METHODOLOGY

### A. DATA COLLECTION METHOD

The method chosen to conduct this research and gather information regarding the movement of medical supplies to overseas destinations consisted of a mail questionnaire. This questionnaire was mailed to eight overseas Naval treatment facilities and was separated into five general topic areas in which the responsible individuals were asked to respond. These topics are:

1. General
2. Education
3. Transportation Training
4. Supply Experience
5. Medical Shipment Information Required

The general section requested information concerning the respondent's rank, age, sex, billet grade and billet title. The education section asked for data concerning the respondent's formal education, including college major, and if any transportation related courses had been taken. The training section requested the respondent to indicate if he/she had completed any of the six supply/transportation courses that were listed in the questionnaire. The experience

section asked the respondent to list all military medical supply experience acquired during his/her military service. The final section requested both quantitative and qualitative responses to questions pertaining to the movement of medical supplies to his/her respective activity.

The survey questions were selected to assist in answering the primary and subsidiary research questions developed for this thesis. These survey questions were also reviewed and approved by personnel located at the Naval Medical Material Support Command (NAVMEDMATSUPPCOM) Fort Detrick, Maryland, prior to sending the questionnaire to the eight overseas medical facilities. These individuals at NAVMEDMATSUPPCOM are recognized as experts in the military medical logistics field and they assisted by reviewing the questionnaire for clarity and content. The questionnaire can be viewed at Appendix A.

#### **B. MAIL QUESTIONNAIRE ADVANTAGES AND DISADVANTAGES**

For many years, mail questionnaires were one of the least-used methods of conducting surveys. Low response rates and lack of control over the actual conduct of the survey were cited as the main reasons for not using mail questionnaires [Ref. 21]. Telephone and face-to-face interviews were the most-used survey methods. Recently, there has been a growing trend in the use of mail questionnaires over other forms of survey techniques. The same factors that stimulated the growth of telephone interviewing in the 1950s, i.e., speed and

low cost, are encouraging greater use of mail surveys [Ref. 21].

Mail questionnaires, according to Joseph M. Viladas in his book entitled The Book of Survey Techniques [Ref. 21], offer several unique advantages. The primary advantage is in their low cost per survey [Ref. 21]. The mail questionnaire is by far the lowest cost survey method available to an interviewer. The mail survey also has an advantage over other methods, when questions require looking up records or consulting other personnel [Ref. 21]. These two advantages are why this type of survey method was selected for this research. In general, according to Viladas, mail surveys offer advantages in sampling, execution, cost, and the quality of information gathered [Ref. 21].

According to Viladas, the most obvious limitation regarding the use of a mail questionnaire is the absence of an interviewer to explain instructions clearly [Ref. 21]. This limitation appears to have been a factor in several of the returned surveys. Although the questionnaire was reviewed for clarity and understanding by personnel with similar experience prior to its submission, several activities were unsure of the exact meaning of certain questions. Another limitation in the use of mail surveys is the lack of control over the sequence in which questions are answered [Ref. 21]. In this case, this limitation was not a factor since the



sequence in which questions were answered was unimportant. A final limitation, and probably the most important, is that it is easier to leave a mail questionnaire unanswered than to say no to an interviewer [Ref. 21]. This appears to have been a problem and may have accounted for some questions being left unanswered by the respondents. Even though the respondents were encouraged to contact the author if they were unsure of any question, the author recognizes that it is easier to leave a question unanswered than to try to call from an overseas location.

Low response rates often quoted as a major limitation in the use of mail surveys have been unjustified according to recent studies. New studies have suggested that well planned and executed mail surveys do not have lower response rates than telephone or face-to-face surveys [Ref. 21]. Mail surveys can achieve a high response rate but they also require careful attention and proper follow-up techniques.

The fear of this non-response bias, along with other similar limitations, have caused a significant amount of research to be conducted on ways to achieve high response rates from mail questionnaires. According to Viladas three devices have proved successful. They are [Ref. 21]:

1. Writing or calling prospective respondents prior to mailing the questionnaire.

2. Including a cash incentive with the questionnaire.
3. Follow-up telephone calls to ensure compliance.

Of the above devices, two were used to improve the response rate of this questionnaire. All except two activities were contacted by telephone prior to mailing the questionnaire. Numerous attempts were made to contact the other two facilities but, due to the unpredictable nature of the AUTOVON telephone system, these calls could not be placed. Follow-up telephone calls were also made to all activities to determine if the survey was received and to speed up its submission. A cash incentive was not considered appropriate in this situation and was not included with the questionnaire.

The mail questionnaire was, in this circumstance, the most appropriate type of survey instrument for this research. Considering the questionnaire's low cost, the requirement for extensive collection of data and the unpredictable nature of overseas telephone interviewing, the mail survey was selected. The response rate, however, was not as high as anticipated. The final response rate from the eight activities was only 62%.

#### **C. DESCRIPTION OF SAMPLE SIZE AND DEMOGRAPHICS**

In order to determine the appropriate size and demographic make-up of the sample for this thesis questionnaire, it was imperative to review what was attempting to be accomplished

in this research. The main thrust of this thesis, as stated in Chapter I, was to determine if a problem exists in the movement of direct vendor medical material to overseas locations.

Based upon this objective, the natural population from which to draw the sample was the ultimate consignee of medical material transiting overseas. This population base consisted of shore-based Naval Hospitals, Naval Medical Clinics, Naval Dental Commands, Afloat Medical units and similar components of the Air Force and Army.

In an attempt to narrow the population base and to arrive at a manageable sample to conduct this research, a method of non-probability sampling called "judgement sampling" was used. This procedure requires selection of a sample by knowledgeable persons whose judgement can be relied upon [Ref. 21]. Factors such as author familiarity with the system, interviewee accessibility and expertise were also used as a basis for sample selection. After consulting with several management experts at the Naval Postgraduate School, the population base was narrowed to a specified sample and the several activities, discussed next, were omitted.

First, Air Force and Army facilities were not considered due to this researcher's lack of knowledge and expertise concerning their logistical systems. Second, due to this author's unfamiliarity with the afloat forces and the

difficulties in arranging a questionnaire with these activities, afloat medical units were similarly not considered. Third, since most overseas Medical and Dental clinics receive their supply support from Naval hospitals, they also were omitted from the sample. So, the final sample selected to represent the population of overseas medical material customers consisted only of shore-based overseas Naval hospitals.

There are currently eleven overseas Naval hospitals under the Naval Medical Command claimacy ranging in size from a small branch hospital to a large multi-treatment facility. Of these eleven facilities only eight were selected to be surveyed. Three facilities were not included because of their lack of material management expertise and their small supply workload in proportion to the other activities.

#### **D. DATA ANALYSIS TECHNIQUES**

The techniques used to analyze the data from the mail questionnaire consisted of both parametric and nonparametric methods. The parametric procedures consisted of hypothesis testing for quantitative and qualitative data. Nonparametric procedures were used to determine the amount of correlation between several different variables.

More specifically, to determine if the selected modes of overseas transportation are working properly, a one sample test of hypothesis for a proportion was used to analyze if

direct vendor medical material is received on time at least 95% of the time and received at all 99% of the time. A one-tailed test of hypothesis for a mean was also used to determine if the average transit times from all facilities were within UMMIPS time standards.

In an attempt to determine the degree of association between standard stock and non-standard direct vendor supply transportation, a nonparametric procedure, Spearman's Rank Correlation Coefficient, was used.

The use of these data analysis techniques should provide some insight into determining if a problem exists in the shipping of medical material to overseas destinations. The actual presentation of the data will be discussed in the Chapter V.

## **V. PRESENTATION OF DATA COLLECTED**

### **A. INTRODUCTION**

The objective of this thesis is to determine if a problem exists in the movement of direct vendor medical supplies to overseas locations. To make this determination, two different methods of moving direct vendor supplies to overseas Naval Treatment Facilities were selected for analysis. These two methods, the NECP and the MPS, were evaluated by responses received from questionnaires mailed to eight overseas Naval hospitals. Responses were received from five of the eight facilities for a 62.5% response rate.

This chapter presents the responses from the five mail questionnaires received and is organized according to the sections contained in the survey. Quantitative information gathered from the NECP contractor and the JMPAs will also be presented.

### **B. QUESTIONNAIRE**

#### **1. General**

Information concerning rank, billet title, sex, and age were requested from each activity to get an idea of the demographic composition of the sample selected. The average age of the respondents was 35.2 years with 80% male and 20% female. Of the five surveys received, the rank structure

consisted of: two Lieutenant Commanders, two Lieutenants, and one Hospital Corpsman First Class. The survey was intended to be completed by the Head, Materials Management Department at an overseas Naval hospital. However, only three of these surveys were completed by the Materials Management Department head. Of the remaining two surveys, one was completed by the Assistant Head, Materials Management and one by the activity Comptroller.

## 2. Education

Education levels for the position of Head, Materials Management at Naval hospitals are prescribed by the Naval Medical Command in Washington DC. Of the 18 Head, Materials Management billets worldwide, only four, none of them overseas, require a Masters degree [Ref. 22].

Of the five responses received, 60% of the medical materials personnel have a graduate degree. Two have Masters degrees in Public Administration and one has a graduate degree in Community Healthcare. Of the remaining two individuals who do not have Masters degrees, one has a Bachelors degree in Business Administration and one has only a high school diploma.

The respondents also were asked if they had taken any college-level courses pertaining to Transportation Management. Of the five responses received, none had taken any of these courses.

### 3. Transportation Training

In this section, the medical supply personnel were asked to annotate which of six training courses listed in the survey they had attended. The responses are listed in Table IV.

TABLE IV TRAINING COURSE ATTENDANCE

TRAINING COURSES	YES	NO	%
FINANCIAL & SUPPLY MGMT COURSE	04	01	80
DPSC INTERNSHIP PROGRAM	00	05	00
PHYSICAL DISTRIBUTION COURSE	00	05	00
INTRODUCTION TO TRANSPORTATION MGMT	00	05	00
TRANSPORTATION MGMT (ADVANCED)	00	05	00
MILSTAMP: OVERAGE & SHORTAGE COURSE	00	05	00

All Head, Materials Management billets require completion of the 12 week Financial and Supply Management Training Course (FSMTC) located at the Naval School of Health Sciences in Bethesda, Maryland, prior to assignment as a department head. According to the mail questionnaires received, all of the respondents who identified themselves as filling a Head, Materials Management billet had completed this 12 week course. The only respondent who did not attend this course identified himself as filling an assistant head position and thus was not required to attend the FSMTC course. No respondent attended the five other courses listed in Table



IV. According to attendance records at the Navy Transportation School, Oakland, California, no record was found of any Medical Service Corps officer ever attending their transportation-related courses.

#### **4. Supply Experience**

In the section entitled "Experience," the respondents were asked to list all military medical supply experience by activity type, if located overseas, and number of years in the medical supply billet. Of the five questionnaires received, 40% of the respondents had medical supply experience prior to their current assignment. The percentage of respondents that had no supply experience prior to assignment overseas was 60%. Only one respondent (20%) had previous medical supply experience overseas. The number of years of experience, prior to their current assignment in the medical supply community, were 0, 0, 3, 3, and 14 years respectively.

#### **5. Medical Shipment Information Required**

This section of the questionnaire requested quantitative and qualitative responses to 19 questions pertaining to the movement of medical supplies to overseas Medical Treatment Facilities. Questions concerning the movement of supplies via the NECP and MPS were the main focus of this section. Questions pertaining to the shipping of standard stock material also were asked in order to compare the shipping of non-standard versus standard medical supplies.

The raw information collected from this section is tabulated in Tables V through VII. Information concerning level of satisfaction and degree of training is presented in Appendix B. According to this data, 80% of the respondents felt they had been poorly trained in transportation procedures and 60% felt that more emphasis should be placed on transportation management in courses such as the Financial and Supply Management Training Course.

#### **C. NAVY EXPEDITING AND CONSOLIDATION PROGRAM DATA**

A computer printout was received from the NECP contractor, Logistics Operations Inc., which specified the number of shipments on hand by Transportation Control Number (TCN) as of 18 November 1989. A total of 1,375 shipments were in the contractor's facility as of this date. Of these shipments, 99 were medical supplies destined for overseas Naval hospitals. Of these 99 shipments, 74 were TP3 shipments, 20 were TP2 and five were TP1. As stated in Chapter Three, TP1 and TP2 shipments must be transported within 24 hours of receipt and TP3 must be shipped within five working days.

A total of 62 of these 99 shipments did not meet the above time standards. The days on hand for these medical shipments ranged from 1 to 85 days late with a mean of 24.3 days. Appendix C is a copy of the medical portion of this printout.

**D. MILITARY POSTAL SERVICE DATA**

The JMPAs are responsible for periodically monitoring the movement of mail from CONUS points of embarkation to overseas Military Post Offices. This is done to ensure the shippers are meeting UMMIPS time standards. To accomplish this task, the JMPAs send test packages to overseas Post Office Branches. Based upon these test packages, the JMPAs have arrived at an average transit time for mail moved to an overseas Military Post Office. These times are illustrated in Table VIII.

TABLE V NECP DATA

QUESTIONS	ACTIVITY				
	1	2	3	4	5
% OF SHIPMENTS WHICH ARRIVED LATE	89	13	NR	75	NR
% OF SHIPMENTS WHICH NEVER ARRIVED	00	00	00	00	NR
AVERAGE TRANSIT AND PROCESSING TIME	150	45	60	180	NR
% OF SHIPMENTS WHICH ARRIVED DAMAGED	06	00	10	NR	NR

NR = NO REPLY

TABLE VI MPS DATA

QUESTIONS	ACTIVITY				
	1	2	3	4	5
% OF SHIPMENTS WHICH ARRIVED LATE	32	00	NR	100	NR
% OF SHIPMENTS WHICH NEVER ARRIVED	00	00	NR	01	NR
AVERAGE TRANSIT AND PROCESSING TIME	180	40	NR	210	NR
% OF SHIPMENTS WHICH ARRIVED DAMAGED	02	00	10	NR	NR

NR = NO REPLY

TABLE VII STANDARD STOCK DATA

QUESTIONS	ACTIVITY				
	1	2	3	4	5
% OF SHIPMENTS WHICH ARRIVED LATE	58	24	02	85	16
% OF SHIPMENTS WHICH NEVER ARRIVED	00	00	00	01	40
AVERAGE TRANSIT AND PROCESSING TIME	29	38	25	199	NR
% OF SHIPMENTS WHICH ARRIVED DAMAGED	01	00	10	NR	00

NR = NO REPLY

TABLE VIII MPS AVERAGE OVERSEAS TRANSIT TIMES

PORT LOCATION	EXPRESS	PRIORITY	MOM	SURFACE
OKINAWA	02 DAYS	05 DAYS	05 DAYS	27 DAYS
JAPAN	02 DAYS	03 DAYS	03 DAYS	22 DAYS
GUAM	02 DAYS	04 DAYS	04 DAYS	23 DAYS
PHILLIPINES	02 DAYS	04 DAYS	04 DAYS	34 DAYS
ITALY	02 DAYS	03 DAYS	04 DAYS	39 DAYS
SPAIN	02 DAYS	03 DAYS	05 DAYS	41 DAYS
PUERTO RICO	02 DAYS	02 DAYS	03 DAYS	10 DAYS
CUBA *	02 DAYS	02 DAYS	04 DAYS	NA

\* = MOVEMENT BY MAC ONLY

NA = NOT APPLICABLE

## **VI. DATA ANALYSIS**

### **A. OVERVIEW**

This chapter will analyze the data collected from the questionnaires and reports in order to make inferences about the shipping of direct vendor medical material to overseas Naval Treatment Facilities. This chapter begins by discussing the statistical procedures used to analyze the quantitative data collected from each questionnaire. It then presents an analysis of the data obtained about the Navy Expediting and Consolidation Program and the Military Postal Service methods of transporting direct vendor medical supplies. This chapter concludes by summarizing the quantitative analysis performed on the data collected.

### **B. STATISTICAL PROCEDURES**

To determine the effectiveness of the movement of direct vendor medical supplies shipped through the NECP and MPS, two types of hypothesis testing and one correlation procedure were used. The hypothesis test and correlation analysis were performed on data collected from the mail surveys.

Based on a sample of 100 purchase orders for each of the selected methods of medical shipping, three questions were asked of each medical facility. These questions were:

1. How many orders arrived at your facility late?
2. How many orders never arrived at your facility?
3. What is the average processing and transit time for these orders?

The raw answers to these questions are presented in Tables V through VII in Chapter V and provide the basis for the hypothesis testing. More specifically, a one sample test of hypothesis for a proportion was used on data collected from the first and second questions, while a one sample test of hypothesis for a mean was used on information gathered from the third question. The rejection region for the hypothesis test for a proportion was computed to be  $Z > 1.645$  based on a .05 level of significance. For the hypothesis test of a mean, the rejection region based on a .05 level of significance was computed to be  $t > 1.66$ . The null and alternative hypothesis for these tests are illustrated in Table IX.

TABLE IX HYPOTHESIS TEST

SYMBOLGY	DESCRIPTION	QUESTION
Ho: $p < .05$ H1: $p > .05$	ONE SAMPLE HYPOTHESIS TEST FOR A PROPORTION (ALL ACTIVITIES)	ONE
Ho: $p < .01$ H1: $p > .01$	ONE SAMPLE HYPOTHESIS TEST FOR A PROPORTION (ALL ACTIVITIES)	TWO
Ho: $u < 54$ H1: $u > 54$	ONE SAMPLE HYPOTHESIS TEST FOR A MEAN (CARIBBEAN ACTIVITIES)	THREE
Ho: $u < 63$ H1: $u > 63$	ONE SAMPLE HYPOTHESIS TEST FOR A MEAN (WESTPAC ACTIVITIES)	THREE

Since no transportation quality standards could be found, arbitrary standards were set based upon this author's experience and assessment of what is acceptable to an overseas Naval treatment facility. For the one sample test of hypothesis for a proportion, the methods were determined to be working properly if no more than 5% of the orders arrived late and no more than 1% never arrived. For the one sample test of hypothesis for a mean, the process was determined to be working properly if the average processing and transit times were less than or equal to 63 or 54 days depending on their ultimate destination. The Spearman's Rank Correlation procedure also was used to determine if any association exists between the shipping of standard stock material and non-standard material shipped through the NECP and MPS.

#### **C. NAVY EXPEDITING AND CONSOLIDATION PROGRAM ANALYSIS**

##### **1. Question One - Arrive Late**

Of the five responses received, only three facilities provided information concerning this question. All three of these facilities are located in the Western Pacific region. The hypothesis tests conducted resulted in rejection of the null hypothesis on all three occasions as well as overall for the entire Western Pacific region. The Z values were 38.50, 32.12 and 3.67 for the individual activities, and 37.6 for the region as a whole. This indicates that more than 5% of the

orders shipped through the NECP contractor arrive late with 95% confidence.

## **2. Question Two - Never Arrive**

Of the five questionnaires received, only four activities responded to this question. Three of these medical facilities are located in the Western Pacific region and one activity is located in the Caribbean area. The hypothesis tests for all cases resulted in acceptance of the null hypothesis. The Z value for these four facilities were -1.005, -1.005, -1.005 and -1.005. The overall Z value was -2.01. This indicates that less than 1% of the orders never arrive at their ultimate destination with 95% confidence.

## **3. Question Three - Average Processing and Transit Time**

Of the five surveys collected, only four responses for this question were received. Three of the facilities are located in the Western Pacific and one in the Caribbean. The hypothesis tests resulted in rejection of the null hypothesis on three of the four tests performed. The only acceptance occurred for the medical facility located in the Caribbean region. The Z values were 28.06, 31.62, 7.50, and -9.44. This seems to indicate that the average processing and transit times for NECP shipments destined for the Western Pacific is greater than UMMIPS time standards with 95% confidence. A one way analysis of variance test also concluded that the means of the activities are not equal.



#### **4. Correlation Procedure**

To determine if a correlation exists between standard and non-standard medical supply transportation, a correlation analysis was performed on the average transit and processing times using Spearman's Rank Correlation procedure. The Z value calculated from the data for this test was .707. Since .707 is less than the .05 significance level of 1.645, the null hypothesis is not rejected. This indicates there is no positive correlation between the transportation of standard stock material and non-standard material shipped through the NECP with 95% confidence.

#### **5. Independent Analysis**

The data received from the NECP contractor, as presented in Appendix C, seems to support the findings of the hypothesis testing for the Western Pacific region. A total of 62.6% of the medical shipments on hand in the west coast NECP contractors's facility had been there beyond required time standards. The average time of stay in the NECP facility for these medical shipments is 24.3 days. Of the 62.6% that were listed, only 10% were listed as frustrated. This seems to indicate there is a definite "bottleneck" in the processing of medical material by the NECP contractor to the air and surface points of embarkation. In addition, the high dissatisfaction rate from the survey respondents for this

method, as illustrated in Appendix B, indicates problems when shipping medical material through the NECP contractor.

#### **D. MILITARY POSTAL SERVICE ANALYSIS**

##### **1. Question One - Arrive Late**

Only three of the five facilities from which a questionnaire was received responded to this question. All three of these hospitals are located in the Western Pacific area. The hypothesis tests resulted in rejection of the null hypothesis for two of the three facilities as well as the overall total. The Z values were 12.39, 43.59, and -2.29 for the individual facilities and 30.99 overall. This indicates that for two of the three facilities responding, more than 5% of the orders are received late with 95% confidence.

##### **2. Question Two - Never Arrive**

Of the five questionnaires received, only three hospitals responded to this question. All three activities are located in the Western Pacific region. The hypothesis tests resulted in acceptance of the null hypothesis on all three occasions. The individual facility Z values were -1.005, -1.005, and 0.00. The overall Z value was -1.16. This indicates that less than 1% of all orders never arrive at their ultimate destination with 95% confidence.

### **3. Question Three - Average Processing and Transit Time**

Of the five surveys received, only three of the hospitals responded to this question. All three of these facilities are located in the Western Pacific area. The hypothesis tests resulted in rejection of the null hypothesis on two of the three tests performed. The Z values were 31.62, 31.96, and -14.67. This indicates that for two of the three facilities responding to this question, the processing and transit time for orders shipped through the Postal Service is greater than the UMMIPS time standards with 95% confidence. A one way analysis of variance test also concluded that the means of the activities are not equal.

### **4. Correlation Procedure**

To determine if a correlation exists between the transportation of non-standard medical material transported through the Military Postal service and movement of standard stock material the Spearman's Rank Correlation procedure was used. Based on this analysis, the Z value calculated was determined to be 1.41. Since this value is greater the 1.645, the null hypothesis is not rejected. This concludes there is no positive association between these two variables with 95% confidence.

### **5. Independent Analysis**

The data received from the JMPA-A and JMPA-P present the average transit times for services of all types of mail

to each overseas location. Based on the times illustrated in Table VIII of Chapter V, the transportation of mail from the point of embarkation to point of debarkation appears to be functioning properly and is within UMMIPS time standards. However, the null hypothesis for mail movement, corresponding to its ability to arrive on time and average processing and transit times, were rejected in two of the three tests performed, both of which are located in the Western Pacific. Combining these hypothesis tests with the average overseas transit times seems to indicate a problem in either the General Mail Facility processing or vendor related problems, i.e., out of stock, etc. An informal tour of a west coast military mail facility seemed to indicate a problem in the processing of improperly marked mail. According to various workers, it was not uncommon for frustrated packages to remain in the mail facility for 30 days or more.

#### **E. SUMMARY**

Hypothesis testing is a method of statistical analysis used to draw inferences about a population based upon sample data collected. The objective of this research is to determine if a problem exists in the movement of direct vendor medical material to overseas Naval medical, treatment facilities. Tests of hypotheses for means and hypotheses for proportions were conducted in sample data collected from a mail survey. Base on these tests, the NECP and MPS methods

of transporting medical material to overseas locations appear to have a problem in meeting required time standards, especially when shipping to Western Pacific medical facilities. All three of the Western Pacific medical facilities surveyed, exhibited an inability to receive medical supplies in a timely manner using the NECP. Two of the three Western Pacific medical activities showed significant problems in receiving medical supplies shipped through the MPS. No facility had problems in never receiving medical supplies through these two methods of overseas shipping. The results of these tests as well as the correlation analysis are presented in Table X. The mean and standard deviation used to perform the hypothesis tests are illustrated in Appendix D.

TABLE X SUMMARY OF STATISTICAL ANALYSIS

TEST PROCEDURE	ACTIVITY TEST RESULTS				
	1	2	3	4	5
HYPOTHESIS TEST OF A PROPORTION ON NECP (p<.05)	*	*		*	
	38.50	1.68	NR	32.12	NR
HYPOTHESIS TEST OF A PROPORTION ON NECP (p<.01)					
	-1.00	-.50	-1.00	-1.00	NR
HYPOTHESIS TEST OF A MEAN ON NECP (u<54, 63)	*	*		*	
	31.62	7.50	-4.92	28.06	NR
HYPOTHESIS TEST OF A PROPORTION ON MPS (p<.05)	*			*	
	12.39	-1.15	NR	43.59	NR
HYPOTHESIS TEST OF A PROPORTION ON MPS (p<.01)					
	-1.00	-.503	NR	0.00	NR
HYPOTHESIS TEST OF A MEAN ON MPS (u<54, 63)	*			*	
	31.62	-7.83	NR	31.96	NR
CORRELATION ANALYSIS (NECP VS STANDARD STOCK)	.71				
CORRELATION ANALYSIS (MPS VS STANDARD STOCK)	1.41				
ONE WAY ANALYSIS OF VARIANCE TEST FOR NECP	*				
	251.76				
ONE WAY ANALYSIS OF VARIANCE TEST FOR MPS	*				
	366.80				

\* = rejection of the null hypothesis NR = NO REPLY

## **VII. CONCLUSIONS AND RECCMENDATIONS**

### **A. OVERVIEW**

The Navy Expediting and Consolidation Program and the Military Postal Service are designed to perform delivery of direct vendor supplies to overseas activities. Although no actual data is available, this author's past experience indicates these two methods of shipping account for approximately 75% of all direct vendor medical shipments. Therefore, it is imperative that these two methods function properly so that overseas medical activities can receive their supplies in a timely manner. The purpose of this chapter is to make inferences about the effectiveness of direct vendor shipments based on the data findings, and analysis on these two methods that are described in previous chapters. This chapter begins by drawing conclusions concerning the effectiveness of direct vendor movement of medical supplies. It concludes by providing recommendations to improve the current situation.

### **B. CONCLUSIONS**

Based upon the analysis conducted in Chapter VI, no conclusion can be drawn on the overall effectiveness of the movement of direct vendor medical supplies to overseas Naval medical facilities. This is due to the lack of information

received from hospitals other than those located in the Western Pacific region. While two surveys were received from facilities located in the Caribbean, numerous questions were left unanswered and thus little if any statistical analysis could be performed. No questionnaires were received from the two European Naval hospitals.

However, while no blanket conclusion can be drawn, it appears there is a problem in the movement of direct vendor medical supplies to hospitals located in the Western Pacific region. Based on the hypothesis tests performed, supplies shipped through the NECP and MPS have trouble arriving at their ultimate destination in accordance with UMMIPS time standards. This appears to be the result of bottlenecks occurring in the freight processing facilities of both systems. Average holding and processing times for the NECP and MPS chronically exceed required standards.

While not enough data was collected to properly analyze medical facilities located in the Caribbean and European regions, it is this author's opinion that similar conclusions would have been drawn for these facilities had enough information been received.

### **C. RECOMMENDATIONS**

The following recommendations are not intended to radically change the way direct vendor medical material is transported, but rather to reinforce current procedures which



will hopefully improve efficiency in the movement of direct vendor supplies and raise the level of customer satisfaction.

For material shipped through the Navy Expediting and Consolidation Program it is recommended that:

1. The military contracting officers include the exact address and location of the NECP consolidation facility in the purchase document. This should ensure the delivery of medical supplies to the appropriate consolidation point and decrease the number of lost shipments.
2. The military contracting officers send an advance copy of the purchase document to the NECP contractor to establish a due-in record. This should save valuable processing time once the medical shipment is received and improve the flow of material through the contractor's facility.
3. The contracting officer include in the purchase document the requirement to include the following information on the exterior of the package: Transportation Control Number, Purchase Order Number, Transportation Account Code, Point of Debarkation, Consignee Name, and Consignee's Unit Identification Code.
4. The contracting officer provide the vendor with appropriate military shipping labels/documentation with instructions on proper preparation. This will speed up the shipping process and should prevent unnecessary delays at the contractor's facility.
5. NAVMTO Norfolk strictly enforce the NECP contract and penalize the contractor for not meeting required time standards. This recommendation should reduce the excessive delay times encountered at the contractor's facility by forcing the contractor to pay a monetary fine.
6. The contracting officer include in the purchase document the requirement for export packing in accordance with MIL-STD 129 for shipments destined to overseas activities. Numerous packages arrive in an undeliverable state and require the NECP contractor to either repack or return these packages to the vendor for proper

packaging. This should eliminate problems of improper packing by making it a contractual requirement.

For medical supplies shipped through the Military Postal Service it is recommended that:

1. The contracting officer include in the purchase document the requirement for proper and complete addressing. The entire plain language address and specific location should be clearly marked on the exterior of the package. The complete address should include: Consignee Official Name, Building Number, Room Number, FPO Mail Consolidation Facility, and Nine digit Zip Code Number. This should eliminate any doubt as to the proper location and prevent mail clerks from misrouting the mail packages.
2. The contracting officers instruct the commercial vendors through the purchase document to ensure proper postal endorsements are annotated on the exterior of the packages prior to shipment. (The absence of any endorsements will cause packages to be sent via the lowest class of mail, i.e., surface parcel post.)
3. The contracting officers make use of registered mail requirements on medical supplies which require traceability. This provides a mechanism to track down mail packages once they have exceeded UMMIPS time standards.

The following recommendations are made concerning the training of overseas medical material managers. It is recommended that:

1. All personnel selected to fill a Materials Management billet overseas should attend the two week Advanced Transportation Management course, given at the Naval Transportation School Oakland, California, prior to their assignment.

2. The Financial and Supply Management Training Course (FSMTC) include a basic segment on Transportation Management in its core curriculum.

**APPENDIX A**

**QUESTIONNAIRE**

**GENERAL**

Rank \_\_\_\_\_ Billet Title \_\_\_\_\_

I am filling an ENS( ) LTJG( ) LT( ) LCDR( ) CDR( ) billet.

Sex M( ) F( ) Age \_\_\_\_\_

**EDUCATION**

Bachelors Degree Yes( ) No( ) Major \_\_\_\_\_

Masters Degree Yes( ) No( ) Major \_\_\_\_\_

Ph.D Degree Yes( ) No( ) Major \_\_\_\_\_

**TRANSPORTATION TRAINING**

Have you completed any of the following training courses/programs:

	Yes	No
Financial and Supply Mgmt Training course (NSHS Bethesda 12 week course)	( )	( )
DPSC Internship Program (DPSC Philadelphia 5 month course)	( )	( )
Physical Distribution course (NTS Oakland 6 month course)	( )	( )
Introduction to Transportation Mgmt (NTS Oakland 2 week course)	( )	( )
Transportation Management course (NTS Oakland 2 week course)	( )	( )
MILSTAMP: Overage and Shortage course (NTS Oakland 2 week course)	( )	( )

**SUPPLY EXPERIENCE**

List all Military Medical Supply Experience, beginning with your current assignment.

Activity Type (hosp., clinic)	Located Overseas	Month & Year From	To	Position Title
_____	Y( ) N( )	_____	_____	_____
_____	Y( ) N( )	_____	_____	_____
_____	Y( ) N( )	_____	_____	_____

**MEDICAL SHIPMENT REQUIRED INFORMATION**

All information should be based on FY-89 data and refers only to direct vendor medical supplies transported from a CONUS origin. No acquisitions for medical equipment or administrative supplies should be included in your information.

Based on a random sample of 100 standard stock requisitions, please answer the following three questions:

How many of these 100 requisitions for standard stock medical material (cog 9L) arrived at your activity late? (based on UMMIPS time standards)

\_\_\_\_\_

How many of these 100 requisitions for standard stock medical material (cog 9L) never arrived at your activity?

\_\_\_\_\_

How many requisitions for standard stock material (cog 9L) arrived at your facility damaged or spoiled? (based on RODs you have submitted)

\_\_\_\_\_

Based on a random sample of 30 requisitions (10 from each UMMIPS priority group) what is the average procurement and transportation lead time for standard stock medical material (cog 9L) shipped from a CONUS supply source.

Priority 03 \_\_\_\_\_ Priority 06 \_\_\_\_\_ Priority 13 \_\_\_\_\_

\* \* \* \* \*

Based on a random sample of 100 open purchase contracts for medical material that use the Navy's Expediting and Consolidation Program (currently operated by Logistics Operations Inc.) for OCONUS transportation, please answer the following four questions:

How many contracts for open purchase medical material that were transported via the Navy's Expediting and Consolidation Program arrived at your activity late? (Based on your requested RDD)

---

How many contracts for open purchase medical material that were transported via the Navy's Expediting and Consolidation program never arrived at your activity?

---

What is the average procurement and transportation lead time for open purchase medical material when shipped through the Navy's Expediting and Consolidation Program? (includes requisition submission, processing, transit and receiving time)

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How many contracts for open purchase medical material that were transported via the Navy's Expediting and Consolidation Program arrived at your facility damaged or spoiled?

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\* \* \* \* \*

Based on a random sample of 100 open purchase contracts for medical material that use the U.S. Postal Service for transportation, please answer the following four questions:

How many contracts for open purchase medical material that were transported via the U.S. Postal Service arrived at your activity late? (based on your RDD)

---

How many contracts for open purchase medical material that were transported via the U.S. Postal Service never arrived at your activity?

---

What is the average procurement and transportation lead time for open purchase medical material when shipped directly from CONUS commercial vendors through the U.S. Postal Service. (Includes requisition submission, processing transit and receiving times)

---

How many contracts for open purchase medical material that were transported via the U.S. Postal Service arrived at your facility damaged or spoiled?

---

\* \* \* \* \*

On a scale of 1 to 5, to what degree do you feel you have been adequately trained in transportation management and procedures? (with 5 being poorly trained and 1 highly trained)

VERY HIGH	HIGH	ADEQUATE	POOR	VERY POOR
1	2	3	4	5
( )	( )	( )	( )	( )

Should more emphasis be placed on Transportation Management in training programs such as the Fiscal and Supply Management Training Course?

Yes( )                      No( )                      Indifferent( )

On a scale of 1 to 5, to what extent are you satisfied with the various direct vendor transportation services used by your activity for the movement of medical material? (with 5 being very dissatisfied and 1 very satisfied)

Navy's Expediting and Consolidation Program

VERY				VERY
SATISFIED	SATISFIED	INDIFFERENT	DISSATISFIED	DISSATISFIED
1	2	3	4	5
( )	( )	( )	( )	( )

The U.S. Postal Service .

VERY				VERY
SATISFIED	SATISFIED	INDIFFERENT	DISSATISFIED	DISSATISFIED
1	2	3	4	5
( )	( )	( )	( )	( )

Have you had any transportation "horror" stories or "good" transportation experiences you would like to share?

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**APPENDIX B**

**ACTIVITY RESPONSES CONCERNING TRANSPORTATION**

1. To what degree do you feel you have been adequately trained in transportation management and procedures?

Very High	High	Adequate	Poor	Very Poor
		1	2	2

2. Should more emphasis be placed on transportation management in training programs such as Fiscal and Supply Management Course?

Yes	No	Indifferent
3	1	1

3. To what extent are you satisfied with the various transportation services used by your activity for the movement of medical supplies?

Navy Expediting and Consolidation Program

Very Satisfied	Satisfied	Indifferent	Dissatisfied	Very Dissatisfied
	3		2	

Military Postal Service

Very Satisfied	Satisfied	Indifferent	Dissatisfied	Very Dissatisfied
	3		2	

**APPENDIX C**

**MEDICAL SHIPMENTS ON HAND AS OF 18 NOV 89 AT NECP FACILITY**

TCN	PIECES	PRIORITY	DATE RECEIVED	DAYS LATE
N682921140406XXX	03	03	9237	85
N6809692062071XAX	07	03	9249	73
N6829291520529CCC	00	03	9256	66
N6549191476008XXX	26	03	9261	61
N6549191576007XXX	08	03	9261	61
N6847092073421XBX	01	03	9261	61
N6549191476008XAX	03	03	9262	60
N6847091422767XAX	01	03	9262	60
N6829291290547XXX	01	03	9263	59
N6847091843245XXX	01	03	9263	59
N6809691505012XXX	01	02	9264	58
N6829292494114XXX	01	02	9269	53
N6809692052031XZX	01	03	9275	47
N6809692512021XXX	01	02	9275	47
N6829292554166XAX	01	03	9277	45
N6829292374004XXX	01	03	9279	43
N684709208N055XXX	01	01	9280	42
N684709275A427XZX	01	03	9293	29
N6809692745115XXX	19	03	9296	26

N6809692627021XXX	01	03	9297	25
N6809692745118XAX	01	03	9297	25
N6549191721240XBX	01	03	9299	23
9300506	03	02	9300	22
N680969259209LXAX	01	03	9303	19
N6829292444421XZX	01	03	9303	19
N6847090471761XXX	03	03	9306	16
N6847092513855XXX	05	03	9307	15
N6847082634173XHX	02	02	9310	12
N6847090742075XXX	13	01	9310	12
N6847092293633XAX	01	03	9310	12
N6847092513852XXX	01	03	9310	12
N6549191251246XXX	03	03	9311	11
N6809692627031XXX	01	03	9311	11
N6829292444421XAX	06	03	9311	11
N6847092740214XXX	03	03	9311	11
N6809692082082XXX	08	03	9312	10
N6809692093151XXX	03	03	9312	10
N6847092003378XDX	01	03	9312	10
N6847092543891XXX	01	03	9312	10
N6847092713990XXX	10	03	9312	10
N6847092740214XAX	01	02	9312	10
N6829281973603XGX	01	02	9313	09
N6847092003386XXX	01	03	9313	09

N684709226H915XXX	01	03	9313	09
N6847092623953XXX	04	03	9313	09
N6847092740213XAX	01	02	9313	09
N684709275A940XXX	01	03	9313	09
N6847092803988XBX	11	03	9313	09
N6549192659800XXX	01	03	9317	00
N6809692083111XXX	01	03	9317	00
N6809692562024XAX	03	03	9317	00
N6847091713096XAX	01	03	9317	00
N6847092723996XXX	01	03	9317	00
N684709277A421XXX	01	03	9317	00
N684709284B345XXX	01	03	9317	00
N6809692282911XXX	01	01	9318	04
N6809692562073XXX	01	03	9318	00
N680969261205BXAX	02	03	9318	00
N680969261205EXXX	02	03	9318	00
N6809692632046XXX	01	03	9318	00
N6829291420021RXX	09	02	9318	04
N684709194P505XXX	09	03	9318	00
N684709284B346XXX	01	03	9318	00
N684709291A937XXX	01	03	9318	00
N6829292624447XZX	10	03	9319	00
N684709226H915XAX	01	03	9319	00
N6847092740214XBX	02	03	9319	00
N684709275A078XAX	01	03	9319	00

N684709289A504XXX	01	03	9319	00
N6847092980158XAX	01	03	9319	00
N6847092980158XXX	01	03	9319	00
N6809692423141XXX	01	02	9320	02
N6809692582051XXX	01	03	9320	00
N6809692633011XXX	01	02	9320	02
N6809692704071XXX	04	03	9320	00
N684709117H469XXX	01	03	9320	00
N6847091933319XXX	01	03	9320	00
N684709275B338XXX	01	03	9320	00
N6847092830531XXX	01	03	9320	00
N6549192712840XXX	01	03	9321	00
N6809692133121XBX	01	03	9321	00
N6809692562024XBX	02	03	9321	00
N6809692582781XJX	08	03	9321	00
N6829292350502XXX	01	03	9321	00
N6829292350503XXX	02	03	9321	00
N6829292420500XXX	02	03	9321	00
N684709241N123XXX	02	03	9321	00
N684709243N127XXX	04	03	9321	00
N6847092573927XXX	03	02	9321	00
N6829291420021RXX	09	02	9318	04
9300506	03	02	9300	22
N6847082634173XHX	02	02	9310	12
N6847090742075XXX	13	01	9310	12

N6847092740214XAX	01	02	9312	10
N6847092740213XAX	01	02	9313	09
N6809692282911XXX	01	01	9318	04
N6829291420021RXX	09	02	9318	04
N6809692423141XXX	01	02	9320	02
N6809692633011XXX	01	02	9320	02
N6847092573927XXX	03	02	9321	00

**APPENDIX D**

**SAMPLE MEANS AND STANDARD DEVIATIONS FOR TRANSIT TIMES  
BY METHOD OF TRANSPORTATION**

	<u>NECP</u>	<u>MPS</u>	<u>STANDARD STOCK</u>
<b>ACTIVITY 1</b>			
MEAN	150	180	29.1
STANDARD DEVIATION	31	37	7
<b>ACTIVITY 2</b>			
MEAN	45	40	37.7
STANDARD DEVIATION	18	15	8
<b>ACTIVITY 3</b>			
MEAN	60	NR	24.6
STANDARD DEVIATION	8	NR	5
<b>ACTIVITY 4</b>			
MEAN	180	210	199.1
STANDARD DEVIATION	37	46	31
<b>ACTIVITY 5</b>			
MEAN	NR	NR	NR
STANDARD DEVIATION	NR	NR	NR

## LISTS OF REFERENCES

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