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CIVIL RESERVE AIR FLEET ENHANCEMENT PROGRAM: A STUDY OF ITS VIABILITY IN TODAY'S ENVIRONMENT

by

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During the 1970s and 1980s, there existed a gap between the strategic mobility requirement and the nation's cargo assets to meet this requirement. Consequently, the Military Airlift Command developed and implemented the Civil Reserve Air Fleet Enhancement Program (CEP) to bridge this gap. Civilian airlines were given monetary and other incentives to modify their existing wide-body passenger aircraft enabling them to carry military-sized cargo in the event of military necessity. This study examines the National Defense Airlift System, the concept behind the CEP's development and reasons for its failure. It also discusses whether the current military, Congressional, and airline environments are conducive to a revitalization of the CEP. It was determined that the current environments do not favor a re-birth of the CEP. However, if a CEP were deemed necessary to meet a potential gap in the strategic mobility requirement, actions could be taken by AMC, Congress, and the airlines to aid its success. Some of these actions are: developing adequate incentives enticing airline participation, ensuring even distribution of enhanced aircraft among CEP participants, investigating use of medium-sized aircraft, investigating benefits of placing financial liens on enhanced aircraft, and reducing CRAF activation concerns among participants.

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A STUDY OF ITS VIABILITY IN
TODAY'S ENVIRONMENT**

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ABSTRACT

During the 1970s and 1980s, there existed a gap between the strategic mobility requirement and the nation's cargo airlift assets to meet this requirement. Consequently, the Military Airlift Command developed and implemented the Civil Reserve Air Fleet Enhancement Program (CEP) to bridge this gap. Civilian airlines were given monetary and other incentives to modify their existing wide-body passenger aircraft enabling them to carry military-sized cargo in the event of military necessity. This study examines the National Defense Airlift System, the concept behind the CEP's development and reasons for its failure. It also discusses whether the current military, Congressional, and airline environments are conducive to a revitalization of the CEP. It was determined that the current environments do not favor a re-birth of the CEP. However, if a CEP were deemed necessary to meet a potential future gap in the strategic mobility requirement, actions could be taken by AMC, Congress, and airlines to aid its success. Some of these actions are: developing adequate incentives enticing airline participation, ensuring even distribution of enhanced aircraft among CEP participants, investigating use of medium-sized aircraft, investigating benefits of placing financial liens on enhanced aircraft, and reducing CRAF activation concerns among participants.

TABLE OF CONTENTS

I. INTRODUCTION

A. PURPOSE

The purpose of this research paper is to analyze the formulation and subsequent termination of the Civil Reserve Air Fleet Enhancement Program (CEP). Additionally, the research focuses on whether a revitalization effort of the CEP, or a derivative program, is warranted in today's environment to ensure the U.S. can meet its defense transportation requirements brought about by participation in global military activities.

B. BACKGROUND

Over the past decades, the military transportation requirements for moving military personnel, equipment, and supplies throughout the globe have changed dramatically. This change in requirements has resulted in part due to the changing world political atmosphere as well as to current fiscal and budgetary constraints.

One of the primary goals of the United States Military airlift policy, however, has remained steadfast over the past decades. This goal is to maximize the available wartime reserve of airlift capacity for use during a time of national need. In the development of this policy, the Civil Reserve Air Fleet (CRAF) was created to ensure the defense mobility requirement for personnel, equipment, and supplies could be met and maintained.

The CRAF program, now managed by the Air Mobility Command (AMC), a component of the United States Transportation Command (USTRANSCOM), was founded in 1952 based upon the guidance from president Truman in the aftermath of

demands placed on military airlift after World War Two and during the Berlin Airlift. The CRAF fleet is compromised of U.S. registered civil transport aircraft that possess the range, payload, speed, and configuration to perform Department of Defense (DoD) directed missions. Until recently, the U.S. strategic airlift system, which includes both military and civilian aircraft, has consistently fallen short of the proposed wartime mobility requirement. In an attempt to fill this mobility requirements gap during the 1980's, the Military Airlift Command (MAC), predecessors to the AMC, created and implemented the CEP. This program was aimed at filling the gap through subsidizing the conversion of jumbo-sized aircraft into cargo-carrying platforms. Although this program did result in a total of 23 aircraft being converted, the program was discontinued in 1991.

C. RESEARCH QUESTIONS

1. Primary Research Question

Based on the lessons learned from the creation and termination of the CEP, is a re-vitalization of the CEP concept in today's environment warranted?

2. Secondary Research Questions

a. What was the impetus behind the creation of CRAF and what value does it play within the national airlift system in meeting defense transportation needs?

b. What was the role of CEP within the larger CRAF program and what were the expected advantages of CEP?

c. What were the dominant problems inherent in CEP and were these problems unavoidable?

d. What were some of the legal guidelines utilized in CEP and could they be re-written to help insure an effective CEP program today?

e. Was the scope of the acceptable participants in CEP too limited? Should it have been widened to include all civilian airlines?

f. What were the incentives available to CEP participants and were they sufficient? Would these same incentives be sufficient today?

g. Given the aging of our legacy transport aircraft (C-141 Starlifter, and C-5 Galaxy), and the cutback to procure only 120 C-17's, what position is AMC now in to insure current defense cargo transportation requirements are met?

h. Was the scope of aircraft type too limited in the CEP and should it be modified to include not just wide-body aircraft but medium size aircraft if the CEP were to be implemented today.

D. SCOPE

This research focuses on providing an impartial analysis of the issues pertaining to the development and demise of the CEP. This study specifically addresses the reasons for initiating CEP, its termination, and whether the barriers to its success were unavoidable. Additionally, this research paper explores if these barriers could be overcome in the development of a future "enhancement" program.

E. METHODOLOGY

This research paper integrates and analyzes information obtained through various military and civilian transportation agency publications, reports, manuals, instructions, and phone interviews. The projected primary sources of information for this study have been collected with the assistance of, but not limited to, the following:

- United States Transportation Command (USTRANSCOM)
- Air Mobility Command (AMC)
- Logistics Management Institute (LMI)
- United States Government Accounting Office (GAO)
- Various civil air carriers

Research was also conducted through an in-depth review of military and civilian literature. Additionally, personal interviews were conducted with individuals at the CRAF Management Office in AMC, as well as civilian employees at various CRAF participating air carriers.

F. ORGANIZATION

Chapter II (National Defense Airlift System) provides an overview of the National Defense Airlift System. It provides information on the two components of this system, military and civilian airlift. This chapter concludes with information on the current airlift requirement and capability and the actions considered by AMC to decrease the past deficit.

Chapter III (Enhancement of the Civil Reserve Air Fleet: From Concept to Reality) introduces the CEP and provides the concept behind its creation. Additionally, the advantages and disadvantages are presented. The actual results of CEP implementation are discussed followed by the concerns of both the civil air carriers and the government. Chapter III concludes with the actions that the Military Airlift Command (MAC) initiated in dealing with these concerns.

Chapter IV (Contemporary Environment and Mitigating Solutions) presents some contemporary issues of the military, Congress, and civilian air carriers pertaining to the current U.S. mobility requirement situation in relation to a possible new CEP program. It concludes with presenting mitigating solutions for the military, Congress, and air carriers if a CEP were deemed necessary.

Chapter V (Conclusions and Recommendations) summarizes the findings of the research, answers the research questions, and presents recommendations for further research and study.

G. BENEFITS OF STUDY

This research has the potential to benefit AMC in two ways. First, it presents the CEP developmental factors as well as the program implementation shortfalls that led to the program's termination. Second, it presents the contemporary concerns of the military, Congress, and civilian airline sector and assists in determining if the current atmosphere is conducive to a successful CEP reactivation.

II. NATIONAL DEFENSE AIRLIFT SYSTEM

A. INTRODUCTION

Before examining the viability of re-implementing the CRAF Enhancement program, it is essential that the National Defense Airlift System components and their roles be understood. This chapter presents the purpose of the National Defense Airlift System and its two components, military and civilian airlift. Additionally, it presents information on the nation's current airlift requirement, capability, and actions that have been considered by AMC to ensure that DoD's defense mobility requirements are met.

B. PURPOSE OF THE NATIONAL DEFENSE AIRLIFT SYSTEM

The 1987 National Defense Airlift Policy objective, initiated by Military Airlift Command (MAC) and signed into effect by President Reagan, is to "ensure that both the military and civilian airlift resources will be able to meet defense mobilization and deployment requirements in support of U.S. defense of foreign policies." [Ref. 1] The 1987 National Airlift Policy attempts to consider all of the mobility variables by further stating that the airlift system should be developed to "effectively and efficiently meet established requirements for aircraft in both peacetime and in the event of crisis or war." [Ref. 1] This policy, however, can cause some confusion because the most effective wartime airlift force might prove to be inefficient in peacetime and vice versa.

When the current National Airlift Policy was generated, much of the focus was placed on the wartime mobility requirement in comparison to the peacetime requirement. The cold war era had not yet ended causing this military requirement focus. The MAC

Deputy Chief of Staff for Plans reinforced this perception in his interpretation of the newly approved policy statement. He stated, "the new statement remains the keystone of our national submission, that the peacetime force of MAC and the mobilization base of the commercial air carrier industry must reflect wartime needs." [Ref. 2]

Today's environment, however, has changed dramatically in comparison to the cold war mobilization philosophy. The US has taken the role of "peacekeeper" and subsequently has increased opportunities and demands to utilize airlift in situations short of war. It is for this reason that the focus of AMC and of USTRANSCOM has shifted away from an almost exclusive emphasis on wartime requirements.

However, the issue of military versus civilian roles in the airlift system remains an area of concern. Since World War II, situations have occurred where proponents of the civil air and military components have had differing views over who should move military passengers and cargo during peacetime. Military proponents have claimed that the peacetime movement of cargo and passengers on military aircraft is a cost-effective by-product of the need to train and exercise the military's wartime airlift system. [Ref. 3: p. 206] Commercial proponents hold that this view is unfair and that airlines could carry most of the military cargo and passengers more effectively than the military. [Ref. 3: p. 205] The present National Airlift Policy settles these differences by stating:

> During peacetime, the Department of Defense regulations for passenger and/or cargo airlift shall be satisfied by the procurement of airlift from commercial air carriers participating in the CRAF program, to the extent that the Department of Defense determines that such airlift is suitable and responsive to the military requirement. [Ref. 1]

Since the defense airlift system components' roles differ during peacetime and wartime, the current National Airlift Policy developed a compromise that not just maintains an airlift force capable of meeting either peacetime or wartime requirements, but meets both sets of requirements. One of the ultimate goals of the National Airlift Policy is to provide the greatest possible reserve of wartime airlift capacity while maintaining an efficient and effective airlift force capable of filling DoD's peacetime mobility requirements.

C. NATIONAL DEFENSE AIRLIFT SYSTEM COMPONENTS

1. Military Airlift

a. Organization

The military's portion of the National Defense Airlift System is comprised of active duty Air Force transportation units managed by AMC, and Air Reserve Component (ARC) units. The ARC can be further divided into Air Force Reserve and Air National Guard (ANG) units . Air Force Reserve units report to the Air Force Chief of Staff (AFCOS) during peacetime and to AMC during wartime. [Ref. 4:p. 4] Air National Guard units report to their governors and state Air National Guard headquarters during peacetime and to AMC during wartime. [Ref. 4:p. 22,23] During time of war, AMC has the overall responsibility to ensure the nation's strategic mobility requirements are satisfied. [Ref. 4:p. 12]

Active duty Air Force transportation units provide 45 percent of the nation's military and civilian contract strategic mobility capacity. The primary purpose of these units is to provide airlift assets for the transportation of U.S. military personnel

and cargo to all U.S. military bases and selected regions of the world requiring U.S. military presence. [Ref. 4:p.22] Regularly scheduled flights, termed "channel flights," are flown to predetermined locations throughout the world in support of U.S. military doctrine. Additionally, unscheduled contingency flights are also flown with minimal notice. Active duty Air Force personnel man these units in which they train and operate to maintain an effective reaction capability in the event of any required U.S. military mobilization.[Ref. 4]

The primary role of the ARC is to train reserve personnel and to be ready for wartime mobilization. [Ref. 4: Summary] During peacetime, the ARC provides military cargo airlift as a by-product of training. The ARC units require the same global training and experience as the active duty Air Force units and provide 25 percent of the airlift capacity.[1] [Ref. 4:p. 17] Most of the peacetime ARC missions have long scheduled lead times, are of limited duration, and have firm return dates making them compatible with the part-time nature of the reservist' participation. [Ref. 4:p. 18] In wartime, ARC reserve units can be called to serve in an active duty status and report directly to AMC for mission assignments. [Ref. 4:p. 25]

b. Military Airlift Assets

Five types of aircraft make-up the military component. These aircraft are the C-130, C-141, C-5, C-17, and KC-10. Specific aircraft capabilities are: [Ref. 6]

[1] The remaining 30 percent is performed by civilian contract airlift.

- The C-130 is a turbo prop, non air-fuelable, assault aircraft that can deliver troops or cargo in either airdrop or airland operations. It can carry 92 ground troops with required field gear, 64 paratroopers, 74 litters, or six pallets. The maximum affective range with a 25 ton payload is 2000 nautical miles.. Its primary use is in intra-theater operations.

- The C-141 is an air-refuelable, long range jet transport which can carry 200 ground troops, 103 litter patients, or 13 pallets. It can transport a 45 ton payload up to 1970 nautical miles without refueling and can airdrop 35 tons of cargo or 155 paratroopers.

- The C-5 is an air refuelable, long range heavy lift transport aircraft designed to lift a wide variety of combat and support units, personnel, military supplies, munitions, and equipment. It can carry 73 troops and 36 military pallets in its normal configuration or up to 340 troops with associated baggage in its total airbus configuration. It can carry a payload of 121 tons up to 1650 nautical miles.

- The C-17 is air refuelable, long range, heavy lift jet transport aircraft which operates efficiently in intra-theater and inter-theater roles. It is designed for airdrop, airland, and parachute delivery of all sizes of equipment. It can carry up to 144 troops with 18 pallets and has a maximum range of 2400 nautical miles with a 86 ton payload. It is capable of delivering cargo and/or supplies directly into the forward operating location.

- The KC-10 is an air refuelable, long range aircraft capable of cargo carrying, air-to-air refueling, or both. In its cargo role can carry 27 pallets and a payload of 85 tons over 3400 nautical miles. In its refueling mode it can carry 390,000 lbs of fuel.

All of these aircraft have been designed to meet the requirements that military mobilization require. The C-130, C-5, C-141, and C-17 all have a high "T" tail to facilitate the loading of oversized and outsized cargo as well as perform airdrop

functions. Additionally, these aircraft have large cargo doors and ramps to accommodate this large cargo, and high wing placement to permit operations from austere airfields. [Ref. 7] This high wing placement also results in the aircraft's cargo floor being close to the ground permitting easy loading and unloading of cargo and wheeled vehicles. These features make it possible for the these aircraft to conduct their unique missions, however, they are unable to move passengers and smaller cargo as efficiently as can civilian aircraft due to the time required to shift configurations. Therefore, it is uncommon to find these same characteristics in the civilian airline sector.

The KC-10's main function is that of an airborne re-fueling platform. However, it can perform the cargo function relatively well. AMC currently plans to operate 39 of these KC-10 aircraft in a cargo carrying mode during crisis operations. [Ref. 8]

c. Military Airlift Advantages

The military component provides capabilities that the civilian component can not provide. Some of the more important advantages are:

- Civilian air carriers are often unable and/or unwilling to transport passengers into militarily desired locations. Often hostile locations or locations with ill-prepared airstrips are more likely to be served with military aircraft only.

- Air-dropping operations of both personnel and supplies are best performed by military aircraft and flight crews.

- Civilian aircraft can not accommodate all of DoD's cargo. Few CRAF aircraft can carry oversized cargo (cargo which can not fit on a standard Air

Force pallet, requiring a C-130 aircraft or larger) and none can carry outsized cargo (cargo requiring a C-5 or C-17). [Ref. 5]

- Military aircraft and aircrews have the advantage to change destination, payloads, and overall mission requirements with short notification. Commercial airlift could attain a similar ability by placing aircraft and aircrews on "alert" status. However, this would be cumbersome with civilian unionized employees and conflicting commercial obligations.

- During missions, the military have the distinct advantage to observe and relay classified information to the appropriate military agencies.

2. Civilian Airlift

In times of both peace and war, the civilian airlift sector currently adds the remaining 30 percent of required airlift capacity to the National Defense Airlift System. The two components of this civilian airlift capability are the Civil Reserve Air Fleet and civilian contract airlift.

a. Civil Reserve Air Fleet

The military use of commercial aircraft during World War II and later in the Korean War led to the creation of CRAF. During both time frames, the reason for using airliners instead of military transports was simple: the nation owned few transport aircraft and greatly needed additional aircraft to carry out its missions. The military gained its first experience in working with the airlines in World War II when president Roosevelt directed the Secretary of War on December 31, 1941 to take possession of any commercial aviation assets required for the war effort. [Ref. 9] At that time, AMC, then called the Air Corps Ferrying Command, could not meet the demand for airlift from

government-owned airlift assets. One of the Ferrying Command's first missions was to ferry American built, lend-lease aircraft overseas to the United Kingdom. [Ref. 10] Commercial aircraft flew hundreds of missions and made significant contributions during World War II. Commercial aircraft also flew military missions during the Berlin Crisis in 1948-49 when airlift was the only means of delivering food and supplies to West Berlin. [Ref. 10]

One decade later, the Air Force needed help from the civilian airline industry again for the Korean Conflict. Between World War II and the Korean Conflict, military transport capability had languished, while during this same period, the civil aviation industry grew rapidly. The military's previous experience with the airlines, combined with the beginning of the Korean War requirements and insufficient airlift resources, led president Truman to consider establishing a more permanent arrangement with the airlines. [Ref. 10]

In December 1951, President Truman issued an executive order later signed by his successor, President Eisenhower. This direction called for a program to formalize agreements between DoD and the airlines for the use of their aircraft during military contingencies. This Joint Memorandum of Understanding (JMOU) signed in 1952 established the CRAF. With this agreement, the CRAF did away with the ad-hoc use of commercial aircraft, and allowed for the first time, systematic planning beforehand for their use under predetermined circumstances. [Ref. 10] In exchange for their commitment, CRAF participants receive priority access to a large portion of DoD's peacetime passenger and cargo airlift business. This additional airlift capability created

by CRAF does not require the government to purchase, man, or maintain any of these aircraft during peacetime. [Ref. 11]

CRAF was, and still is, designed to be activated incrementally in three stages to provide a force depending on specific mobility requirements. Stage I presently provides access to 80 long-range international aircraft. Stage II provides 238 aircraft, and Stage III provides for full mobilization of all 379 aircraft currently in the CRAF program. [Ref. 12] All of these stages can be activated by the Commander in Chief, USTRANSCOM, with the approval of the Secretary of Defense. Activation of Stages I and II require a response time of 24 hours or less after notification. Stage III requires a response time of 48 hours or less. [Ref. 13] The effectiveness of the CRAF program was proven during its first and only full-scale activation during the Gulf Crisis. During Desert Shield/Desert Storm, 27 percent of the airlift cargo and over 60 percent of passenger movement was accomplished by CRAF assets. (Stages I and II were activated) [Ref. 14]

b. Civilian Contract Airlift

Unlike CRAF activation, civilian contract airlift occurs during a time of peace and in war. Currently, 90 percent of DoD's passenger requirement and 30 percent of its cargo requirement is transported by civilian air carriers. A civilian air carrier must be a participating member in CRAF in order to bid for DoD contract airlift business. The DoD airlift requirement is spread across all contract participants depending on the number and type of aircraft they have enrolled in the CRAF program. [Ref. 13]

Figure 1 shows the peacetime and wartime relationships between the various military and civilian transportation components presented earlier and their respective managing commands.

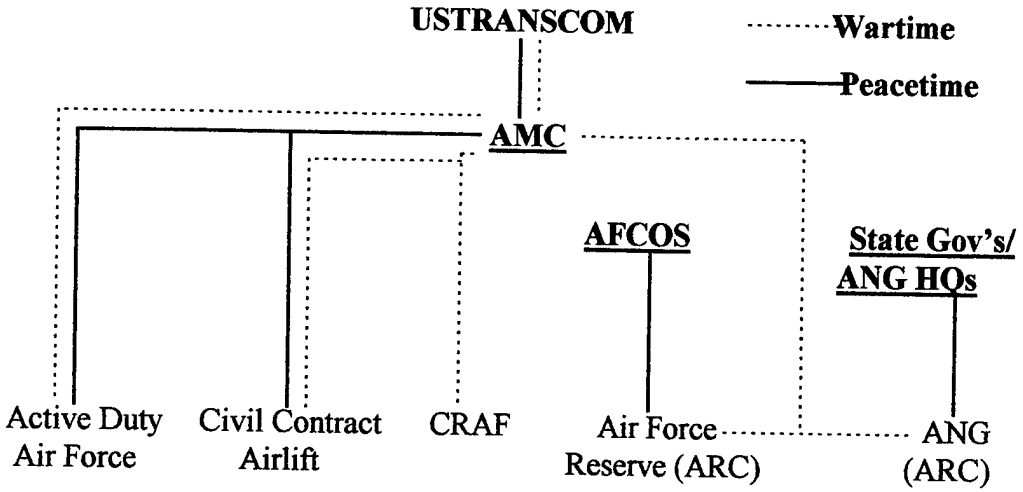

Fig. 1, Peacetime and Wartime Reporting Diagram

D. CURRENT AIRLIFT REQUIREMENT

Since 1981, the strategic airlift requirement to move military cargo has been steadily decreasing. In 1981, a Congressionally mandated Mobility Study determined that 66 million-ton-miles/day (MTM/D) had to be moved in order to meet the minimum strategic airlift requirement to maintain the successful involvement of U.S. forces in a major regional conflict. The airlift capability at that time permitted movement of only 56 MTM/D using all available military and CRAF assets. [Ref. 9:p. 57] MTM/D is the term used to describe an aggregate quantity of cargo-airlift capacity. The equation for calculating this figure for a single aircraft is:[2]

[2] This research paper will not address the individual equation components. MTM/D will be used as a comparison term only to demonstrate the relationship between the past/present airlift capability.

$$\text{MTM/D} = \frac{(\text{Block Speed})*(\text{Utilization rate})*(\text{Payload})*(\text{Productivity factor})}{1{,}000{,}000 \text{ nautical miles}}$$

The requirement of 66 MTM/D remained constant throughout the 1980s. After the Gulf War (Desert Shield/Desert Storm), the requirement was reduced to 52 MTM/D based on analysis presented in the Mobility Requirements Study (MRS). This new level also reflected the fiscal constraints imposed upon DoD in conjunction with the overall cutback in military bases, personnel, and equipment. [Ref. 4] The nation's strategic airlift requirement was lowered further to its current level of 49.7 MTM/D as a consequence of the 1995 Mobility Requirements Study Bottom Up Review (MRSBURU). [Ref. 15]

The 1981 Mobility Study identified a strategic transportation shortfall between the strategic requirement and the combined available capacity from CRAF and military airlift assets. [Ref. 12] The Civil Reserve Air Fleet Enhancement Program (CEP) was implemented during the 1980s to cover the 10 MTM/D requirements shortfall (66 MTM/D required, 56 MTM/D available) through the use of incentives including monetary reimbursements provided to CEP participants. [Ref. 3:p. 31] CEP participants agreed in return for these incentives to modify selected jumbo-size passenger aircraft permitting the quick transformation from passenger to cargo configuration to accommodate the larger oversized military cargo. However, the CEP fell short of its expected goal of 60 enhanced aircraft to fill the gap due to a number of barriers. [Ref. 3] The CEP has since been discontinued after acquiring only 23 enhanced aircraft. A

detailed discussion on the creation and termination of the CEP program is presented in Chapter III.

The current strategic mobility capacity of 51.2 MTM/D exceeds the strategic requirement of 49.7 MTM/D, and consequently there is no gap. [Ref. 16] However, there was still a gap when the requirement was 52 MTM/D based on the MRS. Figure 2 shows the current and forcasted contributing cargo airlift capacity in MTM/D provided by military and CRAF assets.

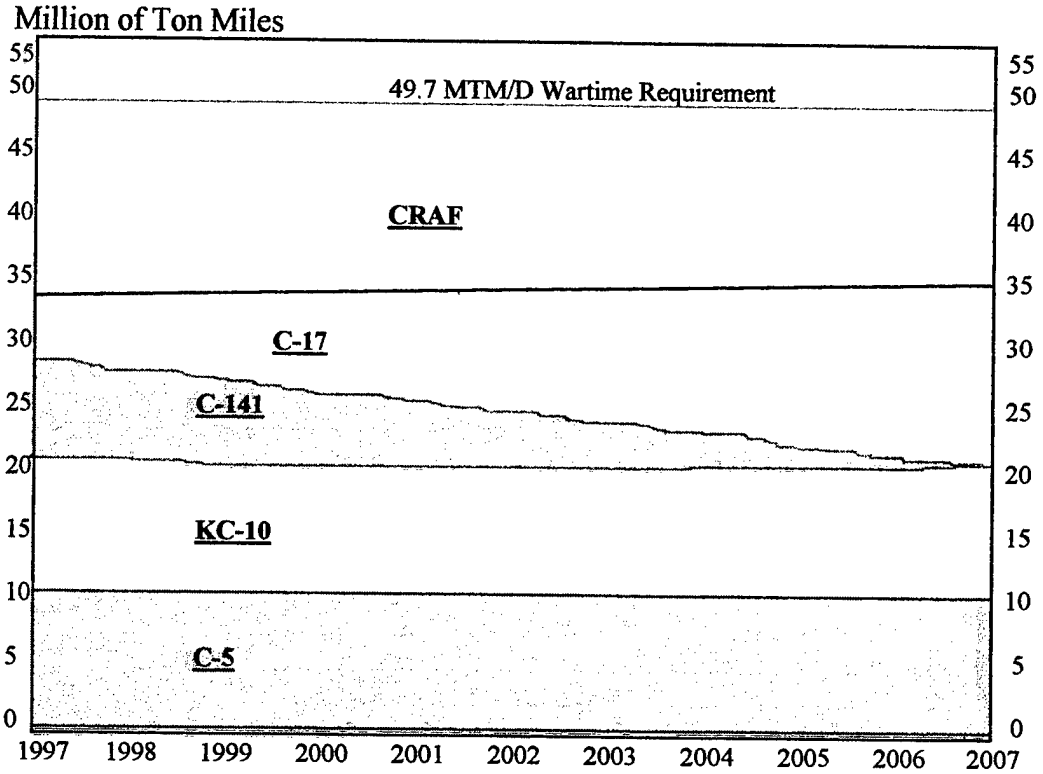

Fig. 2, Strategic Airlift Capacity [Ref. 17]

E. AMC CONSIDERATIONS

Prior to the lowering of the strategic mobility requirement to 49.7 MTM/D, AMC had considered a number of proposals to ensure it could meet the greater mobility

requirement. The C-141 was considered for a Service Life Extension Program (SLEP) which has since been rejected due to the program's high cost. [Ref. 18] This cancellation has resulted in all active duty C-141 airframes being retired by 2001, with the remaining reserve airframes being retired by 2006. The purchase of additional C-5's was also considered. However, this was rejected because of the high life-cycle costs, as well as high requirements for forward-placed airstrip ramp capacity, a particularly scarce resource. [Ref. 18] Another alternative considered to fill the requirement gap was utilizing non-developmental aircraft. This alternative involved the purchasing of existing civilian aircraft capable of carrying, or being modified to carry, military-size cargo. [Ref. 4] The principle non-developmental aircraft candidate was the Boeing 747.

There were advantages in using this non-developmental approach. First, the acquisition time could be shortened allowing a quick solution to the requirements shortfall. Second, the cost of designing, constructing, and testing new airframes is much more costly than utilizing existing airframes. However, the non-developmental program would still take until the year 2001 to get up and running. [Ref. 19]

This non-developmental program, if it could have been initiated in a time-efficient manner, did offer the potential to create a short term solution to the previous shortfall situation. However, the current strategic airlift requirement is now attainable, making the non-developmental program unnecessary. [Figure 1]

AMC is in a good position to meet the strategic mobility requirement set forth by the MRSBURU. It has the required military (Active Duty Air Force and ARC) and civilian (CRAF) airlift assets to meet this transportation requirement, both for passenger

and cargo movement. The question remains, whether the CEP program deserves to be re-visited for future implementation even though a strategic cargo requirements gap does not exist today. The following chapter presents and analyzes the CEP concept and its operational effectiveness.

III. ENHANCEMENT OF THE CIVIL RESERVE AIR FLEET: FROM CONCEPT TO REALITY

A. INTRODUCTION

Prior to determining if the re-implementation of the Civil Reserve Air Fleet Enhancement Program (CEP) has a chance for success in today's environment, it is essential to first examine the concept of the enhancement program. This chapter begins by presenting the concept behind the development of the CEP and its expected advantages. Other CEP considerations are also discussed concerning aircraft type and age, as well as the obligated service requirement of acceptable CEP aircraft. The implementation of the CEP is then be presented, followed by problems that arose during its evolution. These problems concern the profitability of the participating air carriers and Congressional concerns that developed throughout the program's life cycle. Finally, this chapter concludes with the actions that Military Airlift Command (MAC) initiated in response to the concerns of both the airlines and Congress.

B. CRAF ENHANCEMENT CONCEPT

In 1973, MAC conducted the Emergency Cargo Airlift Capabilities Study, which subsequently led to the creation of the CRAF enhancement concept. The study recommended the continuation of the C-5 wing-modification program, increasing the capacity of the C-141 to accommodate additional cargo, and to improve the cargo capabilities of the Civil Reserve Air Fleet. [Ref. 20: p. 34]

The CRAF enhancement concept, an outgrowth of improving the cargo capabilities of the CRAF, was created to ensure availability of additional CRAF cargo

airlift capability to supplement current military cargo capability within the CRAF. The program attempted to achieve this goal by encouraging passenger air carriers to modify a portion of their existing airframes already in the CRAF program into aircraft that could be quickly transformed from a passenger configuration into a cargo configuration should the need arise. [Ref. 20] Airframes like this are often called "cargo-convertible."

At the time of concept development, there existed an excess supply of passenger-carrying capability, and a cargo-carrying shortfall if all three stages of the CRAF program were to be activated. Consequently, CRAF enhancement increased the value of the selected passenger aircraft through the creation of these cargo-convertible platforms.

C. EXPECTED ADVANTAGES

The CRAF Enhancement Program was initiated because it had two very attractive expected advantages [Ref. 20]:

- The CEP offered a method of increasing supplemental cargo airlift capability without the civil air carriers having to purchase more aircraft. The required modifications were to be performed on aircraft already purchased by the carriers and in production, or, were to be performed on aircraft already in the airline's active inventory.

- Since the CEP would have required no major design or development phases, it provided a means for relatively quickly nullifying the then-present cargo airlift capability shortfall. The required modifications could have been conducted quickly on existing airframes and incorporated into aircraft that were currently in production.

D. OTHER CONSIDERATIONS

In addition to the aforementioned advantages of the CEP, other issues must have also been considered in order to effectively implement the program.

1. Determination of Suitable Aircraft

One issue is the determination of what type of aircraft should be eligible for the enhancement modifications. The individual aircraft characteristics, such as speed, range, and existing passenger carrying capability, must be analyzed to determine those aircraft that are more desirable than others. Aircraft design standards would have to be established to ensure that only the most suitable aircraft are actually modified. MAC determined that the B-747 was the most suitable airframe meeting the required criteria.[Ref. 22:p. 14]

2. Determination of Suitable Aircraft Age

A second issue is the determination of how old acceptable aircraft may be. This is a necessary requirement because the older aircraft may not meet the efficiency requirements previously mentioned. Additionally, older aircraft generally have shorter remaining service lives.

3. Determination of Obligation

A third issue is establishing how long the enhanced aircraft would be obligated to the CRAF service and under what conditions would the air carriers be required to make the aircraft available for CRAF service. Since the enhancements would be performed on jumbo-sized B-747 aircraft, activation of CEP aircraft could negatively

impact the carriers' ability to satisfy current customer demand on long distance domestic and international flights, where the jumbo-size aircraft generally operate. [Ref. 25:p 32] The CRAF carrier may then permanently lose this customer base to non-CRAF competition.

4. Incentives

Initially, it may appear that the enhancement concept was a cost effective method of creating additional cargo capability within the CRAF without the military or civil carriers having to purchase additional aircraft. However, the success of the enhancement program depended on the capability of MAC to provide the proper incentives to the civil air carriers thereby making their participation in the program a profitable endeavor. Since carriers are profit driven, and the additional weight of these cargo-convertible aircraft would drive-up the operating costs, it is apparent that more effective incentives should have been provided to entice their participation.

In its most basic form, the CRAF Enhancement concept had the potential to be a cost effective and timely method to increase our nation's cargo airlift capability without requiring an increase in the aggregate capability of the military and civilian air carriers. However, when the program was actually implemented, and some unforeseen issues began to surface, support for the CEP fell resulting in its termination. The following examines the CEP's actual implementation.

E. IMPLEMENTATION OF CEP

In response to the 1973 Emergency Cargo Airlift Capabilities Study, MAC generated an Airlift Master Plan that laid out how MAC would accomplish meeting its

strategic airlift goal. One of the most efficient elements of this plan was the CEP. It would increase the number of cargo capable aircraft available within the CRAF structure. The CEP program offered incentives to the commercial air carriers if they agreed to incorporate cargo-convertible features into their aircraft. These modifications included: [Ref. 20: p. 29]

- Reinforced flooring and strengthened main deck and deck mountings to permit transport of armed vehicles.
- Installation of rails and rollers to accept military-size pallets.
- Installation of side-load cargo doors.
- Modification to existing seating to permit quick removal.

The first CEP contract was awarded in 1980 to United Airlines for the modification of one B-747 aircraft which took nearly two years to complete at a cost of $27.5 million. This cost was divided equally between DoD and United Airlines. However, United Airlines was the only initial airline to participate in the program. The primary reason was that the program was limited to only modifying aircraft coming off the assembly line. But, because the economy was in a recession, few airlines were looking to purchase new aircraft. [Ref. 21]

In 1983, a second version of the CEP was initiated. Instead of new aircraft, MAC asked civil air carriers to consider modifications to existing airframes already in use. A contract was signed with Pam Am World Airways to modify 19 Boeing 747 aircraft. The

final aircraft in this contract was completed in 1990 with the total contract costing DoD an estimated $532 million dollars. The associated conversion cost for each aircraft in this second version of CEP amounted to approximately $28 million. [Ref. 21: p. 39] MAC had hoped to have nearly 60 aircraft modified by 1990, however, the commercial carriers were slow to participate because the economic incentives were not high enough to offset the increased operating cost.

In an attempt to overcome these complaints from the carriers, a third version of the CEP was initiated by congress in 1986. Known as Public Law 97-86, it re-stated Congressional support for the CRAF program and authorized DoD to pay for all of the modification costs associated with the conversions. If the participating passenger carriers agreed not to use the cargo-convertible feature during peacetime, DoD agreed to compensate fully the increased operating cost associated with these modifications. [Ref. 22] With these incentives, both Evergreen Airline and Fed Ex took advantage of the program. Fed Ex modified two B-747 aircraft whereas Evergreen modified only one B-747 aircraft. [Ref. 22:p 46] Although Fed Ex's primary business is cargo movement, the aircraft most likely still required modifications such as reinforcing cargo decking and cargo door enlargement to handle heavier and larger outsized military cargo. Once contracted to the CEP, these aircraft were committed to the CRAF program for a period of 12 years. [Ref. 22: p.34]

By the end of 1987, 14 years after the CEP concept creation, it became apparent that there still existed significant barriers to the overall success of the CRAF Enhancement Program. With the 23 total aircraft including the new Evergreen and Fed

Ex enhanced aircraft and the existing Pan Am and United Airlines aircraft, MAC only achieved a 62 MTM/D capacity. This fell short of its requirement of 66 MTMD as set forth by the 1981 Congressional Mobility Study. [Ref. 20: p. 34,78] Following the Gulf War, Pan Am, the largest CEP participating airline with 19 enhanced aircraft, filed for bankruptcy. Of these 19 aircraft, five were obtained for government use and the remainder were purchased by other carriers. [Ref. 7] Pan Am's bankruptcy, in the context of the previous problems, convinced Congress that the CEP was not a cost effective method to increase the nation's strategic cargo airlift capability and canceled the program in 1991. [Ref. 20: p. 63]

F. CRAF ENHANCEMENT PROGRAM PROBLEMS

The barriers to the Enhancement program's success can be categorized into two areas, the concerns of the civil air carriers and the concerns of Congress. The air carriers' focus was on the operating, financial, and other commercial issues associated with their participation in the CEP. The focus of Congress was on making sure the program sufficiently and cost effectively increased cargo capacity.

1. Profitability of the Air Carriers

In 1974, the concept of the enhancement program was initially very well received by the air carriers. [Ref. 22:p. 16] However, as time elapsed, more of the details and issues surrounding the enhancement program came into view, causing carriers to become disenchanted with the program.

The first important issue to the carriers was that the aircraft modifications and associated financial package would be profitable. In 1980 the government indicated that

it would pay for the costs associated with the modifications, however, confusion arose as to how the government would reimburse the carriers for the increased operating costs with the new heavier aircraft, such as higher fuel consumption. The first contract awarded in 1980 requested United Airlines to estimate the foreseen increase in operating cost, but made no provisions on the method of reimbursement. United Airlines estimated that the enhanced aircraft would experience an eight percent increase in fuel consumption due to its increased weight. United Airlines then forwarded to MAC the total estimated additional operating cost resulting from the modifications for the remaining life of the aircraft. [Ref. 23:p. 5] Realizing the carriers' uneasiness, MAC developed a payment plan in 1983 that consisted of a one-time lump-sum payment equal to this estimated increased operating cost. [Ref. 23] However, the air carriers were also concerned with the volatility of the oil and gas prices they had recently experienced which led to uneasiness in accepting a lump-sum payment. In fact, prior to United Airlines signing the first contract, Braniff International Airways terminated its negotiations with MAC for this very reason. [Ref. 23: p. 121]

MAC, realizing some of the financial concerns of the civil air carriers, developed a "Bonus Award Plan" that went above the existing cost reimbursements. To provide this additional incentive, MAC redistributed its contract award policy to favor those carriers that participated in the CEP. [Ref. 24:p. 187] The Bonus Award Plan guaranteed that CEP participants would receive higher consideration over non-CEP participants in the peacetime contract award process. MAC estimated that each CEP participant could expect a 15 percent increase in asset utilization. [Ref. 24:p.33]

The second most important issue to the air carriers concerned the level of government commitment to the CEP. In 1979, when the CEP was officially created, Congress appropriated only $7.5 million for the CEP, less than one-half of the cost to convert a single aircraft. [Ref. 24: p. 97] Consequently, many of the large carriers were hesitant to become contractually bound to the program given the government's seemingly lack of commitment. The carriers were also concerned about getting involved in a long 12 year CRAF Enhancement Program contract and loosing money should the government choose to withdraw funding or change the guidelines of the program. [Ref. 24: p.155]

2. Congressional Concerns

With the Cold War still raging in the late 1970s, it was obvious to Congress that additional strategic airlift capability was needed. In fact, the House Committee on Armed Services 1975 hearings on the future of military airlift was very supportive of the enhancement concept. [Ref. 25: p. 203] However, the support generated during these hearings did not produce the funds to make the program a reality. Congress had concerns on the effectiveness of the enhancement concept and was unwilling to provide the required funding until these concerns were addressed.

Congress's primary concern regarding the enhancement program was that it did not fully understand the concept behind the program. In 1976, blame was accepted by the Secretary of Defense siting that "The failure of CRAF to pass Congressional scrutiny is due to DoD's failure to properly explain the need for the CRAF modifications." [Ref. 26: p. 187] Until Congress was aware of the motives and reasoning behind the enhancement concept, it would not provide the needed funding.

Congress was also concerned that the enhancement program appeared to be nothing more that another subsidy for the civil air carriers. In 1975, Sen. Barry Goldwater claimed that the recent disapproval for CRAF enhancement funding was because "they felt that the proposed modification to commercial airline aircraft was more of a blessing to the airlines that to DoD." [Ref. 26: p. 202]

The most pronounced barrier to congressional approval of the enhancement program was concern about government liabilities if a CRAF-enhanced aircraft was damaged, or in any accident that might be linked to the airframe enhancements. Congress was also worried about access to these modified aircraft if the carriers chose to lease or sell these aircraft. Additionally, they felt that the public's investment in these aircraft could be totally lost if a participating carrier filed for bankruptcy. [Ref. 26: p. 65]

G. MAC's RESPONSE TO AIRLINE AND CONGRESSIONAL CONCERNS

MAC realized that in order to transform the enhancement concept into a successful program, it would have to address both the concerns of the civil air carriers, and especially those of Congress. The following presents the actions taken by MAC to overcome these concerns and attempt to develop the enhancement concept into a successful and worthwhile program.

1. Mac's Actions Pertaining to the Civilian Air Carriers

The actions MAC took in response to the concerns of the civil air carriers were well received by the air carriers. In addressing the carriers' concern on the profitability of the enhancement program, MAC understood that the increased share of peacetime airlift contracts promised to enhancement participants (Bonus Award Plan) was not a

large enough incentive. In fact, CEP participants only realized an average of three percent gain in asset utilization resulting from the Bonus Award Plan, far below MAC's 15 percent estimate. Because of this, MAC realized that the solution to the incentive problem was outside the current procurement award structure. [Ref. 26: p. 46]

MAC initiated the awarding of incentives that went beyond the existing reimbursement incentives for the cost of the enhancement modifications. These included targeting the "credit risk" carriers and promising government guaranteed loans, providing low interest loans, tax and depreciation incentives, and providing assistance in obtaining the required procurement insurance. Additionally, in 1985 MAC was able to gain approval for an initial cash incentive of $500,000 dollars provided to the carriers which chose to participate in the enhancement program. [Ref. 26]

Realizing that another barrier in gaining greater participation in the enhancement program was the carrier's concern over reimbursement for the increased operating costs of the heavier enhanced aircraft, MAC persuaded Congress to include a fuel price adjustment clause in future enhancement contracts. [Ref. 27]

The civil air carriers received these actions, taken by MAC on their behalf, as an indication that MAC was willing to develop the CEP into a worthwhile program for all participants. However, MAC was never fully successful at eliminating the carriers' concern that the government was not fully committed to the enhancement program. The six years that elapsed from the program's conception in 1973 to the first fiscal appropriation to the program in 1979, was interpreted by the carriers as a Congressional

lack of commitment for the program. [Ref. 28: p. 407] Moreover, the first appropriation of only $7.5 million in 1979 further solidified this view.

It is clear that the aforementioned incentives offered to the civil carriers were not sufficient enough to obtain the required number of CEP participants to meet the nation's strategic mobility requirement. Even though MAC was able to gain approval to offer cash incentives to enhancement participants and was also permitted flexibility in developing tailored reimbursement contacts to the carriers for the increased operating cost incurred while flying the enhanced aircraft, no additional carriers saw these incentives as sufficient to motivate participation in the CEP. [Ref. 22:p. 17] Following the bankruptcy of Pan Am in 1991, AMC officially terminated the CRAF Enhancement Program. [Ref. 3:p. 25] Consequently, the mobility requirement gap remained until the strategic mobility requirement was lowered in 1995.

2. MAC's Actions Pertaining to Congressional Concerns

Although MAC was fairly successful at mitigating some of the air carrier concerns, it was not as successful in dealing with the concerns of Congress. MAC tried, but was never fully able to convince Congress to provide full support for the enhancement program.

MAC allayed Congressional concern over the liability issues of the enhancement aircraft by responding that "the modified aircraft would be certified by the Federal Aviation Administration (FAA) in a manner similar to the procedure already certifying and accepting aircraft currently in use." [Ref. 29] Acceptance of this certification procedure indicated that no additional liability issues should be raised resulting from the

operation of newly enhanced aircraft. MAC was unable to guarantee access to the modified aircraft in the event of them being sold or leased. However, it did provide for the full repayment of the government's investment should they be sold or leased. [Ref. 29]

Prior to the 1979 appropriation, MAC failed to impress upon Congress that the estimated costs for the conversions were based on modifying several aircraft concurrently. MAC planners expected that spreading-out non-recurring modification costs across a larger number of aircraft would result in a lower unit conversion cost. [Ref. 29:p. 56] However, Congress was not aware of this as it only initially appropriated $7.5 million for the program in 1979. If Congress had properly understood the mechanics of the CEP modification process, it would have realized that the money appropriated would be far too little to modify even a single aircraft.

MAC was able, however, to convince Congress that the CEP was not just another airline subsidy. This is evident because MAC was able to gain approval to offer cash incentives to enhancement participants and was also permitted flexibility in developing tailored reimbursement contracts to the carriers for the increased operating cost incurred while flying the enhanced aircraft. However, MAC was never able to fully convince Congress that the CEP was a cost effective way to increase the nation's cargo capacity and a worthwhile program to support.

The following chapter presents information on the contemporary concerns of the military, government, and civil carriers and how these concerns effect the plausibility of a re-birth of the CEP in today's environment.

IV. CONTEMPORARY ENVIRONMENT, IMPLICATIONS AND REMEDIES

A. INTRODUCTION

The most significant open question is whether or not CEP is a viable option today for ensuring that the nation's strategic mobility requirement can be continually met. If a new CRAF Enhancement Program were implemented today, it would face a very different environment than with the first CEP. The contemporary military, Congressional and airline industry environments are examined in this chapter in relation to a possible new CEP program. For each of these three institutions, the relevant environmental factors are first described, followed by implications for CEP and possible remedies for negative implications.

B. MILITARY ENVIRONMENT, IMPLICATIONS AND REMEDIES

1. Current Military Environment

Since the development of the enhancement concept 25 years ago, the requirement placed upon the U.S. military has changed dramatically. First, with the collapse of the Soviet Union, the threat of attack to the U.S. mainland from "over the horizon" is no longer present. The nation's military policy is now primarily concerned with U.S. involvement in regional conflicts around the world. Coupled with the draw-down in military forces stationed abroad, this results in more emphasis being placed on U.S. strategic airlift to deploy the required forces in the event of military flair-ups requiring U.S. military involvement. [Ref. 35:p. 34]

This military draw-down overseas has also lowered the peacetime requirement for civilian contract airlift augmentation. AMC has estimated that the amount of contract cargo airlift business offered to the civil air carriers may decrease up to 25 percent by the year 2001 in comparison to the level of contract airlift procured in the 1980s. [Ref. 30:p. 59] If U.S. foreign policy continues the trend toward limiting U.S. military contingency and humanitarian military involvement, this trend in lowering peacetime airlift augmentation will continue.

Second, the current strategic mobility requirement for cargo airlift of 49.7 MTM/D is now attainable using military and CRAF airlift assets. [Ref. 16] This is a sharp decrease from the strategic airlift requirement of 66 MTM/D required during the height of the Cold War.

The last, and most important issue, is that the mix of DoD cargo airlift required for a major regional contingency today differs from that planned for a conflict with the Soviet Union. According to the 1981 Mobility Requirements Study, 27 percent of the cargo airlift that DoD planned to send to a NATO/Warsaw Pact conflict was outsized, requiring C-5 (or C-17) aircraft for transportation. By comparison, simulations conducted in the later 1980s of deployments to Korea and the Persian Gulf suggest that only 15 percent to 18 percent of required cargo airlift would be outsized. Official data for the first two weeks of Desert Shield are unavailable, but during the remaining first four months of deployments, approximately 10 percent of the airlift cargo was outsized, increasing to 12 percent by the end of the war. [Ref. 17:p. 19] Although it is difficult to forecast with high accuracy all the regions of the world where the U.S. military may be

involved , the current areas of interest, such as the Persian Gulf, Korea, and Bosnia, indicate that the strategic airlift requirement will be similar in the years to come and the outsized cargo airlift requirement will be less than previously estimated.

2. Implications of Military Environment

The changes in the military environment negatively impact the possibility of re-implementation of the CEP. The current ability of U.S. military airlift assets and CRAF participants to meet the nation's strategic airlift requirement introduces one negative aspect. Previously, MAC had proved to Congress that there existed a need to fund 60 enhanced airframe modifications to meet the previous mobility requirement. Now, however, with a slight excess capacity of 1.5 MTM/D, AMC would have to persuade Congress that the CEP offers supplemental outsized cargo capability that may be necessary if the nation's future mobility requirement increases. This would be very difficult to accomplish considering the current draw-down in military forces and military base closures. Moreover, convincing Congress to fund a program that does not fill a current need is highly unlikely.

The lowering of the peacetime requirement for civilian contract airlift also adversely effects a CEP. During the first CEP, airlines were guaranteed an increased share of available peacetime airlift contracts as incentive to participate in the program. [Ref. 26:p. 46] With the contract cargo airlift business estimated to decrease by 25 percent, the incentive previously offered may be unavailable. DoD's need for peacetime passenger transportation via contract and scheduled airlines has also

significantly fallen since the end of the cold war. This smaller passenger market has reduced the incentive for carrier participation in CRAF in general.

Although the CEP offers a relatively quick method of adding supplemental airlift capacity, in its previous form it did not provide the availability that was needed by DoD. During the Gulf War, only CRAF stages one and two were activated, leaving the enhanced airframes inaccessible since they were to become available only upon stage three activation. [Ref. 33: p. 27]

3. Remedies for Military Environment

The reduction of peacetime DoD contract airlift creates a negative impact on AMC's ability to offer increased peacetime DoD airlift contracts as incentives to CEP participants, such as provided by the Bonus Award Plan. Consequently, AMC could persuade Congress to make available other forms of CEP incentives. One alternative to entice participation is to open-up all government travel, in addition to available DoD contract airlift, to CEP participants. Additionally, a flexible reimbursement plan could be developed to account for rapid changes in fuel prices in response to the higher fuel consumption (cost) enhanced aircraft experience.

With a new CEP, the inaccessibility problem could be avoided through the re-wording of the CRAF activation contractual language. A new CEP could require the enhanced aircraft to be made available during stages one through three, thereby giving DoD access to the enhanced aircraft from the beginning of the CRAF activation period.

C. CONGRESSIONAL ENVIRONMENT, IMPLICATIONS AND REMEDIES

1. Current Congressional Environment

Even though Congress has made sizable cuts in the defense budget over the past few years, it still realizes the importance of strategic airlift mobility. Congress's decision to purchase 120 C-17s was made with the realization that as these aircraft roll-off the assembly line, they would replace the aging and retiring C-141 aircraft. This transition will maintain or slightly exceed the 49.7 MTM/D strategic airlift requirement. [Figure. 1]

Congress became disenchanted with the CEP following Pan Am's bankruptcy after the Gulf War and the consequent inability of the government to access 14 of Pan Am's 19 enhanced aircraft. [Ref. 31: p.31] The five aircraft recovered by the government have since been modified for other military purposes. [Ref. 31:p 22] Although Pan Am's bankruptcy has tainted Congress's view of the CEP, this problem could be avoided in a future CEP. [Ref. 32]

2. Implications of Congressional Environment

As a result of the fiscal austerity that currently surrounds Congress, it seems unlikely that Congress would approve funding for a new CEP program given the recent cost-saving cutbacks in military personnel, equipment, and base operations. Additionally, if a CEP becomes desirable by AMC, it would be very difficult to convince Congress to grant appropriations for a CEP program that does not fill a gap as did the first CEP. The most significant environmental implication is the lingering negative effect resulting from the first CEP and the government's inability to gain access to all of

Pan Am's enhanced aircraft. Congress would have a difficult time in over-coming these implications if a new CEP were proposed today.

3. Remedies for Congressional Environment

In order to protect the government's investment in the enhanced aircraft, Congress could ensure the access to enhanced airframes via legal contracts in the event they are leased, sold, or if participating carriers encounter financial hardship. For example, financial liens could be placed on these enhanced aircraft protecting the government's investment in the event of another civil air carrier financial disaster. These liens would ensure that the government regains the use of these airframes or receives financial compensation for the modification costs incurred by the government.

D. AIRLINE ENVIRONMENT, IMPLICATIONS AND REMEDIES

1. Current Airline Environment

The airline industry has changed dramatically since the concept behind the CEP was first developed in 1973. Issues such as airline deregulation, competition, and the war in the Persian Gulf have combined to make the current airline environment much different than it was in previous decades.[3]

In 1978, the deregulation of the airline industry resulted in changes to the airline's day-to-day business. Airlines are now required to be more efficient due to the increased competition resulting from deregulation. Not only are airlines now required to maintain a smaller excess capacity for passenger and cargo movements in order to secure a

[3] The following information pertains to changes in the airline environment, which has a direct impact on CRAF, and hence, any future enhancement program like the CEP.

minimum acceptable profit margin, but they have changed the nature of their operations as well. [Ref. 31:p. 42]

Wide-body aircraft are the most desirable for the CRAF in general, and especially for cargo enhancement programs. However, structural changes in the industry, due to deregulation and other issues, have had a particularly strong impact on wide-body aircraft. U.S. airlines are now shifting away from using large wide-body aircraft for domestic travel in order to accommodate the more efficient hub-and-spoke airport network that exists today. This network effectively accommodates smaller aircraft such as the Boeing 737 and 757. Consequently, the decreased number of wide-body aircraft today are primarily used on international routes. Of the three U.S. carriers that previously provided the 63 percent of the U.S.'s wide-body fleet, Pan Am filed for bankruptcy and has since gone out of business, TWA filed for Chapter 11 bankruptcy, and Northwest Airlines has entered into an international partnership with KLM Airlines. Seventy-eight percent of current orders placed for wide-body aircraft are made by foreign air carriers. [Ref. 32]

Increased competition has also led to a trend towards leasing aircraft instead of purchasing. Leasing aircraft provides the carriers with the ability to change the size and composition of their fleets based upon changes in the market demand. Additionally, it allows the carriers to have the most modern fleet of aircraft and to take lease-associated tax advantages. [Ref. 31: p. 17]

Desert Shield also changed the daily operations of the civil air carriers. Desert Shield required the first-time-ever activation of the CRAF system since its creation 46

years ago. Participating CRAF carriers made considerable contributions to the war effort, providing 27 percent of cargo and 60 percent of passenger airlift to the Gulf region. [Ref. 14] However, CRAF participants raised concerns over the potential frequency of activations. This involvement led some carriers to reanalyze the risk of their future involvement in the CRAF. [Ref. 34] Primarily, carriers started to raise the issue about the government's ability to provide adequate insurance coverage related to their CRAF wartime activation. [Ref. 32]

2. Implications of Airline Environment

The combined effects of airline industry deregulation, increased competition, and CRAF activation have had negative impacts on the possibility of revitalizing the CEP.

The effects of deregulation and resulting increased competition will make it difficult for AMC to persuade the airlines to contribute wide-body aircraft for a new CEP. U.S. airlines have primarily moved to a hub-and-spoke system requiring smaller aircraft (Boeing 737,757), and the fewer remaining wide-bodies are now used in longer distance domestic and international travel. If a CEP were implemented, the result would be fewer wide-body aircraft remaining in service to meet the long distance domestic and international market demands. Additionally, airlines spend a great deal of time and effort in gaining even minor increases in their international market share. [Ref. 34] Therefore, it seems unlikely that the air carriers operating wide-body aircraft would be willing to contribute their limited number of wide-bodies, at the expense of not meeting customer demand, to another CEP.

An additional contemporary trend that negatively impacts the possibility of revitalizing the CEP is the shift towards international ownership of former U.S.-owned airlines. U.S. Air, Northwest Airlines, and Delta Airlines have all entered formal contractual agreements with foreign air carriers. [Ref. 30:p. 176] Since foreign carriers are eligible for CRAF participation, steps would have to be taken to ensure that these foreign carriers agree to the legal guidelines required for CRAF participation and activation. [Ref. 17:p. 19]

The trend of U.S. carriers to lease aircraft instead of purchasing them also has negative impacts on the possibility of re-implementing a CEP. Air carriers lease between 50 percent to 75 percent of their aircraft. This percentage depends to some extent on the size of the carrier and the service area (regional versus national carriers). Smaller regional carriers tend to lease a greater percentage of aircraft thereby making more use of the associated tax advantages discussed earlier. Larger and national carriers are more likely to lease a smaller percentage because of their concern for capital growth. [Ref. 32] In initiating a new CEP, AMC may be faced with having to persuade both the leasing company and the airline to perform the "cargo convertible" modifications. The CRAF obligation of 12 years is essential in maintaining a constant pool of CRAF aircraft to draw from. However, this time requirement is inconsistent with why carriers lease aircraft in the first place, to have a "flexible" fleet able to respond quickly to changes in market demands.

The last negative impact associated with the current airline environment is their concern over war zone insurance. Although most CRAF participants have renewed their

CRAF participation since the end of the Gulf War, concern still remains within the airline industry over the insurance risk inherent in future CRAF activations. [Ref. 34] The government, in response to the carriers' concern over obtaining adequate insurance coverage while participating in CRAF activations, instituted the Aviation War Risk Insurance Program in 1985. [Ref. 35:p. 4,5] Normal commercial insurance policies generally exclude coverage for civil air carriers operating in war zones during CRAF activation periods. Consequently, commercial carriers flying during a CRAF activation must generally rely on supplemental insurance programs provided by the government for carrier aircraft damage and personnel liability claims. The Aviation War Risk Insurance Program (AWRIP), administered by the FAA, provides this supplemental insurance coverage. This program generally covers losses due to war, capture, seizure, nuclear detonation, hijacking, strikes, and vandalism. [Ref. 35:p. 4]

During the war in the Persian Gulf, CRAF participants showed concern that this insurance program did not have a balance sufficient enough to cover possible claims. At the time of the Gulf War, the AWRIP had a $120 million balance. The current balance of $60 million is even lower. Carriers continue to be concerned that available funds are insufficient for the timely settlement of insurance claims that may result from any future CRAF activation. According to USTRANSCOM, this fund is less than half the amount needed to cover the loss of a single commercial aircraft valued at over $150 million and substantially less than the estimated $1 billion in associated liabilities. In response, AMC has initiated legislation proposing the Secretary of Defense tap into unobligated funds from any source to promptly pay future civil carrier insurance claims. [Ref. 35:p. 5]

Until this issue of prompt and adequate insurance coverage repayment is settled, civil carriers will remain concerned over the business risks inherent in future CRAF activations.

3. Remedies for Airline Environment

As mentioned previously, a number of environmental factors exist that effect the airlines and their perceived reluctance to reenter into a CEP. In addressing these factors, AMC should seek relevant airline data and participate closely with the airlines in designing sufficient incentives. Of these factors, the most easily addressed is the need for sufficient insurance coverage, and required AWRIP balance, in the event of a CRAF activation. Obtaining adequate coverage would greatly reduce the carriers' concern if their aircraft are damaged or lost during a CRAF activation. AMC and Congress need to make sure this issue is addressed.

AMC could avoid the pitfall experienced in the old CEP by ensuring an even distribution of enhanced aircraft among the participating carriers. Doing this would negate the possibility of the government loosing a majority of enhanced aircraft, as well as enabling a larger number of airlines to participate.

AMC could also investigate using medium-sized aircraft such as the Boeing 757 or 767 in order to avoid the obstacles involved in using long distance domestic and international wide-body aircraft. Prior to enhancing any airframe, the airlines and AMC should analyze each type of aircraft's speed, capacity, and range capability in determining its suitability for modification. Boeing 767 aircraft could handle some outsized shipments. However, Boeing 757 aircraft, with their relatively narrow fuselage,

could only handle oversized cargo.

E. SUMMARY

Although it may appear the CEP has a reasonable chance for success in today's environment if the previously mentioned remedies are followed, the nation's current strategic mobility requirement is met and exceeded using available military and CRAF assets. The difficulty in substantiating a need for enhanced aircraft to augment current airlift assets, if the need arose, can not be under estimated. Convincing Congress that money should be appropriated for a program that does not fill a specific need today is highly improbable. However, as this study has shown, environments change. To be better prepared, AMC and Congress should examine the airline and military environments, in addition to their own concerns, on a periodic basis for any changes that could increase or decrease the viability of implementing a CEP. Although the CEP was a valid and worthwhile program in its time, that time has changed to a period that no longer requires "cargo-convertibles."

V. CONCLUSIONS AND RECOMMENDATIONS

Analysis of the data gathered and the current literature reviewed did not reveal any particularly startling conclusions. Nevertheless, the analysis does point out some areas where AMC could take some action if it were to re-implement an enhancement program for commercial aircraft (CEP). This chapter sets forth the major conclusions of the study as well as specific recommendations for consideration by AMC, Congress, and airlines. Additionally, it provides answers to the research questions, and recommendations for further study.

A. CONCLUSIONS

The conclusions reached in this research are: (1) the incentives for participation in the CEP were inadequate, (2) the current strategic cargo airlift requirement and combined military and CRAF capacity does not warrant a new CEP, and (3) the current environments of the military, (4) of Congress, and (5) of the civil air carriers, would require specific remedies before a new CEP could be effectively developed and implemented.

1. Inadequate Incentives

During implementation of the CEP, MAC was able to gain participation of only four airlines. The majority of the airlines did not feel the incentives associated with the airframe enhancements were large enough to warrant their participation. MAC failed to achieve its goal of 60 enhanced airframes because MAC was unable to convince Congress to support the CEP to the level required by most airlines. MAC failed to

convince Congress that to obtain more than four CEP participants, an incentive plan for the CEP needed to be developed that was both attractive and cost affective.

2. Current Strategic Cargo Requirement and Capacity

The current combined military and CRAF strategic capacity of 51.2 MTM/D meets, and slightly exceeds, the strategic cargo requirement of 49.7 MTM/D based on the MRS BURU. Congressional appropriation for a program that does not fill a current need is highly unlikely when viewed in conjunction with the recent overall cutbacks in the military bases, personnel, and equipment.

3. Military Environment

The current military environment has an overall negative impact on revitalizing the CEP. During Desert Shield, only 10 percent of outsized cargo was moved by the airlift system, substantially less than the 15 percent to 18 percent previously estimated. Because the CEP addresses movement of outsized military cargo, it is difficult to substantiate the need for a new CEP if this 10 percent is indicative of future airlift cargo requirements. Additionally, the reduction in the required peacetime DoD contract airlift negatively impacts AMC's ability to offer increased peacetime airlift contracts as incentive for participation in a new CEP as it did in the old program.

4. Congressional Bitterness

Following the Gulf War, Congress became disenchanted with the CEP due to Pan Am's bankruptcy, and then terminated the program. It does not seem likely that Congress could be swayed towards approving a new CEP in light of the old CEP falling so short of its 60 enhanced airframe requirement. With the purchase of 120 C-17s acting

as replacements to the aging and retiring C-141 and C-5 aircraft, the need for additional airlift capacity has vanished for the time being.

5. Inhospitable Airline Environment

The current airline industry environment is much different than it was during the CEP's life-span. The combined effects of the airline industry's deregulation, increased competition, and concerns about adequate CRAF activation insurance coverage, all negatively impact the possibility of initiating a new CEP. With industry trends toward aircraft leasing, flying fewer wide-body airframes, developing international partnerships, and its concern about adequate insurance coverage, any chance for a re-birth of the CEP seems unlikely.

B. RECOMMENDATIONS

The conclusions of this study lead to several recommendations if a CEP were deemed necessary. They are: (1) develop adequate incentives to entice CEP participation, (2) modify the previous CEP activation requirement, (3) ensure a more even distribution of enhanced airframes over the number of CEP participants, (4) investigate the possibility of using medium-sized aircraft, (5) investigate the use of financial liens, (6) reduce CRAF activation concerns, and (7) continue to analyze changes in the military, Congress, and airline industry that may impact implementation of a CEP program.

1. Incentives

AMC should search for adequate incentives that address the concerns of airlines and encourage their participation. For example, develop a flexible reimbursement plan

that adjusts to the change in fuel prices in response to the higher fuel consumption that enhanced airframes experience. Legal guidelines could be developed that allow carriers to use the enhanced capability of their aircraft on a limited basis during peacetime as long as this does not impair or degrade the enhancement for later military use. Additionally, the 12 year commitment could be relaxed, thereby giving carriers more freedom to modify their fleet in response to market demands.

2. Modify CEP Activation Requirement

AMC should change the previous CEP activation requirement from stage III to include stages I and II.

3. Ensure Even Distribution

AMC should ensure a more even distribution of enhanced aircraft among participating carriers.

4. Investigate Using Medium-Sized Aircraft

AMC, airlines, and aircraft manufacturers should jointly investigate the possibility of utilizing medium-sized aircraft such as the Boeing 757 or 767 because of the relative lack of domestic wide-body aircraft. Prior to enhancing any airframe, AMC in conjunction with the airlines and manufacturers, should analyze each aircraft's speed, capacity and range capability in determining its suitability for CEP modification.

5. Investigate Using Financial Liens

Congress could investigate the advantage of placing financial liens on enhanced airframes to protect the government's investment in the event these aircraft are leased or sold.

6. Reduce Activation Concerns

Both AMC and Congress should take action in ensuring the AWRIP is capable of meeting potential airline insurance claims in the event a CRAF activation is warranted.

7. Continual Examination of Environmental Changes

AMC and Congress should continually examine the military and airline environments for changes that could increase or decrease the viability of implementing a CEP program.

C. ANSWERS TO RESEARCH QUESTIONS

1. Based on the lessons learned from the creation and termination of the CEP, is a re-vitalization of the CEP concept in today's environment warranted?

A revitalization of the CEP is not warranted in today's environment. The environmental barriers that exist are discussed in detail in Chapter IV. In brief, the military's environmental barriers are: (1) a draw-down of military forces stationed domestically and abroad, (2) a decrease in peacetime requirement for civilian contract airlift augmentation, and (3) less outsized military airlift cargo required than previously estimated.

In brief, Congress's environmental barriers are: (1) the disenchantment that it experienced resulting from loosing 14 enhanced aircraft following Pan Am's bankruptcy, and (2) the inability of the previous CEP to close the gap between requirements and available assets.

In brief, the air carrier's environmental barriers are: (1) a shift away from wide-body to medium size aircraft, and hence fewer available wide-body aircraft, (2) an

increase in competition, (3) a trend toward leasing aircraft, (4) a shift towards international agreements with foreign airlines, and (5) concern about AWRIP having sufficient funds. The actions that AMC should take if a CEP were re-implemented are found in the recommendations section of this chapter.

2. What was the impetus behind the creation of CRAF and what value does it play within the national airlift system in meeting defense cargo transportation needs?

CRAF was created as a result of need for additional airlift transportation assets following World War II and during the Korean Conflict. In 1952, a Joint Memorandum of Understanding officially created CRAF which formalized agreements between DoD and the airlines for the use of their aircraft during military contingencies. Currently, CRAF participants contribute 30 percent of the strategic cargo requirement.

3. What was the role of CEP within the larger CRAF program and what were the expected advantages of CEP?

The role of the CEP was to bridge the strategic mobility cargo requirements gap present in the 1980s by modifying wide-body aircraft active in the CRAF program making them capable of carrying outsized military cargo. The expected advantages of the CEP were to offer a method of increasing supplemental cargo airlift capability without air carriers having to purchase more aircraft, and provided a means for quickly nullifying the then-present cargo airlift capability shortfall since no major design or development phases were required.

4. What were the dominant problems inherent in the CEP and were these problems unavoidable?

The dominate problems inherent in the CEP are categorized in two areas: the concerns of the civil air carriers and the concerns of Congress. They are discussed in detail in Chapter III. In brief they are: (1) carrier concerns over the profitability of participation including modification reimbursement, increased operating cost, and level of perceived Congressional commitment, and (2) Congress's concern regarding the CEP's effectiveness and associated government liability issues that could result from possible accidents attributed to the enhanced modifications.

These problems were avoidable if MAC had convinced Congress that greater incentives must be provided to participating carriers to entice more participation and this program deserved Congress's full financial support.

5. What were some of the legal guidelines utilized in CEP and could they be re-written to help ensure an effective CEP program today?

Some of the legal guidelines used in the CEP are discussed in detail in Chapter III. In brief they were: (1) initially utilizing existing airframes for modification then transitioning to airframes in production, (2) government reimbursement for modification costs, (3) carrier agreement not to utilize enhanced airframes during peacetime, (4) 12 year enhanced aircraft commitment, and (5) full reimbursement for increased operating cost. Suggested legal guideline modifications are presented in the recommendations section.

6. What were the incentives available to CEP participants and were they sufficient? Would they be sufficient today?

The available incentives for CEP participants were government subsidization for modification costs, reimbursement for increased operating costs, government guaranteed loans, low interest loans, tax and depreciation incentives, assistance in obtaining required procurement insurance, Bonus Award Plan, and providing an initial $500,000 cash incentive for participation in the CEP. To overcome the negative environment with regard to implementing a CEP, these incentives, although sizable, are not sufficient to entice participation today.

7. Was the scope of acceptable participants in CEP too limited? Should it have been widened to include all civilian airlines?

The scope of the acceptable participants was not too limited and did not require widening to include all airlines. If the incentives were more enticing, thereby making participation more appealing to the carriers, MAC most likely would have achieved its goal of 60 enhanced airframes.

8. Given the aging of the nation's legacy transport aircraft (C-141 and C-5), and the cutback to procure only 120 C-17s, what position is AMC in to ensure current defense cargo transportation requirements are met?

With the current strategic cargo requirement of 49.7 MTM/D and the capacity of the military and CRAF cargo airlift assets at 51.2 MTM/D, AMC meets and exceeds the strategic requirement into the foreseeable future.

9. Was the scope of aircraft type too limited in the CEP and should it be modified to include not just wide-body aircraft but medium size aircraft if the CEP were re-implemented?

At the time of CEP concept development and implementation, a greater number of wide-body aircraft were in both domestic and international service than exist today. Consequently, there existed an adequate number of wide-body aircraft available for enhancement modification. However, wide-body availability has diminished. Actions pertaining to utilizing medium-size aircraft are found in the recommendations section.

D. RECOMMENDATIONS FOR FURTHER STUDY

1. Future Environmental Study

More study should address what the future may hold in terms of military, Congressional, and airline industry environments in relation to the strategic mobility requirement and capability. Once this is performed, the applicability and feasibility of a future CEP can be analyzed.

2. Future Incentives

A study should be conducted analyzing the required incentives of a future CEP. Doing this, and if a new CEP was deemed necessary, the future CEP could avoid the problems experienced by the first program and provide incentives that the airlines would require to entice participation.

LIST OF REFERENCES

1. National Security Decision Directive, National Airlift Policy, June 1987

2. Trzaskoma, Richard., Staff Summary Sheet, "Report on National Airlift Policy Statement," 30 June,1987

3. Crackle, Theodore., "History of the Civil Reserve Air Fleet," Center for Air Force History, 1993

4. RAND, "Global and Reserve Participation in the Air Mobility System," 1993

5. AMC, "US Air Force Airlift Master Plan," September 29, 1995

6. Association of the United States Army, Special Report, 1994

7. Owen. J., "The Future of Global Airlift," 1996

8. Long Range Plans Worksheet, AMC, April 1995

9. Brown, Donald., "USAF Mobility Requirements: Proceedings from the International Air Transportation Conference," June 1983

10. Burkard, Dick., "Military Airlift Command: Historical Handbook," June 1983

11. Behrens,C., "Civil Reserve Air Fleet: The Past, First Use, and the Future," Air University Press, 1994

12. AMC, "Civil Reserve Air Fleet Capability Summary," June 1997

13. GAO, NSIAD-86-47, "Airlift Emergency," March 1986

14. RAND, "The CRAF and Operation Desert Shield/Desert Storm," 1993

15. JCS, "Mobility Requirements Bottom Up Review Update," 25 March, 1995

16. Porter, M., Col, USAF, CRAF Management Office, AMC Telephone interview with author, 27 October, 1997

17. Congressional Budget Office, "U.S. Forces: Options for Strategic Mobility," Feb 1997

18. Logistics Management Institute, "The Civil Reserve Air Fleet: Trends and Selected Issues," 1996

19. AMC, "Strategic Capabilities Worksheet," Logistics Management Institute, 1997

20. Chenoweth, Mary., "The CRAF: An example of the use of Commercial Assets to Expand Military Capabilities During Contingencies," June, 1990

21. Stephenson, Thomas., "US Airlines and Defense Airlift," Essay on Strategy, December, 1990

22. HQUSAF, "Report to Congress on Expanding the Scope of the Civil Air Reserve Fleet Enhancement Program," January, 1989

23. DCS/Plans, "Strategic Airlift Enhancement Incentives," 1986

24. MAC History, 1 Jan-31 Dec, 1988

25. House of Representatives Report, "The Posture of Military Airlift," April, 1976

26. MAC History, 1 Jan-31 Dec, 1976

27. MAC History, 1 Jan-31 Dec, 1975

28. MAC History, 1 Jan-31 Dec, 1979

29. HQMAC, "MAC's Position on Senator Leahy's Report on Strategic Mobility," May, 1976

30. RAND, MR-406, "Finding the Right Mix of Military and Civilian Airlift: Issues and Implications," 1994

31. OIG Report, "Civil Reserve Air Fleet," No92-068, April, 1992

32. Spear, Jim., United Airlines, Air Operations Manager, telephone conversation with author, 15 January and 12 March, 1998

33. GAO Report, NSIAD-86-47, "Emergency Airlift: Responsiveness of the Civil Reserve Air Fleet Can be Improved"

34. Hall, James., Delta Airlines Public Relations Officer, telephone conversation with author, 21 January, 1998

35. GAO, NSIAD-97-125, "Military Airlift: Observations on the Civil Air Reserve Fleet," March, 1997

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