



**TRANSFORMING PAST LESSONS TO MOLD THE FUTURE:
A CASE STUDY ON OPERATION NICKEL GRASS**

GRADUATE RESEARCH PROJECT

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AFIT/GMO/ENS/03E-11

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TRANSFORMING PAST LESSONS TO MOLD THE FUTURE:
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GRADUATE RESEARCH PROJECT

Presented to the Faculty

Department of Operations Sciences

Graduate Program for Mobility Management

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Air Mobility

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June 2003

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Preface

I would like to take this opportunity to explain a little about how this project evolved and express my thanks to those who aided in the adventure.

Initially I planned to analyze what specific lessons we, the Air Force, learned from NICKEL GRASS concerning airlift/air mobility and determine how well these lessons have been applied in recent operations. During my research, I discovered that although there were specific lessons from the operation, it was difficult to apply these airlift lessons to contemporary operations. Using the Army's Tenets of Operations and with the service oriented goal of "meeting the customers needs," I shifted gears. With this new vector, I set off to analyze the specific lessons from Operation NICKEL GRASS to determine how the specific lessons from past airlift operations could be transformed and applied to future operations.

I would like to express my sincere appreciation to Colonel Bryan J. Benson and Lieutenant Colonel Lee E. DeRemer for sponsoring my research, and to Colonel (retired) Walter J. Boyne for his insights and understanding. I would also like to thank Lieutenant Colonel (retired) Ray Hill who provided my initial vector toward Operation NICKEL GRASS and my research advisor Lieutenant Colonel Steve Brady. Finally, I want to thank God for His wisdom and blessings and my wonderful wife for her support and love.

Tom Riney

Table of Contents

	Page
Preface.....	iv
Table of Contents.....	v
List of Tables	vii
Abstract.....	viii
I. INTRODUCTION.....	1
Background.....	4
Problem statement.....	5
Scope and Methodology	6
Limitations	7
Summary	7
II LITERATURE REVIEW.....	8
The Two O'clock War by Walter K Boyne.....	9
Decisions and actions of Israeli and U.S. political leaders	9
Decisions and actions of U.S. military leaders	11
Civilian airlines.....	12
Lack of allied support	12
Communication and cooperation	13
Aircraft and aircrew availability	13
Unique mission requirements	14
Aerial port personnel at Lod and Lajes.....	15
Delivering war ready equipment.....	17
Conclusion: Summary of Lessons Learned and Keys to Success from Boyne's Manuscript	18
Comptroller General of the United States Report to Congress on Airlift Operations of the Military Airlift Command During the 1973 Middle East War, 16 April 1975.....	18
Conclusion: Summary of Specific Lessons from Operation NICKEL GRASS and Keys to Success in future Airlift Operations from the 1975 GAO Report	24
Dolle, Dennis B. Operation NICKEL GRASS.....	24

Conclusion: Summary of Specific Lessons and Keys to Success from Dolle's Report.....	28
III. METHODOLOGY	29
Background.....	29
Description of Research Design	29
Ensuring quality and establishing validity	31
IV. ANALYSIS AND RESULTS.....	32
Step 1: Establishing the Importance of Constraints.....	32
Step 2: Tenets of Airlift Operations.....	34
Initiative	35
Agility	37
Depth and Versatility	39
Synchronization	40
Step 3: Applying the Tenets of Airlift	41
IV CONCLUSIONS and RECOMMENDATIONS.....	44
Summary of findings	44
What events led up to the U.S. airlift support to Israel in 1973?	44
What lessons did we learn from the Operation NICKEL GRASS?.....	46
How should these lessons be applied to contemporary airlift operations?	46
Conclusions.....	48
Importance of Findings.....	48
Recommendations.....	50
Recommendations for future research	51
Bibliography	52

List of Tables

Table	Page
1. Lessons from Boyne’s manuscript <i>The Two O’clock War</i>	18
2. Keys to Success from Boyne’s manuscript <i>The Two O’clock War</i>	18
3. Specific lessons from the 1975 GAO Report on Airlift Operations of the Military Airlift Command during the 1973 Middle East War	24
4. Keys to the success of future operations according to the 1975 GAO Report on Airlift Operations of the Military Airlift Command during the 1973 Middle East War	24
5. Specific lesson from Maj Dolle’s 1987 report titled: <i>OPERATION NICKEL GRASS</i>	28
6. Keys to the success from Maj Dolle’s 1987 report titled: <i>OPERATION NICKEL GRASS</i>	28
7. Lessons learned associated with the Tenets of Airlift Operations.....	42
8. Keys to Successful Airlift Operations associated with the Tenets of Airlift Operations.....	42

Abstract

This paper generalizes the specific lessons from a past airlift operation enabling these lessons to be applied in planning, analyzing, or executing contemporary or future airlift operations. In so doing it answers the research question, “How should lessons from past operations be applied to current situations?” In this case, the specific lessons from the 1973 airlift operation supporting Israel, Operation NICKEL GRASS, were analyzed and generalized using the Tenets of Operations described in U.S. Army field manuals.

NICKEL GRASS was a successful airlift-centric operation that provides valuable insights into the Air Force’s ability to carry out short-notice, sustainment operations in support of engaged fighting forces. Case study methodology is used to generalize the specific lessons from the operation and three investigative questions were addressed:

1. What events led up to the U.S. airlift support to Israel?
2. What lessons did we learn from the operation?
3. How should these lessons be applied to contemporary airlift operations?

Finally, the Tenets of Airlift Operations are defined and utilized as general lesson categories. These categories balance the Air Force’s focus on the unique aspects of Air Power and provide common ground for structuring, planning, and execution discussions in the joint environment.

I. INTRODUCTION

“Progress, far from consisting in change, depends on retentiveness. Those who cannot remember the past are condemned to repeat it.” George Santayana

“For any military organization, and especially one like the Air Force that is culturally prone to look to high-technology innovative solutions, forgetting the past is at least as dangerous as failing to adjust to the future.” Jeremy Shapiro (Khalilzad, 2002:1)

The United States Air Force (USAF) plays a critical role in U.S. power projection. It is often the instrument of choice for securing U.S. interests abroad. While very successful in the past, the USAF faces emerging trends in international relations, domestic policy constraints, and military transformation that will challenge the Air Force’s ability to meet the country’s objectives. Along with these challenges, new opportunities will arise. The Air Force’s ability to meet these new challenges and take advantage of the new opportunities will determine its future. (Khalilzad, 2002:iii)

The Air Force finds itself in uncertain territory. The optimism that followed the fall of the Soviet Union has been replaced with the reality of regional conflicts around the world. Cultural divisions continue to replace geographic borders. The tempo of operations continues to build as the Air Force is pulled into more areas around the globe. All this comes on the heels of the military draw-downs and budget cuts of the 90’s and sudden increases in military spending following 9-11.

Meanwhile, the vast improvements in gathering and distributing information are quickening the pace of war. To take advantage of this knowledge, Secretary Donald Rumsfeld is pushing the military to move faster and become leaner and more flexible (Education, 2003:27). General Tommy Franks’ motto during Operation Iraqi Freedom

was “Speed Kills,” and he pushed his troops hard to move quickly in order to maintain the initiative (Education, 2003:26) “The success of the U.S. strategy in Iraq, with its emphasis on speed, is likely to have immediate consequences (Rumsfeld’s Vindication, 2003:1).” With the goal of moving more quickly than the enemy can react, the “core” of emerging U.S. doctrine is that speed is more important than size.

This focus on speed is shaping decisions about the future. The Marine’s plan to increase speed includes airlifting ammunition, fuel, and water directly to the fight (Rumsfeld’s Vindication, 2003:2). The Army wants to rid itself of cumbersome supply lines and is looking to the air to meet its agility requirements. The Air Force must be prepared to support these changing missions.

To support these quicker forces, the Air Force may soon be called upon to deliver more and heavier equipment closer to the front lines than ever before. By taking less time to build up forces, fewer forces may be required to attain the same impact. According to Marine Corp General Peter Price “Speed is a force enhancement (Rumsfeld’s Vindication, 2003:1).” While the Army focuses on how to airlift a mechanized force into a hostile country, the Air Force needs to be prepared to not only get them there, but also sustain them once they are in country. This may call for long-range or intercontinental tactical sustainment operations.

For the purpose of this study the following definitions apply:

- Long-range airlift: Any airlift operation that is longer than intra-theater airlift. Sometimes referred to as strategic, the term long-range is used throughout the study to avoid confusion when used in conjunction with the term “tactical”.
- Tactical airlift: Airlift that locally delivers materials and equipment for immediate use. In contrast to airlift operations that supply materials and equipment for future use, tactical airlift delivers supplies urgently needed by an engaged fighting force.

- Sustainment airlift: Supplying needed materials and supplies to fielded forces. In contrast to deployment airlift that gets the forces and their equipment to the field, sustainment refers to re-supplying fielded forces.
- Long-range tactical sustainment operations: Airlift operations that locally deliver urgent materials, supplies and/or equipment for immediate use by an engaged fighting force.

In 1973 the Air Force accomplished a very successful long-range tactical sustainment operation. Named Operation NICKEL GRASS, the USAF airlifted supplies to the engaged Israeli Defense Forces providing ammunition, missiles, and parts to a force made up of over 2000 tanks and 350 fighter/bomber aircraft (Maxwell, 1986:7). Following a serpentine route to avoid the European landmass and stay outside the Flight Information Region (FIR) of the Arab states on the North African Coast (Hansen, 1988:34), the operation delivered supplies from the United States to Israel covering over 6000 miles. The urgently needed supplies were locally delivered to a central airfield. While on the ground in Israel, the USAF aircraft were within enemy range and vulnerable to attack. Once downloaded, the supplies required only two hours to reach their farthest destination (Maxwell, 1986:55).

This successful operation is a unique blue print for future operations and provides valuable insights into just what makes a long-range tactical sustainment operation successful. However, because of the relatively small size of the Operation NICKEL GRASS, the lessons resulting from the operation have been limited. While the need to provide reinforcements to Europe quickly is not new (Mooney, 1978:4), past analysis has failed to take into account the constraints on Operation NICKEL GRASS and recognize its unique aspects. Past lessons have focused on the international aspects of the operation and ignored any tactical elements (Mooney, 1978:24). While this angle was good for

making aircraft procurement and capabilities decisions in the late 1970's, the emerging doctrine focusing on speed and agility calls for looking at the operation in a new light.

The USAF must make critical decisions now that will impact its ability to accomplish its mission in the future. Fleet modernization and organization decisions must be made. While focusing on the future, the Air Force must not lose sight of the past. As decisions are made that will impact the Air Force and Department of Defense (DOD) for years to come, appropriate general lessons from past operations like Operation NICKEL GRASS must be applied.

The purpose of this research paper is to examine the specific lessons learned from Operation NICKEL GRASS and generalize these lessons so they can be applied when making important decisions today.

Background

On 6 October 1973, Egypt and Syria launched a two-front attack against Israel. Egyptian forces crossed the Suez Canal and attacked Israeli positions in the Sinai Desert while Syrian forces overran Israeli positions in the Golan Heights. Outnumbered in both manpower and equipment, Israel found itself in a fight for its life. The situation grew worse when the Soviet Union began to airlift weapons and supplies to Egypt and Syria on 10 October.

With troops en route from Iraq and Jordan to join the Arab forces, the United States and President Nixon faced a difficult decision: either help Israel and face a possible Oil Embargo, or remain idle and face the possibility of Israel using nuclear weapons in self-defense (Ramey, 1998).

On 13 October the order was given to provide support to Israel, and Operation NICKEL GRASS was born. The Operation lasted until 14 November. During the 31 days of NICKEL GRASS, 51 C-5s and 177 C-141s delivered 22,497 tons of material to Lod International Airport in Israel. (GAO, 1975:8)

Although the Operation did not tax the capability of the Military Airlift Command (MAC) significantly, MAC and the USAF learned some important lessons. As unforeseen difficulties or deficiencies arose, MAC made adjustments to overcome the obstacles. While some of these adjustments were possible because of the relatively small-scale and short-term nature of the operation, these adjustments displayed the individual ingenuity required in any successful airlift operation.

Problem statement

An in-depth look at the lessons learned in Operation NICKEL GRASS is needed now for several reasons. First of all, emerging doctrine is changing the way America fights, and important decisions about how to meet this challenge are being made. Operation NICKEL GRASS provides a unique look at a successful airlift operation. Understanding what has made us successful in the past is the only sound method for basing our decisions. Secondly, the world is changing rapidly. In the midst of these changes, it is easy to forget what has worked in the past and assume that past successes do not apply to the present or future. Without an in-depth understanding of past successes, it will be very difficult to build on our experiences. Operation NICKEL GRASS is an excellent example of a successful airlift operation. It taught the USAF important lessons that should be applied today.

This research paper will focus on answering one primary research question:

Research Question: What lessons from Operation NICKEL GRASS apply to current operations and how should these lessons be applied?

In order to answer this research question, three investigative questions will be addressed:

Investigative Questions:

1. What events led up to the U.S. airlift support to Israel during the 1973 Middle East War?
2. What lessons did we learn from the operation?
3. How should these lessons be applied to contemporary airlift operations?

Scope and Methodology

This project will focus on the important overarching lessons learned from Operation NICKEL GRASS. These overarching lessons will incorporate specific lessons from Operation NICKEL GRASS, and include the factors that made the airlift successful. The resulting overall truths will hold in other airlift operations and enable decision makers to apply the lessons to a myriad of situations.

This paper will provide background information on the 1973 war in the Middle East in order to analyze the USAF's performance during the conflict. Using Case Study methodology, the lessons learned and keys to success in Operation NICKEL GRASS will be analyzed. Finally, the specific lessons learned and keys to success will be generalized so they can be applied to future operations and decisions. The goal of the project is to provide a sharp understanding of what happened during Operation NICKEL GRASS and, in light of emerging doctrine, transform those lessons to impact our military transportation system today.

Limitations

This research will look at the lessons from Operation NICKEL GRASS and how these lessons apply to contemporary operations. The research will not determine or measure how well they are or have been applied in recent operations.

Summary

The Air Force faces important decisions that will impact the ability of the USAF to accomplish its mission in the future. In order to make the best decisions, it is important to understand the general lessons we have learned from past operations and appropriately apply these lessons. Because of the rapidly changing world, increased budget constraints, and emerging threats to our national security, it is imperative that the Air Force understand and apply those underlying truths that lead to success. This paper will focus on the lessons learned from the 1973 airlift to Israel during the Yom Kippur War and what made Operation NICKEL GRASS successful.

The remainder of this paper is divided into four chapters. Chapter 2 covers relevant literature on Operation NICKEL GRASS and addresses the investigative questions outlined earlier. Chapter 3 covers the case study methodology used to analyze the information from chapter 2 and outlines how the research question will be answered. Chapter 4 presents the analysis of information and generalizes the lessons from Operation NICKEL GRASS. Chapter 5 provides conclusions and makes recommendations on how these conclusions should be used.

II LITERATURE REVIEW

There are many reports and books documenting the events surrounding Operation NICKEL GRASS and the Yom Kippur War. Some are strictly historical while others look at lessons learned. This literature review is designed to identify and review the important events leading up to and during the 1973 airlift in order to answer two investigative questions:

- 1) What events led up to the U.S. airlift support to Israel during the 1973 Middle East War?
- 2) What lessons did we learn from the operation?

In order to answer these questions, the literary review will focus on the performance of air mobility as a whole, the internal and external constraints on the operation, and the impact of those constraints.

The backbone of the literature review is Walter K Boyne's manuscript *The Two O'clock War*. Boyne's manuscript is the most recent exhaustive study of U.S. Military actions during the Yom Kippur War and includes a detailed account of the events leading up to U.S. involvement. Boyne documents the performance of U.S. political and military leaders, and the Military Airlift Command (MAC) during the initial stages of the airlift. The Government Accounting Office (GAO) analysis of the airlift operations of the Military Airlift Command during the 1973 Middle East War published in 1975 provides valuable information while validating many of Boyne's positions. Major Dennis Dolle's Air Command and Staff College report on the lessons learned during Operation NICKEL GRASS is cited and analyzed in order to provide further validation.

The Two O'clock War by Walter K Boyne

In his book *The Two O'clock War*, Walter Boyne provides an exhaustive account of the events leading up to the American airlift operation to Israel in 1973. As stated in its introduction, the manuscript is a “chronicle of the international chess game that was played out in October 1973 (Boyne, 2002:intro).” Boyne covers political decisions and international relations that impacted the difficult and controversial airlift. His book highlights the hurdles the U.S. had to overcome in order to provide short notice support. In so doing, he points out important general lessons decision makers can learn from Operation NICKEL GRASS.

Boyne begins his analysis by identifying key figures whose decisions had a significant impact on the war and the United State’s eventual decision to support Israel. Throughout the book he highlights the results of decisions made by these key individuals.

Decisions and actions of Israeli and U.S. political leaders

Although there were plenty of indications that Arab nations were massing for an offensive, Israeli Intelligence and the Israeli Defense Force (IDF) chose not to act based on the signs (Boyne, 2002:11). Confidence resulting from their resounding victory in 1967 over those same Arab nations led to a sense of invulnerability and overconfidence that prevented Israel from taking steps to prepare for defense (Boyne, 2002:274). “Both Israeli intelligence and the IDF believed no matter what the Arab nations did, they would be defeated soon after the war began (Boyne, 2002:10).”

The Israeli leaders were not alone in their confidence. Even after hostilities erupted on 6 October, Henry Kissinger and most of the military leaders he consulted were “confident that Israel would triumph (Boyne, 2002: 48).” Even the Soviet Union and

most of the Arab world fully expected a repeat of the Six Day War. Confident that Israel would prevail without help from the United States, Secretary of State Kissinger focused on how the U.S. could benefit by allowing the situation to develop rather than explore options should the need for action arise. (Boyne, 2002:48)

Israel's initial requests for help, received midmorning 7 October, failed to engage official planning actions. In her first requests for airlift support, Golda Meir remained confident and assured Kissinger that Israel would eventually prevail. Over the following days her requests became increasingly more urgent. It was not until 9 October, when the US political leaders realized that Israel might actually resort to nuclear weapons to ensure survival, that Nixon, Kissinger, and Schlesinger agreed to Meir's initial requests for missiles and ammunition. Through all of this, U.S. political leaders remained confident of an ultimate Israeli victory and focused on minimizing U.S. military involvement. This confidence was apparent at the close of the 9 October high-level decision maker's meeting chaired by Nixon. By 9 October, the U.S. was sure Israel would resort to nuclear weapons unless supplies were provided quickly from an outside source. In what Boyne called an "inexcusable mistake" and a high-level "blunder," the meeting closed with the understanding that the U.S. would supply materials to Israel, however, the airlift would be conducted solely by Israeli commercial El Al aircraft. This decision was made despite the fact that the sheer quantity of equipment required was obviously beyond El Al's capability. (Boyne, 2002:79)

As a result of these decisions, the U.S. Military did not receive official direction concerning the airlift until 12 October. On that date, President Nixon, frustrated that it

had been three days since his promise to supply Israel, vehemently ordered to send “everything that can fly” to Israel. (Boyne, 2002:119)

The hesitation and indecision in the US was starkly contrasted by the decisions in the Soviet Union. Brezhnev approved the supply of arms and munitions to the Arabs as early as 6 October. In Boyne’s words, “In retrospect, it is difficult to reconcile the hesitation and indecision in the United States to initiate the airlift with the speedy decisions generated by the geriatric Politburo in Moscow (Boyne, 2002:93).”

Decisions and actions of U.S. military leaders

In contrast to the overconfidence and hesitation on the part of U.S. political leaders, Gen Paul K. Carlton, Commander of the Military Airlift Command (MAC) began making preparations for an airlift to Israel on 7 October. “Without clear instructions from the Department of Defense (DOD), Carlton called for the creation of a variety of plans that enacted a wide range of operations (Boyne, 2002:77).” On one end of the planning spectrum, Israel El Al aircraft completed the airlift by picking up supplies on the East Coast of the United States. In this scenario, El Al was then responsible for getting the cargo to Israel. This option closely mirrored the political leaders’ decision during the 9 October meeting and consisted of minimal U.S. participation. On the opposite end of the involvement spectrum, Gen Carlton correctly anticipated the president’s eventual call to fly MAC aircraft loaded with supplies all the way to Israel. (Boyne, 2002:76)

While Carlton jump-started the planning, Air Force Chief of Staff, General George S. Brown, began assembling missiles and munitions at standard MAC pickup points around the country. These supplies would soon become desperately needed by

Israel. If Gen Brown had waited for orders from the White House, the equipment would not have been available in the first days of the airlift (Boyne, 2002:76).

Civilian airlines

Despite the preparatory actions taken by senior military leaders and the clear 12 October orders from President Nixon, Operation NICKEL GRASS did not begin smoothly. Initially, Gen Carlton wanted to use Civilian aircraft to augment USAF aircraft, enabling MAC to fulfill more easily its other worldwide commitments. He hoped that the Civil Reserve Air Fleet (an organization through which U.S. civilian aircraft participate in military operations) could complete some of the airlift freeing military aircraft to complete peacetime missions. Foiling Carlton's initial plans, the civilian carriers were unwilling to give even the appearance of helping Israel for fear of offending the oil-rich Arab nations. Bottom line, the airlines wanted to avoid the increase in fuel prices threatened by the Arabs. (Boyne, 2002:76)

Lack of allied support

The second major setback came when Carlton learned that, similar to the U.S. civil air carriers, our European allies were unwilling to offend the Arabs by helping Israel. Again this fear stemmed from the Arab threats to raise oil prices and cut production. Rather than simply making it more difficult to accomplish peacetime missions, the lack of allied support jeopardized the USAF's ability to complete the airlift. Finding a European country willing to allow U.S. military aircraft to land proved to be very difficult. In the end only Portugal, who did not directly rely on Arab nations for oil and hoped for U.S. arms assistance, agreed to allow aircraft bound for Israel to land (Boyne, 2002:98). Without Lajes as a stopover and refueling point, it would have been

nearly impossible to get the needed supplies to Israel in time. Without help, the airlift would have been doomed before it started.

Communication and cooperation

Once Operation NICKEL GRASS was underway and aircraft began arriving in Lajes, the USAF continued to learn hard lessons. At the time, there was no central point of control at the Joint Chiefs of Staff (JCS) for coordination of the separate services in transportation matters. Fortunately, Gen Carlton and Gen Maurice F. “Moe” Casey of the JCS worked well together. Without this working relationship, the inter-service communication required during the operation would have been very difficult. For example, diverting naval tankers to Lajes to meet refueling needs proved to be complicated even with the two generals working together. (Boyne, 2002:122)

Communication within the Air Force itself proved to a problem. Congestion at Lajes was a huge problem throughout the operation. The lack of communication within the Air Force became apparent when Strategic Air Command (SAC) deployed 13 KC-135 tankers and 141 personnel to Lajes without coordinating with or alerting MAC. (Boyne, 2002:139)

Aircraft and aircrew availability

Operation NICKEL GRASS was not the only operation underway. MAC was busy removing supplies from Vietnam and returning the B-52 infrastructure from Thailand. In Europe, MAC was involved in transporting personnel and equipment back to the United States following the annual RE-FORGER maneuvers. On 15 October 1973 MAC had a fleet of 65 C-5s and 255 C-141s. Of the 65 C-5s, 26 were committed and involved in other missions, and 32 were not mission ready. Of the remaining seven, only

three C-5s were immediately available for Operation NICKEL GRASS. Of the 255 C-141s, 112 were on missions elsewhere and 75 were not mission ready leaving 68 C-141s available. (Boyne, 2002:146)

Several steps were taken to maximize use and availability of aircraft. Realizing the need for airlift, Gen Carlton ordered all C-5s in the Pacific back to the States. He also increased the C-5 and C-141 use rates. To keep up with the increased aircraft use rates, crews were ordered to get by with 6 hours of crew rest rather than the normal 12. (Boyne, 2002:140)

In order to transport the heavy M-60 tanks, C-5 weight restrictions were lifted. Under normal operations C-5s were restricted to a max cargo weight of 100,000 lbs to reduce stress on the large aircraft's wings. To complete Operation NICKEL GRASS, C-5s were cleared to operate at their max capacity of 265,000 lbs. (Boyne, 2002:147)

Unique mission requirements

There were constraints on MAC aircraft after leaving Lajes. In order to stay in international airspace, MAC aircraft were forced to fly a centerline route through the Mediterranean Sea. The aircraft were protected by Navy carrier task groups while over the Med and escorted by IAF fighters into the Israeli airspace. This centerline route increased the flight distance and complicated the flight planning, further taxing the aircrews. (Boyne, 2002:138)

Lod International Airport in Tel Aviv was the only suitable landing field in Israel where the aircraft could download their cargo. On one occasion, lack of an alternate airfield with downloading equipment resulted in delays. Due to poor weather, four C-141s and a C-5 had to be diverted to Ramat David airfield in north-central Israel. The

five MAC aircraft waited on the ground at Ramat David for the weather to clear at Lod then flew to Lod to be downloaded (Boyne, 2002:188). Fortunately, the weather held for most of the Operation, and weather delays were for the most part avoided.

Security issues also affected performance during the airlift campaign. The lack of an alternate, the aircraft, and the long lines of supply trucks made the Lod airfield a tempting target for the Arabs. To minimize exposure, only one C-5 was allowed on the ground at a time. (Boyne, 2002:187)

Aerial port personnel at Lod and Lajes

Inside Israel, the US aerial port personnel did an outstanding job, and the Air Force learned valuable lessons from their efforts. The first aircraft landed at Lod International Airport (Lod) in Tel Aviv on 14 October delivering desperately needed 105mm ammunition (Boyne, 2002:140). Still working out the kinks, the airlift did not hit full-stride until two days later, and on 16 October the supplies began pouring in. Teams of Israeli volunteers worked under the guidance of U.S. TALCE (Theater Airlift Control Element) personnel to unload the C-5s and C-141s (Boyne, 2002:157). On 16 October, five C-5s delivered over 750,000 pounds of equipment. Another 500,000 pounds were brought in on ten C-141s. The early shipments consisted of primarily 105mm shells, air-to-air missiles, electronic counter-measures equipment, and the first M-60 tanks. After the first two days, supplies began arriving at a rate of 50 tons per hour and included outsized equipment like M-60 tanks and M-48 tanks as well as medical supplies, rations, and clothing. (Boyne, 2002:164)

During the initial phases of downloading, the ground crews at Lod had to overcome three hurdles in order to minimize ground time and increase cargo flow. The

first problem was the cargo manifests did not arrive in time to organize offload crews and equipment. As the aircraft started bringing in a wider variety of cargo, the situation grew worse. Aircraft had to wait on the ground while ground crews and equipment were organized. The ground crews worked around this problem by setting up a series of communications with the incoming aircrews to determine what type of cargo was onboard before the aircraft landed. (Boyne, 2002:187)

The second hurdle involved the offloading equipment. Once the K-loaders were full of pallets, they were driven to a breakdown area to be unloaded. This pallet breakdown area quickly became a bottleneck. Solving the manifest problem sped up the offloading, but now K-loaders were delayed with no room to offload their pallets in the overloaded pallet breakdown area. The Combat Control Team Commander, Colonel Don Strobaugh, recognized the situation and suggested that roller trucks be built by fitting semi-trailers with rollers. These roller trucks could be used as the offloading area for the K-loaders. The Israelis quickly built eight roller trucks and used them to disperse the pallets before breaking them down. This dispersal saved hundreds of hours in off-loading time. (Boyne, 2002:187)

Finally, with all the cargo arriving and the offloading process streamlined, massive numbers of recently emptied pallets and containers needed to be returned in order to make room for more materials. The Israelis assembled a production line to assemble pallets and load containers so they could be placed quickly on the recently emptied aircraft and flown back to the United States. (Boyne, 2002:188)

Once these downloading difficulties were solved, offloading crews became exceptionally efficient in offloading cargo and getting the essential materials to the front

lines. Israeli downloading teams supervised by American aerial porters competed with each other to see who could download aircraft the fastest. On average the teams could empty a fully loaded C-141 in under an hour. They could do the same for a C-5 in less than two hours. Once offloaded it was not uncommon for the ammunition to be fired by an Israeli tank or for the missiles to be loaded on an aircraft less than three hours later. (Boyne, 2002:188)

Delivering war ready equipment

According to Boyne, Operation NICKEL GRASS was a resounding success and demonstrated the ability of American Air Mobility. The airlift was a symbol of U.S. commitment to Israel. It allowed the IDF to effectively fend off and then take the offensive against superior numbers of Arab forces without the fear of running out of supplies. While the TOW, Maverick, and Shrike missiles delivered via the airlift are credited with turning the tide of the war and keeping nuclear weapons out of the fight, it was the ability of MAC aircraft and personnel to deliver war-ready supplies that could be employed quickly that made the US airlift more effective than the Soviet version. The supplies brought in by the US were quickly identified and put into action. Tanks rolled off of the C-5s ready for war. On the other hand, supplies arriving on Soviet aircraft required additional time to be identified, organized and assembled before they could be dispersed to the Arab forces. (Boyne, 2002:278)

Conclusion: Summary of Lessons Learned and Keys to Success from Boyne's

Manuscript

LESSONS LEARNED

1	Military leaders should plan for contingencies and anticipate political decisions (rather than waiting for specific guidance)
2	The United States cannot rely on allied support and should be capable of acting on its own
3	The USAF cannot rely on Civilian air carriers to jeopardize profits without official CRAF (Civil Reserve Air Fleet) activation
4	Centralized control of military transportation is necessary

Table 1. Lessons from Boyne's manuscript *The Two O'clock War*

KEYS TO SUCCESS

1	Capability of Air Force aircraft to carry all requested material and equipment
2	Capability to deliver "War Ready" equipment over long distances
3	Experienced, innovative aerial port personnel
4	Efficient offload operations at saturated fields including - organizing offload teams to match incoming cargo - space to offload and break down cargo - recycling and returning empty pallets
5	Anticipation, planning, and preparation of military leaders - pre-positioning materials at pick up points
6	Coordination between military leaders

Table 2. Keys to Success from Boyne's manuscript *The Two O'clock War*

Comptroller General of the United States Report to Congress on Airlift Operations of the Military Airlift Command During the 1973 Middle East War, 16 April 1975.

Responding to a request from Congress, the Comptroller General of the United Accounting States (from here on referred to by the office's current title: the U.S. General Accounting Office or GAO) conducted a comprehensive review of the U.S. Military airlift to Israel during the 1973 Middle East War. In the review, the GAO was asked to evaluate the effectiveness of the C-5 aircraft, and determine the problems in airlifting

outsized cargo. The GAO expanded the review to evaluate the total airlift operations of MAC. (GAO, 1975:i)

The review concluded that despite inadequate advanced planning, denial of vital landing, staging, and overflight rights by European and African countries, and MAC's limited authority to manage the airlift, MAC and its aircrews did an outstanding job providing support to Israel. (GAO, 1975:i)

Although the airlift was an overall success, according to the GAO, MAC learned four specific valuable lessons (GAO, 1975:i):

1. Cargo aircraft need in-flight refueling capability
2. MAC needs a logistics contingency plan for operations in the Middle East
3. Management of airlift resources needs to be improved
4. Command and control elements and communication need to be improved

While supporting these specific lessons, the GAO report validated several of Boyne's conclusions. The GAO reported that without an en route refueling point the airlift would not have been possible because the C-141 did not have air refueling capability and there were not enough C-5 crews qualified in air refueling. The lack of allied support for the operation highlighted the fact that we cannot always rely on our allies to provide landing, and/or over-flight rights. (GAO, 1975:11)

Because the DOD did not have a logistics contingency plan for Israel, its support had to be planned and directed on an ad hoc basis. In contrast to Boyne, the GAO felt that this method of planning led to delays because the DOD had difficulties determining the best method to deliver materials. (GAO, 1975:6)

The timeline of events outlined in the GAO report coincides with that described in Boyne's manuscript:

- 6 Oct 1973: Egyptian and Syrian forces attacked Israeli positions in the Sinai Desert and Golan Heights
- 10 Oct: The Soviet Union began a massive airlift operation to supply weapons and supplies to Egypt and Syria
- 10 to 12 Oct: The U.S. considered options for aiding Israel
- 12 Oct: President Nixon directed the DOD to immediately begin an airlift to Israel
 - Headquarters Air Force directed MAC to prepare for the airlift (but to move nothing yet)
 - MAC 1) activated its contingency support staff, 2) authorized increased aircraft use rate, and 3) cancelled all routine training
 - 21st Air Force was designated as the controlling element
 - MAC was directed to start airlifting supplies to Lajes
- 13 Oct: DOD officials announced Lajes could be used as an en route stop
 - The Secretary of Defense directed the airlift to carry supplies all the way to Israel using Lajes as a refueling stop
 - Airlift began
- 14 Oct: First USAF aircraft landed in Tel Aviv
- 24 Oct: Ceasefire agreement signed by all sides
- 14 Nov 1973: Airlift completed after 51 C-5s and 177 C-141s delivered 22,497 tons of cargo to Israel (GAO, 1975:6).

Also similar to Boyne, according to the GAO, between 7 and 13 Oct there were various delivery methods considered to limit the exposure of U.S. military airlift forces. In these options, the DOD attempted to keep U.S. aircraft out of the war zone while enabling MAC to focus on peacetime commitments. Over the six-day period each of the alternatives were discarded for the following reasons:

- Israel was not capable of handling the airlift on its own.
- Sealift would have taken 30 days and Israel needed supplies sooner.
- U.S. commercial carriers refused to participate because military aircraft were not involved and the Arabs were expected to retaliate by cutting oil production.
- Israeli aircraft did not have the capability to move the required equipment from Lajes (or an alternate en-route point) to Israel.

The only viable option for supporting Israel was for USAF aircraft to carry the supplies all the way to Israel. Despite the increased workload, the Air Force managed to

accomplish the airlift while carrying out its peacetime DOD requirements. (GAO, 1975:6,16)

In order to accomplish the airlift, MAC was required to deploy personnel and equipment to major onloading points, the in-transit point (Lajes), and the offloading point (Lod International in Tel Aviv). In addition to deploying extra aerial port personnel, MAC had to take actions to increase the number of aircrews available. The GAO confirmed Boyne's statement that crew rest periods were reduced allowing crews to fly on less rest because of the limited number of aircrew available. In addition, required ground time was reduced and crews were given the option to return to crew rest immediately if they were not alerted within 6 hours after their initial rest period. Post mission crew rest was eliminated and 30-day flying hour restrictions were raised. (GAO, 1975:16)

The GAO report also validated Boyne's position that there were external constraints placed on the airlift by the DOD and MAC. MAC limited the number of aircraft that could pass through Lajes in a 24-hour period to a maximum of 6 C-5s and 36 C-141s. The Secretary of Defense limited the number of aircraft that could land daily at LOD to a maximum of six C-5s and 17 C-141s. The type and number of aircraft MAC could use was ultimately governed by the requirements to move outsized equipment, time limitations, and saturation of ground facilities at Lajes and Lod. (GAO, 1975:9)

The GAO report validated Boyne's assessment of the performance of aerial port personnel at Lod airfield and aircraft availability. According to the report, C-5 turnaround time at LOD (including unloading, refueling, servicing, maintenance, and sometimes crew rest) averaged 3.6 hours with 80 of 147 offloads accomplished in less

than 2.5 hours. C-141 offloads averaged 1.7 hours. The GAO also reported 35% of the USAF C-141s and 60% of the C-5s were inoperative due to maintenance or parts. Because of the scale of Operation NICKEL GRASS, these numbers did not prevent the accomplishment of any missions. (GAO, 1975:10)

The GAO's view on the ultimate significance of the airlift diverges from Boyne's view. In the GAO's opinion, "the Israeli airlift cannot be used to measure U.S. capability to respond to an all-out war because the number of men and amount of material airlifted to Israel were very small compared with U.S. airlift capability." The GAO concluded that, due to the small quantities of outsize equipment delivered, the delivery of outsized equipment had no decisive effect on the war's outcome. While Boyne would agree the airlift did not tax MAC's overall capability, he does not agree with the GAO position on the delivery of outsized equipment. Boyne feels Operation NICKEL GRASS provides an excellent example of an all-out war in a specified theater (Boyne interview, 23 Apr 2003). The GAO defended its positions by reporting no more than 24% of MAC's strategic airlift aircraft were committed to Operation NICKEL GRASS on any one-day. (GAO, 1975:16)

The GAO report confirmed the actions undertaken to increase aircraft availability mentioned in Boyne's book (GAO, 1975:16-18), as well as the impact of saturating both Lajes field and Lod International Airport (GAO, 1975:i).

Based on their findings, the GAO pointed out specific positive actions undertaken by the DOD and MAC that led to the success of Operation NICKEL GRASS:

- Airlift requirements were specific in terms of types of cargo to be moved, number of passengers, and required time frames (GAO, 1975:31).

- Logisticians from each U.S. military service reviewed Israeli requests to determine what should go first and how the material could be best delivered (GAO, 1975:8)
- The DOD moved cargo by surface transportation or feeder aircraft to a relatively small number of selected on-load points (GAO, 1975:31)

Keeping airlift requirements specific enabled MAC to make more concrete plans and efficiently utilize aircraft. By reviewing airlift requests prior to shipment, MAC designated items for airlift based on Israel's immediate needs. Finally, the DOD kept the number of on-load points low in order to utilize effectively the limited number of available cargo aircraft. The GAO pointed out that these practices become even more important as an operation gets larger. While they were important in Operation NICKEL GRASS, during a larger operation they become critical.

In its conclusions, the GAO emphasized that many of the problems encountered during the operation could have been prevented with a contingency plan for logistics support to the Middle East, better command and control of the cargo aircraft, and a more robust in-flight refueling capability. (GAO, 1975:34)

In its response to the GAO's report, the Department of Defense (DOD) disagreed that delays early in the operation were the result of difficulties determining the best delivery method. The DOD contested that the delays were actually the result of political issues rather than the lack of contingency planning or the inability to plan effectively the efficient movement of cargo. In response to the GAO's recommendation to improve in-flight air refueling capability, the DOD pointed out C-5 air refueling capabilities were already being improved and agreed that C-141 air refueling capability would improve MAC's overall capability. (GAO, 1975:61)

Conclusion: Summary of Specific Lessons from Operation NICKEL GRASS and Keys to Success in future Airlift Operations from the 1975 GAO Report

LESSONS LEARNED

1	Cargo aircraft need in-flight refueling capability in order to operate without significant allied support
2	The DOD needs a logistics contingency plan for the Middle East
3	The importance of properly managing airlift resources
4	The importance of command and control and communications during airlift operations

Table 3. Specific lessons from the 1975 GAO Report on Airlift Operations of the Military Airlift Command during the 1973 Middle East War

KEYS TO FUTURE SUCCESS

1	Airlift flow should be centrally controlled by MAC
2	Airlift requirements should be specific in terms of types of cargo to be moved and time frames
3	Cargo to be airlifted should be moved to a relatively small number of pre-selected onloading points
4	Airlift requests must be specific and prioritized in order to efficiently utilize aircraft

Table 4. Keys to the success of future operations according to the 1975 GAO Report on Airlift Operations of the Military Airlift Command during the 1973 Middle East War

Dolle, Dennis B. Operation NICKEL GRASS

Dolle's Air Command and Staff report on Operation NICKEL GRASS provides another valuable perspective on the operation. He provides a brief synopsis of the war to help the reader understand what made the airlift to Israel necessary. Secondly, he presents a history of the airlift itself including the response of the national leadership and the aircraft involved. Finally, Dolle concludes that the United States learned a valuable lesson concerning the problem of conducting airlift operations without allied support. As a result of the lesson, the United States is more prepared for such problems. In response,

the USAF increased its air refueling capability by acquiring the KC-10 and thus is more capable of providing unilateral worldwide support.

When providing background on the events that led up to U.S. involvement, Dolle quotes noted historian Martin Van Creveld to point out that both sides of the conflict (the Arab nations and Israel), while not ill-prepared, did not anticipate the high rate of attrition that would result from the use of modern weapons. As a result, both sides of the Middle East war found themselves running out of ammunition after a single week of fighting. Very early in the conflict, Israel had to face the fact that they had underestimated the stockpiles required to fight in this modern war and looked to outside sources for help. The Arabs were already receiving help from the Soviet Union. According to Dolle, the Israelis needed replacement planes and parts, as well as equipment to detect and counter the Soviet built anti-aircraft batteries employed by the Arabs. In the end, to assure the survival of Israel, supplies would have to come from American stocks. (Dolle, 1987:6)

The facts in Dolle's report support those reported by the GAO and Boyne. Although less detailed, the timeline outlined in his report supports the timeline of both the GAO and Boyne. According to Dolle, U.S. aid to Israel progressed in steps and culminated with MAC providing airlift all the way to Israel.

- Step 1: The U.S. refused to provide additional help because Israel would win the war without help and there was significant internal and external pressure to avoid jeopardizing the flow of oil
- Step 2: Noting the high rate of attrition, the U.S. decided to speed up delivery of the equipment Israel had previously ordered, but Israel would be responsible for getting these supplies to Israel
- Step 3: Realizing the Israeli airlift would not be sufficient, U.S. leaders looked at several plans to help Israel:
 - 1. Using commercial aircraft to provide airlift
 - 2. Transporting materials to Lajes on commercial or U.S. military aircraft and having Israel aircraft pick it up there

- 3. Trying to use diplomatic means to convince the Soviets to stop supplying the Arabs
- 4. Using USAF cargo aircraft to deliver materials all the way to Israel
- Step 4: President Nixon directed the use of USAF aircraft to provide support all the way to Israel (Dolle, 1987:7)

Dolle validated the GAO and Boyne's report concerning the actions that were taken to supply Israel. His report confirmed the need to waive the peacetime load limit imposed on the C-5 in order to deliver the outsized equipment requested. He confirmed that political circumstances led to the eventual route of flight taken by MAC aircraft, and noted the need for stage crews to accomplish the 6450 mile round trip from Lajes to Israel. His report covered the limitations on Lajes and Lod International. Similar to both the GAO report and Boyne's manuscript, Dolle discussed the saturation of personnel and equipment at Lajes field. He pointed out the ramifications of this saturation on billeting and the need for crews to occasionally provide their own sleeping provisions once they arrived on the island. Dolle's report discussed the lack of U.S. aerial port personnel at Lod airfield in Israel and the fact that less than 55 trained aerial port personnel had to guide and manage teams of untrained Israeli workers in order to offload the aircraft. (Dolle, 1987:12)

According to Dolle, the main lesson learned from Operation NICKEL GRASS was the need for allied support to accomplish long range airlift operations and the need to develop the capability to conduct such operations without help. He pointed out that the lack of allied support in Europe made Operation NICKEL GRASS more difficult. He agreed that without Lajes, the airlift would have been impossible. Dolle added that even if the C-141s had been air refueling capable and enough trained crews had been available for the C-5s, the U.S. would have needed forward bases for the tanker aircraft in order to

complete the airlift. Dolle went on to mention the benefit of air refueling based on fuel consumption. By his analysis, air refueling the C-5s would have saved 7 million gallons of fuel over the whole operation. (Dolle, 1987:23)

Dolle noted that in some instances there was not enough time to move supplies to the major air terminals so they could be put on the aircraft. Already strained Airlift Control Element (ALCE) crews had to be dispatched to small airfields in the U.S. to load aircraft. The requirement to fly to these smaller fields cut down on the efficiency of the MAC aircraft and made the airlift overall more difficult, further stressing the already stretched aerial porters. (Dolle, 1987:17) In this way, Dolle supported the GAO conclusion that onload points should be kept to a minimum in order to increase efficiency.

Dolle's position on the importance of the airlift operation is similar to Boyne's. Both feel that the airlift was essential to peace in the Middle East possible (Dolle, 1987:21). In his opinion, the airlift was critical to the survival of Israel, and the survival of Israel is vital to the balance of power in the Middle East (Dolle, 1987:7).

Dolle's assessment of the early performance of the airlift varies from that of both the GAO and Boyne. Although the timeline of events is similar to that outlined in both the GAO report and Boyne's manuscript, Dolle contrasts the other two sources when he states "President Nixon wasted no time in setting the American military airlift in motion (9)." He contradicted himself when he stated initial Israeli requests for assistance were refused because Kissinger felt "the Israelis would win without U.S. help" and as a result of efforts to avoid jeopardizing the flow of oil (Dolle, 1987:7)

Dolle's keys to success are very similar to one described by Boyne. He highlights the importance of aircraft capability. The capability of the C-5 and C-141 aircraft enabled the U.S. to deliver any equipment Israel needed. Equally important with these aircraft, the U.S. was able to deliver equipment ready or nearly ready for war. (Dolle, 1987:10)

Conclusion: Summary of Specific Lessons and Keys to Success from Dolle's Report

LESSONS LEARNED

1	Success of American operations should not rely upon allied support for operations - The U.S. needs to develop capabilities to conduct operations without Allied Support
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Table 5. Specific lesson from Maj Dolle's 1987 report titled:
OPERATION NICKEL GRASS

KEYS TO SUCCESS

1	Capabilities of U.S. C-5 and C-141 cargo aircraft
2	Delivering equipment combat ready

Table 6. Keys to the success from Maj Dolle's 1987 report titled:
OPERATION NICKEL GRASS

III. METHODOLOGY

Background

The research in this paper is designed to provide comprehensive background information on the lessons learned during Operation NICKEL GRASS, the airlift operation that provided support to Israel during the 1973 Middle East War. The goal of the research is to determine what lessons should be applied when planning and executing future operations.

The events of Operation NICKEL GRASS are well documented. However, due to the conclusions of past research projects, lessons from the operation have received limited contemporary application (GAO, 1975:ii). In order to determine what lessons should be applied when analyzing recent operations or when planning future operations, this case study will analyze the lessons learned from Operation NICKEL GRASS based on the answers to the following investigative questions:

1. What events led up to the U.S. airlift support to Israel during the 1973 Middle East War?
2. What lessons did we learn from the operation?
3. How and why should these lessons be applied to contemporary airlift operations?

The first two questions provide the background to answer the third question.

Description of Research Design

Based on Robert K. Yin's book, *Case Study Research*, a single case holistic case study is an appropriate research method for answering the investigative questions above (Yin 1984:42). Operation NICKEL GRASS provides a unique case where airlift activities can be studied isolated from many factors involved in larger operations. The MAC-only operation enables a micro level analysis of a successful short-notice airlift

operation that maximized operations from a single enroute airbase and to a single terminal airfield.

According to Yin, case studies are the preferred strategy when “how” or “why” questions are being posed, when the investigator has little control over the studied events, and when the answers focus on contemporary issues (1984:13). The research characteristics involved in this project makes a single-case study the appropriate research method.

In a single-case study, the goal is to expand and generalize theories so these theories can be applied in more situations (Yin 1984:21). This analysis will generalize the lessons learned during Operation NICKEL GRASS in order to determine how those lessons should be applied to contemporary operations. In order to accomplish this, several components of case study research design are important (Yin, 1984:29). The first component is the study’s questions. These questions are important to focus and clarify the research. The study questions for this project are described earlier in this section. The second important component is referred to as the study propositions. The study propositions in this project are quite simple: 1. Specific lessons can be learned from Operation NICKEL GRASS, and these lessons can be generalized. 2. By generalizing these lessons, the lessons can be applied to contemporary situations. Finally, it is important to link the data logically to the proposition. In order to establish this important link, this analysis will 1) look at the lessons from the operation, 2) consider conclusions from past research projects and how these results may have limited the application of these lessons, and 3) determine if the lessons would be valuable tools for grading or planning contemporary airlift operations.

Ensuring quality and establishing validity

In order to ensure a quality case study, the sources from the literary review will be used to establish a chain of evidence leading to the conclusions. Specific areas that will be studied include: the external and internal constraints on the operation; the reasons for delays during Operation NICKEL GRASS; the effects of operating out of saturated airfields. In contrast to previous studies, the research will focus on broad theoretical issues in order to provide conclusions that apply to general air mobility operations. (Yin, 1984:36-38)

This step-by-step documentation combined with the literary review in chapter 2 will provide reliability for the case study as a whole. The research and analysis of Operation NICKEL GRASS is presented in chapter 4. Chapter 4 is organized to establish reliability by providing step-by-step documentation for answering the study questions and leading to the projects conclusions. By providing background information in the literature review (Chapter 2), and step-by-step documentation outlining how conclusions were determined, future investigators will be able to arrive at the same results. (Yin, 1984:40)

IV. ANALYSIS AND RESULTS

Step 1: Establishing the Importance of Constraints

As discussed in Chapter 2, there are differing conclusions concerning the success and importance of Operation NICKEL GRASS and the performance of MAC. These differences stem from differing views on the constraints surrounding the operation. There are four constraints that should be taken into account before generalizing the lessons learned and keys to success from the operation.

The first constraint on Operation NICKEL GRASS resulted from the political and geographic isolation of Israel. Due to lack of allied support, the U.S. was forced to funnel all aircraft and materials through Lajes. As a result, Lajes quickly became saturated with aircraft and aircrews. Likewise, the geographic isolation of Israel and the country's lack of suitable alternate airfields (Boyne, 2002:188) forced materials to be delivered to a single airfield, Lod International in Tel Aviv. Lod quickly became saturated with aircraft and cargo. When the constraint of having a single enroute airfield and a single terminal airfield is considered, operations at both fields provide excellent examples of cargo operations at busy wartime airfields.

The second constraint was internally applied. The USAF and MAC continued to accomplish other world-wide commitments while accomplishing Operation NICKEL GRASS. Because of these commitments, the aircraft and aircrews available for ONG were limited. As a result, the relatively small size of ONG significantly taxed the aircraft and aircrews dedicated to the operation. In order to accomplish the airlift, MAC was forced to modify aircrew-flying requirements, adjust flying hour programs, and purchase airlift (GAO, 1975:16).

When analyzing the operation compared to the overall airlift capability of the USAF, the GAO's conclusion that "The Israeli airlift cannot be used to measure U.S. capability to respond to an all-out war because the number of men and amount of material airlifted to Israel were very small compared with U.S. airlift capability." is valid. However, when taking the above constraints into account, the performance of aircraft and crews exemplifies how they would perform in larger operations. Based on these constraints, ONG provides an excellent example of how a single supply chain will perform during an all-out war. In the case of an all-out war, there will be more than one saturated en-route field and likely many busy terminal fields, and operations at these fields will resemble those at Lajes and Lod during Operation NICKEL GRASS. In Col (ret) Walter Boyne's words, "Today it would be relatively easy to extrapolate from the Nickel Grass operation to an all-out war in a specified theater." (Boyne Interview, 23 Apr 03)

The third constraint on operations during Operation NICKEL GRASS resulted from security issues. Aircraft and aircrews were not only vulnerable while flying in or out of Israeli airspace, but the threat increased while on the ground at Lod due to the proximity of enemy forces. MAC minimized this threat by limiting the number of aircraft that could be on the ground in Israel at any one time. MAC also limited the number of aerial porters deployed to unload the aircraft (GAO, 1975:17). While restricting the number of aircraft on the ground limited exposure, the restriction made aircraft flow and unloading/loading more difficult. To speed up operations, experienced aerial porters were forced to guide motivated but untrained Israeli volunteers in aircraft downloading (Boyne, 2002:188).

Finally, the time and importance of the materials being delivered to Israel constrained the operation. When the first USAF aircraft arrived at Lod, the IDF had only about one week's worth of ammunition remaining (Dolle, 1987:6). Ammunition loaded on an aircraft in the United States one day was often fired by IDF forces on the next (Boyne, 2002:188). While the threat to aircraft landing at Lod was significant, it was important that supplies be delivered directly so they could be employed quickly. Not only were the supplies urgently needed, there was little time to consolidate the needed materials at standard pick up points in the U.S. Existing stockpiles were not sufficient to provide the needed equipment, and the U.S. was forced to provide material from its operational stocks (Dolle, 1987:6).

The time constraints on the airlift combined with the increased security concerns make ONG an excellent example of utilizing aircraft designed for strategic aircraft to tactically deliver supplies over a distance that is normally considered solely strategic. As U.S. strategy emphasizes speed over mass (Rumsfeld's Vindication, 2003:1), rapidly supplying fielded forces through the air and over long distances becomes more important.

Step 2: Tenets of Airlift Operations

In order to appropriately apply the lessons from Operation NICKEL GRASS to contemporary situations, the lessons must be generalized. To generalize the lessons, one must first define the standards or tenets of airlift success. The army defines five tenets of successful operations. "The Army's success on and off the battlefield depends on its ability to operate in accordance with five basic tenets: initiative, agility, depth, synchronization, and versatility.... The US Army believes that its five tenets are essential to victory. In and of themselves they do not guarantee victory, but their absence

makes it difficult and costly to achieve (Loefstedt, 1996:12)." In tactical airlift operations, successful airlift operations must meet the needs of the forces they are designed to sustain. As operational focus shifts to speed over mass, airlift must be prepared to meet these needs over long distances. Airlift operations must follow the same basic tenets as its customers. Similar to ground operations, in and of themselves these tenets do not guarantee successful long-range tactical sustainment operations, but their absence makes success difficult and costly to achieve.

Operation NICKEL GRASS provides an excellent example of the tenets of tactical sustainment airlift and the perils of ignoring them. When the Air Force and Department of Defense make decisions concerning how to equip and position its forces to take advantage of long-range tactical sustainment, it must keep in mind these five tenets.

Initiative

Army field manual 100-5 defines initiative as "the ability to force the enemy to conform to the commander's operational purposes and tempos while retaining freedom of action (Loefstedt, 1996:12)." According to Army FM 3-0, initiative has both operational and individual components. "From an operational perspective, *initiative is setting or dictating the terms of action throughout the battle or operation*. Army leaders are expected to anticipate events throughout the battlespace. Through effective command and control (C2), they enable their forces to act before and react faster than the enemy does. (Department of the Army, 2001:4-51)

During the Yom Kippur war, the initial success of the Arab forces and eventual success of Israel was primarily the result of gaining the initiative (Loefstedt, 1996:13). In the Sinai Campaign, the surprise Egyptian forces achieved assured them the initiative at

both strategic and operational levels. Until their decision to pause on 8 October, the Egyptians maintained and capitalized on this initiative. The Egyptian pause gave the Israeli forces time to regroup, prepare for the defensive, and eventually take the initiative. The importance of initiative to ground force operations is evident in the initial Arab victories, the disastrous Egyptian attack on 14 October, and the ultimate Israeli successes.

The U.S. military, and especially the Army, understands the importance of initiative. In order to enable our ground forces to maintain the initiative, it is vital that airlift operations designed to supply these rapidly maneuvering ground forces address the importance of initiative. In Operation NICKEL GRASS, Air Force leaders demonstrated initiative in pre-positioning equipment and exploring airlift options prior to receiving official execution orders. Without this airlift initiative, USAF aircraft would not have arrived on 14 October, and the IDF would not have had the equipment or confidence to seize the operational initiative. Thus, the initiative of Air Force leaders in Operation NICKEL GRASS enabled IDF forces to seize the initiative and turned the tide of the war.

As shown by Operation NICKEL GRASS in long-range tactical sustainment operations, initiative is *the ability to anticipate requirements and perform the preparation necessary to meet the war fighter's necessity to gain and maintain operation initiative while maintaining airlift freedom of action*. Military leaders' anticipation of the upcoming presidential directive to airlift supplies all the way to Israel gave the military the head start it needed to execute the orders quickly with the flexibility necessary to deliver the appropriate equipment. Had military leaders not started gathering aircraft and moving equipment to pick up points prior to 13 October, the Air Force would have been significantly limited in what supplies it could quickly provide for Israel. This pre-

positioning made operational stocks available that prior to 1973 were only considered for U.S. military use (GAO, 1975:30 and Maxwell, 1986:56).

Along with military leaders, the initiative of U.S. aerial port personnel was key to the success of Operation NICKEL GRASS. Aerial porters in Lod took the initiative and overcame obstacles before they became overwhelming. For example, by recognizing the need to offload k-loaders more quickly before there was too much equipment blocking the ramp, aerial porters were able to innovatively address the problem and produce a solution. The initiative of U.S. aerial porters kept cargo moving and ensured the timely delivery of needed equipment.

Capabilities play a large role in initiative. Due to the long development and procurement processes, long-term initiative is important to ensure that the military has the capability to meet future needs. For example, the availability of C-5 aircraft made air delivery of tanks possible. The initiative taken in development of the C-17, with its large payload and unique capability to make assault landings, will pay off in future long-range tactical sustainment operations.

The innovation, training, and experience of the individuals involved in the Operation NICKEL GRASS, made airlift initiative possible. As U.S. forces focus on speed and flexibility rather than mass, airlift initiative becomes more important. The Air force must take the initiative to maintain and develop the capability and skills required to support these troops.

Agility

Agility is the ability to adjust quickly (Department of the Army, 2001:4-57). According to Army FM 3-0 tactical, agility is "the ability of friendly forces to react faster

than the enemy (Department of the Army, 2001:4-60)." Agility is required to seize and hold the initiative (Loefstedt, 1996:13). In the Yom Kippur War, the Israeli army showed amazing agility when they shifted quickly from the defense to the offense. This agility enabled them to seize the initiative. In contrast, the Egyptian army was far less agile. The Egyptians could not maintain the initiative and had difficulty shifting from the offense to a defensive posture. (Loestedt, 1996:14)

Tactical sustainment airlift agility is *the ability to deliver supplies fast enough to enable friendly forces to react faster than the enemy*. As the pace of operations increases, Combatant Commanders and fielded forces will need supplies quicker than ever in order to react faster than the enemy. In tactical sustainment airlift operations, airlift must be prepared to adjust quicker and react faster than ever before.

During Operation NICKEL GRASS, airlift agility enabled MAC leaders to overcome planning shortcomings and quickly adjust to delivering materials all the way to Israel using Lajes field as the sole enroute point. This airlift agility ensured the IDF had the required operational agility to take and maintain the initiative.

An important aspect of airlift agility is how quickly delivered supplies can be employed. In 1973, supplies from the Soviet Union began arriving before those from the U.S.. U.S. supplies, however, were delivered to Israel ready-for-war. While Arab supplies spent time being organized and assembled, weapons delivered from the U.S. were utilized quickly by the IDF (Maxwell, 1986:55, Dolle, 1987:20). To the customer of tactical sustainment airlift operations, agility is determined by when the materials are ready to be employed rather than when the equipment actually arrives.

Several factors influence agility. First of all, agility both enables and requires initiative. In the Yom Kippur war, the agility of Operation NICKEL GRASS enabled the IDF to take the initiative by delivering war-ready material that could be more quickly employed than the material delivered by the Soviet Union. In order to achieve this agility, prior planning and initiative on the part of military leaders was required. Secondly, efficient airlift operations are necessary to maximize agility. By shortening reaction time and adding flexibility, in-flight refueling capability positively impacts agility. Improving in-transit visibility, communications, and airlift command and control functions increase efficiency resulting in improved agility.

Finally, aircraft capabilities impact airlift agility. During the Yom Kippur war, the Soviet Union flew almost twice as many missions as the U.S., but the Soviets could muster only 56% of the U.S. tonnage delivered. This discrepancy is the result of differing aircraft capabilities. The ability to carry more cargo enabled USAF aircraft to deliver more material in fewer sorties and this capability positively impacted the agility of the IDF.

Depth and Versatility

In airlift operations, depth and versatility are closely related. To the Army, "depth is the extension of operations in time, space, and resources (Department of the Army:2001:4-61)." "The tenet of operational depth is closely related to that of initiative, in that the ability to fight the enemy throughout the depth of the battlefield can force the enemy to fight on chosen terms, thus yielding the initiative (Loefstedt, 1996:15)." Fighting the deep battle refers to hitting the enemy beyond the front lines and in essence refers to the distance from the front lines to the enemy's centers of gravity. In airlift

operations, the tenet of depth is more closely related to versatility and *refers to the distance from the delivery point back to the item's point of origin.*

According to FM 100-5, versatility is "the ability of units to meet diverse mission requirements, and the ability of commanders and units to shift focus, tailor forces, and move from one role to another rapidly and efficiently (Loefstedt, 1996:17)." Field Manual FM 3-0 defines versatility as "the ability of Army forces to meet the global, diverse mission requirements of full spectrum operations (Department of the Army, 2001:4-67)." It depends on adaptive leaders, competent soldiers and well-equipped units (Department of the Army, 2001:4-68).

Airlift versatility is *the ability to meet diverse delivery requirements enabling commanders and units to rapidly and efficiently shift focus, tailor forces, and move from one role to another.* An easily overlooked aspect of airlift versatility is the depth of operations. In Operation NICKEL GRASS, because of the depth of the operation, the USAF was able to deliver a wide variety of equipment in order to meet the Israeli needs. By reaching all the way back to the U.S., the airlift operation was not constrained by what equipment was available at staging bases.

Synchronization

Focusing on mass, the army describes synchronization as "...arranging activities in time, space, and purpose to mass maximum relative combat power at a decisive place and time (Department of the Army:4-65)." Focusing on logistics, airlift synchronization is *arranging activities in time and space in order to get the right product or piece of equipment to the right place, in the right condition, at the right time* (Stock, 2001:10). Prioritization is the key to long-range, tactical airlift synchronization. There will always

be excess demand for airlift. In order to maximize effectiveness and meet the customer needs, items sent by airlift must be prioritized so limited airlift resources are utilized to delivery the most important items.

In Operation NICKEL GRASS, representatives from each branch of the service examined the Israeli requests and prioritized the air shipments based on Israel's immediate requirements (GAO, 1975:8). As a result of this prioritization, the U.S. was able to effectively deliver the right equipment at the right time under the constraints of the operation. Without this prioritization, the airlift would not have been able to get the essential equipment to the battle because of the limited number of airfields, aircrew, and aircraft available.

Another important aspect of synchronization is communication and coordination. While airlift operations focus mainly on aircraft and the Air Force, coordination with the other service branches goes beyond prioritizing shipments. In Operation NICKEL GRASS, coordination between the Air Force and Navy made it possible for Navy tankers to supply the fuel needed at Lajes field. The need for this coordination highlighted the importance of a central point of contact responsible for interservice transportation issues. As operations become more joint-oriented, centralized control becomes more important.

Step 3: Applying the Tenets of Airlift

After analyzing the lessons learned and the keys to airlift success, looking at the important constraints, and examining the five tenets of airlift operations, the keys and lessons from Operation NICKEL GRASS can be generalized by associating them with the tenets of airlift operations. Table 7 and 8 show this association:

Tenets of Airlift Operations	Lessons From Operation NICKEL GRASS
INITIATIVE	The United States cannot rely on allied support and should be capable of acting on its own - Cargo aircraft need air refueling capability
	The USAF cannot rely on civilian air carriers to jeopardize profits without official CRAF (Civil Reserve Air Fleet) activation - the Air Force must be prepared to act without CRAF assistance
	The DOD needs a logistics contingency plan for the Middle East
	The number of pre-selected loading points should be kept to a minimum
SYNCHRONIZATION	Centralized control of military transportation is necessary to properly manage airlift resources
	Command, control and communications are essential during airlift operations - Airlift flow should be centrally controlled by experienced airlifters

Table 7. Lessons learned associated with the Tenets of Airlift Operations

Tenets of Airlift Operations	Keys to Success in Operation NICKEL GRASS
INITIATIVE	Military leader planned for contingencies, anticipated political decisions, and took preparatory action (rather than waiting for specific guidance)
AGILITY	Cargo to be airlifted was moved to pre-selected loading points
	Capability of Air Force aircraft to carry all requested material and equipment
	Experienced, innovative aerial port personnel made efficient offload operations possible at saturated fields and sped up delivery of war ready equipment - Offload teams organized to match incoming cargo - Selecting and maintaining space to offload and break down cargo - Recycling and returning empty pallets
	Capability of cargo aircraft to carry any of the equipment requested and deliver it quickly in from stocks in the United States - Enough inventory and safety stock was maintained at loading locations and supply lines allowed for quick delivery from points of origin
SYNCHRONIZATION	Prioritization of Israeli requests to efficiently utilize limited airlift capability
	Coordination between military leaders
	Specific airlift requirements in terms of types of cargo to be moved and time frames
VERSATILITY	Ability of personnel to overcome adversity and the DEPTH of the operation enabled MAC to meet Israel's diverse delivery requirements enabling the Israeli forces to seize the initiative

Table 8. Keys to Successful Airlift Operations and the Tenets of Airlift Operations

Examining the two tables highlights the importance of the tenets of airlift operations. By taking into account these five tenets of airlift operations, MAC was able

to execute the long-range tactical sustainment operation successfully despite the shortcomings in initiative and synchronization described in the lessons learned. These five tenets can be used to generalize the lessons from any airlift operation and are especially helpful in association with tactical airlift operations in support of fielded ground forces.

IV CONCLUSIONS and RECOMMENDATIONS

The research in this paper focused on determining what lessons from Operation NICKEL GRASS apply to contemporary airlift operations. In order to address this, three investigative questions were addressed:

1. What events led up to the U.S. airlift support to Israel in 1973?
2. What lessons did we learn from the Operation NICKEL GRASS?
3. How should these lessons be applied to contemporary airlift operations?

Summary of findings

What events led up to the U.S. airlift support to Israel in 1973?

In order to investigate what lessons from Operation NICKEL GRASS apply to contemporary airlift operations, it is important to understand the events that led up to the U.S. involvement in the operation, as well as how the U.S. military performed. The facts surrounding Operation NICKEL GRASS are well documented and consistent. Less consistent are the conclusions drawn concerning the significance of the operation and the applicability of any lessons stemming from the experience. Three sources were examined in order to lay the foundation of the research. The facts reported in all three documents were very consistent with other literature on the Yom Kippur War and provide a solid foundation (Shazly, 1980; van Creveld, 1975). In addition to providing background information, the three sources were chosen to provide a good cross section for examining the different conclusions on the significance of the airlift operation itself.

In his book, *The Two O'clock War*, Walter Boyne concluded MAC performed extremely well throughout the airlift, and the airlift was vital to Israel's survival. In Boyne's opinion the indecision and hesitation of U.S. civilian leadership resulted in

delays and difficulties. It was the individual performance and commitment of the military members involved that led to the success of NICKEL GRASS. Boyne concluded the lessons from the 1973 operation should be applied in any airlift operation regardless of size (Boyne interview, 23 Apr 03).

The GAO report on MAC's performance during Operation NICKEL GRASS concluded that although MAC performed very well during the operation, the airlift was not large enough to be particularly applicable for predicting performance during larger airlift operations. Additionally, the GAO felt the ability of USAF aircraft to deliver outsized equipment had little impact on the outcome of the war. In the GAO's opinion, MAC learned from insufficient prior planning, shortcomings in command and control, and lack of aircraft capability.

The Air Command and Staff College report "Operation NICKEL GRASS" by Dennis B. Dolle provided a third view of Operation NICKEL GRASS. According to Dolle, the mission was a success because of the actions and quick decisions of the civilian leadership as well as the military personnel involved. In Dolle's opinion, the airlift was significant because it stabilized the region by ensuring the survival of Israel. During the operation, MAC learned significant lessons concerning the unreliability of its allies and the need for USAF aircraft to be able to accomplish similar missions without outside help.

Although different in their conclusions, all three sources provide good insight into the lessons from Operation NICKEL GRASS. The differing conclusions are a direct result of differing views on the constraints of the operation. When taking into account the political and geographical isolation of Israel, the lessons on operating out of saturated

airfields can be applied to separate and larger airlift operations. When considering the safety implications and the urgent need for the supplies, the experience from NICKEL GRASS can be applied to tactical elements of larger and smaller airlift operations.

What lessons did we learn from the Operation NICKEL GRASS?

Based on the sources in chapter 2, nine specific lessons were learned from Operation NICKEL GRASS. In essence, these lessons point out the shortcomings in the operation and should be investigated to avoid making the same mistakes again. The shortcomings consisted of: the need for contingency plans; the need to possess the capability to act unilaterally; the difficulties in dealing with outside agencies; the need for centralized airlift control; the need for air refueling capability; the importance of properly managing airlift assets; and the importance of command, control and communications.

In addition to the lessons, 13 keys to airlift success were identified. These keys resulted in success despite the shortcomings listed above. The keys to success included: the ability of U.S. aircraft to carry all requested materials and equipment; the capability to tactically deliver “War Ready” equipment; prioritization of specific airlift requests; experienced aerial porters; efficient offload/on load operations; proper preparation and coordination; and pre-positioning materials at a minimal number of on load points.

How should these lessons be applied to contemporary airlift operations?

As military operations and capabilities evolve, it is easy to assume that specific lessons from the past do not apply. In addition, it is difficult to apply many specific lessons like the ones described above. In order to gain the benefit of experience, specific lessons must be generalized so they can be applied in other situations. In order to

successfully generalize the lessons learned from Operation NICKEL GRASS, one must first define the standards of airlift success.

The tenets of operations described in Army Field Manual 3-0 were chosen to define the tenets of airlift operations for two important reasons. First, these tenets provide standard lesson categories that have been proven over centuries of military operations. Although different than ground operations, airlift operations are still essentially military operations. Secondly, and perhaps more important, using these tenets will facilitate communications between the services. The Army is the primary customer of airlift operations and the Army takes into account these tenets when planning or executing operations. Understanding and utilizing these tenets will enhance communications with the Army because they understand and can relate to the tenets. In today's joint world the importance of this communication cannot be overemphasized.

Similar to Army of operations, airlift success depends on the ability to operate in accordance with five basic tenets: initiative, agility, depth, synchronization, and versatility. These tenets are essential to meeting the customer's requirements and thus essential to a successful airlift operation. In and of themselves they do not guarantee success, but their absence makes it difficult and costly to achieve.

Based on the Army's tenets of operations and experience from Operation NICKEL GRASS, the tenets of airlift operations are defined as follows:

Initiative: the ability to anticipate requirements and perform the preparation necessary to meet the war fighter's necessity to gain and maintain operation initiative while maintaining airlift freedom of action

Agility: is the ability to adapt and react quickly enough to deliver supplies to Combatant Commanders and fielded forces with enough speed to enable them to react faster than the enemy

Depth: refers to the distance from the delivery point back to the item's point of origin and directly affects versatility

Synchronization: arranging activities in time and space in order to get the right product or piece of equipment, to the right place, in the right condition, at the right time

Versatility: the ability of transportation units to meet diverse delivery requirements enabling commanders and units to rapidly and efficiently shift focus, tailor forces, and move from one role to another

Conclusions

After applying the lessons learned from Operation NICKEL GRASS to the tenets of airlift operations, it is apparent the shortcomings in the operation centered around initiative and synchronization. The Air Force and the DOD were not prepared to conduct an operation without allied support, and the command structure was not set up for such an operation. While these shortcomings did not result in failure, lack of long-term initiative and planning made the operation much more difficult. Only through the proper application of the five tenets of airlift operation was the military able to overcome these shortcomings. By taking advantage of the versatility resulting from USAF aircraft capabilities and the depth of the operation, the individual initiative that provided airlift agility and versatility, as well as synchronization between military leaders, MAC was able to meet the requirements of the IDF successfully.

Importance of Findings

When looking at airlift operations it often seems that we continue to learn the same lessons by making the same mistakes. We could break this cycle, by considering the impact decisions have on the tenets of airlift operations. For example, several of the lessons learned during DESERT STORM in the early 90's look surprisingly similar to the lessons we should have learned 20 years earlier during Operation NICKEL GRASS. In

DESERT STORM, a chronic shortage of MAC-assigned High Frequency radio channels meant aircrews were often unable to alert bases of their arrival time. This caught Airlift Control Elements unprepared (Mathews, 1996:73). In Operation NICKEL GRASS, the importance of communication with offload crews was clearly displayed. Similar to 1973, MAC learned greater air refueling of airlift aircraft would have increased airlift agility and effectiveness during DESERT STORM (Mathews, 1996:74).

MAC plans for executing a DESERT SHIELD/DESERT STORM type scenario called for 34 offload locations. Initially, MAC used five primary locations to offload cargo in theater. After a month and a half, 10 more locations were opened but the ARMY was reluctant to validate cargo to the additional fields because they wanted troops and cargo delivered as close to the combat zone as possible. As the offload points became saturated, Material Handling Equipment (MHE) became the limiting factor for conducting offload operations. Eventually, MAC began sequencing aircraft into theater so they did not arrive in clumps and more MHE was sent to the offload points to alleviate the problems. In the meantime, the Air Force had trouble persuading the Army to validate cargo for multiple fields rather than attempting to push everything through the closest airfield to the front. Based on our experience in Operation NICKEL GRASS, we should have been able to anticipate the performance of offload operations at saturated fields and understood the importance of sequencing airlift aircraft. Additionally, we should have understood the importance of MHE already. (Mathews, 1996:75,87)

Finally, during DESERT STORM we once again learned the importance of prioritization. In NICKEL GRASS, the importance of appropriate airlift allocation was noted. Similarly, following DESERT STORM, USTRANSCOM (United States

Transportation Command) recommended that the CJCS (Chairman of the Joint Chiefs of Staff) should direct theater commanders to implement cargo allocations systems to ensure proper utilization of the limited airlift available.

Part of the problem stems from fixing the symptoms rather than the root cause of the problems. By limiting our lessons learned to specific areas unique to specific operations, we fail to generalize these lessons and thus limit their applicability. For example, as a result of Operation NICKEL GRASS we increased the air refueling capability of our cargo aircraft. However, based on DESERT STORM, we failed to recognize fully the importance of air refueling to airlift operations. After NICKEL GRASS, we improved the communication capabilities of cargo aircraft; but based on the limited number of channels assigned to MAC during DESERT STORM, we failed to recognize the importance of the actual communication.

In order to learn our lessons effectively and apply what we have learned to future operations, we must establish standard lesson categories. Similar to the Army's tenets of operations, these lesson categories should hold true for all airlift operations and be essential to effective airlift operations. In order to impact future operations, we must examine past operations and determine success based on more than overall outcomes.

Recommendations

Airlift leaders need to be educated on the tenets of airlift operations, and these tenets should be used when making decisions. Past airlift operations, including exercises, should be analyzed based on how well the tenets of airlift operations were followed and the results then utilized to make planning and procurement decisions. Future decisions concerning airlift should be categorized based on how well the options contribute to the

Air Force's ability to meet the tenets and how well they help the Air Force correct for past shortcomings. When communicating with our sister services during the planning or execution phases of airlift operations, the tenets of airlift operations should be employed to enhance communication.

We cannot count on our enemy allowing us the luxury of long build up times. We must be prepared to provide just-in-time airlift. Adhering to the tenets of airlift operations during planning and execution will allow us to provide this valuable service and meet our customer's changing needs. The key to air power may be flexibility, but the key to long-range tactical sustainment airlift operations is initiative, agility, depth, synchronization, and versatility.

Recommendations for future research

This research was the first step in determining how past lessons should influence future decisions. This paper analyzed airlift's performance during Operation NICKEL GRASS and provides the tenets of airlift operations. The next step is to determine how well the Air Force has applied these tenets in recent operations as well as recent airlift planning and procurement decisions. This information should then be utilized to determine where the Air Force should focus for improvements. These needs could then be communicated to the rest of the military services.

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REPORT DOCUMENTATION PAGE

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1. REPORT DATE (DD-MM-YYYY) 13 - 06 - 2003		2. REPORT TYPE Graduate Research Project		3. DATES COVERED (From - To) June 2002 - June 2003	
4. TITLE AND SUBTITLE Transforming Past Lessons to Mold the Future: A Case Study on Operation NICKEL GRASS				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Riney, Thomas J. Maj, USAF				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Air Force Institute of Technology Graduate School of Engineering and Management (AFIT/EN) 2950 P Street, Building 640 WPAFB OH 45433-7765				8. PERFORMING ORGANIZATION REPORT NUMBER AFIT/GMO/ENS/03E-11	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) LtC Lee E. DeRemer JCS J7 Joint Staff Pentagon DSN 227-7298				10. SPONSOR/MONITOR'S ACRONYM(S) JCS J7	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT This paper generalizes the specific lessons from a past airlift operation enabling these lessons to be applied in planning, analyzing, or executing contemporary or future airlift operations. In so doing it answers the research question, "How should lessons from past operations be applied to current situations?" In this case, the specific lessons from the 1973 airlift operation supporting Israel, Operation NICKEL GRASS, were analyzed and generalized using the Tenets of Operations described in U.S. Army field manuals. NICKEL GRASS was a successful airlift-centric operation that provides valuable insights into the Air Force's ability to carry out short-notice, sustainment operations in support of engaged fighting forces. Case study methodology is used to generalize the specific lessons from the operation and three investigative questions were addressed: 1. What events led up to the U.S. airlift support to Israel? 2. What lessons did we learn from the operation? 3. How should these lessons be applied to contemporary airlift operations? Finally, the Tenets of Airlift Operations are defined and utilized as general lesson categories. These categories balance the Air Force's focus on the unique aspects of Air Power and provide common ground for structuring, planning, and execution discussions in the joint environment.					
15. SUBJECT TERMS Long-Range Tactical Sustainment Airlift, Tenets of Airlift Operations, Operation NICKEL GRASS, Operation DESERT STORM					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 62	19a. NAME OF RESPONSIBLE PERSON LtCol Stephan P. Brady
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER (include area code) (937) 255-6565 x4367