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10K FORCE ANALYSIS

FINAL REPORT

TRADOC Analysis Center
Study and Analysis Center
Study Directorate
Fort Leavenworth, Kansas 66027-5200

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FINAL REPORT

by

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The 2K-10K force analysis study was conducted by the Study Directorate of the Training and Doctrine Command's (TRADOC) Analysis Center (TRAC). This document is the final report for the 10K force analysis. The 2K force analysis was a separate study published under separate cover. The 2K-10K force analysis began with a tasking from the Early Entry Lethality and Survivability (EELS) Battle Lab (BL) reflecting a desire to evaluate various EELS-designed force designs where the early entry force is light, deployable, high lethal, survivable, and readily sustainable. The 2K analysis focused on individual weapon system contributions to a brigade-size force performing an early entry mission. The 10K force analysis evaluated and compared three force designs provided by the EELS BL for lethality, survivability, deployability, and sustainability. The results of both studies verify the need for specific weapon systems, and the 10K force analysis outlines the strengths and weaknesses of force designs considered in performing an unopposed early entry mission.

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ABSTRACT

The 2K-10K force analysis study was conducted by the Study Directorate of the U.S. Army's Training and Doctrine Command's (TRADOC) Analysis Center (TRAC). This document is the final report for the 10K force analysis. The 2K force analysis was a separate study and was published under separate cover.

The 2K-10K force analysis began with a tasking from the Early Entry Lethality and Survivability (EELS) Battle Lab (BL) reflecting a desire to evaluate various EELS-developed force designs where the early entry force is light, deployable, highly lethal, survivable, and readily sustainable. The 2K analysis focused on individual weapon system contributions to a brigade-size force performing an early entry mission. The 10K force analysis evaluated and compared three force designs provided by the EELS BL for lethality, survivability, deployability, and sustainability. The results of both studies verify the need for specific weapon systems, and the 10K force analysis outlines the strengths and weaknesses of force designs considered in performing an unopposed early entry mission.

10K FORCE ANALYSIS
EXECUTIVE SUMMARY

1. Purpose. The purpose of this study was to evaluate various 10K force designs performing an early entry mission. The evaluated force designs were developed because existing early entry forces lack the lethality, survivability, deployability, and sustainability to meet future force projection needs.

2. Introduction.

a. In December 1992, the Early Entry Lethality and Survivability (EELS) Battle Lab (BL) requested the U.S. Army Training and Doctrine Command's (TRADOC) Analysis Center (TRAC) support to analyze 2K (brigade-size force) and 10K (division [-] size force) early entry force alternatives. TRAC-White Sands Missile Range (WSMR) conducted the 2K analysis and TRAC-Study and Analysis Center (SAC) conducted the 10K analysis. The results of the 2K analysis provided the base from which the 10K force was developed and provides the link between the two study efforts. This was necessary since the 2K force is a component of the 10K force. TRAC-SAC conducted the analysis of the 10K force's lethality, survivability, tactical mobility, deployability, and logistic support requirements in coordination with TRAC-Operations Analysis Center (OAC), TRAC-Scenario and Wargaming Center (SWC), TRAC-Fort Lee (LEE), the Combined Arms Support Command (CASCOM), the Military Traffic Management Command (MTMC), and the EELS BL. This report focuses on the 10K results.

b. The study sponsor identified the following study issues.

(1) What is the warfighting capability of modernized early entry force alternatives?

(2) What are the differences in sustainability among the 10K alternatives?

(3) What is the lift requirement for each of the 10K force alternatives?

(4) What are the various deployment schedules (time and aircraft) for the preferred 10K alternative based on employment in various theaters?

(5) What are the command and control (C2) implications of a fully modernized early entry force?

(6) How tactically mobile are each of the 10K alternatives?

c. The concept of operation was for the force to conduct an unopposed entry and engage in combat within 24 to 72 hours upon arrival. The force would expand the lodgment to obtain battle

space and then defend this space to prevent the lodgment from enemy interdiction. This defensive effort would encompass preclusion of air, ground, artillery, and rocket/missile attacks against the lodgement.

d. The 2K analysis used Southwest Asia (SWA), Latin America (LATAM), and Northeast Asia (NEA) scenarios to evaluate lethality and survivability in various terrain and threat environments. This allowed the 10K effort to use a SWA scenario as the most demanding and austere environment to focus on evaluating the critical tasks of: conducting the deep fight, sustainment, deployability, C2, and tactical mobility (tasks which are the inherent responsibility of the parent force).

3. Discussion.

a. Alternatives.

(1) Base case. The 10K base case force is patterned on an existing division (-) force structure with 1999 equipment and was developed by the EELS BL. This structure is provided in figure ES-1.

(2) Alternative 1. The first alternative was designed after a review of the results of the 2K analysis and the Vector-In-Commander (VIC) base case runs which provided the insights and guidelines for alternative development. This structure is provided in figure ES-2 and will be referred to as the "technological improvement alternative (tech imp)" since the major change from the 10K base case was the addition of new technology.

(3) Alternative 2. The second alternative was developed by the EELS BL after examining the combat results of alternative 1. This structure is provided in figure ES-3, and will be called the "organizational change alternative (org chg)."

b. Assumptions.

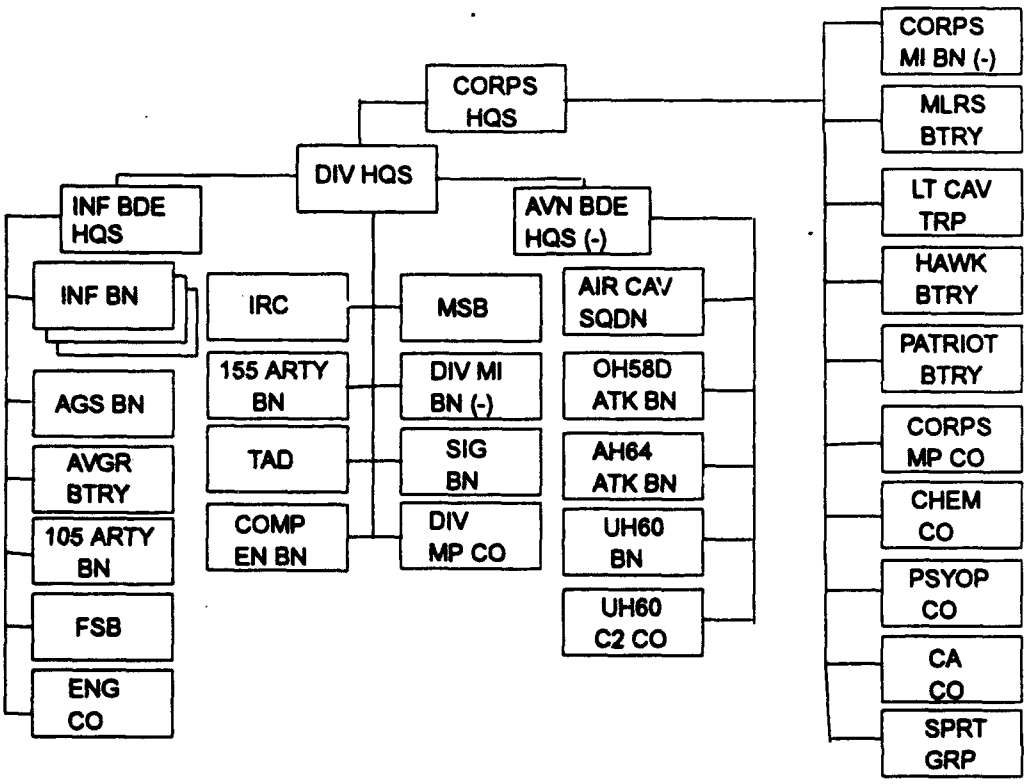
(1) Threat doctrine, equipment, and force structure projections through 2004 are accurate.

(2) Blue doctrine and equipment projections through 2004 are accurate.

(3) Supply requirements based on Army planning factors are representative of supply requirements.

(4) Requirements based on Army manpower authorization requirements criteria (MARC) maintenance data base information are representative of maintenance requirements.

(5) The 10K force can execute an unopposed entry.

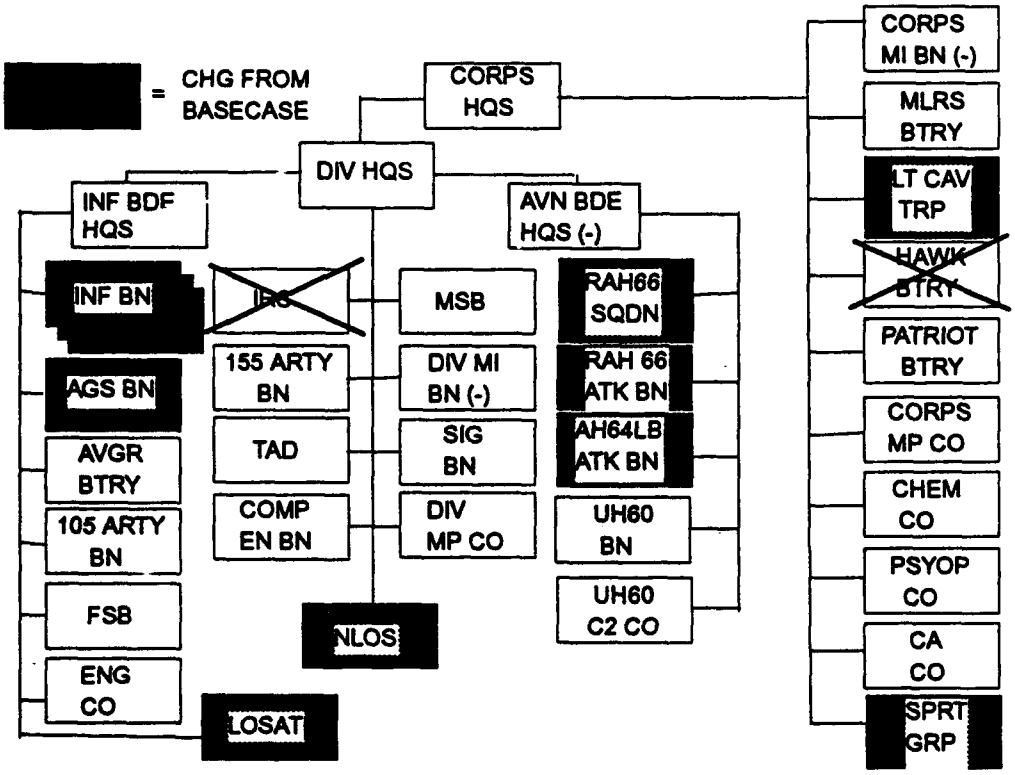


Recapitulation

60 - TOW2B/W/ITAS
2 - 120mm Mortars
12 - 81mm Mortars
4 - M1A2
66 - AGS
9 - MLRS
1 - Q-36 Countermortar Radar
8 - Patriots
12 - Stinger Teams
24 - AH-64A
53 - UH-60
Guardrail

54 - Javelin
18 - 60mm Mortars
4 - M2A2
18 - 105mm Howitzers
24 - 155mm Howitzers
1 - Q-37 Weapons Locating Radar
18 - Avengers
6 - Hawk
48 - OH-58D
JSTARS
Quickfix
UAV

Figure ES-1. 10K base case force

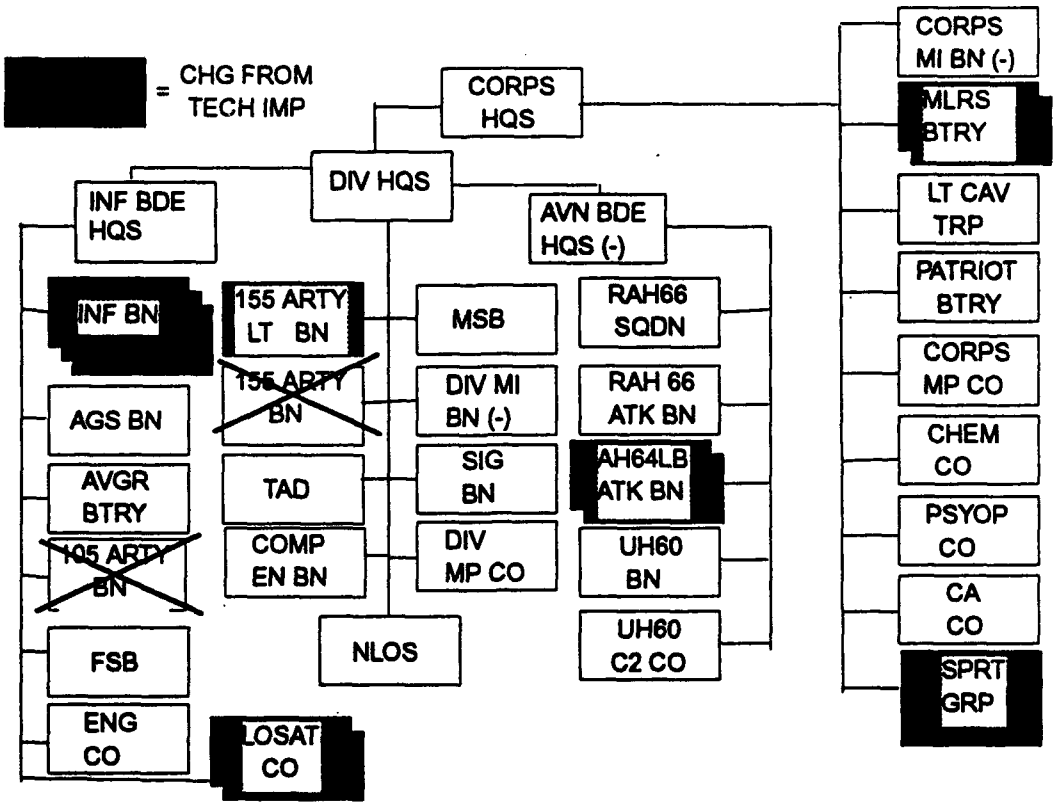


Recapitulation

60 - TOW2B/W/ITAS
2 - 120mm Mortars
12 - 81mm Mortars/Smart
66 - AGS/STF/2d-Generation FLIR
9 - MLRS
1 - Q-36 Countermortar Radar
8 - Patriots
12 - Stinger Teams
24 - AH-66
53 - UH-60
9 - LOSAT on AGS Chassis
Guardrail

54 - Javelin
18 - 60mm Mortars
18 - 105mm Mortars
24 - 155mm Howitzers
1 - Q-37 Weapons Locating Radar
18 - Avengers
24 - AH-64D
24 - RAH-66
12 - NLOS
JSTARS
Quickfix
UAV

Figure ES-2. Technological improvement alternative (10K alternative 1)



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60 - TOW2B/W/ITAS
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18 - Avengers
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24 - RAH-66
12 - NLOS
JSTARS
Quickfix

54 - Javelin
18 - 60mm Mortars
18 - Lite 155mm Howitzers
1 - Q-36 Countermortar Radar
8 - Patriots
12 - Stinger Teams
24 - AH-66
53 - UH-60
18 - LOSAT on AGS Chassis
Guardrail
UAV

Figure ES-3. Organizational change alternative (10K alternative 2)

(6) For those joint assets employed in the scenario, those assets would actually be made available to the 10K force.

c. Limitations.

(1) Analysis was limited to available operational scenarios that could be quickly modified to represent early entry forces. Specifically, a SWA scenario was used.

(2) Threat systems considered for analysis of issues in the study plan reflected, and remained constant with, 2004 projections as represented in operational scenarios. Lack of data limited the play of threat active and passive countermeasures.

(3) The force designs did not include "black" programs; non-lethal, casualty-producing weapon systems; nor ground forces other than Army assets.

(4) Neither the C2 structure nor mobility systems were varied among the alternatives.

(5) The scenario did not include nuclear or biological warfare.

(6) For deployment purposes, Naval air was substituted for U.S. Air Force (USAF) assets to examine the improvement in Army throughput on strategic airlift.

(7) Attack helicopter battalions were evaluated for their lethality contribution and role as a force protector. Scout helicopter capabilities were not examined.

(8) The non-line-of-sight (NLOS) weapon systems were represented as a company of 12 and not subdivided into platoons.

d. Methodology. The methodology consisted of analyses in five separate areas: mission, deployability, sustainment, tactical mobility, and C2. Results from these analyses were integrated to present the overall capability of each alternative force design. Each force design was evaluated against specific success criteria specified by the EELS BL.

(1) Mission analysis.

(a) The mission analysis was conducted using results from the 2K analysis. The 2K analysis utilized a high-resolution model, Combined Arms and Support Task Force Evaluation Model (CASTFOREM), to evaluate the value-added capability to the force for various candidate weapon/munition systems. A detailed explanation of the results can be found in the separate report of a study conducted by TRAC-WSMR (TRAC-WSMR-TR-93-021, Early Entry Analysis, Division Ready Brigade, (DRAFT), dated June 1993). Concurrent with the 2K analysis was the gaming of the 10K base case force design. This design was developed by the EELS BL and patterned after existing early entry forces. A design-model-results-design approach was then

employed by the EELS BL to develop alternative force designs. The EELS BL used the 2K results and insights gained from the 10K base case gaming to develop the first alternative.

(b) The first alternative was gamed in VIC and the results used by the EELS BL to develop the second alternative. Excursions were developed to answer specific questions and were also gamed in VIC. For these 10K force evaluations, the scenario used was an excursion of SWA 3.0 (hereafter referred to as SWA 3.1). This low-resolution excursion was specifically designed to evaluate the base case and the alternatives' ability to defend a lodgment in a desert environment. SWA 3.1 covered a frontage of 40 kilometers (km) and was fought to a depth of 200km. The enemy force conducted a 200km roadmarch culminating in an attack against the 10K force located at the lodgment. There is no land line of communication between the lodgment and any other units. All support arrived by airlift. [For a more detailed discussion of this scenario, see classified annex I of SWA 3.0 under separate cover.] This scenario was study certified by TRAC-SWC.

(c) The requirement to provide specific weapon system information necessitated a subject matter expert (SME) review of aviation, field artillery, and NLOS systems. The SMEs reviewed each system's employment concept and unit organization to ensure that the VIC combat model was accurately representing each system and the system's actual capabilities.

(2) Deployability analysis. Deployability was accomplished with the aid of the Transportability Analysis Requirements Generator (TARGET) and the Rapid Intertheater Deployment Simulation (RAPIDSIM) models. Aircraft sortie requirements and force closure profiles were determined for each force design and compared. The base case and alternative designs were evaluated using four different deployment cases. The cases considered were the Air Force standard planning factors case (mobility requirements study data (MRS)), Desert Shield/Desert Storm (DS/DS) experience case without C-17 aircraft, DS/DS with C-17 aircraft available case, and a combination airlift/fast sealift case (fast sealift ships (FSS)). The last case did not address use of an intermediate staging base (ISB). Aircraft considered available for analysis included C-5A, C-141, and C-17. Additional analysis of pre-positioned (PREPO) materiel and supplies and use of an ISB were examined to identify potential improvement in the force closure profile. An excursion examining improvement of Army short ton (STON) throughput by replacing Air Force air support with Naval air support was also examined.

(3) Sustainment analysis. Sustainment analysis was accomplished with the Combat Service Support Tool (CSS TOOL) and Army standard planning factors. This was a comparative analysis performed to determine the logistic requirements for each of the force designs. Supply requirements were calculated for all classes of supply with emphasis on classes III and V.

(4) Tactical mobility analysis. Tactical mobility was evaluated for adequacy of organic systems by examining units that were totally mobile and units not totally mobile to determine how the not totally mobile units could be moved.

(5) C2 analysis. C2 was examined for the ability of existing systems and headquarters to command and control this force. System evaluation results for information and intelligence development were obtained from VIC. The study team conducted an assessment of the number of C2 headquarters needed to meet force needs.

e. Findings

(1) Mission analysis results. Study issue 1. **What is the warfighting capability of modernized early entry force alternatives?**

(a) Key results from the VIC gaming are provided in table ES-1 and relate the 10K force design results against the specific combat success criteria. The success measurement for "retain airfield" and "system losses" is self-evident. "Airfield open" is considered a success if it remains open 67 percent of the time; "defeat the enemy" means that the Blue force retained the lodgment and forced the Red force into a hasty defense; and "follow-on mission" capability is defined as the Blue force retaining 70 percent combat power.

Table ES-1. Summary of results by combat success criteria

	[illegible]	Airfield open	[illegible]	System losses	Follow-on mission
[illegible]	Yes	50%	Yes	54%	No
[illegible]	Yes	67%	Yes	25%	Yes
[illegible]	Yes	67%	Yes	35%	Possibly

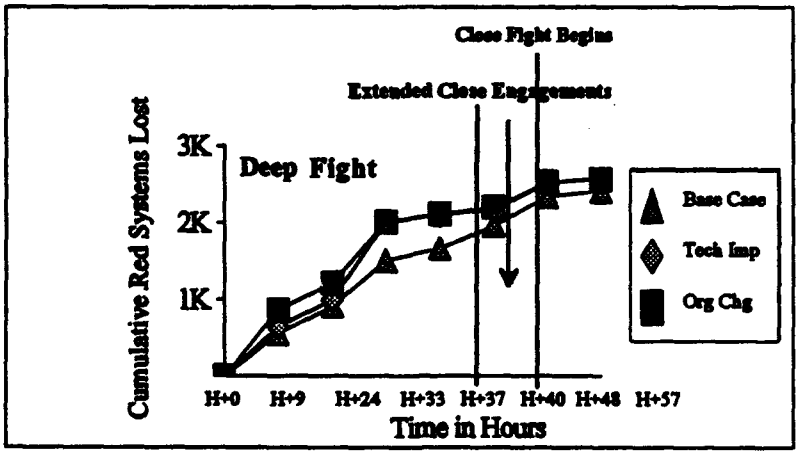


Figure ES-4. Red losses over time

(b) The deep systems (helicopters, MLRS, and fixed-wing) were greatest contributors to the force's lethality, regardless of alternative. Both alternatives' deep systems outperformed the base case, thereby enhancing the force (see figure ES-4).

(c) The base case was outperformed by both alternative designs. This resulted primarily from an inability to defeat the enemy as effectively in the deep fight as the alternatives. Therefore, Blue forces had to rely on an intense close fight to finish the Red force (see figure ES-5). Further, because fewer enemy artillery systems were destroyed outside of the 40km radius of the lodgment, the 10K base case force could only keep the airfield open 50 percent of total combat time. This airfield closure resulted from both conventional artillery/rocket fire and from chemical munitions striking and contaminating the airfield. This force design expended itself in defeating an enemy armored corps and ceased to function as a unit.

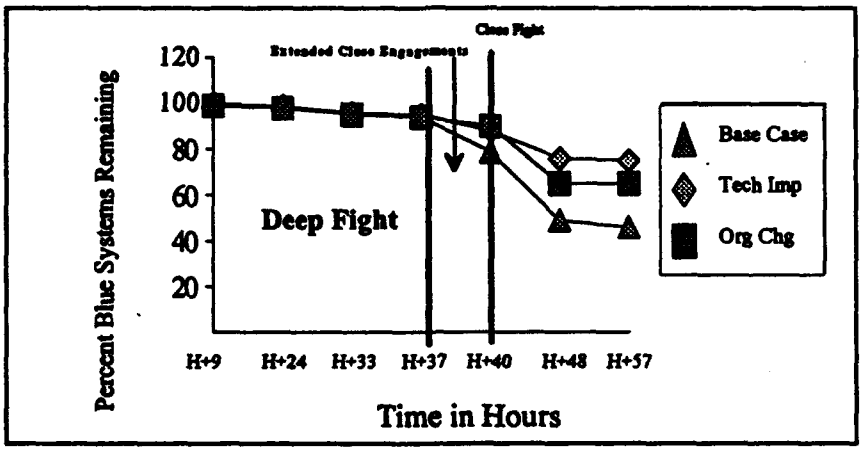


Figure ES-5. Blue systems surviving over time

(d) The technological improvement alternative performed better because the longbow technology on helicopters, coupled with line-of-sight, antitank (LOSAT) and NLOS in this alternative, account for a 21 percent improvement in destruction of enemy forces and 28 percent fewer losses. These enemy kills were inflicted at greater ranges than in the base case design and, thereby, resulted in a less intense close fight. However, killing enemy forces deep with helicopters resulted in 35 percent losses among attack helicopters.

(e) The organizational change alternative performed similarly to the technological improvement alternative, except that total system losses were greater, jeopardizing this design's ability to perform follow-on missions. In this alternative, however, the addition of the second LOSAT company was extremely beneficial because the LOSAT killed additional enemy systems with minimal losses.

(f) In all alternatives, there was a consistent lack of contribution by those weapons classified as extended close systems. These systems, with 5km to 25km ranges, include 155 millimeter (mm) howitzer, 105mm howitzer, NLOS, and 81mm and 120mm mortars. Of these systems, only NLOS (which was in the alternative designs) made any contribution. This can be attributed to three factors: enemy acquisition efforts, artillery available to service acquisitions, and the vulnerability of the extended close systems.

(g) There were several excursions run to explore the contribution and survivability of extended close combat systems. It appears that due to the nature of the Blue force - static and vulnerable to attack by fires (FA and air) -- there is little to improve on for the extended close systems in this situation except as noted in paragraph 3, below. These excursions and results are listed below.

1. Increase the number of MLRS to two battalions, an amount assumed to be the upper bound on prepositioned MLRS assets. Additional MLRS slightly improved the force's overall lethality and survivability and improved the extended close systems' survivability by serving as a force protector.

2. Extending the range of the 155mm howitzer to 40 km. Extending the range of the M-198 howitzer only modestly improved extended close system performance and overall force effectiveness.

3. Extending the range of the NLOS to 60 km. Extending the range of the NLOS made an improvement in the lethality and survivability of extended close systems, but the lethality improvement is primarily limited to the NLOS. Overall force performance was not improved. Blue still wins resoundingly.

4. Reducing the Red unmanned aerial vehicle (UAV) capability to acquire targets. Reducing Red UAV capabilities did not improve overall force or extended close system performance because the Blue force was stationary and could not avoid detection by even a reduced UAV effort.

(h) Another excursion was conducted that combined the OH-58D helicopter with the Apache longbow helicopter (i.e., replacing all Comanches with OH-58D). Helicopter losses in the OH-58D excursion were greater than in the other force designs and the OH-58D could not make the same contribution in lethality. This reduced lethality resulted in a more intense close fight and greater Blue losses (138 more Blue systems lost than in the technological improvement alternative). Force effectiveness dropped substantially when the OH-58D replaced the Comanche helicopter.

(i) Minimizing the effects of tactical ballistic missiles (TBM) was critical to preventing early catastrophic casualties and interdiction of the airfield. Since the counter-TBM capability remained constant across all alternatives, reducing the TBM threat to this force will require better or more air defense artillery (ADA) systems, or both, to improve the amount of time the airfield remains open.

(2) Deployability.

- **Study issue 3. What is the lift requirement for each of the 10K force alternatives?**
- **Study issue 4. What are the various deployment schedules (time and aircraft) for the preferred 10K alternative based on employment in various theaters?**

(a) As can be seen in table ES-2, regardless of force deployment technique, there was no measurable difference among the designs in total sorties required or force closure profile.

Table ES-2. Sortie requirements by force design

Alternative	C-17	C-5
Base Case	1,303	72
Tech Imp	1,289	61
Org Chg	1,357	63

(b) However, as can be seen in figure ES-6, a comparison of deployment techniques reveals significant differences in force closure. MRS in this figure represents Air Force planning factor data prior to DS/DS; DS/DS is deployment based on Gulf War experience; DS+C-17 is Gulf War experience with C-17 aircraft added; and FSS represents moving the 2K by strategic lift and the rest of the 10K by fast sealift. Also included in this figure is an excursion on the technological improvement alternative, where both PREPO equipment and replacing Air Force air assets with Naval air assets greatly improve force closure over the DS/DS case. Both of the excursions and the fast sealift case assume an over-the-shore (OTS) and ISB capability exist. The time saved in employing an ISB and OTS capability are significant.

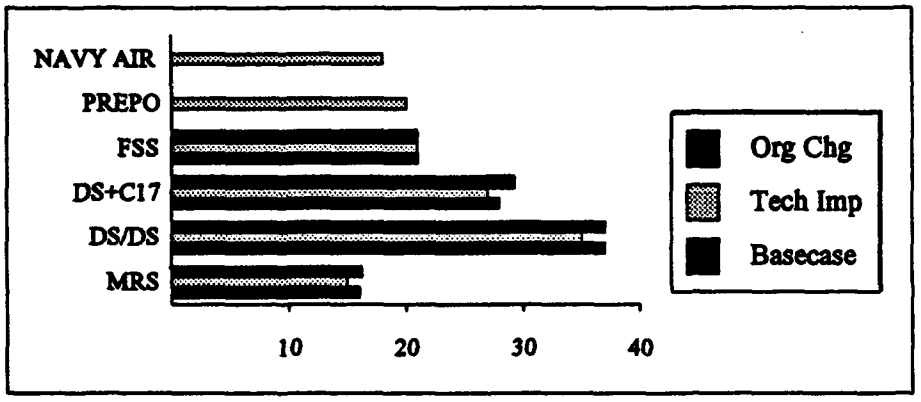


Figure ES-6. Force closure profile

(c) Table ES-3 summarizes the deployment success criteria presented in the preceding paragaphs.

Table ES-3. Summary of results by deployment success criteria

	TOTAL SORTIES (All Types)	DAYS TO DEPLOY
Base Case	1,375	37
Tech Imp	1,350	35
Org Chg	1,420	37

(3) Sustainability. Study issue 2. **What are the differences in sustainability among the 10K alternatives?**

(a) There were no significant differences among the alternatives except in fuel and ammunition (ammo). Because 75 percent of the ammunition requirement is driven by artillery weapon system density, there was an increase in consumption of ammo in the organizational change alternative compared to the technological change alternative. Likewise, since 70 percent of all fuel consumed is by helicopters, the addition of an Apache battalion in the organizational change alternative increased fuel consumption over the other force designs.

(b) There were two sustainment risks for this force. First, these force designs were not supportable completely by air. From table ES-4, it can be seen that it took a large number of aircraft to support this force, a quantity greater than the lodgment airfield's capacity to accommodate.

Table ES-4. Daily sorties required for sustainment in a high usage environment

Aircraft type	Base case	Tech Imp	Org Chg
C-5	27	29	32
C-141	81	86	98
C-17	36	39	44

(c) Secondly, the CSS structure inherent in this force was an austere organization containing limited redundant capabilities. Combat losses in the service support structure would have significantly degraded resupply efforts.

(4) Mobility and C2.

- Study issue 5. **What are the command and control implications of a fully modernized early entry force?**
- Study issue 6. **How tactically mobile are each of the 10K alternatives?**

Each of these force designs had identical mobility and C2 capabilities. A mobility weakness is the lack of CH-47 helicopters to provide recovery capability for damaged helicopters and to perform resupply to MLRS units over extended distances. Other than this shortcoming, the force appears to have adequate mobility and C2 assets to satisfy mission employment requirements.

4. Conclusions.

a. The combat analysis identified several strengths and weaknesses.

(1) Deep systems (helicopters, MLRS, and fixed-wing) were greatest contributors to the force's lethality, regardless of alternative. Both alternatives' deep systems outperformed the base case, thereby enhancing the force.

(2) Combat analysis shows that a 10K early entry force requires helicopters with longbow technology and MLRS to fight deep effectively so that the close fight is either eliminated or significantly reduced in intensity over what was experienced in the base case.

(3) The extended close systems do not make a significant contribution due to the nature of the battle -- Blue static and vulnerable to attack by the large mass of Red fires. Regardless, their presence is essential to the force because extended close systems are the deepest killers available to the 2K force until the deep strike assets of the 10K force arrive.

(4) The close systems contributing to the fight include: LOSAT and armored gun system (AGS) with second-generation forward-looking infrared radar (FLIR) and smart, target-activated, fire-and-forget (STAFF) round. As also shown in the 2K analysis, these systems give the 10K force the ability to defeat enemy forces close that were not destroyed in the deep fight.

(5) The key 10K deficiencies identified were combating UAVs and TBMs.

(a) UAVs continued to pose a serious threat to the 10K force across all designs, especially in a desert environment. Even when specifically identified as a system to be degraded, the UAV presents a huge technological challenge to acquire, shoot down, jam, or interdict at its controlling station.

(b) TBMs are a challenge since not all missiles fired can be shot out of the sky; some will strike their intended target. In the combat analysis, all force designs were unable to prevent the airfield from being contaminated with a persistent chemical agent delivered by TBM because they had the same counter-TBM capability. Varying the quantity of systems and system capabilities is essential to reducing the TBM threat to early entry forces.

b. Deployment of this force without an OTS capability or an ISB is not practical from a purely force closure perspective. The savings in time to move the force when using an ISB may well be the difference in executing an unopposed entry versus a forced entry.

c. All force designs have significant supply requirements and are not sustainable exclusively by air. Establishing a stockage level of three days of supply on the ground before hostilities begin assumes no interdiction of the airfield (a decision not controlled by the Blue force).

d. The comparison among the alternatives shows very little difference in mobility and C2. All force designs appear to be adequately mobile and capable of performing required C2 functions.

e. Table ES-5 summarizes force design performance against all success criteria.

Table ES-5. Summary of results by success criteria

	Total forces (all types)	Days to deploy	Retain airfield	Airfield open	Defeat enemy	System losses	Follow-on mission	Sustain-able
[redacted]	1,375	37	Yes	50%	Yes	54%	No	Not by air
[redacted]	1,350	35	Yes	67%	Yes	25%	Yes	Not by air
[redacted]	1,420	37	Yes	67%	Yes	35%	Possibly	Not by air

5. Recommendation.

a. The recommendation of this study is that the force design depicted in figure ES-7 (technological improvement alternative with an additional LOSAT company) is most desirable because it:

(1) Contains the deep strike assets necessary to establish favorable conditions to conduct the close fight.

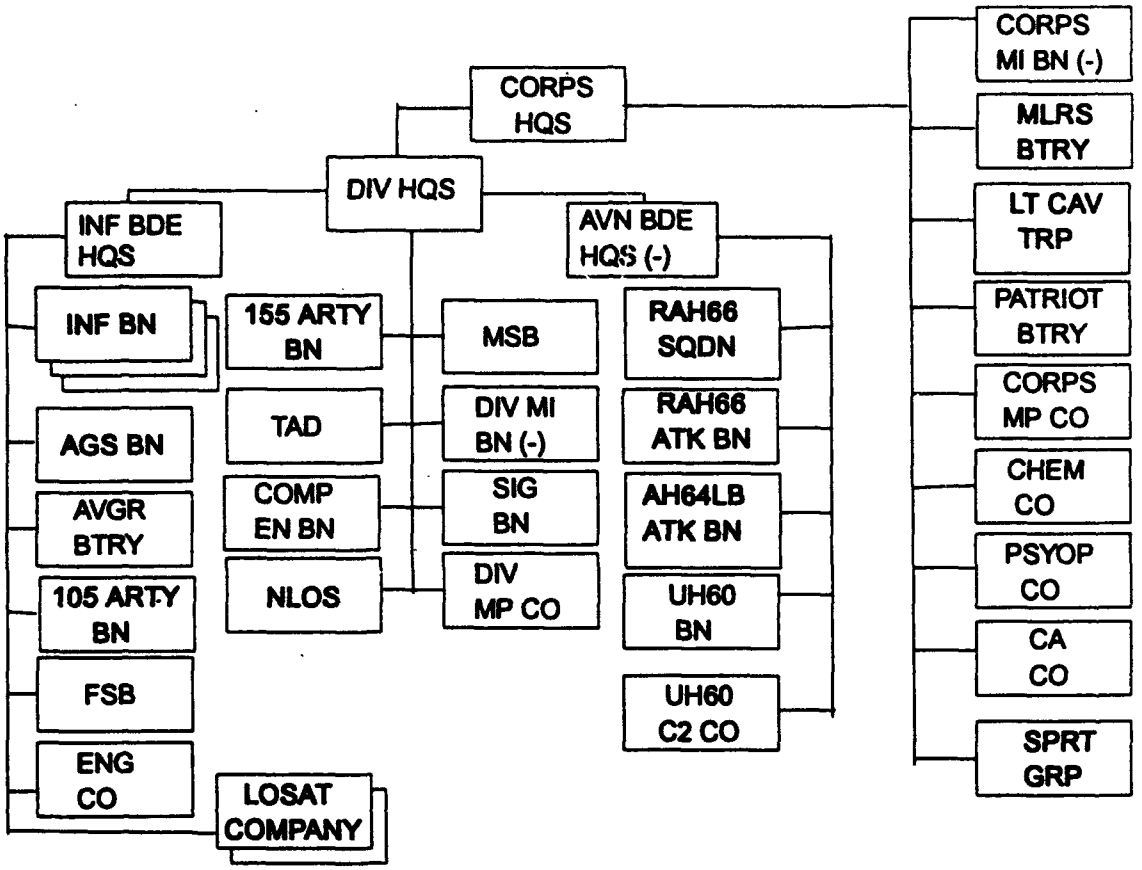
(2) Contains adequate extended close and close systems to finish the remnant Red force and still retain the lodgment.

(3) Can be deployed in three weeks, with prepositioning and some force self-deployment.

(4) Can be sustained by employing a logistics support concept that includes use of intermediate staging bases and over-the-shore logistics.

(5) Contains adequate mobility and command and control capabilities.

b. The results presented in this report provide only a foundation of what an early entry force will need to be successful. Because the strengths and weaknesses already mentioned were observations of force performance against a specific threat in one scenario, this force might not be appropriate for a different threat somewhere else in the world.



Recapitulation

60 - TOW2B/W/ITAS
14 - 120mm Mortars/Smart
66 - AGS/STF/2d-Generation FLIR
9 - MLRS
1 - Q-36 Countermortar Radar
8 - Patriots
12 - Stinger Teams
24 - AH-66
53 - UH-60
18 - LOSAT on AGS Chassis
Quickfix
UAV

54 - Javelin
18 - 60mm Mortars
18 - 105mm Howitzers
24 - 155mm Howitzers
1 - Q-37 Weapons Locating Radar
18 - Avengers
24 - AH64D
24 - RAH 66
12 - NLOS
JSTARS
Guardrail

Figure ES-7. Recommended force design

10K FORCE ANALYSIS
CHAPTER 1
INTRODUCTION

1-1. Purpose. The purpose of the 10K Force Analysis Study was to evaluate the various 10K force designs prforming an early entry mission as outlined in the December 1992 coordination meeting and refined in the 2K-10K Force Analysis study plan.

1-2. Problem statement. ***Existing early entry forces lack the lethality, survivability, deployability, and sustainability to meet future force projection needs.***

a. The purpose of this study was to evaluate various 10K force designs performing an early entry mission. On 15 December 1992, TRAC initiated the analysis of 2K and 10K early entry force alternatives. The 2K analysis was conducted by TRAC-WSMR and the 10K force analysis was conducted by TRAC-SAC. The results of the 2K analysis provided the base from which the 10K force was developed and provided the link between the two study efforts. Analysis of the 10K force's tactical mobility, deployability, and logistic support requirements was effected by TRAC-SAC in coordination with TRAC-OAC, TRAC-SWC, TRAC-LEE, CASCOM, MTMC, and the EELS BL (the study sponsor). This report focuses on the 10K results.

b. The designed organization was developed for the turn-of-the-century timeframe. The following design parameters were identified for the various alternatives.

(1) The organization must be rapidly deployable.

(2) The organization must be capable of being task-organized into entities of less than brigade size.

(3) The corps will provide additional combat power to the organization and additional C2 capabilities.

(4) Tactical mobility is of great concern and, therefore, will weigh heavily in the organization's ability to execute required missions.

(5) The organization will be capable of 24-hour operations under all weather conditions.

(6) The organization must be capable of fighting deep to either eliminate or shape the close fight so that the established lodgment is capable of functioning without significant degradation.

(8) The organization will be capable of operating across the total spectrum of combat from low to high intensity.

c. Upon further coordination with the EELS SME, it was determined that the force would conduct an unopposed entry but would engage in combat within 24 to 72 hours upon arrival. The force would expand the lodgment to obtain battle space and then defend this space to prevent the lodgment from enemy interdiction. This defensive effort would encompass preclusion of air, ground, artillery, and rocket/missile attacks against the lodgment. Finally, the study sponsor identified the following specific study issues to be addressed by the study analysis.

(1) What is the warfighting capability of modernized early entry force alternatives?

(2) What are the differences in sustainability among the 10K alternatives?

(3) What is the lift requirement for each of the 10K force alternatives?

(4) What are the various deployment schedules (time and aircraft) for the preferred 10K alternative based on employment in various theaters?

(5) What are the C2 implications of a fully modernized early entry force?

(6) How tactically mobile are each of the 10K alternatives?

d. The 2K analysis used SWA, LATAM, and NEA scenarios to evaluate lethality and survivability in various terrain and threat environments. This allowed the 10K effort, using a SWA scenario as the most demanding and austere environment, to focus on evaluating the critical tasks of: conducting the deep fight, sustainment, deployability, C2, and tactical mobility (tasks which are the inherent responsibility of the parent force).

1-3. Assumptions.

a. Threat doctrine, equipment, and force structure projections through 2004 are accurate.

b. Blue doctrine and equipment projections through 2004 are accurate.

c. Supply requirements based on Army planning factors are representative of supply requirements.

d. Requirements based on Army MARC maintenance data base information are representative of maintenance requirements.

e. The 10K force can execute an unopposed entry.

f. For those joint assets employed in the scenario, those assets would actually be made available to the 10K force.

1-4. Scope.

a. Limitations.

(1) Analysis was limited to available operational scenarios that could be quickly modified to represent early entry forces. Specifically, a SWA scenario was used.

(2) Threat systems considered for analysis of issues in the study plan reflected, and remained constant with, 2004 projections as represented in operational scenarios. Lack of data limited the play of threat active and passive countermeasures.

(3) The force designs did not include "black" programs; non-lethal, casualty-producing weapon systems; nor ground forces other than Army assets.

(4) The C2 structure nor mobility systems were not varied among the alternatives.

(5) The scenario did not include nuclear or biological warfare.

(6) For deployment purposes, Naval Air was substituted for USAF assets; no effectiveness analysis was done.

(7) Attack helicopter battalions were evaluated for their lethality contribution and role as a force protector. Scout helicopter capabilities were not examined.

(8) The NLOS weapon systems were represented as a company of 12 and not subdivided into platoons.

b. Constraints.

(1) The sustainability analysis was constrained in scope and depth by the level of resolution of current data defining these units.

(2) Deployment analysis was constrained by existing capabilities expected to exist by 1999.

10K FORCE ANALYSIS
CHAPTER 2
METHODOLOGY

2-1. Study methodology. The methodology consisted of analyses in five separate areas: mission, deployability, sustainment, tactical mobility, and C2. Results from these analyses were integrated to present the overall capability of each alternative force design. Each force design was evaluated against specific success criteria established by the EELS BL. For a detailed study methodology, see appendix A.

a. Assumptions and limitations.

(1) Assumptions.

(a) Threat doctrine, equipment, and force structure projections through 2004 are accurate.

(b) Blue doctrine and equipment projections through 2004 are accurate.

(c) Supply requirements based on Army planning factors are representative of supply requirements.

(d) Requirements based on Army MARC maintenance data base information are representative of maintenance requirements.

(e) The 10K force can execute an unopposed entry.

(f) For those joint assets employed in the scenario, those assets would actually be made available to the 10K force.

(2) Limitations.

(a) Analysis was limited to available operational scenarios that could be quickly modified to represent early entry forces. Specifically, a SWA scenario was used.

(b) Threat systems considered for analysis of issues in the study plan reflected, and remained constant with, 2004 projections as represented in operational scenarios. Lack of data limited the play of threat active and passive countermeasures.

(c) The force designs did not include "black" programs; non-lethal, casualty-producing weapon systems; nor ground forces other than Army assets.

(d) The C2 structure nor mobility systems were not varied among the alternatives.

(e) The scenario did not include nuclear or biological warfare.

(f) For deployment purposes, Naval Air was substituted for USAF assets; no effectiveness analysis was done.

(g) Attack helicopter battalions were evaluated for their lethality contribution and role as a force protector. Scout helicopter capabilities were not examined.

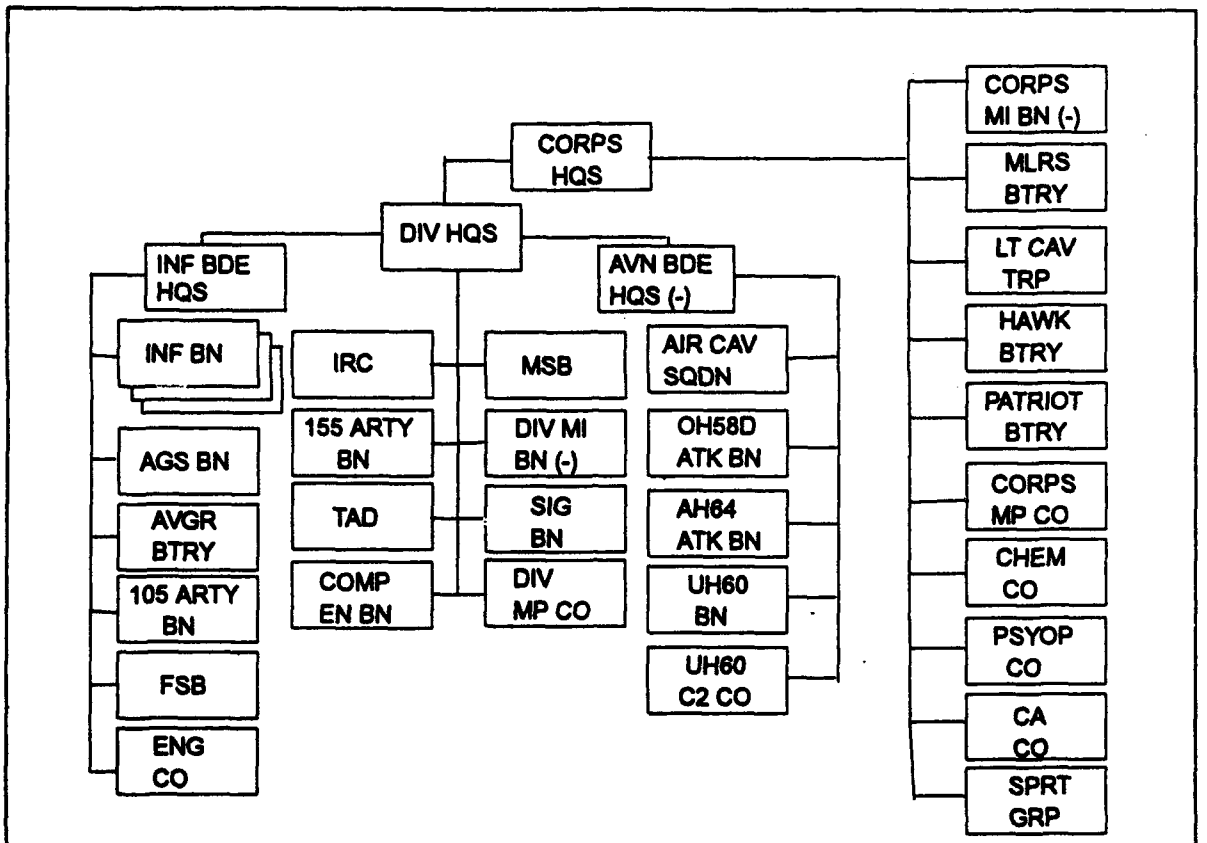
(h) The NLOS weapon systems were represented as a company of 12 and not subdivided into platoons.

b. Mission analysis.

(1) The mission analysis was conducted using results from the 2K analysis. The 2K analysis utilized a high-resolution model, CASTFOREM, to evaluate the value-added capability to the force for various candidate weapon/munition systems. A detailed explanation of the results can be found in the separate report of a study conducted by TRAC-WSMR (TRAC-WSMR-TR-93-021, Early Entry Analysis, Division Ready Brigade, (DRAFT), dated June 1993). Concurrent with the 2K analysis was the gaming of the 10K base case force design. This design was developed by the EELS BL and patterned after existing early entry forces. A design-model-results-design approach was then employed by the EELS BL to develop alternative force designs. The EELS BL used the 2K results and insights gained from the 10K base case gaming to develop the first alternative.

(2) The first alternative was gamed in VIC and the results used by the EELS BL to develop the second alternative. Excursions were developed to answer specific questions and were also gamed in VIC. For these 10K force evaluations, the scenario used was an excursion of SWA 3.0 (hereafter referred to as SWA 3.1). This low-resolution excursion was specifically designed to evaluate the base case and the alternatives' ability to defend a lodgment in a desert environment. SWA 3.1 covered a frontage of 40km and was fought to a depth of 200km. The enemy force conducted a 200km roadmarch culminating in an attack against the 10K force located at the lodgment. There is no land line of communication between the lodgment and any other units. All support arrived by airlift. [For a more detailed discussion of this scenario, see classified annex I of SWA 3.0 under separate cover.] This scenario was study certified by TRAC-SWC.

(3) The requirement to provide specific weapon system information necessitated an SME review of aviation, field artillery, and NLOS systems. The SMEs reviewed each system's employment concept and unit organization to ensure that the VIC combat model was accurately representing each system and the system's actual capabilities.

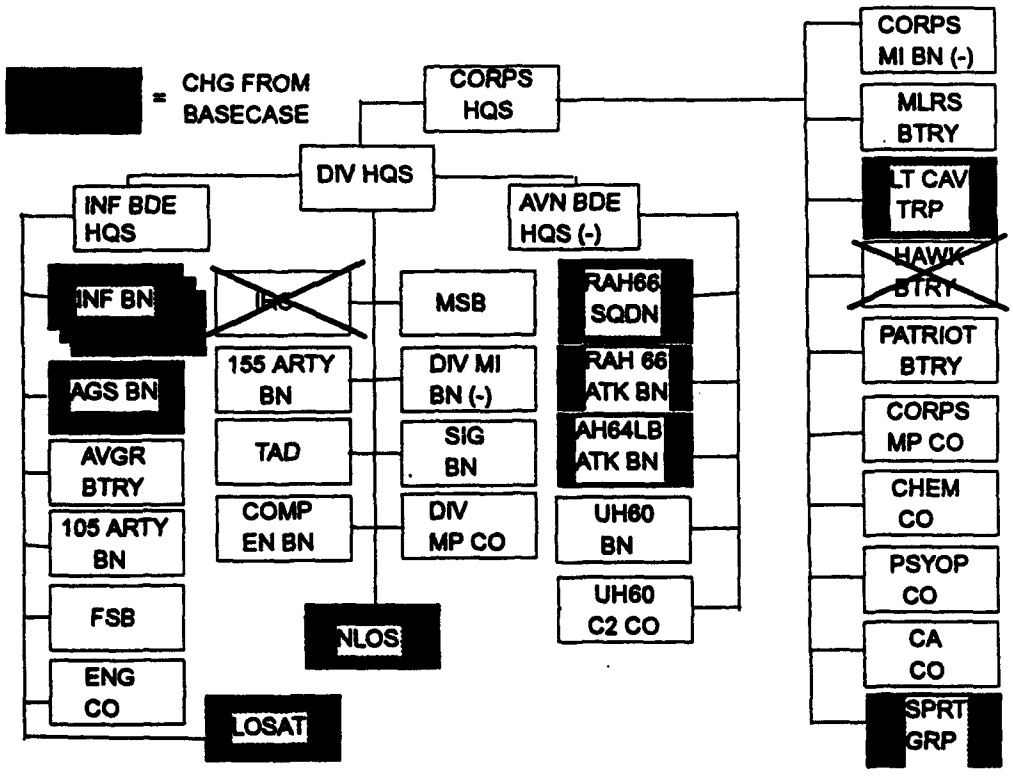


Recapitulation

60 - TOW2B/W/ITAS
2 - 120mm Mortars
12 - 81mm Mortars
4 - M1A2
66 - AGS
9 - MLRS
1 - Q-36 Countermortar Radar
8 - Patriots
12 - Stinger Teams
24 - AH-64A
53 - UH-60
Guardrail

54 - Javelin
18 - 60mm Mortars
4 - M2A2
18 - 105mm Howitzers
24 - 155mm Howitzers
1 - Q-37 Weapons Locating Radar
18 - Avengers
6 - Hawk
48 - OH-58D
JSTARS
Quickfix
UAV

Figure 2-1. 10K base case force



Recapitulation

60 - TOW2B/W/ITAS
2 - 120mm Mortars
12 - 81mm Mortars/Smart
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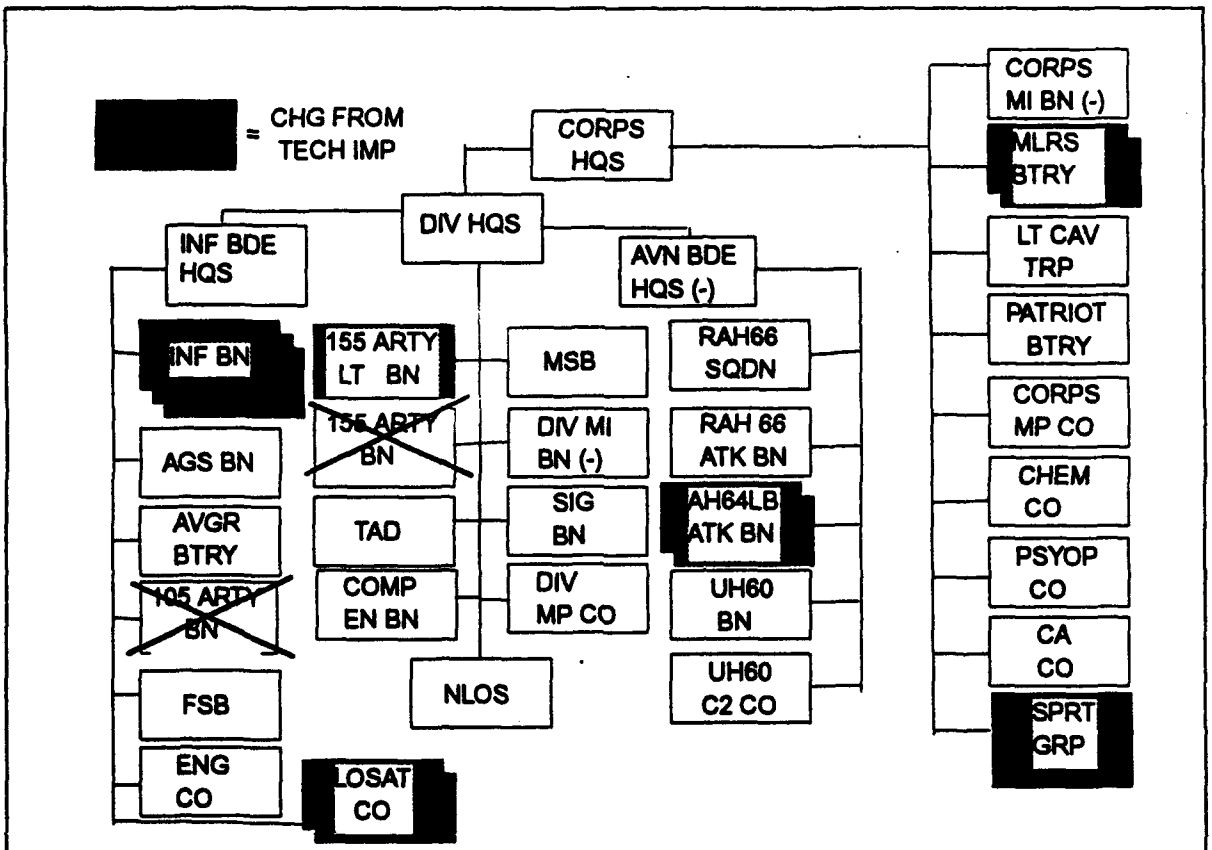
18 - Avengers
24 - AH-64D
24 - RAH-66
12 - NLOS
JSTARS
Quickfix
UAV

Figure 2-2. Technological improvement alternative (10K alternative 1)



Recapitulation

60 - TOW2B/W/ITAS
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66 - AGS/STF/2d-generation FLIR
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18 - Avengers
48 - AH-64D
24 - RAH-66
12 - NLOS
JSTARS
Quickfix
54 - Javelin
18 - 60mm Mortars
18 - Lite 155mm Howitzers
1 - Q-36 Countermortar Radar
8 - Patriots
12 - Stinger Teams
24 - AH-66
53 - UH-60
18 - LOSAT on AGS Chassis
Guardrail
UAV

Figure 2-3. Organizational change alternative (10K alternative 2)

c. Deployability analysis. Deployability was accomplished with the aid of the TARGET and RAPIDSIM models. Aircraft sortie requirements and force closure profiles were determined for each force design and compared. The base case and alternative designs were evaluated using four different deployment cases. The cases considered were the Air Force standard planning factors case (MRS), Desert Shield/Desert Storm (DS/DS) experience case without C-17 aircraft, and DS/DS with C-17 aircraft. Additional analysis of PREPO materiel and supplies and use of an ISB were examined to identify potential improvement in the force closure profile. An excursion examining improvement of Army STON throughput by replacing Air Force air support with Naval air support was also examined.

d. Sustainment analysis. Sustainment analysis was accomplished with CSS TOOL and Army standard planning factors. This was a comparative analysis performed to determine the logistic requirements for each of the force designs. Supply requirements were calculated for all classes of supply with emphasis on classes III and V.

e. Tactical mobility analysis. Tactical mobility was evaluated for adequacy of organic systems to perform tactical mobility. This was accomplished by examining units that were totally mobile and evaluating units not totally mobile against the rest of the 10K force's mobility assets to determine how the not totally mobile units could be moved.

f. C2 analysis. C2 was examined for the ability of existing systems and headquarters to command and control this force. System evaluation results for information and intelligence development was obtained from VIC, while assessment of C2 headquarters was conducted to determine adequacy of force C2 needs.

2-2. Alternatives. The following definitions provide a brief description of each of the alternatives considered in this study. Figures 2-1 through 2-3 portray each alternative.

a. Base case. The 10K base case force is patterned on an existing division (-) force structure with 1999 equipment, and was developed by the EELS BL. This structure is provided in figure 2-1.

b. Technological improvement. The first alternative was designed after a review of the results of the 2K analysis and the VIC base case runs, which provided the insights and guidelines for alternative development. This structure is provided in figure 2-2 and will be referred to as the "technological improvement alternative" (tech imp) since the major change from the 10K base case was the addition of new technology.

c. Organizational change. The second alternative was developed by EELS BL after examining the combat results of alternative 1. This structure is provided in figure 2-3 and will be called the "organizational change alternative" (org chg).

2-3. Success criteria. The success criteria for the early entry force cover three general areas.

a. Deployment in total sorties and force closure in days.

b. Combat results in ability to retain a functional lodgment: retain the airfield, prevent interdiction of force arrival and resupply, minimize effects of TBM against the lodgment, defeat the enemy, and minimize system losses to retain 70 percent combat power (which will allow for follow-on missions to be performed).

c. Sustainability of the force in terms of the supply requirements in STONS, gallons, and airlift.

2-4. Essential elements of analysis (EEA). The EEA are grouped into five areas.

a. The first set of EEA evaluates the warfighting capability of each design.

EEA 1.1: What capabilities will the force need to control the threat?
EEA 1.2: For the 10K force to survive and have mission success, what deep strike capabilities does the force require?
EEA 1.3: What capabilities will the force need to win the information war?
EEA 1.4: What capabilities will the force need to prevent early catastrophic casualties?
EEA 1.5: What is the largest force this 10K force is capable of defeating?

b. The second set of EEA evaluates the sustainability of each design.

EEA 2.1: What are the requirements to arm, fuel, fix, move, and provide soldier support for each of the 10K alternatives?

c. The third set of EEA evaluates the deployability of each design.

EEA 3.1: What are the lift requirements in terms of time and aircraft to strategically deploy each of the 10K alternatives in a representative SWA scenario?
EEA 4.1: How will the deployment schedule be affected when a joint time-phased force deployment list (TPFDL) is varied for different theaters and missions?

d. The fourth set of EEA evaluates the C2 implications of each design.

EEA 5.1: What C2 implications exist for an early entry force?
EEA 5.2: What C2 capabilities does the force need to successfully orchestrate the battle in an expanded battle space?

e. The fifth set of EEA evaluates the tactical mobility of each design.

EEA 6.1: Are organic systems capable of providing the required tactical mobility as dictated by the concept of employment for this force?

2-5. Models. Models and analytic tools include:

a. VIC. VIC is an automated corps- and division-level force-on-force simulation. It is a fast-running analytical tool capable of evaluating operational concepts, tactics, and doctrine. VIC is deterministic, event-sequenced, Lanchester equation-based, and represents all major battlefield functions. It is written in SIMSCRIPT II.5 and executes on SUN or Hewlett-Packard computers. For Blue forces, the normal level of resolution is maneuver and artillery battalions, air defense batteries, cavalry troops, and helicopter companies. Red maneuver forces are represented to battalion level. Special units (i.e., supply convoys, engineer assets, and fixed-wing aircraft) can be represented at higher resolution. VIC-automated C2 is influenced by a unit's evaluation of its tactical situation based on perceived information. Unit actions and reactions are based on tactical decision rules embedded in the model which are modified for each scenario.

b. TARGET. The TARGET unit deployability model allows an automated way to merge unit equipment authorization data from TRADOC's Table of Organization and Equipment (TO&E) Master File with the equipment item data from the U.S. Army Forces Command's (FORSCOM) Computerized Movement Planning and Status System (COMPASS) Equipment Characteristics File (ECF). The TARGET program determines the unit deployment data required for strategic mobility planning, resulting in unit deployment data and sortie requirements.

c. *RAPIDSIM.* The RAPIDSIM simulates the deployment of cargo and troops from ports of embarkation (POE) to ports of debarkation (POD) by air and sea. RAPIDSIM requires user-supplied scenario and movement requirement files. The scenario file defines the defense transportation system (DTS) from continental United States (CONUS) origins to the destination theater, including the inventories and capabilities of aircraft and ships and the location of POEs and PODs. The movement requirements file (also known as the TPFDL) defines units and supplies to be deployed and appropriate timelines and deployment priorities. RAPIDSIM provides closure profiles within joint service movement and summarizes the utilization of the strategic lift assets.

d. CSS TOOL (also, CSST). This analytic tool provides a standardized, automated, and self-contained capability for determining the CSS workload generated by supported forces in a variety of scenarios. For ammunition and fuel, CSST uses Department of the Army (DA)-approved operational planning factors extracted from the bulk petroleum, oil, and lubricants requirements determination template (Bulk POL RDT) and the ammunition requirements determination template (AMMO RDT), both of which were produced by CASCOM. All other classes of supply are population bases and use standard planning factors from Field Manual (FM) 101-10-1/2.

10K FORCE ANALYSIS
CHAPTER 3
COMBAT ANALYSIS

3-1. Introduction. This chapter provides an analysis of each alternative's combat capability and is based upon results from gaming each alternative in the low-resolution model VIC (see paragraph 2-5 for a brief description). The focus of the analysis is on the ability of the Blue force to retain the lodgment and maintain a follow-on mission capability. [Refer to chapter 2 for a more detailed description of the three alternatives (base case, tech imp, and org chg).] Additionally, several excursions of the tech imp alternative were made to offer specific insights.

3-2. Success criteria.

a. Retain airfield. Prevent Red from capturing.

b. Retain follow-on mission. The Blue force must not lose more than 30 percent of its combat systems.

c. Prevent interdiction of air flow.

d. Minimize effects of TBM against lodgment.

3-3. Scenario overview (see appendix C for details). The battle occurs in a desert environment.

a. Blue. The Blue force conducted an unopposed entry, occupied the lodgment, and established defensive positions. Blue forces were expected to defend for three days until relieved by heavy forces. In so doing, pressure was relieved against other forces since Red had to divert forces to defeat the lodgment.

b. Red. Red's objective was to eliminate the lodgment, which posed a threat to adjacent Red forces. A Red corps, consisting of three armored divisions and corps assets, conducted a 200km march and then attacked the lodgment.

3-4. Overall results.

a. All three alternative force designs retained the airfield.

b. Red losses.

(1) All three alternatives defeated the Red corps. Shown in figure 3-1 are losses of Red major combat systems (i.e., tanks, armored fighting vehicles (AFV), artillery, mortar, ADA, antitank (AT), helicopters, and fixed-wing) over time against each alternative. Red initially had 3,452 major combat systems.

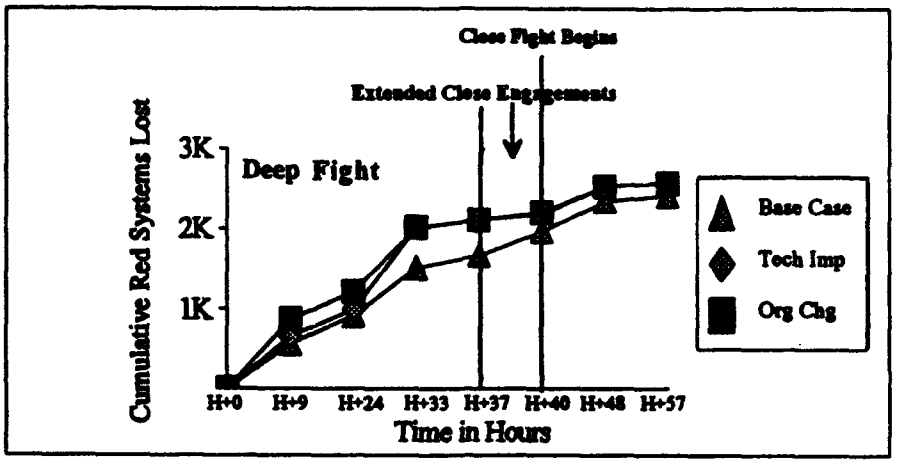


Figure 3-1. Red losses over time

(2) Table 3-1 sets forth the contribution to Red losses by Blue systems. The most significant group, regardless of force design alternative, are the deep systems -- those able to range 25km and beyond friendly forces. Antitank contribution is the combined total of TOWIIB, Javelin, and AT-4.

Table 3-1. Blue system kills (as a percent of total Red combat systems killed)

	Helicopters	39	54	56
	Fixed-wing	18	18	15
	MLRS	15	14	16
	Deep total:	72	86	87
	155mm howitzer	0.5	1	1
	105mm howitzer	0.5	1	not gamed
	NLOS	not gamed	4	3
	120mm mortar	not gamed	not gamed	0
	81mm mortar	0	0	not gamed
	Ext close total:	1	6	4
	Anti-tank	20	2	1
	AGS	5	3	4
	LOSAT	not gamed	3	4
	Other (IRC)	2	n/a	n/a
	Close total:	27	8	9
		100	100	100

(3) From figure 3-1 and table 3-1, it can be seen that the alternative designs kill Red forces earlier in the fight than the base case. These enemy losses are primarily accounted for by the improved contribution of deep systems in the alternative designs.

c. Blue strength.

(1) To defeat the Red force, each alternative suffered different levels of losses. Because each alternative consisted of a different force design, figure 3-2 presents the percent of surviving systems over time.

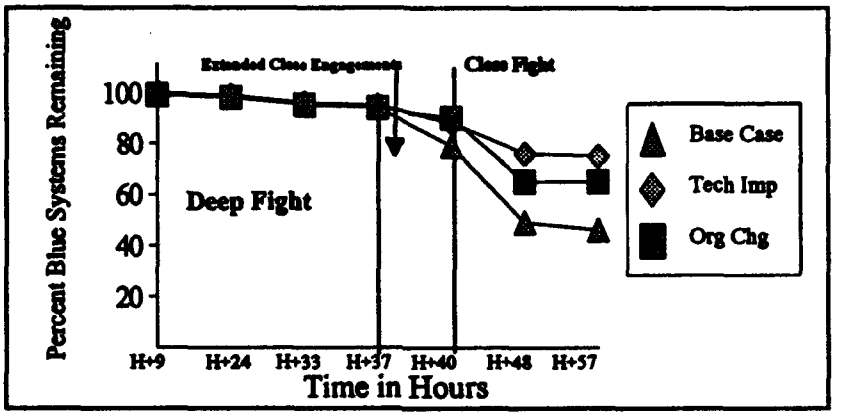


Figure 3-2. Blue systems surviving over time

(2) Table 3-2 shows the percent surviving at the end of the battle for each of the major Blue systems. The alternative designs' experience improved weapon system survivability over the base case.

Table 3-2. Blue end-of-battle systems (percent remaining)

	Attack helicopters	33	65	60
	MLRS	100	100	100
	155mm How	4	29	89
	105mm How	11	72	N/A
	NLOS	N/A	67	50
	120mm Mort	50	0	57
	81mm Mort	50	75	N/A
	AGS	39	74	76
	LOSAT	N/A	89	78
	Antitank	52	79	63
	Other (IRC)	0	N/A	N/A
		72	85	85

d. Overall comparison of alternatives.

(1) As can be seen from the preceding, all three alternatives defeat the Red force by inflicting comparable losses.

(2) Each alternative, however, suffers different losses. Table 3-3 summarizes combat results for the force designs.

Table 3-3. Combat results

	% Red Systems Killed	% Blue Systems Remain	% Blue Personnel Remain		Retain Airfield	Defeat Enemy	Follow-on Mission
Base Case	70%	46	72		Yes	Yes	No
Tech Imp	74%	75	85		Yes	Yes	Yes
Org Chg	74%	65	85		Yes	Yes	Possibly

e. The next three major paragraphs will discuss the details of the combat results. This will be done in terms of deep, extended close, and close systems.

3-5. Deep systems.

a. Clearly, it is much preferred to kill him before he gets to you. As was shown, both the technological improvement and organizational change alternatives inflict about 14 percent more losses (see table 3-1 and figure 3-1) with deep systems.

b. Figure 3-3 displays the Red systems killed by deep systems for each alternative. The Comanches and the Apache longbow helicopter kill more tanks and AFVs in the alternatives, which primarily accounts for the increase in Red kills in the alternative force designs. "Other" include mortars, AT systems, helicopters, and fixed-wing aircraft.

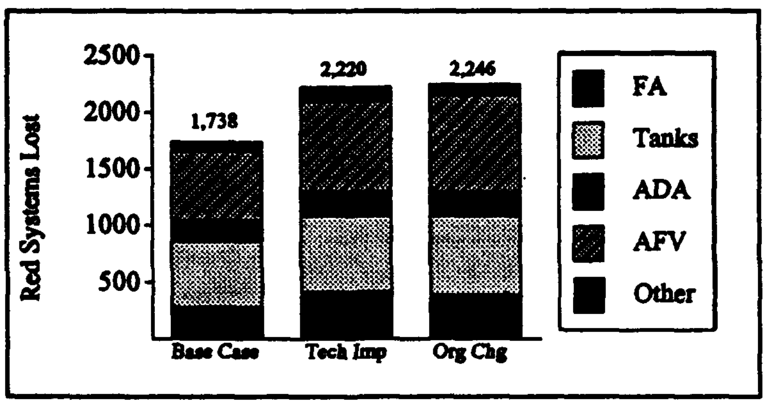


Figure 3-3. Deep system kills

c. Helicopters.

(1) Helicopters were employed against tanks, AFVs, and reconnaissance vehicles as their primary targets. This targeting scheme was essential to setting up the close fight with favorable force ratios for the Blue force. Because of the urgency, helicopters were required to fly over some enemy elements rather than vectoring extended distances around these forces. Combined with the lack of cover and concealment in the desert, overflying remnant enemy forces placed the helicopters at risk to enemy fires as they traveled to their attack positions.

(2) Figure 3-4 shows the kills inflicted by helicopters. Helicopters kill a greater number of tanks and AFVs in the alternative designs. Of the deep systems, helicopters were the predominant killers of tanks, AFVs, and others at these deep ranges.

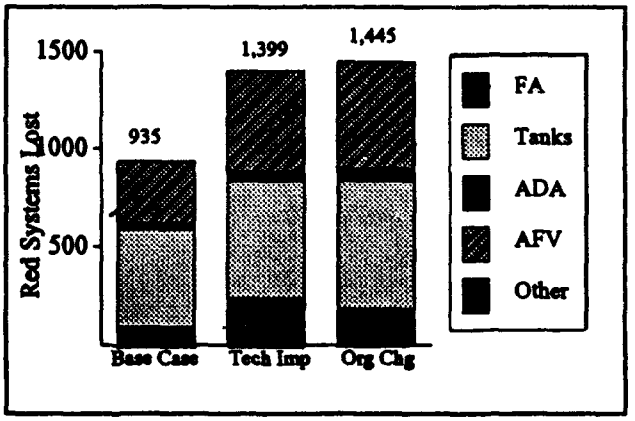


Figure 3-4. Helicopter kills

(3) Figure 3-5 shows the losses suffered by helicopters. Helicopter losses in all force designs resulted from Red maneuver forces. The reduction in helicopters lost in the alternative force designs resulted from the greater survivability of the Comanche and the Apache longbow helicopters. The mast-mounted sight greatly limited Blue helicopter exposure to enemy fire but had no impact when enemy remnant forces were overflown. Because the OH-58D carried far less Hellfire missiles (4) than either the Comanche (14 on the attack version and 6 on the armed reconnaissance version) or the Apache (16), the OH-58Ds and Apaches in the base case had to cycle through attacks more frequently than the alternatives. This additional exposure in the base case resulted in greater losses among its helicopters. Likewise, the additional helicopters of the organizational change alternative put more helicopters at risk in an attempt to kill more Red forces deep, resulting in 13 additional helicopters lost in the organizational change alternative over the technological improvement alternative.

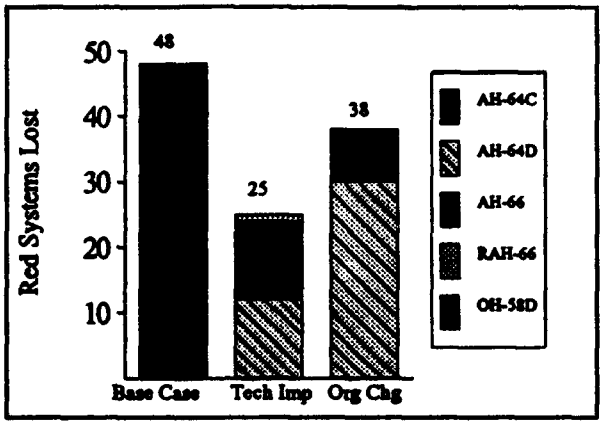


Figure 3-5. Blue helicopter losses

(4) An excursion was conducted which had OH-58Ds replace Comanches in the tech imp alternative. In other words, the 24 AH-66 and 24 RAH-66 were replaced by 48 OH-58D.

(a) Figure 3-6 presents total system losses for both tech imp and its OH-58D excursion. Regardless of the scout helicopter, Blue inflicts about the same losses; however, the Blue force suffers 16 percent more losses ($^{(349-213)}/_{844}$ total Blue systems), with the overall LER decreasing from 12:1 to 7:1.

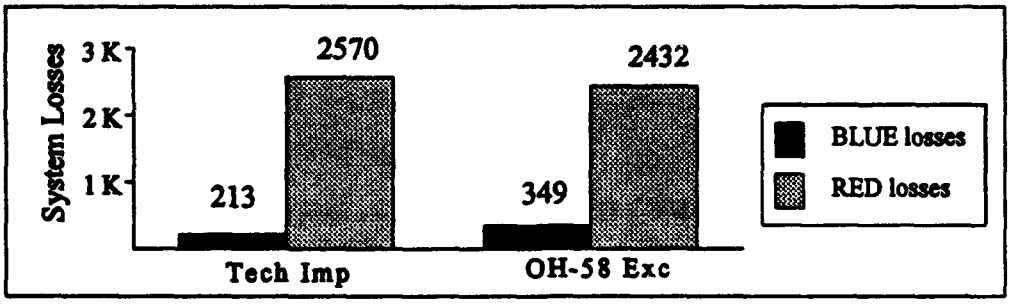


Figure 3-6. Force losses

(b) Figure 3-7 and 3-8 present Blue helicopter losses and Red losses to Blue helicopters. There is a 31 percent decrease in Red systems killed by helicopters. Blue helicopter losses include another 25 percent of the AH-64Ds and another 11 percent of the scout helicopters (Comanches or OH-58D). The increase in AH-64D losses is attributable to the need for the AH-64Ds to engage targets not engaged by the OH-58D.

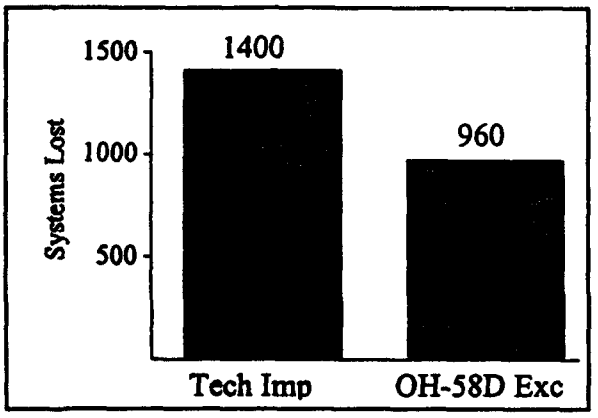


Figure 3-7. Helicopter kills

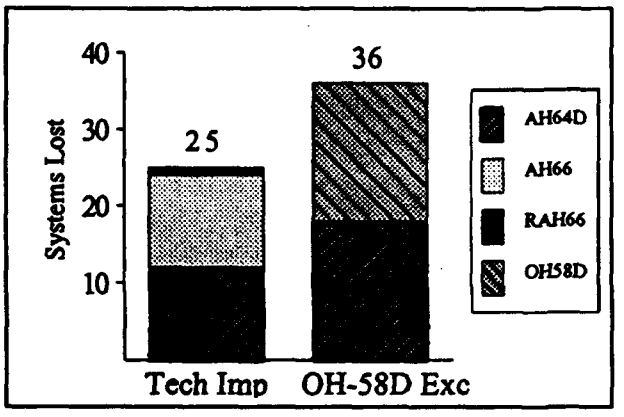


Figure 3-8. Helicopter losses

(c) Combining the preceding, Blue still kills about the same number of Red systems, but suffers 16 percent more system losses. These increased losses (136) are primarily Blue maneuver systems, but 11 more helicopters are lost; the overall LER dropped from 12:1 to 7:1. Much like the base case, the helicopters fail to kill Red maneuver forces deep which allows the Red combined arms force to close within tube artillery range. When the artillery is in range, Blue targets vulnerable to artillery (wheeled vehicles, troops, towed artillery) experience greater losses.

d. MLRS.

(1) Figure 3-9 presents Red systems killed by MLRS. Since the base case and the technological improvement alternative have 9 launchers each, these alternatives kill approximately the same number of Red systems. However, the 18 launchers of the organizational change alternative increase MLRS contribution by 50 systems -- primarily Red artillery systems. This increased contribution resulted from having an additional MLRS battery solely to perform counterfire, a capability not available in the technological improvement alternative.

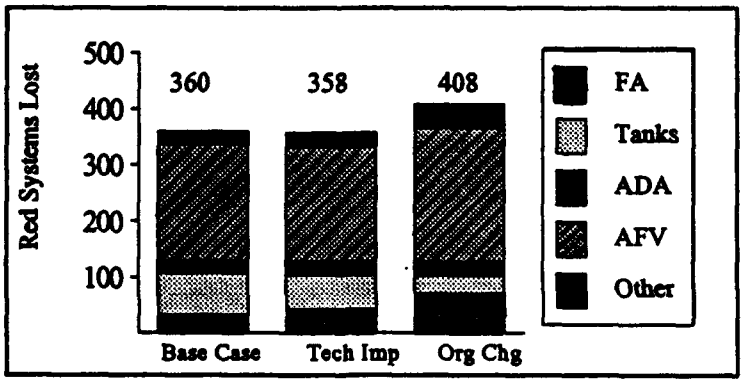


Figure 3-9. Red systems killed by MLRS

(2) In all three alternatives, there were no launchers lost.

(3) In summary, MLRS contributes to Red kills, primarily against AFVs. Overall, about 15 percent of all Red systems killed were by MLRS, regardless of alternative. The additional nine launchers in the organizational change inflict 50 additional losses not achieved by the other force designs. The addition of a second battery was to assist in the destruction of enemy artillery and mortars where it was still greatly needed -- during the extended close and close fights. The contribution of the additional battery, however, is limited by the number of enemy units available to be engaged. The 14 remaining Red artillery battalions available for engagement at commencement of the close fight are all heavily attrited and have yet to be acquired by Blue. As the fight progresses to its conclusion, the additional MLRS battery contributes to enemy destruction at a sharply decreasing rate per MLRS rocket fired. The reduced kills per MLRS rocket for every subsequent MLRS mission results from attacking reduced strength units that have their remaining systems widely dispersed. Therefore, the contribution of the additional MLRS battery in the organizational change alternative is limited to 50 additional Red systems -- primarily Red artillery and mortars.

3-6. Extended close.

a. Reviewing table 3-1 and figure 3-1 clearly indicate a minimal contribution. The major difference between the base case and the technological improvement is the addition of 12 NLOS. The major differences between the technological improvement and the organizational change is the elimination of 18 105mm howitzers, the replacement of the 12 81mm mortars with 12 120mm mortars, and the reduction of 155mm howitzers from 24 to 18.

b. Figure 3-10 displays the Red systems killed by extended close systems for each alternative. The majority of the improvement in Red kills in the alternatives is from NLOS. NLOS, with its 15km range, primarily eliminates tanks and AFVs and accounts for the bulk of the extended close system kills in the technological improvement and organizational change alternatives as depicted in figure 3-10. The "other" in the alternatives includes NLOS kills of helicopters and AT systems.

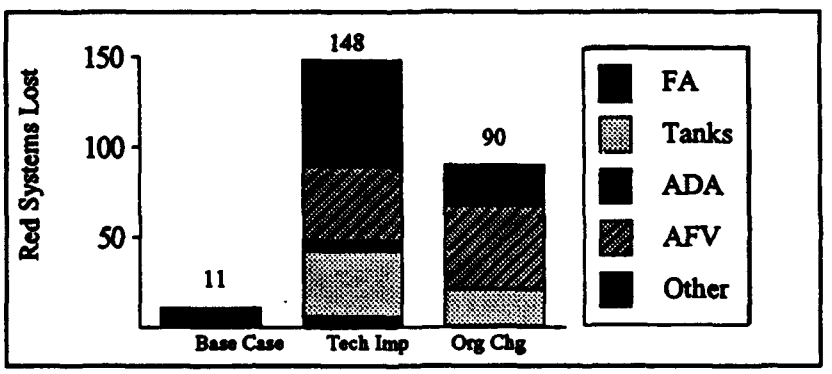


Figure 3-10. Extended close system kills

c. Field artillery (FA).

(1) The 105mm howitzers were positioned 4km behind the forward line of own troops (FLOT) and the 155mm howitzers were about 6km behind the FLOT. Munitions effective were the Dual-Purpose, Improved Conventional Munitions (DPICM) and the Sense-And-Destroy Armored Munitions (SADARM) (SADARM specifically accounting for the enemy artillery kills in the tech imp alternative).

(2) Figure 3-11 shows the kills inflicted by FA. The contribution of artillery increased in the technological improvement alternative (about one-third of the extended close kills) and decreased in the organizational change alternative from the base case. The decrease in the organizational change alternative resulted from a change in the howitzer system. The M-198 of the technological improvement alternative was replaced with a 14km-range lightweight 155mm howitzer which can only range two enemy battalions during the fight (two units barely above 50% strength). When the artillery engages these reduced strength units, the dispersion of the remaining enemy systems results in little or no kills of Red. Therefore, the lightweight 155mm howitzer engagements in the organizational change alternative were primarily smoke and immediate suppression missions since the 155mm howitzers were the direct support in this alternative.

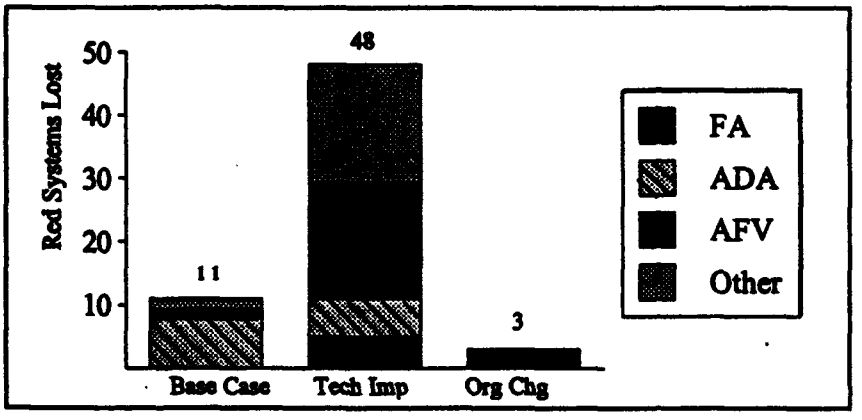


Figure 3-11. Field artillery kills

(3) Figure 3-12 shows the losses suffered by FA. Losses result from Red artillery and were reduced when more enemy artillery was destroyed in the alternative designs.

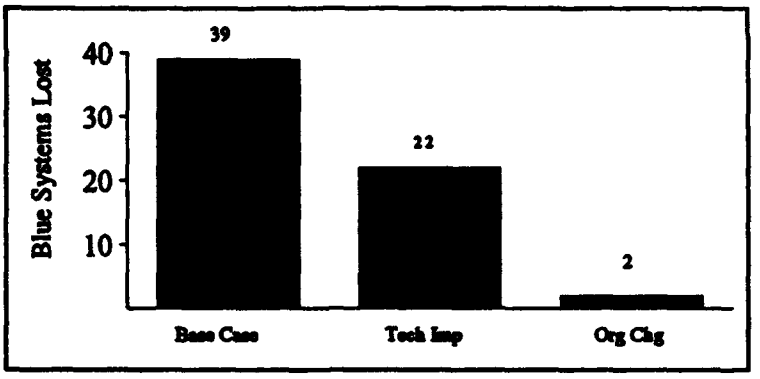


Figure 3-12. Field artillery losses

d. NLOS.

(1) NLOS was positioned as a company about 4km behind the FLOT in both alternatives. NLOS was not in the base case.

(2) Figure 3-13 shows the kills inflicted by NLOS. The NLOS range of 15km gave it a substantial standoff kill capability against its primary targets: tanks and AFVs.

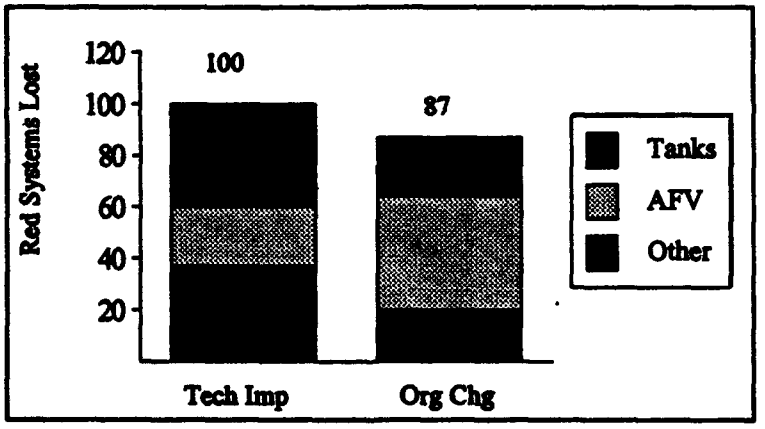


Figure 3-13. NLOS kills

(3) The NLOS company makes little contribution to the total number of Red systems destroyed because a limited number of Red systems survive the deep fight and are presented for NLOS engagement. As seen in table 3-4, of the approximately 140 to 180 Red systems entering NLOS engagement range, there is about a 40 ($^{82}/_{181}$) to 60 ($^{65}/_{114}$) percent chance that NLOS will successfully engage enemy tanks and AFVs. When viewed in this manner, the NLOS clearly becomes an essential lethal component of the 10K force because it serves as both the deep fires asset for the 2K force and assists in killing enemy forces not destroyed by the 10K force's deep assets.

Table 3-4. Successful NLOS engagements against Red armor

	Tech Imp	Org Chg
Targets Within Range	177	142
NLOS Missiles Fired	114	181
Targets Destroyed	65	82
Success Rate Percent	57%	45%

(4) Figure 3-14 shows the losses suffered by NLOS. NLOS losses are attributable to the vulnerability of the high-mobility, multi-wheeled vehicle (HMMWV) platform to Red artillery and fixed-wing aircraft, combined with the greater quantity of Red artillery surviving in the organizational change alternative over what was available in the technological improvement alternative. Regardless, these losses are different from other analyses involving NLOS -- primarily due to an earlier employment concept for NLOS (see paragraph 2-1b(3)).

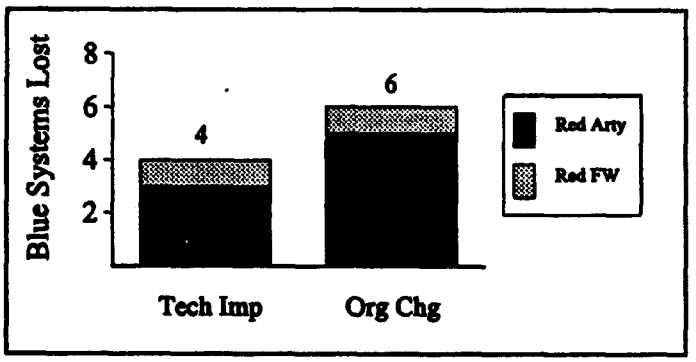


Figure 3-14. NLOS losses

e. Mortars.

(1) 81mm and 120mm mortars were positioned with the infantry battalions. The 81mm mortars had a range of about 6km and the 120mm mortars had a range of 12km.

(2) Mortars did not kill any enemy systems, but did fire smoke and immediate suppression munitions during the close fight. The mortars were not effective against a moving armored target.

(3) Figure 3-15 shows the losses suffered by mortars (all from Red artillery). In all designs, total losses were about the same.

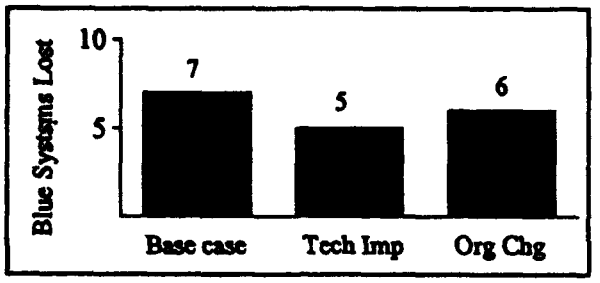


Figure 3-15. Mortar losses

f. To explore extended close systems contributions and their survivability, four excursions were made from the technological improvement alternative.

(1) Increasing the number of MLRS. MLRS was increased to two battalions because it was assumed to be the upper bound for pre-positioning.

(a) Figure 3-16 shows the total system losses for both the technological improvement and the MLRS excursions. Blue inflicts 112 more Red system losses and reduces Blue system losses by 15 systems; however, the loss exchange ratio (LER) only marginally improves from 12:1 to 13:1. This marginal improvement in LER occurs because the additional MLRS batteries repeatedly engage the same reduced-strength Red units (of which there are only six battalions at the beginning of the close fight) with only marginal increases in effects.

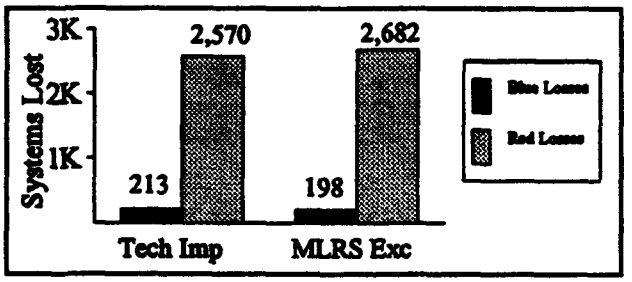


Figure 3-16. Force losses

(b) Figure 3-17 presents the kills inflicted by the extended close systems and losses sustained for the technological improvement alternative and MLRS excursion.

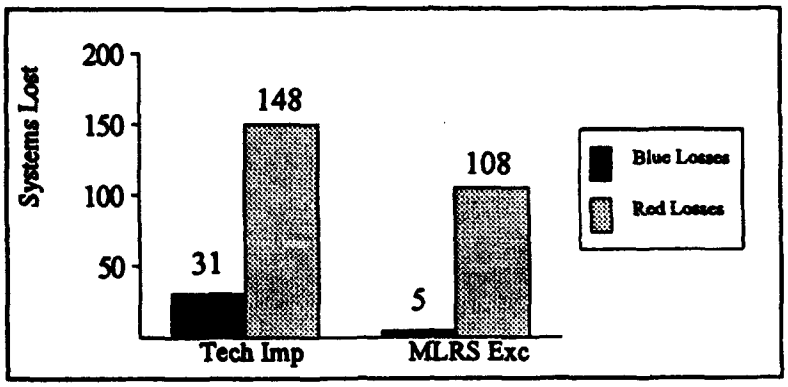


Figure 3-17. Extended close system performance

(c) From figure 3-17, it can be seen that the additional MLRS does not improve contribution to kills by extended close systems but does improve survivability.

(2) Extending the range of the M-198 155mm howitzer. The extended-range M-198 is the existing M-198 with a postulated range of 40km. It was positioned 6km behind the FLOT.

(a) Figure 3-18 shows total system losses for the technological improvement alternative and the 155mm howitzer excursion. Blue inflicts more casualties on Red and with less Blue losses; however, the LER only marginally improves from 12:1 to 14:1. Again, this is due to the resounding thrashing of Red, regardless of alternative.

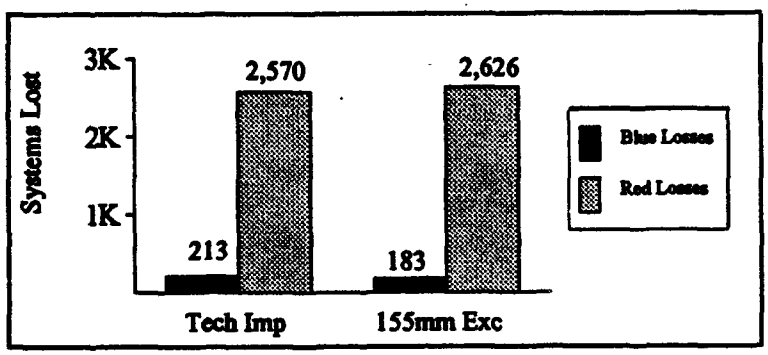


Figure 3-18. Force losses

(b) Figure 3-19 presents the number of Red systems killed by the extended close systems and how many losses the extended close systems sustained. There is an improvement in the lethality of the extended close systems, primarily in AFVs destroyed, with no difference in systems lost. The 155mm howitzers improve in Red artillery killed by 13 systems and kill an additional 11 AFVs while the rest of the lethality improvement is accounted for by the NLOS.

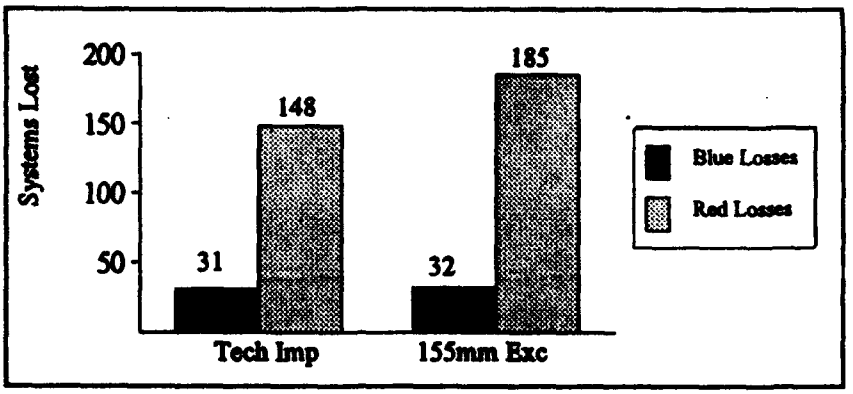


Figure 3-19. Extended close system performance

(c) Another extended-range 155mm howitzer excursion was conducted where the M-198 was moved to a position 11km behind the FLOT. This repositioning was primarily needed to enhance the howitzer survivability -- particularly vulnerable to artillery.

(d) Figure 3-20 shows the total system losses for the technological improvement alternative and the repositioned, extended-range 155mm howitzer. There was very little change in force losses.

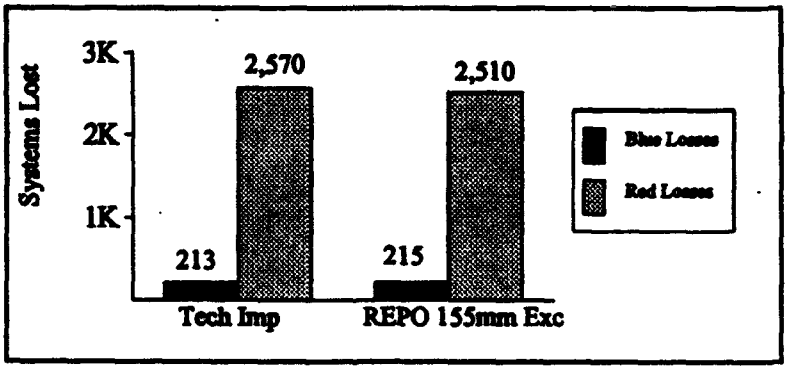


Figure 3-20. Force losses

(e) Figure 3-21 presents the Red systems killed by extended close systems and the Blue extended close losses. In fact, there is a slight decrease in extended close system losses from the previous situation (32 to 17 losses), but kills inflicted is also reduced. Clearly, regardless of positioning, extending howitzer range does not enhance the contributions of the extended close systems.

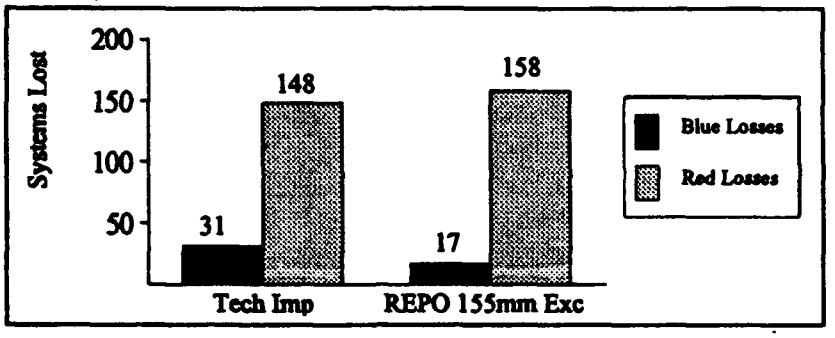


Figure 3-21. Extended close system performance

(3) Extending NLOS range. The NLOS was positioned as a battery about 4km behind the FLOT, but now had a range of 60 km.

(a) Figure 3-22 shows total system losses for the technological improvement alternative and the NLOS excursion. There was no real impact on force losses.

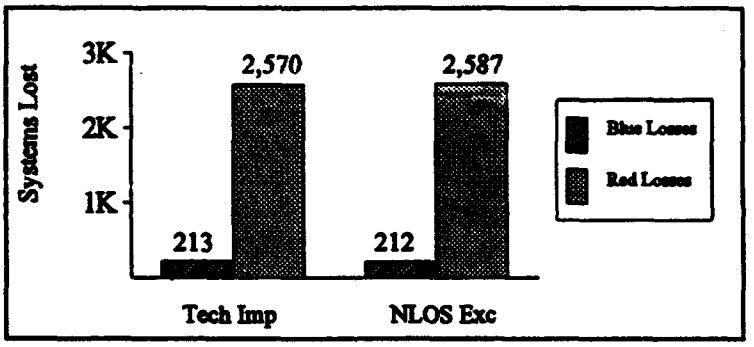


Figure 3-22. Force losses

(b) Figure 3-23 presents the Red systems killed by extended close systems and the Blue extended close losses. There is an improvement in extended close system lethality and survivability. Therefore, an extended-range NLOS enhances extended close system performance by engaging and eliminating Red systems that can then not participate in the close fight.

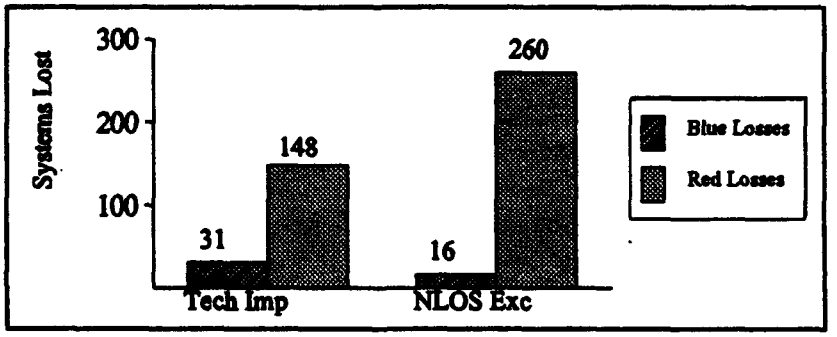


Figure 3-23. Extended close system performance

(4) Reducing Red UAV capability. Red UAV capability to acquire targets was degraded by 50 percent by specifically reducing the probability of acquisition by 50 percent.

(a) Figure 3-24 shows total system losses for the technological improvement alternative and the UAV excursion. Degrading the UAV capability did not change force losses because the Blue forces are stationary and can not evade even a reduced Red UAV acquisition effort.

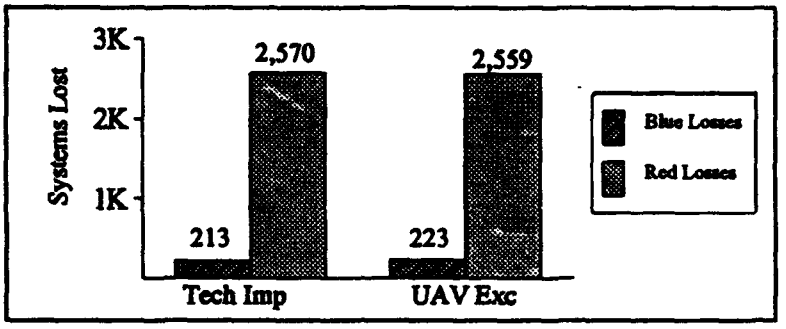


Figure 3-24. Force losses

(b) Figure 3-25 presents the Red systems killed by extended close systems and the Blue extended close losses. Reducing Red UAV capabilities had no impact on extended close system performance. Any effort, short of totally eliminating Red UAVs, is futile since Red has enough artillery available over time to service all targets acquired.

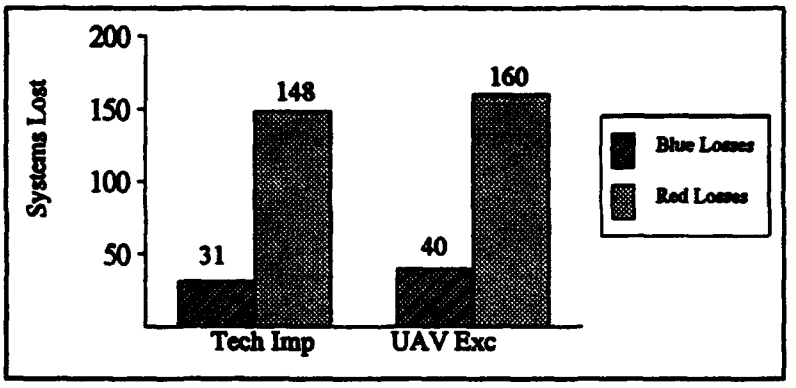


Figure 3-25. Extended close system performance

(5) Summary. It appears that, due to the nature of the Blue force - static and vulnerable to attack by fires (FA and air), there is little to improve on for the extended close systems in this situation except as noted in paragraph (c), below.

(a) Additional MLRS slightly improves the force's overall lethality and survivability and significantly improves the extended close system's survivability by serving as a force protector.

(b) Extending the range of the M-198 howitzer only modestly improves extended close system performance and overall force effectiveness.

(c) Extending the range of the NLOS makes an improvement in the lethality and survivability of extended close systems, but the lethality improvement is limited to the NLOS. Overall force performance is not improved. Blue still wins resoundingly.

(d) Reducing Red UAV capabilities does not improve overall force or extended close system performance.

3-7. Close systems.

a. Although the preference is to kill the enemy deep, this force must have the capability to finish Red forces in the close fight or risk losing the lodgment. This section examines the contribution of the AGS, LOSAT, and AT systems in the three force designs.

b. Figure 3-26 displays the Red systems killed by close systems for each alternative. The total contribution by close systems decreases in the alternatives because less Red forces survive the deep fight to participate in the close fight.

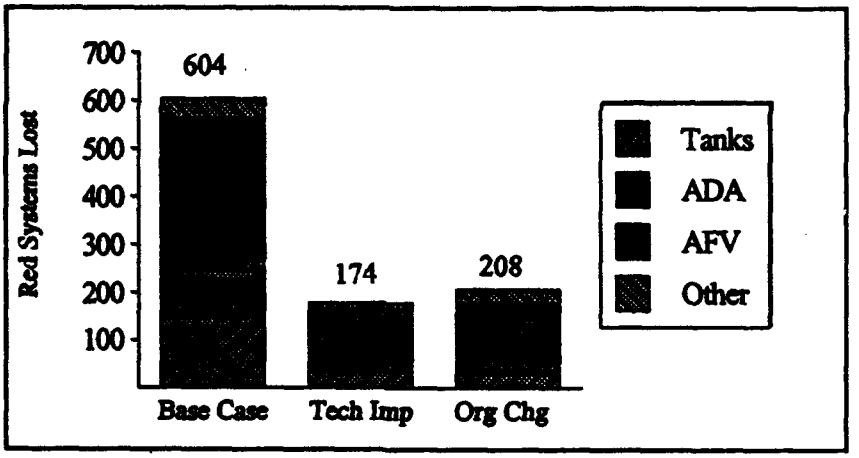


Figure 3-26. Close system kills

c. AGS.

(1) The AGS battalion was positioned with a company in each infantry battalion and another company in reserve about 3km behind the center infantry battalion.

(2) Figure 3-27 shows the kills inflicted by AGS. Across the alternatives, AGS kills about the same quantity of Red systems. The AGS in the alternatives is equipped with second-generation FLIR and STAFF rounds, allowing AGS to engage at 4km instead of the 3km

available to the AGS in the base case. With the reduced close fight in either alternative (technological improvement or organizational change), the AGS accounts for slightly more than half of the close system kills.

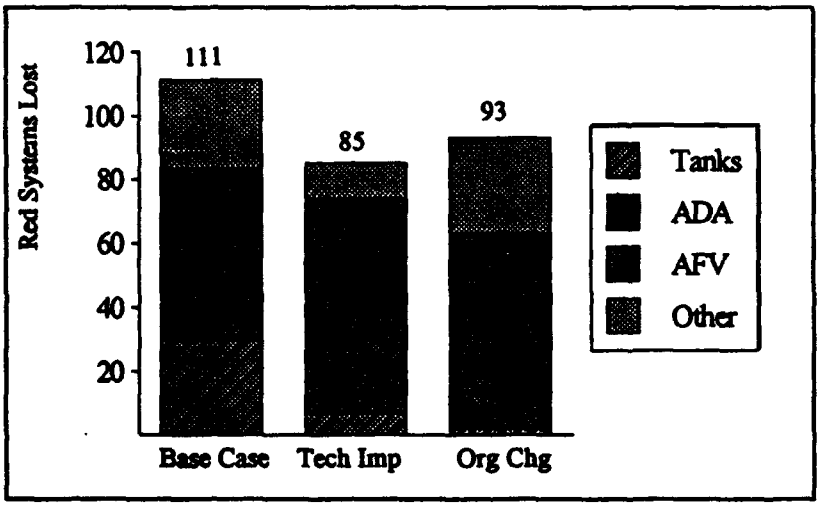


Figure 3-27. AGS kills

(3) Figure 3-28 shows the losses suffered by AGS. The less intense close fight and greater AGS standoff accounts for the improved survivability of the AGS in the alternatives.

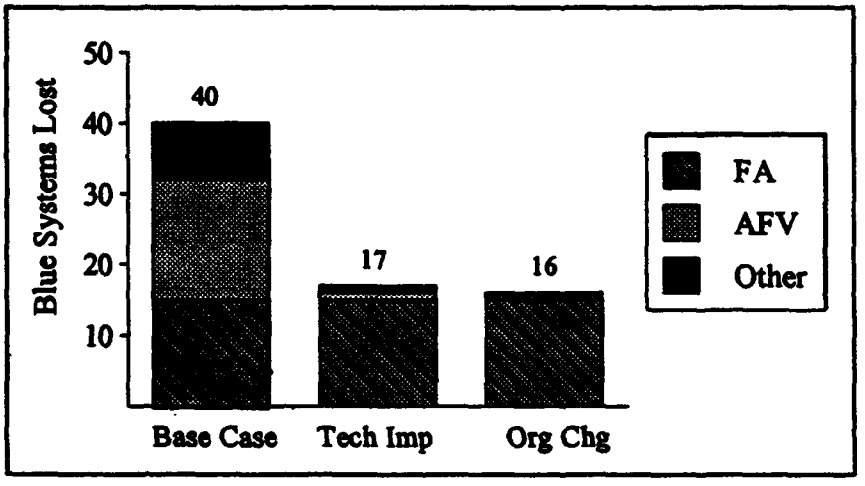


Figure 3-28. AGS losses

d. LOSAT.

(1) The LOSAT company was split into three platoons with one platoon positioned in each infantry battalion sector for the technological improvement alternative. The individual

systems of each platoon were positioned among the infantry battalions' AT systems. For the organizational change alternative, each infantry battalion had two platoons positioned with it since there were two LOSAT companies.

(2) Figure 3-29 shows the kills inflicted by LOSAT. The additional company of LOSAT in the organizational change alternative improves LOSAT lethality contribution, but accounts for slightly less than half of the close system kills.

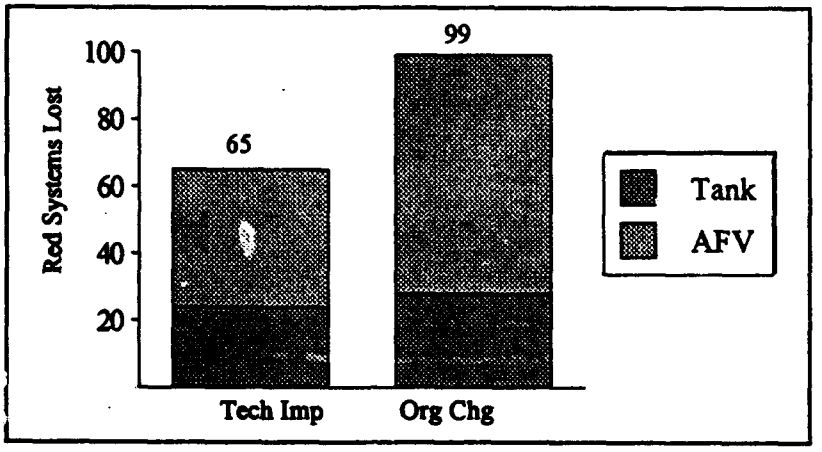


Figure 3-29. LOSAT kills

(3) Figure 3-30 depicts losses suffered by LOSAT. Total losses increase slightly in the organizational change alternative.

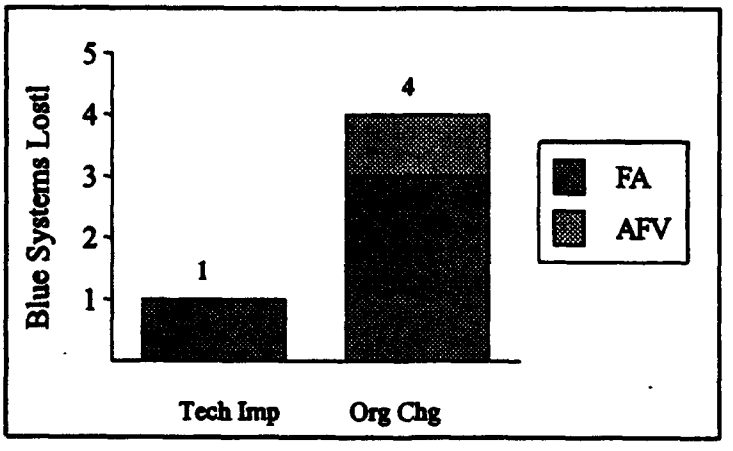


Figure 3-30. LOSAT losses

e. AT.

(1) All AT assets (tube-launched, optical wire-guided antitank missile (TOW2B), Javelin, and AT-4) were positioned within the infantry battalion positions.

(2) Figure 3-31 shows the kills inflicted by the AT systems. The large decrease in kills in the alternatives results from having less targets to engage.

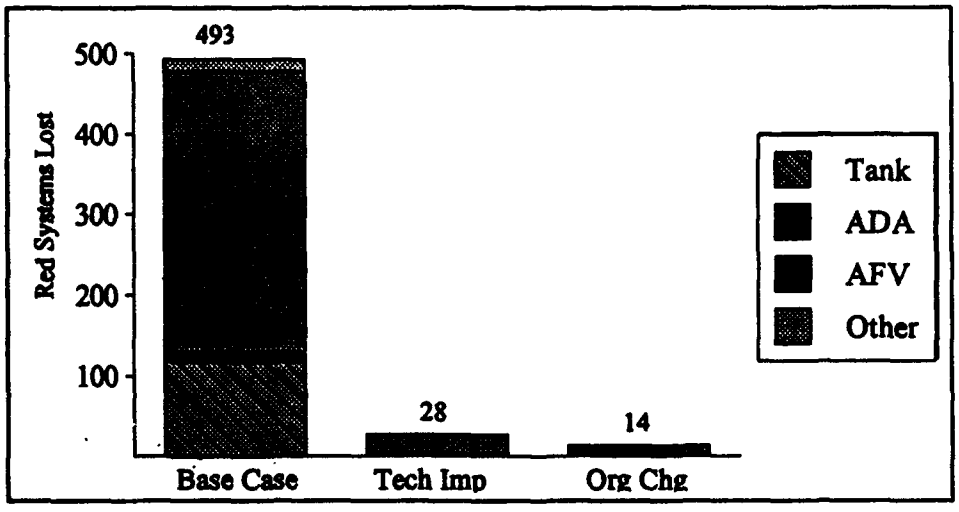


Figure 3-31. AT kills

(3) Figure 3-32 depicts losses suffered by AT systems. Although total losses decrease in the alternatives, AT systems still experience significant losses to artillery and mortars.

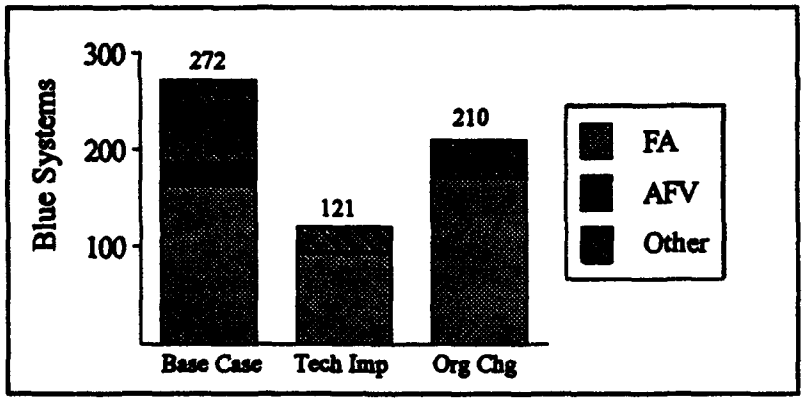


Figure 3-32. AT losses

3-8. Counterfire.

a. From the preceding discussion, as well as from the 2K analysis, it is clear that Red artillery is a significant killer of Blue.

b. As can be seen by figure 3-33, Red loses a goodly amount of artillery, but still maintains a considerable residual capability.

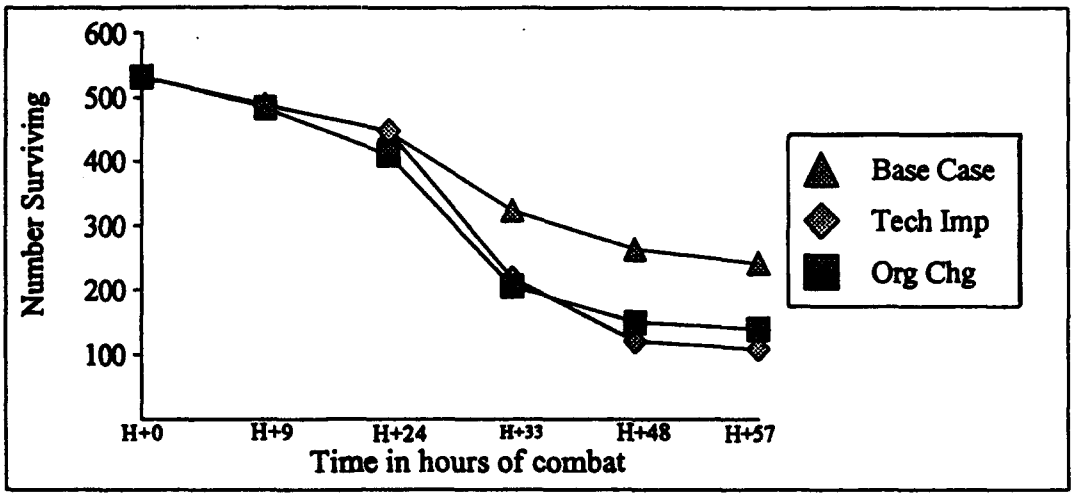


Figure 3-33. Red artillery remaining

c. Figure 3-34 shows the Blue systems killing enemy artillery. The greatest killer of enemy artillery was aircraft. The additional battery of MLRS in the organizational change alternative improves MLRS contribution to Red artillery killed.

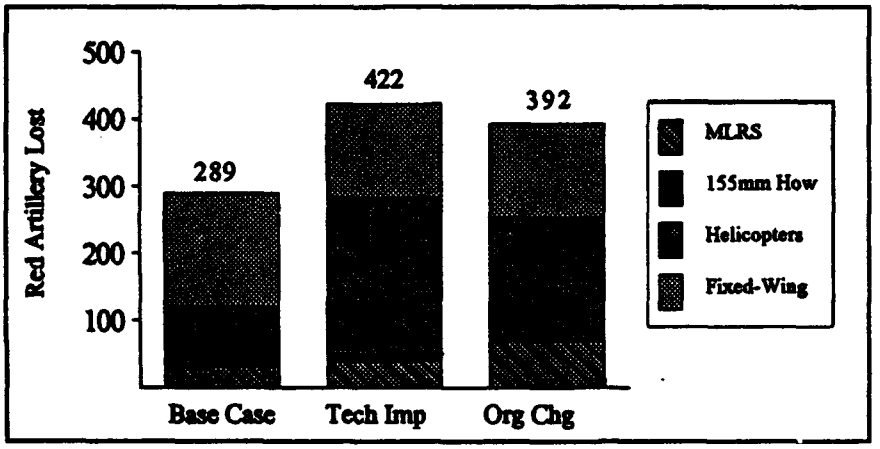


Figure 3-34. Red artillery destroyed

d. The most lethal counterfire systems are helicopters, fixed-wing aircraft, and MLRS. Cannon howitzers do not contribute much to the counterfire fight.

3-9. TBM threat.

a. The last major finding from this study is related to the study issue of minimizing the effects of cannon, rocket, and TBM fires. Minimizing these effects were critical to preventing early catastrophic casualties and interdiction of resupply efforts at the airfield.

b. As shown in table 3-5, the 10K force can reduce the enemy TBM threat, but cannot completely eliminate it since the Patriot was the only Blue system in the various force designs capable of shooting down TBMs. Since none of the force designs varied the number of Patriot units, all force designs had the same counter-TBM capability. To shoot down more TBMs will require better or more ADA systems.

Table 3-5. TBM results across all force designs

- 108 HE missiles fired with 90 destroyed; the remaining 18 strike various targets
- 36 chemical missiles fired with 30 destroyed; the remaining 6 strike the airfield
- Contamination from chemical strikes closes the airfield 33 percent of total combat time

c. In the alternative force designs, only TBM interdiction of the airfield is successful, allowing the airfield to remain open for resupply 67 percent of the time. In the base case, enemy artillery (who were within range of the airfield), in combination with chemical TBM fires, closes the airfield at least 50 percent of the time. This closure period is accomplished with TBM accounting for two-thirds of the closure time and artillery fires accounting for the other one-third and precludes resupply from being conducted for the base case.

3-10. Conclusions.

a. All three force designs offer approximately the same lethality, but accomplish the mission differently. The alternatives were more effective because specific systems were able to defeat enemy forces deeper. In defeating the enemy in this manner, the 10K force alternatives survived better than the base case. A force equipped with longbow technology on helicopters, NLOS, LOSAT, AGS with second-generation FLIR and STAFF rounds, and MLRS, and supported by joint air assets, could be expected to retain a lodgment in this environment for at least three days of combat against an enemy armored corps. The difficulty in executing this mission and meeting all success criteria for combat is obvious since only the technological improvement alternative met all these criteria.

b. The identified weaknesses, which span all alternatives, included lack of contribution by the extended close combat systems and force vulnerability to artillery, UAVs, and TBM. Another excursion addessing the impact of equipping the force with Comanche helicopters was also examined. Addressing these weaknesses through excursions provided several key insights to improve early entry forces conducting combat against a large armored force in a desert.

(1) Towed howitzers and mortars are needed to provide immediate support to the 2K force as the remainder of the 10K force finishes closure. However, these systems are not very survivable or lethal against an armored enemy force.

(2) NLOS is vulnerable on a HMMWV chassis, but is very lethal. With a range capability of 15km or greater, NLOS is highly desirable for this force.

(3) MLRS is very lethal and survivable. An increase in quantity, through PREPO or other means, would be desirable and provides additional counterfire capability.

(4) Degrading UAVs did not improve force or extended close system lethality or survivability. Because the Blue force is stationary and UAV-produced acquisitions cannot be eliminated, the force remains vulnerable to UAVs.

(5) The TBM threat requires varying the quantity of systems and/or system capabilities to improve on the results obtained in this analysis.

(6) Lastly, not equipping the force with the Comanche helicopter as the replacement for the OH-58D imposes lethality and survivability reductions on the early entry force that were not experienced in the 10K alternatives.

10K FORCE ANALYSIS
CHAPTER 4
SUSTAINMENT ANALYSIS

4-1. Introduction. The sustaintability analysis evaluates the sustainability of the 10K force alternative designs in support of an early entry force projection mission into a SWA theater of operations. This chapter summarizes the detailed sustainment analysis found at appendix C. A comparative analysis among the alternatives was accomplished by performing the following three steps.

a. Force structure design. CASCOM and its associated schools performed an evaluation of the combat and combat support force to determine both the level of support required and the CSS concepts to be implemented. The developed CSS structure incorporated into the 10K force is an austere organization designed to meet force supply requirements, make maximum use of joint and host nation support, and minimize lift requirements.

b. Supply requirements determination. TRAC-LEE developed supply requirements for each of the alternative designs using CSS TOOL. This analytic tool uses DA-approved operational planning factors and scenario information to derive requirements for the total force. The requirements determined were for high and low usage rates to provide a range band of daily requirements so that the force designs could be compared.

c. Comparative analysis. The results of these two sub-analyses were compared to measure differences among the alternatives in CSS force structure, supply needs, and lift requirements.

4-2. Results.

a. CSS force structure differences are depicted in table 4-1. These CSS structures are included in the 10K force designs depicted in figures 2-1 to 2-3. There is little difference in the CSS structure for the various force designs. As table 4-1 shows, all of the differences can be accounted for in the mechanic requirements per alternative. "All other CSS personnel" includes ammunition, transportation, quartermaster, medical, public affairs, adjutant general, and finance. All CSS structures developed for incorporation into the various 10K force designs were austere organizations with little or no redundant capabilities.

Table 4-1. CSS force design personnel differences among the alternatives

	377	429	485
	1,544	1,544	1,544
	2,129	2,205	2,267
		76	138

b. Supply requirements.

(1) Using Army standard planning factors, tables 4-2 and 4-3 depict the daily high and low usage figures for fuel and ammo consumption for these force designs operating in the desert. As a benchmark to table 4-3, the VIC gaming results for the organizational change alternative was 1,251 STONS of ammunition -- within 16 percent of the high usage figure from the planning factors.

Table 4-2. Daily fuel consumption range for intensity of combat (kgal)

	High usage	Low usage
Base case	214	90
Tech Imp	255	108
Org Chg	304	130

Table 4-3. Daily ammunition consumption range for intensity of combat (STONs)

	High usage	Low usage
Base case	1,309	454
Tech Imp	1,319	460
Org Chg	1,495	518

(2) These tables depict a 19 percent and 42 percent increase in fuel over the base case for the technological improvement and organizational change alternatives, respectively; and a 14 percent ammunition increase over the base case by the organizational change alternative, primarily due to the type and number of helicopters. The slight difference in class V between the base case and the technological improvement alternative is due greatly to the increase in MLRS launchers and helicopters.

(3) All of the alternatives' daily fuel and ammo (approximately 90 percent of the total resupply requirement) must be accomplished by air. This has a significant effect on the sustainability of the force.

(4) To examine the airlift burden to sustain the force, the high usage daily requirements were converted into sorties of either C-5s, C-141s, or C-17s, as shown in table 4-4. As a frame of reference, during Desert Shield/Desert Storm, there were only 60 C-5s and 116 C-141s available to the entire theater. Furthermore, the airfield would be very busy and spacious; based on USAF-estimated 3-1/2 hour unload time, there would be about 14 C-141s on the ground at any one time (using the C-141 example).

Table 4-4. Daily sorties required for sustainment in a high usage environment

[illegible]	Base Case	Tech Imp	Org Chg
[illegible]	27	29	32
[illegible]	81	86	98
[illegible]	36	39	44

c. Potential sustainability enhancements.

(1) Fuel. Using two pre-positioned tankers with a capability of 16.6M gallons would offer sufficient fuel for any of the alternatives for at least 50 days. Table 4-5 shows the strategic airlift savings in C-141 loads.

(2) Ammunition. Employing pre-positioned ammunition ships, each carrying 19,000 STONS of ammunition, would obviate the strategic airlift requirements (again, shown in table 4-5).

Table 4-5. Strategic airlift savings due to pre-positioning (in C-141 loads)

[illegible]	Base Case	Tech Imp	Org Chg
[illegible]	24	28	34
[illegible]	52	53	59

(3) Either of the above, however, require some means of transport from the port to the lodgment. Since there is no secure ground line of communications, this would require tactical airlift to transport the supplies the approximate 200 miles from the port to the lodgment. Because of the short distance, fewer aircraft would be required; however, the airfield must still be large.

(4) Use of alternative airfields and Army aviation assets were not examined.

4-3. Conclusions.

a. There is little difference in sustainability among the alternatives.

b. Sustaining this force completely by air is extremely tenuous.

c. Protection of CSS assets is critical to effecting force resupply since there is little or no redundant capability.

10K FORCE ANALYSIS
CHAPTER 5
DEPLOYMENT ANALYSIS

5-1. Introduction. The deployment analysis provided a comparative analysis measuring total sorties required to deploy the 10K force designs and how long it takes for the force to close into the lodgment. This analysis tracked the deployment of the 10K force designs to a lodgment located in a SWA theater of operations. This chapter summarizes the detailed deployment analysis found at appendix D. Results will be stated in terms of the most deployable design as measured in total sorties required and force closure in days.

a. The TARGET unit deployability model allows an automated way to merge unit equipment authorization data from the TRADOC's TO&E Master File with the equipment item data from the FORSCOM COMPASS ECF. The TARGET program determines the unit deployment data required for strategic mobility planning, resulting in unit deployment data and sortie requirements.

b. RAPIDSIM simulates the deployment of cargo and troops from POE to POD by air and sea. RAPIDSIM requires user-supplied scenario and movement requirement files. The scenario file defines the DTS from CONUS origins to the destination theater, including the inventories and capabilities of aircraft and ships and the location of POEs and PODs. The movement requirements file (also known as the TPFDL) defines units and supplies to be deployed and appropriate timelines and deployment priorities. RAPIDSIM provides closure profiles within joint service movement and summarizes the utilization of the strategic lift assets.

5-2. Results.

a. Table 5-1 depicts total sorties required per force design. Among the alternatives, there is about a 5 percent difference in C-141 sorties required. For C-5s, the base case has about a 15 percent increase in sortie requirements over the two alternatives. The lift savings in the alternatives occurred for two reasons. First, the independent ready company (IRC) and Hawk battery have been removed and account for most of the C-5 reduction. Second, for lift analysis only, the Patriot was replaced by Corps Sam.

Table 5-1. Sortie requirements by force design

	1,303	72
	1,289	61
	1,357	63

b. Table 5-2 summarizes force closure by means of deployment in days. The means of deployment includes six cases.

(1) "MRS" represents the Air Force planning factors used prior to the Gulf War.

(2) "DS/DS" represents Desert Shield/Desert Storm experience.

(3) "DS/DS W/C-17" represents Gulf War experience with the C-17 aircraft available for strategic lift.

(4) "FSS" represents the movement of the 2K force by airlift and the rest of the 10K force by fast sealift.

(5) "PREPO" represents the pre-positioning of selected equipment and materiel and the impact on 10K force closure. Equipment pre-positioned included the AGS battalion, LOSAT company, MLRS battery, 155mm howitzer battalion, and the field hospital. The aviation intermediate maintenance unit (AVIM) was removed from the 10K CSS structure because a pre-positioned support maintenance facility (PSMF) was available. Lastly, this excursion removed the air ambulance medical company since it was self-deployable.

(6) "Navy/PREPO" represents combining the PREPO from the previous case with increased airlift due to the replacement of 40 percent of the tactical air sorties by Naval air from one aircraft carrier.

Table 5-2. Force closure in days

	16	37	28	21	not evaluated	not evaluated
	15	35	27	21	20	18
	16	37	29	21	not evaluated	not evaluated

c. It is clear from both tables 5-1 and 5-2 that all three alternatives require about the same assets and close at about the same time, regardless of the deployment option used. Using C-17 aircraft reduces the force's closure by 23 percent from the DS/DS case. This one-week savings in deployment time is absolutely critical to force success since getting combat power quickly on the ground is required to defeat the Red corps. Lastly, the table shows that force closure can be improved to approximately three weeks in the last three deployment cases. However, the FSS, PREPO, and NAVY/PREPO cases all require an OTS and/or ISB capability to be executable.

5-3. Conclusions.

a. Regardless of the means used to deploy the force, all force designs have essentially the same force closure profile.

b. Obtaining a significant reduction of force closure from the Desert Shield/Desert Storm experience-based figures would require using C-17 aircraft, sending some of the force by air and the remainder by FSS, or using pre-positioned equipment.

10K FORCE ANALYSIS
CHAPTER 6
MOBILITY AND COMMAND AND CONTROL ANALYSIS

6-1. Introduction. This analysis consisted of examining each of the force designs for adequate tactical mobility and C2 to meet mission requirements. An examination of the total number of vehicles and helicopters available to the force was compared against the number of personnel in the force and the supplies received at the airfield requiring movement to units dispersed throughout the lodgment location. For C2, the evaluation focused on controlling headquarters for the force structure, communications systems available to the force, and intelligence and information-gathering capabilities.

6-2. Results.

a. There was no repositioning of forces during combat by units not having organic transportation assets. Therefore, force tactical mobility was never stressed by an enemy threat from a different direction.

b. For C2, there were appropriate controlling headquarters available to command and control the force. The signal assets brought into the lodgment by the division and corps signal battalions were closed by C+6.

6-3. Conclusions.

a. Because of the limited area occupied by the 10K force and the number of utility helicopters available, there exists adequate capability to reposition forces and move supplies. All alternative designs have the same mobility characteristics.

b. There was no difference in command, control, and communication (C3) capabilities among the alternatives.

10K FORCE ANALYSIS
CHAPTER 7
CONCLUSIONS AND RECOMMENDATIONS

7-1. Conclusions. Table 7-1 reviews each force design against all success criteria.

Table 7-1. Summary of results by success criteria

	1,375	37	Yes	50%	Yes	54%	No	Not by air
	1,350	35	Yes	67%	Yes	25%	Yes	Not by air
	1,420	37	Yes	67%	Yes	35%	Possibly	Not by air

a. The combat analysis identified several strengths and weaknesses.

(1) Deep systems (helicopters, MLRS, and fixed-wing) were greatest contributors to the force's lethality, regardless of alternative. Both alternatives' deep systems outperformed the base case, thereby enhancing the force.

(2) Combat analysis shows that a 10K early entry force requires helicopters with longbow technology and MLRS to fight deep effectively so that the close fight is either eliminated or significantly reduced in intensity over what was experienced in the base case.

(3) The extended close systems do not make a significant contribution due to the nature of the battle -- Blue static and vulnerable to attack by the large mass of Red fires. Regardless, their presence is essential to the force because extended close systems are the deepest killers available to the 2K force until the deep strike assets of the 10K force arrive.

(4) The close systems contributing to the fight include: LOSAT and AGS with second-generation FLIR and STAFF round. As also shown in the 2K analysis, these systems give the 10K force the ability to defeat enemy forces close that were not destroyed in the deep fight.

(5) The key 10K deficiencies identified were combating UAVs and TBMs.

(a) UAVs continued to pose a serious threat to the 10K force across all designs, especially in a desert environment. Even when specifically identified as a system to be degraded, the UAV presents a huge technological challenge to acquire, shoot down, jam, or interdict at its controlling station.

(b) TBMs are also a challenge since not all missiles fired can be shot out of the sky; some will strike their intended target. In the combat analysis, all force designs were unable to prevent the airfield from being contaminated with a persistent chemical agent delivered by TBM because they had the same counter-TBM capability. Varying the quantity of systems and system capabilities is essential to reducing the TBM threat to early entry forces.

b. Deployment of this force without an OTS capability or an ISB is not practical from a purely force closure perspective. The savings in time to move the force when using an ISB may well be the difference in executing an unopposed entry versus a forced entry.

c. All force designs have significant supply requirements and are not sustainable exclusively by air. Even establishing a stockage level of three days of supply on the ground before hostilities begin assumes no interdiction of the airfield (a decision not controlled by the Blue force).

d. The comparison among the alternatives shows very little difference in mobility and C2. All force designs appear to be adequately mobile and capable of performing required C2 functions.

7-2. Recommendations.

a. The recommendation of this study is that the force design depicted in figure 7-1 (technological improvement with an additional LOSAT company) is most desirable because it:

(1) Contains the deep strike assets necessary to establish favorable conditions to conduct the close fight.

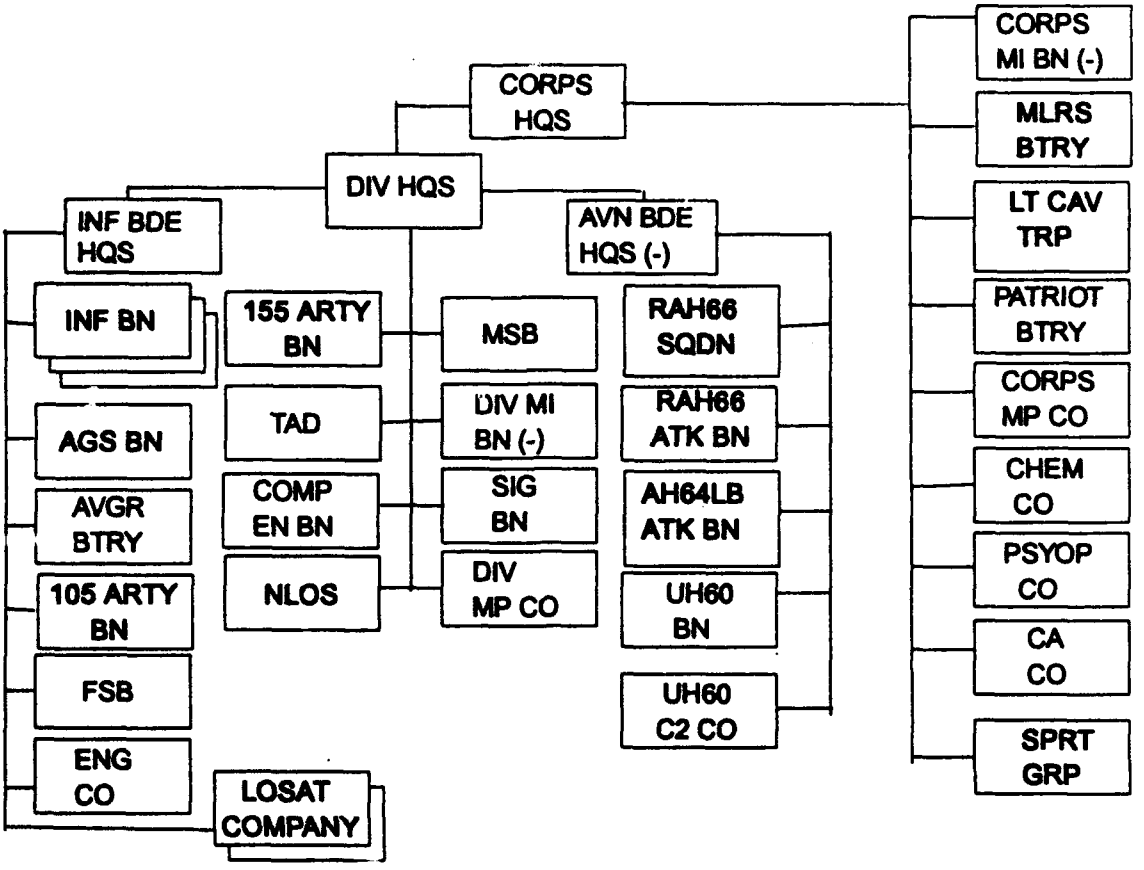
(2) Contains adequate extended close and close systems to finish the remnant Red force and still retain the lodgment.

(3) Can be deployed in three weeks, with prepositioning and some force self-deployment.

(4) Can be sustained by employing a logistics support concept that includes use of ISB and OTS logistics.

(5) Contains adequate mobility and C2 capabilities.

b. The results presented in this report provide only a foundation of what an early entry force will need to be successful. Because the strengths and weaknesses already mentioned were observations of force performance against a specific threat in one scenario, this force might not be appropriate for a different threat somewhere else in the world.



Recapitulation

60 - TOW2B/W/ITAS
14 - 120mm Mortars/Smart
66 - AGS/STF/2d-Generation FLIR
9 - MLRS
1 - Q-36 Countermortar Radar
8 - Patriots
12 - Stinger Teams
24 - AH-66
53 - UH-60
18 - LOSAT on AGS Chassis
Quickfix
UAV

54 - Javelin
18 - 60mm Mortars
18 - 105mm Howitzers
24 - 155mm Howitzers
1 - Q-37 Weapons Locating Radar
18 - Avengers
24 - AH64D
24 - RAH 66
12 - NLOS
JSTARS
Guardrail

Figure 7-1. Recommended force design

APPENDIX A

10K FORCE STUDY PLAN

Study Plan TRAC-SP-0193
Jan 1993

United States Army
TRADOC Analysis Command-Operations Analysis Center
Combined Arms Analysis Directorate
Fort Leavenworth, Kansas 66027-5200

2K-10K FORCE ANALYSIS

STUDY PLAN

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distribution unlimited.

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APPENDIXES:

STUDY PLAN
FOR THE
2K-10K FORCE ANALYSIS

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1. **Purpose.** This plan identifies the study objectives for the 2K-10K force analysis to be conducted by the TRADOC Analysis Command (TRAC) in support of the Early Entry Lethality and Survivability (EELS) Battle Lab (BL). The EELS BL has the responsibility to design a light, early entry force consisting of a quick-response brigade-size force (referred to as a 2K force) and a follow-on division (-) size force (referred to as a 10K force). TRAC has the mission to analyze lethality, survivability, and sustainability of various alternative 2K and 10K forces and integrate deployability analysis conducted by the Military Traffic Management Command (MTMC).

2. **References.** Appendix A.

3. **Terms of reference.**

a. *Problem.* To comply with the National Military Strategy (NMS), the Army must possess the capability to rapidly deploy and insert "first to fight" forces. Operation Desert Shield/Storm exposed the vulnerabilities of our "first to arrive," lightly equipped contingency forces to a threat equipped with heavy armor. Our heavy forces equipped with a sizable number of armored units, while survivable and lethal, are difficult, if not impossible, to transport in a time-sensitive environment. The future Army must have the capability to conduct early entry operations with tailored armored, light, and special operations forces that are more deployable, lethal, survivable, and sustainable.

b. *Impact of problem.* With the end of the Cold War, regional disputes, formerly kept in check by super power rivalry and restraint, have evolved into potentially dangerous confrontations. Many regional powers now have, or could rapidly procure, formidable modernized armed forces, including the latest generation weapon systems. Some are hostile to the U.S. and its allies and are located in areas where they could threaten vital U.S. interests. Yet, there are few, if any, U.S. forces permanently positioned ashore in many of those areas. It is certain that potential future enemies closely observed recent operations involving the projection of U.S. military forces and in the future could seek to exploit U.S. vulnerabilities, including perceived inadequate early entry force lethality and survivability.

c. *Background.*

(1) A meeting was held on 15 December 1992 to discuss TRAC support of the EELS analysis. Representatives from the EELS

BL, TRAC Operations Analysis Center (TRAC-OAC), TRAC White Sands Missile Range (TRAC-WSMR), TRAC Fort Lee (TRAC-LEE), and the Depth and Simultaneous Attack Battle Lab were present. Major General Lehowicz, TRADOC Deputy Chief of Staff for Combat Developments (DCSCD), chaired the meeting.

(2) The objective of the EELS analysis is to design an early entry 2K and 10K force that is light, deployable, highly lethal, survivable, and readily sustainable. This force must be capable of establishing and protecting a lodgment from a modernized threat force. Requirements for this force will be worldwide. The design must include capabilities to respond to a variety of threat forces, environments, distances, technologies, etc.

(3) TRAC-WSMR has initiated work in support of the 2K design. An analysis plan was developed for this work and was approved by the EELS BL. It is included at appendix C. The TRAC-WSMR work will assess the capability of a currently designed division-ready brigade (DRB) to conduct early entry security missions. This base-case force will have 1999 equipment. Once this benchmark is established, TRAC-WSMR will then assess the value of futuristic weapon systems when substituted into this DRB force. The final outcome will be a 2K force structure that maximizes effectiveness and survivability while remaining within a lift constraint determined by the current DRB. The analysis of the lift requirement will be conducted by MTMC. In addition, TRAC-WSMR will design a 2K force that maximizes effectiveness and survivability within force structure constraints but without regard to lift constraints. This will give decisionmakers an upper bound on capability for the tradeoff of additional lift.

(4) The 2K work will support the design of the 10K force. TRAC-OAC will conduct the 10K analysis with support from TRAC-LEE and MTMC. The analysis plan developed for this work is included at appendix D. The base case 10K force will be a division (-) from the 82d Airborne Division equipped with 1999 systems. The results of the 2K design will be the base from which the 10K force design alternatives are created using subject matter experts (SMEs) from the EELS BL. TRAC-OAC has responsibility for the analysis of the 10K alternatives and will integrate the lift requirements provided by MTMC.

(5) TRAC-LEE will also conduct an analysis of the inherent tactical mobility characteristics of each of the 10K alternatives. A methodology will be developed to test the tactical mobility characteristics for adequacy against standards established by EELS SMEs. These standards will be a function of the concept supporting the development of the 2K and 10K forces along with the employment plan.

(6) MTMC will conduct a deployability analysis of the 10K alternatives.

(7) There is a requirement to utilize this force worldwide. Based on this, the force may be modified for various theaters, threats, etc. Once the 10K alternatives have been analyzed, the preferred design will be hypothetically "deployed" to several theaters. This will require the EELS SME to develop a location-specific time-phased force deployment list (TPFDL) which will be analyzed by MTMC to identify variations in the deployment schedule (times and aircraft requirements) for a spectrum of possible employments.

(8) TRAC-LEE will conduct an analysis of each of the 10K alternatives and compare the sustainability impacts across the alternatives. Each of the combat service support (CSS) functional areas (arm, fuel, fix, and man the force) will be examined for these impacts.

d. *Objectives.*

(1) TRAC-WSMR will determine the design for a 2K force by maximizing lethality and survivability while maintaining lift requirements consistent with the current DRB. DRB lift requirements will be provided by MTMC.

(2) TRAC-WSMR will determine the design for a 2K force by maximizing lethality and survivability within force structure constraints but without regard to lift.

(3) TRAC-OAC will assess the effectiveness (lethality, survivability, command and control (C2)) of the alternative 10K force designs. Personnel casualties will be a product of the TRAC-OAC effectiveness assessment.

(4) TRAC-OAC will coordinate a tactical mobility analysis of each of the 10K force alternatives.

(5) MTMC will conduct a deployment analysis for the 10K force alternatives. Once the preferred 10K force is determined, an indepth deployment analysis will be conducted. Based on the requirement for this force to respond worldwide, slightly varied deployment priorities will be developed for several real world employment opportunities. These deployment priorities will be based on the type of threat, the terrain, the distance to theater, etc. Results of this work will provide decisionmakers an interval of possible aircraft quantities and time requirements to deploy this force.

e. *Scope.*

(1) TRADOC operational scenarios will serve as the basis for study scenarios. The scenarios to be utilized in 2K analysis are discussed in the TRAC-WMSR analysis plan for the 10K force analysis, time constraints only permit examination in a single, low-resolution scenario. Of the scenarios considered, a desert environment (Southwest Asia (SWA) 3.0-based) was chosen

since it places the greatest amount of stress on an early entry force and therefore, will result in the most robust 10K force design. Early entry missions will be conducted in these scenarios, all of which will be study certified for this effort by TRAC Scenario and Wargaming Center (TRAC-SWC).

(2) Within each scenario, the Blue base case will be a 1999 force structure. Alternative designs will include futuristic systems.

(3) Threat force year will be 2004 for all scenarios.

(4) The study will address conventional units and weapons. Explicit investigation of special operations forces (SOF) contributions remains to be defined but probably will be limited.

(5) The study will provide estimates of personnel casualties. The emphasis in the NMS on decisive victory with minimum casualties demands that this important criterion be made visible.

f. *Study issues.*

(1) What is the most effective (lethal and survivable) 2K force for early entry missions within the lift constraints of the current DRB? (TRAC-WSMR)

(2) What is the most effective (lethal and survivable) 2K force for early entry missions within force structure constraints but without regard to lift constraints? (TRAC-WSMR)

(3) What is the war-fighting capability of modernized early entry force alternatives? (TRAC-OAC)

(4) What is the lift requirement for each of the 10K force alternatives? (MTMC)

(5) How tactically mobile are each of the 10K alternatives? (TRAC-OAC)

(6) What are the various deployment schedules (time and aircraft) for the preferred 10K alternative based on employment to various theaters? (MTMC)

(7) What are the differences in sustainability among the 10K alternatives? (TRAC-LEE)

(8) What are the C2 implications of a fully modernized early entry force? (TRAC-OAC)

g. *Methodology.*

(1) The methodology for design of the 2K force is explained in detail in the analysis plan developed by TRAC-WSMR. (Appendix C)

(2) Detailed methodology for the 10K force analysis is provided in the analysis plan developed by TRAC-OAC. (Appendix D)

(3) The result of the TRAC-WSMR work will be two 2K designs. One will be designed based on maximizing effectiveness within lift constraints of the current DRB. The second design will be based on maximizing effectiveness with force structure constraints but without regard to lift. Each of these designs will be expanded to develop 10K alternatives for analysis by TRAC-OAC. EELS SME will work with TRAC personnel using information derived from the TRAC-WSMR analysis and will develop 10K alternatives. The TRAC-WSMR work will include, in addition to the preferred 2K force design, information about "value added" by individual new systems and by combinations of new systems. This work will aid the EELS SME in determining which elements would be most beneficial to arrive in theater shortly after the 2K force to augment and expand the capability. In addition, Corps elements sliced to this division will be identified by EELS SME. The TRAC-WSMR analytic effort in combination with the EELS SME will provide the 10K force design alternatives which TRAC-OAC will analyze for lethality and survivability.

(4) TRAC-OAC will utilize the medium resolution simulation model Vector-In-Commander (VIC). SWA 3.0 will be modified to represent an early entry force projection mission. SWA was selected as the appropriate scenario for two reasons. First, SWA presents the austere organization of the early entry force its greatest challenges to mission accomplishment. Any early entry force that is designed/developed must be able to secure, expand, and protect the lodgement; tasks which will be more difficult to perform in the SWA environment than in any other scenario currently available to TRAC. Secondly, the required completion date of this study precludes examining the early entry force in more than one scenario. The impact of employing only one scenario is apparent in its inherent strengths and weaknesses. Obvious strengths include: robustness of designed force (SWA is a more demanding environment than the Generic, Latin America (LATAM), or Northeast Asia (NEA) scenarios); capitalizes on 2K work performed by TRAC-WSMR (they have already examined the 2K force in SWA, LATAM, and NEA scenarios); and, timelines can be maintained thus, providing desired information when needed. The only weakness is that the designed force may be of limited utility if the insights gained from the 2K force analysis are not universally applicable to all potential conflict environments. Measurements of effectiveness to be gained from this analysis will be lethality (systems and personnel), survivability, mission completion (early warning,

adequate security, protection of lodgement) and C2 implications. A comparative analysis across the alternatives will be the product of this portion of the analysis.

(5) TRAC-OAC will conduct an off-line analysis to assess the tactical mobility characteristics of the various 10K alternatives. This will include analysis of the quantity of systems, range capabilities of the systems, and range capabilities of the sustainment systems for each alternative. Limitations of wheeled versus tracked vehicles will be analyzed if the alternatives present this dilemma. Mobility requirements will be identified by the EELS BL as part of the concept for employment of the early entry forces. Mobility analysis will evolve with concept development.

(6) The nature of this force requires it to be sufficiently generic for use throughout the world. Each theater, threat, terrain, and distance combination may require a slightly modified 10K early entry force. These differences may manifest themselves in slightly different equipment, different quantities of equipment, or different priorities in deployment. These differences will be identified by EELS SMEs for several possible scenarios (location, threat, terrain). The unique TPFDL for each of these scenarios will be developed by EELS. MTMC will conduct a deployment analysis with regard to these various deployment schemes and will provide a deployment schedule (time and aircraft) for each of the scenarios.

4. Support and resource requirements.

a. *Support requirements.*

(1) EELS BL. EELS BL will sponsor the study effort, identify study issues, and approve the study plan and final report. EELS BL will provide the base case 10K force for scenario development, SME support to the development of the system substitutions for analysis of the 2K force, the development of the alternative 10K force designs, and the various deployment schemes for the 10K force.

(2) TRAC-WSMR. TRAC-WSMR will serve as the lead analytic agency for the 2K force analysis and will provide input to TRAC-OAC for development of the 10K force analysis.

(3) TRAC-OAC. TRAC-OAC will serve as lead analytic agency for analysis of the 10K force and will integrate deployment work on the 10K force conducted by MTMC.

(4) MTMC. MTMC will conduct deployability analysis in support of both the 2K and 10K force designs.

(5) TRAC Studies and Analysis Center (TRAC-SAC). TRAC-SAC will provide data to support combat simulation modeling.

(6) TRAC-SWC. TRAC-SWC will review all scenarios selected for the study and will recommend necessary modifications to those scenarios to meet study requirements. Director TRAC-SWC will certify all study scenarios.

(7) Combined Arms Command (CAC) Threats. CAC Threats will review all scenarios selected for the study and will recommend necessary modifications to those scenarios to meet study requirements. Director CAC Threats will participate in the certification process for study scenarios.

(8) TRAC-LEE. TRAC-LEE will serve as lead analytic agency for analysis of the sustainment and deployability analysis for the 10K force analysis.

b. *Resource requirements.*

(1) Personnel. Estimated personnel requirements are outlined in table 1 for principal supporting agencies.

Table 1. Estimated personnel requirements

Agency	PSY FY 93
TRAC-OAC	5.0
TRAC-WSMR	3.0
TRAC-LEE	.5
TRAC-SWC	.4
TRAC-SAC	.5
CAC Threats	.4
MTMC	1.0
TOTAL	10.8

(2) Funds. Requirements for coordination among TRAC-WSMR, TRAC-OAC, TRAC-LEE, and MTMC are expected to translate into a travel budget of approximately $3,000 for the duration of the study. Videoteleconferences will be used whenever possible to reduce travel requirements.

c. *Data requirements.* Weapon and system performance data for FY 99 Blue forces, future Blue systems, and 2004 threat forces scenarios must be developed for input to two combat models: VIC and the Combined Arms and Support Task Force Evaluation Model (CASTFOREM). Systems and munitions lists will be generated by TRAC-SAC from existing scenarios; lists will be verified by TRAC-OAC and TRAC-WSMR for U.S. forces and by CAC Threats for all threat forces.

5. **Administration.**

a. *Study schedule.*

(1)	Initial EELS analysis support meeting	15 Dec 92
(2)	WSMR study plan completed	23 Dec 92
(3)	Draft TRAC-OAC study plan completed	15 Jan 93
(4)	TRAC-OAC study plan completed	29 Jan 93
(5)	10K force base case provided to TRAC-OAC	1 Feb 93
(6)	10K force alternatives provided to TRAC-OAC	26 Apr 93
(7)	Senior officer review (2K force only)	13 Apr 93
(8)	VIC analysis of 10K force	May-Jun 93
(9)	Deployability analysis of 10K force	May-Jun 93
(10)	Integration of study areas	Jun 93
(11)	Results presented to EELS BL	Jul 93
(12)	Final report	Aug 93

b. *TRAC-OAC study director.* Mrs. Peggy Fratzel, Chief, Analysis Division I, Combined Arms Analysis Directorate, TRAC-OAC; DSN 552-5474 or commercial (913) 684-5474. Mailing address is Director, TRAC-OAC, ATTN: ATRC-FCA, Fort Leavenworth, Kansas 66027-5200.

ANNEX 1

to

APPENDIX A

REFERENCES

APPENDIX A
REFERENCES

A-1. Army Regulation (AR) 5-5, Army Studies and Analyses, 15 October 1981.

A-2. TRADOC Pamphlet 11-8, Studies and Analysis Handbook, 19 July 1985.

A-3. TRAC-FLVN Policy Memorandum 70-1, Publication of TRAC-FLVN Products, July 1989, and Study Project Leadership Guide, March 1990.

A-4. Draft 11-5, Early Entry Lethality and Survivability Battle Dynamic Operations Concept, 9 December 1992.

ANNEX 2

to

APPENDIX A

GLOSSARY

APPENDIX B
GLOSSARY

2K	brigade size force
10K	division (-) size force
BL	battle lab
C2	command and control
CAC	Combined Arms Command
CASTFOREM	Combined Arms and Support Task Force Evaluation Model, a high resolution combat model
CSS	combat service support
DCSCD	Deputy Chief of Staff for Combat Developments
DRB	division-ready brigade
EELS	Early Entry Lethality and Survivability (Battle Lab)
MTMC	Military Transportation Management Command
NMS	national military strategy
SME	subject matter expert
SOF	special operations forces
SWA	Southwest Asia
TPFDL	time-phased force deployment list
TRAC	TRADOC Analysis Command
TRAC-LEE	TRAC Fort Lee
TRAC-OAC	TRAC Operations Analysis Center
TRAC-OD	TRAC Operations Directorate
TRAC-SAC	TRAC Study and Analysis Center
TRAC-SWC	TRAC Scenario and Wargaming Center
TRAC-WSMR	TRAC White Sands Missile Range
TRADOC	Training and Doctrine Command
U.S.	United States
VIC	Vector-In-Commander, a low-resolution combat model

ANNEX 3

to

APPENDIX A

TRAC-WSMR ANALYSIS PLAN

DEPARTMENT OF THE ARMY
US ARMY TRADOC ANALYSIS COMMAND
WHITE SANDS MISSILE RANGE, NEW MEXICO 88002-5502

REPLY TO
ATTENTION OF

ATRC-WAB 23 Dec 92

MEMORANDUM FOR Chief, Early Entry Lethality and Survivability Battle Lab, ATCD-L, HQS, TRADOC, Fort Monroe, VA 23651-5000

SUBJECT: Analysis Plan for Modernization of Lethality and Survivability of the Early Entry Force

1. References.

a. Memorandum, ATCD-L , 20 Nov 92, subject: Modernization of Lethality and Survivability of the Early Entry Force

b. Phonecon MAJ Miller, EELS and Mr. Porter, TRAC-WSMR, 23 Dec 92, SAB.

2. The TRAC-WSMR analysis plan to address issues stated in Ref a. is enclosed for your approval. The charges discussed in Ref b. are included, and TRAC-WSMR is proceeding to complete work on the schedule established in para 4 of the plan.

3. TRAC-WSMR POC is Richard W. Porter, DSN 258-3535.

FOR THE DIRECTOR:

Roy F. Reynolds

ROY F. REYNOLDS
Director, Close Combat Directorate

Encl

CF:
Dir, TRAC TOD (Mr. Martin)
Dir, TRAC-OAC (Dr. LaRocque)
Dir, TRAC-WSMR (Dr. Collier)

1. Purpose. This analysis plan specifies TRAC-WSMR's analytic support to the Early Entry Lethality and Survivability (EELS) Battle Lab, as requested in ATCD-L Memo, dated 20 Nov 92, Subj: Modernization of Lethality and Survivability of the Early Entry Force.

2. Scope. Work under this plan will be accomplished at the Brigade/Battalion level to provide information to the EELS Lab concerning the optimization of the lethality and survivability of Early Entry Forces at this level for the U.S Army.

a. Issues to be addressed in this Analysis. The following will be accomplished under this plan in order to provide EELS with information on recommended systems for the first brigade deployed as an early entry force to secure an entry point, establish an air land facility, and defeat attempts by local enemy forces to retake the entry point. The following issues will be addressed with consideration of the airlift requirements for the force:

(1) Optimize lethality and survivability of early entry forces.

(2) Optimize force mix configurations for entry deployment to improve mobility, survivability, and sustainability of early entry forces.

b. Limitations.

(1) Analysis will be limited to available, operational scenarios that may be quickly modified to represent Early Entry Forces.

(2) Threat systems considered for analysis of issues in the study plan will reflect, and remain constant with, 2004 projections as represented in operational scenarios.

c. Assumptions.

(1) Current operational scenarios and modifications to represent the Division Ready Brigade (DRB), will be certified for use in this analysis.

(2) Performance data will be available for the CASTFOREM model for U.S. POM systems, selected future systems. and for threat systems.

(3) Valid cost estimates will be available for future systems considered for the Early Entry Force.

3. Methodology.

a. Base Case Early Entry Force. The base case force for consideration in this analysis will represent a Brigade from the 82nd Airborne Division, as projected for the 1999 POM force. Each scenario used in the analysis will be constructed to represent portions of the brigade in action during phases of an early entry operation. Multiple base case runs in the CASTFOREM model will establish the capability of the base force to engage the projected threat in each phase.

b. Future System Alternatives. A list of future system alternatives that are currently under consideration for this analysis is attached as Encl 1. Each system selected will be run in the CASTFOREM model for each scenario to establish the contribution of that system to the base early entry force. Combinations of systems will be selected from the individual system runs by the study team and these combinations will also be run in the CASTFOREM model. Results from CASTFOREM will be used as input data for Brigade Mix Model runs to determine the optimum force to deal with the projected threat either in a constrained airlift or an unlimited airlift mode.

c. Scenarios for Analysis of the Early Entry Force. The TRAC-WSMR Study Team will execute CASTFOREM runs with a POM (FY99) Early Entry Force against a 2004 threat in three scenarios to provide the basic run data for the analysis. Exact troop and weapons lists will be agreed to by the EELS and the TRAC-WSMR Study Team prior to beginning the runs. The following scenarios will be modified and used to provide the basic data:

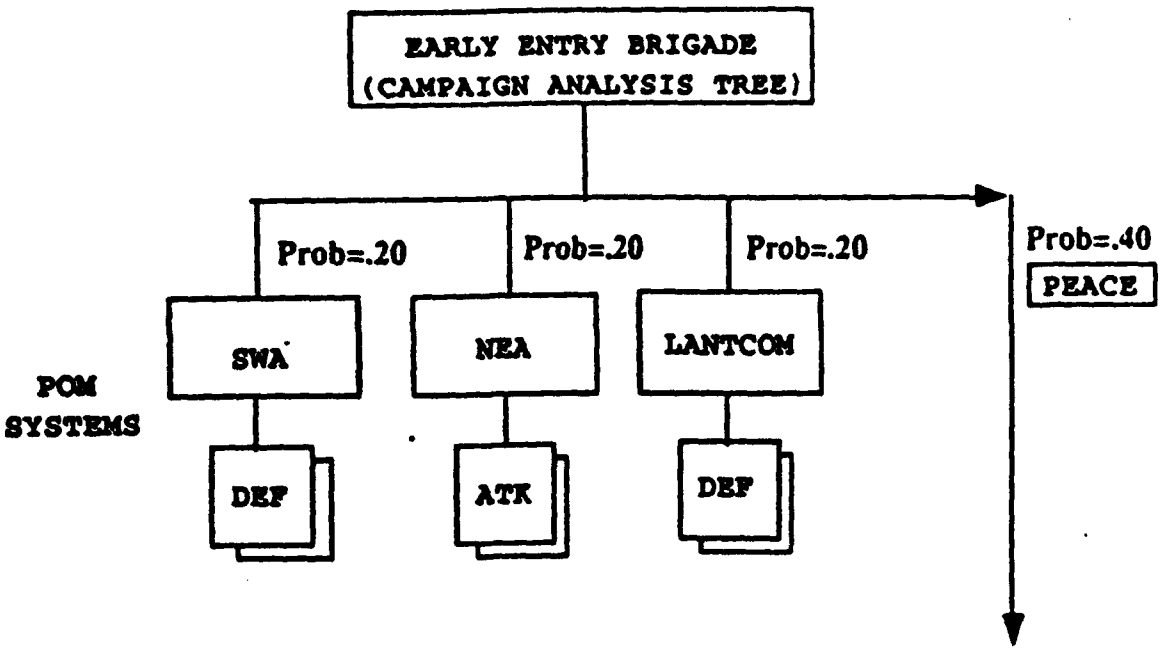
- HRS 30 Variant: The HRS 30 scenario is a light infantry defense against an armor attack in SWA. The blue force in this scenario will be changed to a Division Ready Brigade (DRB) with two battalions in defense supported by brigade assets.

- HRS 31 Variant: The HRS 31 scenario is a hasty attack by a blue heavy force against a balanced enemy defense in NEA. The dismounted portion of the attack will be isolated, changed to an airborne force assault force, and used to represent the securing of an air land facility by the Early Entry Force.

- HRS 33 Variant: The HRS 33 scenario is forced entry by an airborne brigade in LANTCOM. This scenario will be run as it exists with two battalions from the early entry force consolidating blocking positions to keep a mechanized enemy task force from reaching an objective.

d. Campaign Analysis. The results from the base case runs and the runs with future systems will be used in the TRAC-WSMR Brigade Mix Model to optimize on the maximum difference between enemy losses and blue losses for the situations available in each theater.

(1) The data in the following diagram pertaining to the number of battles in each of the theaters and the probabilities associated with each occurring will be established by EELS and the Study Team prior to making the Brigade Mix Model runs.



(2) The following constraints will be applied to the determination of the optimum force structure:

- Primary armor/anti-armor systems will be limited in increase or decrease to no more than 50% of the strength of the number of systems portrayed in the CASTFOREM runs.

- Supporting systems, e.g., air defense systems, will be proportional the number of primary systems selected by the optimization routine.

- Organizational balance will be maintained as near as possible to limit the possibility of selecting all of one type of system in the optimization process.

(3) Air loading data will be obtained from the Military Traffic Management Command to determine equivalent plane loads of weapon systems in the early entry analysis and the number of plane loads required to deploy the projected base case early entry force. With this information, it will be possible to add the constraint of equivalent aircraft loads to the Brigade Mix Analysis to determine the maximum effective force given the number of aircraft is limited to that required for the base case entry force and to calculate the mix of aircraft required to move the maximum effective force.

4. Schedule.

a. Study Planning.

Analysis plan submitted to EELS	18 Dec 92
Analysis plan approved	31 Dec 92

b. Study Execution.

Modify brigade/battalion scenarios	Dec 92-Jan 93
Complete brigade/battalion runs	Jan- Feb 93
Receive air load data from MTMC	Jan 93
Complete Brigade Mix analysis	Feb 93
Prepare Briefing and Supply Data to EELS	1 Mar 93
Adjustments (if required) for presentation	24 Mar 93
Briefing to EELS Senior Officer Review	30 Mar 93

c. Study Documentation.

Draft report	15 Apr 93
Final Technical Report for Approval	30 Apr 93

CANDIDATE ALTERNATIVE SYSTEMS

1. AH-58/WARRIOR W/HELLFIRE
2. AH-58/WARRIOR W/LONGBOW
3. AGS W/FUTURE MUNITIONS
4. AGS W/2ND GENERATION SENSOR
5. FUTURE SOLDIER SUIT
6. 155 TOWED HOWITZER W/SADARM
7. 105/155 TOWED HOWITZERS W/IMPROVED CONVENTIONAL MUNITIONS
8. HIMARS W/DPICM
9. HIMARS W/SADARM/BAT
10. MORTARS W/INCREASED CALIBER
11. MORTARS W/IMPROVED CONVENTIONAL MUNITIONS
12. MORTARS W/SMART MUNITIONS
13. IMPROVED SMALL ARMS
14. IMPROVED SENSORS FOR DISMOUNTED WEAPONS
15. WIDE AREA MINES (WAM)
16. NLOS-CA
17. LOSAT (AGS chasis)

ANNEX 4

to

APPENDIX A

TRAC-OAC ANALYSIS PLAN

ANALYTICAL SUPPORT PLAN
FOR
10K FORCE ANALYSIS

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1. **Purpose.** The purpose of this analysis plan is to outline the analytical support that the TRADOC Analysis Command (TRAC) will provide to the Early Entry Lethality and Survivability (EELS) Battle Lab (BL), the study sponsor, for the 2K-10K Force Analysis study. This document concentrates on the support for the 10K force. Documentation specifically developed in support of the 2K force is at appendix C.

2. **Scope.**

a. *Assumptions.*

(1) System definitions will be available in sufficient detail for evaluation purposes.

(2) Threat doctrine, equipment, and force structure projections through 2004 are accurate.

(3) Blue doctrine and equipment projections through 2004 are accurate.

(4) Approved surrogate data will be available to be substituted for identified data deficiencies.

(5) Supply requirements based on Army planning factors are representative of supply requirements.

(6) Requirements based on Army (manpower authorization requirements criteria) (MARC)) maintenance data-base information are representative of maintenance requirements.

b. *Constraints.*

(1) This force must function as an early entry force with worldwide applicability. The analysis must offer insights into the feasibility of this force to succeed at this mission. Currently, two low-resolution scenarios exist in which an early entry mission can be analyzed. One will depict an open terrain environment, and one will depict rolling terrain. Threat forces will be heavy forces in both scenarios. The constraint of this portion of the analysis lies in the fact that threat forces, environment, climate, etc., will not be varied in simulation modeling over the entire spectrum that this force can expect to face. Insights into the variations that could exist will be addressed off-line when feasible.

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(2) The logistics impact analysis (LIA) will be constrained in scope and depth by the level of resolution of current data defining these units.

3. Environmental and threat considerations.

a. *Environment*. The simulation modeling will not include climatic variations, nor nuclear, biological, or chemical warfare.

b. *Threat*. The threat year for each of the scenarios will be 2004.

4. Methodology.

a. *Related studies*. Studies will be researched as issues arise from the simulation modeling. Some areas of interest cannot be fully modeled. An example would be the threat from theater ballistic missiles. This issue will be addressed by researching appropriate studies which have developed conclusions about the likelihood of this type of threat and the required Blue capability to deter this threat. Other issues, still unknown to the sponsor, may arise and will require the study team to attempt to address them off-line. Research will be the primary tool for these issues.

b. *Study issues*.

(1) What is the war-fighting capability of modernized early entry force alternatives? (Study issue 1.0) (TRAC-OAC)

(2) What are the differences in sustainability among the 10K alternatives? (Study issue 2.0) (TRAC-LEE)

(3) What is the lift requirement for each of the 10K force alternatives? (Study issue 3.0) (TRAC-LEE/MTMC)

(4) What are the various deployment schedules (time and aircraft) for the preferred 10K alternative based on employment in various theaters? (Study issue 4.0) (TRAC-LEE/MTMC)

(5) What are the command and control (C2) implications of a fully modernized early entry force? (Study issue 5.0) (TRAC-OAC)

(6) How tactically mobile are each of the 10K alternatives? (Study issue 6.0) (TRAC-LEE)

c. *Essential elements of analysis (EEA)*.

(1) Study issue 1.0.

(a) What capabilities will the force need to control the threat? (EEA 1.1)

(b) What capabilities will the force need to attrit the threat to a level that the close combat forces of the 10K force can survive and have mission success? (Survive is defined as 70-percent survival rate. Mission success is defined as protection of the lodgment from interdiction of a nature to cause the lodgment to cease to function as a safe haven.) (EEA 1.2)

(c) What capabilities will the force need to win the information war? (EEA 1.3)

(d) What capabilities will the force need to prevent early catastrophic casualties? (TBM, NBC) (EEA 1.4)

(e) What is the largest force that this 10K force is capable of defeating? (EEA 1.5)

(2) Study issue 2.0. What are the requirements to arm, fuel, fix, move, and provide soldier support for each of the 10K alternatives? (EEA 2.1)

(3) Study issue 3.0. What are the lift requirements in terms of time and aircraft to strategically deploy each of the 10K alternatives in a representative SWA scenario? (EEA 3.1)

(4) Study issue 4.0. How will the deployment schedule be affected when a joint time-phased force deployment list (TPFDL) is varied for different theaters and missions? (EEA 4.1)

(5) Study issue 5.0.

(a) What C2 implications exist for an early entry force? (EEA 5.1)

(b) What C2 capabilities does the force need to successfully orchestrate the battle in an expanded battlespace? (EEA 5.2)

(6) Study issue 6.0. Are the organic systems capable of providing the required tactical mobility as dictated by the concept of employment for this force? (EEA 6.1)

d. *Measures of effectiveness (MOE) correlated to specific EEA as indicated.*

(1) Study issue 1.0.

(a) The range and type of Red ground system that first acquired the 10K force. (EEA 1.1, 1.2)

(b) The type of threat system (or systems) most lethal versus the 10K force. (EEA 1.1, 1.2)

(c) The Blue system (or systems) that contributes the most to the fight in terms of lethality and survivability. (EEA 1.1, 1.2)

(d) The threat systems that are best at acquisition and the means by which this is accomplished. (EEA 1.3)

(e) The Blue systems that can efficiently counter the capabilities determined in 4d(1)(d) above. (EEA 1.3)

(f) The Blue systems that provide the most "information" in terms of range, coverage, accuracy, real time, and survivability. (EEA 1.3)

(g) The capability and likelihood that exists in terms of time, quantity, and range for threat forces to employ TBM, NBC, etc. (EEA 1.4)

(h) The Blue capability that exists to counter the capabilities determined in 4d(1)(g) above. (EEA 1.4)

(i) The Red unit that can be defeated by a 10K force. (EEA 1.5)

(2) Study issue 2.0.

(a) The CSS force structure required to sustain each alternative. (EEA 2.1)

(b) The CSS manpower requireed to sustain each alternative. (EEA 2.1)

(c) The amount of Class III (bulk fuel), Class V (ammunition), Class VII (major end items), Class VIII (medical supplies), and Class IX (spare parts) required to sustain each alternative. (EEA 2.1)

(d) The amount of supplies available as prepositioned stockage. (EEA 2.1)

(e) The maintenance manhours required for each alternative. (EEA 2.1)

(f) The transportation assets required for each alternative. (EEA 2.1)

(g) The medical personnel required for each alternative. (EEA 2.1)

(3) Study issue 3.0.

(a) The aircraft required to strategically airlift each alternative. (EEA 3.1)

(b) The time required to strategically airlift each alternative. (EEA 3.1)

(4) Study issue 4.0.

(a) The aircraft required to strategically airlift each alternative. (EEA 4.1)

(b) The time required to strategically airlift each alternative. (EEA 4.1)

(c) The combat strength in theater for each day of the deployment schedule. (EEA 4.1)

(5) Study issue 5.0.

(a) The organizational structure of the 10K alternatives. (EEA 5.1, 5.2)

(b) The C2 initiatives available to this early entry force. (EEA 5.1, 5.2)

(c) The C2 linkage to joint, combined, or coalition forces in theater. (EEA 5.1, 5.2)

(6) Study issue 6.0.

(a) The systems which have the organic ability to move themselves. (EEA 6.1)

(b) The portions of the 10K force which are not tactically mobile. (EEA 6.1)

e. *Alternatives.* The base case for the 10K force analysis will be a division (-) structure from the 82d Airborne Division equipped with 1999 equipment. The alternatives have not been determined. Work currently being conducted by TRAC-WSMR on the 2K force will provide insights for design of the 10K alternatives. Alternatives will be defined by EELS BL.

f. *System employment and organization plan.* N/A

g. *Mission profile.* N/A

h. *Models.* The Vector-In-Commander (VIC) medium resolution model will be used for analysis of the 10K alternatives.

i. *Method of analysis.*

(1) 2K force. Analysis of the 10K alternatives will be supported by the 2K force analysis being conducted by TRAC-WSMR. The analysis plan for the 2K force analysis is at appendix C.

(2) 10K preliminary design. The result of the TRAC-WSMR work will be two 2K designs. One will be designed based on maximizing effectiveness within lift constraints of a current DRB. The second design will be based on maximizing effectiveness, within force structure constraints, but without regard to lift. Each of these designs will be expanded to develop 10K alternatives. EELS subject matter experts (SMEs) will work with TRAC personnel using information derived from the TRAC-WSMR analysis and will develop 10K alternatives. The TRAC-WSMR work will include, in addition to the preferred 2K force design, information about "value added" by individual new systems and by combinations of new systems. This work will aid the EELS SMEs in determining which elements would be most beneficial to arrive in theater shortly after the 2K force to augment and expand the battle space. In addition, corps elements which will augment this 10K force will be identified by EELS SMEs. These efforts will produce the 10K alternatives. For study completion by July 1993, the 10K alternatives must be defined by 5 April and must be limited to no more than four alternative designs.

(3) 10K mission analysis.

1. TRAC-OAC will utilize the medium-resolution simulation model VIC. Two scenarios will be modeled: SWA 3.1 and the Generic Scenario. These scenarios provide opportunities to analyze these alternatives in rolling terrain and desert terrain. A compar tive analysis across the alternatives will be the product of this portion of the analysis.

2. For each of the scenarios, a current division (-) force structure equipped with 1999 equipment will be gamed as the base case. The desire is to see if a light, easily deployable force can conduct the mission of security for a lodgment. Measurements will be taken in regard to success/failure of this unit. These will include number of Blue casualties, Red casualties, types of efficient killer systems (Blue and Red), types of vulnerable systems (Blue and Red), acquisition capabilities (Blue and Red), acquisition advantages, counter-acquisition capabilities (Blue and Red), etc. Once this information has been compiled, the 10K alternatives (designed from the 2K force analysis) can be "tweaked" to benefit from this information. Extremely lethal systems can be added, vulnerable systems minimized, enhanced acquisition capability added, etc. These improved 10K alternatives will then be dynamically gamed to measure each alternatives' success/failure in the security mission. Measurements will be taken regarding lethality, survivability, "reach" of the force, timeliness of destruction, synergistic effect of various capabilities, etc. From this, strengths and weaknesses can be identified for each of the alternatives and the 10K force which best

meets mission requirements will evolve. This force must be tested dynamically to determine the greatest threat force against which this unit could be successfully employed.

(4) 10K LIA. Logistics analysis for the 10K force alternatives will be conducted by TRAC-LEE. This analysis will include determination of the requirements to arm, fuel, fix, move, and sustain the alternatives. In addition to the traditional LIA, TRAC-LEE will research the feasibility of new, innovative approaches for support of the early entry force. The uniqueness of an early entry force, a stand-alone entity, requires support in a nontraditional manner. New support capabilities are necessary.

(5) 10K deployability. TRAC-LEE will conduct the deployability analysis with support from MTMC. The deployability analysis will include airlift analysis for each of the 10K alternatives. This will include aircraft requirements and time scheduling for the deployment of each of the alternatives in a representative SWA scenario. Once the preferred 10K alternative has been chosen (from all phases of the analysis), the EELS SME will prepare various TPFDLs to correlate with real world locations, threats, and missions. MTMC will deploy the preferred alternative based on these TPFDLs and provide the combat strength on a day-by-day basis for each of the locations chosen.

(6) 10K C2. C2 implications will be addressed for the 10K force. As the mission analysis is being conducted for the 10K alternatives, C2 issues will be developed correlated to the types of equipment, organizational structure, mission requirements, etc. Off-line analysis will be utilized to address the C2 implications of the 10K force.

(7) 10K mobility. Tactical mobility will be addressed by TRAC-LEE. It is necessary for this force to contain sufficient tactical mobility to accomplish mission requirements of the employment concept. This analysis will address the inherent organic tactical mobility of the equipment and force structure.

5. Resources support requirements.

a. *Support requirements.*

(1) TRAC-Operations Analysis Center (TRAC-OAC), Combined Arms Analysis Directorate (CAAD).

(a) Write analytical support plan for the 10K force analysis.

(b) Write the study plan for the 2K-10K Force Analysis study.

(c) Serve as lead agency for incorporating analyses provided by other agencies in support of the 10K analysis.

(d) Prepare scripted briefing of final analysis.

(e) Write final report.

(f) Serve as lead agency for mission analysis of 10K force.

(g) Serve as lead agency for C2 implications analysis of 10K force.

(2) TRAC-OAC, Production Analysis Directorate (PAD).

(a) Develop SWA 3.1 base case for VIC.

(b) Develop the Generic Scenario base case for VIC.

(c) Serve as lead agency for VIC computer simulation of SWA 3.1 and the Generic Scenario.

(3) TRAC-Scenarios and Wargaming Center (TRAC-SWC).

(a) Provide assistance in developing SWA 3.1 and the Generic Scenario for each base case.

(b) Certify the base-case scenarios in VIC.

(4) TRAC-Study and Analysis Center (TRAC-SAC).

(a) Provide one officer to serve as data manager for this study.

(b) Serve as lead agency for the development of data for the study.

(5) TRAC-LEE. Provide LIA, deployability analysis, and mobility analysis. Coordinate with MTMC for support as required.

(6) CAC Threats. Provide certification of the threat portrayal to TRAC-SWC for each base case.

(7) MTMC. Conduct deployability analysis.

b. *Resource requirements.*

(1) Travel: $3,000.

(2) Contracts: none.

c. *Data requirements.* The best available data will be used in all cases for this study.

6. **Study schedule.**

Initial EELS analysis support meeting	15 Dec 92
WSMR study plan completed	23 Dec 92
TRAC-OAC study plan and analysis plan completed	01 Mar 93
Senior officer review [2K force]	13 Apr 93
VIC analysis of 10K alternatives	15 Mar-Apr 93
Deployability analysis of 10K alternatives	Apr-May 93
Integration of study areas	Jun 93
Final report	Jul 93

ANNEX 5

to

APPENDIX A

DISTRIBUTION

APPENDIX E
DISTRIBUTION

Commander, CAC and Fort Leavenworth
ATTN: ATZL-CG
Fort Leavenworth, KS 66027-5000

TRADOC DCSCD
ATTN: ATCD-ZA
Fort Monroe, VA 23651

Deputy Commanding General for Combat Developments
ATTN: ATZL-CD
Fort Leavenworth, KS 66027-5300

Commander, TRAC
ATTN: ATRC
Fort Leavenworth, KS 66027-5200

TRADOC DCSA
ATTN: ATAN-AA
Fort Monroe, VA 23651

Director, CAC Threats
ATTN: ATZL-CST-S
Fort Leavenworth, KS 66027

Director, TRAC-OAC
ATTN: ATRC-F/ATRC-FS/ATRC-FP/ATRC-FC/ATRC-FT
Fort Leavenworth, KS 66027-5200

Director, TRAC-WSMR
ATTN: ATRC-W/ATRC-WAB
White Sands Missile Range, NM 88002-5502

Director, TRAC-OD
ATTN: ATRC-TD
Fort Leavenworth, KS 66027-5200

Director, TRAC-SAC
ATTN: ATRC-SA/ATRC-SAD
Fort Leavenworth, KS 66027-5200

Director, TRAC-SWC
ATTN: ATRC-SW
Fort Leavenworth, KS 66027-5200

ANNEX 6

to

APPENDIX A

CONCURRENCES/COORDINATION

CONCURRENCES

Dir, TRAC-WSMR:	concur/~~nonconcur~~ Mr. Porter/telephonic	16Feb93
Dir, TRAC-LEE:	concur/~~nonconcur~~ Mr. Cameron w/comments	02Feb93
Dir, TRAC-OD:	concur/~~nonconcur~~ CPT Blanks w/comments	16Feb93
Dir, C3ISAD:	concur/~~nonconcur~~ Mr. Kroening w/comments	29Jan93
Dir, MD:	concur/~~nonconcur~~ Mr. Ward/telephonic	01Feb93
Dir, PAD:	concur/~~nonconcur~~ Mr. Boehner/telephonic	19Feb93
Dir, TRAC-SAC:	concur/~~nonconcur~~ COL Resnick w/comments	29Jan93
Dir, TRAC-SWC:	concur/~~nonconcur~~ COL Garlock w/comments	01Feb93
Dir, CAC-Threats:	concur/~~nonconcur~~ LTC Oberst w/comments	19Jan93

ATRC-SA

29 January 1993

MEMORANDUM FOR DIRECTOR, CAAD, TRAC-OAC, FT LEAVENWORTH, KS 66027

SUBJECT: 2K - 10K Force Analysis Study Plan Coordinating Draft

1. We have reviewed your draft plan and provide the following:

a. Objectives, as stated, are tasks; therefore, need considerable rewording.

b. Study Issues seem to proceed from a set of assumptions which are not clear. Would recommend the following additions:

(1) What are the missions of the 2K and 10K early entry force?

(2) What are the threats to these forces?

(3) What support is available from other sources (HN, AF, Navy)?

(4) What deficiencies in survivability and lethality exist in the DRB and the 82nd(-)? (An aside - the paper uses "lethality and survivability" as if they were a single capability--in fact, they may need to examine trades between the two.)

c. Uncertain why mobility is a study issue for the 10K force.

d. Methodology. The size of the force seems to be arbitrarily fixed. Instead the analysis should proceed from the missions of these two packages of early entry forces, and determine the force required given current design to accomplish the missions. If thats 3K, well so be it. Now you can optimize in two directions--either minimize casualties to achieve the mission given deployment constraints, or minimize deployment to achieve the mission. (Alternatives to maximize effectiveness without regard to lift make no sense - they result in a heavy force.)

e. Alternative systems do not include any hand held antiarmor, nor any AD (ignores TBM threat).

f. The specific HIMARS issues must be included as was agreed by OAC. The study director must contact Mr. Bill Milspaugh, Depth & Simultaneous Attack Battle Lab, DSN 639-6400.

2. SAC data manager will be CPT Tiongson.

ATRC-SA
SUBJECT: 2K - 10K Force Analysis Study Plan Coordinating Draft

ALLAN M. RESNICK
COL, FA
Director, Study & Analysis Center

CF:
Dir, TOD

SK

21-93 Time: 4:06p

tt,

TDD's review of the draft 2K-10K Force Anlaysis study plan is complete. When the following comments are incorporated into the final study plan and all interested parties' concerns have been addressed, we will recommend CG, TRAC certification. The study schedule should allow sufficient time for certification (normally two weeks).

TRAC must analyze lethality and survivability of alternative 2K-10K forces. This analysis will include future systems; therefore, some form of cost anlaysis maybe warranted in the consideration of modernized forces. If so, DCSA-Cost must be consulted in the cost assessment and must certify the cost portion of the study plan and final report.

Pg 2 Paragraph (5). This paragraph should clarify whether it is a strategic or tactical mobility assessment or both. Paragraph (6). It is unclear how a tradeoff analysis can result from assessing the deployability of only the preferred 10-K alternative. Additionally, a paragraph (7) should address some form of sustainability analysis. Although the schedule may limit the scope of a sustainability analysis, at least a subjective comparison should be done.

Pg 3. The objectives section needs to address the contributions of TRAC-LEE if they will participate in the study. Ms. Pat Doherty is the POC.

Pg 4. Paragraph (5). What is the source of the personnel Capabilities assessment? If TRAC-FBHN is participating, they should be included also. Paragraph f.(5). Do these terms describe mobility?

Cover page should contain consistent signature blocks. BG Lenaway's rank should be cited as MG Lehowicz's. Page 6. Paragraph (6). Editorial: delete hard-return in line 3. Page B-1 Editorial: SWA definition typo. Appendix C. A note should be added verifying that the WSMR study plan has been approved by EELS. Consider including the approved WSMR study plan cover sheet in the appendix.

ks @ 5511

KSK, DOHERTYP, TISDELS

ATRC-FSI 29 January 1993

MEMO FOR Director, CAAD

SUBJECT: 2K-10K Force Analysis Study Plan Comments

1. Comments on the 2K-10K Force Analysis Study Plan are provided below.

2. Sustainment issues. The study plan states that one of the objectives of the Early Entry Lethality and Survivability (EELS) Analysis is to design a force that is "readily sustainable." Is there further or outside efforts that will address this issue? Or is the mobility analysis all that is needed? It would be helpful if the study plan made clear that a full sustainabilty analysis will not be done or state the reasons that the mobility analysis is sufficient.

3. Scenarios. The study plan calls for two scenarios to be used for the 10K analysis: Generic Scenario for rolling terrain and SWA 3.0 for desert terrain. Both of these scenarios may need more than review and certification by TRAC-SWC and CAC Threats. SWA 3.0 has not been used for some time (approximately two years) and will need modifications since the size of the Blue force is larger than 10K. The Generic Scenario begins at D+9 with the forces at a considerable distance from one another. Some work may be needed to develop the story line to get the units in contact. The terrain, as far as the VIC model is concerned, is primarily "good." To see a difference, a suggested approach would be to use the Generic Scenario (updated by TRAC-SWC and CAC Threats) with terrain mapped to "good", and then use it with terrain mapped to the next worse level of terrain. This would reduce the requirement on TRAC-SWC and CAC Threats, be true to the intent of the study (a force able to perform "throughout the world"), and provide consistency for comparisons.

4. POC is Ms. Mary L. Horner, ext. 3533.

DONALD W. KROENING
Director, C3I SAD

C-LM (ATRC-FC/19 Jan 93) 1st End (5-5d) P. Doherty/
CSN 539-1811
SECT: 2K - 10K Force Analysis Study Plan Coordinating
ft

ector, TRAC-LEE, ATTN: ATRC-LM, Fort Lee, VA 23801-
110 2 Feb 93

DIRECTOR, COMBINED ARMS ANALYSIS DIRECTORATE, ATTN:
ATRC-FC (I. PRUEITT), FORT LEAVENWORTH, KS 66027-5200

TRAC-LEE has reviewed the study plan, SAB, and has the
llowing recommendations:

a. Page 1, para 1, line 8. Add "and sustainability"
ter "survivability."

b. Page 2, para 3c(4). Add TRAC-LEE to second sentence.

c. Page 2, para 3c(5). Don't understand "range of
stainment capabilities." Is this part of the sustainment
lysis?

d. Page 2, para 3c(6). Why not do deployability
lysis on all the alternatives?

e. Page 2, para 3c(7). Add the following paragraph:

LEE will conduct an analysis of each of the 10K
natives and compare the sustainability impacts across
natives. Each of the Combat Service Support (CSS)
ctional areas (arm, fuel, fix, and man the force) will
examined for these impacts.

f. Page 4, para 3f. Add the following study issue:

at are the differences in sustainability among the 10K
ernatives?

g. Page 6, para 4a. Add TRAC-LEE to support
irements section.

h. Page 6, Table 1. Add .5 PSY for TRAC-LEE.

i. Page 6, para 4b(2). Add TRAC-LEE to coordination.

j. Page 7, para 5a(11). Change "92" to "93."

LM
CT: 2K - 10K Force Analysis Study Plan Coordinating

RAC-LEE POC is Ms. Pat Doherty, DSN 539-1811.

for Richard C Ortl LTC, FA
ROBERT A. CAMERON. JR,
Director

Encl

ATRC-SWH 1 February 1993

MEMORANDUM FOR DIRECTOR, COMBINED ARMS ANALYSIS DIRECTORATE,
TRAC-OAC, ATTN: ATRC-FCA (MS PRUEITT),
FT LEAVENWORTH, KS 66027-5200

SUBJECT: Review of 2K-10K Coordinating Draft Study Plan, dated 19 January 1993.

1. References.

a. TR 71-4, TRADOC Scenarios for Combat Developments, dated 31 July 1989.

b. TRAC Memorandum, ATRC-TD, dated 6 January 1993, Subj: Certification of TRADOC Scenarios (TRAC Policy Memorandum 5-5.1.3.1).

2. Comments.

a. Under objectives, TRAC-WSMR has been tasked to design a 2K force in two different settings. One based upon current lift constraints and the other without regard to lift constraints. Without further defining the parameters, that may be an impossible task. Without knowing the mission, threat, support available from other services, and the host nation or environment, it will be difficult to develop the best solution.

b. Under scope, it states only approved TRADOC scenarios will be used. Later, it states the Generic scenario would be used. The Generic scenario is not an approved TRADOC standard scenario and does not meet guidelines for certification as outlined in TRAC Policy Memorandum 5-5.1.3.1.

c. The standard scenarios TRAC-WSMR is using for analysis all have a Blue force structure of 1999. That conflicts with guidance stating Blue base case will be current Division Ready Brigade (DRB).

d. The term "casualties" needs to be defined. Janus and CASTFOREM only play personnel kills. An accurate portrayal of wounded is not possible.

e. There is concern over the methodology used to select SWA 3.0 over SWA 4.2 or TRS 1.0. Certification of excursions based on SWA 3.0 will be hampered by Red and Blue force structure, weapons systems, and scheme of maneuver.

ATRC-SWH
SUBJECT: Review of 2K-10K Coordinating Draft Study Plan, dated 19 January 1993.

f. TRAC-WSMR states they are to provide ZELs with information on recommended systems to secure an entry point, establish an air landing facility, and defeat a local force attempt to retake the entry point. A clarification may be necessary. Identification of the best 2K force under current lift constraints and without regard to lift was the task assigned to TRAC-WSMR.

g. TRAC-WSMR states the study scenario is to use the DRB force structure as the base case. This is too vague. The DRB (M) Alpha echelon is portrayed in HRS 33.0, but the DRB (Hvy) Alpha and Bravo echelons are portrayed in the study version of HRS 30.0. This difference in force structure will impact on the outcome of the study.

h. TRAC-WSMR selected HRS 30.0, 31.0, and 33.0 as study scenarios. Only HRS 33.0 simulates the securing of an entry point and establishing and defending an airhead. HRS 30.0 can be configured to defending an airhead, but TRAC-WSMR would be hard pressed to include a secured and established phase in their excursion. HRS 33.0 would need extensive changes to include securing an entry point and defending the airhead.

i. Recommend the Air Force be included in the coordination of this study effort.

3. POC at TRAC-SWC is MAJ Gibson, 4012/15; POC at CAC-Threats is Mr Ennis, 5197.

for WARREN D. GARLOCK
COL, IN
Director, Scenario and Wargaming Center

CF:
DIR, CAC-THREATS, ATTN: ATZL-CST (MR ENNIS), FT LEAVENWORTH, KS 66027-5310

ATZL-CST-S (ATRC-FC/19 Jan 93) (71) 1st End MAJ Weaverling/sc/5197
SUBJECT: 2K - 10K Force Analysis Study Plan Coordinating Draft

Commander, USACAC & Ft Lvn, CAC Threats, ATTN: ATZL-CST-S (MAJ Weaverling), Fort Leavenworth, KS 66027-5310

FOR Director, Combined Arms Analysis Directorate, ATTN: ATRC-FC (Ms. Iris Prueitt), Fort Leavenworth, KS 66027-5200

1. CAC Threats concurs with the draft 2K-10K Force Analysis Study Plan, with the following comments:

a. Updated TOEs and Weapons and Munitions List (utilized for SWA 4.2 and SWA TRS 1.0) will be provided by CAC Threats for the SWA 3.0 threat to ensure the most current data available is used. These force structures and weapon systems are based upon post-Desert Storm assessments. SWA 3.0 was a pre-Desert Storm scenario and no longer current.

b. Augment the Generic Scenario with the robust 2004 capability based threat and concept of operations coordinated with LTC Martin, TRAC-OAC (PAD). The original Generic Scenario represents a 1988 threat capability which does not provide a stressful fight for the purposes of the EELS 10K study.

2. In addition, the following concerns should be noted:

a. Use of the Generic Scenario to analyze the employment of early entry forces may be inappropriate. The threat forces have been in combat for weeks, have been heavily attrited, and are under constant attack by blue air. This scenario would not provide the stressful fight for the 10K "early entry" force. Also, the Generic Scenario is not an approved TRADOC Standard Scenario.

b. The employment of blue air power in SWA 3.0 and the Generic Scenario must be reviewed to ensure a viable threat force survives to provide the 10K force a fight.

3. CAC Threats also reviewed the WSMR study analysis plan included with the draft study plan. The following comments are provided:

a. Do not use HRS 30 in this study. This scenario was not developed from Defense Planning Guidance, not linked to a Low Resolution or Theater Resolution Scenario, and has never been approved as a TRADOC Standard Scenario.

b. HRS 31 and 33 are reasonable, however, HRS 31 is not yet approved.

4. The point of contact at CAC Threats is Major Ron Weaverling, x5197.

for Nicholas C. Lamey, GS-14
DAVID J. OBERST
LTC, MI
Director, Threats

CONSIDERATION OF COMMENTS

All comments were accepted and incorporated except those listed below.

TRAC-SAC

1.a. *Objectives were* approved by the study sponsor.

1.b. Study Issues were approved by the study sponsor. In addition, the recommended additions are in the realm of concept development. The sponsor has the responsibility to determine where this force fights, who it fights, its missions, the supporting sources, etc. The study goal is to test the capability of these predetermined requirements.

1.c. Tactical mobility is very important for an early warning force. There will be limited support assets in theater in this time frame and initial positioning or repositioning of forces will be hampered by requirements beyond their organic mobility assets.

1.d. The "names" of the forces, i.e. 2K and 10K, were determined by the study sponsor. There is no requirement to constrain the force to these quantities it was a mere reflection of a light commander's concept of firepower associated with a brigade task force and a division task force, respectively.

1.e. The alternative systems listed in the 2K analysis plan reflect those currently identified as possibilities. It is not a totally inclusive list. The base case force (1999) will have Javelin and Stinger capability. Alternatives for the 10K analysis will consider Patriot and Erint capability. Because the system list for alternatives is still evolving, all systems which will be considered in the 10K analysis have not been identified and therefore no attempt was made to estimate all systems under consideration.

1.f. The Depth & Simultaneous Attack Battle Lab was contacted in writing by Dr. LaRocque informing them of the intent and scope of the 2K - 10K Force Analysis study. Information pertinent to the HIMARS will be provided to this organization.

TRAC-SWC

2.a. The sponsor has the responsibility to determine where this force fights, who it fights, its missions, the supporting sources, etc. The study goal is to test the capability of these predetermined requirements.

2.g. TRAC-WSMR has made the study sponsor aware of the fact that the high resolution scenarios are using slightly different versions of the DRB.

2.h. The study sponsor has been made aware of the fact that the two of the high resolution scenarios chosen do not actually depict an early entry mission. The study sponsor accepts that the portions being modeled have sufficient similarities to an early entry mission, i.e. a security mission with limited support.

2.i. The JPO has been contacted to support the medium resolution work in support of the 10K force analysis.

APPENDIX B

ESSENTIAL ELEMENTS OF ANALYSIS

APPENDIX B
ESSENTIAL ELEMENTS OF ANALYSIS

B-1. Deployment.

a. What are the lift requirements in terms of time and aircraft to strategically deploy each of the 10K alternatives in a representative SWA scenario? [EEA 3.1] All force designs are deployable by air with no significant difference among the alternatives. However, as seen in Figure B-1, the means of delivery significantly affects closure time for all force designs.

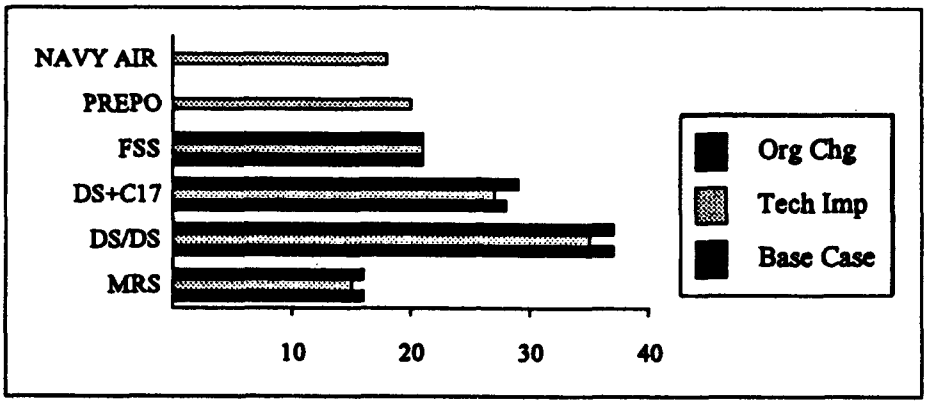

Figure B-1. Closure profile

b. How will the deployment schedule be affected when a joint time-phased force deployment list (TPFDL) is varied for different theaters and missions? [EEA 4.1] Not examined for more than the SWA scenario in this study effort because of time constraints. This EEA will be examined for additional theaters of operation in the LAM 94 study of More Lethal, Survivable, Deployable Forces.

B-2. Warfighting capability.

a. What capabilities will the force need to control the threat? [EEA 1.1] For the 10K force to defeat an enemy armored corps, the force required deep capabilities that could deliver substantial firepower and close systems that were not only lethal but very survivable. The systems capable of meeting these requirements include: helicopters with longbow technology, NLOS, LOSAT, and MLRS. A serious weakness of this force was its inability to eliminate Red UAVs or their downlink stations. This allowed the Red force to accurately target the 10K force in all alternative force designs with only the technological improvement alternative surviving at an acceptable level. This was accomplished by eliminating enemy artillery earlier in the fight than in the other model runs. AGS in the alternatives was as effective as the LOSAT, even though the

table shows a decrease in contribution to the fight. This resulted from having less targets to engage because of the more robust deep fight. Table B-1 summarizes percent contribution to the fight by Blue systems.

Table B-1. Blue system percent contribution to combat

SYSTEM OF	SYSTEM	FORCE DESIGN		
		BASE CASE	TECHIMP	ORG CHG
	Helicopters	39	54	56
	Fixed-wing	18	18	15
	MLRS	15	14	16
	Deep total:	72	86	87
	155mm howitzer	0.5	1	1
	105mm howitzer	0.5	1	not gamed
	NLOS	not gamed	4	3
	120mm mortar	not gamed	not gamed	0
	81mm mortar	0	0	not gamed
	Ext close total:	1	6	4
	Anti-tank	20	2	1
	AGS	5	3	4
	LOSAT	not gamed	3	4
	Other (IRC)	2	n/a	n/a
	Close total:	27	8	9
		100	100	100

b. For the 10K force to survive and have mission success, what deep strike capabilities does the force require? [EEA 1.2] The 10K force must have helicopters with longbow technology, MLRS in sufficient quantity to service deep targets, and substantial fixed wing assets to effectively defeat deep the enemy force. The range of munitions required for this deep capability includes: hellfire missiles for the longbow helicopters, TACMS Block II MLRS, and cluster bombs for the fixed wing assets.

c. What capabilities will the force need to win the information war? [EEA 1.3] The 10K force conducted the fight over a 200 km depth and was responsible for 360° security by either electronic means or control of terrain through air and ground forces. The most critical assets to targeting the enemy and protecting the flanks and rear areas of the 10K force were: JSTARS, ASARS, air cavalry, Guardrail, and ANTPQ-37. To some extent, systems like NLOS were able to provide real time acquisition of enemy forces while engaging targets during the fight.

d. What capabilities will the force need to prevent early catastrophic casualties? [EEA 1.4] As can be seen in table B-2, the 10K force can reduce the enemy TBM threat but cannot completely eliminate it. The Patriot was the only system contained in the various force designs capable of shooting down the enemy TBMs. Interdicting TBMs prior to launch was impractical because the TBM launchers could not be located.

Table B-2. TBM results against the 10K force

- 108 HE missiles fired with 90 destroyed; the remaining 18 strike various targets.
- 36 chemical missiles fired with 30 destroyed; the remaining 6 strike the airfield.
- Contamination from the chemical strikes closses the airfield 33 percent of total combat time.

e. What is the largest force this 10K force is capable of defeating? [EEA 1.5] The 10K force in the base case could only defeat two divisions and still retain a follow-on mission capability. The organizational alternative could defeat three enemy divisions but could not do so and retain 70 percent combat power. Only the technological improvement alternative could defeat three enemy divisions (an enemy armored corps) and still meet all the lodgment success criteria.

B-3. Sustainability. *What are the requirements to arm, fuel, fix, move, and provide soldier support for each of the 10K alternatives?* [EEA 2.1] The differences between the force designs for fuel and ammunition are directly attributable to weapon system densities of helicopters and artillery. As expected, the organizational change alternative, with its greater number of MLRS and helicopters, consumed far greater quantities of classes III and V than any other force design. All force designs were supported by floating maintenance facilities in the Persian Gulf but had minimal recovery capabilities within the lodgment. Lastly, the difference in the number of personnel required to support the 10K force was insignificant across the alternatives, but all alternatives would experience a 2,000 personnel increase if a port facility were to be opened in support of the lodgment. From a purely sustainment perspective the technological improvement alternative was the preferred force design. However, sustaining the lodgment solely by air is impossible.

B-4. Command and control implications.

a. What C2 implications exist for an early entry force? [EEA 5.1] The early entry force commander, at all levels, is particularly stressed to command and control his unit. While deploying to the lodgment, and upon beginning operations at arrival, commanders at every level

within the 10K force will be confronted with the difficulties of C2 over expanded battlespace and must be able to see the battlefield to the full depth of their unit's employment. To effectively do this requires substantial communications capability and an organizational structure replete with controlling headquarters. Since early entry operations will be conducted as a joint and/or coalition mission the force must also be able to communicate, coordinate, and possibly command and control those assets.

b. What C2 capabilities does the force need to successfully orchestrate the battle in an expanded battlespace? [EEA 5.2] The organizational structure of the 10K force designs appear to contain the requisite number of C2 headquarters to meet force needs. Additionally, organic communication systems found on vehicles and aircraft combined with the signal assets brought in by the 10K force ensured that information processing and intelligence development could occur. However, the study was limited by an inability to measure degradation of C2 from combat attrition because of the level of aggregation employed in the VIC model, and was unable to assess the 10K force's capability to interface with joint and coalition assets in theater.

B-5. Tactical mobility. *Are organic systems capable of providing the required tactical mobility as dictated by the concept of employment for this force?* [EEA 6.1] Figures 2-1, 2-2, and 2-3 of the main report reflect the various force designs. These designs provide an equipment recapitulation of major combat systems and utility helicopter assets used to evaluate movement capabilities of the force. All units included in the 10K force, except the infantry battalions, contained enough vehicular or aircraft systems to be mobile. The infantry battalions could be rapidly moved around the battlefield by the utility helicopters contained in the force. Therefore, all force designs had the same mobility characteristics and were found to have adequate mobility to meet mission requirements.

APPENDIX C

SCENARIOS

APPENDIX C

SCENARIOS

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1. Scenario. The 10K force analysis study used a desert scenario, SWA 3.1, Southwest Asia - Early Entry, Annex I to SWA 3.0 (Southwest Asia), TRAC-SC 0390, and MVRS-2041, volumes 1-4, classified SECRET/NOFORN, which has been published separately.

2. The gist of the scenario. An enemy force in corps strength conducts a 200km roadmarch that culminates in an attack of the lodgment containing the 10K force. The enemy force is composed of three armored divisions and corps assets and has about an 8-to-1 advantage over the Blue forces. The enemy forces are attrited over time as they close with the Blue force but do conduct a close fight in all alternatives.

APPENDIX D

SUSTAINMENT ANALYSIS

2K-10K SUSTAINABILITY ANALYSIS

TRAC-LEE

PATRICIA W. DOHERTY

18 AUGUST 1993

TABLE OF CONTENTS

SUSTAINABILITY ANALYSIS
FOR THE
2K-10K FORCE ANALYSIS

1. Purpose. To evaluate the sustainability of the 10K Early Entry Force alternative designs in support of missions requiring the projection of U.S. forces into a South West Asia scenario.

2. Summary. A Combat Service Support (CSS) force structure of approximately 2000 people is required to support this force. This is bare-based and does not include port operations. The primary effect of the technological improvement alternative on sustainment was an increase in fuel consumption, while the organizational change alternative required significant increases in both fuel and ammunition. Due to the assumption that all sustainment must be airlifted into the lodgement area, there is a high risk that sufficient air support may not be available.

3. References.

a. Draft 13.5, Early Entry Lethality and Survivability (EELS) Battle Dynamic Operations Concept, 4 Jan 1993.

b. Study Plan for the 2K - 10K Force Analysis, TRADOC Analysis Command - Operations Analysis Center, Combined Arms Analysis Directorate, Fort Leavenworth, Kansas, Jan 1993.

4. Terms of Reference.

a. Problem. In order to comply with the National Military Strategy (NMS) the Army must possess the capability to rapidly deploy and insert "first to fight" forces. Our armored forces, while survivable and lethal, are heavy, large, and cumbersome to deploy in a time-sensitive environment. The future army must have the capability to conduct early entry operations with tailored, armored, light, and special operations forces that are more deployable, lethal, survivable, and sustainable.

b. Background.

(1) With the end of the Cold War, regional conflicts, formerly kept in check by superpower rivalry and restraint, have evolved into potentially dangerous rivalry confrontations. Many regional powers now have, or could rapidly procure formidable modernized forces, which could threaten U.S. interests. There will be few U.S. forces located in areas where these conflicts might arise. It is, therefore, imperative that we design an early entry force capable of meeting these contingencies.

(2) Technology will dramatically increase force lethality through advanced weapon systems and missiles. Command and control will also greatly improve through information management. However, although these advances will greatly enhance the lethality and survivability of the early entry force, it cannot be sustained without a strong commitment to battlefield logistics. This analysis compares support requirements for alternative early entry forces and the CSS concepts for providing that support.

c. Objectives.

(1) Determine the Combat Service Support (CSS) force structure, concepts, and support requirements to sustain the base case and alternative early entry forces.

(2) Compare and analyze the requirements across the alternatives.

d. Scope.

(1) The study defined CSS force structure and concepts for sustaining the early entry force.

(2) The comparative analysis determined CSS requirements for sustaining the early entry forces in a SouthWest Asia (SWA) scenario during the first thirty days of a conflict.

(3) Sustainment requirements for all classes of supply except Cl VII (major end items) and Cl IX (spare parts).

e. Limitations.

(1) Although there are Joint Responsibilities for sustainment, only US Army requirements were addressed.

(2) Seaport operations were not addressed. However, transportation force structure required to operate the port was included for information purposes.

(3) The study did not consider support for follow-on forces, such as heavy divisions, that could begin entering the theater by day 15.

f. Assumptions.

(1) The force must be totally air deployed.

(2) Resupply of major items of equipment (CL VII) will not be available to this early entry force.

(3) Cl IX resupply will be restricted to the units' Prescribed Load List (PLL) and Authorized Stockage List (ASL).

(4) Assured communications will be available to the CSS elements.

(5) Airport facilities will be available and secured.

(6) Systems currently projected to be fielded by 1999 will continue to be funded.

(7) Supply requirements based on Army planning factors are representative of actual requirements.

(8) Maintenance requirements based on Army Manpower Requirements Code (MARC) data base information are representative of maintenance manpower requirements.

g. Constraints. Higher priority projects precluded CASCOM from using the FASTALS model to develop the CSS force structure.

h. Threat. Threat force year for the scenario was 2004.

i. Essential Elements of Analysis (EEA). The Sustainability Analysis (SA) EEA addressed the following study EEA:

EEA 2.1. What are the requirements to arm, fuel, fix, move, and provide soldier support for each of the 10K alternatives?

SA EEA 1. What are the CSS force structure requirements at brigade, division, and EAD to support the alternative combat and combat support (C,CS) forces?

SA EEA 2. What are the supply, maintenance, and transportation requirements for each of the alternatives and their supporting forces?

SA EEA 3. What CSS concepts would be implemented in support of the early entry force?

5. Measures of Performance.

a. Manpower required by each alternative.

b. Short tons of ammunition required by each alternative.

c. Gallons of fuel required by each alternative.

d. Short tons of supplies, other than ammunition and fuel, required by each alternative.

e. Number of planes required to lift a daily supply requirement.

6. Study Alternatives. The study alternatives are defined in detail in the combat effectiveness analysis report. Table 1 shows densities of major weapon systems for each of the alternatives. A summary description of each alternative follows:

a. Base Case. An airborne force with its corps support slice.

b. Technological Improvement. The base case force modernized with AH64D/Longbow and RAH66 helicopters, plus an NLOS and a LOSAT unit .

c. Organizational Change. The main differences from the Technological Improvement alternative were the addition of a second AH64D/Longbow unit, NLOS unit, and MLRS battery.

Systems	Base Case	Tech Imp	Org Chg
AH64A	24		
AH64D/LB		24	48
OH58D	48		
RAH66		48	
NLOS		12	12
LOSAT		9	18
MLRS	9	9	18
HOWITZER 105MM	18	18	
HOWITZER 155MM	24	24	18

Table 1. Major Equipment Densities.

7. Methodology.

a. General Overview. An overview of the methodology used in performing the sustainment analysis is graphically depicted in Figure 1. The analysis had three major components. These included the force structure design, supply requirements determination, and a comparative analysis across the alternatives.

(1) CSS Force Structure. Subject matter experts (SME) at CASCOM and its Associated Schools (CAS) developed the CSS force structure to support the 10K force. They evaluated of

the Combat and Combat Support force to determine both the level of support required, given the above assumptions, and the CSS concepts for implementation of that support. The CAS were directed to design a bare-base operation, given that all support must be airlifted into the lodgement area.

(2) Requirements Determination.

(a) TRAC-LEE developed supply requirements for each of the alternatives using the Combat Service Support Tool (CSST). This analytic tool provides a standardized, automated, and self-contained capability for determining the CSS workload generated by supported forces in a variety of scenarios. For ammunition and fuel CSST uses DA approved operational planning factors extracted from the Bulk Petroleum Requirements Determination Template (Bulk POL RDT) and the Ammunition Requirements Determination Template (AMMO RDT), both of which were produced by the CASCOM. All other classes of supply are population based and use CASCOM standard planning factors. The Class VIII, medical factor, of .65 lbs/man/day was supplied by the Army Medical Department (AMEDD).

(b) High and low usage rates were determined to provide a range band for daily requirements. These rates were based on heavy and light first day defend postures.

(3) Comparative Analysis. TRAC-LEE performed a comparative analysis on the results of the above subanalyses to determine sustainment differences among the alternatives in force structure, supply and lift requirements.

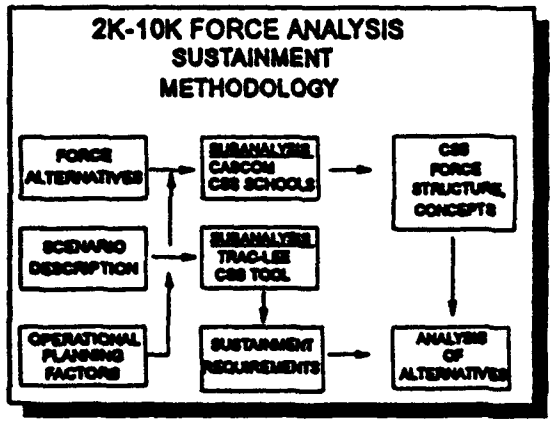

Figure 1. Analysis Methodology - Overview

8. Analysis of Alternatives.

a. CSS Force Structure.

(1) Discussion. CASCOM and the CAS developed the CSS base case force structure, depicted in Figure 2. They also determined their concepts for support to the early entry force. The CSS concept for support was provided to the EELS Lab by CASCOM independent from this study. A brief summary of the support by each CSS element is included in the force structure section of this report. The force, as developed by the SMEs is bare-based, i.e. the minimum CSS capable of supporting the 10K force.

(2) Alternatives. The SMEs also made an assessment of the combat and combat support changes in the force alternatives to determine whether changes should be made to the CSS Base Case structure. The structure of the CSS force did not change across the alternatives. However, there were changes in the total maintenance manpower requirements. These are depicted in Table 2. A total of 76 additional mechanics are required for the Technological Improvement alternative over the Base Case and 138 for the Organizational Change alternative above the Base Case. These include both aviation and ground mechanics. The rest of the force structure remains constant across the alternatives.

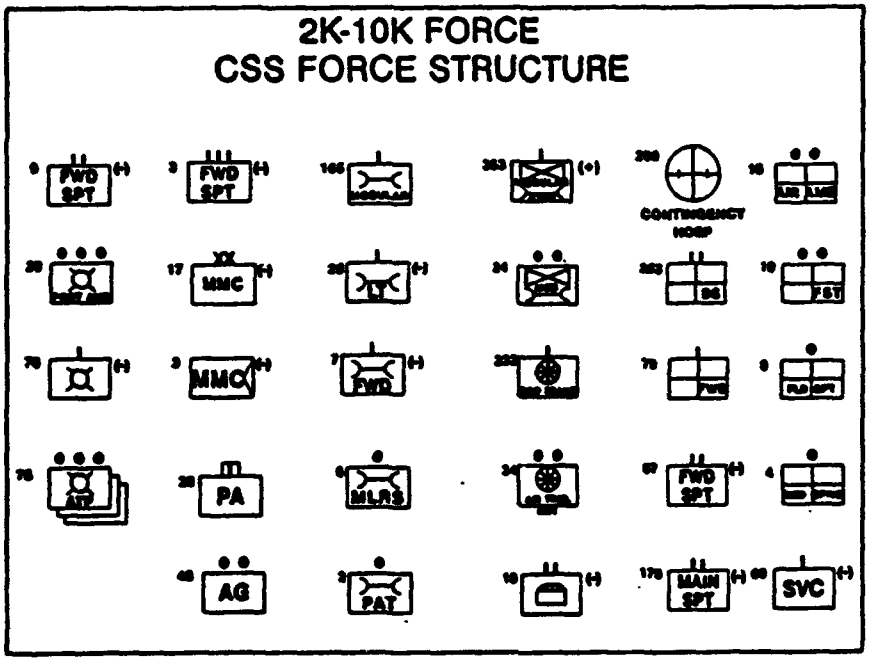

Figure 2. CSS Base Case Force Structure

	BASE CASE	TECH IMP	ORG CHG
AVN-MECH	377	+52	+108
GRND MECH	209	+24	+30
AMMO	280	CONSTANT ACROSS ALL	
TRANS	266		
QM	325		
MED	578		
PA	28		
AG	48		
FIN	19		
TOTAL	2,129	2,205	2,267
DELTA		+76	+138

Table 2. CSS Manpower Totals

(3) Aviation Maintenance.

(a) Manpower. The primary manpower differences among the alternatives is in the number of aviation mechanics. Table 3 shows the aviation maintenance manpower required for each alternative by helicopter type. Differences shown are from the Base Case. The CSS manpower cost in the Technological Improvement alternative, which replaced the OH58D with the RAH66, is an additional 52 maintenance personnel. In the Organizational Change alternative, an additional attack helicopter unit with 24 AH64D/Longbow, was added. This results in an increase of 108 personnel above the base case.

Helicopter	Base	Tech Imp	Diff from Base	Org Chg	Diff from Base
AH64A	56		-56		-56
AH64D/LB		56	56	112	112
RAH66		136	136	136	136
OH58D	84		-84		-84
UH60A	110	110		110	
Overhead	127	127		127	
TOTAL	377	429	52	485	108

Table 3. Aviation Maintenance Manpower

(b) Concept. The aviation logistics support concept for the early entry force envisions the use of a prepositioned sustainment maintenance facility (PSMF). This is a containerized aircraft maintenance facility designed for installation aboard a commercial containership, prepositioned for timely deployment. It will contain on-board Authorized

Stockage List (ASL) and Prescribed Load list (PLL) for a minimum 30 days sustainment. It will also carry an Operational Readiness Float (ORF); two AH64s is a possibility. The only aviation maintenance in the lodgment area would be unit maintenance (AVUM), which is deployed with the combat and combat support units. All aviation intermediate (AVIM) repair requirements would be evacuated to the PSMF. The PSMF also reduces the deployment requirement for the force, since all of the AVIM equipment is on board.

(2) Ground Maintenance.

(a) Manpower. The addition of the NLOS and LOSAT to the Technological Improvement alternative creates a requirement for an additional 30 mechanics (Table 4). Changes in the density of artillery systems in the Organizational Change alternative (Table 1) had no net impact on the mechanics required.

(b) Concept. Ground maintenance will rely primarily on the ASL and PLL of the deployed units for repair parts. Under the Contingency Corps Parts Initiative (CCPI), units designated as contingency forces will have their ASLs supplemented so that the units are self sufficient for 30 days. Controlled substitution, where parts are removed from non-operational systems, will also be used to increase the operational capability of the force during its mission. These parts will be replaced as the availability of parts and METT-T permits.

Weapon Type	Base	Tech Imp	Diff from Base	Org Chg	Diff from Base
Track	18	18		18	
Wheel	40	40		40	
Fire Control	2	2		2	
Ground Power	26	26		26	
Artillery	13	13		7	-6
Utility	23	23		23	
Electronic	70	70		70	
Engineer	8	8		8	
MLRS	6	6		12	6
Patriot	2	2		2	
LOSAT		18	18	18	18
NLOS		6	6	12	12
TOTAL	208	232	24	238	30

Table 4. Ground Maintenance Manpower.

(3) Ammunition.

(a) Manpower. The 280 personnel supporting the ammunition distribution include an ordnance company (ammunition), an airport accounting detail, and three ordnance platoons in addition to a Materiel Management Center (MMC) section.

(b) Concept. The ordnance personnel will set up and manage Ammunition Transfer Points (ATPs) at a location close to the airfield.

(4) Transportation.

(a) Manpower. There is only a minimum corps transportation capability provided due to the assumption that all support will be airlifted into the lodgement area. Transportation capability includes an Air Movement Control Team and a Cargo Transfer Company, a total of 266 people. Although the transportation force structure to operate the seaport was not included in the 10K CSS Force Structure by direction of the EELS Lab, it is included here for information purposes. In order to operate the seaport approximately 2000 additional transporters will be required (Figure 3).

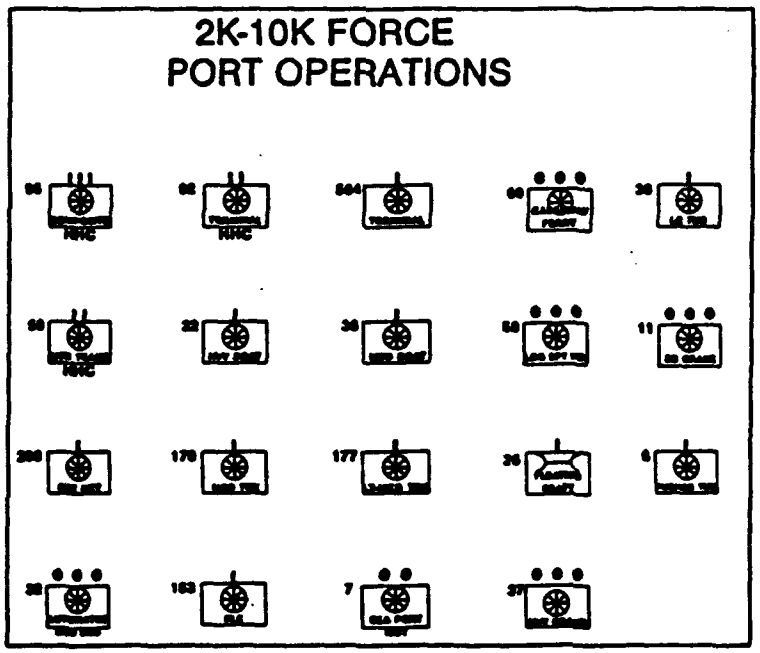

Figure 3. Seaport Transportation Operations.

(b) Concept. The transporters will support the Air Force in unloading the planes and moving supplies to a distribution area. All units in the lodgement area will use

their organic vehicles and a supply point distribution system, to pick up supplies at a support area.

(5) Quartermaster.

(a) Manpower. The 325 quartermaster personnel will receive, store, and issue supplies to include fuel and water. It also includes a section of Force Provider (60 people). In addition, QM will also provide limited graves registration and contingency contracting.

(b) Concept. Supplies will be managed using a Split Operations concept, which will reduce the deployability burden and improve the management response time, i.e. the supply management capability will be in theater by C+5 versus C+45. The concept employs a mainframe in CONUS and flyaway portable computers in theater communicating by satellite. A limited Force Provider capability will also be included, mainly to furnish shower facilities to the force.

(6) Medical.

(a) Manpower. The 578 personnel in the medical force structure include a forward support medical company (FSMC), a surgical company, air and ground ambulance companies, and 200 people to man the 100-bed contingency hospital.

(b) Concept. Once the airhead has been secured , modules of the contingency hospital will be phased into theater. The hospital will provide initial level III treatment and hospitalization. Upon arrival of the hospital, forward surgical teams will be employed as far forward mobile surgical elements. Air ambulance sections of the air ambulance company will collocate with the FSMCs and provide aeromedical evacuation support to the brigades. Casualties requiring evacuation out of theater will be evacuated by US Air Force assets.

(7) Public Affairs.

(a) Manpower. There will be 28 Public Affairs (PA) personnel in the force.

(b) Concept. The PA element will provide coordination and liaison for the civilian news media and through PA communications channels to operational and strategic headquarters and news organizations, information products for release.

(8) Adjutant General.

(a) Manpower. The AG team will consist of 48 personnel.

(b) Concept. The AG team will direct military personnel support to all elements within the force. This will include strength management, personnel accounting and strength reporting, casualty management, personnel database management, and selected essential emergency military functions.

(9) Finance.

(a) Manpower. The finance will consist of 19 personnel.

(b) Concept. The primary finance function in support of the early entry force will be for logistical contracting and procurement activities.

b. Supply Analysis.

(1) General. The capability of the supply system to sustain the force will be critical to the mission. Supplies will need to be moved into the lodgement area while the force is still deploying. Since one of the study assumptions requires all support to move by air, this will place an extra burden on the available aircraft and must be taken into account in the Time Phased Force Deployment List (TPFDL). However, assuming a port will be available, supplies can be moved from prepositioned ships to the port and flown to the lodgement area in a tactical airlift.

(2) Total Supply Requirements.

(a) Discussion. Total supply and water requirements displayed in Table 5 depict the high and a low usage representing the upper and a lower bound for the daily requirements. All other classes of supply are population based and, since there was little difference in population among the alternatives (Table 5), this requirement remained essentially constant across all alternatives. The primary differences in requirements across the alternatives were for ammunition and fuel. Each suppport requirement is addressed in detail below.

(b) Airlift Cost. The airlift cost, in terms of daily sorties, is an estimate to give the study proponent an approximation of the requirement. It is based solely on the total lift capacity of the aircraft and the daily sustainment requirements and represents the number of sorties per day that would land in the lodgement area. Airlift of all these daily requirements into the lodgement area will take between 33, low usage, and 98, high usage, C-141s sorties per day (Table 6). Water, if not available locally, will require approximately 15 more C-141 sorties to the daily total (133K gallons/9K gallons per C-141). Sortie totals are mutually

exclusive, i.e. they represent either pure C-5, C-141, or C-17s. At the high usage rate, i.e. 98 sorties per day, an airfield capable of handling 14 planes at a time would be needed. This is based on an Air Force estimate of 3 1/2 hours to unload each plane.

High Usage	[illegible]	Base	Tech Imp	Diff	Org Chg	Diff
Ammunition	s/tons	1,309	1,319	1%	1,495	+14%
Fuel	k/gals	213	255	19%	304	+42%
Other	s/tons	115	115		115	
Water	k/gals	133	134		135	
Low Usage						
Ammunition	s/tons	454	460	1%	517	14%
Fuel	k/gals	91	109	19%	130	42%
Other	s/tons	113	113		113	
Water	k/gals	133	134		135	

Table 5. Daily supply requirements.

High Usage	Base	Tech Imp	Org Chg
C-5	27	29	32
C-141	81	86	98
C-17	36	39	44
Low Usage	[illegible]	[illegible]	[illegible]
C-5	11	12	13
C-141	33	35	39
C-17	14	16	18

Table 6. Total Airlift Sorties for Sustainment.

(3) Ammunition Analysis.

(a) Discussion. Requirements for ammunition are very much dependent upon METT-T. Therefore, CSS units must have ammunition ready to support whatever missions might arise. Combat units, excluding artillery, deploy with approximately three days of supply as their basic load. Because of the bulk of artillery ammunition, these combat support units do not have the organic transportation to carry three days of supply. They expect to be resupplied within 6-8 hours after combat begins. It is, therefore, imperative that at least three days of ammunition supply be on the ground at the ammunition transfer points (ATPs) before these units engage in combat. Given the assumption that all sustainment must be airlifted into the area, this airlift cost in terms of

available airplanes, must be integrated with the deployment requirements.

(b) Base Case. The base case requirement for ammunition ranged from 454, low usage, to 1309, high usage, short tons (Table 7). Over 75 percent of this requirement was for artillery support, i.e. howitzers, MLRS, and mortars (Figure 4). The 'other' category includes rifles and other small arms.

Short Tons	How	MLRS	Mortars	Helos	Arm Sys	Other	Tot
High Range							
Base	606	388	25	123	108	59	1,309
Tech Imp	606	388	25	123	118	59	1,319
Org Chg	273	776	41	224	122	59	1,495
Low Usage							
Base	211	136	8	42	37	20	454
Tech Imp	211	136	8	43	42	20	460
Org Chg	95	271	9	79	43	20	517

Table 7. Ammunition Usage by Weapon Type.

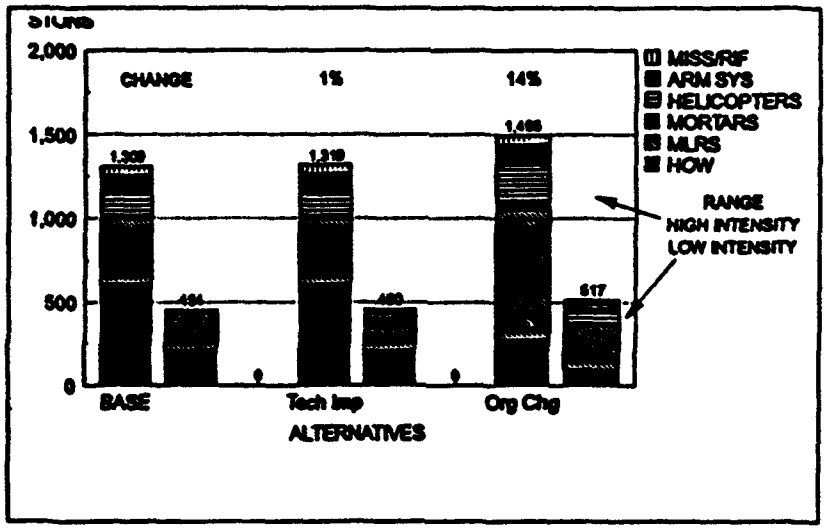

Figure 4. Ammunition Requirements.

(c) Technological Improvement. The addition of the NLOS and LOSAT resulted in a 1% difference between the Base Case and this alternative. The replacement of the OH58D and AH64A with the RAH66 and the AH64D/Longbow had no impact on the total ammunition requirement.

(d) Organizational Change. In this alternative changes in artillery and helicopters both contributed to the 14 percent overall increase in ammunition requirements above the base case. The density of the MLRS was doubled, which increased the overall requirement by 30 percent above the base case. Also contributing to the increase was the replacement of the 81MM with the 120MM mortar (1%). The additional 24 AH64D/Longbows raised the requirement by a further eight percent. However, offsetting this 39 percent increase was a reduction in the density of howitzers decreasing the total requirement by 25 percent. This resulted in a net overall increase of 14 percent above the base case.

(e) Airlift Cost. Ammunition accounts for over 60 percent of the total lift requirement. The sorties required to move one day of ammunition resupply from the port area into the lodgement area are depicted in Table 8. Only a tactical lift is required because of the prepositioning of ammunition in ships in a location convenient to the lodgement area.

(f) Prepositioned Ammunition. Prepositioned ships at Diego Garcia in the Indian Ocean each carrying approximately 19,000 short tons of ammunition, eliminate the requirement for a strategic lift for ammunition. These ships would deliver the ammunition to the seaport of debarkation (SPOD). The sorties would, therefore, only be required for the tactical lift from the SPOD to the lodgement area.

High Usage	Base	Tech Imp	Org Chg
C-5	17	18	20
C-141	52	53	59
C-17	22	22	25
Low Usage			
C-5	6	6	7
C-141	25	18	21
C-17	8	8	9

Table 8. Airlift Sorties for Ammunition

(4) Fuel Analysis.

(a) Discussion. Requirements for fuel begin and continue daily almost as soon as the first units deploy. Assuming these units deploy with their basic load of fuel, then, within three days after they arrive, the resupply of fuel for sustainment must be available. Storing and issuing of fuel will not be a problem. Bladders will be located at Fuel System Supply Points (FSSP) with sufficient capacity to support this force. A problem arises if all of the fuel must

be airlifted into the lodgement area. There may not be a sufficient number of U.S. Air Force bladderbirds to meet the requirement. This issue is consistent across all alternatives.

(b) Base Case. The base case requirement for fuel ranged from 91,000 gallons, low usage, to 213,000 gallons, high usage, (Table 9). As can be seen from Figure 5, helicopters consume 70-75 percent of all fuel. Therefore, any change in the type or density of helicopters will have a marked impact on total fuel usage. Approximately 50 percent of this usage by helicopters in the base case is for assault and medical helicopters (Figure 6). This requirement does not change across the alternatives. Since there are no CH47s in the 10K force, the assault helicopters will be expected to support the distribution of supplies, particularly ammunition and fuel, as time and mission permit. Therefore their fuel consumption is expected to be high.

	Helos	Arm Sys	Trucks	Other	Total
High Usage					
Base	146	36	21	10	213
Tech Imp	186	38	21	10	255
Org Chg	230	43	21	10	94
Low Usage					
Base	63	15	9	4	91
Tech Imp	80	16	9	4	109
Org Chg	99	18	9	4	130

Table 9. Fuel Usage by Weapon Type (Thousand Gallons).

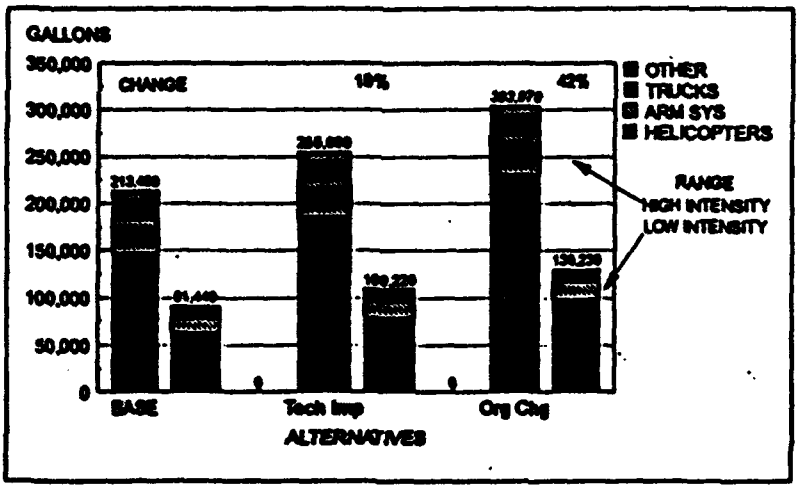

Figure 5. Fuel Requirements.

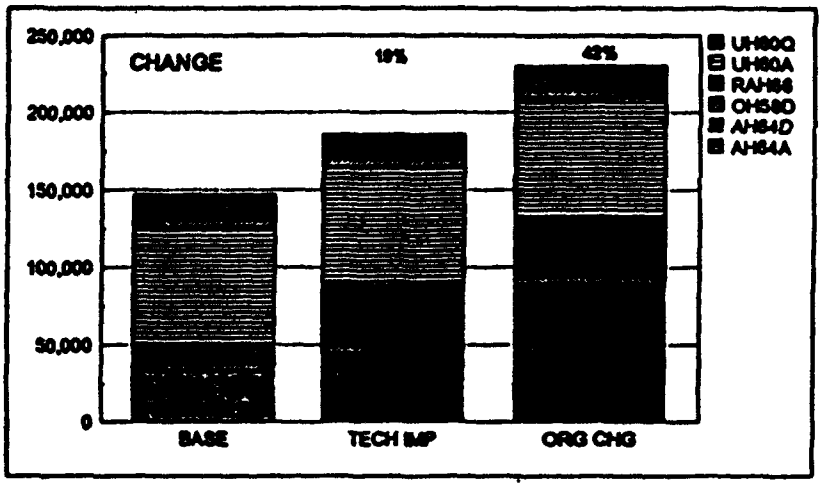

Figure 6. Helicopters - High Fuel Usage.

(c) Technological Improvement. Replacing the OH58D and the AH64A of the Base Case with the RAH66 and the AH64D/Longbow in the Technological Improvement alternative caused 18 percent of the 19 percent increase in fuel consumption. Both of the replacement helicopters have a higher consumption rate than those they replace (Table 10).

	Gal/Hr		Gal/Hr
OH58D	54	RAH66	146
AH64A	135	AH64D	182

Table 10. Fuel Consumption Rates.

(d) Organizational Change. In addition to the RAH66 and the AH64D replacements, 24 AH64Ds were added to this force. This contributed most of the 42 percent increase in fuel requirement above the base case. Other changes in weapons density had only minor impacts on the requirement.

(e) Airlift Cost. Daily fuel resupply accounts for about 25 percent of the total lift requirement. The sorties required to move this fuel requirement are depicted in Table 11. C-130s or C-17s would be most likely to airlift fuel. However, the airlift for fuel will be constrained not only by the availability of planes but also by the availability of Harvest Eagle kits. These kits contain the bladders, pallets, and pumps to configure the planes to carry fuel.

High Usage	Base	Tech Imp	Org Chg
C-130	40	45	50
C-141	24	28	34
C-17	12	15	27
Low Usage			
C-130	15	20	20
C-141	10	12	14
C-17	5	6	7

Table 11. Airlift Requirements for Fuel.

(f) Prepositioned Fuel. Two fuel tankers, the Potomac and the American Osprey, are located at Diego Garcia and will be ready to support any contingency operation in the area. The Potomac holds 6.9 million gallons and the American Osprey 9.7 million gallons. This is sufficient to support any of the alternatives in this force for at least 50 days. These ships can also sail to a friendly port and refuel if required.

	Supply Type	S/tons
Class I	Subsistence	39
Class II	Clothing,Tools, Individual Equipment, Admin & Housekeeping	20
Class III (Package)	Oils, Lubricants	4
Class IV	Construction, Barrier Materials	48
Class VI	Personal Demand Items	0
Class VII	Major End Items	0
Class VIII	Medical Supplies	4
Class IX	Repair Parts	0
	Total	115

Table 12. Other Supply Requirements

(5) Other Supplies. Requirements for all other supplies remained constant across all alternatives since they are population based and the force population did not vary significantly (Table 12). Assumptions that were made include the following:

a. Class I was based on one T-Ration and two MREs per day.

b. Class VI and Class VII were assumed to be unavailable due to the short duration of the mission (30 days).

c. Class IX would be available only through the units' PLLs and ASLs.

(6) Water. Water supply is a major issue in a SWA environment. The requirement of for water remained essentially constant (Table 13) across the alternatives. It is population based and the force population remained fairly stable. Possible sources for water in the lodgement area would include wells, lakes, pipelines. If none of these are available then one possibility is to have the army engineers drill wells. Even if the source water is brackish, the Reverse Osmosis Water Purification Units (ROWPUs) can provide potable water for the force. However, if all of the water must be airlifted into the lodgement area then it will take an additional 15 C-141 sorties per day to supply the force.

	Base	Tech Imp	Org Chg
Water (Gals)	133,000	134,000	135,000
Population	11,160	11,286	11,353

Table 13. Water Requirements.

9. Risks. There were several major risk to this force from the sustainment perspective. They are as follows:

a. Airlift Dependence. Total reliance on airlift into the lodgement area is the greatest risk to sustainment. To sustain the high usage rate (98 planes per day) would require 14 planes to be on the ground at any one time purely for sustainment. If alternate modes of delivery into the lodgement area, such as an MSR and pipelines, are not available, the risk is high that the supplies will not arrive in the lodgement area in sufficient quantities to support the mission.

b. Transportation. Another risk is the lack of transportation. Assault helicopters will be required to support the distribution of fuel and ammunition. Also, since there are no CH-47s in the force, and assault helicopters cannot recover the AH64s or the RAH66s, these combat damaged helicopters will not be recovered.

c. Communications. A further risk is that without robust communications, the movement of supplies may be impeded. The Split Operations concept relies heavily on assured communications.

d. Joint Responsibilities. Finally, since joint responsibilities were not addressed, the requirements, particularly for fuel, are understated.

10. Conclusions.

a. Force Structure. The CSS force structure of approximately 2000 people as defined for the base case will support all three alternatives with the addition of 76 to 138 maintenance personnel. However, it is austere and has, therefore, no redundancy to meet contingencies.

b. Force Alternatives. The technological improvement alternative had only a minor impact on ammunition, but increased the fuel requirement considerably, while the organizational change alternative increased requirements for both ammunition and fuel.

c. TPFDL. Supplies must start arriving in the lodgement area while the force is still deploying. Therefore, sustainment requirements must be integrated into the TPFDL.

d. Airlift. While, theoretically, the force can be sustained by air, in all practicality, due to deployment and joint requirements, it is highly unlikely that the Army will be able to get sufficient airlift to meet these requirements. A land line of communication from the seaport must be secured to ensure the continued flow of supplies.

APPENDIX E

DEPLOYMENT ANALYSIS

MTMCTEA REPORT BL 93-2

2K-10K FORCE

DEPLOYABILITY ANALYSIS

August 1993

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PURPOSE AND SCOPE.

The Early Entry, Lethality, and Survivability (EELS) Battle Lab has the responsibility for designing a light, early entry force consisting of a quick-response brigade size force (2K force), and a follow-on division(-) size force (10K force). The TRADOC Analysis Command, Studies and Analysis Center (TRAC-SAC), Fort Leavenworth, KS, has the mission of analyzing lethality, survivability, sustainability, and deployability of these forces in support of the EELS Battle Lab. TRAC-SAC requested MTMCTEA perform an analysis of the 10K force deploying to Southwest Asia (SWA).

The main objective of the analysis is to show how fast the force's combat power can be delivered to SWA within a joint deployment, and to compare the impact of future weapon systems and alternative force structures on the deployability of the force. The analysis examines the airlift assets and time required to deploy the base case and the two alternative forces. The focus is on closure times, showing a day-by-day schedule of the arrival of combat power. It compares closure times predicted by simulation models to those suggested by Operation Desert Shield. The analysis also shows closure times for threat force year 2005 both with and without C-17 aircraft. Another excursion shows closure times with the 2K force deployed by air and the remainder of the division deployed by sea. Finally, MTMCTEA analyzed two additional excursions; one with heavy artillery units prepositioned afloat, and the other, based on the prepositioned excursion, employs a Navy aircraft carrier with Naval tactical fighters in lieu of 40% of the Air Force's tactical fighters.

FINDINGS.

1. The 10K alternative designs are not significantly different than the base case force. The biggest impact on deployability for the 10K force is the utilization rates and capabilities of our airlift resources.

3. The 10K TECH IMP force was the most rapidly deployable of the alternatives and would require 1,289 C-141 and 61 C-5 sorties for a deployment to SWA.

4. Application of historical planning factors with the RAPIDSIM model predicts that the 10K TECH IMP force would close to SWA on C+15. This closure must be regarded as very optimistic.

5. Airlift capabilities demonstrated during DS suggests that the 10K TECH IMP force would not close until C+35.

6. The C-17 aircraft is critical to the deployability of the Army's future Early Entry force. If the C-17 is fielded as scheduled, the 10K TECH IMP force would close to SWA on C+27, about 23% faster than with the current C-141/C-5. If the C-17 production is halted, future airlift capability will drop by about one-half of its potential capability as C-141 aircraft are retired. The 10K TECH IMP force would not close until C+50.

7. Using a combination of sealift and airlift, the force closure using DS demonstrated capability can be significantly improved. Closure times for the 10K TECH IMP force decreases by 40 percent from day C+35 to day C+21 by using sealift resources.

8. Prepositioning units such as heavy artillery and aviation maintenance significantly reduced the force closure times. The 10K TECH IMP alternative force closed on C+20 given the increased capability with the C-17. This is 7 days faster than before prepositioning.

9. The use of Naval tactical fighters in lieu of Air Force fighters for 40 percent of the daily combat sorties can save Air Force requirements for strategic lift. Diverting this airlift to deploy the 10K TECH IMP force (with prepositioning) would result in a closure on C+18, an additional savings of 2 days.

10. Based on our analysis of the alternative 10K force designs, the TECH IMP is the most rapidly deployable. Table 1 summarizes our findings, showing closure times for the excursion with the C-17 fielded.

TABLE 1
SUMMARY OF ANALYSIS

Alternatives	Lift Required C-141/C-5	Closure Times
Base Case	1303/72	C+28
TECH IMP	1289/61	C+27
ORG CHG	1357/63	C+29
Prepositioning Afloat	915/38	C+20
Prepo/Naval Fighters	915/38	C+18

RECOMMENDATIONS. The EELS Battle Lab should:

1. Vigorously support fielding of the C-17 aircraft.

2. Recommend the Technological Improvement alternative as it is the most rapidly deployable.

3. Consider a combination air/sea deployment to speed closure.

4. Preposition units when possible to minimize use of strategic airlift.

5. Recommend discussion in joint community on airlift allocations when deploying highly lethal early entry joint forces.

I. INTRODUCTION

Desert Shield (DS) demonstrated the time it would take to deploy a theater-level joint force to Southwest Asia (SWA). The large majority of the Army's equipment (95%) deployed by sea. Airlift capabilities proved to be extremely limited for the units required to be intheater before sealift could arrive. The DS airlift provided two principal points that have a tremendous impact on any airlift analysis of Army forces: (1) any future operation will be joint, and the Army will share airlift capabilities with other services; (2) the Air Mobility Command's (AMC) sustained airlift deployment capability was less than prior predictions.

As the Army refines its doctrine and structure, adjusting to our new military strategy based on rapid force projection, deployability analyses can be used to quantify assets required to move units and the closure times necessary to meet the requirements of a given scenario.

MTMCTEA was tasked by the TRADOC Analysis Command, Studies and Analysis Center (TRAC-SAC), in support of the Early Entry Lethality and Survivability (EELS) Battle Lab, to analyze the deployability of various designs of a 10K force. The objective of this force design is to be light, rapidly deployable, highly lethal and survivable, and readily sustainable.[1]

This analysis examines the required lift assets and total time required to deploy these 10K force designs to a theater of operations. The base case force is listed at Table 2 in deployment priority order.

TABLE 2
10K BASE CASE FORCE

Unit SRC	Unit Description
07035L000	3 INF BN (ABN)
57042L000	HHC AIRBORNE BRIGADE
57004L000	HHC AIRBORNE DIVISION
06205L000	FA BN, 105MM T (ABN) AOE
44437L000	ADA BTRY, AVENGER
05027L000	ENGR CO, ENGR BN, ABN DIV
05443L100	ENGR CO, LIGHT EQUIP, ABN
34265L000	MI BN (CEWI) ABN DIVISION
11065L000	DIV SIG BN (MSE)
19313L000	MP COMPANY AIRBORNE DIV(-)
03057L000	CHEM CO (SMK/DECON) ABN/AA
01267L300	3 AIR RECON TROOP (OH-58D)
01055L300	ATTACK HEL BN (OH-58D)

[1] 2K-10K Force Analysis Study Plan, Study Plan TRAC-SP-0193, Jan 1993.

TABLE 2 (cont)
10K BASE CASE FORCE

Unit SRC	Unit Description
01303L200	2 ASSAULT HEL CO (UH-60)
17275L000	LIGHT ARMOR BATTALION
	LIGHT CAVALRY TROOP
06398L000	FA BTRY MLRS
44637L000	ADA BTRY,PATRIOT
01269L300	AVIATION UNIT MAINT TROOP
08058L100	MEDICAL CO (FSB) HVY DIV
63266L666	MSB(-) FOR 10K FORCE
63422L000	CSS AMMO
63433L000	MAT MGT CENTER OFFICE
55580LF00	MOVEMENT CON (AIR TERM)
55817L200	TRANS CARGO TRANSFER CO
01427L300	ATS COMPANY (CORPS)
	HHC, CORPS FOR 10K FORCE
01385L200	ATTACK HEL BN (AH-64)
01217L000	COMMAND AVIATION CO (UH-1)
01266L000	HHT, AIR RECON SQUADRON
17207L000	CAV TRP (GROUND)
	IMMEDIATE READY COMPANY
44497L000	ADA BTRY, HAWK (CORPS)
06413L000	CORPS TGT ACQ DETACHMENT
05447L100	ENGR CO,ENGR CBT BN,ABN
05427L000	ENGR CBT CO, CORP (WHL)
01913A300	RAS AMC
01946A000	AMB HHD
01947A300	GS AMC
01948A200	ATK AMC
01953A000	AMC
01973L100	AVN MAINT CO, ABN (AH-1)
01207L000	ASSAULT HEL CO/TRP (UH-60)
43209L000	MAINT CO NON-DIVISIONAL DS
06435L000	FA BN, 155MM T, ABN
08498L000	MED DET, PM (SANITATION)
08457L000	MEDICAL COMPANY (AREA SPT)
08449L000	MEDICAL AMBULANCE COMPANY
08446L000	HHD, MED EVAC BN
41718L000	CA DET (DIRECT SUPPORT)
08419L000	MED DET, VET SVC (SMALL)
33708L000	PSYOP TACTICAL COMPANY
34235L100	MI BN (TE), AIRBORNE CORPS
19477L000	MP CO COMBAT SUPPORT
03457L000	CHEMICAL CO (SMK/DECON)
08813L000	FIELD HOSPITAL
	CHAPLAIN UNIT FOR 10K FORC
	CMMS FOR 10K FORCE
12427L000	PERS DET (PERS SVCS CMD)
14423L000	FINANCE DETACHMENT
08567LA00	MED DET, CMBT STRESS CNTRL
45423L000	PRESS CAMP HQ

II. METHODOLOGY

A. GENERAL. This analysis tracks the deployment of the 10K force alternatives to SWA. Results from this analysis will provide TRADOC decisionmakers with the most deployable alternative, quantifying the required lift assets, and closure times.

B. TARGET. MTMCTEA's Transportability Analysis Requirements Generator (TARGET) unit deployability model provides an automated way to merge unit equipment authorization data from TRADOC's Table of Organization and Equipment (TOE) Master File with the equipment item data from FORSCOM's Computerized Movement Planning and Status System (COMPASS) Equipment Characteristics File (ECF). The TARGET programs, written and designed by MTMCTEA, can determine the unit deployment data required for strategic mobility planning. MTMCTEA analysts used TARGET to generate unit deployment data (vehicle quantity, square feet, short tons (STON)), and sortie requirements for the 10K base case force and each alternative.

C. RAPIDSIM. The Rapid Intertheater Deployment Simulator (RAPIDSIM) models the deployment of cargo and troops from ports of embarkation (POEs) to ports of debarkation (PODs) by air and sea. RAPIDSIM requires user-supplied scenario and movement requirement files. The scenario file defines the Defense Transportation System (DTS) from CONUS origins to the destination theater, including the inventories and capabilities of aircrafts and ships, and the location of POEs and PODs. The movement requirements file defines units and supplies to be deployed (i.e. equipment, resupply, ammo, etc.), and appropriate timelines and deployment priorities. The movement requirements file is also known as the time-phased force deployment list (TPFDL). Given the required input files, RAPIDSIM will provide unit closure profiles within a joint service movement, and summarize the utilization of the strategic lift assets.

III. ANALYSIS

A. FORCE DESIGN AND DEPLOYMENT DATA.

1. The force designs used throughout the analysis were provided by the EELS Battle Lab, Ft Monroe. The 10K force is a tailored division designed to be similar to an airborne division with some modifications. The initial force design of the 10K force is referred to as the base case force. It uses 1999 equipment from the TRADOC TOE and its dimensional data from the FORSCOM ECF. Two alternative force designs were analyzed. The first, based on the addition/substitution of future weapon systems to the base case was referred to as the Technological Improvement (TECH IMP) alternative. The second alternative was based on the first alternative with additional organizational changes to the force and was called the Organizational Change (ORG CHG) alternative.

2. Figures 1 through 3 show the base case, TECH IMP, and the ORG CHG force structures. The TECH IMP alternative includes future weapon systems such as the Armored Gun System (AGS), Comanche and Apache Longbow helicopters and Corps Surface-to-Air Missile (Corps SAM) system. A Line of Sight Antitank (LOSAT) company and Non-Line-of-Sight Antitank (NLOS-AT) battery were also added to the force. A complete list of the future weapon systems included are shown in Table 3. The ORG CHG alternative is based on the TECH IMP alternative with a modified force structure. It includes an additional LOSAT company, MLRS battery and Apache Longbow battalion. The 155 Artillery Battalion was modified to a light version while the 105mm Artillery Battalion was deleted. The Immediate Ready Company and Hawk Battery were removed from both alternatives.

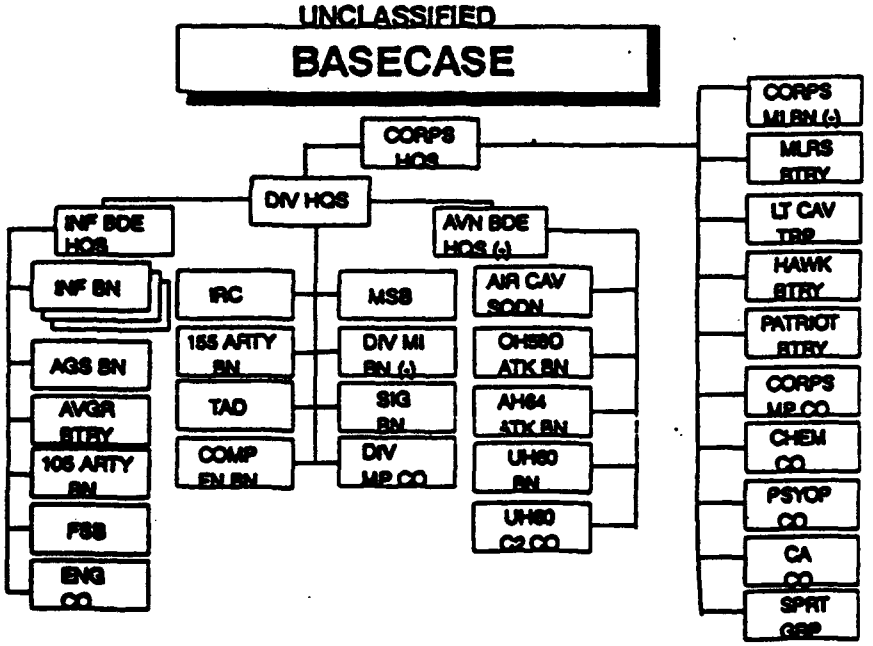

Figure 1. Base Case Force Design

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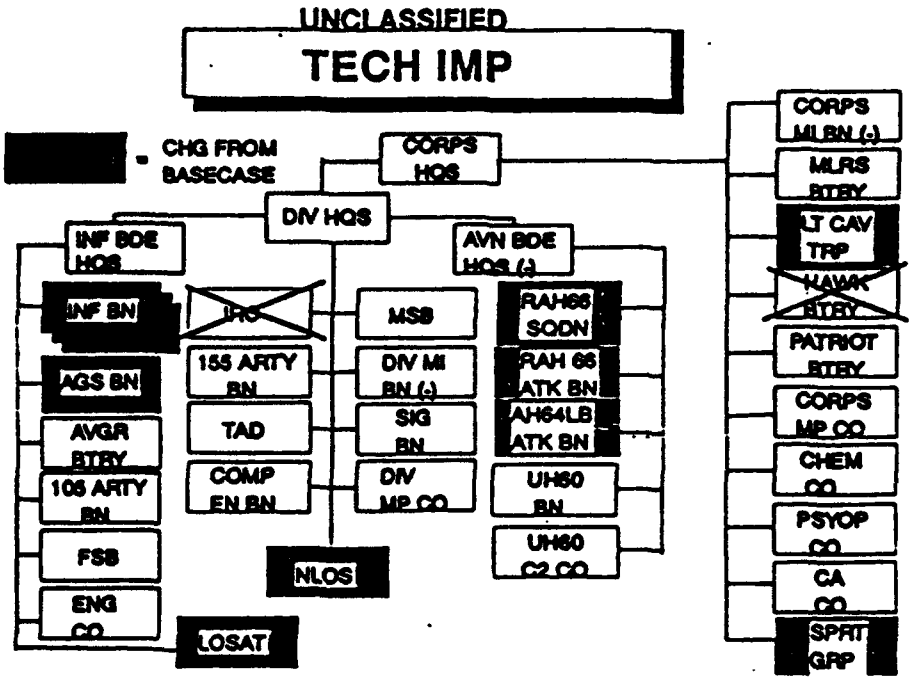

Figure 2. TECH IMP Alternative Design

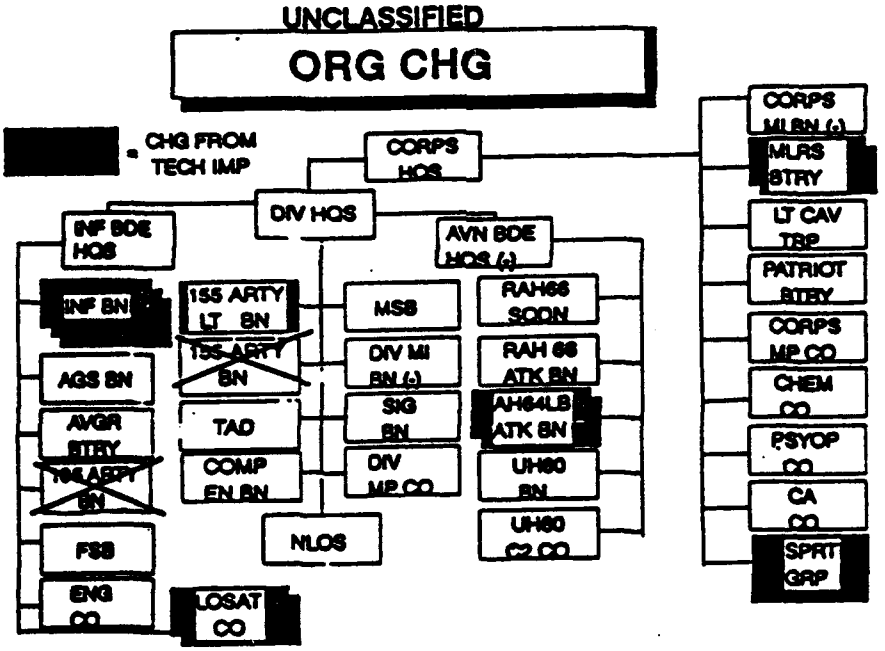

Figure 3. ORG CHG Alternative Design

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TABLE 3
FUTURE WEAPON SYSTEMS

AGS W/STAFF & 2ND GN FLIR	81 MM MORTAR W/SMART
NLOS-AT	120 MM MORTAR W/SMART
LOSAT	155 HOWITZER
APACHE LONGBOW	CORPS SAM
RAH66 COMANCHE	

3. Table 4 shows the deployment data generated by the TARGET model for the base case and the two alternatives. Three days of accompanying supplies and small arms ammunition have been included with the force. The 10K base case force proved to be about 37% heavier than the current airborne division structure. However, it includes heavier artillery, additional helicopters, and tanks in order to improve lethality and survivability. Very little difference in weight was noted between the alternatives, which is critical when deploying by air. The TECH IMP alternative was a little lighter (-3%) due to the lighter and smaller future weapon systems as well as the removal of the heavy M1 and M2 platoons and Hawk Battery. The ORG CHG alternative was a little heavier (+2%) due to the additional units.

TABLE 4
UNIT DEPLOYMENT DATA SUMMARY

Alternative	Personnel	Square Feet	Accp Sup/ Ammo(STON)	Total STON
Base Case	11,218	798,813	283/214	31,776
TECH IMP	11,188	784,518	282/213	30,769
ORG CHG	11,245	820,435	284/214	32,324

4. For the purpose of this analysis, the EELS Battle Lab assigned deployment priorities for the units composing the 10K force as was shown in Table 2. The initial priorities are the infantry battalions and HHCs, followed by artillery, air defense, combat support, aviation, light armor, MLRS, Patriot, and combat service support.

B. SCENARIO. The EELS Battle Lab requested this analysis address deployment to SWA. The RAPIDSIM scenario and TPFDL used in the analysis were provided by the Joint Staff's Defense System Support Organization (DSSO). Specifically, these files are the Mobility Requirements Study (MRS), Major Regional Contingency-East (MRC-E), Case A, Subcase D-2 scenario and TPFDL from CONUS to SWA. The TPFDL includes all of the joint combat forces, resupply, combat support, combat service support, and ammunition requirements for this scenario. As in all actual deployments, the services compete for the limited transportation assets based on their required delivery dates (RDD) in the TPFDL.

C. DEPLOYMENT ANALYSIS.

1. General. The primary variables influencing airlift capability are the availability of aircraft, their utilization (UTE) rates and average payloads. These were all much lower during DS than assumed in the RAPIDSIM model, and are discussed in the analysis that follows. This analysis will show deployment of the 10K forces with both the predicted RAPIDSIM and the demonstrated DS capabilities. Airlift priorities and RDDs are determined by the supported Unified Commander (Commander in Chief, U.S. Central Command (USCINCENT) in the case of SWA). For the purpose of this analysis, we assume that the 10K force would be the USCINCENT's first priority for Army airlift and would begin arriving in SWA on C+1. The daily airlift closures for the base case and alternative 10K forces are shown in Appendix A. Units that changed between the base case and alternatives are annotated with an asterick in the Appendix A tables. A summary of force closure times for all deployment excursions is shown later in this report (Table 8).

2. Sortie Requirements. MTMCTEA's TARGET air loading module estimated air mission requirements for the 10K force, as shown in Table 5. The 10K base case force would require about 1,303 C-141 and 72 C-5 missions for a deployment to SWA. The TECH IMP alternative required 3% fewer sorties than the base case force while the ORG CHG alternative required 2% more sorties to airlift. TARGET's algorithm loads "C-5 required" equipment on C-5s, then fills the remaining space in those aircraft with smaller equipment to ensure efficient C-5 utilization. Remaining equipment is then loaded on C-141s. If, however, no equipment requires C-5s, then none are used.

TABLE 5
SORTIE REQUIREMENTS

Alternative	Number of Sorties C-141	C-5
Base Case	1303	72
TECH IMP	1289	61
ORG CHG	1357	63

3. Force Closure - MRS Planning Factors (RAPIDSIM).

a. The MRS MRC-E TPFDL includes multi-Service requirements for strategic airlift. It includes an initial airborne division (weight = 2,730 STON) with its RDD. The first 30 days of airlift capability (4,700 STON/day) are allocated among the Services. Results of RAPIDSIM model runs show daily arrival of Army cargo fluctuates over the first 30 days, but averages 2,068 STON/day (44 percent share). Using a throughput factor of 2,068 STON/day, the base case force's entire 31,776 STON arrive by C+16 (Table A-1). The infantry battalions, HHCs

and 46 percent of the 105mm towed artillery battalion would arrive on C+1. The 2K force, consisting of the first 21 units (infantry battalions through MSB), would arrive on day C+7.

b. Using these same MRS planning factors, the TECH IMP alternative closes intheater by C+15 due to the smaller, lighter weapon systems (Table A-2). These future systems are being designed for better transportability, which increases the deployability of forces equipped with such systems.

c. The ORG CHG alternative includes the technologically improved weapon systems and an additional LOSAT company, MLRS battery and attack helicopter battalion. This alternative, heavier than the TECH IMP alternative, closes intheater at C+16 (Table A-3).

4. Force Closure - Demonstrated DS Airlift Capability.

a. As stated above, the RAPIDSIM model predicts that AMC airlift would deliver an average of 4,700 STON per day to SWA. Other AMC, U.S. Transportation Command (USTRANSCOM), and Joint Staff deployment models predict similar capabilities. However, after-action reports by TRANSCOM and AMC showed that an average of approximately 2,000 STON per day were delivered during the first 60 days of Operation Desert Shield/Storm. A comparison of airlift capabilities between the modeled capability using MRS factors and DS is shown in Table 6. A variety of factors contributed to the less than optimal performance of the airlift system, including problems with planning, aerial ports, aircrew availability, and aircraft performance. A full discussion of these problems and their contribution to airlift throughput is beyond the scope of this analysis. This more conservative estimate of airlift capability is probably more realistic, since it was actually demonstrated in a recent urgent contingency. Even more recently, the airlift to Somalia during Operation Restore Hope continued to confirm the validity of assuming that these lower throughput capabilities will continue until the fielding of the C-17 is well underway.

TABLE 6
AIRLIFT COMPARISION

	MRS Planned	Desert Shield
All Services STON/Day	4700	2000
Army share STON/Day	2068	880
Available Aircraft:		
C-141	114	116
C-5	97	60
Average payload (STON):		
C-141	25	19
C-5	75	61
Utilization rate (HRS/Day/ACFT):		
C-141	12.5	7.0
C-5	11.0	5.7

b. The 10K force airlift closures for the base case and two alternatives shown in Tables A-4 thru A-6 are based on the Army receiving 880 STON of airlift per day (44 percent of 2000 STON/day.) The base case force would not close in SWA until C+37, more than twice as long as predicted using MRS planned airlift capabilities. The 2K force would now arrive on day C+16. The infantry battalions would arrive over the first two days with the HHC's arriving on C+2 also. The artillery battalion would not arrive in total until day C+3. The TECH IMP alternative now closes intheater on C+35 with the 2K force closing on day C+17. The heavier ORG CHG alternative reaches the theater on day C+37.

5. Force Closure - DS Capability with C-17.

a. The C-17 aircraft is now under production, with 120 aircraft scheduled to enter service over the next 10 to 12 years. Most of the 247 existing C-141 will be retired, with some remaining in the Reserves. The Air Force has often stated that replacing C-141s with 120 C-17s would have increased the DS airlift deliveries by 30 percent. Assuming a 30 percent increase in DS airlift throughput results in delivery of 2,600 STON per day. Based on the Army receiving a 44 percent allocation (1,144 STON per day), closure for the 10K force with the expected 2005 airlift fleet are shown in Tables A-7 through A-9. The base case force would now close in SWA on C+28, 9 days faster than with the current airlift fleet. The 2K force should arrive by C+13. The alternatives showed similar improvements in closure with the TECH IMP and ORG CHG alternatives closing on C+27 and C+29, respectively.

b. If C-17 production is halted, future airlift capability will drop as C-141 aircraft are retired. Projections of future airlift suggest that the 2005 fleet's capability would drop by 30 percent from that of the current fleet if the C-17 is not built. If this 30 percent decrease in airlift throughput becomes a reality, it would result in the delivery of only 1,400 STON per day, with the Army's 44 percent allocation dropping to 616 STON per day. The 10K base case force would not close in SWA until C+52 and the TECH IMP and ORG CHG alternatives would close on C+50 and C+53, respectively.

6. Air/Sea Deployment. Since the 10K force closure proved to be excessive using throughput demonstrated during DS, an excursion was performed to determine closure times given a combination air and sea deployment. The 2K force was deployed by air and the remaining force by sea via Fast Sealift Ships (FSS). The 2K force, using DS throughput was able to close by air on C+16 for the base case and C+17 and C+18 for the TECH IMP and ORG CHG alternatives, respectively (Tables A-4 through A-6.) It would take approximately 3 ships (75% stow factor) to transport the remainder of the division. The entire force would close intheater by C+21 for the base case and alternatives.

7. Prepositioning Afloat.

a. We used the preferred TECH IMP alternative with the DS data, coupled with the future C-17 airlift capability, to run another excursion. In this excursion, we analyzed deployment closures of the 10K force with most of the heavy fire power units and field hospital prepositioned afloat. The EELS Battle Lab identified the units to be prepositioned. These were the heaviest units in the force, usually requiring C-5 strategic airlift. An additional criterion was that these units could not be unique to the Army. The air ambulance medical company did not require strategic lift, as it can be self-deployed. Aviation maintenance units were removed from the force since this maintenance could be performed by the Prepositioned Sustainment Maintenance Facility (PSMF). The total STON for the units prepositioned or removed is 9,708.9 (Table 7). This amounts to a 32% reduction in the total STON of the force.

TABLE 7
UNITS NOT REQUIRING STRATEGIC AIRLIFT

UNIT	STON
Prepositioned Afloat:	
Lt Armd Bn	1995.4
LOSAT Co	280.0
MLRS Btry	991.7
FA Bn, 155mm	1971.0
Field Hospital	256.3
Self-Deployable:	
Med Co, Air Ambl	622.3
AVIM removed for PSMF:	
RAS AMC	724.9
AMB HHD	36.5
GS AMC	722.8
ATK AMC	723.1
AMC	727.5
AVN MAINT CO, ABN	657.4
Total	9708.9

b. Airlift sorties required to move the force for the TECH IMP alternative dropped from 1,289 C-141 and 61 C-5 to 915 C-141 and 38 C-5 with the additional prepositioning. Some of the C-17 airlift capability would have to be re-routed to transport those prepositioned units from the POD to the tactical assembly area. Since 20 percent of the total STON could be prepositioned, we assumed 20 percent of the additional C-17 capability would be diverted from strategic to intratheater lift. Therefore, the increased capability from the acquisition of the C-17s would now be only 24 percent as opposed to the 30 percent if used for

strategic lift only. STON strategically airlifted to the theater in this excursion would be 1,091 per day. When these units were prepositioned, the 2K force closed on C+11 and the 10K force closed by C+20. See Table A-10 for day-by-day closures.

8. Naval Aircraft Fighters Replace Air Force Fighters.

a. When the above units were prepositioned, we were able to decrease the Army's lift requirements. If, at the same time, we could increase the available lift allocation, we would see an improvement in deployment times. As provided by the EELS Battle Lab, an estimated 40 percent of the daily Air Force combat sorties could be generated by the Navy from one carrier. If the Navy replaced 40 percent of the daily Air Force combat missions, strategic airlift could be diverted from support of the Air Force fighters to the airlift of deploying Army units. This excursion is based on the prepositioned excursion force with an increased allocation of airlift for the Army when 40 percent of the daily Air Force combat missions are flown by the Navy.

b. Two Air Force F-15 squadrons (48 aircraft) can be airlifted in 96 C-141 sorties given a load of 20 STON per C-141.[2] This amounts to a total of 1,920 STON of Air Force required airlift that could be used by the other Services. Optimistically assuming that the Army could receive the total allocation of 1,920 STON for the deploying 10K force and if that increased STON is distributed evenly by day, the airlift throughput for the Army would be 1,197 STON. This would enable the 10K force to close intheater on C+18, or 2 days earlier than the force with prepositioning.

9. Summary of the Analysis.

a. A summary of the 10K force airlift closures is shown in Table 8. Until the capability predicted by the RAPIDSIM model can be demonstrated, the "Current/MRS" closure profile must be regarded as very optimistic. If the 10K force were to deploy to SWA today, the "Current/DS" closure profile is a much better prediction. Closure profiles with and without the C-17 shows the absolute need for this aircraft. If we fail to produce the C-17, we will lose about one-half the airlift capability required to support the Army's early entry forces. The TECH IMP alternative is slightly better than the others. In addition, prepositioning heavy units significantly reduces the sortie requirements and speeds deployment by 25% given the fielding of the C-17. The use of Naval aircraft fighters in lieu of Air Force fighters for 40 percent of the daily combat mission could, optimistically improve closure of the force by 2 days.

TABLE 8
10K FORCE AIRLIFT CLOSURE SUMMARY

Alternative	Current/ MRS	Current/ DS	Future w/ C-17	Future w/o C-17	Current/ Air/Sea
Base Case	C+16	C+37	C+28	C+52	C+16/21
TECH IMP	C+15	C+35	C+27	C+50	C+17/21
ORG CHG	C+16	C+37	C+29	C+53	C+18/21
Prepo			C+20		
Naval A/C			C+18		

b. A note of caution must be included. Only small-arms ammunition has been included with the 10K force. 10K force weapons will also require significant tonnage of ammunition to be airlifted. Recall that the MRS MRC-E TPFDL, when modeled with RAPIDSIM, showed only 44 percent of the first 30 days of airlift capability allocated to the Army. This 44 percent allocation included not only Army unit equipment, but also ammunition. If the Army's 44 percent allocation (assumed for the analyses in Tables A-1 through A-10) must also include ammunition, then the closure profiles in Table 8 would be extended even later.

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[2] Logistics/ Mobility Center, 1st Tactical Fighter Wing, Langley, AFB.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions.

1. The 10K base case force is structured similar to an airborne division but is about 37% heavier and contains less personnel. In terms of total weight and airlift requirements, the 10K force is equivalent to an air assault division. It includes lethal and heavy systems such as the Multiple Launcher Rocket System (MLRS) and Armored Gun System (AGS), and about 48% more helicopters than the current airborne division structure. The increase in weights and quantities naturally cause an adverse impact on deployability, especially when the force deploys by air. One alternative to an air deployment is to send the 2K force by air with the remainder of the 10K force deploying by sea. Deploying by sea has the added advantage of allowing much heavier equipment to be included in the force thereby making it more lethal and survivable.

2. The addition/substitution of future weapon systems to the base case design is the basis for the two alternative designs, a technological improvement (TECH IMP) and an organizational change (ORG CHG), respectively. Analysis of the closure times of the alternatives when compared to the base case shows a very slight impact on the deployability of the force. Closure tiems for the ORG CHG alternative were very similar to the base case. The TECH IMP alternative closure times, however, were 1-2 days earlier than the base case for all excursions. This supports the conclusion that the impact of suggested future weapon systems on the deployment of the 10K force is insignificant.

3. The 10K base case force requires 1,303 C-141 and 72 C-5 sorties for a deployment to SWA. The two alternatives require 1,289 C-141 and 61 C-5, and 1,357 C-141 and 63 C-5 sorties, respectively. The decrease in sortie requirements in the TECH IMP alternative is due primarily to the future weapon systems which are lighter and smaller, and the removal of the Hawk battery and "C-5 required" M1 and M2 platoons from the force. For example, the preliminary CORPS SAM designs are C-141 eligible, while the Patriot system requires C-5 transport. The ORG CHG alternative requires more C-141 sorties due to additional units added to the force, yet less C-5s, which is again due to the lighter, smaller future systems.

4. Application of optimistic historical planning factors with the Rapid Intertheater Deployment Simulator (RAPIDSIM) model predicts that the 10K base case force and ORG CHG alternative closes by air to SWA on C+16. The TECH IMP alternative closes a day earlier.

5. Operation Desert Shield/Storm showed:

a. Airlift will service joint requirements; therefore, the Army must share airlift capabilities with the other Service-

b. AMC's sustained capability (first 60 days) was less than prior predictions (based on historical planning factors).

6. Airlift capabilities demonstrated during Desert Shield suggests that the 10K base case and the ORG CHG alternative force would not close until C+37, while the TECH IMP alternative closes two days earlier on day C+35.

7. The C-17 aircraft is critical to the deployability of the Army's future Early Entry Force. If the C-17 is fielded as scheduled, the 10K base case force would close to SWA on C+28 (year 2005) and the TECH IMP and ORG CHG alternatives would close on C+27 and C+29, respectively. If, however, the C-17 or similar capability is not acquired, the 10K base case force would not close until C+52.

8. A combined air and sea deployment significantly improves the arrival of the force when considering the Desert Shield demonstrated airlift capabilities. The 2K force (base case) closes by air on C+16, with the 10K force closing by sea on C+21. The TECH IMP and ORG CHG alternative 2K forces arrive at the POD on C+17 and C+18, respectively by air, and 10K forces on day C+21 by sea. Additional time will be required, however, for onward movement to the tactical assembly area (TAA).

9. An excursion with prepositioning of units such as heavy artillery and aviation maintenance showed a significant reduction in force closure. Given the fielding of the C-17 aircraft, the 10K TECH IMP force closed on C+20. This is a 7 day improvement over the excursion without prepositioning.

10. Using Naval tactical fighters in lieu of Air Force fighters for 40 percent of the daily combat missions could free up some of the early on strategic lift that would have supported the fighters. We could optimistically assume that the Army would receive the additional lift not required by the Air Force to support the combat aircraft. Based on our results of prepositioning and diverting the additional lift to the Army for deploying units, we found the 10K force could arrive intheater on C+18.

B. Recommendations. The EELS Battle Lab should:

1. Vigorously support fielding of the C-17 aircraft.

2. Recommend the Technological Improvement alternative as it is the most rapidly deployable.

3. Preposition units when possible to minimize use of strategic airlift.

4. Consider a combination air/sea deployment to speed closure.

5. Recommend initiation of discussion in joint community (CINCs, Joint Staff, Joint Warfare Center, and USTRANSCOM) regarding the allocation of airlift among the Services to the supported CINC who deploys a highly lethal early entry joint force.

ANNEX 1
to

APPENDIX E

DAY -BY-DAY CLOSURE PROFILES OF ALTERNATIVES

TABLE A-1
AIRLIFT CLOSURE - MRS PLANNED CAPABILITY
10K BASE CASE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
07035L000	3 INF BN (ABN)	1285.5	C+ 1	100
57042L000	HHC AIRBORNE BRIGADE	127.4	C+ 1	100
57004L000	HHC AIRBORNE DIVISION	288.5	C+ 1	100
06205L000	FA BN, 105MM T (ABN) AOE	796.5	C+ 1	46
			C+ 2	54
44437L000	ADA BTRY, AVENGER	199.7	C+ 2	100
05027L000	ENGR CO, ENGR BN, ABN DIV	111.8	C+ 2	100
05443L100	ENGR CO, LIGHT EQUIP, ABN	1241.0	C+ 2	100
34265L000	MI BN (CEWI) ABN DIVISION	558.6	C+ 2	15
			C+ 3	85
11065L000	DIV SIG BN (MSE)	1432.7	C+ 3	100
19313L000	MP COMPANY AIRBORNE DIV(-)	146.7	C+ 3	100
03057L000	CHEM CO (SMK/DECON) ABN/AA	546.8	C+ 3	3
			C+ 4	97
01267L300	3 AIR RECON TROOP (OH-58D)	119.1	C+ 4	100
01055L300	ATTACK HEL BN (OH-58D)	500.7	C+ 4	100
01303L200	2 ASSAULT HEL CO (UH-60)	1681.0	C+ 4	55
			C+ 5	45
17275L000	LIGHT ARMOR BATTALION	1995.4	C+ 5	65
			C+ 6	35
111111111	LIGHT CAVALRY TROOP	301.2	C+ 6	100
06398L000	FA BTRY MLRS	991.7	C+ 6	100
44637L000	ADA BTRY,PATRIOT	589.4	C+ 6	14
			C+ 7	86
01269L300	AVIATION UNIT MAINT TROOP	165.9	C+ 7	100
08058L100	MEDICAL CO (FSB) HVY DIV	346.8	C+ 7	100
63266L666	MSB(-) FOR 10K FORCE	575.1	C+ 7	100
63422L000	CSS AMMO	275.7	C+ 7	100
63433L000	MAT MGT CENTER OFFICE	3.1	C+ 7	100
55580LF00	MOVEMENT CON (AIR TERM)	12.2	C+ 7	100
55817L200	TRANS CARGO TRANSFER CO	1208.8	C+ 7	15
			C+ 8	85
01427L300	ATS COMPANY (CORPS)	147.0	C+ 8	100
222222222	HHC, CORPS FOR 10K FORCE	136.4	C+ 8	100
01385L200	ATTACK HEL BN (AH-64)	1106.9	C+ 8	69
			C+ 9	31
01217L000	COMMAND AVIATION CO (UH-1)	53.0	C+ 9	100
01266L000	HHT, AIR RECON SQUADRON	733.5	C+ 9	100
17207L000	CAV TRP (GROUND)	88.6	C+ 9	100
333333333	IMMEDIATE READY COMPANY	487.2	C+ 9	100
44497L000	ADA BTRY, HAWK (CORPS)	1029.3	C+ 9	35
			C+10	65
06413L000	CORPS TGT ACQ DETACHMENT	181.5	C+10	100
05447L100	ENGR CO,ENGR CBT BN,ABN	643.3	C+10	100
05427L000	ENGR CBT CO, CORP (WHL)	784.5	C+10	73
			C+11	27

TABLE A-1 (cont)
AIRLIFT CLOSURE - MRS PLANNED CAPABILITY
10K BASE CASE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
01913A300	RAS AMC	724.9	C+11	100
01946A000	AMB HHD	36.5	C+11	100
01947A300	GS AMC	722.8	C+11	100
01948A200	ATK AMC	723.1	C+11	51
			C+12	49
01953A000	AMC	727.5	C+12	100
01973L100	AVN MAINT CO, ABN (AH-1)	657.4	C+12	100
01207L000	ASSAULT HEL CO/TRP (UH-60)	336.1	C+12	99
			C+13	1
43209L000	MAINT CO NON-DIVISIONAL DS	1070.3	C+13	100
06435L000	FA BN, 155MM T, ABN	1971.0	C+13	50
			C+14	50
08577LA00	HOSP UNIT, SURG FWD (HUSF)	48.9	C+14	100
08909L000	MED LOG SUPPORT DET	99.9	C+14	100
08447L200	MED CO, AIR AMBL (UH-60A)	622.3	C+14	100
08498L000	MED DET, PM (SANITATION)	13.9	C+14	100
08457L000	MEDICAL COMPANY (AREA SPT)	177.7	C+14	100
08449L000	MEDICAL AMBULANCE COMPANY	259.5	C+14	49
			C+15	51
08446L000	HHD, MED EVAC BN	66.1	C+15	100
41718L000	CA DET (DIRECT SUPPORT)	36.1	C+15	100
08419L000	MED DET, VET SVC (SMALL)	9.5	C+15	100
33708L000	PSYOP TACTICAL COMPANY	96.6	C+15	100
34235L100	MI BN (TE), AIRBORNE CORPS	955.3	C+15	100
19477L000	MP CO COMBAT SUPPORT	226.8	C+15	100
03457L000	CHEMICAL CO (SMK/DECON)	625.6	C+15	87
			C+16	13
08813L000	FIELD HOSPITAL	256.3	C+16	100
55555L500	CHAPLAIN UNIT FOR 10K FORC	40.9	C+16	100
66666L666	CMMS FOR 10K FORCE	236.5	C+16	100
12427L000	PERS DET (PERS SVCS CMD)	23.0	C+16	100
14423L000	FINANCE DETACHMENT	14.1	C+16	100
08567LA00	MED DET, CMBT STRESS CNTRL	63.9	C+16	100
45423L000	PRESS CAMP HQ	40.5	C+16	100

[1]Based on Army allocation of 2068.0 stons per day.

TABLE A-2
AIRLIFT CLOSURE - MRS PLANNED CAPABILITY
10K TECH IMP ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON DELIVERED [1]	
07035L000	3 INF BN (ABN)	1285.5	C+ 1	100	
57042L000	HHC AIRBORNE BRIGADE	127.4	C+ 1	100	
57004L000	HHC AIRBORNE DIVISION	288.5	C+ 1	100	
06205L000	FA BN, 105MM T (ABN) AOE	796.5	C+ 1	46	
			C+ 2	54	
17277L000	LOSAT CO	280.0	C+ 2	100	2
44437L000	ADA BTRY, AVENGER	199.7	C+ 2	100	
444444444	ADA BTRY, NLOS-AT	164.4	C+ 2	100	2
05027L000	ENGR CO, ENGR BN, ABN DIV	111.8	C+ 2	100	
05443L100	ENGR CO, LIGHT EQUIP, ABN	1241.0	C+ 2	71	
			C+ 3	29	
34265L000	MI BN (CEWI) ABN DIVISION	558.6	C+ 3	100	
11065L000	DIV SIG BN (MSE)	1432.7	C+ 3	80	
			C+ 4	20	
19313L000	MP COMPANY AIRBORNE DIV(-)	146.7	C+ 4	100	
03057L000	CHEM CO (SMK/DECON) ABN/AA	546.8	C+ 4	100	
01267L300	3 AIR RECON TROOP (OH-58D)	172.8	C+ 4	100	2
01055L300	ATTACK HEL BN (OH-58D)	554.3	C+ 4	100	2
01303L200	2 ASSAULT HEL CO (UH-60)	1681.0	C+ 4	22	
			C+ 5	78	
17275L000	LIGHT ARMOR BATTALION	1995.4	C+ 5	38	
			C+ 6	62	
111111111	LIGHT CAVALRY TROOP	301.2	C+ 6	100	
06398L000	FA BTRY MLRS	991.7	C+ 6	53	
			C+ 7	47	
44637L000	ADA BTRY, CORPS SAM	533.6	C+ 7	100	2
01269L300	AVIATION UNIT MAINT TROOP	165.9	C+ 7	100	
08058L100	MEDICAL CO (FSB) HVY DIV	346.8	C+ 7	100	
63266L666	MSB(-) FOR 10K FORCE	575.1	C+ 7	96	
			C+ 8	4	
63422L000	CSS AMMO	275.7	C+ 8	100	
63433L000	MAT MGT CENTER OFFICE	3.1	C+ 8	100	
55580LF00	MOVEMENT CON (AIR TERM)	12.2	C+ 8	100	
55817L200	TRANS CARGO TRANSFER CO	1208.8	C+ 8	100	
01427L300	ATS COMPANY (CORPS)	147.0	C+ 8	100	
222222222	HHC, CORPS FOR 10K FORCE	136.4	C+ 8	100	
01385L200	ATTACK HEL BN (AH-64)	1118.7	C+ 8	24	2
			C+ 9	76	
01217L000	COMMAND AVIATION CO (UH-1)	53.0	C+ 9	100	
01266L000	HHT, AIR RECON SQUADRON	735.7	C+ 9	100	2
17207L000	CAV TRP (GROUND)	88.6	C+ 9	100	
06413L000	CORPS TGT ACQ DETACHMENT	181.5	C+ 9	100	
05447L100	ENGR CO,ENGR CBT BN,ABN	643.3	C+ 9	24	
			C+10	76	
05427L000	ENGR CBT CO, CORP (WHL)	784.5	C+10	100	
01913A300	RAS AMC	724.9	C+10	100	
01946A000	AMB HHD	36.5	C+10	100	

TABLE A-2 (cont)
AIRLIFT CLOSURE - MRS PLANNED CAPABILITY
10K TECH IMP ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
01947A300	GS AMC	722.8	C+10	5
			C+11	95
01948A200	ATK AMC	723.1	C+11	100
01953A000	AMC	727.5	C+11	90
			C+12	10
01973L100	AVN MAINT CO, ABN (AH-1)	657.4	C+12	100
01207L000	ASSAULT HEL CO/TRP (UH-60)	336.1	C+12	100
43209L000	MAINT CO NON-DIVISIONAL DS	1070.3	C+12	94
			C+13	6
06435L000	FA BN, 155MM T, ABN	1971.0	C+13	100
08577LA00	HOSP UNIT, SURG FWD (HUSF)	48.9	C+13	58
			C+14	42
08909L000	MED LOG SUPPORT DET	99.9	C+14	100
08447L200	MED CO, AIR AMBL (UH-60A)	622.3	C+14	100
08498L000	MED DET, PM (SANITATION)	13.9	C+14	100
08457L000	MEDICAL COMPANY (AREA SPT)	177.7	C+14	100
08449L000	MEDICAL AMBULANCE COMPANY	259.5	C+14	100
08446L000	HHD, MED EVAC BN	66.1	C+14	100
41718L000	CA DET (DIRECT SUPPORT)	36.1	C+14	100
08419L000	MED DET, VET SVC (SMALL)	9.5	C+14	100
33708L000	PSYOP TACTICAL COMPANY	96.6	C+14	100
34235L100	MI BN (TE), AIRBORNE CORPS	955.3	C+14	70
			C+15	30
19477L000	MP CO COMBAT SUPPORT	226.8	C+15	100
03457L000	CHEMICAL CO (SMK/DECON)	625.6	C+15	100
08813L000	FIELD HOSPITAL	256.3	C+15	100
55555L500	CHAPLAIN UNIT FOR 10K FORC	40.9	C+15	100
66666L666	CMMS FOR 10K FORCE	236.5	C+15	100
12427L000	PERS DET (PERS SVCS CMD)	23.0	C+15	100
14423L000	FINANCE DETACHMENT	14.1	C+15	100
08567LA00	MED DET, CMBT STRESS CNTRL	63.9	C+15	100
45423L000	PRESS CAMP HQ	40.5	C+15	100

[1] Based on Army allocation of 2068.0 stons per day.
[2] Unit STON changed from the base case force.

TABLE A-3
AIRLIFT CLOSURE - MRS PLANNED CAPABILITY
10K ORG CHG ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON DELIVERED [1]	
07035L000	3 INF BN (ABN)	1285.5	C+ 1	100	
57042L000	HHC AIRBORNE BRIGADE	127.4	C+ 1	100	
57004L000	HHC AIRBORNE DIVISION	288.5	C+ 1	100	
17277L000	2 LOCAT CO	560.0	C+ 1	65	2
			C+ 2	35	
44437L000	ADA BTRY, AVENGER	199.7	C+ 2	100	
444444444	ADA BTRY, NLOS-AT	164.4	C+ 2	100	2
05027L000	ENGR CO, ENGR BN, ABN DIV	111.8	C+ 2	100	
05443L100	ENGR CO, LIGHT EQUIP, ABN	1241.0	C+ 2	100	
34265L000	MI BN (CEWI) ABN DIVISION	558.6	C+ 2	28	
			C+ 3	72	
11065L000	DIV SIG BN (MSE)	1432.7	C+ 3	100	
19313L000	MP COMPANY AIRBORNE DIV(-)	146.7	C+ 3	100	
03057L000	CHEM CO (SMK/DECON) ABN/AA	546.8	C+ 3	16	
			C+ 4	84	
01267L300	3 AIR RECON TROOP (OH-58D)	172.8	C+ 4	100	2
01055L300	ATTACK HEL BN (OH-58D)	554.3	C+ 4	100	2
01303L200	2 ASSAULT HEL CO (UH-60)	1681.0	C+ 4	52	
			C+ 5	48	
17275L000	LIGHT ARMOR BATTALION	1995.4	C+ 5	64	
			C+ 6	36	
111111111	LIGHT CAVALRY TROOP	301.2	C+ 6	100	
06398L000	2 FA BTRY MLRS	1992.0	C+ 6	52	2
			C+ 7	48	
44637L000	ADA BTRY,CORPS SAM	533.6	C+ 7	100	2
01269L300	AVIATION UNIT MAINT TROOP	165.9	C+ 7	100	
08058L100	MEDICAL CO (FSB) HVY DIV	346.8	C+ 7	100	
63266L666	MSB(-) FOR 10K FORCE	575.1	C+ 7	12	
			C+ 8	88	
63422L000	CSS AMMO	275.7	C+ 8	100	
63433L000	MAT MGT CENTER OFFICE	3.1	C+ 8	100	
55580LF00	MOVEMENT CON (AIR TERM)	12.2	C+ 8	100	
55817L200	TRANS CARGO TRANSFER CO	1208.8	C+ 8	100	
01427L300	ATS COMPANY (CORPS)	147.0	C+ 8	43	
			C+ 9	57	
222222222	HHC, CORPS FOR 10K FORCE	136.4	C+ 9	100	
01385L200	2 ATTACK HEL BN (AH-64)	2237.4	C+ 9	83	2
			C+10	17	
01217L000	COMMAND AVIATION CO (UH-1)	53.0	C+10	100	
01266L000	HHT, AIR RECON SQUADRON	735.7	C+10	100	2
17207L000	CAV TRP (GROUND)	88.6	C+10	100	
06413L000	CORPS TGT ACQ DETACHMENT	181.5	C+10	100	
05447L100	ENGR CO,ENGR CBT BN,ABN	643.3	C+10	96	
			C+11	4	
05427L000	ENGR CBT CO, CORP (WHL)	784.5	C+11	100	
01913A300	RAS AMC	724.9	C+11	100	
01946A000	AMB HHD	36.5	C+11	100	

TABLE A-3 (cont)
AIRLIFT CLOSURE - MRS PLANNED CAPABILITY
10K ORG CHG ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON DELIVERED [1]	
01947A300	GS AMC	722.8	C+11	69	
			C+12	31	
01948A200	ATK AMC	723.1	C+12	100	
01953A000	AMC	727.5	C+12	100	
01973L100	AVN MAINT CO, ABN (AH-1)	657.4	C+12	60	
			C+13	40	
01207L000	ASSAULT HEL CO/TRP (UH-60)	336.1	C+13	100	
43209L000	MAINT CO NON-DIVISIONAL DS	1070.3	C+13	100	
06435L000	FA BN, 155MM T, ABN	1923.7	C+13	21	[2]
			C+14	79	
08577LA00	HOSP UNIT, SURG FWD (HUSF)	48.9	C+14	100	
08909L000	MED LOG SUPPORT DET	99.9	C+14	100	
08447L200	MED CO, AIR AMBL (UH-60A)	622.3	C+14	63	
			C+15	37	
08498L000	MED DET, PM (SANITATION)	13.9	C+15	100	
08457L000	MEDICAL COMPANY (AREA SPT)	177.7	C+15	100	
08449L000	MEDICAL AMBULANCE COMPANY	259.5	C+15	100	
08446L000	HHD, MED EVAC BN	66.1	C+15	100	
41718L000	CA DET (DIRECT SUPPORT)	36.1	C+15	100	
08419L000	MED DET, VET SVC (SMALL)	9.5	C+15	100	
33708L000	PSYOP TACTICAL COMPANY	96.6	C+15	100	
34235L100	MI BN (TE), AIRBORNE CORPS	955.3	C+15	100	
19477L000	MP CO COMBAT SUPPORT	226.8	C+15	99	
			C+16	1	
03457L000	CHEMICAL CO (SMK/DECON)	625.6	C+16	100	
08813L000	FIELD HOSPITAL	256.3	C+16	100	
55555L500	CHAPLAIN UNIT FOR 10K FORC	40.9	C+16	100	
66666L666	CMMS FOR 10K FORCE	236.5	C+16	100	
12427L000	PERS DET (PERS SVCS CMD)	23.0	C+16	100	
14423L000	FINANCE DETACHMENT	14.1	C+16	100	
08567LA00	MED DET, CMBT STRESS CNTRL	63.9	C+16	100	
45423L000	PRESS CAMP HQ	40.5	C+16	100	

[1] Based on Army allocation of 2068.0 stons per day.
[2] Unit STON changed from the base case force.

TABLE A-4
AIRLIFT CLOSURE - DS CAPABILITY
10K BASE CASE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
07035L000	3 INF BN (ABN)	1285.5	C+ 1	68
			C+ 2	32
57042L000	HHC AIRBORNE BRIGADE	127.4	C+ 2	100
57004L000	HHC AIRBORNE DIVISION	288.5	C+ 2	100
06205L000	FA BN, 105MM T (ABN) AOE	796.5	C+ 2	7
			C+ 3	93
44437L000	ADA BTRY, AVENGER	199.7	C+ 3	71
			C+ 4	29
05027L000	ENGR CO, ENGR BN, ABN DIV	111.8	C+ 4	100
05443L100	ENGR CO, LIGHT EQUIP, ABN	1241.0	C+ 4	57
			C+ 5	43
34265L000	MI BN (CEWI) ABN DIVISION	558.6	C+ 5	63
			C+ 6	37
11065L000	DIV SIG BN (MSE)	1432.7	C+ 6	47
			C+ 7	53
19313L000	MP COMPANY AIRBORNE DIV(-)	146.7	C+ 7	81
			C+ 8	19
03057L000	CHEM CO (SMK/DECON) ABN/AA	546.8	C+ 8	100
01267L300	3 AIR RECON TROOP (OH-58D)	119.1	C+ 8	100
01055L300	ATTACK HEL BN (OH-58D)	500.7	C+ 8	37
			C+ 9	63
01303L200	2 ASSAULT HEL CO (UH-60)	1681.0	C+ 9	34
			C+10	52
			C+11	14
17275L000	LIGHT ARMOR BATTALION	1995.4	C+11	32
			C+12	44
			C+13	24
111111111	LIGHT CAVALRY TROOP	301.2	C+13	100
06398L000	FA BTRY MLRS	991.7	C+13	11
			C+14	88
			C+15	1
44637L000	ADA BTRY,PATRIOT	589.4	C+15	100
01269L300	AVIATION UNIT MAINT TROOP	165.9	C+15	100
08058L100	MEDICAL CO (FSB) HVY DIV	346.8	C+15	35
			C+16	65
63266L666	MSB(-) FOR 10K FORCE	575.1	C+16	100
63422L000	CSS AMMO	275.7	C+16	28
			C+17	72
63433L000	MAT MGT CENTER OFFICE	3.1	C+17	100
55580LF00	MOVEMENT CON (AIR TERM)	12.2	C+17	100
55817L200	TRANS CARGO TRANSFER CO	1208.8	C+17	55
			C+18	45
01427L300	ATS COMPANY (CORPS)	147.0	C+18	100
222222222	HHC, CORPS FOR 10K FORCE	136.4	C+18	100
01385L200	ATTACK HEL BN (AH-64)	1106.9	C+18	5
			C+19	80
			C+20	15

TABLE A-4 (cont)
AIRLIFT CLOSURE - DS CAPABILITY
10K BASE CASE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
01217L000	COMMAND AVIATION CO (UH-1)	53.0	C+20	100
01266L000	HHT, AIR RECON SQUADRON	733.5	C+20	89
			C+21	11
17207L000	CAV TRP (GROUND)	88.6	C+21	100
333333333	IMMEDIATE READY COMPANY	487.2	C+21	100
44497L000	ADA BTRY, HAWK (CORPS)	1029.3	C+21	22
			C+22	78
06413L000	CORPS TGT ACQ DETACHMENT	181.5	C+22	42
			C+23	58
05447L100	ENGR CO,ENGR CBT BN,ABN	643.3	C+23	100
05427L000	ENGR CBT CO, CORP (WHL)	784.5	C+23	17
			C+24	83
01913A300	RAS AMC	724.9	C+24	31
			C+25	69
01946A000	AMB HHD	36.5	C+25	100
01947A300	GS AMC	722.8	C+25	48
			C+26	52
01948A200	ATK AMC	723.1	C+26	70
			C+27	30
01953A000	AMC	727.5	C+27	91
			C+28	9
01973L100	AVN MAINT CO, ABN (AH-1)	657.4	C+28	100
01207L000	ASSAULT HEL CO/TRP (UH-60)	336.1	C+28	46
			C+29	54
43209L000	MAINT CO NON-DIVISIONAL DS	1070.3	C+29	65
			C+30	35
06435L000	FA BN, 155MM T, ABN	1971.0	C+30	25
			C+31	45
			C+32	30
08577LA00	HOSP UNIT, SURG FWD (HUSF)	48.9	C+32	100
08909L000	MED LOG SUPPORT DET	99.9	C+32	100
08447L200	MED CO, AIR AMBL (UH-60A)	622.3	C+32	24
			C+33	76
08498L000	MED DET, PM (SANITATION)	13.9	C+33	100
08457L000	MEDICAL COMPANY (AREA SPT)	177.7	C+33	100
08449L000	MEDICAL AMBULANCE COMPANY	259.5	C+33	83
			C+34	17
08446L000	HHD, MED EVAC BN	66.1	C+34	100
41718L000	CA DET (DIRECT SUPPORT)	36.1	C+34	100
08419L000	MED DET, VET SVC (SMALL)	9.5	C+34	100
33708L000	PSYOP TACTICAL COMPANY	96.6	C+34	100
34235L100	MI BN (TE), AIRBORNE CORPS	955.3	C+34	66
			C+35	34
19477L000	MP CO COMBAT SUPPORT	226.8	C+35	100
03457L000	CHEMICAL CO (SMK/DECON)	625.6	C+35	52
			C+36	48

TABLE A-4 (cont)
AIRLIFT CLOSURE - DS CAPABILITY
10K BASE CASE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
08813L000	FIELD HOSPITAL	256.3	C+36	100
55555L500	CHAPLAIN UNIT FOR 10K FORC	40.9	C+36	100
66666L666	CMMS FOR 10K FORCE	236.5	C+36	100
12427L000	PERS DET (PERS SVCS CMD)	23.0	C+36	100
14423L000	FINANCE DETACHMENT	14.1	C+36	100
08567LA00	MED DET, CMBT STRESS CNTRL	63.9	C+36	14
			C+37	86
45423L000	PRESS CAMP HQ	40.5	C+37	100

[1] Based on Army allocation of 880.0 stons per day.

TABLE A-5
AIRLIFT CLOSURE - DS CAPABILITY
10K TECH IMP ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON DELIVERED [1]	
07035L000	3 INF BN (ABN)	1285.5	C+ 1	68	
			C+ 2	32	
57042L000	HHC AIRBORNE BRIGADE	127.4	C+ 2	100	
57004L000	HHC AIRBORNE DIVISION	288.5	C+ 2	100	
06205L000	FA BN, 105MM T (ABN) AOE	796.5	C+ 2	7	
			C+ 3	93	
17277L000	LOSAT CO	280.0	C+ 3	51	2
			C+ 4	49	
44437L000	ADA BTRY, AVENGER	199.7	C+ 4	100	
444444444	ADA BTRY, NLOS-AT	164.4	C+ 4	100	2
05027L000	ENGR CO, ENGR BN, ABN DIV	111.8	C+ 4	100	
05443L100	ENGR CO, LIGHT EQUIP, ABN	1241.0	C+ 4	21	
			C+ 5	71	
			C+ 6	8	
34265L000	MI BN (CEWI) ABN DIVISION	558.6	C+ 6	100	
11065L000	DIV SIG BN (MSE)	1432.7	C+ 6	16	
			C+ 7	61	
			C+ 8	23	
19313L000	MP COMPANY AIRBORNE DIV(-)	146.7	C+ 8	100	
03057L000	CHEM CO (SMK/DECON) ABN/AA	546.8	C+ 8	74	
			C+ 9	26	
01267L300	3 AIR RECON TROOP (OH-58D)	172.8	C+ 9	100	2
01055L300	ATTACK HEL BN (OH-58D)	554.3	C+ 9	100	2
01303L200	2 ASSAULT HEL CO (UH-60)	1681.0	C+ 9	1	
			C+10	52	
			C+11	47	
17275L000	LIGHT ARMOR BATTALION	1995.4	C+11	5	
			C+12	44	
			C+13	44	
			C+14	7	
111111111	LIGHT CAVALRY TROOP	301.2	C+14	100	
06398L000	FA BTRY MLRS	991.7	C+14	44	
			C+15	56	
44637L000	ADA BTRY,CORPS SAM	533.6	C+15	61	2
			C+16	39	
01269L300	AVIATION UNIT MAINT TROOP	165.9	C+16	100	
08058L100	MEDICAL CO (FSB) HVY DIV	346.8	C+16	100	
63266L666	MSB(-) FOR 10K FORCE	575.1	C+16	27	
			C+17	73	
63422L000	CSS AMMO	275.7	C+17	100	
63433L000	MAT MGT CENTER OFFICE	3.1	C+17	100	
55580LF00	MOVEMENT CON (AIR TERM)	12.2	C+17	100	
55817L200	TRANS CARGO TRANSFER CO	1208.8	C+17	14	
			C+18	73	
			C+19	13	
01427L300	ATS COMPANY (CORPS)	147.0	C+19	100	

TABLE A-5 (cont)
AIRLIFT CLOSURE - DS CAPABILITY
10K TECH IMP ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON DELIVERED [1]	
222222222	HHC, CORPS FOR 10K FORCE	136.4	C+19	100	
01385L200	ATTACK HEL BN (AH-64)	1118.7	C+19	39	[2]
			C+20	61	
01217L000	COMMAND AVIATION CO (UH-1)	53.0	C+20	100	
01266L000	HHT, AIR RECON SQUADRON	735.7	C+20	20	[2]
			C+21	80	
17207L000	CAV TRP (GROUND)	88.6	C+21	100	
06413L000	CORPS TGT ACQ DETACHMENT	181.5	C+21	100	
05447L100	ENGR CO,ENGR CBT BN,ABN	643.3	C+21	3	
			C+22	97	
05427L000	ENGR CBT CO, CORP (WHL)	784.5	C+22	33	
			C+23	67	
01913A300	RAS AMC	724.9	C+23	49	
			C+24	51	
01946A000	AMB HHD	36.5	C+24	100	
01947A300	GS AMC	722.8	C+24	65	
			C+25	35	
01948A200	ATK AMC	723.1	C+25	87	
			C+26	13	
01953A000	AMC	727.5	C+26	100	
01973L100	AVN MAINT CO, ABN (AH-1)	657.4	C+26	9	
			C+27	91	
01207L000	ASSAULT HEL CO/TRP (UH-60)	336.1	C+27	84	
			C+28	16	
43209L000	MAINT CO NON-DIVISIONAL DS	1070.3	C+28	77	
			C+29	23	
06435L000	FA BN, 155MM T, ABN	1971.0	C+29	32	
			C+30	45	
			C+31	23	
08577LA00	HOSP UNIT, SURG FWD (HUSF)	48.9	C+31	100	
			C+31	100	
08909L000	MED LOG SUPPORT DET	99.9	C+31	100	
08447L200	MED CO, AIR AMBL (UH-60A)	622.3	C+31	44	
			C+32	56	
08498L000	MED DET, PM (SANITATION)	13.9	C+32	100	
08457L000	MEDICAL COMPANY (AREA SPT)	177.7	C+32	100	
08449L000	MEDICAL AMBULANCE COMPANY	259.5	C+32	100	
08446L000	HHD, MED EVAC BN	66.1	C+32	100	
41718L000	CA DET (DIRECT SUPPORT)	36.1	C+32	45	
			C+33	55	
08419L000	MED DET, VET SVC (SMALL)	9.5	C+33	100	
33708L000	PSYOP TACTICAL COMPANY	96.6	C+33	100	
34235L100	MI BN (TE), AIRBORNE CORPS	955.3	C+33	79	
			C+34	21	
19477L000	MP CO COMBAT SUPPORT	226.8	C+34	100	

TABLE A-5 (cont)
AIRLIFT CLOSURE - DS CAPABILITY
10K TECH IMP ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
03457L000	CHEMICAL CO (SMK/DECON)	625.6	C+34	72
			C+35	28
08813L000	FIELD HOSPITAL	256.3	C+35	100
55555L500	CHAPLAIN UNIT FOR 10K FORC	40.9	C+35	100
66666L666	CMMS FOR 10K FORCE	236.5	C+35	100
12427L000	PERS DET (PERS SVCS CMD)	23.0	C+35	100
14423L000	FINANCE DETACHMENT	14.1	C+35	100
08567LA00	MED DET, CMBT STRESS CNTRL	63.9	C+35	100
45423L000	PRESS CAMP HQ	40.5	C+35	100

[1] Based on Army allocation of 880.0 stons per day.
[2] Unit STON changed from the base case force.

TABLE A-6
AIRLIFT CLOSURE - DS CAPABILITY
10K ORG CHG ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON DELIVERED [1]	
07035L000	3 INF BN (ABN)	1285.5	C+ 1	68	
			C+ 2	32	
57042L000	HHC AIRBORNE BRIGADE	127.4	C+ 2	100	
57004L000	HHC AIRBORNE DIVISION	288.5	C+ 2	100	
17277L000	2 LOSAT CO	560.0	C+ 2	10	2
			C+ 3	90	
44437L000	ADA BTRY, AVENGER	199.7	C+ 3	100	
444444444	ADA BTRY, NLOS-AT	164.4	C+ 3	100	2
05027L000	ENGR CO, ENGR BN, ABN DIV	111.8	C+ 3	13	
			C+ 4	87	
05443L100	ENGR CO, LIGHT EQUIP, ABN	1241.0	C+ 4	63	
			C+ 5	37	
34265L000	MI BN (CEWI) ABN DIVISION	558.6	C+ 5	75	
			C+ 6	25	
11065L000	DIV SIG BN (MSE)	1432.7	C+ 6	52	
			C+ 7	48	
19313L000	MP COMPANY AIRBORNE DIV(-)	146.7	C+ 7	100	
03057L000	CHEM CO (SMK/DECON) ABN/AA	546.8	C+ 7	8	
			C+ 8	92	
01267L300	3 AIR RECON TROOP (OH-58D	172.8	C+ 8	100	2
01055L300	ATTACK HEL BN (OH-58D)	554.3	C+ 8	37	2
			C+ 9	63	
01303L200	2 ASSAULT HEL CO (UH-60)	1681.0	C+ 9	32	
			C+10	52	
			C+11	16	
17275L000	LIGHT ARMOR BATTALION	1995.4	C+11	31	
			C+12	44	
			C+13	25	
111111111	LIGHT CAVALRY TROOP	301.2	C+13	100	
06398L000	2 FA BTRY MLRS	1992.0	C+13	4	2
			C+14	44	
			C+15	44	
			C+16	8	
44637L000	ADA BTRY,CORPS SAM	533.6	C+16	100	2
01269L300	AVIATION UNIT MAINT TROOP	165.9	C+16	100	
08058L100	MEDICAL CO (FSB) HVY DIV	346.8	C+16	6	
			C+17	94	
63266L666	MSB(-) FOR 10K FORCE	575.1	C+17	96	
			C+18	4	
63422L000	CSS AMMO	275.7	C+18	100	
63433L000	MAT MGT CENTER OFFICE	3.1	C+18	100	
55580LF00	MOVEMENT CON (AIR TERM)	12.2	C+18	100	
55817L200	TRANS CARGO TRANSFER CO	1208.8	C+18	47	
			C+19	53	
01427L300	ATS COMPANY (CORPS)	147.0	C+19	100	

TABLE A-6 (cont)
AIRLIFT CLOSURE - DS CAPABILITY
10K ORG CHG ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON DELIVERED [1]
222222222	HHC, CORPS FOR 10K FORCE	136.4	C+19	67
			C+20	33
01385L200	2 ATTACK HEL BN (AH-64)	2237.4	C+20	37 [2]
			C+21	40
			C+22	23
01217L000	COMMAND AVIATION CO (UH-1)	53.0	C+22	100
01266L000	HHT, AIR RECON SQUADRON	735.7	C+22	41 [2]
			C+23	59
17207L000	CAV TRP (GROUND)	88.6	C+23	100
06413L000	CORPS TGT ACQ DETACHMENT	181.5	C+23	100
05447L100	ENGR CO,ENGR CBT BN,ABN	643.3	C+23	28
			C+24	72
05427L000	ENGR CBT CO, CORP (WHL)	784.5	C+24	53
			C+25	47
01913A300	RAS AMC	724.9	C+25	71
			C+26	29
01946A000	AMB HHD	36.5	C+26	100
01947A300	GS AMC	722.8	C+26	87
			C+27	13
01948A200	ATK AMC	723.1	C+27	100
01953A000	AMC	727.5	C+27	9
			C+28	91
01973L100	AVN MAINT CO, ABN (AH-1)	657.4	C+28	33
			C+29	67
01207L000	ASSAULT HEL CO/TRP (UH-60)	336.1	C+29	100
43209L000	MAINT CO NON-DIVISIONAL DS	1070.3	C+29	10
			C+30	82
			C+31	8
06435L000	FA BN, 155MM T, ABN	1923.7	C+31	41 [2]
			C+32	46
			C+33	13
08577LA00	HOSP UNIT, SURG FWD (HUSF)	48.9	C+33	100
08909L000	MED LOG SUPPORT DET	99.9	C+33	100
08447L200	MED CO, AIR AMBL (UH-60A)	622.3	C+33	77
			C+34	23
08498L000	MED DET, PM (SANITATION)	13.9	C+34	100
08457L000	MEDICAL COMPANY (AREA SPT)	177.7	C+34	100
08449L000	MEDICAL AMBULANCE COMPANY	259.5	C+34	100
08446L000	HHD, MED EVAC BN	66.1	C+34	100
41718L000	CA DET (DIRECT SUPPORT)	36.1	C+34	100
08419L000	MED DET, VET SVC (SMALL)	9.5	C+34	100
33708L000	PSYOP TACTICAL COMPANY	96.6	C+34	100
34235L100	MI BN (TE), AIRBORNE CORPS	955.3	C+34	8
			C+35	92
19477L000	MP CO COMBAT SUPPORT	226.8	C+35	2
			C+36	98

TABLE A-6 (cont)
AIRLIFT CLOSURE - DS CAPABILITY
10K ORG CHG ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
03457L000	CHEMICAL CO (SMK/DECON)	625.6	C+36	100
08813L000	FIELD HOSPITAL	256.3	C+36	12
			C+37	88
55555L500	CHAPLAIN UNIT FOR 10K FORC	40.9	C+37	100
66666L666	CMMS FOR 10K FORCE	236.5	C+37	100
12427L000	PERS DET (PERS SVCS CMD)	23.0	C+37	100
14423L000	FINANCE DETACHMENT	14.1	C+37	100
08567LA00	MED DET, CMBT STRESS CNTRL	63.9	C+37	100
45423L000	PRESS CAMP HQ	40.5	C+37	100

[1]Based on Army allocation of 880.0 stons per day.
[2]Unit STON changed from the base case force.

TABLE A-7
AIRLIFT CLOSURE - DS WITH C-17 CAPABILITY
10K BASE CASE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
07035L000	3 INF BN (ABN)	1285.5	C+ 1	89
			C+ 2	11
57042L000	HHC AIRBORNE BRIGADE	127.4	C+ 2	100
57004L000	HHC AIRBORNE DIVISION	288.5	C+ 2	100
06205L000	FA BN, 105MM T (ABN) AOE	796.5	C+ 2	74
			C+ 3	26
44437L000	ADA BTRY, AVENGER	199.7	C+ 3	100
05027L000	ENGR CO, ENGR BN, ABN DIV	111.8	C+ 3	100
05443L100	ENGR CO, LIGHT EQUIP, ABN	1241.0	C+ 3	50
			C+ 4	50
34265L000	MI BN (CEWI) ABN DIVISION	558.6	C+ 4	94
			C+ 5	6
11065L000	DIV SIG BN (MSE)	1432.7	C+ 5	78
			C+ 6	22
19313L000	MP COMPANY AIRBORNE DIV(-)	146.7	C+ 6	100
03057L000	CHEM CO (SMK/DECON) ABN/AA	546.8	C+ 6	100
01267L300	3 AIR RECON TROOP (OH-58D)	119.1	C+ 6	100
01055L300	ATTACK HEL BN (OH-58D)	500.7	C+ 6	2
			C+ 7	98
01303L200	2 ASSAULT HEL CO (UH-60)	1681.0	C+ 7	39
			C+ 8	61
17275L000	LIGHT ARMOR BATTALION	1995.4	C+ 8	6
			C+ 9	57
			C+10	37
111111111	LIGHT CAVALRY TROOP	301.2	C+10	100
06398L000	FA BTRY MLRS	991.7	C+10	11
			C+11	89
44637L000	ADA BTRY,PATRIOT	589.4	C+11	44
			C+12	56
01269L300	AVIATION UNIT MAINT TROOP	165.9	C+12	100
08058L100	MEDICAL CO (FSB) HVY DIV	346.8	C+12	100
63266L666	MSB(-) FOR 10K FORCE	575.1	C+12	52
			C+13	48
63422L000	CSS AMMO	275.7	C+13	100
63433L000	MAT MGT CENTER OFFICE	3.1	C+13	100
55580LF00	MOVEMENT CON (AIR TERM)	12.2	C+13	100
55817L200	TRANS CARGO TRANSFER CO	1208.8	C+13	48
			C+14	52
01427L300	ATS COMPANY (CORPS)	147.0	C+14	100
222222222	HHC, CORPS FOR 10K FORCE	136.4	C+14	100
01385L200	ATTACK HEL BN (AH-64)	1106.9	C+14	21
			C+15	79
01217L000	COMMAND AVIATION CO (UH-1)	53.0	C+15	100
01266L000	HHT, AIR RECON SQUADRON	733.5	C+15	29
			C+16	71
17207L000	CAV TRP (GROUND)	88.6	C+16	100
333333333	IMMEDIATE READY COMPANY	487.2	C+16	100

TABLE A-7 (cont)
AIRLIFT CLOSURE - DS WITH C-17 CAPABILITY
10K BASE CASE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
44497L000	ADA BTRY, HAWK (CORPS)	1029.3	C+16	5
			C+17	95
06413L000	CORPS TGT ACQ DETACHMENT	181.5	C+17	91
			C+18	9
05447L100	ENGR CO,ENGR CBT BN,ABN	643.3	C+18	100
05427L000	ENGR CBT CO, CORP (WHL)	784.5	C+18	62
			C+19	38
01913A300	RAS AMC	724.9	C+19	100
01946A000	AMB HHD	36.5	C+19	100
01947A300	GS AMC	722.8	C+19	11
			C+20	89
01948A200	ATK AMC	723.1	C+20	70
			C+21	30
01953A000	AMC	727.5	C+21	100
01973L100	AVN MAINT CO, ABN (AH-1)	657.4	C+21	30
			C+22	70
01207L000	ASSAULT HEL CO/TRP (UH-60)	336.1	C+22	100
43209L000	MAINT CO NON-DIVISIONAL DS	1070.3	C+22	32
			C+23	68
06435L000	FA BN, 155MM T, ABN	1971.0	C+23	21
			C+24	58
			C+25	21
08577LA00	HOSP UNIT, SURG FWD (HUSF)	48.9	C+25	100
08909L000	MED LOG SUPPORT DET	99.9	C+25	100
08447L200	MED CO, AIR AMBL (UH-60A)	622.3	C+25	95
			C+26	5
08498L000	MED DET, PM (SANITATION)	13.9	C+26	100
08457L000	MEDICAL COMPANY (AREA SPT)	177.7	C+26	100
08449L000	MEDICAL AMBULANCE COMPANY	259.5	C+26	100
08446L000	HHD, MED EVAC BN	66.1	C+26	100
41718L000	CA DET (DIRECT SUPPORT)	36.1	C+26	100
08419L000	MED DET, VET SVC (SMALL)	9.5	C+26	100
33708L000	PSYOP TACTICAL COMPANY	96.6	C+26	100
34235L100	MI BN (TE), AIRBORNE CORPS	955.3	C+26	47
			C+27	53
19477L000	MP CO COMBAT SUPPORT	226.8	C+27	100
03457L000	CHEMICAL CO (SMK/DECON)	625.6	C+27	66
			C+28	34
08813L000	FIELD HOSPITAL	256.3	C+28	100
55555L500	CHAPLAIN UNIT FOR 10K FORC	40.9	C+28	100
66666L666	CMMS FOR 10K FORCE	236.5	C+28	100
12427L000	PERS DET (PERS SVCS CMD)	23.0	C+28	100
14423L000	FINANCE DETACHMENT	14.1	C+28	100
08567LA00	MED DET, CMBT STRESS CNTRL	63.9	C+28	100
45423L000	PRESS CAMP HQ	40.5	C+28	100

[1] Based on Army allocation of 1144.0 stons per day.

TABLE A-8
AIRLIFT CLOSURE - DS WITH C-17 CAPABILITY
10K TECH IMP ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON DELIVERED [1]	
07035L000	3 INF BN (ABN)	1285.5	C+ 1	89	
			C+ 2	11	
57042L000	HHC AIRBORNE BRIGADE	127.4	C+ 2	100	
57004L000	HHC AIRBORNE DIVISION	288.5	C+ 2	100	
06205L000	FA BN, 105MM T (ABN) AOE	796.5	C+ 2	74	
			C+ 3	26	
17277L000	LOSAT CO	280.0	C+ 3	100	2
44437L000	ADA BTRY, AVENGER	199.7	C+ 3	100	
444444444	ADA BTRY, NLOS-AT	164.4	C+ 3	100	2
05027L000	ENGR CO, ENGR BN, ABN DIV	111.8	C+ 3	100	
05443L100	ENGR CO, LIGHT EQUIP, ABN	1241.0	C+ 3	14	
			C+ 4	86	
34265L000	MI BN (CEWI) ABN DIVISION	558.6	C+ 4	15	
			C+ 5	85	
11065L000	DIV SIG BN (MSE)	1432.7	C+ 5	47	
			C+ 6	53	
19313L000	MP COMPANY AIRBORNE DIV(-)	146.7	C+ 6	100	
03057L000	CHEM CO (SMK/DECON) ABN/AA	546.8	C+ 6	42	
		546.8	C+ 7	58	
01267L300	3 AIR RECON TROOP (OH-58D)	172.8	C+ 7	100	2
01055L300	ATTACK HEL BN (OH-58D)	554.3	C+ 7	100	2
01303L200	2 ASSAULT HEL CO (UH-60)	1681.0	C+ 7	6	
			C+ 8	68	
			C+ 9	26	
17275L000	LIGHT ARMOR BATTALION	1995.4	C+ 9	35	
			C+10	57	
			C+11	7	
111111111	LIGHT CAVALRY TROOP	301.2	C+11	100	
06398L000	FA BTRY MLRS	991.7	C+11	71	
			C+12	29	
44637L000	ADA BTRY,CORPS SAM	533.6	C+12	100	2
01269L300	AVIATION UNIT MAINT TROOP	165.9	C+12	100	
08058L100	MEDICAL CO (FSB) HVY DIV	346.8	C+12	44	
			C+13	56	
63266L666	MSB(-) FOR 10K FORCE	575.1	C+13	100	
63422L000	CSS AMMO	275.7	C+13	100	
63433L000	MAT MGT CENTER OFFICE	3.1	C+13	100	
55580LF00	MOVEMENT CON (AIR TERM)	12.2	C+13	100	
55817L200	TRANS CARGO TRANSFER CO	1208.8	C+13	7	
			C+14	93	
01427L300	ATS COMPANY (CORPS)	147.0	C+14	13	
			C+15	87	
222222222	HHC, CORPS FOR 10K FORCE	136.4	C+15	100	
01385L200	ATTACK HEL BN (AH-64)	1118.7	C+15	79	2
			C+16	21	
01217L000	COMMAND AVIATION CO (UH-1)	53.0	C+16	100	
01266L000	HHT, AIR RECON SQUADRON	735.7	C+16	100	2

TABLE A-8 (cont)
AIRLIFT CLOSURE - DS WITH C-17 CAPABILITY
10K TECH IMP ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
17207L000	CAV TRP (GROUND)	88.6	C+16	100
06413L000	CORPS TGT ACQ DETACHMENT	181.5	C+16	15
			C+17	85
05447L100	ENGR CO,ENGR CBT BN,ABN	643.3	C+17	100
05427L000	ENGR CBT CO, CORP (WHL)	784.5	C+17	44
			C+18	56
01913A300	RAS AMC	724.9	C+18	97
			C+19	3
01946A000	AMB HHD	36.5	C+19	100
01947A300	GS AMC	722.8	C+19	100
01948A200	ATK AMC	723.1	C+19	51
			C+20	49
01953A000	AMC	727.5	C+20	100
01973L100	AVN MAINT CO, ABN (AH-1)	657.4	C+20	9
			C+21	91
01207L000	ASSAULT HEL CO/TRP (UH-60)	336.1	C+21	100
43209L000	MAINT CO NON-DIVISIONAL DS	1070.3	C+21	20
			C+22	80
06435L000	FA BN, 155MM T, ABN	1971.0	C+22	14
			C+23	58
			C+24	28
08577LA00	HOSP UNIT, SURG FWD (HUSF)	48.9	C+24	100
08909L000	MED LOG SUPPORT DET	99.9	C+24	100
08447L200	MED CO, AIR AMBL (UH-60A)	622.3	C+24	73
			C+25	27
08498L000	MED DET, PM (SANITATION)	13.9	C+25	100
08457L000	MEDICAL COMPANY (AREA SPT)	177.7	C+25	100
08449L000	MEDICAL AMBULANCE COMPANY	259.5	C+25	100
08446L000	HHD, MED EVAC BN	66.1	C+25	100
41718L000	CA DET (DIRECT SUPPORT)	36.1	C+25	100
08419L000	MED DET, VET SVC (SMALL)	9.5	C+25	100
33708L000	PSYOP TACTICAL COMPANY	96.6	C+25	100
34235L100	MI BN (TE), AIRBORNE CORPS	955.3	C+25	33
			C+26	67
19477L000	MP CO COMBAT SUPPORT	226.8	C+26	100
03457L000	CHEMICAL CO (SMK/DECON)	625.6	C+26	44
			C+27	56
08813L000	FIELD HOSPITAL	256.3	C+27	100
55555L500	CHAPLAIN UNIT FOR 10K FORC	40.9	C+27	100
66666L666	CMMS FOR 10K FORCE	236.5	C+27	100
12427L000	PERS DET (PERS SVCS CMD)	23.0	C+27	100
14423L000	FINANCE DETACHMENT	14.1	C+27	100
08567LA00	MED DET, CMBT STRESS CNTRL	63.9	C+27	100
45423L000	PRESS CAMP HQ	40.5	C+27	100

[1]Based on Army allocation of 1144.0 stons per day.
[2]Unit STON changed from the base case force.

TABLE A-9
AIRLIFT CLOSURE - DS WITH C-17 CAPABILITY
10K ORG CHG ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON DELIVERED [1]	
07035L000	3 INF BN (ABN)	1285.5	C+ 1	89	
			C+ 2	11	
57042L000	HHC AIRBORNE BRIGADE	127.4	C+ 2	100	
57004L000	HHC AIRBORNE DIVISION	288.5	C+ 2	100	
17277L000	2 LOSAT CO	560.0	C+ 2	100	2
44437L000	ADA BTRY, AVENGER	199.7	C+ 2	13	
			C+ 3	87	
444444444	ADA BTRY, NLOS-AT	164.4	C+ 3	100	2
05027L000	ENGR CO, ENGR BN, ABN DIV	111.8	C+ 3	100	
05443L100	ENGR CO, LIGHT EQUIP, ABN	1241.0	C+ 3	56	
			C+ 4	44	
34265L000	MI BN (CEWI) ABN DIVISION	558.6	C+ 4	100	
11065L000	DIV SIG BN (MSE)	1432.7	C+ 4	3	
			C+ 5	80	
			C+ 6	17	
19313L000	MP COMPANY AIRBORNE DIV(-)	146.7	C+ 6	100	
03057L000	CHEM CO (SMK/DECON) ABN/AA	546.8	C+ 6	100	
01267L300	3 AIR RECON TROOP (OH-58D)	172.8	C+ 6	100	2
01055L300	ATTACK HEL BN (OH-58D)	554.3	C+ 6	5	2
			C+ 7	95	
01303L200	2 ASSAULT HEL CO (UH-60)	1681.0	C+ 7	37	
			C+ 8	63	
17275L000	LIGHT ARMOR BATTALION	1995.4	C+ 8	4	
			C+ 9	57	
			C+10	39	
111111111	LIGHT CAVALRY TROOP	301.2	C+10	100	
06398L000	2 FA BTRY MLRS	1992.0	C+10	4	2
			C+11	57	
			C+12	39	
44637L000	ADA BTRY,CORPS SAM	533.6	C+12	69	2
			C+13	31	
01269L300	AVIATION UNIT MAINT TROOP	165.9	C+13	100	
08058L100	MEDICAL CO (FSB) HVY DIV	346.8	C+13	100	
63266L666	MSB(-) FOR 10K FORCE	575.1	C+13	81	
			C+14	19	
63422L000	CSS AMMO	275.7	C+14	100	
63433L000	MAT MGT CENTER OFFICE	3.1	C+14	100	
55580LF00	MOVEMENT CON (AIR TERM)	12.2	C+14	100	
55817L200	TRANS CARGO TRANSFER CO	1208.8	C+14	62	
			C+15	38	
01427L300	ATS COMPANY (CORPS)	147.0	C+15	100	
222222222	HHC, CORPS FOR 10K FORCE	136.4	C+15	100	
01385L200	2 ATTACK HEL BN (AH-64)	2237.4	C+15	18	2
			C+16	51	
			C+1	31	
01217L000	COMMAND AVIATION CO (UH-1)	53.0	C+17	100	
01266L000	HHT, AIR RECON SQUADRON	735.7	C+17	53	2
			C+18	47	

TABLE A-9 (cont)
AIRLIFT CLOSURE - DS WITH C-17 CAPABILITY
10K ORG CHG ALTERNATIVE

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED	
17207L000	CAV TRP (GROUND)	88.6	C+18	100	
06413L000	CORPS TGT ACQ DETACHMENT	181.5	C+18	100	
05447L100	ENGR CO,ENGR CBT BN,ABN	643.3	C+18	83	
			C+19	17	
05427L000	ENGR CBT CO, CORP (WHL)	784.5	C+19	100	
01913A300	RAS AMC	724.9	C+19	34	
			C+20	66	
01946A000	AMB HHD	36.5	C+20	100	
01947A300	GS AMC	722.8	C+20	87	
			C+21	13	
01948A200	ATK AMC	723.1	C+21	100	
01953A000	AMC	727.5	C+21	45	
			C+22	55	
01973L100	AVN MAINT CO, ABN (AH-1)	657.4	C+22	100	
01207L000	ASSAULT HEL CO/TRP (UH-60)	336.1	C+22	26	
			C+23	74	
43209L000	MAINT CO NON-DIVISIONAL DS	1070.3	C+23	84	
			C+24	16	
06435L000	FA BN, 155MM T, ABN	1923.7	C+24	50	[2]
			C+25	50	
08577LA00	HOSP UNIT, SURG FWD (HUSF)	48.9	C+25	100	
08909L000	MED LOG SUPPORT DET	99.9	C+25	100	
08447L200	MED CO, AIR AMBL (UH-60A)	622.3	C+25	7	
			C+26	93	
08498L000	MED DET, PM (SANITATION)	13.9	C+26	100	
08457L000	MEDICAL COMPANY (AREA SPT)	177.7	C+26	100	
08449L000	MEDICAL AMBULANCE COMPANY	259.5	C+26	100	
08446L000	HHD, MED EVAC BN	66.1	C+26	100	
41718L000	CA DET (DIRECT SUPPORT)	36.1	C+26	100	
08419L000	MED DET, VET SVC (SMALL)	9.5	C+26	94	
			C+27	6	
33708L000	PSYOP TACTICAL COMPANY	96.6	C+27	100	
34235L100	MI BN (TE), AIRBORNE CORPS	955.3	C+27	100	
19477L000	MP CO COMBAT SUPPORT	226.8	C+27	40	
			C+28	60	
03457L000	CHEMICAL CO (SMK/DECON)	625.6	C+28	100	
08813L000	FIELD HOSPITAL	256.3	C+28	100	
55555L500	CHAPLAIN UNIT FOR 10K FORC	40.9	C+28	100	
66666L666	CMMS FOR 10K FORCE	236.5	C+28	36	
			C+29	64	
12427L000	PERS DET (PERS SVCS CMD)	23.0	C+29	100	
14423L000	FINANCE DETACHMENT	14.1	C+29	100	
08567LA00	MED DET, CMBT STRESS CNTRL	63.9	C+29	100	
45423L000	PRESS CAMP HQ	40.5	C+29	100	

[1] Based on Army allocation of 1144.0 stons per day.
[2] Unit STON changed from the base case force.

TABLE A-10
AIRLIFT CLOSURE - DS WITH C-17 CAPABILITY
10K TECH IMP ALTERNATIVE WITH PREPO

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON DELIVERED [1]	
07035L000	3 INF BN (ABN)	1285.5	C+ 1	85	
			C+ 2	15	
57042L000	HHC AIRBORNE BRIGADE	127.4	C+ 2	100	
57004L000	HHC AIRBORNE DIVISION	288.5	C+ 2	100	
06205L000	FA BN, 105MM T (ABN) AOE	796.5	C+ 2	60	
			C+ 3	40	
44437L000	ADA BTRY, AVENGER	199.7	C+ 3	100	
444444444	ADA BTRY, NLOS-AT	164.4	C+ 3	100	2
05027L000	ENGR CO, ENGR BN, ABN DIV	111.8	C+ 3	100	
05443L100	ENGR CO, LIGHT EQUIP, ABN	1241.0	C+ 3	24	
			C+ 4	76	
34265L000	MI BN (CEWI) ABN DIVISION	558.6	C+ 4	27	
			C+ 5	73	
11065L000	DIV SIG BN (MSE)	1432.7	C+ 5	48	
			C+ 6	52	
19313L000	MP COMPANY AIRBORNE DIV(-)	146.7	C+ 6	100	
03057L000	CHEM CO (SMK/DECON) ABN/AA	546.8	C+ 6	35	
			C+ 7	65	
01267L300	3 AIR RECON TROOP (OH-58D)	172.8	C+ 7	100	2
01055L300	ATTACK HEL BN (OH-58D)	554.3	C+ 7	100	2
01303L200	2 ASSAULT HEL CO (UH-60)	1681.0	C+ 7	1	
			C+ 8	65	
			C+ 9	34	
111111111	LIGHT CAVALRY TROOP	301.2	C+ 9	100	
44637L000	ADA BTRY,CORPS SAM	533.6	C+ 9	39	2
			C+10	61	
01269L300	AVIATION UNIT MAINT TROOP	165.9	C+10	100	
08058L100	MEDICAL CO (FSB) HVY DIV	346.8	C+10	100	
63266L666	MSB(-) FOR 10K FORCE	575.1	C+10	44	
			C+11	56	
63422L000	CSS AMMO	275.7	C+11	100	
63433L000	MAT MGT CENTER OFFICE	3.1	C+11	100	
55580LF00	MOVEMENT CON (AIR TERM)	12.2	C+11	100	
55817L200	TRANS CARGO TRANSFER CO	1208.8	C+11	40	
			C+12	60	
01427L300	ATS COMPANY (CORPS)	147.0	C+12	100	
222222222	HHC, CORPS FOR 10K FORCE	136.4	C+12	100	
01385L200	ATTACK HEL BN (AH-64)	1118.7	C+12	7	2
			C+13	93	
01217L000	COMMAND AVIATION CO (UH-1)	53.0	C+13	96	
			C+14	4	
01266L000	HHT, AIR RECON SQUADRON	735.7	C+14	100	2
17207L000	CAV TRP (GROUND)	88.6	C+14	100	
06413L000	CORPS TGT ACQ DETACHMENT	181.5	C+14	100	
05447L100	ENGR CO,ENGR CBT BN,ABN	643.3	C+14	13	
			C+15	87	

TABLE A-10 (cont)
AIRLIFT CLOSURE - DS WITH C-17 CAPABILITY
10K TECH IMP ALTERNATIVE WITH PREPO

UNIT SRC	UNIT DESCRIPTION	UNIT STON	DEPLOY DAY	% STON [1] DELIVERED
05427L000	ENGR CBT CO, CORP (WHL)	784.5	C+15	68
			C+16	32
01207L000	ASSAULT HEL CO/TRP (UH-60)	336.1	C+16	100
43209L000	MAINT CO NON-DIVISIONAL DS	1070.3	C+16	47
			C+17	53
08577LA00	HOSP UNIT, SURG FWD (HUSF)	48.9	C+17	100
08909L000	MED LOG SUPPORT DET	99.9	C+17	100
08498L000	MED DET, PM (SANITATION)	13.9	C+17	100
08457L000	MEDICAL COMPANY (AREA SPT)	177.7	C+17	100
08449L000	MEDICAL AMBULANCE COMPANY	259.5	C+17	70
			C+18	30
08446L000	HHD, MED EVAC BN	66.1	C+18	100
41718L000	CA DET (DIRECT SUPPORT)	36.1	C+18	100
08419L000	MED DET, VET SVC (SMALL)	9.5	C+18	100
33708L000	PSYOP TACTICAL COMPANY	96.6	C+18	100
34235L100	MI BN (TE), AIRBORNE CORPS	955.3	C+18	84
			C+19	16
19477L000	MP CO COMBAT SUPPORT	226.8	C+19	100
03457L000	CHEMICAL CO (SMK/DECON)	625.6	C+19	100
55555L500	CHAPLAIN UNIT FOR 10K FORC	40.9	C+19	100
66666L666	CMMS FOR 10K FORCE	236.5	C+19	20
			C+20	80
12427L000	PERS DET (PERS SVCS CMD)	23.0	C+20	100
14423L000	FINANCE DETACHMENT	14.1	C+20	100
08567LA00	MED DET, CMBT STRESS CNTRL	63.9	C+20	100
45423L000	PRESS CAMP HQ	40.5	C+20	100

[1]Based on Army allocation of 1091.0 stons per day.
[2]Unit STON changed from the base case force.

ANNEX 2
to

APPENDIX E

ACRONYMS AND ABBREVIATIONS

APPENDIX B

GLOSSARY OF ACRONYMS AND ABREVIATIONS

The following is a listing of selected acronyms and abbreviations that are frequently used in this analysis. If a long title or acronym is frequently used in the analysis, it is spelled out fully the first time it is used along with its related acronym or abbreviation. The acronymn or abbreviation is used thereafter.

AASLT	Air Assault
ABN	Airborne
AGS	Armored Gun System
AMC	Air Mobility Command
C-Day	Day Deployment Begins
CINC	Commander-in-Chief
COMPASS	Computerized Movement Planning and Status System
CONUS	Continental United States
CORPS SAM	Corps Surface-to-Air Missile System
DS	Desert Shield
DSSO	Defense Systems Support Organization
DTS	Defense Transportation System
ECF	Equipment Characteristics File
EELS	Early Entry Lethality and Survivability
FORSCOM	Forces Command
FSS	Fast Sealift Ship
LOSAT	Line-of-Sight Antitank
MLRS	Multiple Launcher Rocket System
MRC	Major Regional Contingency
MRS	Mobility Requirements Study
MTMCTEA	Military Traffic Management Command Transportation Engineering Agency
NLOS-AT	Non-Line-of-Sight Antitank
POD	Port of Debarkation
POE	Port of Embarkation
RAPIDSIM	Rapid Intertheater Deployment Simulator
RDD	Required Delivery Date
STON	Short Ton (2,000 Pounds)
SRC	Standard Requirements Code
SWA	Southwest Asia
TAA	Tactical Assembly Area
TARGET	Transportability Analysis Reports Generator
TOE	Table of Organization and Equipment
TPFDL	Time Phased Force Deployment List
TRAC-SAC	TRADOC Analysis Command, Studies and Analysis Center
TRADOC	Training and Doctrine Command
USTRANSCOM	United States Transportation Command
USCENTCOM	United States Central Command
UTE Rate	Aircraft Utilization Rate

ANNEX 3
to

APPENDIX E

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APPENDIX F

GLOSSARY

APPENDIX F

GLOSSARY

2K	brigade-size force
10K	division (-) size force
ADA	air defense artillery
AFV	armored fighting vehicle
AGS	armored gun system
ammo	ammunition
AMMO RDT	ammunition requirements determination template
AT	antitank
AVIM	aviation intermediate maintenance
BL	battle lab
Bulk POL RDT	bulk petroleum, oil, and lubricants requirements determination template
C2	command and control
C3I	command, control, communications, and intelligence
CAC	Combined Arms Command
CASCOM	Combined Arms Support Command
CASTFOREM	Combined Arms and Support Task Force Evaluation Model
COMPASS	computerized movement planning and status system
CONUS	continental United States
CSS	combat service support
CSS TOOL (or CSST)	Combat Service Support Tool
DA	Department of the Army
DCSCDD	Deputy Chief of Staff for Concepts and Doctrine Development
DPICM	dual-purpose improved conventional munitions
DS/DS	Desert Shield/Desert Storm
DTS	defense transportation system
ECF	equipment characteristics file
EEA	essential elements of analysis
EELS	Early Entry Lethality and Survivability (battle lab)

FA	field artillery
FLIR	forward-looking infrared
FLOT	forward line of own troops
FM	field manual
FORSCOM	U.S. Army Forces Command
FSS	fast sealift ships
HE	high explosive
HMMWV	high-mobility, multi-wheeled vehicle
IRC	independent ready company
ISB	intermediate staging base
Javelin	medium antitank weapon system
km	kilometer
LATAM	Latin America
LER	loss exchange ratio
LOSAT	line-of-sight, antitank
MARC	manpower authorization requirements criteria
MLRS	multiple-launch, rocket system
mm	millimeter
MRS	mobility requirements study
MTMC	Military Transportation Management Command
NEA	Northeast Asia
NLOS	non-line-of-sight
org chg	organizational change alternative
OTS	over-the-shore
POD	port of debarkation
POE	port of embarkation
PREPO	pre-positioned
PSMF	pre-positioned support maintenance facility
RAPIDSIM	Rapid Intertheater Deployment Simulation
SADARM	sense-and-destroy armored munitions
SME	subject-matter expert

STAFF	smart, target-activated fire-and-forget
STON	short ton
SWA	Southwest Asia
TARGET	Transportability Analysis Requirements Generator
TBM	tactical ballistic missile
tech imp	technological improvement alternative
TO&E	table of organization and equipment
TOW2B	tube-launched, optical wire-guided antitank missile
TPFDL	time-phased force deployment list
TRAC	TRADOC Analysis Center
TRAC-WSMR	TRAC-White Sands Missile Range
TRAC-SWC	TRAC-Scenario and Wargaming Center
TRAC-SAC	TRAC-Study and Analysis Center
TRAC-OAC	TRAC-Operations Analysis Center
TRAC-LEE	TRAC-Fort Lee
TRADOC	U.S. Army Training and Doctrine Command
UAV	unmanned aerial vehicle
USAF	U.S. Air Force
VIC	Vector-In-Commander (a low-resolution model)

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