AIR MOBILITY COMMAND GLOBAL REACH TO AFRICA: SUSTAINED RAPID GLOBAL MOBILITY TO UNITED STATES AFRICA COMMAND

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE
General Studies

by

DAVID A. HAMMERSCHMIDT, MAJ, USA, USAF
B.S., Florida State University, Tallahassee, FL, 1997

Fort Leavenworth, Kansas
2009

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
12-06-2009	Master's Thesis	AUG 2008 – JUN 2009

4. TITLE AND SUBTITLE
Air Mobility Command global reach to Africa: Sustained rapid global mobility to United States Africa Command

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

HAMMERSCHMIDT, DAVID A., MAJ, USAF

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Command and General Staff College
ATTN: ATZL-SWD-GD
Fort Leavenworth, KS 66027-2301

8. PERFORMING ORG REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution is Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

As United States Africa Command (USAFRICOM) matures, United States Transportation Command will have to be postured and trained to accommodate a greater Department of Defense dependence on the En Route System (ERS) to ensure rapid global mobility of forces and resources. Today's ERS is postured to handle limited movement of forces to multiple theatres concurrently. The maturation of USAFRICOM will place increased reliance on the ERS to move resources to Africa. The current ERS is not adequately postured to handle large, sustained, humanitarian or military operations in, through or out of USAFRICOM. Increased movement requirements to and through Africa will require an investment of people or infastructure to ensure sustainability, effectiveness and efficient movement of resources. A review of the current ERS reveals the need for an additional en route location to effectively and efficiently deliver resources to Africa if large, sustained movement is required.

15. SUBJECT TERMS
En Route System (ERS), USAFRICOM, Airlift, Department of Defense (DoD)

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. PHONE NUMBER** *(include area code)*
(U)	(U)	(U)	(U)	109	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

MASTER OF MILITARY ART AND SCIENCE
THESIS APPROVAL PAGE

Name of Candidate: MAJ David A. Hammerschmidt

Thesis Title: Air Mobility Command Global Reach to Africa: Sustained Rapid Global Mobility to United States Africa Command

Approved by:

_____, Thesis Committee Chair
Martin J. Huggard, M.A., M.S.

_____, Member
James B. Martin, Ph.D.

_____, Member
Major William D. Percival, M.M.A.S.

Accepted this 12th day of June 2009 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, Ph.D.

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

AIR MOBILITY COMMAND GLOBAL REACH TO AFRICA: SUSTAINED RAPID GLOBAL MOBILITY TO UNITED STATES AFRICA COMMAND, by MAJ David A. Hammerschmidt, 109 pages.

As United States Africa Command matures, United States Transportation Command will have to be postured and trained to accommodate a greater Department of Defense dependence on the En Route System (ERS) to ensure rapid global mobility of forces and resources. Today's ERS is postured to handle limited movement of forces to multiple theatres concurrently. The maturation of USAFRICOM will place increased reliance on the ERS to move resources to Africa. The current ERS is not adequately postured to handle large, sustained, humanitarian or military operations in, through or out of USAFRICOM. Increased movement requirements to and through Africa will require an investment of people or infrastructure to ensure sustainability, effectiveness and efficient movement of resources. A review of the current ERS reveals the need for an additional en route location to effectively and efficiently deliver resources to Africa if large, sustained movement is required.

ACKNOWLEDGMENTS

Although only one name appears on the cover of this thesis, the completion of this project would not have been possible without the steadfast guidance of my committee, the efforts of the CARL research librarians, the detailed skills of Ms. Venita, the support of my family, and the sacrifices made by my wife and son.

I would first like to thank my Committee, my Chair Mr. Marty Huggard as well as Major Bill "Percy" Percival and Dr. Jim Martin. Without their guidance, mentoring and support, this thesis would have one, never been completed, and two, not be at the level of quality that it is now, which I am very proud of.

I would also like to thank the research librarians at the Combined Arms Research Library and Ms. Venita "do not call me Ma'am" Krueger. The resources the librarians provided were very helpful in the completion of this thesis. Additionally, the detailed efforts of Ms. Venita helped ensure standardized formatting throughout, which contributed greatly to elevating the quality of this thesis.

Next I would like to thank my family. To my parents Dave and Nancy and my brother Kelly, despite the many years and miles of separation, you remain a constant source of pride, strength and motivation that has pushed me to endure many challenges in life, this undertaking was no different.

Last, I want to thank my wife Kimberlie and my son Austin for their love, support and the sacrifices they made to allow me to complete this project. I apologize for the late nights and the lost weekends and evenings that we'll never get back. My hope is that the investment of time, effort, and our collective sacrifices now will pay us exponential dividends of quality time together in the future. Sincerely, Dave

TABLE OF CONTENTS

Page

ACRONYMS

ACC	Air Combat Command
ACGSC	Army Command General Staff College
AFDD	Air Force Doctrine Document
AGE	Aerospace Ground Equipment
ALOC	Air Line of Communication
AMC	Air Mobility Command
AMOG	Air Mobility Operations Group
AMS	Air Mobility Squadron
ATC	Air Transport Command
AMOW	Air Mobility Operations Wing
AOR	Area of Responsibility
BIF	Basing Infrastructure and Facilities
CARL	Combined Arms Research Library
COCOM	Component Command
COIN	Counter Insurgency
CONUS	Continental United States
CRG	Contingency Response Group
DoD	Department of Defense
EAMS	Expeditionary Air Mobility Squadron
EMTF	Expeditionary Mobility Task Force
ERS	En Route System
GAO	Government Accounting Office
GLOC	Ground Line of Communication

GRL	Global Reach Laydown (strategy)
GWOT	Global War on Terrorism
HDLD	High Demand Low Density
IGO	Inter-Government Organization
IW	Information Warfare
JP	Joint Publication
JFC	Joint Force Commander
LOC	Line of Communication
MAC	Military Airlift Command
MOB	Main Operating Base
MOG	Maximum on Ground
MRS	Mobility Requirements Study
MRSBURU	Mobility Requirements Study Bottom Up Review
NATO	North Atlantic Treaty Organization
NGO	Non-Governmental Organization
OCONUS	Outside Continental United States
OIF	Operation Iraqi Freedom
OEF	Operation Enduring Freedom
OL	Operating Location
SAC	Strategic Air Command
SOFA	Status Of Forces Agreement
SWA	South West Asia
TAC	Tactical Air Command
TACC	Tanker Airlift Control Center
UN	United Nations

USG	United States Government
USAF	United States Air Force
USAFRICOM	United States Africa Command
USCENTCOM	United States Central Command
USEUCOM	United States European Command
USPACOM	United States Pacific Command
USTRANSCOM	United States Transportation Command
WWII	World War II

ILLUSTRATIONS

Page

CHAPTER 1

INTRODUCTION

Since the end of the Cold War the Department of Defense (DoD) has struggled to find the right force structure and overseas basing posture to meet current and future challenges. Today, the likelihood that the US will fight a large-scale war with a near-peer nation-state is unlikely. However, if recent insurgent battles against non-state actors in Iraq and Afghanistan are an indication of the future, then the US will need a more flexible, responsive military to prevent regional or global destabilization resultant from insurgent non-state actors. Not only does this illustrate the need for a more flexible force, but one that is able to quickly mobilize and face multiple, evolving global threats. One region of particular concern is the African continent. As we look at the October 2008 establishment of United States Africa Command (USAFRICOM), it is readily apparent that there is a lack of basing and resources to support sustained rapid global mobility for humanitarian and military operations in this new command and evolving AOR.

This study researched Air Mobility Command (AMC) delivery of DoD resources to and through USAFRICOM. Specifically, the research and analysis within identifies what issues must be explored when considering airlift operations to move these resources in support of USAFRICOM goals. It also identified factors deserving consideration when attempting to determine where to place ground resources to support enroute airlift operations. The thesis presents options that may be utilized to effectively increase the ability to deliver resources to USAFRICOM without significantly degrading the efficiency of the entire Global Reach Laydown (GRL) strategy. Finally, analysis within this paper shows a correlation between political climate, basing, ground resources, and

centralized command and control to facilitate efficient airlift operations. An understanding of these interrelated variables will help AMC, United States Transportation Command (USTRANSCOM), and USAFRICOM adequately posture enroute locations with the resources needed to meet the new command's mission requirements in support of US strategic objectives.

Background

The United States Air Force (USAF) is made up of numerous major commands to help identify roles and responsibilities across the service. Two of these commands are Air Combat Command (ACC) and AMC. ACC is responsible for USAF fighter and bomber missions and the aircraft that perform these function for the DoD. Conversely, AMC is responsible for the mobilization of DoD resources through the use of cargo and air refueling aircraft. AMC cargo aircraft are designed to haul everything from passengers to food, boats to tanks, as well as fuel and ammunition all over the world in support of national interests.

There are twelve Main Operating Bases (MOB) in AMC located in the Continental United States (CONUS) where cargo aircraft are assigned and which assume responsibility for servicing functions of assigned and transient aircraft. AMC also has thirteen fixed Air Mobility Squadrons (AMS) and eight Expeditionary Air Mobility Squadrons (EAMS) at bases in Europe, South West Asia (SWA) and the Pacific that are responsible for servicing functions of transiting AMC strategic airlift and contracted civilian aircraft. The primary responsibility of these AMSs and EAMSs is to facilitate global reach and rapid global mobility of US resources. The collective body of these locations makes up the En Route System (ERS). This system of overseas bases

complements and sustains rapid global mobility, provided by strategic airlift aircraft, and global reach, enabled through air refueling. This system of overseas bases, airlift, and aerial refuel aircraft combined with the force generation capability of the twelve CONUS bases make up the GRL strategy. This fluid combination of globally dispersed resources falls under the centralized command and control of the Eighteenth Air Force.

Since September 11, 2001, the AMSs within AMC have experienced a significant increase in aircraft movement in support of Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), and other overseas contingency operations. The preponderance of this airflow has been from the CONUS to SWA, transiting Europe then back again. Fortunately, the USAF and the DoD have invested large amounts of resources to ensure the infrastructure and resources in Europe and SWA are there to support the increased flow through this system. Due to the significant flow of aircraft, air mobility ground support resources and infrastructure improvements have been focused and deployed to these theaters. Consequently, the Pacific portion of the ERS is not resourced at a level to handle the same airflow. If a significant conflict occurred in the Pacific which required sustained airlift support, ground support resources would have to be stripped away from Europe or SWA to meet mission requirements. Likewise, there has not been an investment in infrastructure or resources in USAFRICOM to accommodate potential increased movement of resources to Africa. AMCs ground support personnel are a finite resource. Supporting one airlift operation in an immature and ill-funded theater often results in degrading the capability of an operation in another region. Appreciating these challenges, with consideration given to the lack of infrastructure and still to-be-determined mission of USAFRICOM, is the basis for this thesis.

Primary Research Question

What factors should be weighed when considering basing options in Africa to support USAFRICOM goals.

Secondary Research Questions

1. What led to the establishment of the GRL strategy and the ERS?

2. How has the ERS been used to move resources in the past?

3. Is the ERS adequately postured to meet the current demands of the DoD and the growing needs of USAFRICOM?

4. What considerations should be made by DoD to establish a base of operations in Africa to meet USAFRICOM goals?

Significance of the Thesis

Since the end of the Cold War the US DoD has struggled to find the right force structure for its military. Despite solidifing its position as the strongest military in the world, current analysts predict that the focus of the US military will remain one of counter insurgency operations, information warfare and special operations. It does not mean that young US men and women are not dying and that the US will not experience combat operations in the foreseeable future. To the contrary, the current overseas contingency operations have US and coalition troops engaged in military operations all around the world.

Since the US has established itself as the world's preeminent military power, it has taken on the role of protecting those that cannot protect themselves and providing humanitarian relief for those in need. The military has also engaged in operations to help

stabilize regions where governments have difficulty maintaining security and managing the affairs of their nation. Africa is full of people and governments that fit this description. Without a force to effectively secure and stabilize this region the US, its coalition partners, and the world will continue to see mindless acts of terrorism against humanity and growing terrorist recruiting throughout Africa. To secure the diverse tribal populations, stabilize the numerous governments, protect the natural resources of Africa, and create an inhospitable environment for terrorists, the US and its allies will need a plan to quickly deliver support and aid where and when needed through efficient use of AMC aircraft and the ERS. Doing this will require flexible, agile AMC airlift and a plan for implementation and execution.

Assumptions

The first assumption of the study is the expeditious movement of resources to USAFRICOM will be provided by AMC, utilizing the ERS and airlift. Second, USAFRICOMs primary mission focus will be stability through humanitarian relief. Third, to meet greater demand and to support sustained movements to USAFRICOM, an increase in en route resources will be required to accommodate aircraft handling operations. Finally, additional airfield locations in Africa may be required to rapidly respond and provide effective, efficient humanitarian support to USAFRICOM in times of crisis.

Definitions

Below the reader will find definitions of a key words and terms. These definitions will aid the reader in understanding the issues and concepts presented by the author

throughout the thesis. Many of these terms are not well defined in the literature. Other terms, while commonly understood within AMC, may not be familiar to those from the joint community.

Air Mobility Command (AMC) Air Mobility Command is responsible for all of the USAF cargo aircraft and the personnel that support, manage, and maintain them.

Air Mobility Operations Wings (AMOW) are responsible for command and control, cargo transportation, and aircraft maintenance oversight for AMC at 30 geographically separated units made up of: Air Mobility Groups (AMOG), AMS, Detachments, Operating Locations, and Expeditionary Air Mobility Squadrons (EAMS) throughout the Pacific, Europe, SWA, and Africa.

Air Mobility Squadron (AMS) contain AMC transportation specialists, command and control specialists, and aircraft maintenance technicians. They are responsible for safe, effective movement of DoD cargo, aircraft and aircrews.

Expeditionary Mobility Task Force with the 15th on the west coast and the 21st on the east coast, these units manage the 715th and 721st Contingency Response Wings located at Travis Air Force Base (AFB) and McGuire AFB, NJ, as well as the 715th and 721st AMOWs located at Hickam AFB, Hawaii, and Ramstein Air Base, Germany.

Global Mobility is "the timely movement, positioning, and sustainment of military forces and capabilities through air and space across the range of military operations" (AFDD1, 2003, 80). For this paper, global mobility is focused on those effects supported by the ERS and the GRL strategy. In particular is the ERS ability to maintain a posture that allows for a flexible response of airlift assets.

Global Reach is defined as the ability "to quickly apply strategic global power to various crisis situations world-wide by delivering necessary forces" (AFDD1, 2003, 50). Similar to global mobility, global reach is facilitated through the bases that make up the ERS. This combination is relevant to the study as they pertain to the continent of Africa.

Joint Strategic Planning integrates military actions with those of other instruments of national power and our multinational partners in time, space, and purpose to achieve a specified end state." (JP 5-0, 2006, ix) Joint planning will be used in this study to explain the synchronization that must take place between the various services when planning movement of DoD resources to and from theatres. Joint Planning helps set up, coordinate and monitor effective and efficient movement of equipment, vehicles, supplies and personnel from origination to destination.

Maximum On Ground (MOG) advertises a simultaneous capability. For example, an aircraft maintenance MOG of two means the AMS has the ability to repair or service two aircraft at the same time. A parking MOG of six means there are a maximum of six aircraft parking spots. Although some airfields are limited by size and space most often the limiting factor to AMC operations is aircraft maintenance working MOG.

Limitations

One limitation to this study is the infancy of USAFRICOM which was established on 1 October, 2008. There are few historical examples of airlift operations throughout Africa to draw parallels or examples from that support or discredit the research in this thesis. The roles and responsibilities of this command are still maturing as not all of the USAFRICOM personnel are assigned. Due to the unique challenges of the USAFRICOM area of responsibility (AOR) the mix of military, civilian, Non-Governmental

Organization (NGO), and International Governmental Organization (IGO) personnel on the USAFRICOM Staff will be different from any other command. Assumptions have been made that the primary role of airlift in the USAFRICOM AOR will be humanitarian relief to support regional stability efforts. Given these factors, this thesis is limited to historical documents, published doctrine, and military papers and Government Accounting Office (GAO) documentation on topics relating to the subject. Another limitation was the size of the African continent. Considering the size, and diversity within Africa, and the limitations of the length of this study, the thesis did not attempt to dissect considerations for airlift operations against each and every country on the continent. Accordingly, there are numerous opportunities for follow on studies for future researchers.

Scope

This thesis began by taking a historical look at airlift in the US Army Air Forces during World War II (WWII), when C-46, C-47, and C-54 aircraft were used to fly supplies from India, over the Himalayas, into China. This operation was the first use of an Air Line of Communication (ALOC) to sustain large conventional ground forces. With the Ground Lines of Communication (GLOC) cut by the Japanese, airlifting supplies from India to China was the only means to keep the Chinese supplied and engaged in the war against Japan.

This operation established many of the guiding principles that are ingrained in Air Force doctrine today. It identified the complexities of airlift operations which justified the need for centralized control of airlift assets to maximize efficiency across numerous

locations. The operation also demonstrated the speed and flexibility of airlift, which would change the way the US would go to war forever.

The thesis also looked at Operation Nickel Grass. In this operation the US sent military supplies to Israel during the Yom Kippur war of 1973. Israel was critically low on artillery and ammunition and was at risk of being overrun by Syrian and Egyptian forces. Despite being denied the use of its bases in Europe due to a feared Arab oil embargo, within twenty four hours of directing the DoD to send aid, US airlift aircraft were offloading needed supplies in Tel Aviv, Israel. The responsiveness and capability of the airlift during Operation Nickel Grass enabled the Israelis push back the Syrian and Egyptian forces and re-establish their boarder. The effectiveness of the airlift operation provided Israel with everything they needed defend their nation and thereby prevented the commitment of any US ground combat forces. Nickel Grass highlighted the dynamics of politics and the influence they have on airlift operations. Additionally, it identified the need to have a pre-existing system of overseas bases to expedite the movement of airlift around the world.

Lessons learned from Nickel Grass led to US to develop the GRL strategy. This strategy fostered the investment in key overseas locations to facilitate global reach and rapid global mobility of resources. This system of bases is now known as the ERS.

The thesis then highlights the responsiveness of the ERS and airlift to provide humanitarian assistance to the remote regions of Pakistan in the aftermath of the 2005 earthquake that killed 73,000 and displaced over three million persons. This operation demonstrates the capabilities of the ERS and airlift when political barriers, impeding access, are removed. The study shows the interrelationship between political access,

basing, and ground resources needed to facilitate airlift operations. The case studies provide examples of the significance of each of these areas to facilitate airlift operations.

The thesis concludes by applying some of the political, basing and ground resource lessons learned from the case studies to USAFRICOM. It also provided a planning factor using 2,000 nautical mile range rings to identify a basing strategy to apply to USAFRICOM. After considering, comparing, and contrasting these variables, the study provides recommendations to help meet sustained airlift operations to USAFRICOM with ideas for minimal basing and without severely degrading of efficiency to the GRL strategy.

Delimitations

The focus of this thesis is providing a means to efficiently sustain airlift operations to support USAFRICOM goals without degrading the overall effectiveness of the GRL strategy. This thesis did not look at ACC combat missions, their support, or sustainability. Additionally, this thesis did not look at airlift requirements purely to support sustained ground combat operations. This thesis focused on the political challenges faced by the US in past airlift operations, basing requirements needed to conduct airlift operations, and ground support resources needed to sustain operations. It then applied these factors to USAFRICOM to identify some limitations to airlift operations in USAFRICOM and concluded by providing some suggestions to mitigate those challenges.

This chapter provided background on various missions of USAF air mobility. It identified some of the aircraft, CONUS and outside the continental US (OCONUS basing, and resources requirements necessary to support AMC strategic airlift operations

and how they, collectively, support the GRL strategy. It then discussed the primary and secondary research questions and explained the significance of these questions and the thesis. It identified a few of the assumptions made in the study. It highlighted some definitions to the reader that are unique to this topic and some of the limitations and delimitations. This chapter also outlined the scope of the study to explain the relevance of the information chosen to emphasize the key points of the thesis. Chapter 2 will expand upon the framework which the thesis is built by discussing the literature reviewed from Joint and Air Doctrine to GAO reports and historical books to identify gaps in the record as well as trends among various reference sources.

CHAPTER 2

LITERATURE REVIEW

Significant Literature

The study utilized numerous resources. Some of the more significant resources can be broken down into five general categories. These include Joint and Air Force doctrine; USAFRICOM guidance, Professional Journals and GAO reports; Service School publications; and historical documents.

Joint doctrine explains a variety of the military requirements for conducting airlift operations across the DoD. This information was used to identify the military requirements for conducting joint military operations. After comparing the requirements to the resources available within USAFRICOM a comparison can be draw to identify limitations to conducting airlift operations in Africa. Guidance taken from the USAFRICOM website frames the issues faced by the new command. The research utilized professional journals to gain insight into previous military and humanitarian airlift operations. GAO documents provided insight to support the rational and methodology behind the size and structure of the current ERS to meet Congressional and DoD global reach requirements. Many of these documents helped frame the rationale behind the establishment of the ERS. Service School publications provided a view of parallel issues from the past with a military view for the future. The paper also used historical documents, books, and articles to explore the case studies in depth. The research in the historical documents identified common themes across each of the operations that lead to the establishment and maturation of the ERS. This chapter

highlights some of the gaps in information, trends found, as well as those areas containing conflicting guidance.

Joint Doctrine

Joint doctrine focuses on the integration of various service capabilities to achieve synergistic effects while simultaneously maximizing efficiency. There are numerous Joint Publications (JP) that address a variety of air, ground, and sea movement planning topics. JP 5-0, *Joint Operation Planning* is the overarching process that guides joint force commanders (JFC) in developing plans for the employment of military power within the context of national strategic objectives and national military strategy to shape events, meet contingencies and respond to unforeseen crises (JP 5-0 2006, I-4). JP 3-07.6 covers *Joint Tactics, Techniques, and Procedures for Foreign Humanitarian Assistance*. In particular JP 3-07.6 covers types of Foreign Humanitarian Assistance Operations designed to relieve or reduce the results of natural or manmade disasters or other endemic conditions such as human suffering, disease, or privation that might present a serious threat to life or loss of property (JP 3-07.6 2007, I-1). Joint doctrine highlights the different movement requirements between the services. It also illustrates the operational gains in efficiency when effective communication between the services is utilized to maximize the capabilities of each of the respective strengths of each of the services. A review of Joint Doctrine it is important to help understand how Air Force doctrine fits into the bigger picture of the joint operation.

Air Force Doctrine

Overarching USAF Doctrine is explained in Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, as a statement of officially sanctioned beliefs, warfighting principles, and terminology that describes and guides the proper use of air and space forces in military operations. This baseline doctrine shapes the manner in which the Air Force organizes trains, equips and sustains its forces in support of national objectives (AFDD 1 2003, xi). It is important to note that although Air Force doctrine is written to provide the guiding principles for Air Force personnel, AFDD's are based on experience. Therefore, as Air Force personnel gain experience in combat, contingency operations, exercises, or experiments they should apply the lessons learned from their experiences to continue to grow, shape and enhance applicable AFDD's for future Air Force personnel.

Within AFDD 2-4.4 the Air Force outlines the fundamentals of combat support through *Basing, Infrastructure and Facilities* by providing combat support through training, deployment, employment, generation, sustainment, protection and redeployment of aerospace personnel, assets, and capabilities through all peacetime and wartime military operations (AFDD 2-4.4 1999, 1). The goal of combat support through basing infrastructure and facilities is to contribute to the capabilities of aerospace power to include speed, flexibility, versatility, and global reach (AFDD 2-4.4 1999, 1). This document addresses the different challenges associated with meeting the various combat support requirements from garrison, expeditionary, and austere operating locations that will be fundamental to addressing operations under USAFRICOM.

AFDD 2-6 outlines *Air Mobility Operations* which covers the aspects of speed, flexibility, and versatility that provide the U.S. rapid global mobility to project, concentrate, or reposition forces to meet military or humanitarian needs anywhere in the world at any time (AFDD 2-6 2006, 6). The document covers a broad range of functions, including aerial refueling, nuclear operations support, global movement of injured, wounded, and deceased military personnel, combat delivery of troops, and equipment and the execution of clandestine operations (AFDD 2-6 2006, 6). This thesis explores the aspects of basing, infrastructure, and air mobility operations to show how the interdependence of these areas that should be considered when planning air mobility operations in support of USAFRICOM goals.

Historical Documents, Books, and Articles

Various books and articles provide a historical perspective of how airlift was successfully utilized to overcome geographic and political barriers. Examples include airlift operations in Burma during WWII, as well as Operation Nickel Grass during the Yom Kippur War. The historical documents were used extensively to frame the foundation of US airlift operations. These documents also provided examples of the political, basing, ground resource, and command and control issues that were common among each of the case studies. The historical documents provided the foundation for the theme and eventual lessons learned of the thesis. Historical examples also illustrated the advantages airlift provided combatant commanders and political leaders at the time. They provide the perspective needed to identify those actions that led to the maturation of overseas bases into an integrated system of bases. It provided examples how overseas basing has been used in the past and it identified the historical path taken by the US that

led to the GRL strategy and the ERS of today. The historical documents provides the foundation from which the military objectives of rapid global mobility and global reach are met.

Africa Command Guidance

USAFRICOM was established on 1 October, 2008 to address humanitarian and stability issues taking place on the continent of Africa. The command guidance frames the key issues and concerns within USAFRICOM, such as the lack of military basing. Open source information extracted from the USAFRICOM website and other government sites provided insight into those nations within Africa that had good working relationships with the US or were taking steps to mature relationships. These sources also provided insight into those locations where government or political relations where stained or unstable. This combination helped focus the thesis on other political issues that must be considered when planning airlift operations for the new command.

Government Accounting Office Documents

Several GAO documents were used to gain perspective on military readiness. Two reports were of significance to this study. The first, *Effects of a U.S. Military Presence in Europe on Mobility Requirements* (2001) focuses on the current force structure of the military OCONUS, the impact of the drawdown of forces, and the effect the drawdown of bases in Europe had on the ability of the US to quickly project forces globally. A second document, *Management Focus Needed on Airfields for Overseas Deployments* (2001) underscores issues of command and control, infrastructure oversight, and improvement requirements needed to ensure AMC global reach for America now and

into the future. The focus is on infrastructure improvements that must be met to assure continued safe, effective, and efficient deployment of combat and humanitarian support around the globe. The study also reviewed documentation that addressed the ERS. This information included data about the *Mobility Requirement Study* of 1995 and 2001 and the *Mobility Requirements Study Bottom Up Review*. Documentation from these studies explained the strategy behind the ERS basing. Further documentation was utilized to explain the maturation of the ERS to its current state and the rationale behind the strategy of today. The value of the ERS is also supported in various service school papers wherein this strategic structure was utilized to support and facilitate various missions.

Service School Publications and Papers

Publications and papers from various service schools, such as US Army Command and General Staff College and equivalent Air Force Schools, provide focus into specific areas of the ERS. Specifically, these sources supported research into the previously identified historical case studies. These papers supported the utility of airlift to meet military objectives, but also provided insight into specific challenges. Time, distance, and geography are all issues airlift has had to overcome since its advent. The service school publications provided additional insight into current and future challenges to airlift as well as dialogue to help mitigate those situations where military airlift capacity is lacking.

Analysis of Literature

Current documentation provides good guidance on how to request, implement, and utilize strategic, operational, and tactical military airlift to support geographic

combatant commander movement requirements. The study reviewed historical examples wherein military airlift was utilized to meet military, political, or economic objectives. While Joint and service doctrine in combination with other varied sources, such as USAFRICOM websites and GAO reports, enabled a detailed look at the ERS and its impact on the African continent, these are significant gaps in the literature. Specifically, the author found little information addressing requests for military lift or commercial lift for humanitarian needs in support of nonmilitary peace and stability operations.

Gaps in the Record

What is the right mix of aircraft to provide Strategic and Tactical lift between commercial contracted and military airlift. Given the political instability of operation in Africa between many neighboring nations airlift support may be best received if it is provided by commercial carriers as opposed to military aircraft. Additionally, airlift supported through commercial means decreases the burden on high demand low density C-5 and C-17 aircraft and their corresponding logistics footprint. This allows theses high demand low density resources to be used for more military applications like movement of oversize outsized M-1 tanks. However, some nations may prefer military airlift over commercial means in order to increase host-nation military training opportunities. Identifying nations desiring military airlift assistance to facilitate training, cooperation, and access could have stabilizing effects for regional military forces with positive second and third order effects.

Significance of Thesis in Relation to Existing Literature

Existing literature provides examples of military airlift to support military operations. There are also examples of commercial air supporting commercial operations could be applied in further study of this topic. Full exploration of commercial air, rail, and inter-modal options should be expanded on to provide options to alleviate overdependence on the ERS to move large amounts of resources quickly.

This chapter provided a review of the literature used to complete this study. Significant documentation included portions of Joint and Air Force doctrine to explain the differences between multi-service airlift planning and single service, or USAF, airlift planning. Additional documentation included historical references, service school publications as well as GAO reports. Information extracted from these sources helped explain the early application and importance of airlift. The documentation provided examples of using airlift to meet political objectives when no other transportation means could have worked. It also helped frame the strategy behind the inception, growth and development of the current ERS. The next chapter will explain the methodology behind the research as well as some of the strengths and weaknesses of the information used in this study.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter will first explain how the information was compiled and then used in this thesis to address the primary and secondary research questions presented in chapter 1. This chapter will then discuss the criteria used to differentiate between the useful information and that which distracted from the objective of the thesis. From there, it outlines the methodology behind the study to frame the thesis in a chronological manner and, finally, discusses some of the strengths and weaknesses of the methodology.

Gathering Information

Information for this thesis was gathered from unclassified, open sources which include Air Force and Joint doctrine. The internet was used extensively to electronically obtain GAO documents, articles, reports, and also updated information on USAFRICOM. The study also used the available resources from the Combined Arms Research Library (CARL) at Ft Leavenworth, Kansas to obtain hard copy and electronic versions of multiple service school publications and papers. The CARL was valuable to gain access to historical documentation including books and articles. Although much of the research in this study is exploratory in nature, the historical documents, reports, and information gathered had great value in providing supporting data.

Research Criteria

The research consists of case studies of airlift supporting conventional operations over the Himalayas between India and China in WWII, a smaller operation in Israel during the Yom Kippur War, and a reactionary, humanitarian operation in the wake of the

Pakistan earthquake. The case studies provide the background of the evolution of the current ERS and how it is used today. The key components of political access, basing, ground support resources, and centralized control are critical to the ERS. Collectively, these components facilitate rapid global mobility for AMC. The study identifies the lack of these components in USAFRICOM to highlight the need to consider these variables when planning airlift operations to Africa, to avoid unnecessary aircraft delay, and mission degradation.

The current AMC ERS is a mature system with proven capability to provide global reach and rapid global mobility for America, but the ERS is neither limitless or a system that operates without significant and often expensive resource requirements to function safely, effectively, and efficiently. By comparing the historical case studies involving the use of airlift with current ERS and the challenges of attempting to sustain airlift operations in Africa, the author was able to pre-identify some challenges to airlift operations in USAFRICOM. If not addressed before hand, these challenges could result in significant delays to airlift operations. To illustrate these challenges the thesis used historical examples from three distinct operations.

The first case study is a WWII example of airlift operations flying over the Himalayas to resupply the Chinese from India, illustrating the capability of airlift to support a large scale conventional ground forces. It also can be considered the birth of the ERS. Next the study examined Operation Nickel Grass.

In 1973 the US used airlift to support Israel by flying in tons of artillery shells and ammunition to aid their defense against advancing Egyptian and Syria during the Yom Kippur War. Operation Nickel Grass struggled initially as the US was denied access to

their bases in Europe. Fearing an oil embargo from the Arab nations the US was limited to one base in the Azores. Despite the initial set back, the airlift operation through Lajes proved to be successful as the US airlifted enough ammunition and artillery to ensure Israel's defense. Nickel Grass was an example of how flexible, rapid global mobility, can be used to meet national political objectives. Additionally, it did so without placing American forces in harm's way.

The final historical case study is the 2005 Pakistan Earthquake relief operation. This demonstrated the unique capabilities of airlift to rapidly move supplies, people, and equipment around the world to provide relief to over three million displaced Pakistanis. Due to the isolation of the remote mountain villages, the rugged terrain, and the loss of roads and highways due to the earthquake, many supplies had to be airdropped. Airlift proved to be the only vehicle that could respond quickly and distribute aid and resupply under these conditions.

Additional research was done to identify gaps in the GRL strategy over Africa. Upon comparison of the gaps in capabilities between the ERS and USAFRICOM, this thesis identifies a strategy option to overcome or mitigate some of the factors that limit airlift throughput in USAFRICOM.

Research Methodology

To address the research question the study used a chronological method to explain the establishment and maturation of airlift into the GRL strategy and the current ERS. This approach explained the unique applications of airlift by using historical examples to illustrate the significance of each of the airlift operations. This also assists in explaining the rationale behind the maturation of the GRL strategy and the ERS and identifies

limitations of the current ERS when it comes to supporting sustained operations in USAFRICOM. Highlighting the political, infrastructure, and resource limitations that must be considered by airlift planners is paramount to this study. Lack of consideration of these keys to airlift, will lead to unnecessary delays. The result is lost efficiency which limits overall effectiveness to support USAFRICOM. Furthermore, lost efficiency degrades GRL strategies ability to sustain global reach and rapid global mobility in USAFRICOM and around the world.

Research Methodology Strengths and Weaknesses

The strength of this study resides in the use of the historical examples from Burma, Operation Nickel Grass, and the humanitarian effort during the Pakistan earthquake relief. These examples provide a framework for the varied missions that airlift has the ability to support and could potentially need to support in USAFRICOM. This study also explains the relevance of the ERS, as it frames the significance of airlift operations with three case studies. The study is also strong in the discussion of the current ERS, the strategy behind its structure, and its ability to meet the rapid global mobility and global reach requirements of the DoD. These strengths identify past successes directly attributable to airlift, the rationale behind the development, the maturation of the ERS, and the current capabilities and limitations. The ability of the thesis to identify and communicate the capabilities of the current ERS directly corresponds with the ability of the thesis to articulate the lack of capability that exists in USAFRICOM, as well as the challenges to operating in Africa. The comparison of the current ERS to the USAFRICOM capability creates a clear picture of the differences in capacity between those commands with ERS bases and USAFRICOM which has nothing. The

methodology also does not specifically address the estimation of airlift requirements to support USAFRICOM. It merely shows the differences in capability in particular basing and coverage.

Established in late 2008, this command is still in its infancy. This "newness" does create some problems. It is still difficult to succinctly define the roles and responsibilities USAFRICOM will have as their mission is still ill-defined and uniquely more focused on co-operation than operation. A second issue the new command is contending with is the lack of people and resources. Growing a new command requires growing the right people to fill it. These challenges are still not fully resolved. The tone from USAFRICOM is one of a command that will largely be responsible for humanitarian relief operations, promoting stability, and deterring regional aggression. Stability helps avoid U.S. or coalition military intervention. It fosters an environment that promotes mutually beneficial working relationships between the countries, tribes, religions, and ethnicities of Africa.

Attempting to predict the level of airlift necessary to meet potential USAFRICOM goals is not the purpose of this study. Similarly, attempting to identify the location of every airfield and their infrastructure capabilities to support possible airlift requirements is also not a focus. It will take time for the roles and responsibilities of USAFRICOM to mature and grow stable to support partnerships with the nations of Africa. Until the new command matures and the relationships with partner nations grow, efforts to predict regular airlift requirements for USAFRICOM will likely bear little fruit. Nevertheless, a strategy for meeting airlift requirements that provides adequate coverage

to the entire AOR with the least investment of infrastructure and resources should be made.

The research methodology used historical examples of successful military and humanitarian airlift operations to answer the question, why airlift? This thesis explains the current ERS and its capacity, to answer the question of, how. Next the study explained the capability of USAFRICOMs existing infrastructure to identify potential limiting factors and considerations when planning airlift operations. The thesis then suggests a strategy overcome airlift movement limitations

Next the study will look in depth at airlift operations between India and China during WWII. Following this case study will be a look at the airlift operation that supported Israel during the Yom Kippur War of 1973. Immediately following Operation Nickel Grass, the thesis discusses the impact that this operation had on the US philosophy about overseas basing. Finally, the chapter will conclude with a lessons learned from each of these operations that should be considered heavily when planning sustained airlift operations support in USAFRICOM.

The case studies provide great examples of the use of airlift over time and they establish the framework for the modern day ERS. The current system is then compared to the geography and infrastructure within USAFRICOM to highlight the differences in capability so leaders and action officers can plan airlift operations for the new command with realistic expectations.

CHAPTER 4

HISTORICAL AIRLIFT CASE STUDIES

While today's enroute structure is the foundation of American global reach, the system was born of necessity and has evolved over time. Understanding the origins of the ERS, and specific issues shaping it has direct impact on GRL support to USAFRICOM. This chapter will analyze three historic operations involving the use of overseas basing and how they led to the current fixed ERS of today. These operations include: flying supplies over the Himalayas from India to China during WWII; Operation Nickel Grass, in support of Israel during the Yom Kippur War of 1973; and the humanitarian operation in Pakistan in the aftermath of the 2005 earthquake. These three case studies will focus on four factors that impact enroute support to air mobility operations; political will, basing rights, ground support, and command and control. By identifying the effects of these factors this study can then authoritatively define the issues facing the ERS in Africa.

One of the noteworthy results of case study number two is the recognition of ERS importance following the airlift operation to support Israel in 1973. Recognizing the importance of maintaining overseas basing to support airlift operations, an interconnected system of overseas bases became today's fixed ERS. By supporting AMC's GRL strategy this network of bases facilitates global reach and rapid global mobility of DoD and non-DoD resources.

Concluding this chapter are lessons learned from each of the case studies, which will directly affect the GRL strategy for USAFRICOM.

Establishing an Air Line of Communication over Burma 1942-1945

Beginning in 1942, with the GLOC cut by advancing Japanese forces, Army Air Forces in Southeast Asia began airlifting supplies and personnel to an isolated China. This operation involved flying troops and supplies using twin engine C-47 and C-46 aircraft from India, over the Himalayas, into China. Later, four engine C-54s were added to the operation. This operation became affectionately known as flying "The Hump" by US aircrews. The importance of this mission was three fold. First, flying an air supply route over Burma demonstrated the first airlift operation used as a lifeline for a large conventional war. The political significance of this airlift operation cannot be emphasized enough. These airlifted supplies kept Chaing Kai Shek's Nationalist China, in the war against the Japanese on the Asiatic mainland. Second, operations over the Hump identified the need for centralized command and control of airlift operations which balanced a multitude of variables and maximized efficiency and effectiveness. Finally, many of the lessons learned in Burma became guiding principles for future airlift operations. As the first example of an ERS operation, the Hump integrated multiple bases to deliver cargo and passengers. The principles identified by 1945 over the Hump would not only pave the way to US success during the Berlin Airlift but these principles are engrained in the fabric of air mobility operations today.

Although the Berlin Airlift is one of the more well known applications of large scale airlift support to a geographically isolated location, it was not the first. The Army Air Force's successful use of airlift over the Hump of Burma from India to China came first. The idea, considered radical at the time, occurred only after the Japanese effectively

cut the Burma Road into China, the primary line of communication for allied forces in China (Lichte 2008, 39).

After the Japanese severed the Burma Road, the Allies no longer had a means to move resources by surface transportation. Additionally, the Japanese had firm control over the Pacific, which ruled out sealift, thus leaving only one option, airlift. Until the Ledo and Burma roads could be opened by US forces under General Joseph Stillwell, the Army Air Force would have to fly the supplies from India to China. Between 1942 and 1945 the American transports used nineteen different bases, sustaining the allied forces in China by delivering more than 650,000 tons over the Hump (Miller et al. 1998, 22). (See figure 1) This configuration of bases would later serve as a template upon which the ERS was mirrored.

Considered a desperate attempt by some, the operation centered on keeping Chinese forces supplied and engaged with the Imperial Army on the Asiatic mainland. With China in the war, fewer Japanese troops would be available to defend the island strong holds in the Pacific. Forced to divide their strength on two fronts, the Japanese were unable to mass their forces against the advancing Americans to the east. Keeping the Chinese in the fight was not an easy task. Doing so would require enormous amounts of resources. Facing the challenge to meet these requirements, American airpower proved the unique capability of airlift and changed the US view of airlift forever.

In theory flying from India to China seemed easy enough. The Americans had already flown half way around the world just to get to India. All they would need to do now is simply fly over the Himalayas to deliver the supplies to China. Despite the relatively hospitable nature of the arrival and departure locations, there was nothing

hospitable about the area between. Although daunting, the mountainous geography would prove to be only one of the many challenges that the Allies had to overcome.

An aerial sustainment of this scale had never before been accomplished, attempted or even contemplated. "Few entertained the notion that an army could be supplied entirely from the air, and the idea that there could be a global network of air routes moving passengers and cargo around the world could scarcely be imagined" (Miller et al. 1997, 17). Brought on by the needs of war, the volume, scale, and tonnage airlifted from the operations origins in April, 1942 to the peak in August 1945 was unimaginable.

The Hump operation to support China was new territory for the US Army Air Forces. Without tactical, technical or operational manuals to explain how to employ a supply system based solely on airlift, Army Air Force planners and aircrew created these documents from data gathered from every mission over days, weeks and months. By the end of the war the ad hoc airlift system had evolved to include manuals, training programs, scheduling processes, and an efficient system of supply that kept China in the war against the Japanese, but this was no easy task.

The Army Air Forces were limited by numerous factors during the Chinese sustainment operation of WWII. One such factor was the performance and reliability of the C-46 and C-47 aircraft they flew. While the C-47 Dakota, a modified military version of the Douglas DC-3, was capable and rugged, its load capacity in mountainous terrain was limited to two tons. In contrast, the Curtis C-46 Commando had greater cargo capability, but was far more complex and difficult to maintain. Another challenge was the

Himalayan Mountains, they were susceptible to large variations in weather and temperatures which further degraded the capabilities of the already struggling aircraft.

The operational requirements demanded maximizing the payload of each aircraft. Even the more capable, yet finicky, C-46 had to operate at the limit of the acceptable performance. Until the four engine C-54s came in the last few months, meeting the altitude requirements to clear the Himalayas left little margin for aircraft or aircrew error. If things did not go well, it often meant crashing into the jungle or a mountain. Surviving a crash meant the crew would have to navigate extreme mountains of snow, rock, and ice or dense jungle, ripe with disease and scattered, but unfriendly natives.

Additional C-46 aircraft, known as the "Commando", were brought in to augment the C-47, "Dakota" fleet. Although the C-46 was new at the time, it was initially less reliable primarily because of various leaks and engine problems experienced on the Hump. It took several months before it became a reliable transport the crews could depend on. The C-46 could carry 4 tons of cargo compared to the 2 and one-half tons of cargo of the C-47 (Tunner 1985, 62). The C-46 significantly helped raise the tonnage moved across the hump every month, as did the C-54 that came later in the Hump operation. In 1944 the India-China Ferry Division received the first Douglas C-54, "Skymaster". Compared to the twin engine C-46 and C-47 the Douglas C-54 was a reliable, easy to maintain, four engine aircraft capable of carrying 6 tons of cargo with greater speed and endurance. Although the C-54 brought a leap in capability to the theatre, it also brought its own unique logistics footprint and a corresponding increase in support management challenges. Adding to the challenges of the Division, bases would

now need to closely manage and maintain aircraft, parts, crews, and maintainers to support three different types of aircraft.

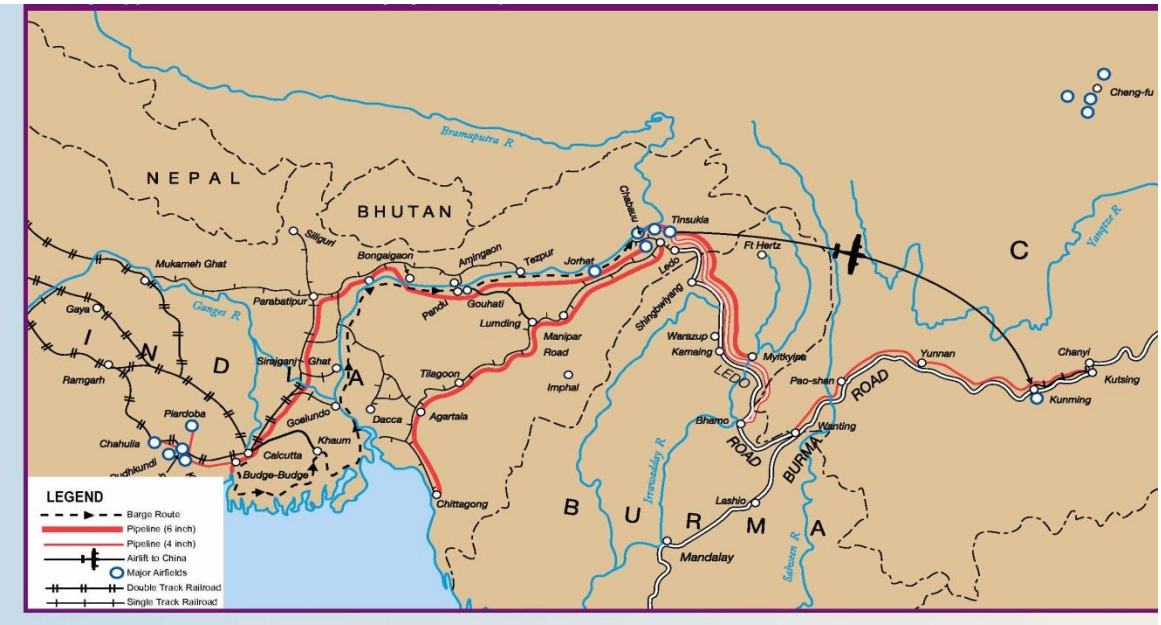


Figure 1. Moving Supplies from India to China: "Flying the Hump," 1942-1945
Source: Arthur J. Lichte, "Strategic Air Mobility and Global Power Projection," *Joint Force Quarterly* (2008): 40.

Demanding that aircraft operate continuously at peak performance levels every day in severe inclement weather combined with a lack of communication equipment, minimal navigation equipment, and the threat of enemy air or ground forces meant that Hump operations were dangerous. In November 1943, there were 38 major accidents. "It was safer to take a bomber deep into Germany than to fly a transport plane over the Rockpile from one friendly nation to another" (Tunner 1998, 63). Despite these risks, supplies had to get through and the cargo was of the utmost importance. This point was illustrated by the first mission ever flown over the Hump.

The first cargo-carrying flight over the Himalayas on April 8, 1942, was a load of high-octane gasoline destined for the planes of then LtCol James H. Doolittle. LtCol Doolittle later used that fuel in his famous attack on Tokyo on April 18 (Tunner 1985, 60). This was the first of thousands of dangerous and important missions yet to come. Not only was the airlift operation supporting the Chinese on the ground it was supporting Tenth Air Force combat missions in China as well as operations in the Pacific as illustrated by "Doolittles Raid" on Tokyo.

One of the challenges leadership struggled with in the India-Burma-China theater was command and control of airlift forces, specifically, centralized control. Maximizing airlift operations meant taking the responsibility out of the hands of combat focused leadership and placing it in the hands of those in the Air Transport Command (ATC). Airlift operations demand a full-time focus on efficient use of theatre airlift resources to maximize effects created by this finite resource. As long as air transport operations were managed by combat focused leadership, they would lack the efficiency needed to sustain Chinese resistance to the Japanese occupation. As noted by William H. Tunner, the chief architect of the operation,

> Our logistics planners didn't know then what they should know now, that combat commands do not make the best operators of air transportation. During April and May, under command of the Tenth Air force, a handful of planes, mostly C-47's, flew a total of 308 tons to China. By August the monthly figure had reached 700 tons, but this was certainly not going to keep the Chinese in the war. (Tunner 1985, 60)

The ability of the Tenth Air Force to double the amount of tonnage delivered across the Himalayas from 308 tons in April 1942 to 700 tons in August, 1942 was certainly noteworthy and a testament to the leadership and personnel involved. Despite this achievement, the reality remained that air transportation operations were not the chief

concern of the Tenth Air Force in 1942. At the time, they were focused on combat operations, bombing missions, and missions supporting troops in contact with enemy forces. At any other time, doubling tonnage delivered in the span of a few months would have received ecstatic praises but this was not the case in China in 1942.

Eventually the political and military leadership were able to negotiate with India and China to expand the number of aerodromes supporting the Hump operations to a total of thirteen bases in India and six bases in China. The flexibility to use additional bases, coupled with more reliable aircraft with increased cargo capacity, would further assist ATC in raising the tonnage moved from India to China. The added capability of each base brought additional management challenges. More locations required greater efforts by the India-China Division staff, to de-conflict and constantly coordinate the movement of cargo and passengers to maintain the efficiency of operations across the nineteen locations of varying capability and across Tenth AF command lines. This command and control responsibility was the job of the Operations officers at the bases in India and China to schedule both airplanes and crews in an efficient manner in order to get the maximum from each (Tunner 1985, 118).

The Operations officers worked tirelessly to de-conflict aircraft maintenance, crew rest and flight times to maximize aircraft utilization to move tonnage between multiple locations in India and China. As the bases grew more capable, the processes began to standardize, and the aircrews, staffs, ground crews all became more comfortable with the pace of air transport operations. As a result monthly tonnage across the Hump continued to grow. With increases in bases, aircraft, crews, personnel, and monthly

tonnage totals, came a greater dependence on airlift to continue to supply the theatre, as well as increased pressure to produce more tonnage.

> [O]nce the airlift got under way, every drop of fuel, every weapon, and every round of ammunition and 100 percent of such other diverse supplies as carbon paper and C-rations, every such item used by American forces in China was flown in by airlift. Never in the history of transportation had any community been supplied such a large proportion of its needs by air, even in the heart of civilization over friendly terrain. After the Hump, those of us who had developed and expertise in air transportation knew that we could fly anything anywhere anytime. (Tunner 1985, 59)

Despite the growing competence and confidence of Tunner and his Officers, there were still challenges that had to be addressed to make the system more effective. One challenge that had occurred repeatedly and was especially frustrating for the ATC schedulers and operations officers was caused by the repeated, unannounced, requisition of aircraft and crews by Tenth AF leadership. Before ATC had sole control of all airlift aircraft, Theatre Commanders had a great deal of power and often diverted transitioning ferry aircraft to serve their immediate needs, consequently, global airflow and strategy suffered (Miller et al. 1998, 23). These unplanned requisitions of crews and aircraft by Tenth Air Force leadership created enormous turmoil in an airlift operation that was very dependent on strict adherence to policies, procedures and timelines.

As illustrated in Air Force Doctrine Document 1, "all efforts should be directed and coordinated toward a common objective" (2003, 20). This prioritizes the use of limited air assets to achieve objectives and gains maximum efficiency in airlift operations around the globe. The operating plan was very simple: airplanes were flying, being fixed, on-loading or off-loading cargo every second of the day. Aircraft maintenance teams, aircrews supply personnel and their individual activities were regimented according to strict directives to create a constant unvarying cadence (Miller 1998, 47). Meshing the

management of the crews who required rest, with the aircraft that required maintenance, servicing, upload and download, required detailed planning to maximize the throughput of tonnage and Tunners' charts graphed the progress every step of the way.

Tunner, referred to as "the transportation expert to end transportation experts" (Miller 1998, 45) by General Curtis LeMay, knew they could increase the tonnage if they were given complete control of air transport operations from the thirteen locations in India, through the six bases in China, and forward to the final destinations in China. Unfortunately operations in China were under regional command of Tenth AF which was under control of General Chennault. It was not until the surge was over and the Japanese drive to Kunming had been defeated that Chennault would turn over complete control of airlift operations in India and China to ATC expertise. Tunner could now operate the theatre at maximum efficiency to increase tonnage to the fullest potential of the system.

China needed supplies to survive and the US believed Chinese pressure on the Japanese was needed to win in the Pacific. This interdependence coupled with the growing demands of managing combat missions eventually led to the turnover of the India-China ferrying division from Tenth Air Force to ATC. With ATC focused solely on the air supply to China, airlift operations in December, 1942 were finally centralized under a single command. Regional commands, focused on combat Air Force issues, could no longer interrupt a global flow of aircraft, cargo, and passengers to National Chinese forces (Miller et al. 1998, 23). As stated in current Air Force doctrine, "air and space powers operational-level perspective calls for unity of command to gain the most effective and efficient application" (AFDD1 2003, 20).

In the first month of ATC control they delivered 800 tons of cargo with a steady rise to 3,000 tons by July 1943 (Tunner 1985, 62). Despite the significant increases in tonnage, it wasn't enough. Combat operations had been forced to shut down on several occasions in the spring of 1943 due to a lack of aviation fuel. General Chaing Kai-shek's plea to Washington for more aid resulted in an order by President Roosevelt to increase the tonnage to 10,000 tons by September and hold it there. Not only would the US surpass that goal, by October 1944 the monthly tonnage would exceed 24,000 tons (Lichte 2008, 39). Increasing the tonnage during this time was facilitated by the combination of increased airdromes, aircraft, and personnel in India and China as well as improvements in doctrine, safety and aircraft maintenance.

As the numbers and types of aircraft flying the Hump rose, the importance of the job of the aircraft maintainers rose too. They and their ability to recover, service, repair and launch aircraft quickly became a low density, high demand resource to maintain General Tunner's demand for a steady rhythmic pace of operations. "I knew full well that the maintenance I was going to get would determine the success or failure of the operation. I must get the maximum performance out of the planes assigned to my command, or I would fail to do the job" (Tunner 1985, 65-66).

Each demand placed on the ATC, and in-turn the Burma-China Ferrying Division, created a new high water-mark month after month. The ATC was doing what had never been attempted or even imagined before, but it was not just due to centralized management of aircraft, crews and resources. As the demand for more tonnage came from politicians and leadership, requests for more airfields, aircraft, facilities, parts and people were returned. In parallel with the current ERS, politics drove access to bases and

ground resource requirements needed to support airlift throughput. Because of the priority of these missions many of the requests for airfields, aircraft and personnel were met as timely as possible. Some of these requests were even met by the local people of China.

The US forces employed the Chinese people to help build, repair and lengthen runways and expand parking. More runways and parking allowed the US to bring in more aircraft, and aircrews. Additionally, the Chinese provided a means to use the local population to help with less skilled tasks such as washing and loading the aircraft. This allowed the specially trained aircraft mechanics to concentrate on tasks associated with the aircraft.

Given the combination of newly acquired centralized control, maturing doctrine, and the more capable, and reliable C-54's, ATC was able to steadily increase tonnage until the last big month of August 1945 when they delivered seventy-two thousand tons to China (Tunner 1985, 128).

> The superiority of air transport over surface transport under such conditions and over such terrain can't be emphasized enough. For three years there were no means for surface transportation to provide supplies from the allies to the Chinese with the Burma road cut. Once the Japanese were driven out of Burma more than 20 Battalions were put to work on the Burma road. By comparison the Burma-China division of ATC had only 2 assigned Battalions. Despite the enormous effort and expense the maximum amount of supply carried over the Burma Road at its peak of operation amounted to just six thousand net tons a month. Many of the 13 bases in India were individually topping that figure consistently. (Tunner, 1985, 130)

Flying the Hump over Burma set the cornerstone for future airlift operations and showed the unique capability and flexibility of airlift to support a large scale sustainment of ground forces solely through an ALOC. Never again would the US go to war without consideration of airlift to support mission requirements.

Operations in Burma presented Army Air Forces with new challenges. Consistently demanding peak aircraft performance through the roof of the world in unpredictable weather, with little to no formalized manuals, documents, training or processes were among a few of these challenges. It identified the need for a centralized command and control structure to manage the movement of resources across all airlift locations to maximize efficiency of the system. In the end, the efforts over the hump kept Chinese in the fight which caused the Japanese to divide their forces and fight on two fronts. This ultimately prevented the Japanese military from massing their strength against the Americans in the Pacific. Although impossible to estimate, the airlift operation over the Hump undoubtedly saved thousands of lives. The airlift operation supporting China paved the way for a new era in aviation and changed how the US would go to war forever.

Hump operations over Burma set the foundation for future airlift successes, such as the Berlin Airlift, and highlighted the need for the expansion of airlift capabilities as well as the requirement for infrastructure to adequately support it. Burma showed that airlift operations are no less technical than combat air force operations and therefore require specialized and centralized management and leadership by those with experience in airlift and air transportation. These lessons would be applied to the establishment of a Cold War basing strategy that would eventually facilitate a new era of global reach and rapid global mobility for the US. This strategy would prove its merit time and time again in later wars, humanitarian operations, and in direct support of allied nations.

In the short time between the end of the Vietnam War and the Paris Peace Accords, the advantage of fixed overseas basing to support airlift operations was

underscored during Operation Nickel Grass. During this difficult time in US history, airlift was called upon to support the defense of Israel in October 1973. Airlift would again prove to be the only means of transportation capable of meeting the time, distance, cargo, and speed requirements of this critical mission. Operation Nickel Grass demonstrated the importance of investing and maintaining overseas basing and host nation relationships to facilitate rapid global mobility.

Operation Nickel Grass, The Yom Kippur War, Israel, 1973

The Yom Kippur War of 1973 started on 6 October 1973. It was not until six days later that Military Airlift Command (MAC) was ordered to begin airlifting supplies to Israel. The length of time between the kick off of the war and the beginning of the US airlift operations to Israel was due to the political and economic considerations of US involvement in the defense of the Jewish State. During this lull of airlift activity, the US evaluated the support that the Soviet Union was providing to Egyptian and Syrian forces. Israel was a vital ally in the region. However, President Nixon wanted to avoid triggering a significant military escalation between the two superpowers.

This case study focuses on Operation Nickel Grass. This was the name of the MAC operation that utilized the C-5A "Galaxy" and C-141A "Starlifter" aircraft to re-supply Israel's critically low levels of artillery and ammunition during the Yom Kippur War in October 1973. Within hours of President Richard M. Nixon's order, MAC was flying supplies east from the CONUS to overseas bases to help Israel defend itself. With advancing Egyptian forces crossing the Suez Canal in the south and Syrian forces attacking across the Golan Heights to the north the young Jewish state was in peril (Krisinger 2009, 1).

Although Nickel Grass was successful, this case study highlights political actions, basing requirements and ground support resources that hindered airlift operations by limiting the speed, flexibility, and responsiveness of the ERS. Nickel Grass also defined a fourth point, airlift's unique ability to rapidly move resources to stabilize a situation and achieve political objectives without having to employ combat forces.

The Soviets responded to requests by Egypt and Syria and, while US observers looked on with growing apprehension, began airlifting military supplies into Egypt and Syria. The arrival of over eighty flights of Soviet transports in Egypt and Syria on October tenth showed extensive pre-planning in preparation for the conflict. The flights originated at a number of bases in eastern Europe and the Soviet Union (Boyne 2002, 84). The U.S. attempted negotiation with the communist regime during the first week of the Yom Kippur War, seeking to limit their support. Unfortunately, those attempts at direct negotiations between Washington and Moscow failed. Given few options, the US was then challenged with the delicate task of balancing support to the Israelis with that given to Egypt and Syria by the Russians. Maintaining this balance was crucial because US strategy sought to avoid escalation with the Soviets, provide support to Israel, and avoid the need to dedicate combat forces to the defense of Israel.

America's political climate in 1973 was strained. The US had withdrawn the last of its troops from Vietnam in March and the Nixon administration was in the midst of the Watergate scandal. This turmoil complicated the problem of assisting Israel with their defense. The US could not afford militarily or politically, to supply too much combat power to Israel, nor could they risk looking weak in the face of Soviet supported aggression.

The Syrian and Egyptian attack caught Israeli forces severely off guard. Despite initial set-backs, the Israeli defense force managed to secure a defensive line within a few days, but not without expending a large amount of their ordinance. It soon became clear that Israel was in considerable need of supplies. On October 9, Israeli Prime Minister Golda Meir issued a personal appeal to President Nixon for assistance. Fearing an oil embargo by the Arab nations the European nations refused the Prime Minister's request (Air Mobility Command Museum 2009, 1).

Meanwhile the Soviets had already begun a large scale resupply of Syrian and Egyptian forces. On October 12, President Nixon decided no more delays could be allowed and ordered the Air Force to send emergency shipments to provide support. Within nine hours, C-141s and C-5's were en-route to Israel (Lacomia 2009, 1).

Despite the decision by President Nixon to "send everything that can fly" (Lichte 2008, 40), the movement plan from the US to Israel was not complete. The planes were headed east, but they would not be able to make it all the way from the CONUS to Israel in one flight. In 1973, the C-141's and C-5's were not air refuel capable, therefore, they would need an en-route location to refuel and allow the crews to rest before continuing to Israel. The MAC aircrews were placed in this situation partially because of the lack of understanding of airlift support requirements on the part of the Secretary of State and Defense at the time.

> Most of us, like Kissinger and Schlesinger, do not realize that an airlift is not simply a bunch of aircraft carrying freight. It is instead a massive operation involving intense logistical coordination to create what Major General Tunner called an airborne conveyor belt. (Boyne 2002, 99)

With aircraft airborne and their en-route fuel stop location still unknown, the political maneuvering continued as traditional European allies refused to allow US

aircraft to land to refuel or even overfly their countries. Fearing economic unification of Arab nations, the European nations denied access to their overseas bases to any aircraft associated with Nickel Grass. (Air Mobility Command Museum 2009, 1). Fortunately for American prestige and Israeli survival, Portugal offered assistance in the form of Lajes Field in the Azores. This little island in the Atlantic became the key staging point for the American aircraft during Operation Nickel Grass.

Receiving permission to use Lajes Field was the first major hurdle to the success of the operation. While their first hurdle had been cleared, a second challenge loomed for American planners and aircrew: deploying ground support resources to support the coming airflow.

Missions into the Azores increased steadily. Despite having supplies at allied bases in Europe, they would have to be flown west to Lajes before they could be turned around and flown east to Israel due to the continued fear of an oil embargo. Funneling the airlift operation entirely through the Azores increased the pace dramatically. Soon over 30 aircraft per day were transiting the island. This rapid increase in aircraft quickly surpassed the organic resource capabilities of the airfield. MAC knew they had to augment Lajes with ground support resources to handle the enormous increase of airflow. Aircraft mechanics were quickly flown to the island along with cargo handling and supply personnel. The base quickly expanded to accommodate the augmentation. Many of which had to be billeted in hastily reactivated WWII barracks. All total, Lajes received over 1500 people to facilitate operations during Nickel Grass (Boyne 2002, 121). Airlift Control Elements were also placed at Lajes and at Lod airport in Tel Aviv to ensure the command and control was fully integrated between AMC, Lajes, and Israel as missions

continued to flow around the clock (Bruno 1997, 121). Once aircraft were serviced and repaired at Lajes, political sensitivities again dictated operations. This time it would determine the flight path that the MAC aircrews were required to fly to safely deliver their cargo to Israel.

To maintain the political balance, airlift crews had to fly a precise route through the Mediterranean to avoid upsetting any European nations to the north and to avoid making their aircraft vulnerable to attack from Arab threats to the south. The transports had to split the Straits of Gibraltar and fly down the middle of the Mediterranean Sea where they were escorted by fighters from the U.S. Sixth Fleet. Once MAC aircraft were within 150 miles of Israel, Israeli Air Force F-4 "Phantoms" escorted them into Lod airport (Heist 2009, 1). The cooperative efforts of Israel, the USAF, the USN, and Portugal, through the use of Lajes, enabled the United States to support the Israeli defense. Without the use of the Azores to facilitate refuel, ground handling, aircrew, and personnel billeting, support to Israel may not have come in time to provide them with the resources they needed to defend their country.

Between 14 October and 14 November MAC planners scheduled an average of four C-5s and twelve C-141s per day into Tel Aviv, Israel. By the end of Nickel Grass US airlift had flown a combined total of 567 missions, logging over 18,000 hours of flight time and delivering 22,318 tons of material to Israel. Of note was the performance of the newly acquired C-5s, which carried half the total tonnage and one hundred percent of the oversized and outsized cargo on 145 of 567 MAC missions flown (AMC Museum 2009, 1).

US airlift simply outperformed that of the Russians. The US airlifted the needed resources to allow Israeli ground forces to defend and attack their aggressors. Within two weeks Israel would launch devastating counterattacks, re-establish its borders and drive deep into enemy territory. By comparison, the Soviet Air Force airlift aircraft hauled 15,000 tons on 935 missions, less than half the American effort. What made MACs performance even more noteworthy was the fact that the American transports flew a one way distance of 6,450 nautical miles compared to an average distance of 1,700 nautical miles by the Russian transport aircraft (AMC Museum 2009, 1).

The first challenge to Operation Nickel Grass was the political sensitivity of Europe to the threat of an oil embargo by Arab nations to all nations that supported Israel. The US had military bases and resources in Europe that could have quickly responded with military assistance to Israel. Unfortunately, the fear of the embargo caused the European nations to deny the use of US bases within their respective countries. Because of the political climate, the US had to look elsewhere for a base from which to operate.

Driven by political consideration, the second challenge resulted from funneling airlift through one limited enroute location. The US was granted permission by Portugal to use Lajes Field in the Azores. However, this was the only airfield between Israel and the CONUS that the US could use. This meant the US would have to channel everything in and out of Lajes which quickly surpassed the capabilities of the airfield. This quickly diverted the attention of the MAC planners to the ground, in particular, the ground resources that would now be required to sustain this operation.

The isolated airfield in the Azores required a significant increase in ground support personnel and equipment to handle the increased airflow, these resources also,

had to be airlifted in. These combined lessons drove the DoD to take a hard look at the available overseas basing infrastructure and invest in expanding the future capabilities of the ERS.

Despite the political challenges to garner basing support and the lack of resources at the beginning of the operation, the speed of airlift provided the needed support to Israel and prevented the US from committing any US combat ground forces to assist in their defense. Significant to this study and the impact of extending the ERS to support AFRICOM, this operation illustrates the speed and flexibility of airlift as well as the political and economic considerations of the basing locations. The lessons from Nickel Grass underscores the need for investing in and maintaining overseas basing while maintaining host nation relationships. Only through these actions can DoD hope to quickly and consistently gain unrestricted access to resources in other nations to support sustained rapid global mobility and the GRL strategy. Despite the lopsided performance of MAC airlift over Soviet airlift, there were many lessons learned by the Americans.

Nickel Grass revealed a severe deficiency in American airlift capabilities as well as validating the need for staging bases overseas. As a result the U.S. greatly expanded the aerial refueling capabilities of its fleet by modifying the C-141 and C-5 to make them air refuel capable and thus made long distance flight operations the standard rather than the exception (AMC Museum 2009, 2). The operations also re-emphasized the value of centralized command and control of aircraft, aircrew and resources. It provided insight as to why consideration of economic and political factors must be made to prevent degrading mission effectiveness through delayed movement of resources. Had it not been for Lajes, the Yom Kippur War might have turned out very different for Israel and the

US. Finally, the most important lesson learned from Operation Nickel Grass was that the US understood the importance of maintaining a system of overseas bases to support airlift operations and the rapid deployment of forces. This understanding prevented the US from repeating the same, historic, post-war contraction of overseas resources after the War in Vietnam. The criticality of overseas basing to facilitate and expedite the rapid movement of resources outside the CONUS became a key component to the future success of the military. This system would mature to become the ERS of today, but this would first require an overhaul to ensure the success of future operations.

The political challenges of Nickel Grass highlighted the need to maintain a limited presence at airlift capable bases overseas. This understanding eventually led the USAF into a new strategy of global reach and rapid global mobility. This strategy would become dependent on a combination of overseas bases containing highly trained, equipped and postured aircraft maintenance, supply, aerial port, and command and control personnel. These overseas locations facilitate efficient recovery, service, up-load, and download of passengers and cargo and launch of transiting aircraft. They also provide billeting to accommodate crew rest demands, as well as billeting for the ground support personnel. Tying the various capabilities of the multiple bases together required renewed emphasis on centralized command and control of this system to ensure efficient operations. This posture proved to be flexible, responsive, efficient and effective in support of military and humanitarian operations around the world.

Making the GRL strategy work requires a global look at the overseas bases to determine which bases have the capability to support and which ones require additional investment to achieve the required level of support. This system-wide approach, led to

the concepts of Global Reach and Rapid Global Mobility which are facilitated by the current ERS. This combination of airlift, air refueling, and ERS basing is the GRL strategy. As a result, the ERS can extend the long arm of America with a clenched fist or an open hand within hours of a military crisis or a natural disaster. A benefit to this structure is a reduced dependence on air refueling support. Accordingly, unrefueled range of airlift aircraft became a primary factor in determining the ERS basing strategy.

The enroute locations that support AMCs GRL strategy, are based off a 3,500 nautical mile, unrefueled, planning factor. This strategy attempts balance payload, crew duty day, and logistical velocity to maximize effectiveness. This planning factor was the result of a Rand study of the 1950's which recommended procuring aircraft with operating ranges from 1,500 to 3,500 nautical miles while carrying up to seventy five ton payloads. This concept was reviewed and subsequently a Military Air Transport Service study validated the requirement (Miller et al. 1998, 116).

The European bases picked were equal distances from the CONUS and SWA. Drawing 3500 nautical mile arcs from both the Middle East and the east coast created an optimum lens over Europe to place the ERS bases. A similar lens was drawn in the Pacific using the west coast, Alaska, Hawaii and the Pacific Rim. (See figure 2)

Figure 2. ERS "Lens" Denotes 3500 Nautical Mile Airlift Planning Factors for Fixed ERS Basing Strategy

Source: Neil P.Curtain, U.S. General Accounting Office, GAO 01-566, *Military Readiness: Management Focus Needed on Airfields for Overseas Deployments* (Washington, DC: Government Printing Office, 2001), 5.

Advances in aircraft, speed, cargo capacity, reach, and reliability have directly affected the enroute structure. Due to increased aircraft range, which has been increased by air refueling, the need for overseas basing has declined. When WWII ended the ATC had resources at 335 locations around the world. This support decreased to 70 airfields during the Korean conflict and 32 during Vietnam (Miller et al. 1998, 118). The fixed ERS of today is made up of 12 locations dispersed between the European and Pacific theatres.

The reduced dependence of airlift on refueling operations created additional capability and flexibility for the tankers which now primarily support fighter and bomber

aircraft. This decreased dependency also reduced the need to have tanker aircraft, aircrews, and resources deployed in parallel with airlift aircraft in the ERS construct. When airlift and tanker aircraft are co-located on a base they compete for shared ground servicing resources. In these cases, the effectiveness of fuel services, aircraft maintenance, supply and aerospace ground equipment suffer due to the inefficiencies created by competition for these resources. This is caused by the requirement to de-conflict the mission priorities between the airlift and tanker missions. These items illustrate the compounding benefits of the ERS and overseas basing. MAC realized the benefits of maintaining overseas basing to support airlift and the Gulf War proved those benefits and in 1991 brought about a re-structuring of the Air Force that would lead to additional DoD emphasis investments and maturation of the ERS.

The major commands, Strategic Air Command, (SAC) Tactical Air Command, (TAC) and MAC were consolidated into ACC and AMC. AMC received the bulk of the airlift assets and a considerable portion of the tanker force. The integration of lift and tankers was to facilitate global mobility and reach thereby expediting AMCs rapid global response capability (Agency Group 09 2000, 4). The restructuring brought about another hard look at the ERS that was used to facilitate AMCs global mobility, reach, and response. AMC took the lead on the study and in 1993 set out to evaluate the fixed en route structure.

The study attempted to determine what the minimum footprint necessary to support peacetime AMC operations would be for the overseas basing structure, the results recommended another contraction in overseas resources but not a complete withdrawal. AMC would retain only strategic airlift and air mobility assets at key locations. The

reduced AMC presence overseas from 5,287 personnel at 39 sites to 3,933 at thirteen key locations provided the minimum forward, fixed facilities necessary for peacetime support. In July 1994, AMC implemented the GRL concept to rapidly expand fixed en route locations, or establish a presence, where infrastructure was nonexistent anywhere in the world (Agency Group 09 2000, 4). After settling into the GRL concept AMC wanted to be sure the thirteen key sites identified were truly postured with the right people, resources, infrastructure, and equipment to properly support GRL into the twenty first century. In order to bring additional attention to this strategy and the ERS, AMC highlighted numerous infrastructure improvements needed at the key sites to ensure success for the future of the DoD. Fittingly, AMC named 1997 as "The Year of the En Route" and between 1996 and 2006 fuels and infrastructure improvement projects in excess of $717M were programmed for construction (Agency Group 09 2000, 4). The GRL concept would be tested before most of the programmed construction could even be started. The attacks of September 11th, 2001 brought America into the War in Iraq, Afghanistan, and from November 2001 through May 2009, the en route system has continued to prove its ability to support and sustain OIF, OEF, and numerous humanitarian operations around the globe.

One such humanitarian operation occurred in the middle of OIF and OEF and again demonstrated the speed, reach, flexibility, and responsiveness of airlift utilizing the ERS and the GRL strategy. On 8 October 2005, Pakistan's Kashmir region was rocked by a 7.6-magnitude earthquake that killed more than 73,000 people, destroyed entire villages, and left nearly 3 million people homeless. The greatest impact was felt in the remote mountainous Azad Jammu and Kashmir state of Pakistan. These events triggered

fears of even more deaths as the harsh winter of this region was fast approaching (Miles 2006, 2).

Pakistan Earthquake Relief Operation
October 2005-February 2006

The third and final case study covers the Pakistan earthquake relief operation. This humanitarian effort brought aid and supplies to over three million displaced persons in the aftermath of an earthquake that killed over 73,000 in one of the most isolated regions of the world.

This airlift operation is significant for four reasons. First, because this was a humanitarian operation, the political barriers were removed as international willingness to assist provided the US with access permissions by many nations to depart from, over-fly, and land at airfields as needed. Second, with the absence of political barriers to access, AMC was quickly able to respond and maximize the full potential of the ERS and the aircraft. This operation demonstrates the unique speed, flexibility, and responsiveness of airlift and the ERS to respond to a crisis anywhere in the world in a short time. Third, airlift was the only means of delivering relief supplies, aid, and medical care quickly to the people in this remote part of the world. Access to some of the most remote villages was impossible due to the rock or mud slides that severed or buried the roads. Fourth and finally, the operation had unforeseen, positive effects on general public opinion about America and Americans. Throughout Pakistan, positive opinions of America jumped by nearly twenty percent in three months.

Due to the fact that this was a humanitarian mission, international support combined with inter-service, multi-national, and interagency cooperation maximized

relief capabilities. The US and the North Atlantic Treaty Organization (NATO) airlifted supplies donated by the alliance and partner countries as well as the United Nations (UN) High Commissioner for Refugees. This was accomplished via two air bridges from Germany and Turkey. The airlift missions flown from the various countries carried nearly 18,000 tents, 505,000 blankets, 17,000 stoves and heaters, more than 31,000 mattresses and 49,800 sleeping bags, as well as tons of medical supplies from multiple nations (NATO Practice 2007, 1).

Unlike Operation Nickel Grass, the political restrictions that often delay or prevent airlift operations were not present. Operating without political limitations afforded airlift utilization of direct routing to optimum airfield locations to facilitate air land cargo operations. This access also allowed medical and relief supplies to be moved from existing AMSs in Europe to establish operations in Pakistan to facilitate reception and onward movement of supplies and personnel. Contingency Response Groups were sent forward into Pakistan unimpeded to establish airfield forward operating locations. These forward operating locations helped facilitate command and control, cargo upload, download, and aircraft maintenance needs. This expedited ground handling operations and allowed more resources to be fed to Pakistan.

During this time US, NATO, UN and other NGOs pulled together and served a common purpose to bring humanitarian aid to the people of Pakistan. Regardless of the cooperative efforts of the international communities, getting the supplies to Pakistan was only half the battle. They knew they had to respond quickly because the next challenge, winter, was approaching fast. Supplies had to be moved in quickly before snow and ice of the Pakistan winter prevented access to the people in the most remote mountain villages.

AMC responded quickly through the use of a mature ERS of fixed bases. “A C-17 loaded with relief supplies left Bagram, Afghanistan for Pakistan on October ninth, less than forty-eight hours after the earthquake” (Schwartz 2006, 1). Unencumbered political access to the country was instrumental in facilitating a forty-eight hour response time. The speed and responsiveness was facilitated by the capabilities and resident expertise of the ERS. The centralized command and control through the Tanker Airlift Control Center (TACC) linked the AMSs in Germany and Turkey to the CRGs in Pakistan as part of the GRL strategy. This structure allowed the ERS to quickly re-prioritize, re-configure and re-load aircraft, and re-set the missions and aircrews to respond to the humanitarian crisis. The multiplying benefits of the AMC ERS and its fleet of strategic aircraft provided speed, range, and flexibility to not only respond to a crisis but also to sustain the effort.

The Pakistan Humanitarian relief operation illustrates how fast AMC can respond to a crisis to help contain and resolve matters when political barriers preventing access are removed. A favorable political environment, as illustrated in this operation, allowed AMC to maximize the compounding capabilities of the ERS and its strategic aircraft to quickly respond to this crisis.

The earthquake and the subsequent tremors that continued for days caused rock and mud slides which severed many of the mountain roads, thus denying access by ground transportation. For some of the remote villages, this left little hope of receiving aid anytime soon. The C-17’s could only move resources to the region. To facilitate onward movement of supplies, into the mountains, the C-17s airlifted CH-47 “Chinook”

helicopters, aircrew, and maintainers from the CONUS to Pakistan to facilitate the last leg of delivery to the remote villages.

After the supplies and expertise arrived via C-17, they were quickly off-loaded, re-configured, and loaded on the CH-47 Helicopters. The responsibility to complete the last leg of delivery of the relief supplies to the isolated villages of the mountains fell on the helicopters and they quickly stepped up to the challenge. The coordinated efforts of the US and coalition helicopters flew more than 3,200 sorties, carrying over 15,000 passengers and collectively they evacuated more than 3,800 casualties and delivered more than 3,500 tons of humanitarian aid. The Chinooks delivered over 100 tons of cargo a day, much of it sling loaded to speed delivery and increase the amount of supplies that could to be ferried (Miles 2009, 1). The Pakistan earthquake relief operation saw its last mission on 1 February 2006. By the end, AMC's airlift to Pakistan totaled 1,674 passengers and just over 5,549 short tons of supplies (Schwartz 2006. 6). Despite the impressive tonnage and passenger numbers generated by the hard work of the men and women of the US military and international partners, there was another set of numbers that were equally impressive; specifically the US approval rating by the people of Pakistan.

One of the unexpected strategic level objectives achieved by the US during the Pakistan earthquake relief was the influence on the perception of America and Americans by the people of Pakistan. American popularity rose quickly from twenty-three percent before the earthquake to 45 percent by November 2005. "Clearly we were doing something right and the people recognized and appreciated genuine American aid to the stricken Pakistani population" (Chamberline 2007, 5). This statistic speaks volumes about

the capability airlift can bring to a theatre, to not only support major combat operations, but also humanitarian operations, for nations or people in need. Unlike combat aircraft that have greatest applications in tactical or operational roles; mobility aircraft can support tactical, operational, and strategic objectives, sometimes simultaneously, and through a variety of missions.

The remote regions and the isolation created by the geography of Pakistan was a limiting factor in this operation. Fortunately the favorable political environment and the close proximity of Pakistan to the resources of the ERS allowed for a timely, adequate, and sustained response. Unfortunately, the ERS is not currently postured in a manner that would provide the same level of effectiveness and efficiency if it had to support a similar military or humanitarian crisis within the interior of Africa.

Like Pakistan, one of the problems in Africa is geographic isolation of its people. Unlike Pakistan, it is not the vertical aspect of altitude that creates the isolation of people instead, the problem is horizontal. The tyranny of time and distance across the continent of Africa will create challenges for the GRL strategy and its mission to meet sustained rapid global mobility to support USAFRICOM goals. The geographic challenge is compounded by the fact that there are not any US military bases in Africa. Additionally, the GRL strategy was not designed to provide the same level of coverage and redundancy to Africa that it does to SWA and the Pacific Rim. If the US needs to respond quickly to a military or humanitarian crisis in Sub-Saharan Africa to meet USAFRICOM objectives, efficiency of the ERS will be degraded. If sustained airlift operations are required and forward operating locations in USAFRICOM cannot be secured, the enroute systems' ability to deliver resources globally will be degraded. This is due primarily to a lack of

basing in Africa, coupled with a lack of ground support resources and weak or unstable governments throughout the continent. These challenges must be addressed to facilitate sustained rapid global mobility to support the goals of the new command. Chapter five will discuss these issues in greater detail.

Lessons Learned

Each of the historical case studies is unique. The Burma study discussed the dawn of airlift operations and the first ever use of an ALOC to sustain a large conventional ground force. The lessons learned in Burma set the stage for success in the Berlin Airlift and became part of the doctrinal framework of air mobility operations today. Operation Nickel Grass demonstrated the speed, range, and capability of MACs newest airlifters. These aircraft, and the ability to rapidly expand operations at Lajes, simply outclassed the Russian airlift effort. This feat was especially noteworthy because the US airlifters flew three times the distance of the Russian aircraft. This led to modification of the US airlifters to make them air refuel capable to further their endurance. Finally the Pakistan Relief operation demonstrated the ability to utilize airlift in a humanitarian role in an equally effective manner. Despite the different lessons learned from each of these missions, it is what these missions have in common that are key to this thesis. These key themes are political access, basing, ground support resources, and centralized control.

The first key is political access. Each mission required political access to facilitate airlift operations. In Burma the US needed access from India and China to begin operations. In Nickel Grass, the European allies failed the US by denying airlift access or even over-flight of their countries. Fortunately, the US gained political access to Lajes through Portugal to facilitate airlift operations. The Pakistan earthquake relief operation

demonstrated the speed with which airlift operations can respond to a crisis when political barriers are removed from the equation.

After access is achieved we can look to basing as the second key theme. The location of the basing becomes important because it dictates how much airlift can carry given time, distance, cargo, and aircraft endurance considerations. In Burma, it was the consistent addition of bases that allowed for the increased movement of resources to support the mission. In Nickel Grass, it was the bases at Lajes and Lod that dictated the amount of resources that could be flown into Israel to assist them in their defense. In Pakistan, it was the use of fixed ERS bases in Germany and Turkey that facilitated a movement of resources to Pakistan within forty-eight hours.

As access is gained and basing is achieved, the next challenge is to identify the size, speed, volume, and length of the operation. These variables will help determine the third key which is ground support resources. After political access is granted and basing is determined, ground support resources dictate the pace, and sustainability of the operation. From Burma, India the airlift operation was able to keep the Chinese supplied and in the fight. This effort forced the Japanese to divide their forces and fight on two fronts causing them to culminate sooner. During Operation Nickel Grass, the rapid response and the precise movement of airlift through the enroute base in Lajes was fostered by quickly augmenting the Azores with 1,500 ground support personnel. This provided a level of airlift sustainment to keep supplies moving freely to Israel. The expeditious movement of artillery and ammunition allowed them to keep fighting without fear of running out of ammunition and they quickly beat back their opponents. In Pakistan, the ground resources at the ERS fixed bases in Germany and Turkey were able

to quickly turn jets and deploy ground support personnel and aid to Pakistan. Upon arrival, personnel were able to facilitate aircraft maintenance and cargo operations to download helicopters and speed sling-load operations to bring supplies to the remote mountain villages.

Finally, all of the variables associated with the different capabilities of each of the bases were tied together through centralized control to conserve airlift resources and reach effective mission closure faster. In Burma, the need for centralized control was first discovered when Tenth AF leadership requisitioned aircraft and crew without notice, thereby interrupting the delicate rhythm of the operation. Each step toward centralized control yielded increases in tonnage over the Hump. In Nickel Grass, the centralized control was facilitated through the airlift control elements at Lod and Lajes which were tied into MAC. This constant communication was instrumental to coordinating the efficient movement of resources that were funneled through Lajes. In Pakistan, centralized control of the ERS allowed AMC to utilize aircraft, crews, and resources that were already overseas. These jets were quickly re-loaded with supplies and ground support personnel to respond within hours of the earthquake.

These three case studies demonstrate airlift's unique ability to rapidly move supplies to sustain support of major combat operations and to prevent the need to deploy ground forces and to aid our allies in times of need. The cases also showed how airlift can prevent undue suffering by providing humanitarian support within hours of request.

If the US wishes to achieve these objectives in USAFRICOM the US must first garner political access to facilitate basing in Africa. If sustained airlift support to USAFRICOM is required, ground support resources will be necessary to effectively meet

USAFRICOM goals. Finally, the centralized command and control of these resources must not be interrupted to preserve the efficiency of AMC operations to meet on-going and future rapid global mobility requirements.

CHAPTER 5

AIRLIFT OPERATIONS IN USAFRICOM

The examples highlighted in the case studies of Chapter 4 identify the need to consider a multitude of issues that affect ERS support. These considerations are important when planning airlift operations throughout USAFRICOM. As we look to future air mobility support options for this command, we must consider the unique, yet historically familiar challenges of its AOR. As seen in the previous chapter, there are four areas that will directly affect airlift operations in Africa. These areas include the unstable political environment, the lack of ERS basing in Africa, the small number of airlift resources assigned to USAFRICOM and the sheer size of the continent. While three of the four areas are consistent with Chapter 4, geography replaces centralized control in this chapter.

The AMC command and control of aircraft and resources is fully integrated across the globe and centralized under Eighteenth Air Force, Headquarters, Scott AFB, Illinois. The men and women of AMC maintain vigilance of all aircraft, crews and overseas ground resources twenty-four hours a day, seven days a week, three-hundred-sixty-five days a year. While this solves the centralized control issues experienced in the previous case studies, it does not address the challenge of geography of the continent. At three times the size of the US, the sheer size of Africa will present challenges for planners and therefore must be considered when discussing airlift support to USAFRICOM.

These issues, combined with the limited road and rail infrastructure to support surface transportation, mean that USAFRICOM operations will be very dependent on the

speed, range, and flexibility of airlift operations to meet the emerging mission requirements of the new command.

While the GRL strategy was designed to provide global reach throughout the world, the selection of the locations reflects a design geared toward primarily supporting rapid global mobility to two anticipated threat areas. Unfortunately for USAFRICOM, Africa was not one of those areas. DoD selected the bases according to their proximity to the anticipated war zones, the host nation's willingness to allow the use of its bases, and other factors such as climate (Curtin 2001, 5). These distances created the lens in which the ERS bases are located. The GRL strategy was not designed to provide sustained rapid global mobility to USAFRICOM like it was to SWA and the Pacific Rim. One key from the reference above is, base-selection-criteria is dependent on host nation willingness to allow access to its bases. Political will is significant when considering airlift operations to and throughout USAFRICOM.

Unlike the Pakistan study, the Burma and Israel case studies demonstrated political challenges that prevented direct airlift access to each country using the most ideal and efficient routing. In Burma, Airmen had to gain access to China by flying from India over the Himalayas. In Operation Nickel Grass, the only country that allowed aircraft to transit their location was Lajes Field, Portugal, in the Azores. This in-turn created an enormous bottleneck for airlift to operate in. In contrast to Burma and Nickel Grass, political restrictions were removed during the Pakistan earthquake relief operation. The fact that this was a humanitarian mission made political access easy. These limitations on airlift operations from the case studies in chapter 4 emphasize the need to consider politics in airlift operations.

Politics

A favorable political climate between the US and the nations of Africa allows access to and over-flight of the many countries of Africa. USAFRICOM will have similar challenges to work through to ensure ease of access to, through, and over nations to ensure flexibility and responsiveness for airlift operations. Access is typically requested and granted with a diplomatic clearance which provides one time access to a specific aircraft and crew on a specific mission. However, diplomatic clearances take time to request if there isn't a well established relationship between the US and the nation the US is requesting the diplomatic clearance from. The issue of over-flight will be increasingly difficult when attempting to access any of the thirteen land locked countries in the interior of Africa. Unless a country offers the US unrestricted diplomatic clearance to or through their country, diplomatic clearances are typically restricted to a specific mission, departure and arrival locations, and a specific block of time. This process and these limitations can significantly hinder the speed with which AMC can respond to crisis situations. (See figure 3)

The figure titled *Africa Overflight Request Challenges* on the next page identifies the nations of Africa numerically when routine overflight is allowed. Nations that do not have a number or a letter are considered problematic when requesting overflight permissions. Finally, those nations identified with a letter indicate countries with restricted overflight. Of the forty-eight countries in Africa, fourteen allow routine overflight, thirty-one have problematic overflight where planners can expect delays in planning and execution. Last, three countries have restricted overflight where aircraft should not go unless presented with a need to make an emergency landing.

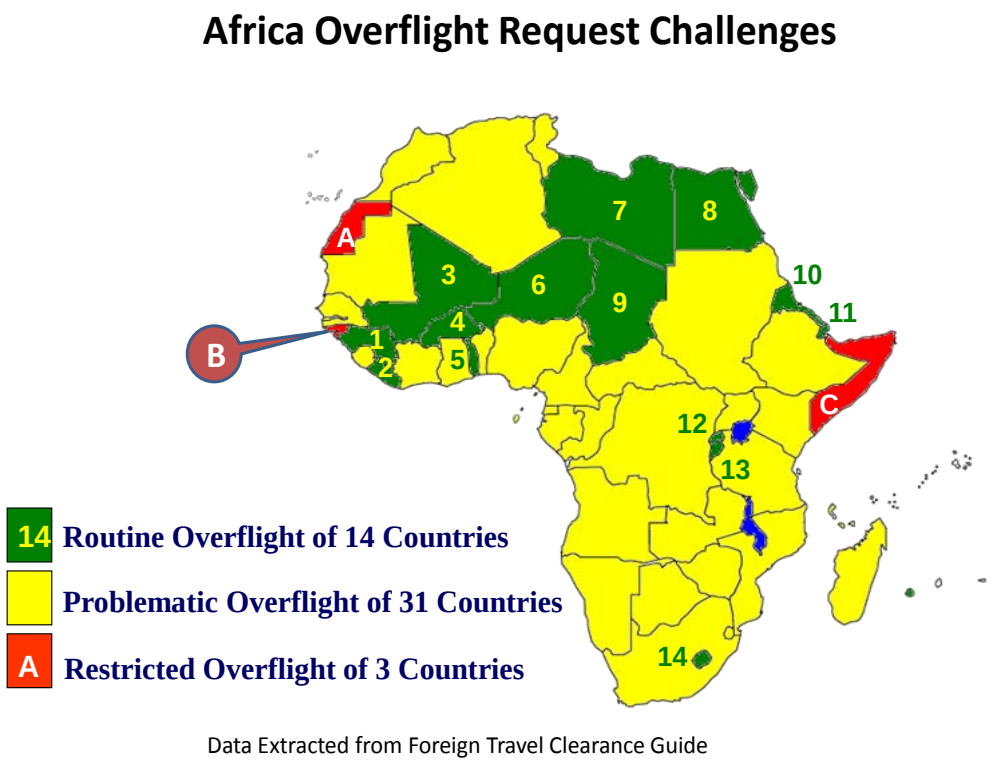


Figure 3. Data Extracted from Foreign Travel Clearance Guide
Source: U.S. Department of Defense, "Africa and Southwest Asia," *Electronic Foreign Clearance Guide*, https://www.fcg.pentagon.mil/fcg.cfm (accessed 17 May 2009).

One of the reasons for the problematic, non-standard, and diverse over-flight process stems from the lack of political standardization between the US and the nations of Africa. One of the more notable political challenges is the lack of a Status of Forces Agreement (SOFA). Using the NATO SOFA as an example, troops can train, organize, and equip, en masse, without the burdens of visa applications, weapons permits, import duties, foreign taxes, or foreign driving tests (Palmer 2008, 80). The military efficiencies gained by having a well understood, working relationship outlined in the form of a SOFA are significant. Not having a formal agreement outlining how forces from one nation or

another will operate, from one country to the next, creates operational challenges to fostering partnerships between the nations of Africa. In addition to the operational challenges for the US, the lack of a Pan African SOFA places US forces deployed to the region in a situation where they could be subject to the laws of the host nation as opposed to operating under the protective veil of a SOFA.

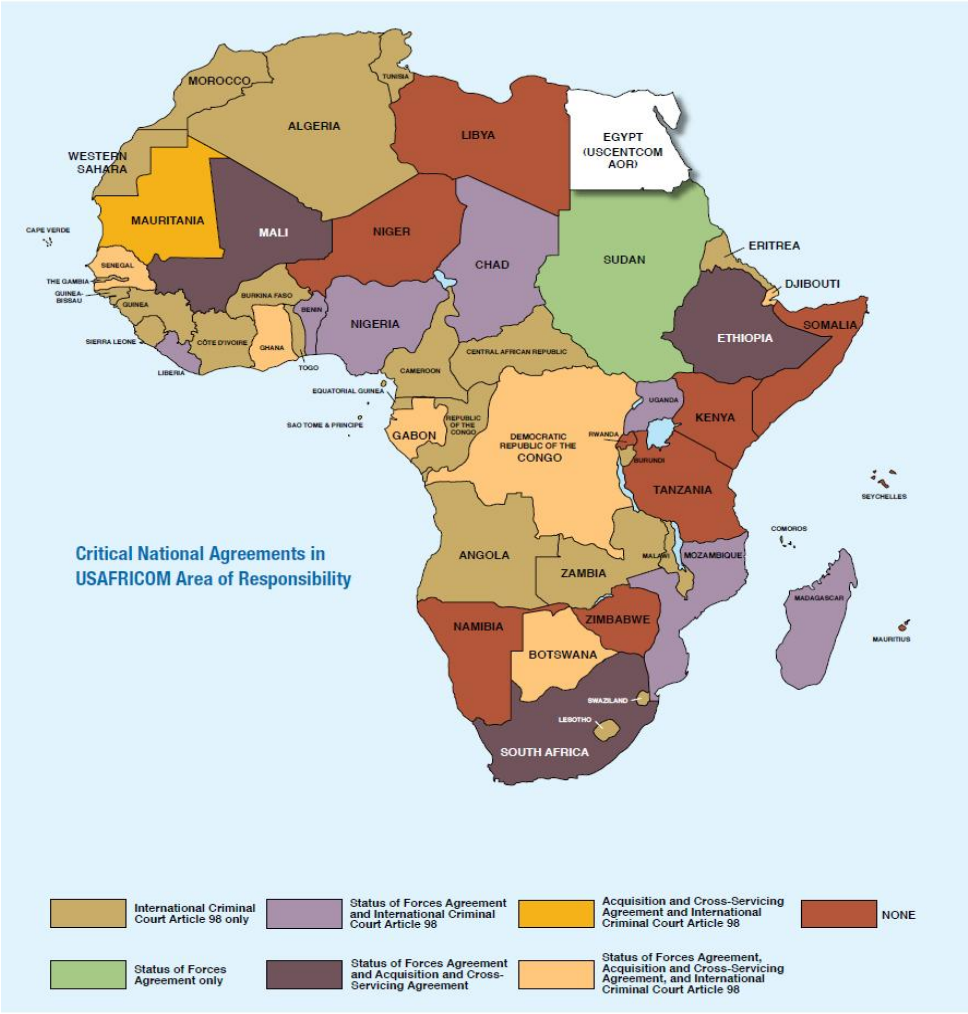
> If we consider the functionality of the SOFA in the context of USAFRICOM, we find a less than ideal arrangement. Among the states that comprise the command, less than one third have some form of international agreement that addresses the presence of American forces in their country. Thus, for the majority of countries in the USAFRICOM area of responsibility U.S. military personnel have the same status as tourists--they are subject to visa requirements, customs restrictions, taxes, and all the laws of the host state. Note that states have no independent obligation to provide visitors with even basic due process rights. Essentially, absent specific legal authority, one enters and operates in a foreign setting at his own peril. (Palmer 2008, 80)

Within Africa only nineteen of the forty-eight countries have a SOFA with the US, twenty-one of the nations have an International Criminal Court Article 98 agreement, and the remaining eight countries have no formal agreement with the US (Palmer 2008, 80).

The lack of standardization across USAFRICOM presents significant political challenges to those wishing to plan airlift throughout the AOR. This is compounded by the fact that once airlift is planned into the various countries, in some cases military forces may be placed in situations where there is a lack of any formal agreement protecting them, their movements and their operations. The map of Africa in figure 4 identifies those nations with some form of military agreement with the US in the form of a SOFA. The figure also identifies those nations in Africa that have an International Criminal Court Article 96 agreement with other nations. The U.S. currently does not recognize the International Criminal Court Article 96. More importantly one should understand the fact that eight countries within Africa have no formal military agreement

with the US or the International Criminal Court. This paints a larger picture of political instability within the country, political prejudice against the US, or a lack of desire to work with other nations. Putting US Soldiers, Sailors, Airmen or Marines on the ground in any one of these eight countries should necessitate serious consideration of the circumstances, urgency, and political importance of the mission.

In April of 2009, Somali pirates took hostage Captain Richard Phillips of the US flagged sea vessel, the Maersk Alabama. The ship was carrying food and other humanitarian supplies destined for Nairobi, Kenya. There was a tense standoff for a few days before three of the four pirates were shot and the other captured. After the incident Captain Phillips, his crew, and numerous military members involved in the rescue were moved to a hotel in Kenya awaiting military airlift back to the US. Fortunately US relations with Kenya are good, however, referring to Figure 4 below identifies that neither Somalia, Tanzania nor Kenya have a SOFA with the US or an Article 96 agreement with other nations. If the US did not have good relations with the government of Kenya it would have been increasingly problematic to return Captain Phillips and his crew to the US. Operating in foreign nations without a SOFA means that US personnel will be accepting greater risk by operating outside the protective umbrella of formal US SOFA or International agreements.



Source: "Treaties in Force," Section 2: Bilateral Agreements, U.S. Department of State, April 10, 2007.

Figure 4. Critical National Agreement

Source: Jeffery S. Palmer, "Legal Impediments to Operationalization," *Joint Force Quarterly*, no. 51 (4th Quarter, 2008): 82, http://www.ndu.edu/inss/Press/jfq_pages/i51.htm (accessed 19 May 2009).

Unlike flying across the established Component Commands (COCOM) AOR, (see figure 5 for Geographic COCOM Diagram) flying across USAFRICOM will present additional time and distance challenges which will hinder responsiveness. The GRL

strategy provides great coverage for US Central Command (USCENTCOM), US European Command, (USEUCOM) and US Pacific Command, (USPACOM) (see figure 6). There is redundancy in the GRL strategy which allows for the loss of a base or bases due to weather or political reasons without significantly impacting global reach or rapid global mobility. Unfortunately the GRL does not provide the same coverage for USAFRICOM.

Figure 5. Geographic COCOM Diagram
Source: Defense Procurement and Acquisition Policy, http://www.acq.osd.mil/dpap/pacc/cc/areas_of_responsibility.html (accessed 19 May 2009).

Basing

As shown in figure 6 below, the thirteen ERS airfields are located mostly in Europe and throughout the Pacific. As noted previously in Chapter 4 each base is planned between a 3,500 nautical mile arc from the US and anticipated war zones. This distance

provides a basic planning factor for the maximum efficient range of the C-17 cargo aircraft without refueling. Operation of the ERS airfields is shared between the host nation, which owns the airfield, and a number of DOD organizations. Host nation responsibilities vary and are documented in the SOFA for each country (Curtin 2001, 5).

Figure 6. Location of ERS Airfields
Source: U.S. General Accounting Office, GAO 01-566, *Military Readiness: Management Focus Needed on Airfields for Overseas Deployments* (Washington, DC: Government Printing Office, 2001), 5.

Airfields within the ERS provide support to global reach, rapid global mobility, and the GRL strategy for SWA and the Pacific Rim. Although the strategy does provide a means to facilitate global reach to USAFRICOM, it was not designed to provide sustained rapid global mobility to this AOR. Given the limitations created by the size and distance of Africa, the lack of DoD bases and resources within USAFRICOM, and the

uncertainty of the commands still maturing mission, efficient airlift support will be sub-optimal. Even though airlift will still likely be the fastest means to deliver resources to and throughout USAFRICOM, its response time will be poor when compared to those COCOMs containing an ERS presence. USAFRICOM cannot expect the same flexibility to provide crisis action response as other COCOMs. Similarly, USTRANSCOM, AMC, and the TACC cannot expect to achieve the same level of efficiency and effectiveness with missions operating outside the ERS pipelines wherein the organic ground support personnel and equipment sustain the expeditious movement of airlift through this system.

Airlift Ground Support People, Parts, and Equipment

As illustrated in Operation Nickel Grass, distance can be overcome if you have resources in place to facilitate a sustained movement. Unfortunately USAFRICOM does not have aircraft maintainers or troops to process cargo and passengers or the specialized equipment needed by these specialties to perform their duties. Not only is there a lack of resources in the new command but the make-up of those resources is very different from USCENTCOM, USEUCOM and USPACOM. Each of the other COCOMs own multiple military bases where these resources are assigned. These ground support resources help sustain airlift movement as part of the GRL strategy. Having ultimate responsibility for their ground support resources allows each of the COCOMs to draw directly from each of their manpower pools within their chain of command and rapidly mobilize those specialties through the ERS to meet theatre, Chairman Joint Chiefs of Staff, and/or DoD mission requirements. This ability plays a significant role in facilitating and expediting global reach and rapid global mobility for AMC. USAFRICOM does not have any such specialized manpower pools in their AOR. Additionally, they do not have large amounts

of assigned Army, Navy, Marine or Air Force personnel or equipment to draw from to quickly respond to a military or humanitarian crisis.

USAFRICOM is unique in the fact that it has a larger percentage of DoD civilian employees, and non-DoD civilian employees than the other commands. The new command has been authorized 1,356 positions for their headquarters, of which 639 will be military, 665 are civilian DoD and fifty-two are to be filled by non-DoD agencies like State and USAID (Pendleton 2009. 3). As of October 2008 about seventy percent of the personnel were assigned. Most of the military were in place, but only about half of the DOD civilians and about a quarter of the interagency personnel had been assigned (Pendleton 2009. 3). Without assigned basing, infrastructure, and airfields moving USAFRICOM personnel around their AOR will be challenging. Nevertheless, before troops can be moved they must first be identified. With few assigned resources organic to the new command, they will be forced to ask other commands for ground resource personnel and equipment support. Asking another command to mobilize their troops and equipment to support a mission of a sister command will present some unique challenges for USAFRICOM.

To meet USAFRICOM mission goals, specially trained troops and specialized equipment will need to be identified, located, and requested by USAFRICOM to the owning COCOM. This will take a great deal of coordination between the commands. If the COCOM agrees to fill the requests for personnel and equipment from their command, the owning command will then be required to mobilize those individuals or resources so they can depart. Without additional resources to facilitate these requirements, COCOMs may view support for USAFRICOM request as mission creep with zero return on their

investment of time and energy. Similarly, the COCOMs will still have the responsibility to supply, train, and equip these forces upon their return. This has the potential to sour relations between USAFRICOM and sister commands. After the coordination has taken place, then resources will be allowed to be moved to the prescribed destination to help meet USAFRICOM goals. This simple description of the request and mobilization process highlights the challenges to the new command due to the lack of assigned resources.

Despite the challenges to move military personnel, moving civilian DoD personnel or non-DoD civilian personnel will likely be a different process with many more complications. Each of these entities will likely have their own request process to facilitate movement of USAFRICOM personnel to and through their AOR. Not all DoD civilians stationed overseas are covered by a SOFA. Based on this knowledge one can assume that not all Non-DoD civilians will likely be covered by a SOFA. Similarly, it is possible that not all of the civilians will have passports. US military members can travel to most countries with orders and a military identification card. Civilian employees may not have identification cards that are recognized by nations in Africa. Similarly, some nations may require a visa prior to arrival. Requests for visas and their processing often takes too much time which will limit the flexibility of USAFRICOM to move one-deep civilians, with unique skill sets, to many nations in Africa. Although the new command is still struggling to define its mission, it is safe to say that sustained movement to their AOR will require the support of ground resources. These resources include specialized aircraft mechanics as well as cargo and passenger handling personnel and the required equipment that goes with these functions. Void of these organic capabilities

USAFRICOM will have to request this support from sister COCOMs. These requests may not be well received as it will require the COCOMs to part with capability for the duration of the mission. Additionally, they will also have to shoulder the burden of preparing the personnel and equipment for deployment. Compounding the problem for the new command will be the need to use different processes through different agencies to move the unique skill sets of the civilians to various locations in Africa. Although this problem may be a bit difficult to quantify, one of the challenges to airlift operations for the new command that is easy to recognize is the sheer size of the USAFRICOM AOR.

If a crisis in USAFRICOM requires an immediate response by the DoD, a NATO ally, the UN, or an NGO, the response will most likely require AMC airlift to move the resources to the location. While helicopters can deliver to isolated areas void of runways they are limited in both range and cargo capacity. The limitations in rotary-wing aircraft range and cargo capacity renders their use inefficient and ineffective to deliver to the African interior. Ships can deliver large amounts of supplies, but they are very slow to respond, they require large ports, and need a great deal of infrastructure, people and specialized equipment to facilitate off load of cargo. Additionally, once cargo is off loaded from a ship it still needs to be delivered. One of the most easily recognizable challenges to airlift operations is the sheer size of the USAFRICOM AOR.

Geography

At nearly three times the size of the US, the African continent alone presents a formidable challenge to conducting flexible, responsive, and efficient airlift operations. Consideration must be given to the vast distances across the isolated areas of Africa, as the US works to address the challenges associated with widespread poverty, hunger,

disease, and political instability throughout the continent. Africa is over 11,000,000 square miles, large enough to fit the United States, China, Argentina and all of the countries of Western Europe within its borders. (See figure 3) Even if USAFRICOM had unlimited access to airfields and bases with suitable resources to support the ERS, the tyranny of time and distance combined with the isolation of much of the continent's population would still prove to be a daunting challenge.

Attempts to respond to a crisis quickly will be hindered by the geography of this vast AOR. The ability to reach isolated areas throughout the continent cannot be quickly addressed with helicopters like in the Pakistan operation. Support to nations with sea ports may provide options for shipping, however, this is not nearly as flexible or responsive as airlift. Due to poor infrastructure and unreliable GLOC, material transported by sealift may not reach the interior of Africa.

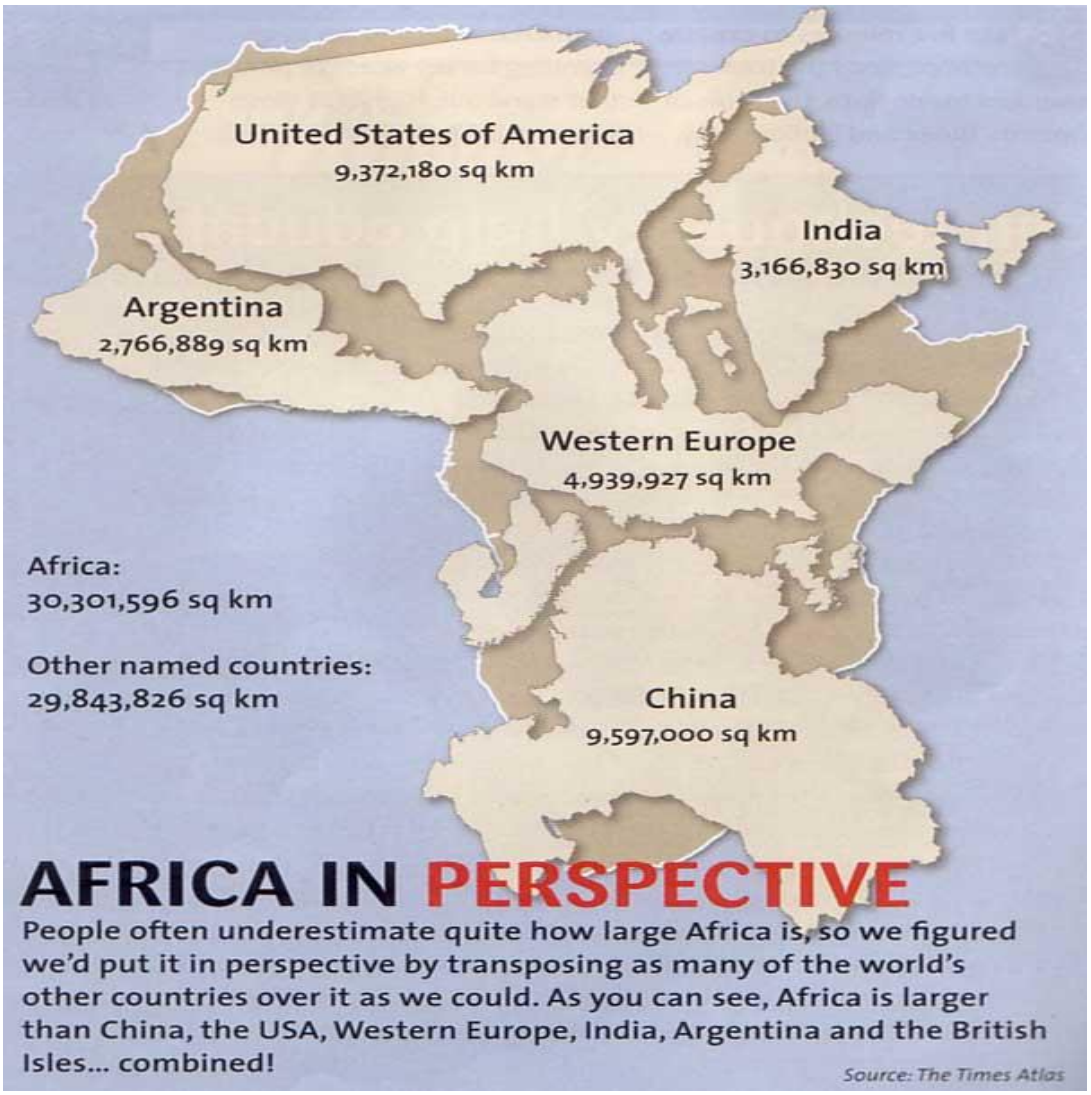


Figure 7. Africa, the US, India, China, Argentina and W. Europe
Source: The Times Atlas, http://strangemaps.files.wordpress.com/2006/11/africa_in_perspective_map.jpg (accessed 17 May 2009).

USAFRICOM has numerous challenges to content with. These challenges include but are not limited to, the uncertainty of the mission of the new command, the political challenges that will most likely, impede expeditious access to nations, the lack of basing and the associated lack of ground support personnel and equipment. Additionally, USAFRICOM will rely heavily on the capabilities of the existing ERS structure and the

GRL strategy to overcome the distances associated with the sheer size of the continent to airlift resources in support of mission objectives across the AOR of the new command.

Conclusion

Sustained global reach to and throughout USAFRICOM can be accomplished, but it will be at the expense of time and efficiency for AMC. As identified in the historical examples of Burma, Operation Nickel Grass and Pakistan earthquake relief operation, a lack of efficiency in airlift operations will yield less than optimal mission effectiveness. The challenges from the case studies in chapter 4 identified political, basing, and ground support resource limitations to each of those operations. Taking the lessons learned and adding the geographic challenge of Africa highlights numerous areas to consider when planning airlift operations to support USAFRICOM goals.

Strengthening partnerships between the US and African nations will help overcome some of the political challenges which facilitates access to airlift capable airfields. This may help off-set the problems associated with the lack of basing. Politics and mission circumstances should be considered to balance risk, before placing US troops and resources in countries with unstable governments. These areas are identified by the lack of SOFA or formally recognized international agreements. Although the challenges to airlift operations in USAFRICOM are significant, they are not insurmountable. There are options to overcome the lack of DoD infrastructure in USAFRICOM and still achieve effective support to meet USAFRICOM goals.

DoD has recognized some of these challenges and have taken steps to mitigate the problems associated with the strained political environments of nations, the lack of basing, and the limited number of resources to support airlift operations to overcome the

challenges of geography on the continent. They have engaged in talks with south and west African nations about basing rights. These talks have produced proposals to establish eleven new offices in US Embassies of eleven countries by 2012. Some of these proposed locations include offices in Niger, Cameroon, and Gabon (Pendalton 2009, 26). These locations could be important to an increased US presence.

Improved relationships between the US and Africa is as important as improving the relationships between the nations of Africa. Cooperative endeavors like the African Union will foster better security measures, regional stability, and pave the way for improved access to these regions. Increased access will improve the global efficiency and effectiveness of airlift operations to USAFRICOM as demonstrated by the historical case studies in chapter 4.

This chapter applied the lessons learned from the case studies in chapter 4 to the situation in USAFRICOM. Although the mission of the new command is still solidifying, consideration will have to be given to the political climate to gain access, to basing to conduct operations. Once these conditions are met, USAFRICOM will need to identify, request, and mobilize ground support personnel and equipment to sustain airlift operations to, from, and through the location. Depending on the location of the base in relation to the destination of the resources being delivered, USAFRICOM must consider the distance, terrain, infrastructure, mission priority, security, and host nation willingness to assist. Only then will they be able to determine how to best facilitate efficient delivery of resources given the geographic size and isolation of Africa. These considerations lead to a few recommendations to overcome some of these challenges.

CHAPTER 6

RECOMMENDATIONS AND CONCLUSION

The 1 October, 2008 establishment of USAFRICOM presents the US with new challenges, to include the sustainment of an Air Force core competency to provide rapid global mobility to Africa. As noted in the study, the GRL strategy facilitates rapid global mobility through a series of fixed overseas bases that make up the ERS. Today these bases are located in USEUCOM, USCENTCOM and USPACOM, but not USAFRICOM. These airfields and their supporting infrastructure all exist to facilitate airlift through these areas of operation.

The Burma, Israel and Pakistan case studies demonstrate the advantages sound political alliances, basing, ground support resources, and centralized command and control have on the efficiency and effectiveness of sustaining global airlift operations. These lessons identify key components necessary to ensure sustained global reach and rapid global mobility. Consideration of these components should be weighed to decide how to integrate USAFRICOM into the ERS, to provide sustained, rapid global mobility to meet the needs of the new command. Integration into the ERS will prevent degrading the effectiveness of the GRL strategy. Investing the intellectual capital to garner political access to basing and cooperative use of ground support resources in USAFRICOM will help ensure the efficiency and effectiveness of airlift support to the global ERS.

Interpretations of Findings

Through analysis of historical case studies from Burma, Israel, and Pakistan, the Author identified four common threads to sustaining efficient, effective airlift outside the

CONUS. These threads are political access, basing, ground support resources, and centralized command and control of resources. While all four are vital to successful inter-theater airlift operations, the first requirement is political access.

Favorable political climates expedite and ensure access to nations around the world. During the Hump operation in WWII the Japanese control of the Pacific ports and the Burma road provided the US with only one option to supply the Chinese nationalists: airlift. This option not only required access to India's air bases to fly supplies from, but the political will of the allies to dedicate scarce resources to infrastructure needs in China. In contrast, politics prevented access to US bases during Operation Nickel Grass. Denied the ability to overfly European nations, the US struck a deal with Portugal to gain access to Lajes airfield in the Azores. This lone airfield in the mid-Atlantic became the sole base for the US to funnel airlift through to provide support for Israel's defense. Politics also played a role in Pakistan. Due to the humanitarian nature of the mission, nations freely allowed access from, to, and through their countries which expedited the movement of relief supplies to the people of Pakistan. In airlift operations, once political access is achieved, basing becomes the next priority.

Basing provides access to a country as well as means to facilitate a hub for airlift operations to conduct airlift missions. This capability often has a force multiplying effect by increasing access to other locations or nations within the range of the aircraft. This was best illustrated in the WWII by the addition of bases in China, increasing the reach and integration of the entire system. This in turn resulted in increased tonnage delivered to an isolated China. The lack of US basing within Africa will create challenges for air

mobility planners. The third common theme is ground support resources to sustain airlift operations.

Operation Nickel Grass demonstrated the importance of ground support personnel to handle increased operations. To meet the airflow needs, over 1,500 ground support personnel were deployed to Lajes, as well as a handful to Lod International Airport, Israel to facilitate aircraft servicing, maintenance, and cargo upload and download. The same holds true for the Pakistan operation wherein ground resources were brought in to facilitate aircraft maintenance, servicing, and cargo download. Inter-theatre airlift operators, enabled by the ERS also facilitated the download of CH-47's to assist with cross-load operations to the helicopters. Finally, airlift operations must never forget the importance of centralized command and control to maximize the efficiency of any sustained airlift operation.

Centralized control was a challenge for early Air Transport Command leadership in Burma. However, once control was handed over everyone recognized the benefit of centralized management of this new capability. The benefits were revealed in the steady increases in tonnage over the Hump month after month. Centralized control was equally effective in Operation Nickel Grass. Utilizing one location, on an island, in the middle of the Atlantic, to facilitate an airlift resupply effort is an enormous undertaking. Doing it by deconflicting a flow of fifteen to thirty aircraft and crews per day across multiple time zones on eastbound and westbound missions requires detailed coordination. Synchronizing the aircraft and aircrew flow with the ground resources across two MOBs on the east coast, the west hub at Lajes and the destination location at Lod, Tel Aviv, Israel requires diligent, centralized command and control. Fortunately for the people of

Pakistan this level of detailed planning and centralized command and control was ingrained in the fiber of AMC and Eighteenth Air Force by the time the 2005 earthquake hit Pakistan. Centralized control allowed AMC to quickly turn airlift resources from Germany and Turkey to send humanitarian supplies and resources to Pakistan. USAFRICOM will also be the beneficiary of the responsiveness of this system when the time comes. This will be beneficial for the new command as they wrestle with having to overcome the challenges of geography associated with the size of their AOR.

The lessons from each of these case studies demonstrates the interrelationship of the political climate surrounding the operation, the basing required to facilitate the operation, the ground resources necessary to sustain the size and endurance of the operation, and the need for centralized command and control to ensure an efficient balance of all these factors. All four are necessary to planning or conducting airlift operations overseas.

Recommended Changes

Upon comparing the ERS against the case studies in Burma, Israel, and Pakistan as well as the potential for increased airlift requirements to support USAFRICOM, changes to the existing GRL strategy are needed. Consideration should be given to establishing a more robust means of supporting sustained, airlift operations throughout the whole of Africa. Failing to do so will cause inefficiencies in rapid global mobility, delays in global reach, and hinder the efficiency of the entire GRL strategy. These considerations include the need for increased political access to African nations; greater investment into ERS basing or similar civilian capabilities in USAFRICOM, and ground support infrastructure capable of rapid expansion to meet increased throughput demands.

This should include equipment and personnel to ensure sustainability and improvements in communication infrastructure to ensure effective command and control of airlift resources throughout USAFRICOM.

Efforts to strengthen political relationships between the nations of Africa and the US to allow AMC access to airfields within Africa is critical to efficient and effective airlift operations. Two recommended areas to focus on when considering host nation politics and airlift are access and US military presence.

Access to host nation airfields helps airlift planners determine the amount of support that can be provided. Without political access to airfields to conduct air-land operations from, airlift is constrained to supporting at the limit of the aircrafts' performance range or through airdrop operations.

As previously identified the lens is built off a 3,500 nautical mile, unrefueled, one way planning factor. The aircraft can still carry near maximum payload and cover this distance. If there is not a base for the aircraft to land, they must return to their base of origin. This reduces the distance that can be traveled from 3,500 nautical miles down to 2,000 nautical miles, severely limiting the reach of the aircraft. These operations may require assistance from aging tanker aircraft that are decreasing in number, to help meet distance and fuel requirements.

When considering the fact that fifteen of the countries in Africa are land locked, another point about political access must be made, airlift is achieved through over-flight of neighboring countries. When political negotiations are strained between neighbors, airlift access to the destination nation may be granted but over-flight of its neighbor may be denied. If the most direct flight path involves overflying an uncooperative nation or

nations, airlift planners are forced to re-route the airflow, as witnessed during Operation Nickel Grass. Flying around a country as opposed to flying over it decreases the effectiveness and efficiency of airlift, thus requiring additional mission planning, coordination, and flight time. When airlift is denied access to optimum routing, missions require additional consideration of augmenting the number of aircrews because of added flight time, as well as trading cargo for more fuel thus limiting the downrange impact of the airlift itself. As identified in Operation Nickel Grass, it is unreasonable to assume that all nations in Africa or Europe will always grant US airlift over-flight privileges. With this understanding, USAFRICOM should work with AMC to identify optimum and alternate airlift routing to each nation with strong consideration for political relations along those routes. In concert with these efforts, they should work to establish over-flight agreements across neighboring nations throughout the continent to prevent unnecessary delays. While indirect routing has a negative effect on airlift, planning for known problems provides predictability and realistic expectations.

The second political consideration for USAFRICOM is military presence. If a nation is a strong ally, with a standing SOFA and a history of conducting exercises with the US, then a sizeable military presence in that country may be acceptable. If the nation does not share any formal agreements, lacks experience working with the US military or their current political environment is strained, then options involving large C-5 and C-17 aircraft and hundreds of uniformed soldiers may prove counterproductive. In some cases the host nation could view the US as uncooperative and unyielding to negotiations. Situations like these may require consideration of contracted commercial airlift to move supplies or resources more discreetly than US flag bearing military aircraft. Local

sensitivities may also necessitate exploration of contracting ground servicing personnel to assist the host nation with cargo on and off-load and distribution services. These factors should be weighed against the size, length and nature of the operation. These issues should be identified before the operation starts to ensure the political sensitivities are understood and considered in the planning process not after the mission has already started.

Balancing the political issues provides airlift access to basing. This provides airlift planners and the host nation a realistic expectation of capabilities and expected traffic volume. Unfortunately not every nation in Africa has the political, military or economic means to support building multiple bases, nor does the US. For these reasons, the GRL strategy was designed around a few strategically placed bases throughout the world.

Basing in USAFRICOM would provide advantages to the current ERS structure. First, basing allows for a footprint of permanently assigned resources to foster increased cooperation, understanding, and mutual trust between the US and the host nations' military and civilian personnel. Second, it facilitates cost sharing programs to build and enhance infrastructure, thereby reducing the financial burden on individual nations. Basing also provides a means for military to military and regional training to enhance cooperation for future exercises as well as coalition and UN missions. Cooperative programs foster increased regional stability among neighboring nations. Nevertheless the problem remains, where would you put a base?

When considering basing to support sustained rapid global mobility to USAFRICOM, three factors must be weighed; geographic distance from existing ERS bases, political stability, and base capabilities and capacity. The current ERS bases of

Lajes (Portugal) Rota (Spain) and Sigonella (Italy) provide effective coverage to the countries in the northern part of Africa. South of the Sahel in Sub-Saharan Africa, airlift operations currently require tanker support or reduced cargo tonnage to allow for more fuel which hinders performance. Planning operations in the absence of tanker support or basing, provides airlift planners with a 2,000 nautical mile optimal, unrefueled, out and back routing for C-17 aircraft. Winds, weather, or denied over-flight rights, quickly reduce this operational radius. If a base was established south of the Sahel planners could optimize cargo tonnage because they could receive fuel, servicing and maintenance at the destination One candidate for ERS basing in Africa is Camp Lemonier, Djibouti which supports C-5 and C-17 missions regularly.

Djibouti is located in the eastern boarder of Africa along the Red Sea and the Gulf of Aden. The flow of airlift aircraft access Djibouti via flight routes from the Mediterranean, through the Suez Canal, the Red Sea, and the Indian Ocean. Djibouti is a likely candidate for cooperative basing consideration in Africa. The addition of this location to the fixed ERS would enhance coverage from the northern ERS bases. This would also increase coverage to the east and many of the nations in southern Africa that are currently outside primary ERS routing and outside the 2,000 nautical mile out and back range rings.

To address the lack of coverage to countries in western Africa and to provide redundant coverage in some Sub-Saharan countries, USAFRICOM should give consideration to some type of cooperative basing in the Ascension Islands in the Atlantic. A location in the Ascension Islands would provide coverage to some of the southwestern countries in Africa that are inaccessible from Djibouti. Additionally, Ascension Island

would provide redundant coverage with Djibouti over some of the Sub-Saharan countries as well those of western Africa, in concert with Lajes, Rota, and Sigonella. (see figure 8)

One of the multiplying capabilities of the ERS is the inherent flexibility created by the redundancy of the fixed bases in the GRL strategy. This redundancy allows the ERS to continue to operate effectively even when a base is rendered unusable for weather, political reasons or runway closure for repairs. The limited redundancy of the ERS creates the flexibility in the GRL strategy and ensures rapid global mobility of resources often through multiple bases simultaneously. The goal should be integration of AFRICOM into the ERS to create redundancy and to ensure flexibility and efficiency for airlift operations. Therefore, consideration should be given to establishing basing at airfields in proximity to where the 2,000 nautical mile unrefueled planning arcs intersect each other with the greatest overlap or redundancy. From strictly a geographic point of view that location falls near the nations of Cameroon, Nigeria, Equatorial Guinea, and Gabon.

Figure 8 depicts Lajes, Rota, and Sigonella with red diamonds and their corresponding 2,000 nautical mile planning arcs. The addition of unrestricted access or cooperative ERS basing in Djibouti and Ascension Island (identified by orange squares) would provide airlift coverage south of the 2,000 nautical mile limits of the fixed European bases. Additionally, establishment of basing in or around Cameroon or Nigeria (triangle) would add significant redundancy to the entire system with minimal, additional bases. This would increase coverage to USAFRICOM and effectively tie the African AOR into the current GRL strategy of ERS bases.

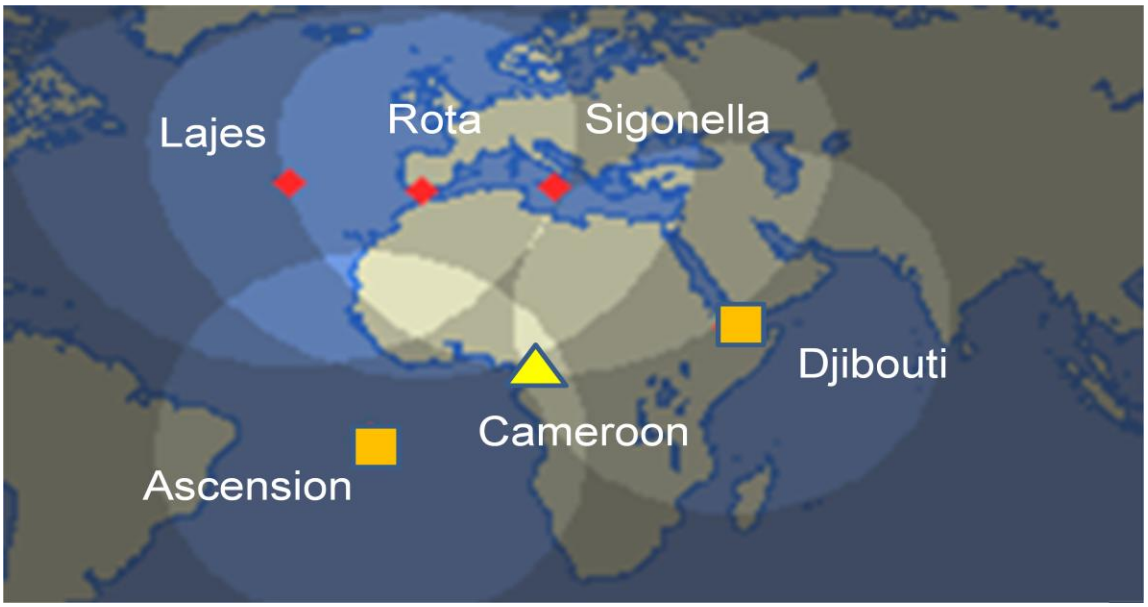


Figure 8. Lajes, Rota and Sigonella Fixed ERS Locations and 2000NM Planning Arcs

This example depicts a USAFRICOM lay-down strategy from a direct-line, geographic view. It does not consider over-flight restrictions, political sensitivities, airflow or ground resource requirements. Consideration would have to be given to these areas to determine feasibility which would be largely dependent on host nation cooperation and regional support capabilities and willingness, as previously discussed.

The next consideration is ground support resources. This issue is closely tied to the political sensitivities of the host nation as well as the airlift through put and mission requirements. As addressed in the discussion about political sensitivities, one nation may have a strong working relationship and SOFA with the US military. They may be very comfortable with airlift aircraft and uniformed troops operating in their country. Conversely other countries may not and thus deny US access to their sovereign territory. Identification of nations desiring US support without the strong visual presence of aircraft

and uniformed troops may require consideration of contracted airlift and ground support personnel to facilitate DoD operations.

Some nations may have the capability, capacity, and desire to recover aircraft, assist with refuel operations, and provide download and distribution functions. Some nations may not have the training but strongly desire it to create the capability and , more importantly, jobs for their people. Consideration should be given to these scenarios to balance the capabilities and desires of the host nation with US requirements to move aircraft, cargo, crews, and resources safely, effectively and efficiently throughout USAFRICOM.

Recommendations for Further Study

Throughout the analysis of the thesis, numerous areas for further study became obvious. This thesis is, by design, airlift centric with primary concentration on providing airlift options to support USAFRICOM objectives. Given, the enormity and complexity of providing airlift to Africa, the thesis did not cover other key resource delivery capabilities or requirements. Six topics are noteworthy for further study, providing multiplying effects to airlift and USAFRICOM support. These include but are not limited to; exploration of inter-modal air and sealift options, expansion and integration of rail and road surface options, establishing clear prioritization and command and control synchronization between USAFRICOM, USTRANSCOM and TACC, exploration and exploitation of the unique capabilities of the civilian and Interagency capabilities of the command to support their objectives, identify the effect sustained airlift support to Africa will have on the overall efficiency and effectiveness of the entire GRL strategy to meet rapid global mobility requirements. The last recommendation is for USAFRICOM

planners to take a look at Naval Station Rota, Spain. Having a co-located sea port and airfield creates a unique capability near the mouth of the Mediterranean. Naval Station Rota, Spain is the southern most European hub, best postured to sustain airlift operations to meet the needs of USAFRICOM. Additionally this is a template of what capabilities a base in Africa should have to best serve the fluid mission dynamics of the new command on the continent of Africa. Rota is what "right" looks like.

Inter-modal sealift and airlift operations would have great applications in Africa by using sealift to move large amounts of resources to ports to then cross load to aircraft to be airlifted to remote airfields in the interior of Africa. Given the size of the continent, the many isolated areas, and the population of 900 million that is forecast to double by 2050, selection of an airfield that is co-located with or at least near a sea port would certainly justify consideration of locations that could facilitate inter-modal sealift operations. The rapid population growth will bring a commensurate demand for supplies which cannot be fulfilled with airlift alone. Sealift will become increasingly important to support USAFRICOM goals. Effective inter-modal operations can be force multipliers.

Second, expansion and integration of existing rail and road networks to provide surface transportation options that link ports and airfields to various locations within and across Africa should be explored. Establishing airfields requires skilled labor and concentrates jobs in very small areas. The economic capital required to build airfields capable of sustain airlift operations can be cost prohibitive for many nations. Therefore, the use, expansion, and integration of existing road and rail capabilities may provide a more cost effective means of providing movement of resources. These initiatives also

have the potential to create jobs for laborers across many miles, nations and regions which often yields a stabilizing effect.

Third is the identification of the USAFRICOM, host nation, command and control infrastructure that will communicate with USTRANSCOM and TACC to de-conflict the planning and prioritization of multi-service and coalition airflow with host nation and commercial traffic, into and out of African airfields with MOG limitations. Planning in the blind with little or no consideration for sister service, coalition, commercial or host nation military airflow has the potential to create bottlenecks in a system that already has significant resource limitations. Prioritization of airlift missions will have to be done by USAFRICOM. Missions will then need to be de-conflicted with host nation and commercial movement requirements before requesting airlift through USTRANSCOM. Not doing so could create unnecessary bottlenecks to air operations which could negatively impact US and host nation relations and render airlift ineffective.

The fourth recommendation for further study addresses the uniqueness of USAFRICOM. The new command is authorized approximately 650 military, 650 DoD civilians and fifty non-DoD civilian interagency personnel. The specialization of the DoD civilians and the fifty or so non-DoD civilians from the State Department and the US Agency for International Development may provide opportunities to solve problems by utilizing the unique capabilities of the non-active duty military members of the command. Identification of these unique capabilities could lead to other-than-military options for balancing USAFRICOM goals and objectives with DoD resource limitations.

Fifth is probably the most important recommendation of all. There is a need to study the effect that increased airlift operations to support USAFRICOM goals will have

on the efficiency and effectiveness of the GRL strategy. The strategy is facilitated through fixed basing, airlift aircraft, and ground support resources. These are all finite resources. Currently the operational demand for airlift results in a launch of an AMC aircraft, somewhere around the world every ninety seconds. Having an understanding of the limitations of the system and the resources that support the system, additional operational tempo to support USAFRICOM goals could have a negative effect on the efficiency of airlift operations and the GRL strategy.

Finally, to help USAFRICOM planners identify what right looks like, command planners should visit Naval Station Rota, Spain to see an example of what a co-located sea port and airfield within a secure perimeter looks like. Naval Station Rota has a seaport capable of accommodating all Navy ships with the exception of an Aircraft Carrier. There are plans to dredge out the pier and make it capable of accommodating a carrier. There is a secure access road leading one half mile from the pier to the airfield to expedite cross load to strategic airlift. The airfield contains sixteen C-5 capable parking spots all of which are fuel pit accessible with a fuel system capable of refueling four C-5s simultaneously. This is also home to the 821st Air Mobility Operations Group and the 725th Air Mobility Squadron. These organizations consist of permanently assigned AMC command and control, aircraft maintenance and aerial port personnel. The ground support personnel work daily supporting AMC missions transiting Naval Station Rota to maintain rapid global mobility of OIF, OEF, and humanitarian missions as part of the GRL strategy. The 821st also leads AMC ground support personnel at Lajes Field and has responsibility for the AMC facilities at Naval Air Station Sigonella. Located in southern Spain, Rota enjoys over three hundred sunny days per year which keeps weather delays

to a minimum. This location also permits easy access to unrestricted flight routes through the Mediterranean and the Atlantic making flight routes to most of Africa easy. The naval station also receives great political and local support allowing for airlift operations to continue, twenty-four hours a day, seven days a week, three hundred sixty-five days a year. Until USAFRICOM can secure basing in Africa, airlift operations to support the commands goals will be very dependent on Naval Station Rota, Spain.

Conclusion

The establishment of USAFRICOM in October, 2008 ushered in a renewed emphasis on the importance of addressing the many challenges in Africa. Reaching out to the continent across the vast geography will require access. Given the lack of basing and ground support resources in USAFRICOM, access will most likely be facilitated by airlift via the ERS.

The current AMC ERS is a mature system with proven capability to provide global reach and rapid global mobility for America. Despite the proven capabilities of the ERS to meet these requirements, the system does not have the capability to provide sustained, airlift support to the USAFRICOM AOR in an efficient manner. This is primarily due to the lack of basing and ground support resources. This problem is compounded by the size of Africa and the political instability of many of the nations of Africa.

To address these concerns the thesis utilized three case studies from Burma, Israel and Pakistan to support the idea that access to overseas basing to support airlift must consider the political sensitivities of the host nation and balance them against the priority of the mission. Basing and a secure political climate help foster flexibility and mission

effectiveness for airlift. Once the political situation has granted access and basing is identified, ground support resources are required to provide endurance, and sustainability to the operation. Finally, centralized command and control ties the operation together to maximize efficiency and mission effectiveness. Application of these case studies to the USAFRICOM AOR identifies shortfall in basing to support airlift operations in Africa. The addition of limited ERS type basing, with ground service capabilities, in USAFRICOM that could be integrated with the fixed ERS bases could support sustained rapid global mobility throughout USAFRICOM with greater efficiency.

Comparing the current GRL strategy and the layout of the fixed bases that make up the ERS against the sheer size and lack of bases in Africa identifies a lack of capability to sustain efficient airlift operations in USAFRICOM. Consideration should be given to political, basing and ground support resource constraints in Africa. These must be compared with command goals, objectives and resource constraints to support airlift operations. Investing the intellectual, military, political and financial capital into limited basing in Africa will provide effective support to meet these goals without significantly degrading the efficiency and effectiveness of airlift operations to SWA, the Pacific Rim and the rest of the globe.

REFERENCE LIST

Agency Group 09. 2000. “En Route System Has Come a Long Way.” FDCH Regulatory Intelligence Database.

Air Mobility Command. 2007. *Concept of operations (CONOPS) for joint cargo aircraft (JCA).* Scott Air Force Base, IL: Government Printing Office.

Air Mobility Command Museum. “Operation nickel grass.” http://www.amcmuseum.org/history/airlifts/operation_nickel_grass.html (accessed 18 May 2009)

Airlift Concepts and Requirements Agency (ACRA). 1985. *A qualitative intratheater airlift requirements study (QITARS).* Scott Air Force Base, IL: Government Printing Office.

Berschinski, Robert G. 2007. “AFRICOM’s dilemma: the ‘global war on terrorism,’ ‘capacity building,’ humanitarianism, and the future of U.S. security policy in Africa.” Strategic Studies Institute, U.S. Army War College, Carlisle, PA.

Bossert, Philip A., Jr. 1995. “Strategic airlift inefficiencies from Desert Shield to Vigilant Warrior.” Thesis, US Army Command and General Staff College, Fort Leavenworth, KS

Boston, Ronald G., Major. 1982. “Doctrine by default: The historical origins of tactical airlift.” Student Report, United States Air Force Air Command and Staff College, Maxwell Air Force Base, AL.

Boyne, Walter J., 2002. “The two o’clock war.” (New York, NY: St. Martin’s Press.

Brewer, Edward S., 2004. “Commercial solution to the intertheater airlift shortfall.” Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, KS

Brunhaver, John, S., Major. 1996. “Lifeline from the sky: The doctrinal implications of supplying an enclave from the air.” Thesis, School of Advanced Airpower Studies, Air University Press, Maxwell Air Force Base, AL.

Cahill, Kevin M., M.D., 2003, “Basics of international humanitarian missions.” A Joint Publication of Fordham University Press and The Center for International Health and Cooperation, New York, 2003

Chamberlin, Wendy, 2007. “Pakistan in transition: Understanding us interests in upcoming elections.” Washington, DC: Middle East Institute. http://www.mideasti.org/transcript/pakistan-transition-understanding-us-interests-upcoming-elections (accessed 19 May 2009)

Cirafici, John L., 1995. *Air head operations: where AMC delivers: the linchpin of rapid force projection*. Maxwell Air Force Base, AL: Air University Press,

Curtain, Neal, P., 2001. GAO-02-99, "Military readiness: effects of a U.S. military presence in Europe on mobility requirements." Washington, DC: United States General Accounting Office.

———. 2001. GAO-01-566, "Military readiness: Management focus needed airfields for overseas deployments." Report to the Chairman, Subcommittee on Military Readiness, Committee on Armed Services, House of Representatives. United States General Accounting Office.

Faulkenberry, Barbara J. 1996. "Global reach, global power: Air Force Strategic vision, past and future." Air University Press, Maxwell Air Force Base, AL.

Fricano, Michael, Lieutenant Colonel. 1996. "The evolution of airlift doctrine and organization" Research report, United States Air Force Air War College, Maxwell Air Force Base, AL.

Futrell, Robert Frank. 1989. "Ideas, concepts, doctrine: Basic thinking in the United States Air Force." Vol.1 1907-1960. Maxwell Air Force Base, AL: Air University Press.

———. 1989. "Ideas, concepts, doctrine: Basic thinking in the United States Air Force." Vol.2 1961-1984. Maxwell Air Force Base, AL: Air University Press.

Gaedecke, David M., Major. 2006. "The difficulty in measuring the effectiveness of airpower at the operational level of war." Research paper, United States-Naval War College, Newport, RI.

Grieme, Wayne C., Jr. 2000. "Roles and missions and the strategic airlift problem." Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, KS

Hazdra, Richard J., 2001. "Air mobility: the key to the United States national security strategy." Air University Press, Maxwell Air Force Base, AL

Harme, John, J., 1979. "U.S. airlift forces: Enhancement alternatives for NATO and non-NATO contingencies." Background Paper, Congress of the United States, Congressional Budgeting Office

Heist, Harry, LtCol., 2009. "An account by LtCol Harry Heist USAF (Ret)." Air Mobility Command Museum. http://www.amcmuseum.org/history/airlifts/operation_nickel_grass.html (accessed 18 May 2009)

Hilburn, Cofield Beau, Major. 2005. “Transforming for distribution based logistics.” Monograph, United States Army School of Advanced Military Studies, Fort Leavenworth, KS.

Hufford, Kent V., Lieutenant Colonel. 1990. “An airfield too far: The army’s search for a runway.” Research report, United States Air Force Air War College, Maxwell Air Force Base, AL.

Hutcheson, Keith A., Robertson, Charles T., 1999. “Air mobility: the evolution of global reach.” Vienna, VA: Point One Inc.

Joint Chiefs of Staff. 2006. (Incorporating Change 1 13 February 2008). Joint Publication 3-0, *Joint operations.* Washington, DC: Government Printing Office.

———. 2001. Joint Publication 3-07.6, *Joint tactics, techniques, and procedures for foreign humanitarian assistance.* Washington DC: Government Printing Office.

———. 2008. Joint Publication 4-0, *Doctrine for logistics support of joint operations.* Washington, DC: Government Printing Office. www.dtic.mil/doctrine/jel/new_pubs/jp4_0.pdf. (accessed 17 May 2009).

———. 2000. Joint Publication 4-01.4, *Joint tactics, techniques and procedures for joint theater distribution.* Washington, DC: Government Printing Office. www.dtic.mil/doctrine/jel/new_pubs/jp4_01_4.pdf (accessed 17 May 2009).

———. 2006. Joint Publication 5-0, *Joint operation planning.* Washington, DC: Government Printing Office.

Kwiatkowski, Karen, U. Lieutenant Colonel. 2001. “Expeditionary air operations in africa; challenges and solutions.” The Fairchild Papers. Air University Press, Maxwell Air Force Base, Alabama

Krisinger, Chris J. Capt. USAF, “Operation Nickel Grass: Airlift in Support of National Policy. Article. GlobalSecurity.org http://www.globalsecurity.org/military/ops/yom_kippur.htm.(accessed 18 May 2009)

Lacomia, John. “Remember when … Operation nickel grass.” 60th Air Mobility Wing History Office. http://www.travis.af.mil/news/story.asp?id=123122053 (accessed 19 April 2009).

Lichte, Arthur J., 2008. “Strategic mobility and global power projection.” *Joint Force Quarterly*, no. 49 (2d Quarter 2008).

Miller, Roger, G. 1998. “To save a city: The Berlin airlift 1948-1949.” U.S. Government Printing Office: 1998-433-155/92107

Miller, Roger, G., et al. 1998. "Air mobility symposium: 1947 to the twenty-first century." Washington, DC: U.S. Government Printing Office: 1998-657-571

Miles, Donna, 2006. "U.S. relief aid intensifies as snow hits Pakistan quake region." *American Forces Press Service* http://www.defenselink.mil/news/newsarticle.aspx?id=14650 (accessed 29 May 2009).

Millmet, Stanley, Lieutenant Colonel, and Lieutenant Colonel David E. Watts. 1967. "An analysis of intratheater air lines of communications of the support of army combat forces in low intensity warfare." Thesis, School of Systems Logistics, Air Force Institute of Technology, Wright-Patterson Air force Base, OH.

NATO, Practice. 2007. "Pakistan earthquake relief operation; What did this mean in practice?" North Atlantic Treaty Organization. http://www.nato.int/issues/pakistan_earthquake/practice.html (accessed 19 May 2009).

NATO, Evolution. 2007. "Pakistan earthquake relief operation; How did this operation evolve?" North Atlantic Treaty Organization. http://www.nato.int/issues/pakistan_earthquake/evolution.html (accessed 19 May 2009).

Owen, Robert C., and Karl P. Mueller. 2007. *Airlift capabilities for future U.S. counterinsurgency operations.* Santa Monica, CA: RAND Corporation.

Palmer, Jeffery S., 2008. "Legal impediments to operationalization." *Joint Force Quarterly*. no. 51. (4th Quarter, 2008). http://www.ndu.edu/inss/Press/jfq_pages/i51.htm (accessed 19 May 2009).

Pendleton, John H., 2009. GAO-09-181, "Defense management: Actions needed to address stakeholder concerns, improve interagency collaboration, and determine full costs associated with the U.S. Africa Command." Report to the Subcommittee on National Security and Foreign Affairs, Committee on Oversight and Government Reform, House of Representatives. United States Government Accountability Office.

Rutherford, Robert L., Cossaboom, Robert T., 1996. "General Robert L. Rutherford, Commander in Chief, United States Transportation Command and commander , Air Mobility Command: an oral history." United States. Air Mobility Command. Office of History., United States. Transportation Command. Scott Air Force Base, IL.

Swisher, Robert W., John F. Holley, and David J. Foster. 2005. Theater mobility forces: command and control doctrine." *Air Force Journal of Logistics* 39, no.2 (Summer): 2-15.

http://www.aflma.hq.af.mil/lgj/Vol_29%20No%202%20WWW.pdf (accessed 17 May 2009).

Tunner, William H. 1985. “Over the hump.” Washington, DC: Government Printing Office.

United States General Accounting Office, 2000. “Defense transportation: more reliable information key to managing airlift more efficiently” Washington, DC: Government Printing Office.

U.S. Air Force. 1954. Air Force Manual 1-9, *Air doctrine: theater airlift operations.* Washington, DC: Government Printing Office.

———. 2003. Air Force Doctrine Document 1, “*Air Force Basic Doctrine.”* Washington DC: Government Printing Office. www.dtic.mil/doctrine/jel/service_pubs/afdd1.pdf (accessed 17 May 2009)

———. 1999. Air Force Doctrine Document 2-4.4. “*Bases, Infrastructure and facilities*.” Washington DC: Government Printing Office. www.dtic.mil/doctrine/jel/service_pubs/afd2_4_4.pdf (accessed 19 May 2009)

———. 2006. Air Force Doctrine Document 2-6, *Air mobility operations*. Washington DC: Government Printing Office. http://www.dtic.mil/doctrine/jel/service_pubs/afdd2_6.pdf (accessed 17 May 2009)

U.S. Army. 2003b. Field Manual 4-20.41, *Aerial delivery distribution in the theater of operations.* Washington, DC: Government Printing Office. www.globalsecurity.org/military/library/policy/army/fm/4-20-41/fm4-20-41.pdf (accessed 17 May 2009)

U.S. Department of Defense. “Africa and Southwest Asia.” Electronic Foreign Clearance Guide. https://www.fcg.pentagon.mil/fcg.cfm (accessed 17 May 2009)

INITIAL DISTRIBUTION LIST

Combined Arms Research Library
U.S. Army Command and General Staff College
250 Gibbon Ave.
Fort Leavenworth, KS 66027-2314

Defense Technical Information Center/OCA
825 John J. Kingman Rd., Suite 944
Fort Belvoir, VA 22060-6218

Mr. Martin J. Huggard
DLRO
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352

Dr. James B. Martin
DAO
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352

Maj William D. Percival
Air Force Element
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352