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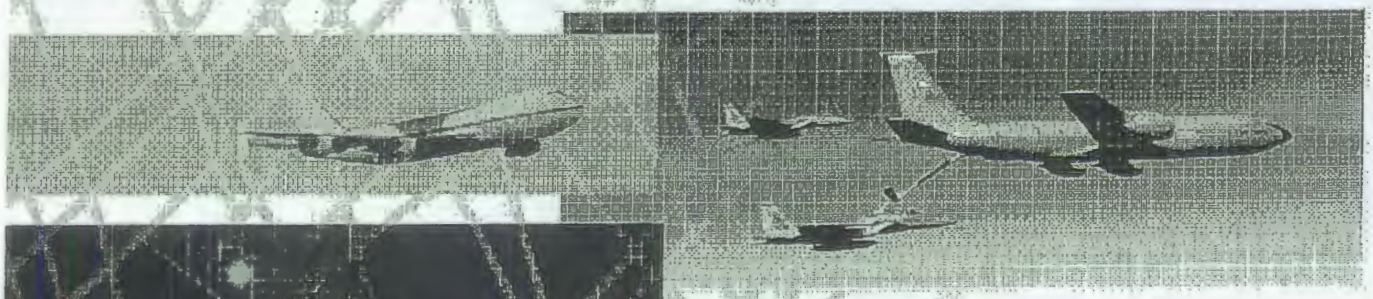
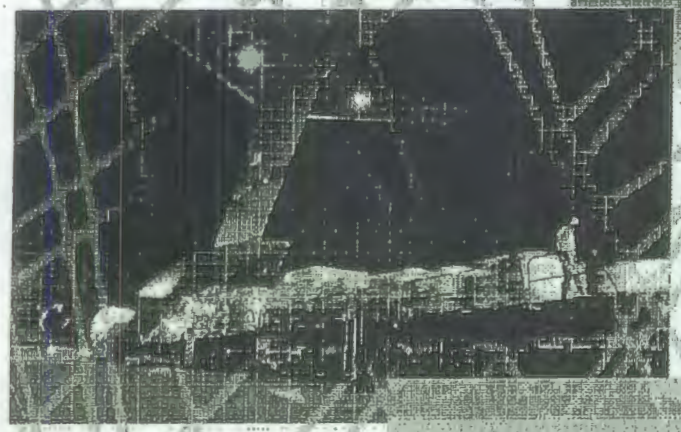
MOBILITY capabilities & requirements STUDY





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DEPUTY SECRETARY OF DEFENSE
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FEB 26 2010

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
COMMANDERS OF THE COMBATANT COMMANDS
ASSISTANT SECRETARIES OF DEFENSE
GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
DIRECTOR, OPERATIONAL TEST AND EVALUATION
DIRECTOR, COST ASSESSMENT AND PROGRAM EVALUATION
INSPECTOR GENERAL OF THE DEPARTMENT OF DEFENSE
ASSISTANTS TO THE SECRETARY OF DEFENSE
DIRECTOR, ADMINISTRATION AND MANAGEMENT
DIRECTOR, NET ASSESSMENT
DIRECTORS OF THE DEFENSE AGENCIES

SUBJECT: Mobility Capabilities and Requirements Study 2016

Enclosed is the report of the Mobility Capabilities and Requirements Study 2016 (MCRS). The MCRS represents a significant effort by the Department to identify the mobility capabilities and requirements that will be needed to support U.S. strategic objectives in the 2016 timeframe. The study used the Defense Planning Scenarios and recent operational experience against the backdrop of the Department's force planning construct and the evolving global defense posture, to project future mobility needs.

MCRS results will provide a key reference point as we continue to shape our mobility forces. However, the MCRS is not an end, but simply a milestone in the Department's ongoing process to assure mobility capabilities are sufficient to meet future needs. I have tasked the MCRS team to remain engaged to ensure that mobility capabilities remain sufficient in light of any future changes and to ensure that funding decisions reflect strategic priorities.

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As stated

OSD 75436-10

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Mobility Capabilities and Requirements Study 2016 (MCRS-16)

Approved:

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MCRS-16 Executive Summary

Introduction

A. The National Military Strategy (NMS) has continued to evolve since the Department of Defense (DOD) conducted its last comprehensive mobility study, the Mobility Capabilities Study (MCS), in 2005. Although the ability to prosecute two nearly simultaneous conventional campaigns remains a cornerstone of U.S. defense, the current strategy places increased emphasis on Irregular Warfare, Stabilization Operations, and DOD support to Homeland Defense (HLD). Furthermore, the current strategy recognizes the reality of long-term U.S. involvement in globally dispersed operations which may include lengthy commitments to major campaigns.

B. In addition to the refinement of U.S. strategic priorities, important fact-of-life changes have occurred since the MCS was completed that place new demands on the mobility system. These changes include a higher level of engagement around the world, increased reliance on the Reserve Components, increased reliance on airlift to move equipment and supplies that were once moved almost exclusively via surface transport, the introduction of new specialized equipment (e.g., Mine Resistant Ambush Protected vehicles), the continued growth of Special Operations Forces, the establishment of United States Africa Command, and the increase in Army and Marine Corps end strength.

C. In response to these changes, the DOD has made informed investment decisions designed to maintain the right mix of strategic and intra-theater transportation capabilities. Examples of recent investments in DOD's strategic capabilities include completion of C-17 procurement, ongoing C-5 modernization, and planned KC-135 recapitalization. Investments in DOD's theater capabilities include ongoing procurement of C-130J aircraft to recapitalize the Air Force's aging C-130 fleet, ongoing procurement of the C-27 Joint Cargo Aircraft to move Army time-sensitive, mission-critical cargo, ongoing procurement of Joint High Speed Vessels to improve the ability to rapidly reposition forces and equipment within an area of operations, and the development of a precision airdrop system. Additionally, the Department continues to invest in modernization programs, such as C-130 avionics and the Joint Precision Approach and Landing System.

D. In order to provide an updated, comprehensive assessment of the Department's mobility system, one which could be used to inform the 2010 Quadrennial Defense Review (QDR), the Secretary of Defense directed the United States Transportation Command and the Office of the Secretary of Defense, Program Analysis and Evaluation[1], "...in coordination with DOD components [to] conduct a mobility study to identify mobility capabilities and requirements needed to support the defense strategy." The Mobility Capabilities and Requirements Study 2016 (MCRS) is the fifth comprehensive mobility study conducted by the DOD, and the second mobility study conducted since 9/11.

[1] Now known as Cost Assessment & Program Evaluation (CAPE)

E. MCRS is a joint, collaborative study designed to conduct a detailed analysis of the major components of the NMS, which included steady-state operations, lesser contingencies, homeland defense, and major surge campaigns. Participants included the Services, Combatants Commands, the Joint Staff, the Defense Logistics Agency, and the Maritime Administration of the Department of Transportation. This executive summary provides an unclassified overview of the objectives, scope, methodology, and major insights of the MCRS. The classified report provides a detailed explanation of the study and its results. Additional information concerning analytic models, and the study's validation and verification process, as well as all data used in this study, are available upon request.

Objectives

The objectives of MCRS were to determine the mobility capabilities and requirements needed to deploy, employ, sustain and redeploy joint forces in support of the NMS in the 2016 timeframe; to determine capability gaps/overlaps associated with the programmed mobility force structure; and to provide insights and recommendations to support the QDR and decisions regarding mobility programs.

Scope

A. The study used approved DOD planning scenarios to develop and analyze three separate cases designed to provide senior leaders with a detailed understanding of the range of mobility capabilities needed to support different levels of demand based on different possible future strategic environments. All cases assessed mobility demands over a notional seven-year period.

B. The study assessed the major components of the mobility system required to move forces from point of origin to point of effect and to sustain those forces in the 2016 timeframe using the programmed force in the 2009 President's Budget (PB09), updated to include pertinent decisions made during the formulation of the 2010 President's Budget (PB10). The components of the mobility system assessed in this study include airlift, aerial refueling, sealift, surface transportation, ashore and afloat prepositioning, forward stationing, and infrastructure.

C. The study also examined how changes in the mobility system impact the outcomes of major operations, and assessed the associated risks and/or benefits of these changes.

(U) Methodology

A. MCRS used the Department's suite of approved mobility models to support analysis of the following stages of deployment.

- **CONUS deployment**: Units and materiel deploy from initial positions (forts, air bases, sea bases, reserve mobilization stations, and depots) to air- and sea ports of embarkation.

- **Inter-theater deployment**: Strategic assets (aircraft and ships) transport personnel, equipment, and stocks to ports of debarkation.
- **Intra-theater deployment**: Theater assets (trucks, rail systems, watercraft, and aircraft) deploy units, and sustainment to tactical assembly areas, air bases, and battlefield locations.
- In addition, the aerial refueling assessment included employment analysis.

B. MCRS developed three cases to evaluate a broad spectrum of military operations which are linked to notional strategic environments that could be used to inform the QDR and support possible decisions regarding future mobility force structure.

- **Case 1:** U.S. forces conduct two nearly simultaneous large-scale land campaigns, and respond to three nearly simultaneous HLD consequence management events with corresponding aerospace control levels (ACLs) and maritime awareness presence levels, which take place concurrent with the land campaigns.
- **Case 2:** U.S. forces conduct a major air/naval campaign concurrent with the response to a large asymmetric campaign and respond to a significant HLD consequence management event with corresponding ACLs and maritime awareness presence levels. This case includes scenarios and operations that are part of the QDR Security Environment.
- **Case 3:** U.S. forces conduct a large land campaign against the backdrop of an ongoing long-term irregular warfare campaign. The case includes three nearly simultaneous HLD consequence management events with corresponding ACLs and maritime awareness presence levels.

C. The study assessed the mobility system's performance by examining how force closures supported achievement of U.S. campaign objectives. This was done by assessing required delivery timelines and a comprehensive set of campaign risk metrics to determine whether available forces met war fight objectives within desired timelines.

D. The study used Service-provided force deployment data for each scenario, developed corresponding logistics concepts of operation to ensure the scenarios were logistically supportable, and developed time-phased force deployment data, which included sustainment requirements, to prescribe the delivery profiles for forces deploying to a given scenario. MCRS also used current data from the Mobility Planning Factor Database, which covers the physical and operational characteristics of organic and commercial air, sea, and land mobility platforms; and the characteristics and capabilities of mobility infrastructure.

Key Assumptions

Key assumptions underlying the analysis are identified below.

- MCRS used PB09 as the Program of Record (with appropriate PB10 adjustments).
- Non-mobility forces, i.e., combat and support forces, will not exceed programmed levels.

- Defense Planning Scenario (DPS) guidance[2] is in effect. U.S. forces must be prepared to support:
  - Two nearly simultaneous conventional campaigns
  - Or, one conventional campaign, if engaged in a long-duration irregular warfare campaign
  - Plus, up to three nearly simultaneous domestic events
  - Plus, ongoing steady state operations
- Force development planning assumptions are in effect
- Scenario assumptions, as defined in approved DPS, Multi-Service Force Deployments, and Analytical Baselines, are in effect

Overall Assessment

A. With few exceptions, MCRS found the Department's planned mobility capabilities sufficient to support the most demanding projected requirements. Inter- and intra-theater airlift capabilities, surge sealift, pre-positioning and CONUS transportation assets are largely satisfactory. In general, the lack of foreign infrastructure required to support major force deployments remains the fundamental constraint when attempting to reduce deployment timelines in support of U.S. objectives. Procurement of additional airlift, sealift, and prepositioned assets by itself will not overcome this reality. The Department should continue to explore strategies that seek to mitigate the adverse impacts of infrastructure constraints by reducing reliance on destination infrastructure wherever possible. Additionally, continued focus on flexible multi-modal nodes and capabilities that facilitate adaptable transportation networks may produce increased velocity and throughput.

B. The percent of available system capacity used to meet the demands of each case is summarized in Figure 1.

C. The capacity of the Department's strategic airlift fleet exceeds the peak demand in each of the three MCRS cases. The programmed strategic airlift fleet, which consists of 223 C-17s and 111 C-5s, provides a capacity of 35.9 million ton-miles per day (MTM/D). The peak for MCRS Case 1, which represents the highest level of modeled strategic airlift demand, required 32.7 MTM/D. Case 2 required 30.7 MTM/D, and Case 3 required 29.1 MTM/D.

D. MCRS determined that the peak demand for strategic lift occurs during the deployment phase of a major warfight and, more specifically, during the deployment to the second of two nearly simultaneous warfights. The requirement for the delivery of over- and outsized (O&O) equipment early in warfights drives this peak demand. Additionally, MCRS found that the peak demand for strategic airlift and intra-theater airlift are not concurrent. The demand for strategic airlift is at its highest during the deployment of forces. The demand for intra-theater airlift is at its highest after the majority of the forces are deployed; thus, C-17s can

[2] Defense Planning Scenario: Steady State Security Postures/Integrated Security Postures, dated 18 Apr 2008.

be used to support intra-theater missions without adding to the peak demand for C-17s. Both insights are consistent with findings from previous mobility studies.

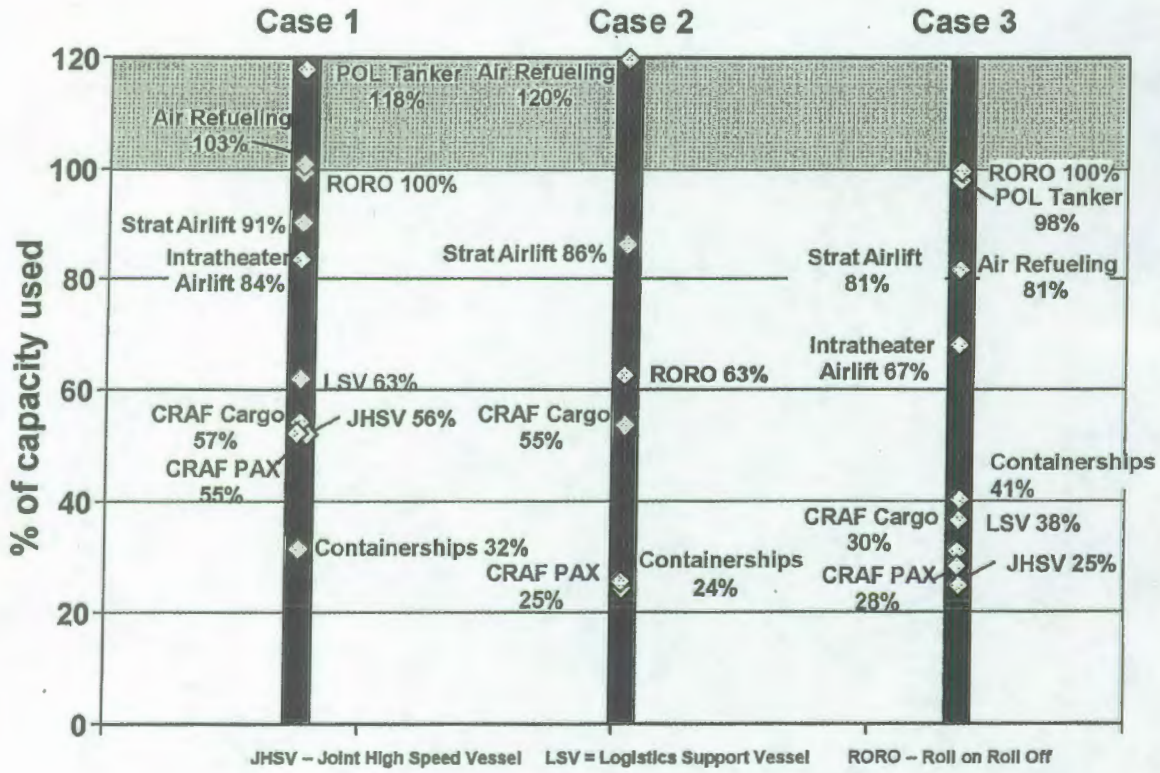

Figure 1: (U) Mobility System Utilization by MCRS Case

E. The peak airlift requirement in support of HLD consisted of a relatively small number of dedicated aircraft (a combination of 12 DOD aircraft and 36 commercial). These aircraft were needed to ensure Chemical, Biological, Radiological, Nuclear, and High-Yield Explosive Consequence Management Response Force units could meet their required delivery dates. The analysis shows the use of additional DOD airlift assets does not improve overall force closure. This is because ground transportation provides the best rate of closure -- more than 10 times the rate of airlift -- when moving significant forces and large amounts of equipment from dispersed locations in response to major HLD events. The CONUS road network and commercial truck fleet – including over two million trucks for hire – have significant capacity that outstrips the throughput capacity of airlift.

F. Because the movement of O&O equipment early in the warfight drives the demand for strategic airlift, the recent addition of ground force end strength to provide a larger rotational pool of forces to sustain long-duration stability operations does not impact the peak demand for strategic airlift. MCRS also found that variations in basing had little impact on the peak demand for strategic airlift.

G. DOD relies on the Civil Reserve Air Fleet (CRAF) as the primary means of delivering passengers and bulk air cargo. Projected CRAF cargo capacity is significant, and greatly exceeds the requirements for all MCRS cases.

H. The intra-theater airlift analysis included C-130s, C-17s and C-27s. The programmed fleet of 401 C-130s exceeds the peak demand in each of the three MCRS cases. The highest C-130 demand occurred in Case 1, which required 335 aircraft[3]. The peak aircraft demand in each case occurs during surge airdrop/airland operations. However, based on current total force planning objectives, the C-130 crew force structure cannot sustain steady state operations in combination with a long duration irregular warfare campaign.[4] C-27s were used to support the Army's requirement for the movement of time-sensitive, mission critical cargo. They were deployed to each major combat operation and the irregular warfare campaign, as specified by the Army, although no specific assessment of the direct support missions was conducted. C-27s provide some improvement in airfield access over C-130 aircraft.

I. The current tanker inventory consists of 474 USAF aircraft (415 KC-135s/59 KC-10s) and 79 USMC KC-130s. This inventory does not satisfy the peak demands of two of the three cases assessed. The demand ranged from a low of 383 KC-10s/KC-135R-equivalents and 66 KC-130s to a high of 567 KC-10s/KC-135R-equivalents and 79 KC-130s. However, a modernized fleet would require fewer aircraft to meet the same demand (lower depot/greater capability).

J. En route infrastructure is sufficient in all theaters to support the fuel requirements for deploying and sustaining the force.

K. Sealift is the primary means for delivering large ground forces and is essential to building up combat power required to seize the initiative in major ground operations. MCRS moved approximately 90% of all cargo by sealift.

L. The available sealift fleet of organic, commercial, alliance, and effective U.S. controlled roll-on/roll-off ships and containerships was sufficient to meet the military objectives of the most demanding MCRS case – with no appreciable reserve in two of the three cases and some operational delays. Maintaining viable Department capacity is critical given there are only 276 Roll-on/Roll-off ships worldwide, of which 92 are US-flag or Effective U.S. Control. While demand slightly exceeded projected U.S. and allied Petroleum, Oil, Lubricants tanker capacity, the study noted that this could be easily mitigated by gaining access to the 1,980 useful tankers available globally, 254 of which are owned by North Atlantic Treaty Organization countries.[5]

M. Prepositioned assets provide operational and strategic flexibility. Programmed prepositioned assets were sufficient to meet the most demanding MCRS case. In fact, for the specific scenarios/warfights assessed, the majority of ground combat components of the currently programmed afloat prepositioned sets were not used until well after sealift closure from the CONUS. However, the afloat prepositioned port opening, theater opening, and logistics packages were essential to rapidly closing the force. MCRS did not determine whether there would be any

[3] Direct support mission was not assessed. C-130s may be required to supplement C-27s to support this mission.
[4] Per 17 Jan 2007 Secretary of Defense Memorandum, Subject: Use of the Total Force.
[5] Based on summer 2009 market figures.

detrimental effects or unintended consequences associated with eliminating currently programmed prepositioned sets. Rather, it suggests an opportunity to reevaluate the concept of employment and mix of afloat prepositioned equipment across the full range of military operations to include scenarios/warfights that were not assessed and that would include new technology such as selective offload and at-sea transfer.

N. The programmed CONUS infrastructure is sufficient to meet the most demanding MCRS case.

O. Joint Logistics Over the Shore assets and Joint High Speed Vessels are critical enablers for deployment and sustainment and are sufficient to support the most demanding MCRS case. A single Offshore Petroleum Discharge System is insufficient to meet the demands of two overlapping land campaigns. Even with a full complement of enablers, infrastructure constrained areas of responsibility, such as those in Africa, will limit the ability to deploy and sustain forces and will continue to require mitigation strategies.

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1. (U) Purpose

(U) This report describes the Mobility Capabilities and Requirements Study 2016 (MCRS). The purpose of MCRS was to identify the mobility capabilities needed to support the National Defense Strategy (NDS) in the 2016 timeframe. The findings summarized in this report are based on detailed analysis of approved scenarios from the Department's Analytic Agenda. MCRS developed and analyzed three different cases to evaluate a broad spectrum of military operations linked to notional strategic environments. The intent was to provide a range of capability requirements designed to inform the Quadrennial Defense Review (QDR) and support future decisions regarding mobility force structure.

2. (U) Background

(U) The Guidance for the Development of the Force (GDF)[6] directed the United States Transportation Command (USTRANSCOM) and Office of the Secretary of Defense (OSD) Program Analysis and Evaluation (PA&E)[7], in coordination with Department of Defense (DOD) components, to conduct a mobility study to identify mobility capabilities and requirements needed to support the defense strategy. MCRS satisfies this directive by examining alternatives in mobility capabilities, sources (military and commercial), basing, prepositioning, air refueling (AR), advanced logistics concepts, and destination theater austerity.

(U) MCRS is the fifth major mobility study conducted by the DOD since 1994. It is the second mobility study conducted since 9/11, and the first to glean lessons learned from eight years of conflict in Iraq and Afghanistan.

(U) The National Military Strategy has continued to evolve since the DOD conducted its last comprehensive mobility study, the Mobility Capabilities Study (MCS), in 2005. Although the ability to prosecute two nearly simultaneous conventional campaigns remains a cornerstone of U.S. defense, the current strategy places increased emphasis on Irregular Warfare (IW), Stabilization Operations, and DOD support to Homeland Defense (HLD). Additionally, the current strategy recognizes the reality of long-term U.S. involvement in globally dispersed operations, which may include lengthy commitments to major campaigns.

(U) In addition to the refinement of U.S. strategic priorities, important fact-of-life changes have occurred since the MCS was completed that place new demands on the mobility system. These changes include a higher level of engagement around the world, increased reliance on the Reserve Components, increased reliance on airlift to move equipment and supplies that were once moved almost exclusively via surface transport, the introduction of new equipment (e.g., Mine Resistant Ambush Protected vehicles [MRAPs]), the growth of Special Operations Command, the establishment of United States Africa Command (USAFRICOM), and the increase in Army and Marine Corps end strength.

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[6] (U) Guidance for the Development of the Force FY10-15, April 2008.
[7] (U) Now known as Cost Assessment & Program Evaluation (CAPE).

(U) In response to these changes, the DOD has made informed investment decisions designed to maintain the right mix of strategic and intra-theater transportation capabilities. Examples of recent/ongoing investments in DOD's strategic capabilities include procurement of C-17 aircraft, C-5 modernization, KC-135 recapitalization, investment in improved Roll-on/Roll-off (RORO) ship readiness and service life, and the modification of afloat prepositioned sets (PREPO). Investments in DOD's theater airlift and sealift capabilities include procurement of new C-130J aircraft to recapitalize the Air Force's aging C-130 fleet, procurement of the C-27 Joint Cargo Aircraft (JCA) to move Army time-sensitive, mission-critical cargo, procurement of Joint High Speed Vessels (JHSVs) to improve the ability to rapidly reposition forces and equipment within an area of operations, and the development of a precision airdrop system. Additionally, the Department continues to invest in modernization programs like C-130 avionics modernization and the Joint Precision Approach and Landing System.

(U) MCRS has had a unique opportunity to incorporate a high degree of operational relevancy into the analysis by leveraging lessons learned from the last eight years of global operations. During that time, USTRANSCOM has supported major deployments and force rotations, sustained U.S. and allied forces in austere environments, conducted airdrop and airland operations, increased vertical resupply operations by more than 500%, and provided continuous support to worldwide AR operations.

2.1. (U) OBJECTIVES

- (U) Determine the mobility capabilities and requirements needed to support the NDS in the 2016 timeframe.
- (U) Identify the capabilities and requirements to deploy, employ, sustain and retrograde joint forces in support of the NDS in the 2016 timeframe.
- (U) Determine capability gaps/overlaps associated with the programmed mobility force structure in the 2016 timeframe.
- (U) Provide a risk assessment.
- (U) Provide study insights and recommendations to support the upcoming QDR and future defense programs.

2.2. (U) SCOPE

(U) MCRS assessed the major components of the mobility system required to move forces from point of origin to point of effect and sustain those forces in the 2016 timeframe using the programmed force in the 2009 President's Budget (PB09), and the Future Years Defense Program for FY09-FY13. Major components included airlift, AR, sealift, surface transportation, ashore and afloat PREPO, and forward stationing.

(U) The study assessed movement requirements at the equipment level of detail and examined force closure, sustainment levels, and asset and infrastructure utilization as the primary mobility metrics. Analysts linked the performance of the mobility system to campaign analysis results to determine the impact of various mobility solutions on campaign outcomes. Model runs integrated scenarios over a seven-year period and included the employment demands on intra-theater lift and AR assets.

(U) The study included sensitivity analyses to determine the impact of changes in the mobility system on the outcomes of major operations and associated risks and/or benefits of increased or decreased mobility capability.

(U) Six case studies complemented the MCRS modeling and simulation by providing additional information on mobility issues that are either not conducive to modeling or not adequately addressed with the scenarios. The topics represent issues of persistent interest to the DOD and Congress: Troop Growth, Standup of USAFRICOM, Deploying by Deployment Order (DEPORD) vs. Time Phased Force Deployment Data (TPFDD), Chemical, Biological, Radiological, Nuclear, High Yield Explosive (CBRNE) Consequence Management Response Force (CCMRF) Operations, Basing Variations (consolidated vs. dispersed), and Army Movement.

2.3. (U) OIF/OEF LESSONS LEARNED

(U) MCRS incorporated lessons learned from OPERATION IRAQI FREEDOM (OIF) and OPERATION ENDURING FREEDOM (OEF), specifically relating to theater airlift, force structure and sustainment.

(U) C-130s provide sustainment for fielded forces during operations via Scheduled Theater Airlift Routes (STARs). The lessons learned from OIF/OEF influenced the development of the route structure, scheduling, and throughput capability for the STARs developed in MCRS. As a result of OIF/OEF data analysis, MCRS STARs more accurately accounted for movement of Distinguished Visitors, detainees, Congressional Delegations, Staff Delegations, and forces on Rest and Recreation.

(U) OIF/OEF operations highlighted the use of C-17s in the direct delivery and intra-theater airlift roles. Once C-17s fulfilled their strategic role, including direct delivery missions to rapidly deliver combat equipment to theater, USTRANSCOM leveraged these aircraft to support intra-theater missions. MCRS modeled the dual use of C-17s based on operations in OIF and OEF.

(U) The study team ensured that model data (e.g., pallet weights) were updated based on historical records and current experience to accurately portray realistic capabilities.

(U) Examination of OIF/OEF force structure influenced the MCRS TPFDD lists. For instance, MCRS added forces to the TPFDDs to meet security and maintenance requirements and to open and operate mobility nodes. Equipment, such as MRAPs, add-on armor, and AM-2 matting, were also included, as recommended by the Services. Finally, MCRS used the current Army Force Generation rotation requirements and mobilization timelines to assess long duration IR campaign.

(U) Sustainment accounts for nearly half of all cargo moved and, thus, has a significant impact on mobility requirements. The MCRS study team benchmarked sustainment data from operations in Iraq and Afghanistan to ensure the models accurately depicted requirements. The following items were specifically addressed.

- (U) Services modified support relationships and equipment lists based upon OIF lessons learned.
- (U) Services updated supply class consumption data based on historical patterns.
- (U) Defense Energy Supply Center (DESC) updated Class IIIB (Petroleum, Oil and Lubricants [POL]) sourcing and distribution information.
- (U) Bottled water requirements were added based on historical usage patterns.

2.4. (U) STRATEGY ASSESSED

(U) MCRS assessed the capability of the mobility system to support the NDS as it was described in the 2008 GDF. The GDF specified the kinds of operations that the U.S. military must be prepared to undertake, and established the corresponding Force Planning Construct, illustrated in Figure 2-1. Descriptions of steady state and surge demands for each major component of the strategy are provided below along with a brief description of how MCRS assessed that activity.

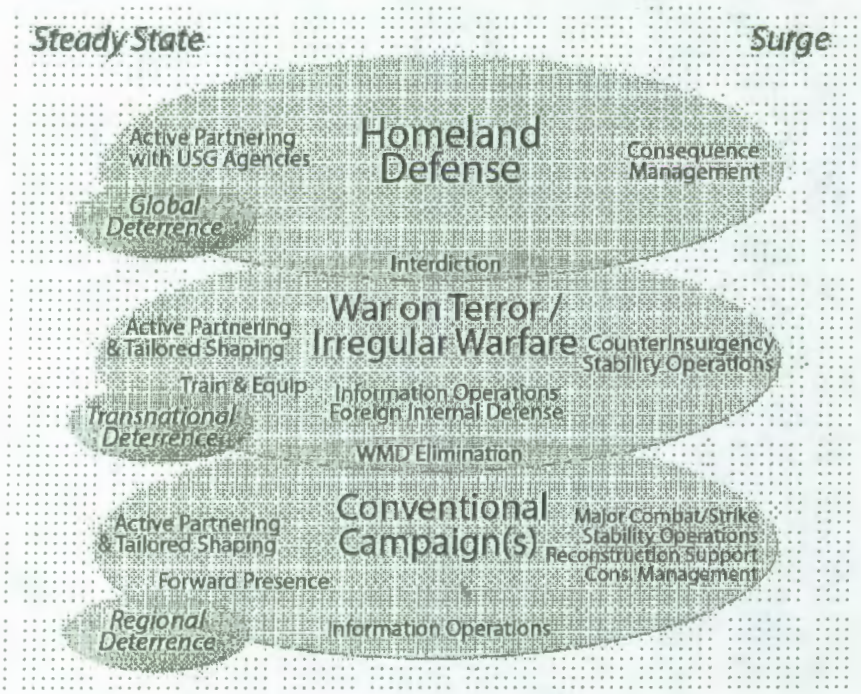

Figure 2-1: (U) Force Planning Guidance

2.4.1. (U) DEFEND THE HOMELAND

- (U) Steady-State: Detect, deter and, if necessary, defeat external threats to the U.S. homeland, and enable partners to contribute to U.S. national security.
- (U) Surge: Contribute to the nation's response to and management of the consequences of weapons of mass destruction (WMD) attacks or a catastrophic event,

such as Hurricane Katrina, and also raise the level of defense responsiveness in all domains (e.g., air, land, maritime, space, and cyberspace), if directed.

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2.4.2. (U) PREVAIL IN THE WAR ON TERROR AND CONDUCT IRREGULAR (IR) OPERATIONS

- (U) Steady-State: Deter and defend against external transnational terrorist attacks, enable partners through integrated security cooperation programs, and conduct multiple, globally distributed irregular (IR) operations of varying duration.
- (U) Surge: Conduct a large-scale, potentially long-duration IR campaign, including counterinsurgency (COIN) and security, stability, transition and reconstruction operations.

(U) MCRS analysis included the deployment and sustainment to support up to 69 different vignettes around the globe over a seven-year period, including COIN, Non-combatant Evacuation Operation, Humanitarian Assistance, Disaster Relief, Foreign Internal Defense, Counter Terrorism (CT), Strike, and Expeditionary Operations. It also included a detailed analysis of a large scale, long-duration IR campaign.

2.4.3. (U) CONDUCT AND WIN CONVENTIONAL CAMPAIGNS (CCs)

- (U) Steady-State: Deter inter-state coercion or aggression through forward deployed forces, enable partners through theater security cooperation, and conduct presence missions.
- (U) Surge: Wage two nearly simultaneous conventional campaigns (or one CC, if already engaged in a large-scale, long-duration IR campaign), while selectively reinforcing deterrence against opportunistic acts of aggression. Be prepared in one of the two campaigns to remove a hostile regime, destroy its military capacity and set conditions for the transition to, or for the restoration of, civil society.[8]

(U) MCRS assessed the mobility demands of three CCs and one long duration IR campaign. Two of the three cases assessed included nearly simultaneous CCs, and one case assessed a CC while already engaged in a long duration IR campaign.

3. (U) Scenarios and Cases Defined

(U) MCRS modeled three different Integrated Security Postures (ISPs), hereafter referred to as cases, to provide a broad analytical basis to support mobility force structure decisions and inform the QDR. Figures 3-1a and 3-1b depict notional demands placed on the mobility system

[8] (U) Guidance for the Development of the Force Fiscal Years 2010-2015, Published April 2008 by Secretary of Defense.

that corresponds with the guidance provided in the Force Planning Construct. Two of the three MCRS cases assessed demands associated with two overlapping major campaigns, as depicted in Figure 3-1a. One MCRS case assessed demands associated with a conventional campaign overlapping a long duration IR campaign, as depicted in Figure 3-1b. The demands examined in all three cases spanned a seven-year period.

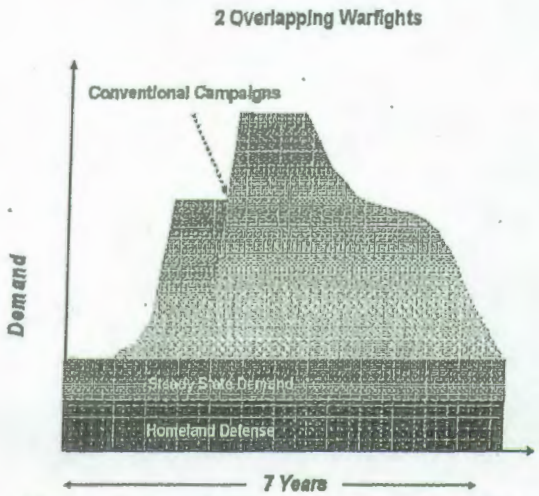

Figure 3-1a: (U) Two Overlapping Major Campaigns

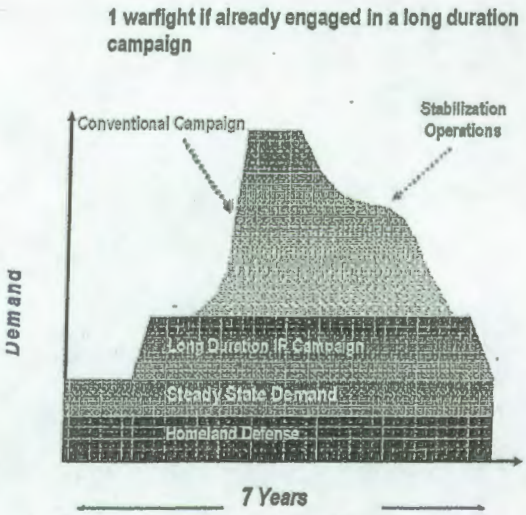

Figure 3-1b: (U) One Conventional Campaigns Overlapping a Long Duration IR Campaign

(U) The major components for these cases are HLD, steady state demands, and surge scenarios. A description of each component of demand follows.

3.1. (U) HOMELAND DEFENSE REQUIREMENTS

(FOUO) The study assessed four separate HLD consequence management events, as described below. Each event requires Defense Support to Civilian Authorities (DSCA). The 2006 National Planning Scenarios and related analysis conducted in the 2008 Civil Support Analytic Baseline served as the basis for MCRS HLD analysis.

(U) The models simulated the movement of units from their home installations to the appropriate destinations. The objective of the MCRS analysis was to provide the swiftest response possible using the programmed force structure. Analysts then assessed alternatives for improving response times, where required.

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3.2. (U) STEADY STATE REQUIREMENTS

(U) MCRS assessed steady state requirements for airlift, sealift, and AR assets by evaluating historical support to Global Logistics (GL), and by modeling the deployment, employment, redeployment and sustainment of forces supporting globally dispersed operations. Steady state analysis is important for two reasons. First, it quantifies the level of effort needed from the mobility system to support daily operations without mobilization. Second, it sets the initial conditions for the location of forces that will need to be relocated by the mobility system to support the commencement of surge events.

(U) USTRANSCOM analysts examined seven years of mission data from the Global Decision Support System database to identify the historical support requirements for GL. GL missions include routine channel missions, exercise missions, and Special Assignment Airlift Missions (SAAMs) that fly daily in support of Combatant Commands (COCOMs). Channel missions consist of cargo and passenger missions – organic and commercial – flown in support of the COCOMs. The study team assumed that exercises other than Joint Chiefs of Staff (JCS)/COCOM exercises would be canceled when engaged in one warfight, and all exercises would be cancelled during two overlapping warfights. SAAMs include movement of nuclear weapons and nuclear weapons related material, presidential logistics support, special operations support, and other time-sensitive high priority airlift requirements. The study assumed some SAAM requirements would continue even during overlapping campaigns. Sealift required to meet daily COCOM demands was provided through liner service.

(S//REL ACGU)[9]

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[9] (U) SSSP ISP, Apr 18, 2008.
[10] (U) Ibid.

3.3. (U) SURGE SCENARIO REQUIREMENTS

(U) The analysis assessed five surge scenarios, each with its associated mobility challenges. MCRS assessed each scenario as a stand-alone event and then integrated the scenarios into the cases described later in this chapter.

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3.3.2. (S//REL ACGU) ~~OPR SCENARIO (QS)-1 2016 (IRAN)~~

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3.3.6. (U) CASE ANALYSIS

(U) MCRS integrated the HLD, steady state and surge scenarios, as described above, into three illustrative cases, as depicted in Figure 3-3. Each case posed different mobility challenges, facilitating a full spectrum analysis providing flexible options for the QDR and underpinnings for future decisions on mobility programs.

(b)(1)

Figure 3-3: (S//REL ACGU) (b)(1)

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3.3.6. (U) CASE ANALYSIS

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Figure 3-3: (S//REL ACGU) (b)(1)

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Figure 3-6: (S//REL ACGU) (b) (1)

3.4. (U) SCENARIO INTEGRATION

(S//REL ACGU) (b) (1)

(S//REL ACGU) (b) (1)

(U) Subsequent to the force allocation workshop, Case 2 was realigned with the ongoing QDR work. This redefined the case from that which was originally articulated in the MCRS Study Plan (MCO-1 followed by CC-2). The updated Case 2 consisted of CC-2 followed by QS-1. Thus the study team refined the timeline and adjusted the workshop results based on the ongoing QDR work.

(U) Decisions made at the workshops are listed in Appendix A. Force allocation decisions were binned as follows.

- (U) Reduce Demand – lower the requirement for forces and assume more risk
- (U) Substitute Forces – substitute similar forces/capabilities to mitigate a force shortage
- (U) Delay Arrival – allow later force arrival than the stand-alone scenario and assume more risk
- (U) Disengage – move forces from one event to another and assume more risk

(U) This process not only ensured the accuracy of mobility demands, it also ensured that the models transported units from the correct locations, as in situations where forces moved from a steady state vignette to a major campaign.

(U) It is clear from this process and the resulting force allocation decisions that there is inherently more risk associated with executing two overlapping campaigns, even if unlimited mobility assets are available. The goal of the MCRS was to identify only those risks associated with limitations of the mobility system, and to provide insights concerning ways to mitigate those limitations. The intent of the MCRS was not to comment on the ability of non-mobility force structure to meet the needs of the strategy.

4. (U) LOGCONOPS and MCRS Data

4.1. (U) LOGISTICS CONCEPT OF OPERATIONS (LOGCONOPS)

(U) MCRS analyses rely on a LOGCONOPS to ensure the assessment is based on a plausible deployment and distribution strategy. JS J4 led the LOGCONOPS development with assistance from USTRANSCOM, COCOMs, Defense Logistics Agency (DLA), and the Services. Using the Multi-Service Force Deployment (MSFD) as the source reference, the LOGCONOPS team developed rules, procedures, and processes needed to ensure that the scenarios are logistically supportable and that the models accurately portrayed the available mobility network.

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4.2. (U) MOBILITY DEMAND DATA

(U) TPFDD and sustainment demand signals comprise the mobility demand used for MCRS. The TPFDD prescribes the desired delivery profile for forces deploying to a given scenario and contains detailed data on the composition of forces and their constituent units. It includes personnel and cargo information for in-place units, and, for deploying units, adds their priority, desired sequence, and routing. MCRS developed the TPFDDs based on guidance from the MSFD and details provided in the LOGCONOPS. The TPFDDs reflect current Service-approved data with a level of fidelity comparable to an Operations Plan (OPLAN) TPFDD.

(U) The required delivery dates (RDDs) espoused in these TPFDDs represents the Services' best estimates of the priority and timing of the forces necessary to meet scenario

demands. The actual timing required to satisfy the campaign objectives is not known until the warfight analysis is complete; therefore, MCRS used the TPFDDs to generate the demand and used the campaign objective criteria as the primary metric of system performance.

(U) Part of the TPFDD building process included packaging forces into force modules (FMs). FMs are a collection of units that represents a capability package, both support packages and combat packages (e.g., combat brigade, sustainment brigade, base support package). Then, the study team associated support FMs with combat FMs and sequenced them to ensure combat forces arriving in theater had the requisite support to perform their mission. For aircraft squadrons, this meant that both base support and combat aircraft had to be in place before that combat capability was considered closed.

(U) The other major source for the mobility demand signal is sustainment. Required sustainment is added to the TPFDD in accordance with Service-developed sustainment files, called Logistics Factor Files. The rate of consumption for each class of supply is based on historic data and the activity level of the unit (peacetime, reserve, low/moderate/high intensity combat). The models used in MCRS simulate the consumption of supplies and depot stock levels and ensure adequate sustainment is delivered to support the operations.

4.3. (U) MOBILITY PLANNING FACTORS DATABASE (MPFD)

(U) While the TPFDD and Logistics Factor Files provide the mobility demand, the MPFD is a compilation of source data depicting mobility system attributes for the supply side of the models. The MPFD of mobility and distribution planning factors, maintained by the USTRANSCOM Joint Distribution Process Analysis Center, is the reference point for mobility planning data to support programmatic analysis and modeling. Each mobility category referenced in the MPFD has a single point of contact from USTRANSCOM J5/4, Air Mobility Command's Analyses, Assessments, and Lessons Learned (AMC/A9), Military Sealift Command (MSC), or the Surface Deployment and Distribution Command Transportation Engineering Agency. Other MCRS participants coordinated and approved the MPFD for use in the MCRS.

(U) MPFD data covers the physical and operational characteristics of organic and commercial air, sea, and land mobility platforms; the characteristics and capabilities of the mobility infrastructure; and operational descriptions of the Defense Transportation System. The MPFD is maintained for the current Program of Record (POR) and is updated annually in collaboration with the Transportation Component Commands and the COCOMs. During the course of MCRS, the MPFD was reviewed and updated by all study participants to align with the specific operational requirements of the scenarios and associated modeling.

(U) The Aircraft Generation Tool contained in the MPFD was used to create day-by-day aircraft generation schedules for the MCRS. The MCRS inputs to the Aircraft Generation Tool accounted for aircraft availability as set by guidance in the Mobility Supplement to the Joint Strategic Capabilities Plan (JSCP), which specifies aircraft withholds for training and alerts. Withholds for ongoing operations were set based on historical experience during OEF/OIF.

5. (U) Mobility Models

(U) MCRS assessed the capabilities and requirements for the end-to-end Joint Deployment Distribution Enterprise by modeling the movement of unit personnel and equipment represented in the TPFDD along with associated sustainment supplies, from point of origin to theater destination. The models addressed three "stages" of mobility.

- Deploy: Units and supplies deploy from initial positions (forts, air bases, seaports, reserve mobilization stations, depots, etc.) on board commercial and organic vehicles to the Port of Embarkation (POE) – both air and sea.
- Transport: Strategic platforms (aircraft and ships) transport personnel and cargo to Ports of Debarkation (PODs) – both air and sea.
- Move to Theater Destination: Intra-theater assets (trucks, rail, watercraft, pipeline and aircraft) move units and supplies to their tactical assembly areas, air bases, battlefield locations, or supporting supply activity, including the reception, staging and onward movement process at theater PODs.

(U) The Analysis of Mobility Platform (AMP) federation of models was used to support the analysis. Comprising the three major mobility models used in this study, AMP enabled data interfaces among the models, and automatically transferred output from one model into input for another. The three models were:

- (U) Continental United States (CONUS) Enhanced Logistics Intra-theater Support Tool (ELIST), which modeled the use of CONUS assets to move personnel, UE, and sustainment stocks from point of origin to the POE. In this analysis, home station was the origin for active duty forces, while mobilization stations were the origin for Reserve and National Guard forces. ELIST provided a means of realistically modeling the flow of personnel and materiel over road, rail, and air networks within CONUS.
- (U) Model for Inter-theater Deployment by Air and Sea (MIDAS), which modeled the transportation of personnel and materiel, using strategic mobility platforms. MIDAS incorporates air- and seaport capacity, as well as aircraft and ship characteristics, to move forces from the POE to the POD.
- (U) Theater ELIST, which modeled the transportation of personnel and materiel from the POD to theater destinations by allocating available organic and host nation transportation assets across a network of roads, rails, canals, and other networks.

(U) The Combined Mating and Ranging Planning System (CMARPS) AR model was used to support the analysis of deployment AR requirements for this study. CMARPS is a high fidelity tanker planning tool that allows planners/analysts to plan and schedule receiver and tanker missions. With this tool, analysts can determine the number of tankers required to support receivers conducting deployment operations.

(U) The Air Refueling Combat Employment Model (ARCEM) was used to calculate the number of tankers needed to support every day of the CC-3 and MCO-1 air campaigns modeled in Synthetic Theater Operations Research Model (STORM). Given the air tasking order level

data, ARCEM flight plans and schedules tanker sorties to meet receiver AR requests, taking into account the timing, location, altitude, and size of the AR request; number and type of receiver aircraft; tanker aircraft performance; and tanker basing constraints.

(U) These mobility models were subjected to a rigorous process of verification, validation and accreditation (VV&A) to ensure they adequately represented their respective mobility operations during changing levels of demand in the scenario.[11]

6. (U) Metrics

(U) MCRS utilized metrics to assess the performance of the mobility system. The primary metrics fall into the categories of: closing the force, sustaining the force, and achievement of campaign objectives. The study also utilizes secondary diagnostic metrics to provide insights into the workings of the mobility system. These include asset and infrastructure utilization metrics.

6.1. (U) PERFORMANCE METRICS

(U) **Force Closure**. Campaign analysts considered a combat capability available to engage when 90% of the associated FM (by weight and passengers) closed. The TPFDD building process categorized one or more unit line numbers (ULNs) into FMs. Mobility analysts tracked the arrival of each ULN in the FM until the 90% threshold was achieved, at which time the FM was deemed operational for warfight modeling purposes.

(U) **Sustainment.** Sustainment accounts for nearly half of all cargo moved over the course of a major campaign and is, therefore, an essential measure of the performance of the mobility system. As forces arrive to the theater, they must be sustained. As a general rule, sustaining deployed forces takes precedence over deploying additional forces. As more forces arrive in theater, more sustainment must flow through the mobility system. Thus, when the mobility system is operating at full capacity, the ability to deliver forces diminishes over time, as the requirement to sustain forces increases.

(U) MCRS tracked sustainment levels as measured in Days of Supply (DOS) for all classes of supply. Analysts set models to maintain stockage goals for each campaign. Stockage goals that could not be met were reported and assessed as an indicator of less than optimum mobility capability.

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(U) **Campaign Metrics.** Campaign metrics were developed as part of the AB campaign analysis.[12] MCRS linked the FM closure metric to the campaign metrics, operational effects and

[11] (U) The complete VV&A report is available on the Joint Data Support Web site.
[12] (U) Campaign metrics for CC-2 were not developed in time to inform this study.

key tasks as defined by the AB campaign analysis team. Outcomes that were deemed less than desired could be traced to the FM. Analysts then assessed whether the FM arrival date was a causal or contributory factor to the outcome.

(U) In addition to linking force closure to campaign metrics, MCRS compared the campaign metrics of the stand-alone scenario with results from the case analysis. This comparison facilitated the risk assessment of conducting overlapping warfights and the implications for the mobility system.

6.2. (U) UTILIZATION METRICS

(U) **Asset Utilization.** While the effectiveness measures described above are used to indicate the performance of the mobility system, utilization metrics provide insights concerning the amount of mobility capability required to meet those measures. Asset utilization can also provide insights on possible constraints within the mobility system which can be further studied by assessing infrastructure utilization metrics.

(U) **Infrastructure Utilization.** A balanced mobility system consists of both sufficient mobility assets and sufficient infrastructure to close forces within required timelines. When infrastructure is limited, additional mobility assets that rely on that infrastructure provide little to no added value; thus, tracking the infrastructure utilization throughout the scenario is an important aspect of mobility analysis. MCRS assessed many infrastructure features to evaluate whether the available end-to-end infrastructure was sufficient to support the campaign as planned. Infrastructure utilization metrics included measures such as aircraft maximum on ground (MOG), ship berths, marshalling yard capacity, road capacity, and rail capacity. Besides accounting for infrastructure limitations during the simulation, the mobility models also identify the percent of infrastructure used each day. This enables analysts to determine choke points in the system that constrain the flow of forces and sustainment. MCRS tracked utilization metrics for both surge and steady state activities.

7. (U) Mobility Basics

(U) The mobility system relies on airlift, sealift and prepositioning to ensure forces, equipment, and supplies are positioned to support overseas operations. The vast majority of cargo moves via sealift or is prepositioned. Both modes have the capability to position significant amounts of equipment, including equipment that cannot be moved by air. PREPO is unique in that it is the only method currently available to ensure rapid delivery (ten days or less) of large amounts of equipment. By comparison, airlift, which can move cargo anywhere in the world within a day, can only deliver relatively small amounts of cargo when compared to sealift. Understanding the advantages and limitations of each mode (PREPO, sealift and airlift) is necessary to maximize the overall ability of the mobility system to respond to crises.

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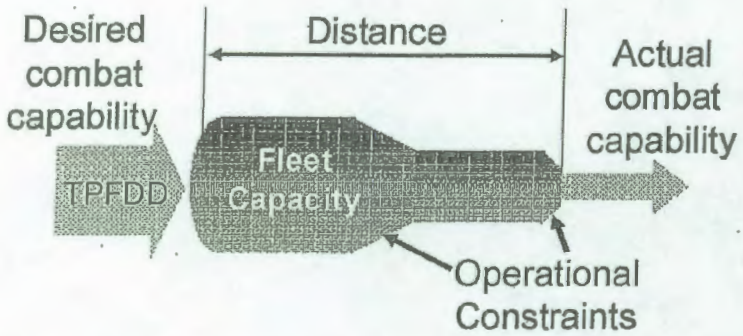

Figure 7-2: (U) Operational Constraints Can Restrict Flow

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8. (U) Strategic Airlift

(U) Strategic airlift includes organic aircraft (C-5s and C-17s) and the Civil Reserve Air Fleet (CRAF). Each fleet has its own unique capability. CRAF is the primary means of delivering passengers and bulk air cargo and has more cargo capacity than the organic fleet.[13] When surging to meet wartime demands, the organic fleet moves primarily over- and outsized (O&O) cargo. While some CRAF aircraft can carry some O&O equipment, DOD relies primarily on C-17s and C-5s to perform this task. Therefore, MCRS analysis assumed CRAF would not carry O&O to ensure study results reflect sufficient numbers of C-17s and C-5s to perform these missions. The actual ability of CRAF to move O&O cargo is therefore additional capability not reflected in the MCRS analysis.

(U) One of the goals of MCRS was to assess the unique capabilities of C-5s and C-17s in order to determine the benefits of different fleet mixes. While C-5s can carry more cargo, cargo unsuitable for C-17s, and can fly longer distances, C-17s can access more airfields than C-5s. Accordingly, there are missions that are better suited for one or the other aircraft. However, MCRS analysis reconfirms findings from previous mobility studies that C-5s and C-17s are largely interchangeable (Figure 8-1).

[13] (U) October 2009 CRAF report shows 42 Million Ton-Miles per Day (MTM/D) long range international cargo capacity. Program of Record organic fleet (C-17/C-5) equals 35.9 MTM/D.

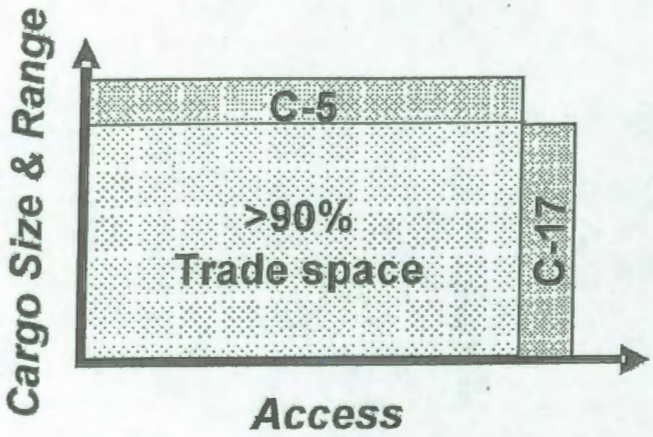

Figure 8-1: (U) C-5/C-17 Trade Space

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Table 8-1: (S//REL ACGU)

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[14] (S//REL ACGU) (b)(1)

Table 8-2: (S//REL ACGU)

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Figure 8-2: (S//REL ACGU) (b)(1)

[15] (U) Ibid.

(U) Because the majority of required airlift missions can be supported by either a C-5 or a C-17, the MCRS fleet mix analysis focused on fleet capacity, or throughput, as expressed by the MTM/D metric.[16] The study team conducted model runs to validate MTM/D as a valid metric for assessing alternative fleets. These excursions consisted of homogeneous fleets (pure C-17 fleet or pure C-5 fleet) of equal MTM/D capacity. The results showed that MTM/D-equivalent fleets had very similar force closure profiles, which suggests that the MTM/D metric is valid for assessing fleet mix options.

8.1. (U) ORGANIC AIRLIFT RESULTS

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Figure 8-3: (S//REL ACGU) (b)(1)

[16] (U) AFPAM 10-1403 factors applied to Primary Aircraft Assigned (PAA) in accordance with JSCP guidance on depot and training aircraft.

(b)(1)

Figure 8-4: (S//REL ACGU (b)(1)

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(U) Impact of End Strength Growth on Airlift Demand. The two primary determinants of organic fleet size are the amount of O&O cargo and the time frame in which that cargo must be delivered to meet the CONOPS. The MCRS Troop Growth case study assessed the impact of the recent increase in Army and Marine Corps end strength on airlift demand. Study results support the conclusion that airlift demand is a function of the type of operation being supported and the associated CONOPS. Airlift demand is not specifically tied to total end strength of the Services. An increase in end strength would only result in an increase in airlift requirements if the added forces will be used to support operations, and have O&O equipment that must deploy in the first three-weeks of a major campaign. This was not the case for the most recent growth in the force.

(U) C-17 Overutilization. MCRS assessed C-17 use in response to recent concerns that the C-17 fleet is being over utilized due to OIF/OEF. Historical flying hour data indicates that

2003 was the only year that C-17s flew significantly above the programmed flying hours (Figure 8-5). The data indicates that the fleet performed as expected by surging to meet the high demands associated with a large scale campaign. It is worth noting that at the time of the 2003 surge, the Department's C-17 fleet consisted of 111 aircraft. By 2011 the programmed C-17 fleet will consist of 223 aircraft.

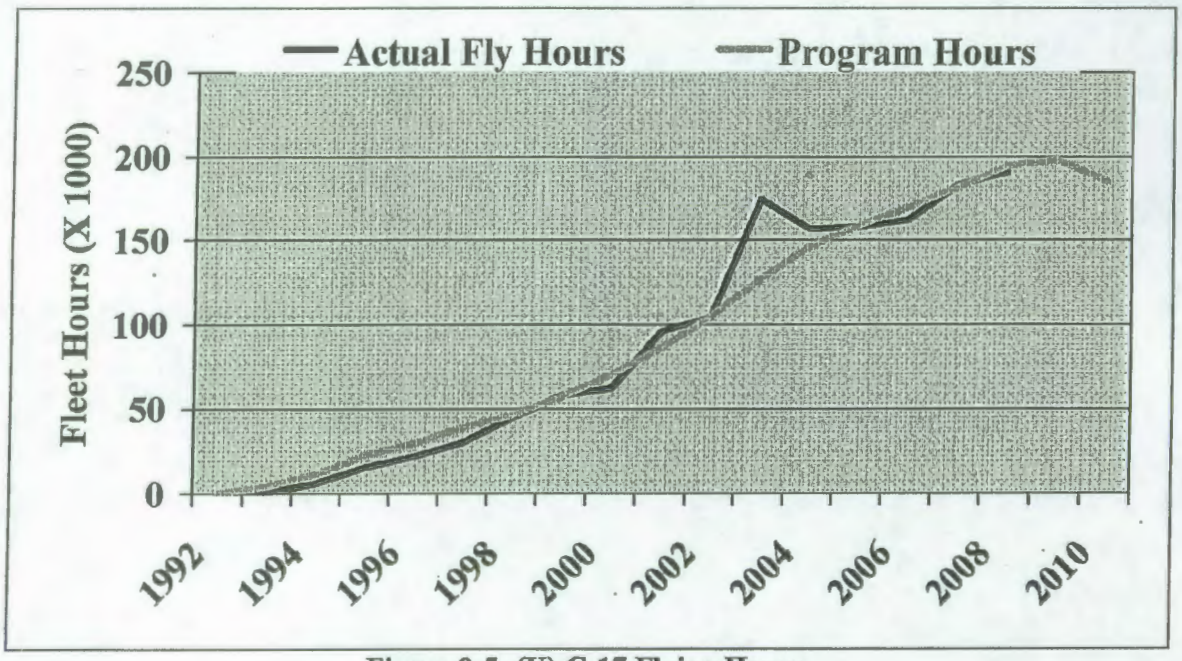

Figure 8-5: (U) C-17 Flying Hours

8.2. (U) ORGANIC FLEET REQUIREMENT FOR MCRS CASES

(U) The Department's current POR for strategic airlift consists of 223 C-17s and 111 C-5s. This capacity is sufficient to meet the peak airlift requirements of the most demanding MCRS case. Table 8-3 depicts the modeled demand for each case. In the table's "Alternative" column, the term, "Used," refers to the fleet that satisfied the airlift demand in the modeled scenarios. Subsequent alternatives represent MTM/D-equivalent fleets.[17]

[17] (U) MTM/D= [(0.9 x Total Aircraft Inventory) - Dedicated trainers at Full Mobilization] x MTM factor (C-17 = 0.1245, C-5M = 0.1378, C-5A = 0.1019).

Table 8-3: (S//REL ACGU)

(b)(1)

(U) Figure 8-6 illustrates the demand for each case over time. In Case 1, for example, the peak demand is 304 aircraft. For Case 2, the peak demand is 288 aircraft, and for Case 3, the peak demand is 274 aircraft.

(U) The steady state demand in each case, prior to the surge events, requires approximately 150 aircraft, or roughly 50% of the peak requirement, with occasional surges to meet deployment activity for SSSP vignettes.

(b)(1)

Figure 8-6: (S//REL ACGU) (b)(1)

8.2.1. (U) ORGANIC AIRLIFT: CASE 1

(S//REL ACGU)

(b)(1)

(b)(1)

Figure 8-7: (S//REL ACGU) (b)(1)

8.2.2. (U) ORGANIC AIRLIFT: CASE 2

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Figure 8-8: (S//REL ACGU) (b)(1)

8.2.3. (U) ORGANIC AIRLIFT: CASE 3

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Figure 8-9: (S//REL ACGU [(b) (1)]

8.3. (U) AIRLIFT REQUIREMENTS FOR HOMELAND DEFENSE

(U) The peak HLD requirement for airlift is one C-5, two C-17s, nine C-130s, and 36 commercial aircraft. These aircraft were needed to ensure the CCMRF units meet their RDDs. The analysis shows the use of additional DOD airlift assets does not improve overall force closure.

(U) Ground transportation provides the best rate of closure in responding to DSCA events, as illustrated in Figure 8-10. The CONUS road network and commercial truck fleet, including over two million trucks for hire, have significant capacity.

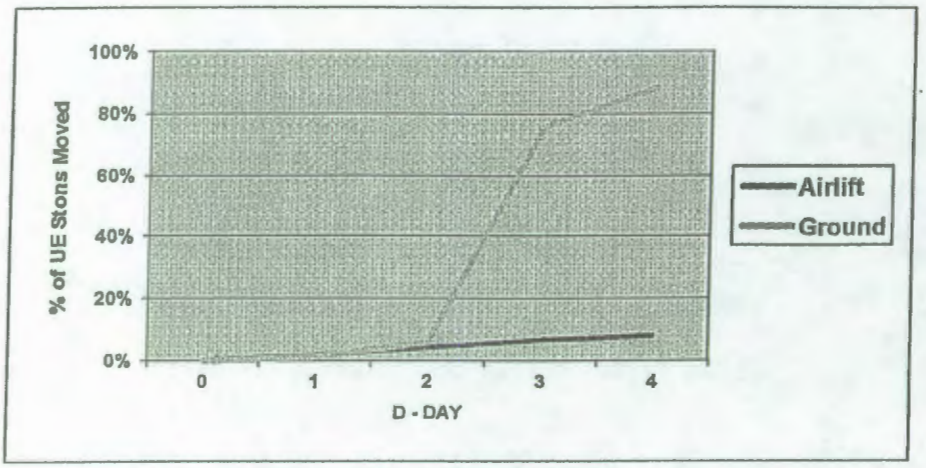

Figure 8-10: (U) Contribution of Airlift and Ground Movement to UE Closure

8.4. (U) CIVIL RESERVE AIR FLEET

(S//REL ACGU) (b)(1)

(b)(1)

Figure 8-11: (S//REL ACGU) (b)(1)

(S//REL ACGU) (b)(1)

[18] (U) Current CRAF capacities based on October 2009 AMC HQ Form 312, *CRAF Capability Summary.*

(b) (1)

8.5. (U) PACIFIC EN ROUTE AIRLIFT INFRASTRUCTURE

(S//REL ACGU)

(b) (1)

Table 8-4: (S//REL ACGU)

(b) (1)

(S//REL ACGU)

(b) (1)

[19] (U) Based on MOG allocated to AMC expressed in C-17 equivalents per the Mobility Planning Factors Database.
[20] (S//REL ACGU) (b) (1)

Table 8-5: (S//REL ACGU)

(b) (1)

(S//REL ACGU)

(b) (1)

(S//REL ACGU)

(b) (1)

Table 8-6: (S//REL ACGU)

(b) (1)

[21] (U) Fuel usage did not include self-deploying aircraft.

8.6. (U) EUROPEAN EN ROUTE INFRASTRUCTURE

(S//REL ACGU)

(b)(1)

Table 8-7: (S//REL ACGU)

(b)(1)

Table 8-8: (S//REL ACGU)

(b)(1)

[22] (U) MOG usage based on MOG allocated to AMC.
[23] (U) The central European commercial hub was used in the analysis to capture the commercial capacity used by CRAF aircraft en route to the theater.
[24] (U) Fuel usage did not include self-deploying aircraft.

(S//REL ACGU)

(b)(1)

Table 8-9: (S//REL ACGU)

(b)(1)

8.7. (U) EN ROUTE INFRASTRUCTURE TO WEST AFRICA

(S//REL ACGU)

(b)(1)

Table 8-10: (S//REL ACGU)

(b)(1)

9. (U) Intra-theater Airlift

(U) The MCRS intra-theater airlift analysis included C-130s, C-17s, and JCAs (hereafter referred to as C-27s). The analysis focused on the intra-theater lift required to deliver the force, sustain the force via STARs, and support airdrop/airland operations.[26] The analysis also includes

[25] (U) Fuel usage did not include self-deploying aircraft.
[26] (U) MCRS did not assess Direct Support mission requirements.

an assessment of the C-17 in an intra-theater airlift role and an assessment of C-27 and C-130 airfield accessibility.

9.1. (U) C-130 AIRCRAFT REQUIREMENTS

(S//REL ACGU)

(b)(1)

(b)(1)

Figure 9-1: (S//REL ACGU (b)(1)

[77] (U) While Direct Support mission requirements were not assessed, C-130s may be required to supplement C-27s in this mission.

Table 9-1: (S//REL ACGU)

(b)(1)

(S//REL ACGU)

(b)(1)

(S)

(b)(1)

[28] (U) The HLD DSCA events used intra CONUS airlift to meet demand timelines. The peak demand is one C-5, two C-17s. nine C-130s, and 36 commercial aircraft which ensured CCMRF units met closure timelines.
[29] (S)

Table 9-2: (S//REL ACGU)

(b)(1)

(U) **Campaign Operations Demand**. Within campaign operations, intra-theater airlift is required to deliver the force TPFDD, sustain the force via STARs, and support airdrop/airland operations. Figures 9-3 and 9-4 illustrate the relationship between the three major demands placed on the C-130 fleet. STARs account for the largest ongoing demand for C-130s with a smaller percentage of missions supporting the TPFDD. The peak demand in each case occurs during surge airdrop/airland operations at which time STAR missions are suspended as illustrated. Throughout the most demanding period, there are C-17s available to assist, if needed.

(b)(1)

Figure 9-3: (S//REL ACGU) (b)(1)

(b)(1)

Figure 9-4: (S//REL ACGU (b)(1)

(U) **STAR Demand.** AMC/A9 developed the STAR network and system capacity for each case, based on OIF/OEF data. Analysts expressed STAR capacity using pure pallet equivalents (PPEs) where one PPE roughly equals a 1.9 STon pallet of cargo or 11.2 passengers. Total demand on the STAR network was based on the assumption that C-130s would be leveraged to reduce convoy traffic as they have been in OIF/OEF.

(S//REL ACGU)

(b)(1)

(S//REL ACGU)

(b)(1)

(S//NF)

(b)(1)

(S//REL ACGU)

(b)(1)

(b)(1)

9.2. (U) CASE RESULTS

(S//REL ACGU)

(b)(1)

(b)(1)

Figure 9-5: (S//REL ACGU)

(S//REL ACGU)

(b)(1)

(b)(1)

Figure 9-6: (S//REL ACGU) (b)(1)

(U) While the total C-130 fleet demand for both Case 1 and Case 3 are well below the current inventory, Case 3 highlights other challenges to supporting future steady state operations over a long duration campaign.

(S)

(b)(1)

(b)(1)

Figure 9-7: (S//REL ACGU)

9.3. (U) INTRA-THEATER AIRLIFT INFRASTRUCTURE

(S//REL ACGU)

(b)(1)

[30] (U) One third of Active Component can be deployed at any one time, which yields a 1:2 Active Duty deploy-to-dwell ratio. One sixth of Reserve Component can be deployed at any one time, which yields a 1:5 Reserve Component deploy-to-dwell ratio, per 17 Jan 2007 Secretary of Defense Memorandum, Subject: Use of the Total Force.

(b)(1)

9.4. (U) THE C-17 IN INTRA-THEATER ROLE

(U) The peak demand for strategic airlift and intra-theater airlift are not coincident. Thus, C-17s performing intra-theater missions do not add to the peak demand for C-17s. MCO-1 provides a good illustration of C-17 utilization for intra-theater lift (Figure 9-8). Early in the campaign during the force build up, C-17s support the deployment. Phase III begins after the preponderance of O&O cargo has been delivered, allowing the C-17s to transition to intra-theater airlift when it is most needed. This dynamic is not unique to this scenario. The demand for intra-theater airlift is at its highest after the majority of the forces are deployed, whereas the demand for strategic airlift is at its highest during the initial two to three weeks of force deployment.

(b)(1)

Figure 9-8: (S//REL ACGU) (b)(1)

9.5. (U) AIRFIELD ACCESSIBILITY (C-130 and C-27)

(U) MCRS analysts examined worldwide airfield accessibility to illustrate the benefits of improved access. From the Automated Air Facilities Intelligence Files database, there are 4,300 airfields worldwide that are accessible to only C-27s. Many of these airfields are in countries where U.S. military presence is highly unlikely, such as New Zealand or Norway.

(U) C-27-only airfields provide unique military value in terms of access to the extent there is not a nearby airfield that provides C-130 access. A C-27-only airfield that is 100NM from the nearest C-130-capable airfield is more valuable than one that is within five miles. MCRS assessed the proximity of the C-27 airfields to C-130 accessible airfields. Figure 9-9

shows the distance distribution between C-27-only airfields and those airfields accessible by C-130s. The greater the distance to a C-130 capable field, the greater the potential military value of a C-27-only airfield. Seventy-five (75) percent of the C-27-only airfields worldwide are less than 30 nautical miles from a C-130 capable airfield.

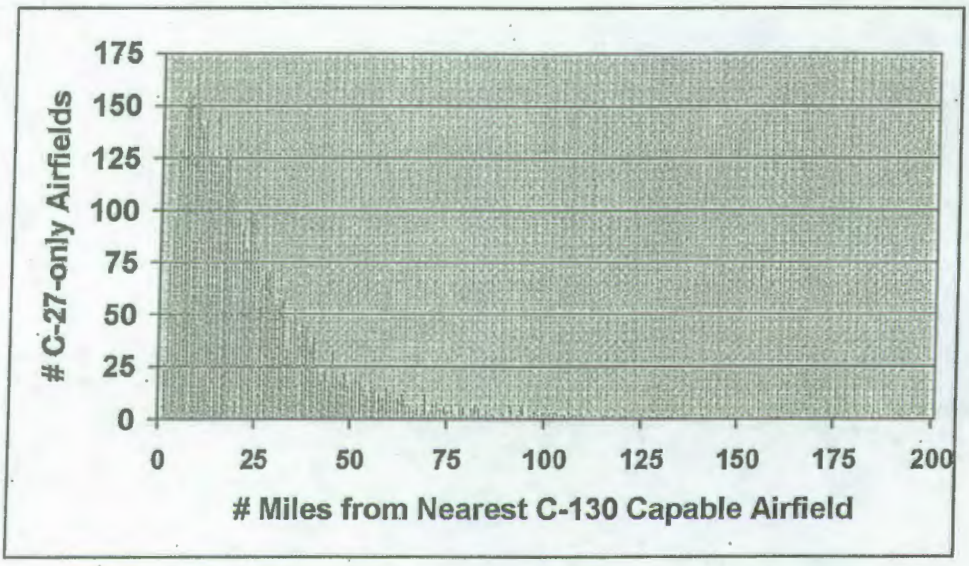

Figure 9-9: (U) Worldwide Distribution of Distance Between C-27-Only and Nearest C-130 Capable Airfields

(U) Table 9-3 shows the number of total airfields in the countries associated with the MCRS scenarios, along with the C-27-only airfields. Of the 31 C-27-only airfields, five were more than 25 NM from the nearest C-130 capable airfield. Figure 9-10 shows the distribution of the distance to the C-130 capable airfields for these airfields.

Table 9-3: (S//REL ACGU)

(b)(1)

[31] (U) Based on AAFIF data as of 2 March 2009

(b)(1)

Figure 9-10: (S//REL ACGU)

(b)(1)

(S//REL ACGU)

(b)(1)

(b)(1)

Figure 9-11: (S//REL ACGU)

10. (U) Aerial Refueling (AR) Analysis

(U) The MCRS AR analysis identified the AR requirements for the three cases. This included USAF KC-135s and KC-10s as well as USMC KC-130s. Each case consisted of various components of demand, as illustrated in Table 10-1.

Table 10-1: (S)

(b)(1)

10.1. (U) 2016 TANKER SUPPLY

(U) The total aircraft inventory (TAI) tanker fleet, as provided by the United States Air Force (USAF), is 474 tankers. This includes 59 KC-10s and 415 KC-135s. The Marine KC-130 force structure is 79 aircraft. Table 10-2 shows tanker force structure, including the active duty and ARC.

Table 10-2: (U) 2016 Programmed Tanker Fleet – TAI

	Active	Guard	Reserve	Total
KC-10s	59	0	0	59
KC-135Rs	181	170	64	415
KC-130s	51	0	28	79
Total	291	170	92	553

10.2. (U) DEPOT, WITHHOLDS, TRAINING

(U) The MCRS convention for aircraft depot is 10% of the total inventory. While this is appropriate for the airlift fleet, the tanker fleet is much older. Past studies have shown that, as aircraft age, depot time increases. Currently, there are 69 KC-135s in depot, which is 16.5% of the total KC-135 fleet. AMC projects increased depot time as the KC-135s age. MCRS results include a 19% depot rate for the KC-135s and 10% for all other tankers.

(S)

(b)(1)

(S//REL)

(b)(1)

10.3. (U) HOMELAND DEFENSE

(S)

(b)(1)

(S)

(b)(1)

(S)

(b)(1)

(S)

(b)(1)

10.4. (U) GLOBAL LOGISTICS AND STEADY STATE SECURITY POSTURE

(S)

(b)(1)

[32] (U) Per JSCP at Full Mobilization.
[33] (U) ONE EXORD 2008 version.

(b)(1)

(U) In addition to meeting various dispersed operations, there are daily tanker missions, controlled by the 618th Tanker Airlift Control Center, that support geographic COCOMs. These missions include JCS/COCOM or higher priority exercises, channel missions, SAAMs and business efforts (carrier support, test aircraft support, etc.). On average, there are 16 tankers dedicated to such missions.[35] MCRS results reflect that, during the peak demand period, six tankers would continue to support these missions.

10.5. (U) DEPLOYMENT

(U) MCRS used the CMARPS to model tanker deployment operations using the integrated case TPFDD and associated force flow as model inputs. This ensured that receivers were deployed at the same time as their supporting unit.

(U) Swift deployment of aircraft requires substantial tanker support and is essential to achieve U.S. objectives to thwart the enemy's advance. During stand-alone scenarios and planning for current Operations Plans, USTRANSCOM uses tankers at en route locations throughout the campaign to support force rotations, provide sustainment, move attrition backfill aircraft, and respond to other mobility missions, as needed. Upon D-Day for a second campaign, the remaining receiver force structure deploys to the second campaign. At this point, MCRS assumes risk in the first campaign by temporarily discontinuing en route support and dynamically tasking tankers, as needed, to provide the required refueling support to the second campaign.

(U) In all three MCRS cases, all receivers in the first warfight arrive in theater well before the initiation of the second warfight on D+30; thus, a second surge at D+30 can be serviced by the same tankers with acceptable risk to the first campaign. The tanker deployment demand in the second campaign includes a minimum of two days for re-tasking and transit to another base, when required.

10.6. (U) EMPLOYMENT

(U) Both USAF and USMC tankers are used in employment operations. In the MCRS models, USMC tankers accomplished Marine refuelings first. If Marine AR requirements exceeded USMC AR capabilities, then USAF tankers filled the remaining Marine AR requirements. Cases 1 and 2 required 71 KC-130s in the employment role, and Case 3 required 60 KC-130s.

[34] (S) (b)(1)

[35] (U) AMC Data.

(S//REL ACGU)

(b)(1)

(U) For CC-2 the study team examined the sensitivity of the results to changes in planning factors. Applicable planning factors include:

- (U) Service-approved factors
- (U) AFI 65-503, U.S. Air Force Cost and Planning Factors
- (U) Air Combat Command (ACC) fuel requirement planning factors used in previous ACC studies
- (U) Fuel flow planning factors extracted from CMARPS

(S//REL ACGU)

(b)(1)

(S)

(b)(1)

(S)

(b)(1)

10.7. (U) RESULTS

(U) Table 10-4 summarizes the peak demand day for each of the three cases, while Figure 10-1 shows the peak demand period for each of the three cases over time. This tanker demand satisfies all AR requirements in each scenario with tankers dedicated to each component of demand (employment, deployment, HLD, etc). For example, in Case 1 and Case 2, the tankers supporting operations in Afghanistan are assumed to be dedicated to that effort and are not available to support operations in MCO-1.

Table 10-4: (S)

(b)(1)

(U) The results illustrated in Figure 10-1 are robust. Given this demand, Figures 10-2 and 10-3 depict the tankers under USTRANSCOM command that are not tasked. These tankers are readily available to support any unforeseen missions not explicitly modeled, such as ancillary airlift (cargo and/or passenger), medical evacuation, or other refueling missions.

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[36] (U) Assumes 19% depot rate for the KC-135s and 10% for all other tankers.
[37] (U) Per JSCP at Full Mobilization.
[38] (U) Based on MCRS analysis, with tankers operating at surge levels. Case 1 = ACL-3, Case 2 = ACL-4, Case 3 = ACL-1.
[39] (S//REL ACGU) (b)(1)

(b) (1)

Figure 10-1: (S//REL ACGU)

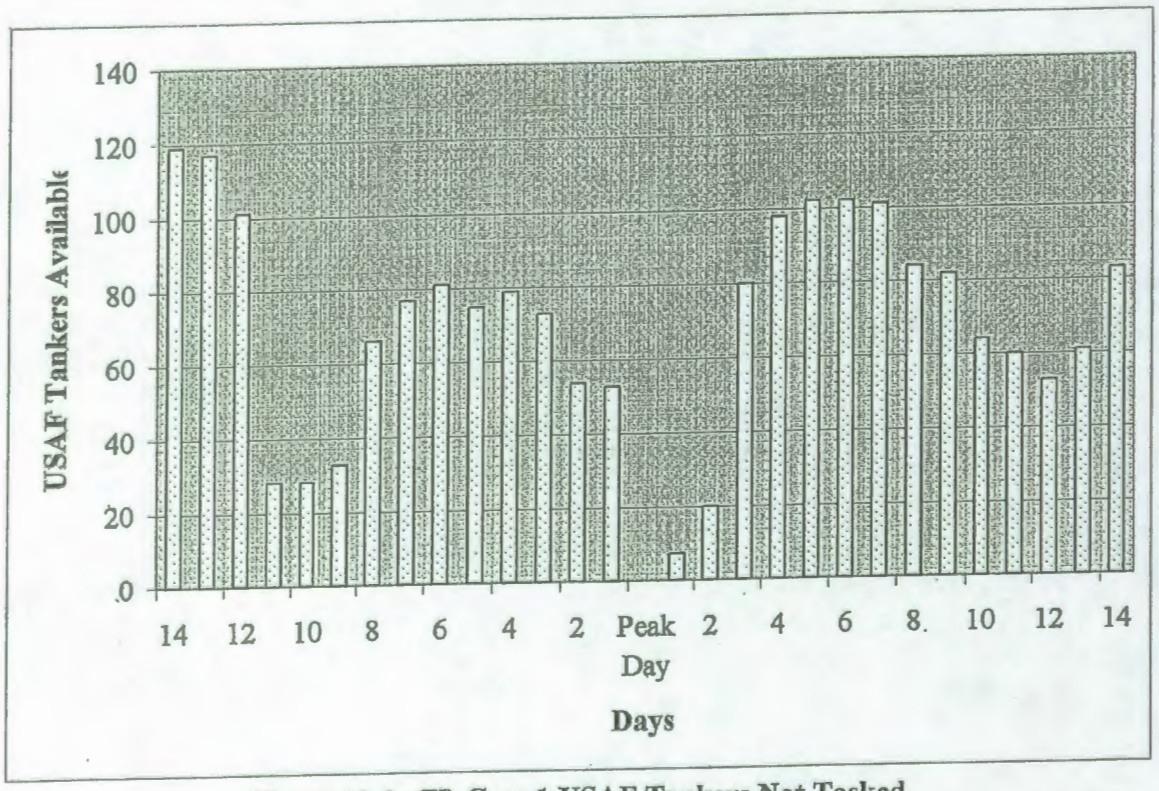

Figure 10-2: (U) Case 1 USAF Tankers Not Tasked

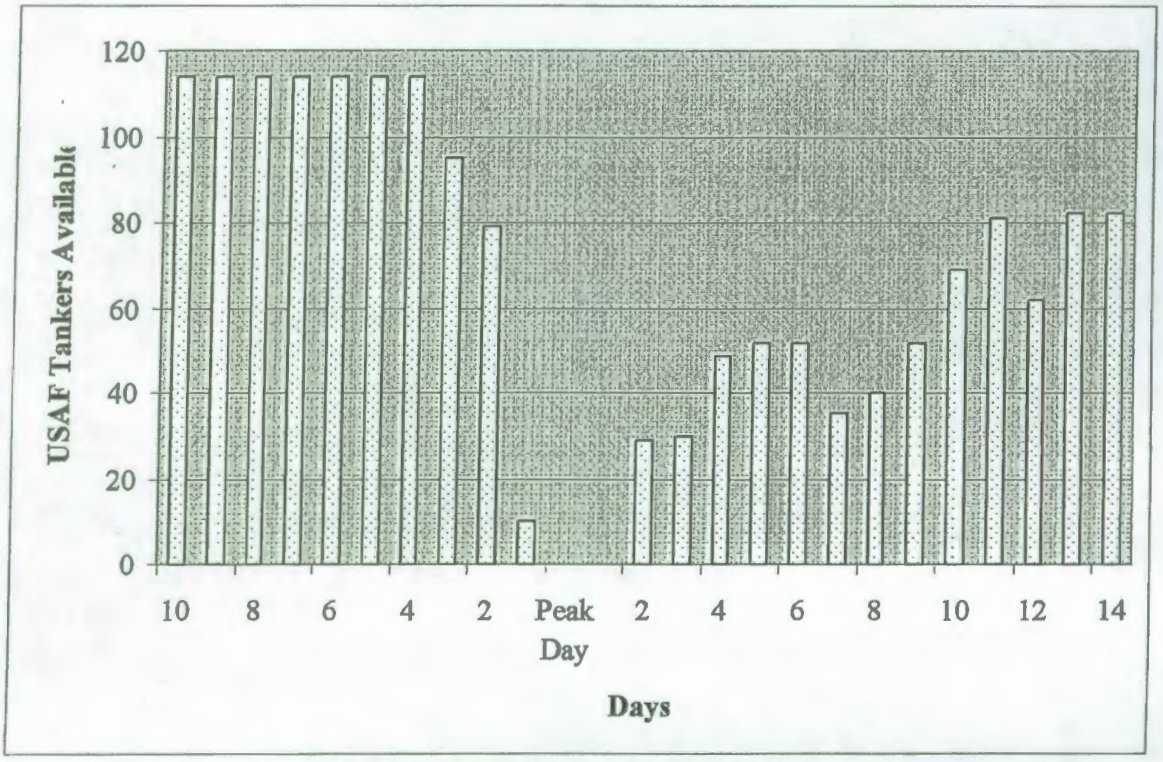

Figure 10-3: (U) Case 2 USAF Tankers Not Tasked

(U) As the Department recapitalizes the tanker fleet, the total number of tankers required to meet the same demands should decline because depot rates would be lower, and a new tanker will have greater capability, as documented in the Analysis of Alternatives for KC-135 Recapitalization.[40] The ability to receive fuel in flight and conduct both hose/drogue refuelings and boom refuelings on the same sortie (independent of the size of the tanker) may reduce the total number of tankers required.

11. (U) Sealift

(U) Sealift is the primary transportation means for approximately 90% of the cargo moved in a contingency. While airlift and prepositioned assets are relied on to halt the enemy's initial advance, sealift is relied on to transport the large amounts of combat power needed to initiate major counterattack operations. A rapid intra-theater sealift capability expands the geographic response capability for forward stationed/deployed forces within an AOR.

(U) A common misperception is that airlift delivers and builds combat power faster than sealift. While it is true that ships travel much slower than aircraft, MCRS analysis shows that sealift can deliver cargo at roughly eight to nine times the rate of airlift (Figure 11-1). Thus, not only do ships carry more cargo, they deliver more cargo per day. So, while an aircraft can deliver

[40] (U) Analysis of Alternatives for KC-135 Recapitalization conducted by RAND, Dec 2005.

a small load of cargo faster than a ship, the fastest way to build combat power (given the availability of required port infrastructure) is via sealift. In addition to the fact that sealift can support a faster buildup of combat power, sealift has a cost advantage of approximately 50:1 per STon moved when compared to airlift.[41]

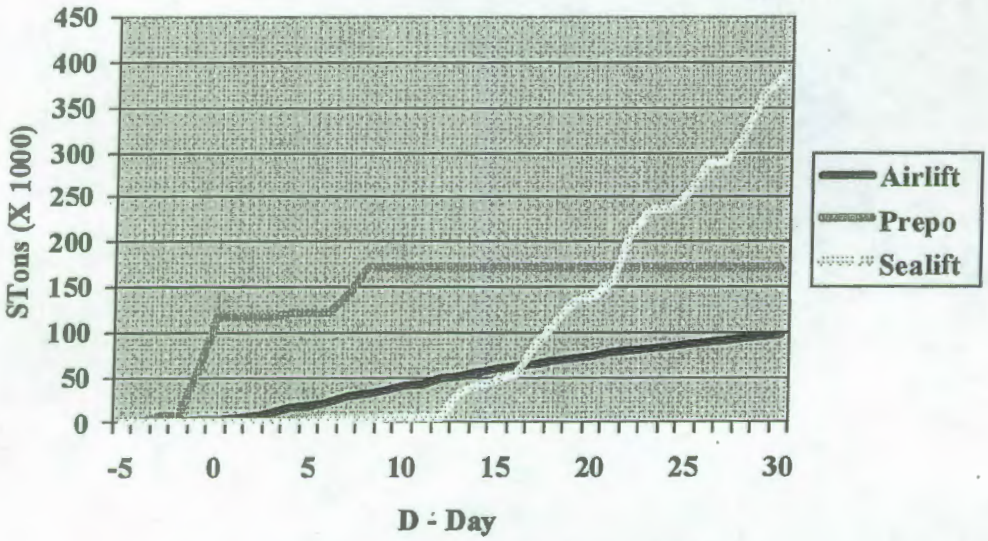

Figure 11-1: (U) Rate of Delivery by Transportation Mode (CC-3)

(U) Time/distance/volume calculations are critical to the analysis but do not take into account the complete system in which ships operate. At about 20 Kts, it takes 2-3 weeks to transit to most theaters of operation. Table 11-1 reflects typical voyage times for ships at various speeds. Using these figures alone does not account for readiness levels, activation timelines, ship characteristics, loading constraints, and seaport limitations, such as number of berths, draft and marshalling yard capacity. MCRS models account for all these factors and, thus, analysts were able to examine the system as a whole. In many cases, the theater seaports were the constraining factor, not the number or speed of the ships.

[41] (U) MCRS Troop Growth case study.

Table 11-1 (S//REL ACGU):

(b)(1)

(S//REL ACGU)

(b)(1)

11.1. (U) SHIP TYPES

(U) There are three main types of strategic sealift ships used in the mobility system: RORO, container, and tankers. Sealift requirements can be measured in terms of numbers of ships or total capacity. ROROs are typically measured by square feet (SqFt),[42] containerships by twenty-foot equivalent unit (TEU) capacity, and sealift tankers by barrels (BBLs) of fuel carried. In large scenarios, most UE cargo originates from CONUS and goes to a limited number of ports in theater. Therefore, it is important to assess both the capability of the ships and the capacity of the system as a whole. Containerships can be fully dedicated ships (primarily ammunition) or partially dedicated, as is often the case with sustainment cargo moving on liner routes. POL refineries are dispersed throughout the world, making the number of tanker ships a relevant metric for the analyses.

(U) There are two main organic intra-theater sealift vessels used in the mobility system: the JHSV and the Logistics Support Vessel (LSV). A common characteristic of the JHSVs and LSVs is that they are both shallow draft vessels, with the LSV having a shallower draft than the JHSV. However, generally speaking, JHSVs and LSVs have similar access. Where they differ is in capacity and speed. Compared to the JHSV, an LSV carries more weight, but has less capacity and travels at one-third the speed.[43]

[42] (U) MCRS used militarily useful gross square feet (no slow factor applied) for model inputs and in reports of use.
[43] (U) Weight capacity (LSV=2000 STons / JHSV=650 STons): Deck area (LSV=10,500 SqFt / JHSV=20,053 SqFt): Speed (LSV=12 knots / JHSV=35 knots).

11.2. (U) SEALIFT SOURCES

(U) DOD employs both organic and commercial sealift assets. Organic ships are those owned by the government or under long-term charter. Commercial sealift is obtained through volunteerism, via charters, by vessel or capacity activation agreements, or by requisitioning ships normally operating in commercial trade. Other ships available to support U.S. operations include allied shipping (via pre-arranged agreement) and foreign-flag shipping.

(S//REL ACGU)

(b)(1)

11.2.1. (U) ORGANIC SEALIFT

(U) Organic sealift readiness varies from Full Operating Status with ships loaded (i.e., PREPO) or immediately available to go to their loading berth, to Reduced Operating Status (ROS) where they require a set number of days (typically four or five days) before they are ready to go to a loading berth. Organic ships provide guaranteed access and responsiveness, and may also have unique capabilities specifically suited to DOD requirements. They are the primary means to deliver initial combat power to reinforce the theater and prepare for a counterattack.

11.2.2. (U) SEALIFT EMERGENCY PREPAREDNESS PROGRAMS (VISA AND VTA)

(U) Commercial vessels are available through the following emergency preparedness programs: Voluntary Intermodal Sealift Agreement (VISA); and Voluntary Tanker Agreement (VTA).

(U) VISA was developed by the Department of Transportation's Maritime Administration in coordination with DOD, USTRANSCOM, and the commercial sealift industry to complement DOD organic shipping capacity. It is a contractual arrangement with commercial carriers for obtaining time-phased access to militarily useful commercial sealift capacity, infrastructure and intermodal capability. Contracts can be pre-negotiated to shorten response timelines.

(U) When voluntary capacity commitments are insufficient to meeting DOD contingency requirements, VISA can be activated at the request of the Commander USTRANSCOM, with Secretary of Defense (SECDEF) approval. Upon activation, participants must provide inter-modal equipment, terminal facilities, inter-modal management services, inter-modal systems, and other related resources needed to operate the activated vessels

(U) VISA provides the defense community with assured access to commercial U.S. flagged sealift capacity and inter-modal infrastructure during time of war or national emergency in return for peacetime business preference. VISA has three stages, which can be activated in whole or in part.

- (U) Stage I: Participants provide 15% of their capacity.
- (U) Stage II: Participants provide 40% of their capacity.

- (U) Stage III: Participants provide 50% of the U.S. flag capacity or 100% of the capacity of vessels receiving MSP payments.
- (U) Jones Act ships[44] are excluded from Stages I and II.

(U) The VTA is a VISA-like program for POL tankers that is intended to facilitate the voluntary participation of tankers in wartime operations. VTA allows U.S. tanker owners – not DOD – to select the vessels to meet DOD requirements during a declared national emergency. Tankers in MSP must be in VTA. MCRS assumed three ships as participants in VTA.

11.2.3. (U) MARITIME SECURITY PROGRAM

(U) MSP authorizes a stipend to support the operation of 60 U.S. flag vessels in the foreign commerce of the United States. The stipend is meant to partially offset the cost difference between U.S flag and foreign flag vessel operations. Participants are required to make their vessels and commercial transportation resources available upon request by the SECDEF during times of war or national emergency. Additionally, vessels must be enrolled in VISA or VTA program for tankers.

(U) MSP is authorized under the Maritime Security Act of 2003 for 10 years, beginning FY06. MCRS analysis and results assume MSP will be renewed at current levels of capacity and that VISA Stage III vessels will be available.

11.2.4. (U) REQUISITIONING

(U) The president has the authority, in time of national emergency, to requisition ships that are U.S. flagged and those that are under Effective U.S. Control (EUSC)[45]. EUSC vessels are U.S.-owned but fly flags under Liberian, Panamanian, Honduran, Bahamian, or Marshall Islands registry.

(U) Figure 11-2, 11-3, and 11-4 illustrate ships and capacity available at various VISA Stages, and through requisitioning.

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[44] (U) The Merchant Marine Act of 1920 (P.L. 66-261), Section 27, is known as the Jones Act. It requires that all goods transported by water between U.S. ports be carried by U.S. flagged ships, constructed in the U.S., owned by U.S. citizens, and crewed wholly by U.S. citizens.

[45] (U) Authority for requisitioning is Section 902 of the Merchant Marine Act of 1936.

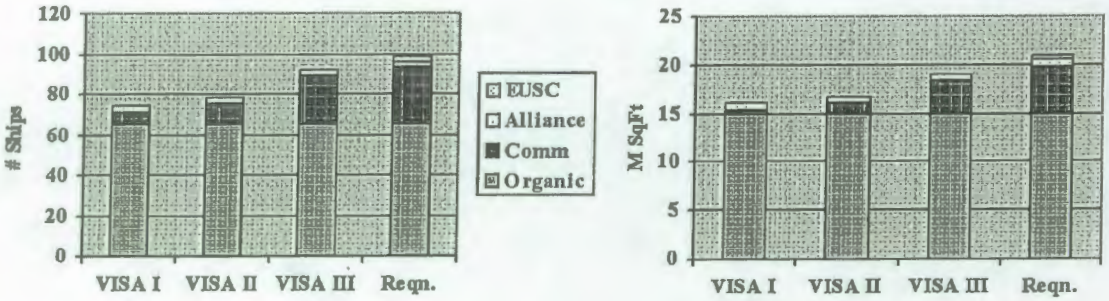


Figure 11-2: (U) RORO Ship Availability and Capacity (SqFt) at Various Activation Levels

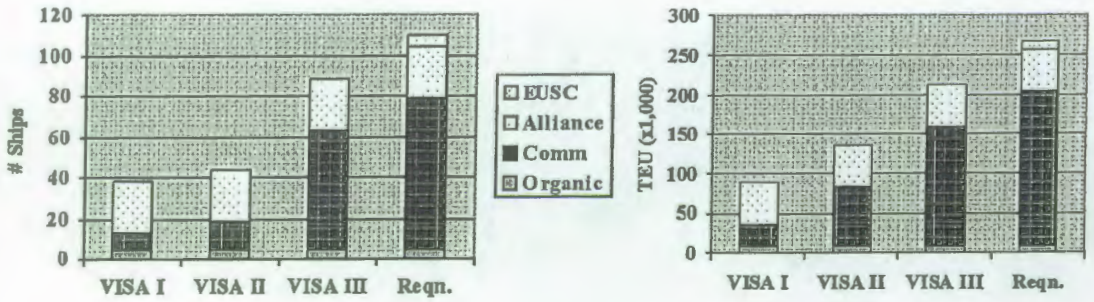


Figure 11-3: (U) Containership (Equivalent) Availability and Capacity (TEUs) at Various Activation Levels

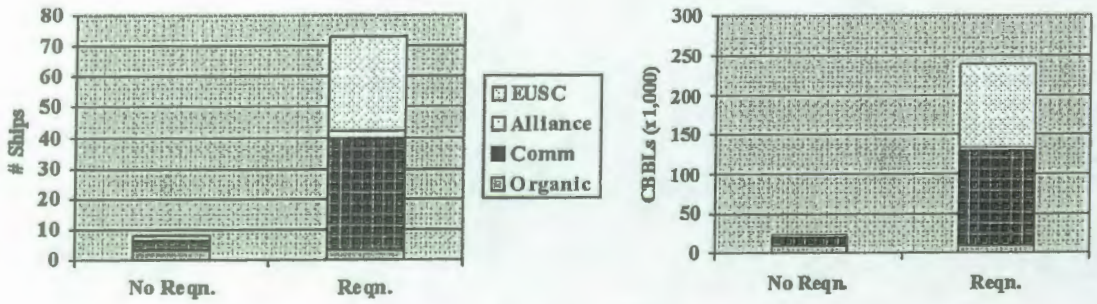


Figure 11-4: (U) Sealift POL Tanker Availability and Capacity (CBBLs) at Various Activation Levels[46]

[46] (U) CBBL = Hundred Barrels.

11.2.5. (U) FOREIGN SHIPS

(S//REL ACGU) (b)(1)

(U) Foreign flag vessels are those other than EUSC or allied. For example, there are over 275 militarily useful[47] ROROs worldwide, of which 92 are U.S. flag or under EUSC. There are nearly 2,000 militarily useful tankers worldwide, of which 254 belong to North Atlantic Treaty Organization (NATO) allies. The ten non-NATO countries with the most tankers are listed in Table 11-2. This represents another 1,285 tankers. Finally, there is an abundance of containerships of various sizes and unique characteristics, including self-sustaining containerships with onboard cranes, available worldwide.

Table 11-2: (U) Non-NATO Countries with the Most Tankers

Country	Quantity
Panama	357
Singapore	199
Japan	164
Liberia	155
Marshal Islands	78
South Korea	77
Indonesia	75
Malta	73
Thailand	56
Malaysia	51

(U) MCRS analysis and results assumed access to EUSC and allied shipping but not foreign flag vessels, based on guidance from National Security Directive (NSD)-28[48]. NSD 28 stipulates that "U.S.-owned commercial ocean carrier industry, to the extent it is capable, will be relied upon to provide sealift in peace, crises, and war." It further states that sufficient U.S.-owned sealift resources must be available to meet requirements for a unilateral response to security threats.

(U) While NSD 28 stipulates that U.S.-owned vessels must be available to meet requirements, DOD has relied on foreign flagged shipping. From August 1990 to February 1991, DOD contracted 43 foreign flag ROROs, 50 foreign flag containerships, 28 foreign flag sealift tankers, and 101 foreign flag break bulk ships to support Desert Shield /Desert Storm. From January 2003 to May 2003, DOD contracted 32 foreign flag ROROs, 19 foreign flag sealift tankers, and 47 foreign flag containerships to support the deployment for OIF. Figure 11-5 shows the U.S. Flag commercial RORO and foreign flag ROROs used for the initial deployment for OIF, demonstrating the U.S. reliance on foreign flag capacity during a contingency.

[47] (U) Source: Lloyds Sea Searcher Database: Excludes China, Cuba, Iran, North Korea, Russia, Somalia, Syria, Venezuela, and Vietnam.
[48] (U) NSD 28, October 5, 1989.

(b)(1)

Figure 11-5: (S//REL ACGU) (b)(1)

11.3. (U) SHIP CATEGORIES

(U) There are three primary categories of sealift: PREPO, organic surge, and commercial. Each of these categories has availability, responsiveness, and cost advantages/disadvantages.

- (U) Afloat PREPO is immediately available, very responsive, and, when compared to other sealift alternatives, relatively expensive. It is primarily used to close large combat forces and support assets to assist in halting an enemy, provide operational reserves, and establish enabling capabilities to support reception, staging, onward movement, and integration (RSO&I) and sustainment of units as they arrive from CONUS. PREPO ships normally enter the common-user pool for follow-on transport of cargo after downloading their primary cargo.
- (U) Organic ships are responsive and can arrive at their load berth within four to five days, depending on their activation timeline, and have modest upkeep costs. Due to their assured access and rapid availability, organic ships are normally counted on to deliver the initial combat power to reinforce the theater.
- (U) Commercial ship availability and responsiveness are dependant on the degree of volunteerism and VISA activation. Industry absorbs maintenance and upkeep costs until the ship goes on MSC charter. Commercial ships are normally in use, with only a few immediately available. To account for this, MCRS based the initial condition of the ships on their actual location as of 01 April 2009. From that location, the ships completed their voyages before being made available to meet the MCRS scenario demands. Ships loaded with cargo when chartered discharge their cargo at the scheduled SPOD or the next scheduled port of call en route to the sea port of embarkation (SPOE).

11.4. (U) SEALIFT RESULTS

(S//REL ACGU)

(b)(1)

Table 11-3: (S//REL ACGU)

(b)(1)

11.4.1. (U) RORO

(S//REL ACGU)

(b)(1)

[49] (S//REL ACGU) (b)(1)

[50] (U) There are an additional 7 US-flag, EUSC or Allied ships that can be requisitioned.

[51] (U) JHSV percentages based on JHSVs programmed. JHSVs are envisioned to grow to 28 total by 2023.

[52] (U) Small shallow draft RORO reflects the approximate size and draft of a Cape T vessel; 644 ft length overall, 28 ft max. draft.

Table 11-4: (S//REL ACGU)

(b)(1)

Table 11-5: (S//REL ACGU)

(b)(1)

(S//REL ACGU)

(b)(1)

[53] (U) Total USMC and Army afloat PREPO SqFt included in each column.
[54] (S//REL ACGU) (b)(1)

(b)(1)

7

(b)(1)

(b) (1)

(S//REL ACGU)

(b) (1)

(b) (1)

Figure 11-8: (S//REL ACGU) (b) (1)

(S//REL ACGU)

(b)(1)

(S//REL ACGU)

(b) (1)

(S//REL ACGU)

(b)(1)

(b)(1)

(S//REL ACGU)

(b)(1)

11.4.2. (U) CONTAINERSHIPS

(S//REL ACGU)

(b)(1)

Table 11-6: (S//REL ACGU)

(b)(1)

Table 11-7: (S//REL ACGU)

(b)(1)

(S//REL ACGU)

(b)(1)

12. (U) Sealift Tanker POL Analysis

(U) Refined petroleum is one of the most critical commodities for deploying and sustaining the combat force over the course of a major campaign. While POL trucks and pipelines move fuel within the theater, COCOMs rely on POL tanker ships to deliver refined product over strategic distances to the theater of operations.

(U) MCRS provides analysis of POL tanker ship requirements based on campaign fuel demands for Diesel Fuel Marine (DFM) for ships; JP-5, which is jet fuel for ship-based aircraft; and JP-8 for land-based aircraft and mechanized equipment, such as tanks, trucks, and construction vehicles. MCRS models explicitly tracked campaign fuel demands for both combat and mobility forces over the course of the campaign. Services provided unit consumption rates, and the campaign analysis shows the combat intensity levels. The models also tracked the JP-8 consumption rates for mobility forces, including airlift and AR aircraft, down to the single asset and rounded to the nearest hour of operation.

12.1. (U) POL PRODUCT TANKERS

(S//REL ACGU)

(b)(1)

(U) MCRS models limit the ships to berths that can accommodate their length and draft. For ports with shallower depths, ships are permitted to light load if it is advantageous for timely delivery of POL. All the ports associated with global POL sources have at least 1,000 ft piers and 40 ft draft, except Anchorage, Alaska, and Apra, Guam, which each have 700 ft length piers and drafts of 37 ft and 35 ft, respectively.

12.2. (U) POL SOURCING (STOCKS, INVENTORY & WORLDWIDE PRODUCTION)

(U) Campaign demands are met with a combination of wartime POL stocks and worldwide inventory and production sources. Worldwide inventory and refinery capability are byproducts of competing global demand and, as such, the U.S. does not have unlimited access. To support MCRS, DESC defined the salient assumptions for worldwide POL sources, including

[55] (U) Numbers are based on Summer 2009 market figures.
[56] (U) The U.S. owns the USNS GIANELLA, which is assigned to the MPS and unavailable for common user POL movement.

forward war reserve stocks, depot inventory levels and production capability allocated to support the campaigns.

(S//REL ACGU)

(b)(1)

Table 12-1: (U) Worldwide POL Production Sources[57]

Load Location	JP-8 (CBBLs)		DFM (CBBLs)		JP-5 (CBBLs)	
	Daily Production	Max Inventory	Daily Production	Max Inventory	Daily Production	Max Inventory
DFSP Selby	560	3,100			127	3,100
DFSP Puget Sound	538	3,100	210	3,100	118	3,100
DFSP San Pedro	919	3,100	2,487	6,200	110	3,100
DFSP Houston	3,650	9,300	123	3,100	738	3,100
DFSP Yorktown/Craney	840	3,100	283	3,100	1,600	3,100
DFSP Anchorage	193	3,100			33	500
Singapore	1,199	3,100	285	3,100	156	3,100
Saudi Arabia	893	3,100	78	3,100	78	3,100
Qatar	78	3,100	207	3,100	86	3,100
Egypt	173	3,100				
Greece	783	3,100	158	3,100	78	3,100
Italy	432	3,100	158	3,100		
Netherlands	78	3,100	100	3,100		
Spain	78	3,100	158	3,100	157	3,100
UK	236	3,100	79	3,100		
Australia			78	3,100	78	3,100
Bahrain	206	3,100	153	3,100		
Kuwait	103	3,100			86	3,100

(U) The MCRS assumes the CONUS stocks are unlimited and that Host-Nation Support (HNS) is available for USEUCOM POL requirements. The European en route airlift

[57] (U) Provided by DESC.

infrastructure adheres to established storage and daily pumping capacities at both military and commercial airfields.

(S//REL ACGU)

(b)(1)

12.3. (U) POL DEMANDS

(U) Daily POL requirements are tracked by commodity and aggregated to determine the demand by geographic region.[59] Figure 12-1 depicts Case 1 POL demand, which is the most demanding case studied. JP-8 demand is broken out by detailed geographic regions and the DFM/JP-5 is broken out by theater to support Case 1.

(b)(1)

Figure 12-1: (S//REL ACGU)

(S//REL ACGU)

(b)(1)

[58] (S) (b)(1)

[59] (U) Unit consumption includes all deployed combat and support forces in the TPFDD. In Figure 12-1 unit consumption includes AR tanker and strategic airlift demands, whereas those demands are broken out separately in Figure 12-2.

(b)(1)

(b)(1)

(b)(1)

Figure 12-4: (S//REL ACGU)

12.4. (U) POL TANKER SHIP RESULTS

(S//REL ACGU)

(b)(1)

Table 12-2: (S//REL ACGU)

(b)(1)

(S//REL ACGU)

(b)(1)

[60] (U) Additional capacity consists of EUSC tankers and U.S. flagged tankers not obtained through VTA that would have to be requisitioned.
[59] (U) POL sealift tanker usage was not assessed for Case 2.

(S//REL ACGU)

(b)(1)

(S//REL ACGU)

(b)(1)

(S)

13. (U) Prepositioning (PREPO) Stock

(U) The intent of the PREPO program is to provide early combat capability to thwart the enemy's advance early in a conflict and provide theater RSO&I enablers to speed the entry of arriving forces. PREPO is the singular quickest way to build early combat power in a major campaign. Using CC-3 demand as an example, Figure 13-1 illustrates it would take 22 days by sealift or more than 45 days by airlift to provide a similar capability that PREPO provides within a week.

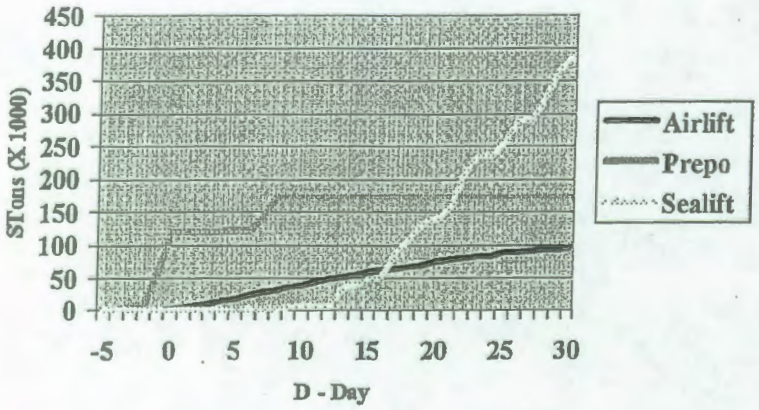


Figure 13-1: (U) Relative Speed of Delivery, by Mode

(U) The Department places PREPO stocks ashore in the area of their intended use or afloat so they can respond to multiple possible scenarios while minimizing the monetary and political costs of having operational units forward deployed on foreign soil.

(S//REL ACGU)

(b) (1)

(b) (1)

Figure 13-2 (S//REL ACGU)

13.1. (U) RESULTS

(U) MCRS scenarios and cases employ ashore PREPO early in the warfight. MCRS offloads afloat PREPO early, but the ground combat equipment was not offensively employed early in the warfight. Logistics material prepositioned afloat was offloaded and employed to assist the rapid offload and forward movement of other forces arriving in the first wave of sealift.

MCRS did not assess the other potential geopolitical uses for PREPO, such as security cooperation activities, deterrence and multilateral training exercises.

13.1.1. (U) CASE 1

(S//REL ACGU)

(b)(1)

Table 13-1: (S//REL ACGU)

(b)(1)

13.1.2. (U) CASE 2

(S//REL ACGU)

(b)(1)

13.1.3. (U) CASE 3

(S//REL ACGU)

(b)(1)

Table 13-2: (S//REL ACGU)

(b) (1)

(S//REL ACGU)

(b) (1)

(S//REL ACGU)

(b) (1)

(S//REL ACGU)

(b) (1)

13.2. (U) PREPO RECAPITALIZATION

(U) Prepositioned Combat Brigade Equivalent Equipment Sets have been employed on several occasions between 1990 and the present. Currently, elements of the Department are reconstituting equipment sets which were employed for OIF and OEF. Figure 13-3 illustrates the PREPO Program of Record as well as planned reset of the overall stock levels of prepositioned combat force equipment.

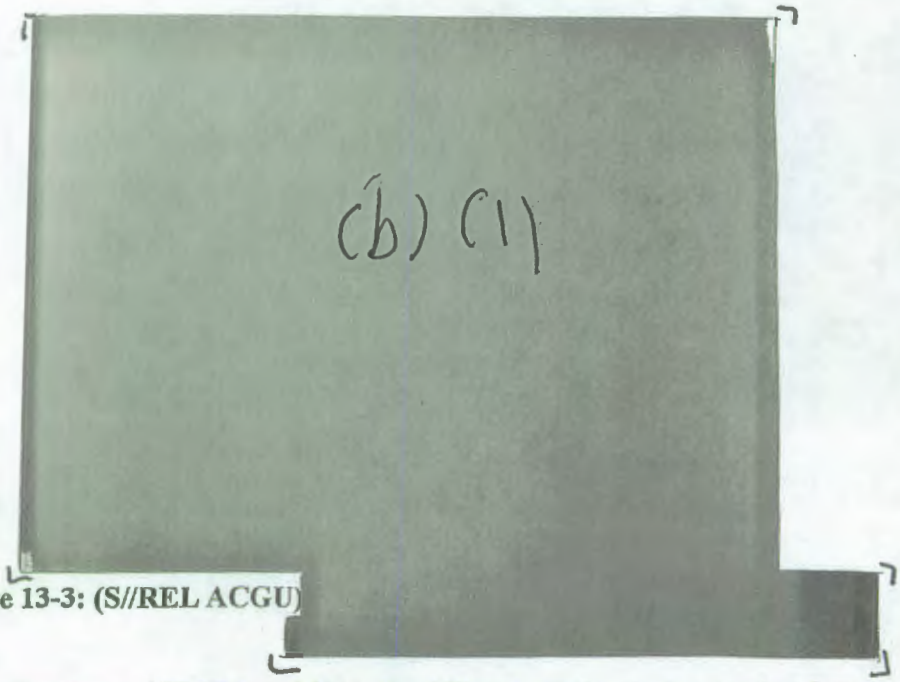
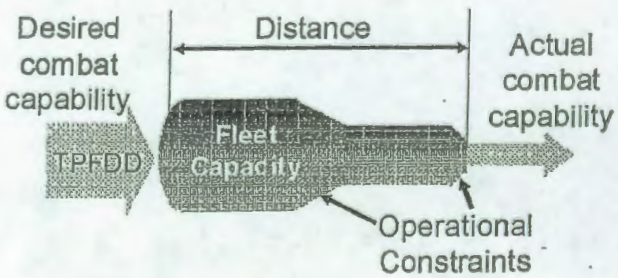


Figure 13-3: (S//REL ACGU)

(U) The advantage of PREPO resides in its ability to employ heavy combat forces and RSO&I capabilities more quickly than any other mode of transport. It does so by emplacing the appropriate equipment close to the expected point of need and thereby relieving the stress on an initial leg of strategic air and sea movements. In order for PREPO to be most effective, it must include the right equipment for the mission and be in the right location to affect the outcome in a timely manner. The afloat PREPO combat equipment was not critical to the success of MCRS scenarios and cases and, with ongoing recapitalization efforts; this may indicate an opportunity to reevaluate the strategic objectives for PREPO and its appropriate equipment composition. These observations suggest that afloat PREPO might provide greater utility to major combat operations if the Department examined options to better align PREPO equipment with early warfight requirements. Early warfight requirements are not the only use for PREPO, however, and because MCRS did not assess other potential geopolitical uses for prepositioning equipment, such as security cooperation activities, deterrence and multilateral training exercises, a study focused more specifically on PREPO mission sets could better formulate a conclusion on the PREPO mission and optimum composition.

14. (U) Infrastructure and Enablers

(U) While airlift en-route infrastructure was adequate to support MCRS scenario demands, infrastructure constrained AORs require mitigation strategies involving the employment of enablers to deploy and sustain forces. In each of the MCRS scenarios, enablers were vital to overcome POD infrastructure constraints.



(U) MCRS examined shallow draft vessels, such as LSVs and JHSVs, to improve the throughput capability at austere SPODs, and Joint Rapid Airfield Construction (JRAC) to increase theater APOD MOG. To mitigate poor or non-existent SPOD facilities, MCRS employed LOTS and the Offshore Petroleum Discharge Systems (OPDS) for over-the-shore throughput of UE, dry cargo sustainment and POL.

(S//REL ACGU)

(b)(1)

14.1. (U) SHALLOW DRAFT VESSELS

(S//REL ACGU)

(b)(1)

(S//REL ACGU)

(b)(1)

14.2. (U) OFFSHORE PETROLEUM DISCHARGE SYSTEM

(S//NF)

(b)(1)

(b)(1)

14.3. (U) JOINT RAPID AIRFIELD CONSTRUCTION (JRAC)

(S//REL ACGU)

(b)(1)

14.4. (U) LOGISTICS OVER THE SHORE

(S//REL)

(b)(1)

[62] (U) MCRS did not assess the feasibility of the hybrid system or the effect of environmental conditions to include sea state, tidal range, and sea/tidal currents.

[63] (S//REL ACGU)

(b)(1)

[64] (S//REL ACGU)

(b) (1)

Figure 14-1: (S//SEL) (b) (1)

15. (U) Implications of Long Irregular Warfare

(U) Sustaining a long, IR campaign presents significant mobility challenges, as force rotations place a continuous demand on the mobility system. A long duration campaign does not change the peak demand of overlapping warfights, but it does raise the level of the steady state or non-surge demand. Thus, the relationship between non-surge and surge demand is fundamentally changed. The main purpose of the Reserve Component, CRAF, VISA and the MSP programs is to provide the additional capacity to meet surge requirements. During a long duration campaign, however, many of these surge forces are not readily available. In the IR-1 analysis, the non-surge C-130 force was unable to meet the demands of the long campaign, but was more than adequate to meet the peak demands of overlapping warfights. Force rotations in locations with austere environments present additional challenges.

15.1. (U) FORCE ROTATION AND INFRASTRUCTURE

(U) For deployment and initial rotation(s) into austere environments, the U.S. must operate within the constraints of immediately available logistics and the existing commercial supply chain infrastructure. Mitigating these challenges may take years. For example, building new roads and improving port facilities is not only a costly proposition, but is not likely to be practical during initial deployment or the first few force rotations. Additionally, if there is not potable water or POL in a country, the U.S. must transport these supplies and set up the required distribution infrastructure.

(U) Mitigation strategies can focus on increasing the supply side by improving infrastructure, developing alternative supply routes, or developing new technology that can bypass traditional supply networks. Alternatively, with a focus on reducing demand, the Army could retain the majority of its equipment in the theater and rotate only the soldiers.

(U) In OIF, a combination of improving the infrastructure and developing alternative supply routes was employed as a mitigation strategy. The number of Iraq-based theater sustainment air bases grew from 12, after the 2003 OIF surge, to 14 by 2007. In 2007, the U.S. matured two additional surface supply routes into Iraq from Port of Um Qasr, Iraq, and Aqaba, Jordan, in addition to the primary routes from Kuwait and Turkey. And most recently, the U.S. added the Northern Distribution network into Afghanistan to complement the Pakistan surface supply route.

(U) MCRS assessed force rotations in the IR-1 scenario over a five-year period using Service force rotation policies, as detailed below.

- (U) U.S. Army Personnel and Equipment – Active Component forces have 365-day deployments, and Reserve Component forces have 270-day deployments. Units deploy and redeploy with their equipment; however, PREPO equipment remains in theater.
- (U) USMC – forces rotate every six months.
- (U) USAF – personnel rotate every four months; however, equipment does not rotate (except aircraft).
- (U) USN – surface combatant ships rotate every six months; Ground-based personnel rotate annually.
- (U) Special Operations Forces (SOF) – individual components rotate in accordance with respective parent Service policy.

(S//REL ACGU) (b) (1)

(b) (1)

Figure 15-1: (S//REL ACGU) (b) (1)

(S//REL ACGU) (b) (1)

15.2. (U) TOTAL FORCE MIX

(U) While total force structure must meet peak demands, the balance of the force must afford the capability to sustain steady state operations. Long duration campaigns, such as OIF/OEF and the IR-1 scenario, add to the daily demands but do not by themselves alter the requirements for the total mobility force. An increase in daily demand translates into a requirement for increased access to capability during non-contingency/non-surge periods. While the Reserve Component and our commercial partners contribute during non-surge periods, the preponderance of their capability is only available during surge following full mobilization. Thus, comparing the percent of surge capability required to support non-contingency steady state operations to the percent of active duty capability provides insights on how well the total force is balanced.

(U) Table 15-1 shows the percent of capability resident in the Active Component (AC) (aircraft and crews) and compares this with the percent of surge capability required to support non-contingency steady state operations as observed in the cases assessed. Examining these ratios yields two key observations.

Table 15-1: (S//REL ACGU)

(b) (1)

- (S//REL ACGU)

(b) (1)

- (S//REL ACGU)

(b) (1)

15.3. (U) COMMERCIAL PARTNERS AND CONTRACTS

(U) Transitioning from organic to commercial capability as the campaign continues is an important aspect of managing the total force. This is true for both sealift and airlift. The sealift commercial industry responded to DOD during OIF/OEF through capacity and capability enhancements.

(U) Prior to 2006, 14 commercial ROROs supported the USCENTCOM AOR; today, 17 ROROs support the AOR. They also made lift more accessible by tailoring commercial liner routes to better service DOD business. One carrier significantly expanded commercial capability by introducing vessels with increased deck heights, enabling the movement of DOD helicopters.. From the commencement of operations in 2003 to the present, these sorts of efforts gradually enabled DOD to increase its reliance upon industry for sustainment and unit moves. The year 2009 marked a milestone in this transformation, with only a single activation of an organic vessel in support of OIF/OEF. These adjustments occurred over a period of years but, once in place, have proven to be reliable and responsive resources for movement of DOD cargo.

[65] (U) AC/RC = Active Component/Reserve Component; excludes crews dedicated to training.
[66] (U) C-17 crew ratio = 4.9:1. C-5 crew ratio = 2.5:1.

(U) Utilization of commercial sealift affords opportunities to realize cost efficiencies, emphasizing DOD's policy of "commercial first." The worldwide commercial sealift enterprise – consisting of infrastructure, assets, and trans-national agreements – sometimes present the only cost-effective distribution solution in logistically challenging environments (e.g., sealift into Karachi, Pakistan, for further surface-transport of cargo to Afghanistan).

(U) For airlift, the use of commercial service, such as contracting the AN-124 or establishing a Theater Express program similar to that which has supported OIF/OEF since December 2005, is essential to meeting the sustained demands of a long campaign and preserving the capability of the organic fleet to surge, if needed.

(U) Contracting for airlift offers cost savings. First, commercial costs are lower because vendors compete for business and have less overhead than military airlift units. For example, the Theater Express program resulted in cost avoidance of $305M in FY08 and about $889M in FY09 (through 15 Sep 09). Currently, seven commercial carriers and five subcontractors operate in the USCENTCOM theater, servicing 73 locations and moving about 40% of all intra-theater cargo.[67]

(U) Industry's worldwide enterprise of infrastructure, strategic lift assets, and existing trans-national agreements are key components to enabling large movements in logistically-restrictive environments. In 2008, USTRANSCOM leveraged this enterprise to develop the Northern Distribution Route into Afghanistan, reducing the risks of a single surface supply route through Pakistan.

15.4. (U) PROVIDING SUSTAINMENT TO REMOTE OR DISPERSED FORCES

(U) It is not unexpected that some long campaigns will require ongoing logistics and sustainment to forward bases and locations that are not serviced by traditional surface supply routes. The dual challenges of rugged terrain and sparse infrastructure significantly impact the effectiveness of traditional convoy resupply operations for many forward bases and combat outposts in Afghanistan. Vertical resupply routes are the primary means for resupplying soldiers operating for extended periods in austere locations that are considerable distances from forward operating bases.

(U) Traditionally, rotary wing meets these mission requirements, but in today's environment, the combatant commander is increasingly leveraging strategic and theater lift aircraft as well as commercial fixed wing to meet requirements.[68] This niche mission plays a critical role in sustaining remote forces; however, even at peak levels, it is typically accomplished with two to four theater missions per day using a combination of C-17s and C-130s, accounting for roughly two percent of all the intra-theater cargo deliveries.

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[67] (S//REL ACGU) (b) (1)

[68] (U) In fiscal year 2009, fixed wing aircraft delivered more than 21 million pounds vertically, and annual airdrop deliveries since 2006 have increased more than 500%.

16. (U) Theater Ground Transportation

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(b)(1)

(S//REL ACGU)

(b)(1)

Table 16-1: (S//REL ACGU)

(b)(1)

(U) Force deployment was not constrained by the number of HETS assets or the availability of POL trucks. While POL assets are fully utilized throughout MCO-1, POL inventory is well-above stockage goals.

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[69] (U) During initial deployment, once capacity exists.
[70] (U) Longest interval of uninterrupted days.
[71] (U) During initial deployment, once capacity exists.
[72] (U) While assets are at max use, POL inventory is well-above stockage goals.
[73] (U) While assets are at max use, POL inventory is well-above stockage goals.

(S//REL ACGU)

(b)(1)

(S//REL ACGU) (b)(1)

(S//REL ACGU)

(b)(1)

17. (U) CONUS Mobility Analysis

(U) MCRS evaluated the capability of the CONUS transportation system to support force deployment by conducting mobility analyses on installation out-loading capability, airport and seaport reception and out-loading capability, and supply depots' (including ammunition) out-loading capability. Figure 17-1 depicts a representative Case 1 flow from origin to SPOE, accounting for the movement of all CONUS originating ground combat forces.

(b) (1)

Figure 17-1: (S//REL ACGU)

(S//REL ACGU) (b) (1)

(S//REL ACGU) (b) (1)

(S//REL ACGU) (b) (1)

(S//REL ACGU) (b) (1)

[74] (U) Depots assessed were Blue Grass, Crane, McAlester, Letterkenny, Tooele, Anniston, Hawthorne AAP, and Hill AFB.

(S//REL ACGU)

(b)(1)

(S//REL ACGU)

(b)(1)

(U) The 2005 Base Realignment and Closure and Grow the Force Programs impact CONUS Army and Marine Corps demographics for major deployment operations. The origin outload demographics have potential implications for the future positioning of DOD-owned heavy railcar capacity leveraged during surge deployment scenarios. By staging these organic heavy railcars to meet anticipated scenario workload requirements, MCRS results demonstrate a potential for a reduction in late SPOE heavy railcar delivered arrivals of UE.

(S//REL ACGU)

(b)(1)

(U) Ground transportation is key to meeting the deployment timeline in the HLD DSCA events, as road movement (unit self-deployment and commercial trucking) accounts for approximately 90% of UE movement. This is because the CONUS road network and commercial truck fleet, including over two million trucks for hire, have significant capacity. Additionally, MCRS found that a large number of the forces are within a two-day drive to the events.[78] For HLD events, deployment by commercial truck, vice rail, is preferred. Deployment by rail is slower and less effective because: (1) commercial trucks are available to the outloading installations more quickly and in greater quantities than railcars; (2) the loading of commercial trucks is faster than railcar loading; (3) commercial trucks travel faster than railcars; and (4) commercial trucks can deliver loads closer to the point of need than rail. Given that 90% of UE moves by ground, the best way to improve force closure is to increase the miles per day commercial trucks can travel from a standard travel day of 600 miles per day to 1,200 miles per day by contracting for dual drivers.[79] With 1,200 mile per day, UE can reach any CONUS location within three days.

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[75] (U) Source: SDDC Operations.

[76] (U) Approximately 80% of U.S. commercial flatcars will reach the end of their expected service life between 2016 and 2020.

[77] (U) Source: DOT Research and Innovation Technology Administration, Bureau of Transportation Statistics, National Transportation Statistics 2009.

[78] (S)

[79] (U) Source: SDDC/G3 Operations.

(U) **Rail and Road Networks**. The CONUS strategic rail and road networks are sufficient to support the movement of forces between deployment stations and POEs and deployment to HLD DSCA events

(S//REL ACGU) (b) (1)

(U) **Airports**. CONUS airlift infrastructure is robust in terms of fuel, reception, staging, marshalling, and outloading capacity to support force deployment, redeployment and sustainment distribution operations for the assessed campaigns. The infrastructure included Army deployment airports, USTRANSCOM-designated APOEs and major AMC operating bases. Dover AFB and Charleston AFB had significant workloads supporting sustainment, channels, and coastal en route operations, although they are not near capacity. Coastal en routes are locations where AMC aircraft transit before departing the CONUS. In addition to Charleston and Dover, there are five west coast locations supporting coastal en route requirements: Travis, McChord, Mountain Home, Fairchild and March AFBs.

(U) Army deployment airports and USTRANSCOM-designated APOEs support an ebb and flow of operations wholly dependent of TPFDD cargo available-to-load dates and scenario RDDs. As such, Biggs AAF, Dover AFB, Cherry Point Marine Corps Air Station (MCAS), McChord AFB, Peterson AFB, Robert Gray AAF, Robins AFB, Westover AFB, and Wright-Patterson AFB exceed 90% of their working capacity for ten or more days over the course of the surge timeframe within the cases. However, none of these airfields operated for more than four consecutive days at this level.

(S//REL ACGU) (b) (1)

(U) Figure 17-2 shows the available berths, by coast. The Gulf Coast reaches maximum berth usage for a single day and typically has three to four berths utilized throughout the surge timeframe. East and West Coasts have sufficient capability to satisfy all scheduled outloading requirements.

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[80] (U) Organic surge ships are Reduced Operating Status (ROS) 4 and 5.
[81] (U) Tacoma, Oakland, Beaumont, Savannah, Charleston, Wilmington, Corpus Christi and Newport News.
[82] (S//REL ACGU) (b) (1)

(b)(1)

Figure 17-2: (S//REL ACGU (b)(1)

(S//REL ACGU)

(b)(1)

18. (U) MCRS Case Studies

(U) Six case studies complemented the MCRS modeling and simulation by providing additional information on mobility issues that are either not conducive to modeling or not adequately addressed with the scenarios. The topics represent issues of persistent interest to the DOD and Congress. Each case study included a small team of stakeholders to conduct a qualitative and quantitative assessment, as appropriate, for their topic and its potential impact on the mobility system. Three of the case studies, marked with an asterisk, were contracted to the Institute for Defense Analysis (IDA) to provide MCRS with an independent assessment.

- Troop Growth
- Standup of United States Africa Command (USAFRICOM)
- Deploying by DEPORD vs. TPFDD
- CCMRF Operations*

- Basing Variations (consolidated vs. dispersed)*
- Army Movement*

(U) This chapter provides an executive overview of each case study. The complete reports are available upon request.

18.1. (U) TROOP GROWTH

(U) Recently, Title 10 and the National Defense Authorization Act (NDAA) provided for force structure growth specifically targeted to decrease warfighter dwell time in the theater.[83] The Congressional Research Report on Strategic Airlift Modernization (November 2007) suggests the Air Force's current and projected strategic airlift fleet would need to be carefully evaluated to support these additional ground forces. The Troop Growth case study examined the impacts of the projected growth on the mobility fleet from a number of perspectives and concluded the growth would not impact strategic lift requirements. The team used an approach that could logically be applied to study the mobility impacts again for a future growth in end strength.

(U) The legislatively prescribed troop growth is for the purpose of supporting force rotations over the long war – to allow troops to dwell longer at home between their deployments. While rotating forces is a mobility function, DOD would not engage in force rotations if involved in two nearly simultaneous major campaigns, which is when the mobility system is most stressed. The strategic lift system operates at peak demand during the deployment phase of a major warfight and, more specifically, during the deployment to the second of two nearly simultaneous warfights. Adding forces to provide a larger rotational pool of forces to sustain long duration Phase IV operations does not impact the peak mobility demand.

(U) The study team examined historical relationships to see what story they told. There was a positive correlation between end strength and airlift force structure, but not sealift force structure, when examining force levels dating back to the end of the Cold War. However, trends alone are not always a good predictor for understanding the impacts of additional forces. During this same time frame, there was a fundamental shift in national strategy that was associated with a host of new DPSs redefining the employment roles of the total force.

(U) Because historical relationship trends are not conclusive, the team examined the relationships between force employment and mobility. The requirement for strategic airlift (C-5s and C-17s) is driven by the need to deploy O&O cargo in the first three weeks of a campaign (e.g., Patriot Battery). Figure 18-1 shows the relationship between time and the strategic lift mode. That which must go early to win the war must be prepositioned forward on ships or ashore, or it must be flown into theater. The sealift fleet can carry substantially more forces than airlift and is typically called upon anytime it can be deliberately used to meet campaign closure requirements beyond 25-30 days. An increase in end strength could result in an increase in airlift requirements only if the added forces have O&O equipment that must deploy in the first three-

[83] (U) This force structure growth includes 100,000 Army soldiers and marine ground forces added in Title 10, §691, and the NDAA 2008.

weeks of a major campaign. The types of force being added and their potential employment role (and associated timing) in prosecuting major campaigns is a significant factor in determining the impact of increased end strength on strategic fleet requirements.

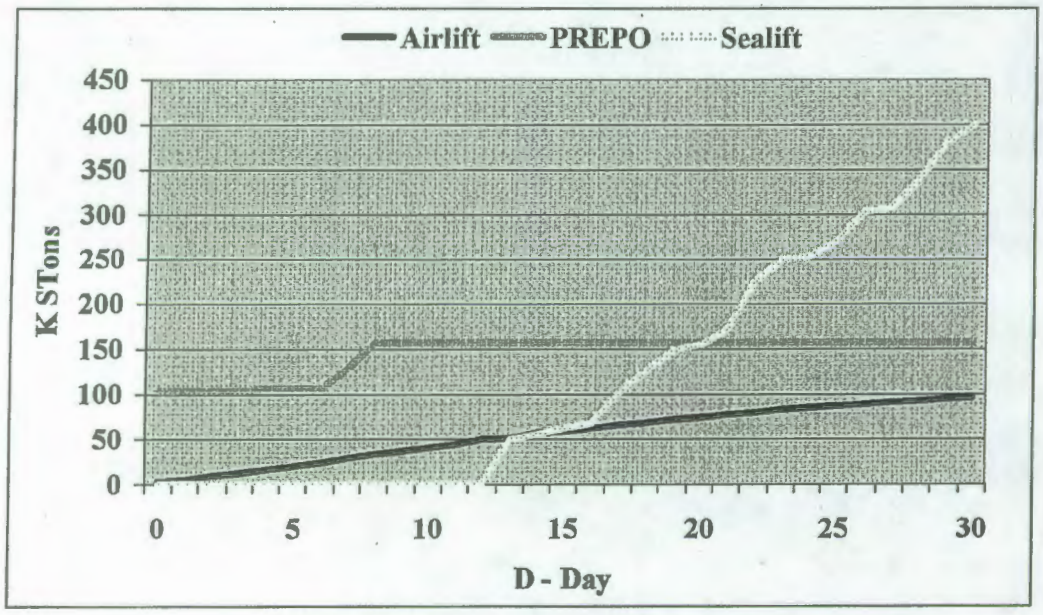

Figure 18-1: (U) Relationship Between Time and STon Delivery

(U) The purpose of troop growth does not support increased employment operations. However, if faced with two overlapping warfights, it is likely that DOD would call upon these forces to deploy. To capture this possibility, the study analyzed applying the increased end strength to the campaigns assessed during the last mobility study by introducing only the assumption that the additional force structure would be applied to augment similar forces in each scenario. When the additional forces were applied to the most demanding scenario, it resulted in a five percent overall increase in cargo moved – with less than a one percent increase in cargo moving in the first three weeks. This is very small change, and the preponderance of the change is associated with sealift, not airlift.

(U) The 2016 force structure, which includes the recent growth in end strength, was incorporated by the Services while building the MCRS TPFDDs underpinning the modeling and simulation. MCRS results do not call for more mobility force structure over that determined by previous studies and, in some cases, required less strategic lift than past studies.

(U) While the historical analysis of the relationship between the size of the force and strategic mobility appears to support the assertion that an increase in end strength may result in an increased demand on strategic mobility, it is inconclusive, given the substantial shifts in national security strategy since the Cold War. To understand the potential impact of troop growth, it is most important to understand the specific purpose of the additional troops and the associated implications for force employment and deployment. The forces added per Title 10, §691 and the NDAA 2008 to increase dwell time do not increase the forces levels deployed during peak

strategic lift timeframes. Some additional demands on sealift are possible if these forces are used for other purposes, but these changes are small and do not require additional assets.

18.2. (U) USAFRICOM CASE STUDY

(U) President George W. Bush directed the establishment of USAFRICOM in February 2007 to establish better relations with African countries. This case study examined the stand up of USAFRICOM in terms of the implications to the mobility system and concluded two things. First, the anticipated increases in engagement activity would not increase peak strategic lift requirements. Second, the enormous size of the African continent and the underdeveloped infrastructure limit the rate of throughput to most countries in Africa. Rapid closure requires a smaller force size or new technology to reliably bypass infrastructure constraints.

(U) USAFRICOM consolidated responsibilities from three existing geographic commands (USEUCOM, USPACOM, and USCENTCOM) and has a mission to "...work in concert with other U.S. government agencies and international partners to conduct sustained security engagement through military-to-military programs, military sponsored activities, and other military operations as directed to promote a stable and secure African environment in support of U.S. foreign policy."

(U) USAFRICOM's mission and associated engagement activities in all likelihood will result in some level of increase in the frequency of staff visits to African nations. On a day-to-day basis, these anticipated activities will drive some increase in Operational Support Airlift requirements, which are already being addressed by the DOD. These anticipated activities will also require a potential increase in strategic airlift support from time to time. However, ongoing support to USAFRICOM activities and vignettes will not impact peak strategic lift requirements. This is because peak strategic lift requirements occur when the U.S. is involved in two nearly simultaneous major campaigns, and our strategic lift assets are most strained. Supporting any given engagement in USAFRICOM that may require strategic lift would be inconsistent with our national strategy of not engaging in additional operations during the peak deployment timeframe of nearly simultaneous campaigns.

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[84] (U) For more details, see the IR-1 scenario in Volume II of MCRS. Forces included 19 BCTs, with average monthly sustainment requirements of 6,500 short tons of dry goods, 13.6 M gallons of water and 77.1 M gallons of fuel.

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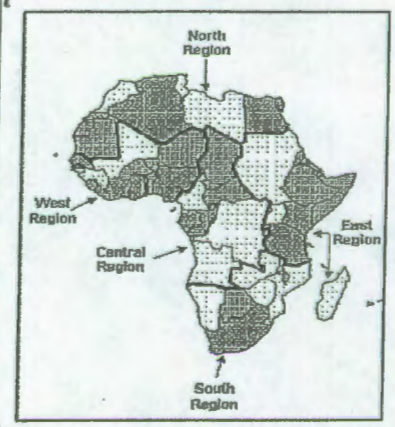

Figure 18-2: (U) Africa Mobility Challenges

(U) Figure 18-3 illustrates the vast size of the African continent, which is roughly the same size as the U.S., China, Western Europe, and Argentina, combined. At its widest point, the continent is 4,365 miles, roughly the same as the distance from Chicago to Honolulu. The north-south distance is even greater at 4,885 miles, nearly the same as New York to Moscow.

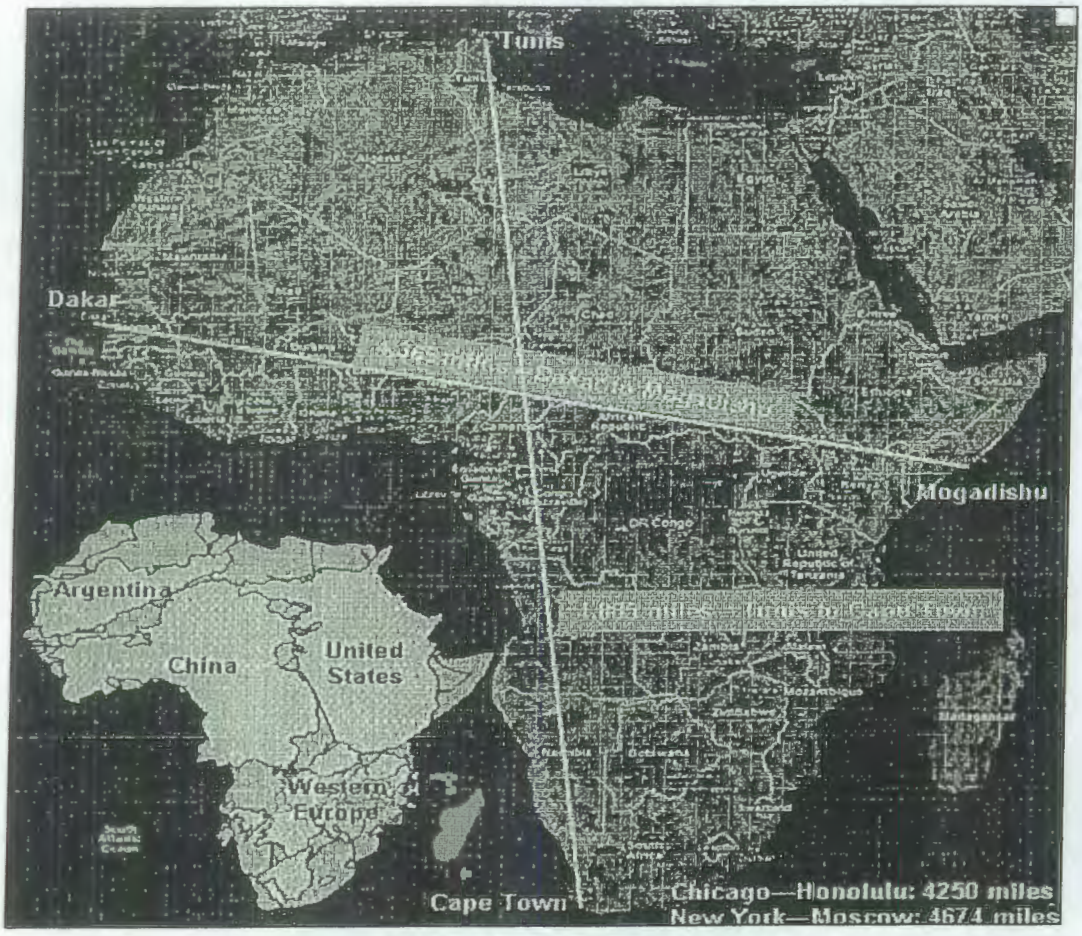

Figure 18-3: (U) Tyranny of Distance

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18.3. (U) TPFDD/DEPORD COMPARISON STUDY

(U) The models employed in past and current mobility studies are dependent on TPFDD as an input. During the MCS, USTRANSCOM noted that the mobility models did not capture the unanticipated changes experienced using a DEPORD process during OIF, and questioned whether this would make a difference in model results or study outcome. This case study examines DEPORDs and TPFDDs and addresses whether a TPFDD is appropriate for assessing the mobility system in a mobility force structure study.

(U) DEPORDs represent an execution process used to direct the flow of forces. A DEPORD can direct the flow of an entire TPFDD, a portion of a TPFDD, or a set of very specific forces. The DEPORD process allows the Department to deploy forces for operations, as needed, by renegotiating and re-sequencing RDDs to react to political factors and CONOPS or threat changes. The process provides the DOD with the operational flexibility to be responsive in execution to unforeseen circumstances or changing requirements, and in the event a TPFDD doesn't exist, it may represent an option for directing the flow of forces.

(U) A DEPORD process is not appropriate for sizing sealift and airlift force structure. TPFDDs have been vetted by the Services and the COCOMs for each scenario. As such, TPFDDs represent the best estimate of force flow requirements and timing for current COCOM war plans and, within the Analytic Agenda process, they represent the most accurate representation of mobility demand for future defense planning scenarios. It is for that reason that the DOD uses TPFDDs for both COCOM OPLAN feasibility assessments and future force structure assessments. For force structure studies such as MCRS, the actual force flow supporting the AB becomes the mobility requirement if the campaign assessment is acceptable to the Department. The analytic process of using TPFDDs as input to the mobility models is sound practice.

18.4. (U) CCMRF CASE STUDY

(U) The ability of the mobility system to support homeland security consequence management events was first studied in the Mobility Capabilities Study. At that time, the DOD's role in responding to such events was not as well defined as it is today; thus, MCRS is better positioned to assess the impact on the mobility system of responding to these events.

(U) Local and state entities are the first responders during a CBRNE attack on a civilian population. The DOD augments the first responders with a CCMRF. This force has been structured to provide search and rescue, decontamination, medical, aviation, communications, and logistics support. The goal is to have three CCMRFs available within a few days' notice and to respond to up to three nearly simultaneous CBRNE incidents in the United States. The CCMRF case study investigated the deployment of CCMRFs to five CONUS locations, including Seattle, San Diego, St. Louis, Boston, and Miami.

(U) Prompt deployment is the key to success. If units are being drawn from across the country, airlift may be required to deliver the CCMRF on-time[85]. The analysis evaluated the need for airlift to meet objective CCMRF deployment timelines, including quantifying the numbers and types of aircraft required. It also considered various surface delivery modes (road, rail, ship). The analysis examined the impact on force closure of expediting aircraft ground times, expanding the deployment window, improving CCMRF readiness, and increasing miles traveled per day by ground transportation assets.

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18.5. (U) BASING VARIATION CASE STUDY

(U) There is general concern that relocating troops to the United States from various locations abroad could seriously impede the U.S. response in times of crisis. The Basing Variation case study examined whether force basing assumptions impact the robustness of strategic airlift conclusions. IDA completed this case study and reports the concern appears unwarranted.

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(U) Changing the starting location of cargo and passengers had a limited effect on strategic airlift closure. The only situation that resulted in a reduction in MCRS closure times was the excursion wherein forces were essentially prepositioned in theater and, therefore, did not

[85] (U) CCMRF is deployed in accordance with the 27 Jun 08 CCMRF EXORD and the CCMRF TPFFD developed by the Joint Task Force - Civil Support on 16 Jan 09.

require airlift. Otherwise, when cargo is re-based closer or further from the final destination, the strategic airlift enterprise appears to be able to meet closure timelines with little variation in fleet size.

18.6. (U) ARMY MOVEMENT CASE STUDY

(U) This case study explored issues associated with troop movement on the battlefield, by air, with a focus on the Mounted Vertical Maneuver (MVM) concept of employment. The IDA study team examined the movement of two BCTs: (1) Stryker; and (2) Future Combat System (FCS). FCS was used as a substitute for whatever vehicles are ultimately selected to satisfy combat maneuver needs under a revised Ground Combat Vehicle program.

(U) The proposed MVM concept for either the SBCT or FCS BCT (FBCT) will significantly affect in-theater airlift. Vertical delivery imposes great demands on airlift, especially if all personnel and vehicles of a BCT are to be delivered within 24 hours, as the current concepts articulate. The MVM CONOPS would have to be significantly relaxed in order to use current airlifters. This is also true for the conceptual short-take-off-and-landing C-17B and developmental A400M, which are still unable to meet performance requirements of the new Joint Future Theater Lift (JFTL).

(U) A vertical/short takeoff and vertical landing aircraft design, such as the JFTL concept, may provide the required capability for MVM, but even with this hypothetical capability, a 24-hour delivery CONOPS is not achievable. A CONOPS that delivers up to an FBCT in about 48 hours can be met with a MOG of 10 and less than 100 JFTLs, assuming generous payload capacity, mission capable rates and aggressive cycle times. It may also be possible to achieve partial BCT movement by airdrop using the Joint Precision Airdrop System (JPADS). This is feasible for an SBCT, but not FBCT, because of vehicle size/weight and aircraft limits. Some combination of JFTL and JPADS may be a possible option for MVM or an SBCT.

(U) In summary, BCTs cannot be delivered around the battlefield according to the MVM CONOPS by anything other than something possessing the vertical or very short take-off characteristics of the JFTL. With that said, JFTL will still be unable to deliver a BCT within 24 hours under realistic MOG conditions.

Appendix A

(U) Case 1 Workshop Decisions

(U) Combat force shortages occurred during the case timeline. Each force shortage required a force allocation decision between the warfight surge events and, sometimes, between HLD events. At the workshop, Service, COCOM, and OSD/Policy stakeholders decided combat force allocations among ISP events, including reducing forces (increasing risk), substituting forces, delaying deployment and/or disengaging.[86] These decisions are provided below and separated into time segments along the case timeline, as indicated. Abbreviations include SOF (Special Operations Forces), USA (U.S. Army), USAF (U.S. Air Force), USMC (U.S. Marine Corps), and USN (U.S. Navy).

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[86] (U) To ensure the focus remained on the mobility system, MCRS moved only forces within the Program of Record.

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(U) Case 3 Workshop Decisions

(U) The Case 3 timeline is separated into five "Turns," which align with major ISP events. Case 3 force allocation decisions, which were required only when a shortage of combat forces existed across the ISP events, were grouped according to these turns and are summarized below. "Reduced demand" means risk is being taken because forces are not available.\

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(U) Glossary

Acronym	Meaning
AAF	Army Airfield
AB	Air Base
AB	Analytical Baseline
AC	Active Component
ACC	Air Combat Command
ACL	Aerospace Control Level
ADA	Air Defense Artillery
AFB	Air Force base
AMC	Air Mobility Command
AMP	Analysis of Mobility Platform
AOR	Area of Responsibility
APOD	Aerial Port of Debarkation
APOE	Aerial Port of Embarkation
APS	Army Prepositioned Stocks
AR	Aerial Refueling
ARC	Air Reserve Component
ARCEM	Air Refueling Combat Employment Model
ASF	Army Strategic Flotilla
ATF	Amphibious Task Force
AWACS	Airborne Warning and Control System
BBL	Barrel
BCT	Brigade Combat Team
Bn	Battalion
CBBL	Hundred Barrels
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance
CAPE	Cost Assessment and Program Evaluation
CBRNE	Chemical, Biological, Radiological, Nuclear, High-Yield Explosive
CC	Conventional Campaign
CCMRF	CBRNE Consequence Management Response Force
C-Day	Mobilization Day
CMARPS	Combined Mating and Ranging Planning System
Co	Company
COCOM	Combatant Command
COIN	Counter Insurgency
CONOPS	Concept of Operations
CONPLAN	Concept Plan
CONUS	Continental United States
CRAF	Civil Reserve Air Fleet
CSS	Combat Service Support

CT	Counter Terrorism
D-Day	Day of Combat Iniation
DEPORD	Deployment Order
DESC	Defense Energy Support Center
DFM	Distillate Fuel Marine
DFSP	Defense Fuel Support Point
DLA	Defense Logistics Agency
DOD	Department of Defense
DOS	Days of Supply
DPS	Defense Planning Scenario
DSCA	Defense Support to Civil Authorities
ELIST	Enhanced Logistics Intra-theater Support Tool
EQ	Earthquake
EUSC	Effective United States Control
EXORD	Execute Order
FBCT	Future Combat System Brigade Combat Team
FCS	Future Combat System
FDO	Flexible Deterrent Option0
FGP	Force Generation Platform
FM	Force Module
FON	Freedom of Navigation
FOUO	For Official Use Only
FSS	Fast Sealift Ship
FY	Fiscal Year
GDF	Guidance for Development of the Force
GDSS	Global Decision Support System
GL	Global Logistics
GPD	Gallons Per Day
GSAB	General Support Aviation Battalion
HBCT	Heavy Brigade Combat Team
HETS	Heavy Equipment Transport System
HLD	Homeland Defense
HNS	Host Nation Support
IBCT	Infantry Brigade Combat Team
IDA	Institute for Defense Analysis
Int'l	International
IR	Irregular
ISB	Intermediate Staging Base
ISP	Integrated Security Posture
ISR	Intelligence, Surveillance, Reconnaissance
IW	Irregular Warfare
JCA	Joint Cargo Aircraft
JCS	Joint Chiefs of Staff
JFEO	Joint Forcible Entry Operation
JFTL	Joint Future Theater Lift

JHSV	Joint High Speed Vessels
JPADS	Joint Precision Airdrop System
JRAC	Joint Rapid Airfield Construction
JS	Joint Staff
JSCP	Joint Strategic Capabilities Plan
JSTARS	Joint Surveillance and Target Attack Radar System
K	1,000
kT	Kiloton
Kt	Knot
LIMS-EV	Logistics Installations and Mission Support – Enterprise View
LMSR	Large Medium-Speed RORO
LOGCONOPS	Logistics Concepts of Operations
LOTS	Logistics Over-the-Shore
LSV	Logistic Support Vessel
M	Million
MCAS	Marine Corps Air Station
MCO	Major Combat Operation
MCRS	Mobility Capabilities and Requirements Study
MCS	Mobility Capabilities Study
MEB	Marine Expeditionary Brigade
MEU	Marine Expeditionary Unit
MIDAS	Model for Inter-theater Deployment by Air and Sea
MOG	Maximum-On-Ground
MOTCO	Military Ocean Terminal at Concord
MPFD	Mobility Planning Factors Database
MPH	Miles Per Hour
MP	Military Police
MPFD	Mobility Planning Factors Database
MPS-#	Maritime Prepositioned Squadron - #
MPSRON	Maritime Prepositioned Squadron
MRAP	Mine Resistant Ambush Protected
MSC	Military Sealift Command
MSFD	Multi-Service Force Deployment
MSP	Maritime Security Program
MTM/D	Million Ton-Miles per Day
MVM	Mounted Vertical Maneuver
NATO	North Atlantic Treaty Organization
NDAA	National Defense Authorization Act
NDS	National Defense Strategy
NECC	Navy Expeditionary Combat Command
NM	Nautical Mile
NMS	National Military Strategy
NOFORN	No Foreign Nationals
NSD	National Security Directive

O&O	Over-sized and Out-sized
OEF	Operation ENDURING FREEDOM
OIF	Operation IRAQI FREEDOM
ONE	Operation NOBLE EAGLE
OPDS	Offshore Petroleum Discharge System
OPLAN	Operational Plan
OSD	Office of the Secretary of Defense
PA&E	Program Analysis and Evaluation
PB	President's Budget
PMAI	Primary Mission Aircraft Inventory
POD	Port of Debarkation
POE	Port of Embarkation
POL	Petroleum, Oil, Lubricants
POR	Program of Record
PPE	Pure Pallet Equivalent
PPO	Port Planning Order
PREPO	Prepositioned
QDR	Quadrennial Defense Review
QS	QDR Scenario
QSE	QDR Strategic Environment
RDD	Required Delivery Date
REL	Releasable
ROK	Republic of Korea
RORO	Roll-on, Roll-off
ROS	Reduced Operational Status
RSO&I	Reception, Staging, Onward Movement and Integration
S	Secret
SAAM	Special Assignment Airlift Mission
SBCT	Stryker Brigade Combat Team
SE	Strategic Environment
SECDEF	Secretary of Defense
SOF	Special Operations Forces
SOH	Strait of Hormuz
SPOD	Sea Port of Debarkation
SPOE	Sea Port of Embarkation
SqFt	Square Feet
SSSP	Steady State Security Posture
STAR	Scheduled Theater Airlift Route
STons	Short Tons (2,000 pounds)
STORM	Situation Testing Operations Rehearsal Model
TAI	Total Aircraft Inventory
TBMD	Theater Ballistic Missile Defense
TEU	Twenty-foot (container) Equivalent Unit
THAAD	Theater High Altitude Air Defense
TPFDD	Timed Phased Force Deployment Data

U	Unclassified
UAV	Unmanned Aerial Vehicle
UCT	Underwater Construction Team
UE	Unit Equipment
ULN	Unit Line Number
U.S.	United States
USA	United States Army
USAF	United States Air Force
USAFRICOM	United States Africa Command
USCENTCOM	United States Central Command
USEUCOM	United States European Command
USG	United States Government
USMC	United States Marine Corps
USN	United States Navy
USPACOM	United States Pacific Command
USSOUTHCOM	United States Southern Command
USTRANSCOM	United States Transportation Command
VET	Veterinary
VISA	Voluntary Intermodal Sealift Agreement
VTA	Voluntary Tanker Agreement
VV&A	Verification, Validation and Accreditation
WBE	Wide Body Equivalent
WMD	Weapons of Mass Destruction

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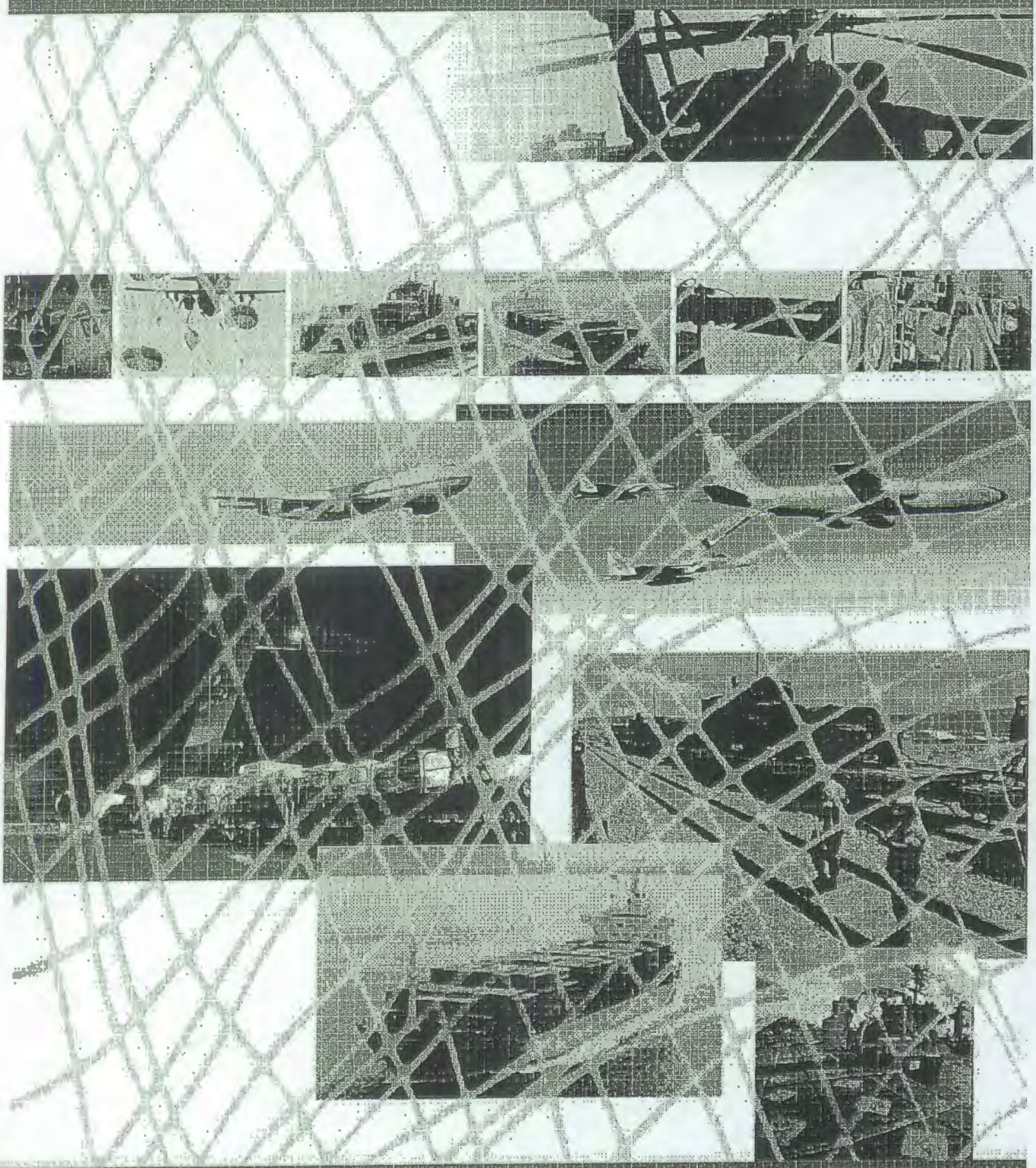
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