

AD A088184

FINAL REPORT  
MILITARY ORGANIZATIONAL EFFECTIVENESS/  
READINESS AND SUSTAINABILITY

September 1979

Contract No. DAAK21-79-C-0015

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MILITARY ORGANIZATIONAL EFFECTIVENESS/READINESS AND SUSTAINABILITY

SCIENCE APPLICATIONS, INCORPORATED  
8400 Westpark Drive  
McLean, Virginia 22102

September 1979

Final Report for Period 30 October 1978 - 30 September 1979

CONTRACT NO. DAAK21-79-C-0015

This work sponsored by the U.S. Army Harry Diamond Laboratories,  
2800 Powder Mill Road, Adelphi, Maryland 20783

Prepared for

Science Advisor  
Office of the Deputy Chief of Staff Operations  
(DAMO-ZD)  
Headquarters, Department of the Army  
Washington, D.C. 20310

This document consists of 379 pages.

*I-a*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
1. REPORT NUMBER	2. GOVT ACCESSION NO. <b>AD-A188184</b>	3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) Military Organizational Effectiveness/ Readiness and Sustainability		5. TYPE OF REPORT & PERIOD COVERED Final Report 30 Oct 78 - 29 Sep 79	
7. AUTHOR(s) G. Ross J. Murphy M. March		8. CONTRACT OR GRANT NUMBER(s) JAAK21-79-C 15	
9. PERFORMING ORGANIZATION NAME AND ADDRESS SCIENCE APPLICATIONS, INC. ✓ 8400 Westpark Drive McLean, Va 22102		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS	
11. CONTROLLING OFFICE NAME AND ADDRESS Science Advisor Office of the Deputy Chief of Staff Operations Hdqtrs, Department of the Army, Wash. D.C. 20310		12. REPORT DATE Sep 179	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES 379	
		15. SECURITY CLASS. (of this report) UNCLASSIFIED	
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report)  Approved for public release; distribution unlimited			
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)			
18. SUPPLEMENTARY NOTES This work sponsored by the U.S. Army Harry Diamond Laboratories 2800 Powder Mill Road, Adelphi, Maryland 20783			
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Battalion Level Organizations Combat Effectiveness Readiness (Combat and Operational) Replenishment			
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The U.S. Army's readiness policy as articulated in Army Regulation 220-1 was analyzed and the effectiveness of type combat battalions in various readiness conditions was measured.			



## 20. ABSTRACT (Continued)

The purpose was to provide insights to improve readiness and replenishment policies by illuminating the relationship between resources and unit readiness and sustainability. The Analysis of Military organizational Effectiveness (AMORE) methodology was applied to tank, mechanized, and artillery battalions to determine their capability to recover from the effects of a range of combat damage. Insights to improve readiness and replenishment policies to sustain forces are provided.

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## EXECUTIVE SUMMARY

The purpose of this research was to examine the impact of readiness levels on the capability, and sustainability of that capability, of U.S. Army company/battalion sized organizations. This analysis derived important new insights which suggest policy changes for improving unit capability and sustainability.

The Analysis of Military Organizational Effectiveness (AMORE) methodology was used to examine the detailed anatomies of the various organizations. The capability of the units in each readiness condition both before and after combat damage was obtained by measuring unit capability as a function of time. In addition, specific skills and materiel items which were key to the restoration of capability were determined.

The Army articulates its readiness policy in Army Regulation 220-1 which specifies a system for reporting unit condition and related limiting factors. It depends on this system for information on contingency planning and resource allocation. The floor or threshold of each readiness level was analyzed in this research effort.

The major issues examined were:

- The determination of combat capability and its relationship to current readiness levels.
- The determination of combat sustainability.
- A review of data on the degradation of human performance in continuous and intense combat, and its impact on unit effectiveness.

## RESULTS

### The Relation of the Current Readiness Rating System to Combat Capability

Current policy does not provide either contingency planners or resource managers the basis for estimating combat capability with any reasonable accuracy. For illustration, Table ES-1 displays a Tank Company reporting itself in various readiness conditions. Its

capability at REDCON 1 could range from 88% to 100%. Its capability in REDCON 3 could range from 69% to 100%. Said another way, it could have 14 essential teams (88% effectiveness) and report in readiness condition 1, 2, or 3. This finding is typical of all the units examined in this study effort. Thus the statistical readiness category ascribed to any given unit, according to current policy, is a very poor indicator of its combat capability.

Table ES-1. Unit Readiness Condition Capability Range, Tank Company

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	14-16	12-14	11-14
Personnel Teams	19-20	16-19	13.7-16
Unit Teams	14-16	12-16	11-16
Unit Capability	88-100%	75-100%	69-100%
Overlap Range	88-100%		

It follows, also, that similar increments of resources (e.g., material, personnel strength, MOS fill) designed to attain a given higher readiness rating do not produce equivalent improvements in combat capability for different or even the same organization(s).

Accordingly, current readiness reporting criteria are ambiguous, unbalanced and unrelated to combat capability; nor do they provide an effective basis for managing resources. New criteria based on the AMORE measure of combat effectiveness would be more meaningful, less ambiguous, and provide a more efficient means for the allocation of available resources.

Combat Sustainability of Units Categorized According to the Current Readiness Rating System

The study examined:

- Three type combat battalions

- Three readiness thresholds plus full TOE
- Four levels of combat degradation

and determined the ability of the units, in each of the conditions, to reconstitute combat capability.

The capability of the unit that could be marshalled over a period of time following initial damage was examined. A measure of sustainability was defined. It is defined as the ratio of percent loss in unit combat capability to the input percent combat attrition. For example, a unit suffering 20% combat attrition (people and related things) which can reconstitute its resources to 90% combat effectiveness has a net 10% loss in unit combat capability; its sustainability measure is  $\frac{.10}{.20} = .5$ . The smaller the ratio the more sustainable (using its internal resources) the unit. In other AMORE applications a ratio of 1.0 or less was considered acceptable.

In Table ES-2 these sustainability ratios are shown for the various components of the three battalions. Each ratio represents a combined ratio obtained through regression analysis of five damage conditions.

Table ES-2. Sustainability Ratios

UNITS	EFFECT OF DAMAGE TO UNITS AT:				EFF. OF REDCON
	TOE	REDCON 1	REDCON 2	REDCON 3	
TANK BN					
TANK CO	1.79	1.72	1.67	1.42	1.12
CSC	1.93	1.57	1.01	.98	2.10
HHC	2.25	1.74	.74	.43	3.00
MECH INF BN					
RIFLE CO	.86	.20	.27	.44	1.50
CSC	.53	1.00	.79	1.17	.97
HHC	2.03	1.57	1.48	.78	2.20
FA BN					
FA BTRY	.93	.89	1.33	1.07	1.06
SVC BTRY	1.17	.78	.48	.80	1.43
HHB	1.20	.92	1.09	.97	.99
FWD SPT CO	1.27	.96	.60	.65	2.02

The circled entries indicate the highest ratio (poorest sustainability) of the company sized elements within each battalion for each readiness condition.

Considering that these "worst" cases will dominate, the artillery battalion is the most sustainable organization and the tank battalion is the least sustainable organization.

Examining these measures for the individual battalion components reveals that for TOE and REDCON 1 units, the headquarters unit are the least sustainable. For REDCON 2 and REDCON 3 units the line companies are least sustainable, with the exception of the Rifle Bn. To better understand these findings the battalion components were studied from still another standpoint.

The following Table ES-3 shows the key limiting factor (Materiel or Personnel) which precluded further restoration of combat capability for each of the damage conditions considered. Limiting factors for the Forward Support Company are also shown.

Table ES-3. Summary of Limiting Factors  
 Personnel = P Materiel = M Equal = E

DAMAGE CASE	TOE					REDCON 1					REDCON 2					REDCON 3				
	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
Tank Co	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
CSC, Tank Bn	M	P	P	P	P	M	P	P	P	P	M	E	P	P	P	M	P	P	P	P
HHC, Tank Bn	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Rifle Co	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
CSC, Inf Bn	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	P
HHC, Inf Bn	E	M	P	P	P	M	M	P	P	P	M	P	P	P	P	P	P	P	P	P
Arty Btry	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Svc Btry, FA Bn	M	M	P	P	P	M	M	M	E	P	M	M	M	P	P	M	M	P	P	P
HHC, FA Bn	E	E	P	P	P	M	M	P	P	P	M	P	P	P	P	M	P	P	P	P
Fwd Spt Co	E	P	P	P	P	M	M	E	P	P	M	M	M	M	P	M	M	M	P	P

Note first that line companies are materiel dominated, whereas headquarters are generally people dominated. Combining that finding with the previous finding that TOE and REDCON 1 rated units are dominated by the capability of the headquarters, and REDCON 2 and 3 by line units provides a basis for establishing resource management priorities. That is, units in REDCON 1 should emphasize its personnel replacements with first priority to headquarters slots. Units in REDCON 2 or 3 should give priority to materiel replacements for line units. While such management priorities may not always provide the highest improvement in readiness rating they will provide the highest improvement in the combat level and sustainability of combat units.

#### The Management of Critical Personnel Skills for Improving Combat Capability

It has been shown that combat capability can be improved by priority attention to personnel for certain units. Additional leverage can be attained by prioritizing replacement of skills critical to reconstitution and sustainability.

Random replacement of personnel or one geared to the strict TOE percentages ignores the criticality to combat effectiveness of certain positions identified by the AMORE process. For example, replenishment of the HHC of the Mechanized Infantry Battalion which entered combat at the REDCON 2 floor and suffered 20% casualties would require about 30 replacements to reach 70% combat effectiveness if replacements are based strictly on TOE distribution. On the other hand, if priority can be given to the critical skills identified in AMORE the same level of combat effectiveness can be attained with only 16 replacements; almost a 50% reduction. A management system geared to the latter approach is worthy of further consideration and effort.

#### Consumables Replacement and Sustainability

The impact on unit sustainability from external sources was examined in the context of ammunition replacement for the Field Artillery Battalion, and fuel resupply for the Tank Battalion. These units



were examined to determine their ability to transport, handle, and store these commodities. The analysis showed that both units possessed sufficient receipt, handling, and storage capabilities to maintain quantities in accordance with unit requirements.

The analysis also examined the impact of varying resupply rates on the unit's ability to sustain combat. These analyses were made for units in each of the readiness conditions considering both no combat damage and Damage Case 1. Sample results obtained for the units at TOE are shown at Figures ES-1, Ammunition, and ES-2, Fuel.

The figures show the length of time that the unit can maintain a required consumption rate given a certain resupply rate. For example, the TOE Artillery Battalion can fire at its expected rate for only 12 hours if it receives no resupply. If the resupply is 50% of the daily planned resupply rate (192 stons) the battalion can fire for about 1 day, and if the rate is as planned it can sustain firing ad infinitum.

If this battalion has received damage equivalent to Case 1 in each 12 hour period there is little difference in the time it can continue to fight if the resupply rate is below 65%. However, when resupply is above 65% the combat attrition of weapons (approximately Case 3 damage), after 36 hours, becomes significant and a resupply rate of 80% will sustain the unit.

The TOE Tank Bn can sustain the expected fuel consumption rate with no resupply for two days. A resupply rate of 6500 gallons allows the unit to maintain that consumption for about 5 days. After approximately 5 days of sustaining damage at Case 1 levels, the reduction of consumers becomes a significant factor in lessening the requirement for resupply.

Considering the mix of unit readiness and combat casualty conditions likely to exist in a future conflict there appears to be some basis for considering a 15-25% drop in the currently planned ammo resupply rate without impacting on combat unit sustainability.

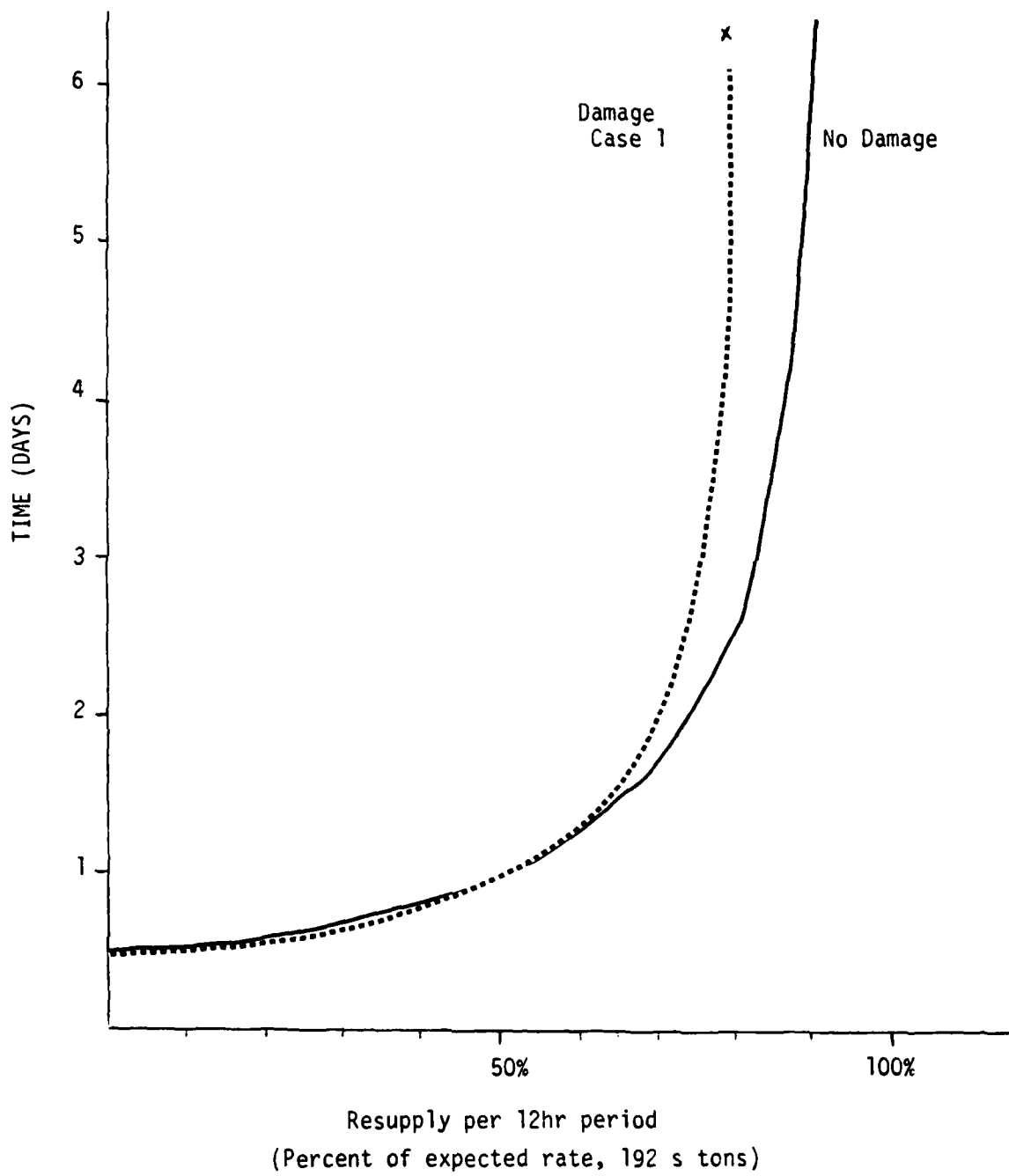


Figure ES-1. Days of expected ammunition expenditure that can be sustained by various resupply rates, Artillery Bn at TOE

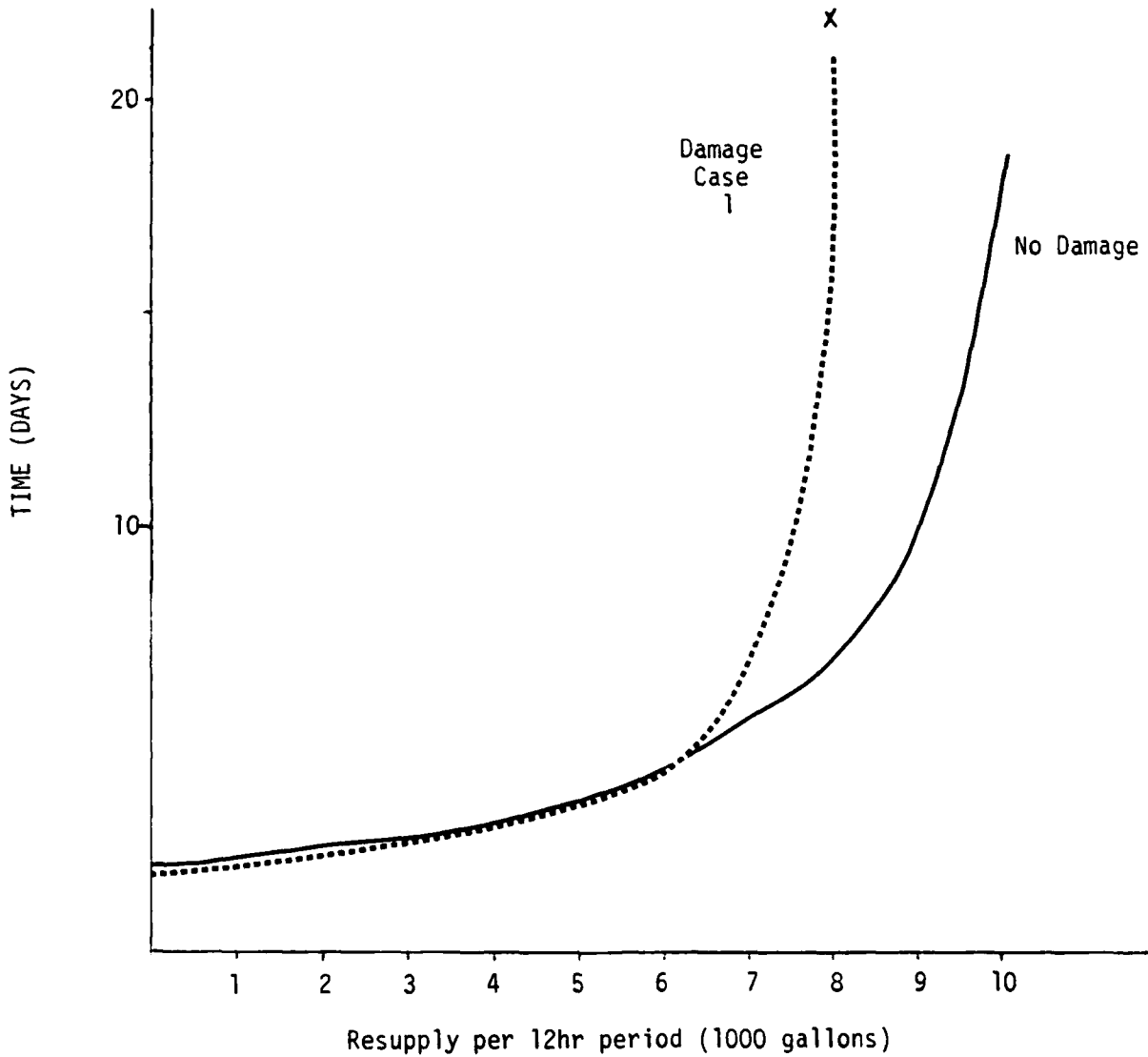


Figure ES- 2. Days of expected POL consumption that can be sustained by various resupply rates, Tank Bn at TOE

### The Relation of Human Factors in Continuous Combat to Combat Capability

The prospect of continuous and intense operations raises concern about the impact of human factors as well as physical damage on combat capability. As a first cut this research attempted to determine the effects of stress, fatigue, and sleep loss on individuals and to quantify the resultant impact on organizational combat capability. Of special interest are those personnel who, while physically unimpaired, are for other reasons prevented from performing tasks. There is some material in the literature on human factors that correlates casualties due to physical damage to "combat reaction" casualties. Ratios of combat casualties to "combat reaction" casualties varies from 10:1 to 1:1 depending on the combat experience of the unit and the intensity of combat.

The combat damage percentages used in the major portions of this study are based on Joint Munitions Effectiveness Manuals which compute only physical losses. In a come-as-you-are war, current battalions without combat experience can be expected to also develop a significant fraction of "combat reaction" casualties.

Using an appropriate number of additional "combat reaction" casualties in AMORE enabled us to quantify the impact of this particular dimension of human factors on unit combat effectiveness. For illustration, the Service Battery of the Field Artillery Battalion can reconstitute to an effectiveness of approximately 98% of original TOE capability following 10% personnel casualties with associated materiel damage from weapons effects. As presented earlier, this unit is materiel limited in the higher REDCON conditions. When expected "combat reaction" casualties are considered, the unit's reconstituted effectiveness drops to about 80-85% if it is experiencing combat for the first time.

On the other hand, units that are personnel limited will experience a much greater impact as a result of "combat reaction" casualties. For example, the HHC of the Tank Battalion can reconstitute to approximately 80% given the same level of attrition (10%) from

weapon effects. However, it will be able to attain only 65% recovery of combat capability if "combat reaction" casualties (assuming inexperienced personnel) are also considered.

Degradation due to human factors can seriously impact the combat effectiveness of units. The AMORE method is uniquely structured to receive appropriate human factor input data and evaluate the resultant impact. Army human factors personnel should research available literature or otherwise develop the types of data which can be input to AMORE for evaluation.

#### Study Report Content

Chapter 1 outlines purpose, scope, assumptions, and technical approach.

Chapter 2 documents AMORE input and describes the relation of the current readiness rating system to combat capability.

Chapter 3 deals with the relation of the current readiness rating system to combat sustainability.

Chapter 4 investigates and quantifies the impact of some human factors.

Chapter 5 presents results of the research.

References list useful key documents.

Appendix A provides key references on the relation of human factors to combat capability.

Appendix B details the AMORE process.

#### Future Developments

This was a pivotal effort in using the AMORE approach to evaluate the current readiness reporting system.

- The AMORE methodology can consider information concerning key personnel changes, personnel turbulence, equipment shortages, and individual/group performance in

measuring unit effectiveness. This measure can provide better estimates of force capability to planners and assist in a more effective prioritization of limited resources to redress shortfalls in the effectiveness and sustainability of combat forces. AMORE should be exercised more fully to further establish its utility as a basis for restructuring our readiness reporting system and for managing resources.

- The AMORE methodology should be used further to help quantify issues such as morale, leadership, confidence, group cohesiveness, suppression, and stress.
- There are indications that management of personnel replacements should consider emphasis on the replacement of critical skills. This should be investigated further.
- There are indications that the supply of consumables, could be adjusted downward considering REDCON and damage conditions expected in a future conflict. This too deserves further study.

CONSIDERATION OF SPONSOR COMMENTS ON THE DRAFT FINAL REPORT

1. General

Sponsor comments on the Final Draft Report are at Annex C. Following are considerations and response to those comments.

2. Comment 1.

In order to avoid a particular scenario definition and yet provide some commonality between units to facilitate the comparative analysis all units were subjected to the same range of personnel casualties, zero to 40%. Each unit was then analyzed to determine the materiel damage associated with the given level of personnel casualties. Effectiveness estimates for the 152mm Howitzer, conventional ammunition, provided in the Joint Munitions Effectiveness Manuals (JMEM's) and the following target assumptions were used for this assessment.

<u>Unit</u>	<u>Mission</u>	<u>Personnel Protected</u>	<u>Posture Prone</u>	<u>Primary Materiel Item</u>
Inf(Mech)Bn				
Rifle Co.	Active Def.	65%	35%	APC
Cbt Spt Co.	Active Def.	65%	35%	APC
HHC	Cmd & Svc Opns	80%	20%	Truck/APC
Tank Bn				
Tank Co.	Active Def	85%	15%	Tank
Cbt Spt Co.	Active Def	65%	35%	APC
HHC	Cmd & Svc Opns	80%	20%	Truck/APC/Tank

<u>Unit</u>	<u>Mission</u>	<u>Personnel Protected</u>	<u>Posture Prone</u>	<u>Primary Materiel Item</u>
FA Bn				
Fa Btry	Firing Position	70%	30%	Howitzer
Svc Btry	Svc Opns	25%	75%	Truck
HQ Btry	Cmd & Svc Opns	80%	20%	Truck/APC
Maintenance Bn				
Fwd Spt Co.	Svc Opns	25%	75%	Truck

3. Comment 2.  
Corrections have been made.

4. Comment 3.  
Corrections have been made.

5. Comment 4.

This is a good caution to users. The assumption that team contribution to unit effectiveness is linear is not a methodology limitation. It is a reflection of the difficulty in the user defining what the validity of team contribution is or should be. It is true that units composed of heterogenous teams and some mission definitions tend to make the difficulty more apparent. The approach used sought uniformity in team definition to establish a common basis for comparing missions. The resolution of this issue remains an analytical problem that SAI continues to investigate in the attempt to better understand the factors involved in organizational effectiveness. The expected value concept for one team can be interpreted as the probability of having that team as a function of time. Explanation of the Mission 1 analysis for headquarters units has been included in Chapter 2. Clarification has also been made that data in Chapter 3 is for Mission 2.



## Chapter 1

### INTRODUCTION, TECHNICAL APPROACH, AND SCOPE

#### Section I. Purpose.

To develop insights to improve readiness and sustainability of U.S. Army battalion sized combat forces.

#### Section II. Objectives.

1. Represent the effectiveness of military units as a function of time.
2. Measure unit effectiveness for various readiness levels.
3. Measure the response of units with given readiness levels that are further degraded by various levels of damage.
4. Determine the relationship between unit effectiveness and key unit resources.
5. Measure unit sustainability for larger periods of time as a function of replenishment policies.

#### Section III. Technical Approach and Scope.

##### 1. GENERAL

The Analysis of Military Organizational Effectiveness (AMORE) methodology was used to examine the detailed anatomies of the Tank Battalion, Artillery Battalion, and the Mechanized Infantry Battalion. The capability of these units entering combat from various readiness conditions was quantified by measuring unit capability at each readiness level against its TOE capability. The criteria for readiness levels as specified in Army Regulation 220-1 (Unit Status Reporting) were used to determine initial degradation as a result of total personnel and equipment shortages and mismatches in MOS trained personnel.

This approach generated data for analysis to compare type combat battalions and their components in their ability to generate mission capability from assigned resources and to determine inherent differences with regard to depth provided in personnel skills and equipment.

The assumption of dominance was used in determining battalion effectiveness. Each type battalion has three primary components: command and control, fire power, and services. For these analyses no transfer of personnel or equipment was permitted between company sized units. The effectiveness of the battalion is considered limited by the element at the lowest effectiveness.

Ten units were examined in each of three readiness conditions. A summary is at Table 1-III-1 below. Five units have a possibility of 100% effectiveness regardless of readiness condition. The capability range of three units is not changed if it is degraded from REDCON 1 to 2. Two units have equal range of capability for REDCONS 2 and 3. One has the same range in all conditions.

Table 1-III-1. Unit Capability Ranges for Readiness Conditions

UNIT	1	2	3
HHC, Tank Bn	72 - 100%	31 - 80%	13 - 60%
CSC, Tank Bn	75 - 100%	50 - 86%	50 - 66%
Tank Co	88 - 100%	75 - 100%	69 - 100%
HHC, Inf Bn	67 - 100%	67 - 100%	39 - 71%
CSC, Inf Bn	100%	80 - 100%	80 - 100%
Rifle Co.	50 - 100%	50 - 100%	50 - 100%
HHB, FA Bn	83 - 100%	83 - 100%	67 - 87%
Service Btry, FA Bn	80 - 100%	60 - 100%	60 - 100%
FA Btry	83 - 100%	83 - 100%	67 - 100%
Forward Support Co.	71 - 100%	43 - 87%	43 - 73%

The next analysis consisted of applying a broad spectrum of personnel casualties and materiel damage to each battalion in each readiness condition to determine its sustainability in combat without replenishment by investigating each battalions' capability to reconstitute following losses. This effort displayed the effects of imbalances in unit readiness levels, unit recoverability and insights to potential gains in effectiveness through adjustment of elements within the battalions.

Since basic data was available on the Forward Support Company, this unit was also analyzed to determine the effect of various readiness criteria on its ability to support a combined arms brigade.

Potential personnel replenishment tradeoffs among organizations were examined to align resiliency profiles and a study was conducted of materiel limitations that precluded additional combat capability to assess the current stockage policy for materiel replenishment.

## 2. LIMITATIONS

Medical support with its specific demands and requirements was not evaluated. Three consummables were analyzed: Class III (POL) for the Tank Battalion, Class V (ammunition) for the Artillery Battalion, and Class IX (spare parts) for the Forward Support Company.

## 3. DAMAGE LEVELS

Casualty and damage combinations were developed to represent a spectrum of the possible intensities of combat that might be expected on a future battlefield. A range of personnel casualties and associated probabilities of damage to materiel were determined from Joint Munitions Effectiveness Manuals. Both generalized and specific personnel/damage combinations were then used.

#### 4. MISSIONS

Two primary missions were differentiated for the purpose of establishing essential teams: a mission representing the surging of as much capability in the unit for a twelve hour period without regard for future periods, and a mission for sustainability on the battlefield--such that combat of a somewhat lower intensity level could be sustained for subsequent battles.

#### Section IV. Assumptions.

##### 1. GENERAL

The current time frame was considered and personnel and materiel systems for baseline organizations were derived from the H-series TOE's. Missions and tasks were analyzed based on 12 hour periods of combat. The capability of personnel to perform tasks was predicated on AR 611-201 as modified by appropriate agencies of TRADOC.

##### 2. SPECIFICS

Units. Units were considered to be at 100% of TOE strength with proper manning and operational equipment prior to degradation by either readiness shortfalls or damage assessment. Damage and casualties were considered to occur over a relatively short period of time. A practical limit of 35 significantly different skills or materiel items was adopted as a self imposed software constraint to control computer expense. Personnel and equipment were considered to be transferable only within the company to which it was assigned for baseline analysis. Transfers within large units were treated in sensitivity analyses. For the various readiness categories, the floor of each category was employed in measuring capability of units included in the category.

Personnel. Personnel were generally considered to be effective in their MOS; sensitivity analyses were conducted to reflect lower levels of personnel effectiveness.

Equipment. Equipment vulnerability was considered individually by type unit and its posture. Items having the same vulnerability as major items were not treated separately. Repair times for damaged equipment items that would exceed four hours were considered as causing the items to be unavailable to the unit and requiring them to be evacuated to higher echelons.

Chapter 2  
BASELINE READINESS

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Section I. General

1. INTRODUCTION

The Analysis of Military Organizational Effectiveness (AMORE) methodology was applied to examine unit effectiveness as a function of unit readiness condition (REDCON). Unit response to include the ability to recover capability, was examined for units in each readiness condition when subjected to various damage levels.

2. READINESS CONDITION DEFINITION

AR 220-1, 15 June 1978, provides the criteria for establishing unit readiness condition. In this effort units were configured to the floor specified for each condition. The unit effectiveness values thus obtained provide an indication of the range of effectiveness expected for a unit in a particular readiness condition. Table 2-I-1 is a modification of Appendix F, AR 220-1, and shows how units were defined for the representation of readiness conditions.

Table 2-I-1. Criteria for Unit Readiness Condition

	C1	C2	C3
PERSONNEL:			
STRENGTH	95%	85%	75%
MOS:			
SENIOR GRADES	86%	77%	68%
JUNIOR GRADES	Not less than 86%	Not less than 77%	Not less than 68%
EQUIPMENT ON HAND	90% or minimum level allowed by Table 3-1, AR 220-1	80% or minimum level allowed by Table 3-1, AR 220-1	70% or minimum level allowed by Table 3-1, AR 220-1

The representation of personnel fill for each REDCON requires differing inputs. For this purpose, a personnel preprocessor was designed to fill personnel spaces on a random basis to meet the minimum constraint for each REDCON. Total unit strength and senior grade (E-5 and above) strength were not allowed to go above, or below, the values shown in Table 2-I-1. Junior grade (E-4 and below) slots were required to be filled at least to the minimum value shown with surpluses (over TOE authorization) in any line being counted as excess (MOS mismatch) personnel. A separate run of the personnel preprocessor was used for each iteration (generally fifty) through AMORE for each REDCON analysis. The fifty personnel configurations for each unit, in each REDCON, were generated and then used for all AMORE runs to insure equitable comparability.

Each materiel line was fixed at the minimum value allowed by AR 220-1, using either the appropriate percentage factor or the value given by Table 2-I-1, AR 220-1. This minimum value was used as the on-hand, operational number for each materiel line for all runs of a particular REDCON. The AR allows 10% of the materiel lines to be below this minimum. That reduction was assumed to be in lines not represented in this analysis.

### 3. DAMAGE CASES APPLIED

For the analysis of damage effects, a range of personnel casualties was first chosen. Associated materiel damages, for each type unit, were then calculated from Joint Munitions Effectiveness Manual (JMEM) data on 152 mm Howitzer conventional ammunition effectiveness. Target assumptions are given on page ES-12. The resulting damage probabilities used for the analysis are shown in Table 2-I-2.

Repair times were established as 18 minutes (0.3 hours) for operator repairable damage and 240 minutes (4 hours) for unit repairable damage. Non-unit repairable items do not have a repair time within the time frame of the analysis and are considered losses to the unit. Decision delay times were input as a function of damage level

Table 2-I-2. Damage Cases.

Applied To:	Case #	Personnel Casualties (%)	1	2	3	4
		Materiel Damage (%)				
Inf (Mech) Co		- Operator Repair	10	10	40	40
Cbt Spt Co, Inf Bn		- Unit Repair	6	19	28	37
Cbt Spt Co, Tank Bn		- Non-Unit Repair	1	6	12	15
HHC, Inf Bn		- Operator Repair	20	20	30	40
HHC, Tank Bn		- Unit Repair	14	26	40	50
HQ Btry, FA Bn		- Non Unit Repair	2	4	7	9
Tank Co		- Operator Repair	9	18	36	18
		- Unit Repair	3	6	16	27
		- Non-Unit Repair	6	12	47	54
Field Arty Btry		- Operator Repair	5	15	10	35
		- Unit Repair	3	6	8	16
		- Non-Unit Repair	5	10	14	35
Service Btry, FA Bn		- Operator Repair	5	10	10	20
Fwd Spt Co		- Unit Repair	1	2	3	6
		- Non-Unit Repair	1	2	4	7



received. These times are shown in Table 2-I-3 and represent the time required to assess the situation and issue orders for the necessary transfers.

Table 2-I-3. Decision Delay Times.

PERSONNEL CASUALTIES	DECISION DELAY TIME (MIN)
Less than 10%	5
11% - 20%	10
21% - 30%	20
Greater 30%	30
UNIT & NON-UNIT CASUALTY & MATERIEL DAMAGE	
Less than 50%	10
Greater than 50%	20

4. UNIT MISSIONS

Two separate missions were analyzed for each unit. Generally the first mission was defined as a crisis combat situation where the maximum effort would be to generate maximum firepower. That is, a situation where all available personnel and equipment would be placed into combat service where possible. The second mission, which includes the first, adds the requirement for necessary support functions.

This general scheme was modified for headquarters units in that the first mission was defined as command and control only. The definition of the minimum essential requirements for this mission resulted in a structure that, once present, has few additional requirements as the number of subordinates are increased. This necessitates a slightly different interpretation of the results: the expected number of teams formed as a fraction of the maximum represents the expected survivability of the command and control element for the cases examined. Mission 2 for the headquarters units added to Mission 1 the requirement

for support, maintenance, and resupply of the subordinate units of the battalion.

The discussions which follow will be directed toward Mission 2 results. Differences between missions will be addressed on a unit by unit basis.

#### 5. GENERAL INPUT DISCUSSION

The following unit TOE's were used as the basis for this analysis.

<u>Unit</u>		<u>TOE</u>
HHC, Tank Bn	17-036H000	w/change 15
Combat Support Co, Tank Bn	17-039H000	w/change 15
Tank Co, Tank Bn	17-037H010	w/change 15
HHC, Infantry (Mech) Bn	07-046H020	w/change 16
Combat Support Co, Inf (Mech) Bn	07-048H030	w/change 15
Rifle Co, Inf (Mech) Bn	07-047H020	w/change 16
HHC, Field Artillery Bn	06-366H000	w/change 17
Service Battery, FA Bn	06-369H000	w/change 16
Field Artillery Btry, FA Bn	06-367H000	w/change 25
Forward Support Maintenance Co.	29-037H0	w/change 26

From these TOE's the major items of input to the AMORE process were developed.

- a. Personnel and equipment authorizations
- b. Personnel task listings
- c. Materiel listings
- d. Personnel transferability matrix
- e. Materiel transferability matrix
- f. Essential personnel team requirements
- g. Essential materiel team requirements

Although derived from the TOE, the personnel and materiel listings do not reflect line by line entries from the TOE. In order to simplify the analysis and satisfy computer input requirements, it was necessary to combine similar personnel tasks and in some cases materiel items. Additionally, some items were eliminated from the analysis entirely. An example of this is the medical platoon of the Headquarter's companies. At the same time, it was necessary to distinguish between senior and junior grade personnel for the REDCON representation. The transfer matrices show the transferability of either personnel or materiel items within the unit. The entries in a row give the time, in minutes, required for a person or equipment item to be prepared to perform the new function, defined by the column. For personnel this could include a background briefing, some basic OJT or familiarization, to bring that person to a level of basic proficiency in the task. For materiel, the times represent an estimate of time to reconfigure equipment to perform the new function. In some cases, a time penalty has been imposed as a function of capacity to handle the new function. An example of this would be a transfer between 5 ton and 2 ½ ton cargo trucks. The 5 ton can substitute for the 2½ ton in zero time but a time penalty has been imposed on transfer of the 2½ ton to perform the 5 ton function simply because of capacity. Entries of "-1" indicate that no transfer is possible. All diagonal entries, row equal column, are zero in that no time is required to perform the original function. Commander's decision delay times (see paragraph 3 above and Table 2-I-3) are added to all transfer times except diagonal values.

Personnel transferability implies cross training. As used in this study it includes formal training in additional MOS's, on the job training prior to damage, and self teaching.

The essential team requirements are determined by the mission, some basic functional building block, and the support required by that basic block. The teams shown in the following sections are accumulated to show the total requirements for each item for a particular number of teams to be built.

## Section II. Tank Battalion

### 1. HEADQUARTERS & HEADQUARTERS COMPANY, TANK BATTALION

Unit analysis was based on TOE 17-36H with change 15, shown in block diagram form at Figure 2-II-1. The medical platoon was eliminated from consideration in this analysis.

#### a. Personnel

A listing of personnel used for this analysis is shown at Table 2-II-1. The transfer matrix which was developed for these personnel is shown at Table 2-II-2. The essential personnel team requirements are shown at Table 2-II-3, Mission 1, and Table 2-II-4, Mission 2.

Mission 1 represents the command and control functions of this company and Mission 2 adds the requirement for maintenance and supply support of the subordinate units.

Tables 2-II-5 thru -7 show the fifty unit configurations of personnel fill used to represent each of the Readiness Conditions. Each row is one unit configuration, the columns are the number of personnel in each personnel task.

#### b. Materiel

The materiel listing for HHC, Tank Bn is provided at Table 2-II-8. The transfer matrix for this materiel is shown at Table 2-II-9. The essential team requirements for materiel are shown at Table 2-II-10, Mission 1, and Table 2-II-11, Mission 2. Table 2-II-12 shows the equipment on-hand quantities used for the representation of Readiness Condition.

#### c. Effect of Readiness Condition on Unit Capability

Figures 2-II-2 and 2-II-3 portray the results of the analysis of unit capability as a function of Readiness Condition. Unit capability is displayed in terms of the number of teams formed; expected

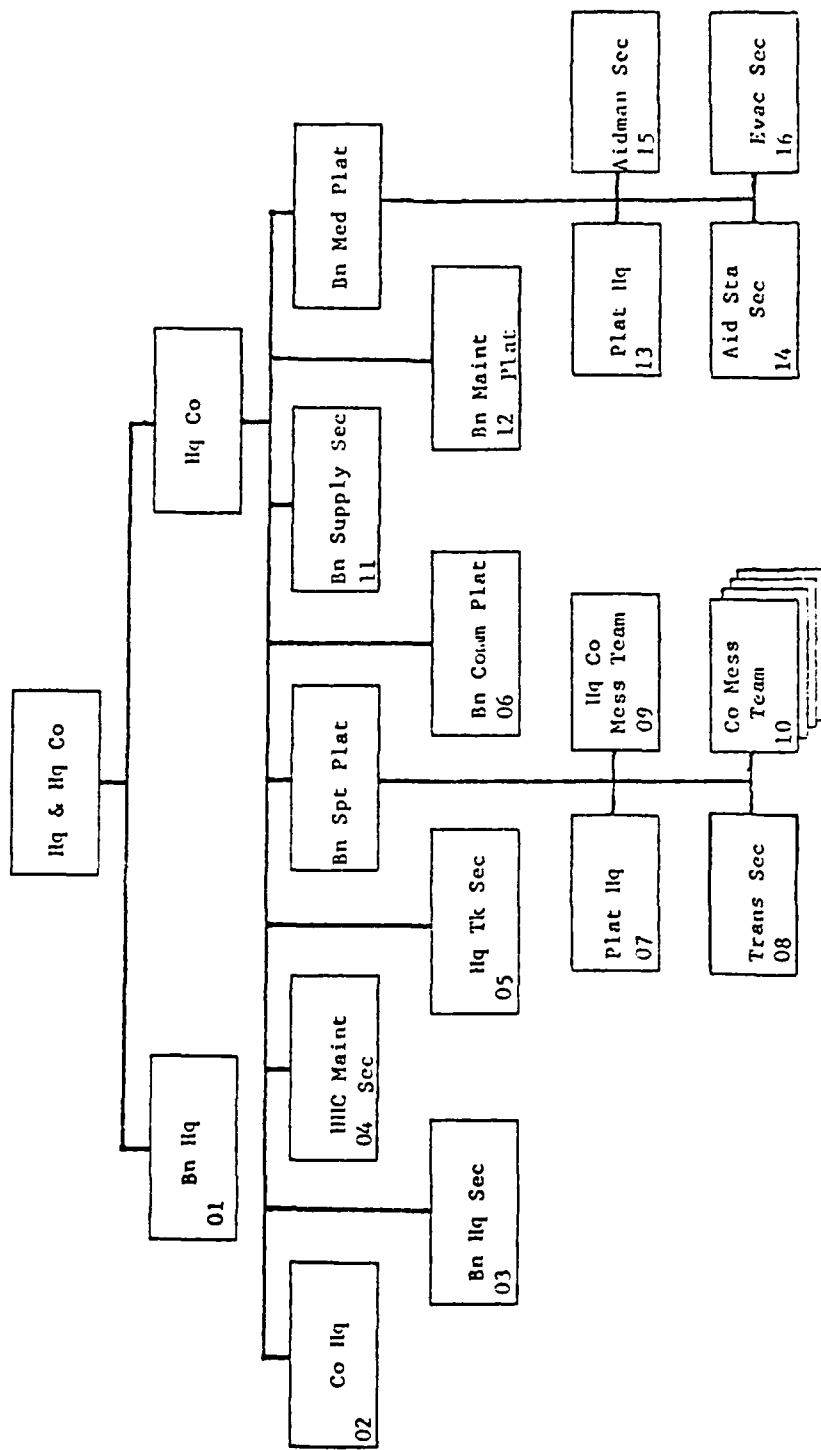


Figure 2-II-1. Headquarters & Headquarters Company, Tank Bn Organizational Chart

Table 2-II-1. TOE Personnel Listing, HQ & HQ Company,  
Tank Bn

TOE 17-36H With Change 15

	PERSONNEL	TOE
1	H1 Bn Co	1
2	H2 Bn Xo	1
3	H3 Bn Staff Officer	8
4	H4 Bn Staff NCO	9
5	H5 APC Driver	5
6	H6 Radio Op	2
7	H7 Light Veh Driver	9
8	H8 Clerk	6
9	H9 Intel Analyst	3
10	C1 Co CO	1
11	C2 Co XO/PLT LDR	2
12	C3 1SGT	1
13	C4 Supply SGT	3
14	C5 General Supplyman	5
15	M1 Motor SGT	4
16	M2 Track Veh Mech	17
17	M3 EQ Maint Clerk	2
18	M4 Wrecker Op	1
19	M5 Power Gen Mech	4
20	M6 Rec Veh Op	7
21	M7 Tank Turret Mech	3
22	M8 Welder	2
23	M9 Auto Maint Tech	1
24	T1 Tank Cmdr	3
25	T2 Tank Driver/Gunner (Sr)	3
26	T3 Tank Gunner/Loader	4
27	T4 Tank Driver (Jr)	2
28	C21 Comm Chf/RATT Team Chf	2
29	C22 RTO/C-E Mech	7
30	TR1 Truck Master	5
31	TR2 Heavy Veh Driver	5
32	TR3 Ammo Spec	1
33	TR4 Ammo Handler	6
34	FS1 Food Svs SGT	11
35	FS2 Cook	11



Table 2-II-3. Personnel - Essential Team Requirements,  
 Headquarters & Headquarters Company,  
 Tank Bn - Mission 1

TEAM		1	2	3	4	5	6
TASK	1	1	1	1	1	1	1
	2	0	0	0	0	0	0
	3	5	5	5	5	5	5
	4	5	5	5	5	5	5
	5	3	3	3	3	3	3
	6	0	0	0	0	0	0
	7	5	5	5	5	5	5
	8	3	3	3	3	3	3
	9	1	1	2	2	3	3
	10	1	1	1	1	1	1
	11	1	1	1	1	1	1
	12	1	1	1	1	1	1
	13	1	1	1	1	1	1
	14	1	1	1	1	1	1
	15	1	1	1	1	1	1
	16	1	1	1	1	1	1
	17	0	0	0	0	0	0
	18	0	0	0	0	0	0
	19	0	0	0	0	0	0
	20	0	0	0	0	0	0
	21	0	0	0	0	0	0
	22	0	0	0	0	0	0
	23	0	0	0	0	0	0
	24	0	0	0	0	0	0
	25	1	2	2	2	3	3
	26	1	2	2	2	3	3
	27	1	2	2	2	3	3
	28	0	0	0	0	0	0
	29	0	0	0	0	0	0
	30	0	0	0	0	0	0
	31	0	0	0	0	0	0
	32	0	0	0	0	0	0
	33	0	0	0	0	0	0
	34	1	1	1	1	1	1
	35	2	2	2	2	2	2
TOTAL		36	39	40	40	44	44



Table 2-II-4. Personnel - Essential Team Requirements,  
Headquarters & Headquarters Company,  
Tank Bn - Mission 2

TEAM	1	2	3	4	5	6
TASK 1	1	1	1	1	1	1
2	0	0	0	0	0	0
3	5	5	5	5	5	5
4	5	5	5	5	5	5
5	3	3	3	3	3	3
6	0	0	0	0	0	0
7	6	7	8	9	10	11
8	3	3	3	3	3	3
9	1	1	1	1	1	1
10	1	1	1	1	1	1
11	1	1	1	1	1	1
12	1	1	1	1	1	1
13	2	2	2	2	2	2
14	2	3	4	5	6	7
15	2	3	4	5	6	7
16	4	7	10	13	16	19
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	2	2	2	2	3	3
20	2	2	4	4	6	6
21	1	2	2	3	4	5
22	1	1	1	1	2	2
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	1	2	2	2	3	3
26	1	2	2	2	3	3
27	1	2	2	2	3	3
28	1	1	1	1	1	1
29	3	5	7	7	7	7
30	2	3	4	5	6	7
31	2	3	4	5	7	8
32	0	1	1	1	1	1
33	0	2	4	6	8	10
34	2	3	4	5	6	7
35	4	6	8	10	12	14
TOTAL	60	80	97	111	133	147



Table 2-II-6. Personnel Fill, HQ & HQ Company, Tank Bn. REDCON 2

EXCESS	TASKS																																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
17	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
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10	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
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9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
11	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
TOT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	



Table 2-II-8. TOE Materiel Listing, HQ & HQ Company,  
Tank Bn

TOE 17-36H With Change 15

MATERIEL		TOE
1	Truck, 1½ Ton	5
2	Truck, 2½ Ton	12
3	Truck, ¼ Ton	10
4	Carrier, CP	4
5	APC	1
6	Compressor	2
7	Wrecker, 10 Ton	1
8	Tank, 105mm	3
9	Generators	7
10	Trailer, ½ Ton	11
11	Trailer, ¼ Ton	5
12	Truck, 5 Ton	6
13	Truck, 8 Ton	5
14	Truck, Fuel Svc (2500 gal)	4
15	Kitchen Trailer, 1½ Ton	2
16	Water Trailer, 1½ Ton	5
17	Range Outfit	11
18	Immersion Heater	26
19	Recon Veh - Light Armor	1
20	Recon Veh - Heavy Armor	2

Table 2-II-9. Materiel Transfer Matrix, Headquarters & Headquarters Company, Tank Bn

NEW FOR  
6 YEARS  
MISSION

TASK	TUE		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2			
1	5	0	0	30	0	30	0	30	35	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	60	60	-1	30	30	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1			
2	12	2	14	30	0	30	60	30	-1	60	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	60	60	60	15	30	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		
3	10	6	9	30	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	0	-1	-1	-1	-1	-1	30	60	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
4	4	2	3	60	60	30	0	30	-1	60	-1	-1	60	15	-1	-1	-1	-1	-1	60	15	-1	-1	-1	-1	60	60	-1	-1	60	60	-1	-1	60	60	-1	-1	60	60	-1	-1	60	60
5	1	0	0	0	0	30	0	-1	15	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	60	60	60	15	30	-1	-1	30	-1	-1	30	-1	-1	30	-1	-1	30	-1	-1	30	-1	
6	2	0	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
7	1	0	0	-1	-1	30	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
8	3	2	2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
9	7	0	6	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
10	11	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
11	5	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
12	0	0	0	60	0	60	60	30	-1	60	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	60	30	30	-1	-1	60	-1	-1	60	-1	-1	60	-1	-1	60	-1	-1	60	-1	
13	5	0	6	60	0	60	60	30	-1	60	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	60	30	30	-1	-1	60	-1	-1	60	-1	-1	60	-1	-1	60	-1	-1	60	-1		
14	4	0	6	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
15	2	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	15	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
16	5	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
17	11	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
18	26	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
19	1	0	0	60	-1	30	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
20	2	0	3	60	-1	30	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	

Table 2-II-10. Materiel - Essential Team Requirements, Headquarters  
& Headquarters Company, Tank Bn - Mission 1

	TEAM	1	2	3	4	5	6
TASK	1	0	0	0	0	0	0
	2	2	2	2	2	2	2
	3	6	6	6	6	6	6
	4	2	2	2	2	2	2
	5	1	1	1	1	1	1
	6	0	0	0	0	0	0
	7	0	0	0	0	0	0
	8	1	1	1	2	2	2
	9	0	0	0	0	0	0
	10	0	0	0	0	0	0
	11	0	0	0	0	0	0
	12	0	0	0	0	0	0
	13	0	0	0	0	0	0
	14	0	0	0	0	0	0
	15	0	0	0	0	0	0
	16	0	0	0	0	0	0
	17	0	0	0	0	0	0
	18	0	0	0	0	0	0
	19	0	0	0	0	0	0
	20	0	0	0	0	0	0

Table 2-II-11. Materiel - Essential Team Requirements,  
 Headquarters & Headquarters Company,  
 Tank Bn - Mission 2

	TEAM	1	2	3	4	5	6
TASK	1	0	0	0	0	0	0
	2	5	6	8	10	12	14
	3	7	7	8	8	8	9
	4	3	3	3	3	3	3
	5	0	0	0	0	0	0
	6	0	0	0	0	0	0
	7	0	0	0	0	0	0
	8	1	1	1	2	2	2
	9	1	2	3	4	5	6
	10	1	2	3	4	5	6
	11	0	0	0	0	0	0
	12	1	2	4	5	7	8
	13	1	2	3	4	5	6
	14	1	2	3	4	5	6
	15	0	0	0	0	0	0
	16	0	0	0	0	0	0
	17	0	0	0	0	0	0
	18	0	0	0	0	0	0
	19	0	0	0	0	0	0
	20	1	1	2	2	3	3



Table 2-II-12. REDCON Materiel Listing, HQ & HQ Company,  
Tank Bn

	MATERIEL	REDCON		
		1	2	3
1	Truck, 1½ Ton	4	4	3
2	Truck, 2½ Ton	11	9	8
3	Truck, ½ Ton	9	8	7
4	Carrier, CP	3	2	2
5	APC	1	1	1
6	Compressor	1	1	1
7	Wrecker, 10 Ton	1	1	1
8	Tank, 105mm	2	1	1
9	Generators	6	6	5
10	Trailer, ½ Ton	10	9	8
11	Trailer, ½ Ton	4	4	3
12	Truck, 5 Ton	5	5	4
13	Truck, 8 Ton	4	4	3
14	Truck, Fuel Svc (2500 gal)	3	2	2
15	Kitchen Trailer, 1½ Ton	1	1	1
16	Water Trailer, 1½ Ton	4	4	3
17	Range Outfit	10	9	8
18	Immersion Heater	23	21	18
19	Recon Veh - Light Armor	1	1	1
20	Recon Veh - Heavy Armor	1	1	1

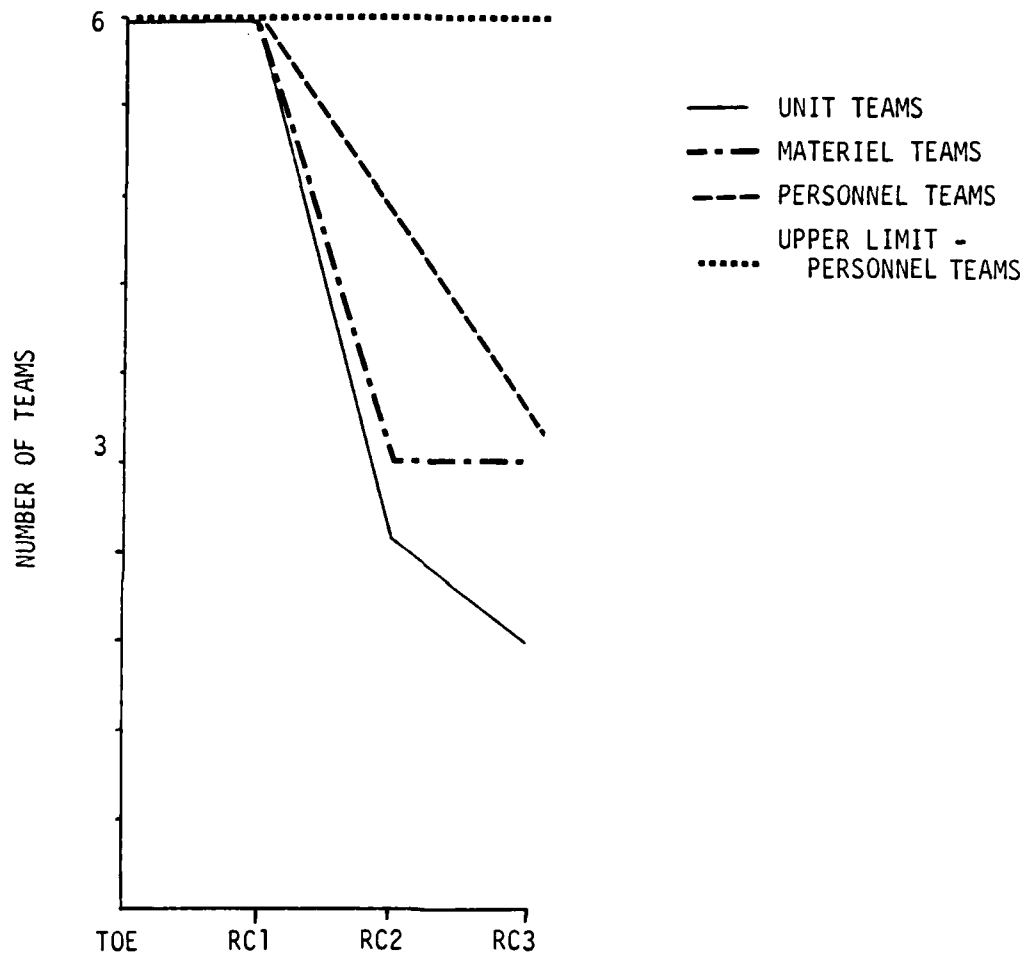
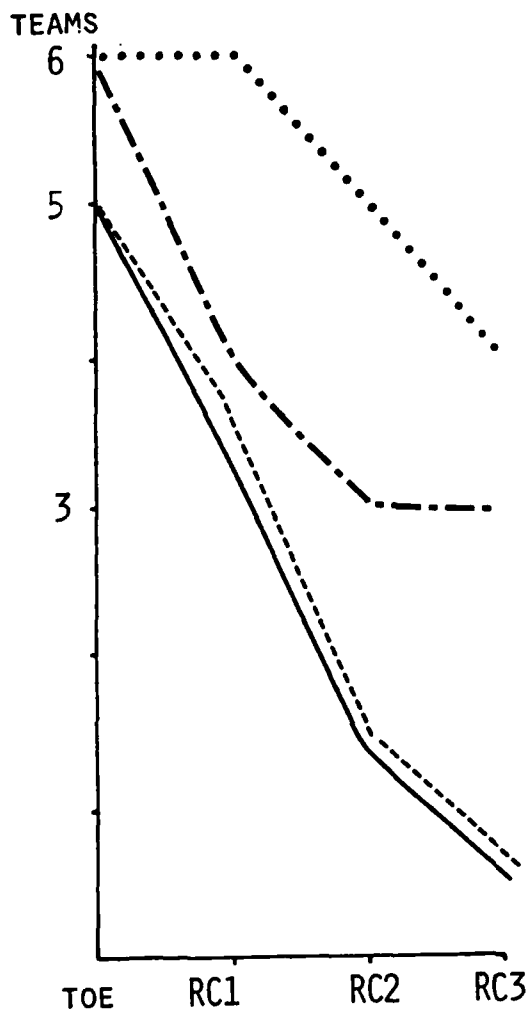


Figure 2-II-2. Unit Readiness Condition Capability and Limiting Factor - HHC, Tank Bn - Mission 1



- UNIT TEAMS
- MATERIEL TEAMS
- - - PERSONNEL TEAMS
- · · · UPPER LIMIT - PERSONNEL TEAMS

Figure 2-II-3. Unit Readiness Condition Capability and Limiting Factors - HHC, Tank Bn, Mission 2

value. The unit teams are a result of the interaction between personnel and materiel teams and is an average of the minimum of those for each iteration. Each point represent the average value from fifty iterations.

These charts show that unit capability is limited by materiel for Mission 1 and by personnel for Mission 2. In either case personnel capability could possibly be increased by additional transferability, gained by cross-training, of personnel. This would not, however, provide a significant gain in unit capability to perform Mission 1. Although unit capability for Mission 2 could be increased, additional cross training of the personnel of the headquarters may not be a preferred alternative.

This analysis has been limited to personnel and materiel on-hand in the unit. Personnel have been assumed to be well trained and equipment on-hand has been assumed to be 100% operational. With this in mind, consider Mission 2 for HHC, Tank Bn and assume that the unit is rated in a particular Readiness Condition due to only one of these items. Table 2-II-13 presents the results of this analysis. The maximum unit capability of 5 teams defines the 100% unit capability and the chart shows that a unit reporting as REDCON 1 or 2 has a possible range of capability of 72% - 80% or a unit reporting as REDCON 2 or 3 has a possible range of capability of 31 - 60%. Further, the chart shows that the ability of this unit to accomplish its mission of command, control, and service of its subordinate units can be markedly degraded for any REDCON condition.

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	4-6	3-4	3
Personnel Teams	3.6-5	1.6-3.6	0.7-1.6
Unit Teams	3.6-5	1.6-4	0.7-3
Unit Capability	72-100%	31-80%	13-60%
Overlap Range	72-80%		31-60%

Table 2-II-13. Unit Readiness Condition Capability Range, HHC, Tank Bn (command, control, and services)

d. Recovered Capability after Damage in Various Readiness Conditions

The number of teams; personnel, materiel, and total unit; which the unit was able to reconstitute following damage are shown in the following charts. Figure 2-II-4 thru -7 apply to mission 1 (command and control). Figures 2-II-8 thru -11 apply to mission 2 (command and control and services). Figure 2-II-2 shows that mission 1 is limited by materiel. Figures 2-II-4 thru -7 show that personnel becomes the limiting factor for any starting readiness condition at very low damage levels. This again points out the critical nature of personnel necessary for command and control and the lack of available substitutes within the company. The additional requirement for service support (mission 2) of the subordinate units further highlights the criticality of personnel in this unit.

2. COMBAT SUPPORT COMPANY, TANK BATTALION

Analysis of this unit was based on TOE 17-039H with change 15. The organization chart for this unit is shown at Figure 2-II-12.

a. Personnel

A listing of the personnel tasks and TOE authorizations used in this analysis is shown at Table 2-II-14. The transfer matrix for these personnel is shown at Table 2-II-15. The essential personnel team requirements are shown at Table 2-II-16 for mission 1 and at Table 2-II-17 for mission 2. Mission 1 is defined as providing fire support for elements of the battalion. Mission 2 added the requirements for limited internal maintenance capability. Tables 2-II-18 thru -20 present the fifty configurations of personnel fill used in the representation of the three readiness conditions.

b. Materiel

The materiel listing with TOE authorizations is at Table 2-II-21 with the transfer matrix shown at Table 2-II-22. The essential materiel

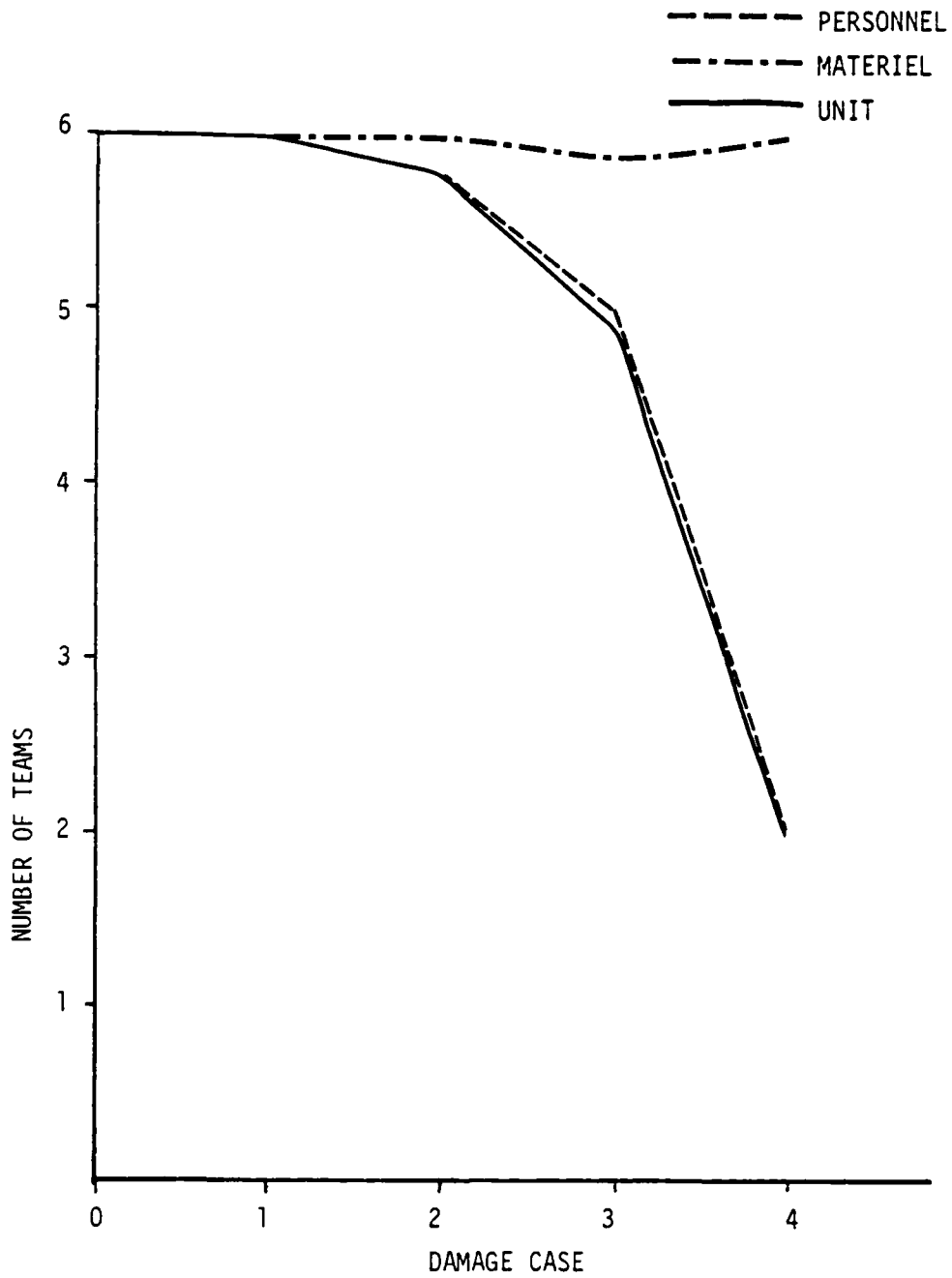


Figure 2-II-4. TOE - Unit Recovered Capability and Limiting Factor - HHC, Tank - Mission 1

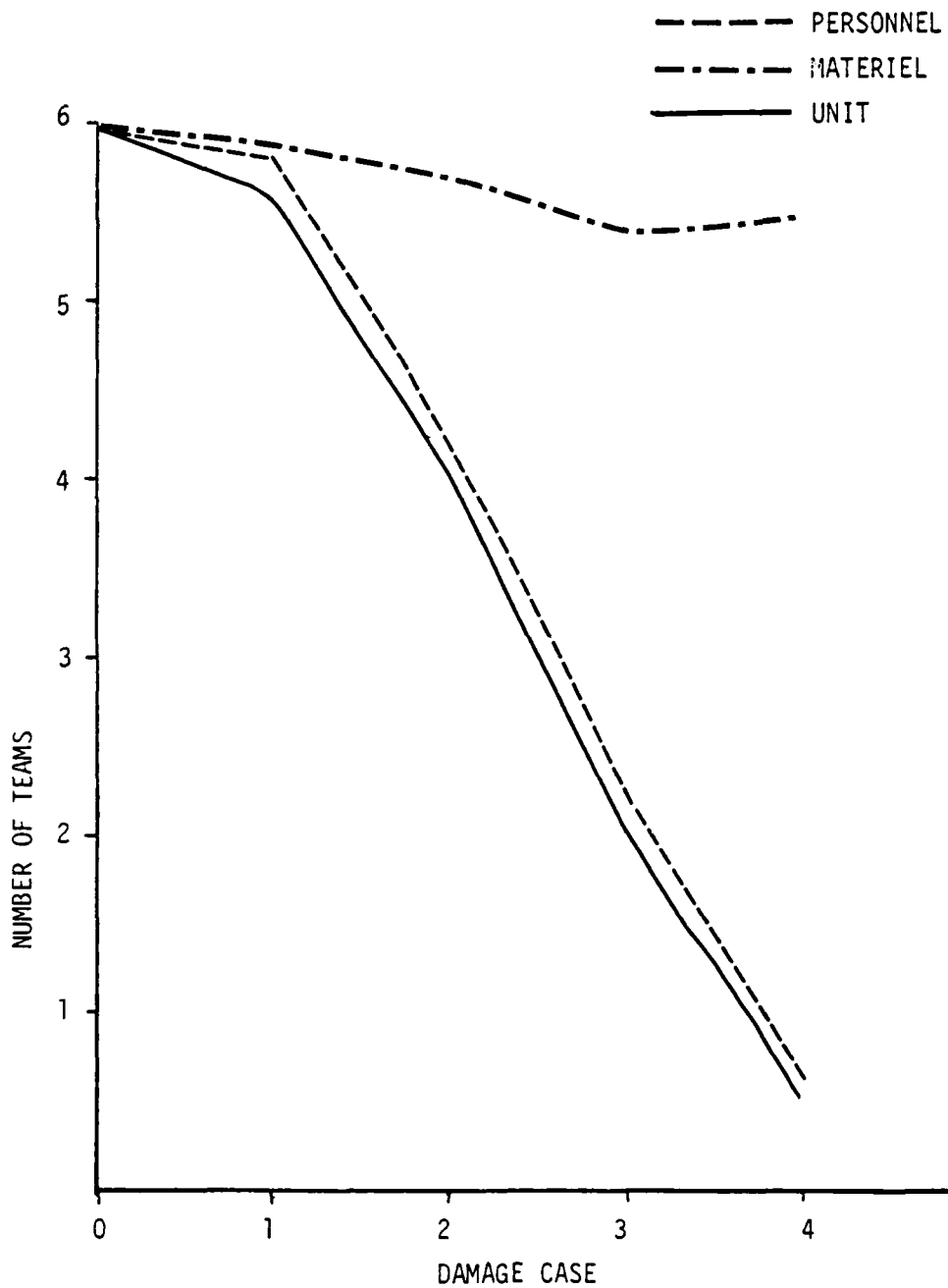


Figure 2-II-5. REDCON 1 - Unit Recovered Capability and Limiting Factor - HHC, Tank - Mission 1

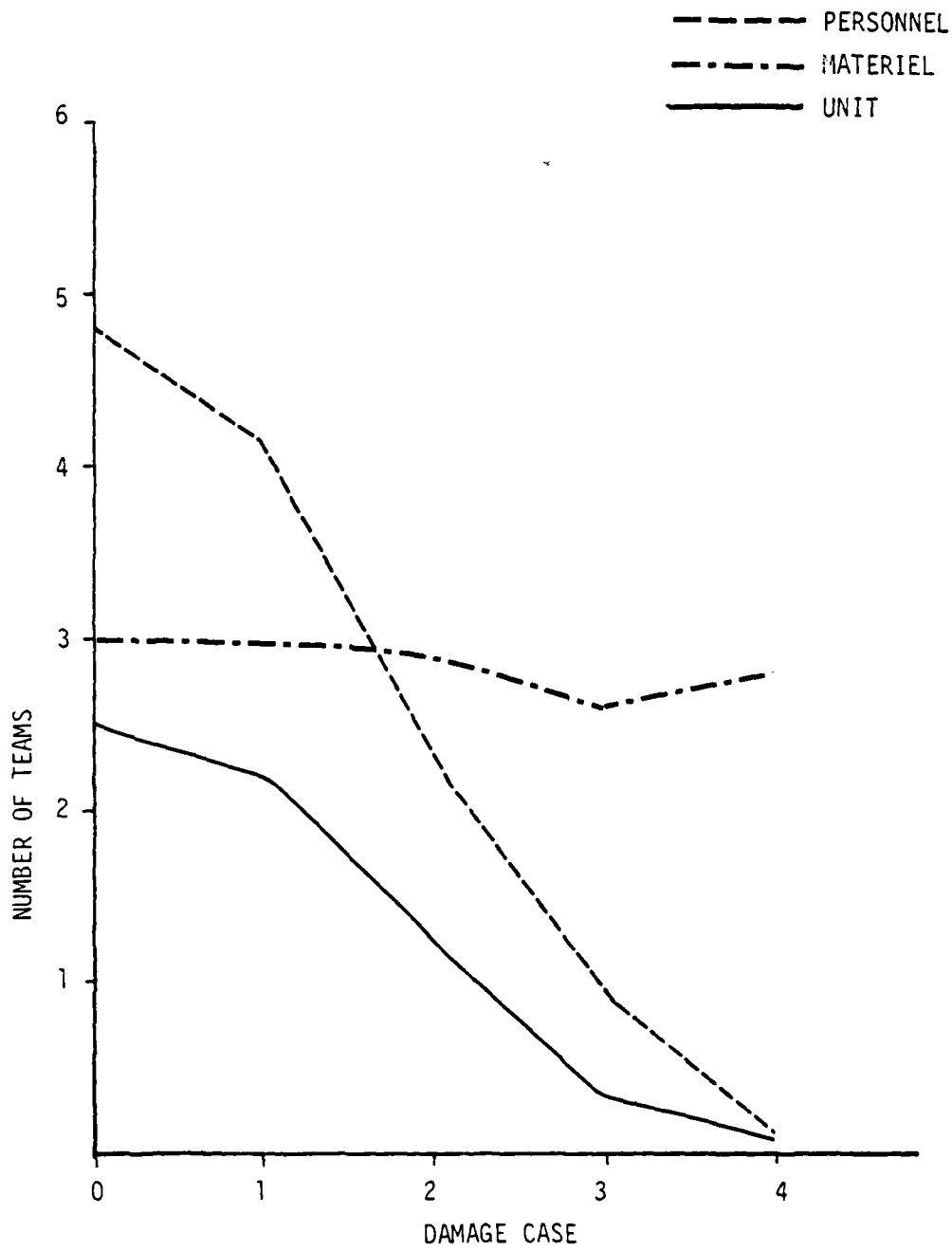


Figure 2-II-6. REDCON 2 - Unit Recovered Capability and Limiting Factor - HHC, Tank - Mission 1



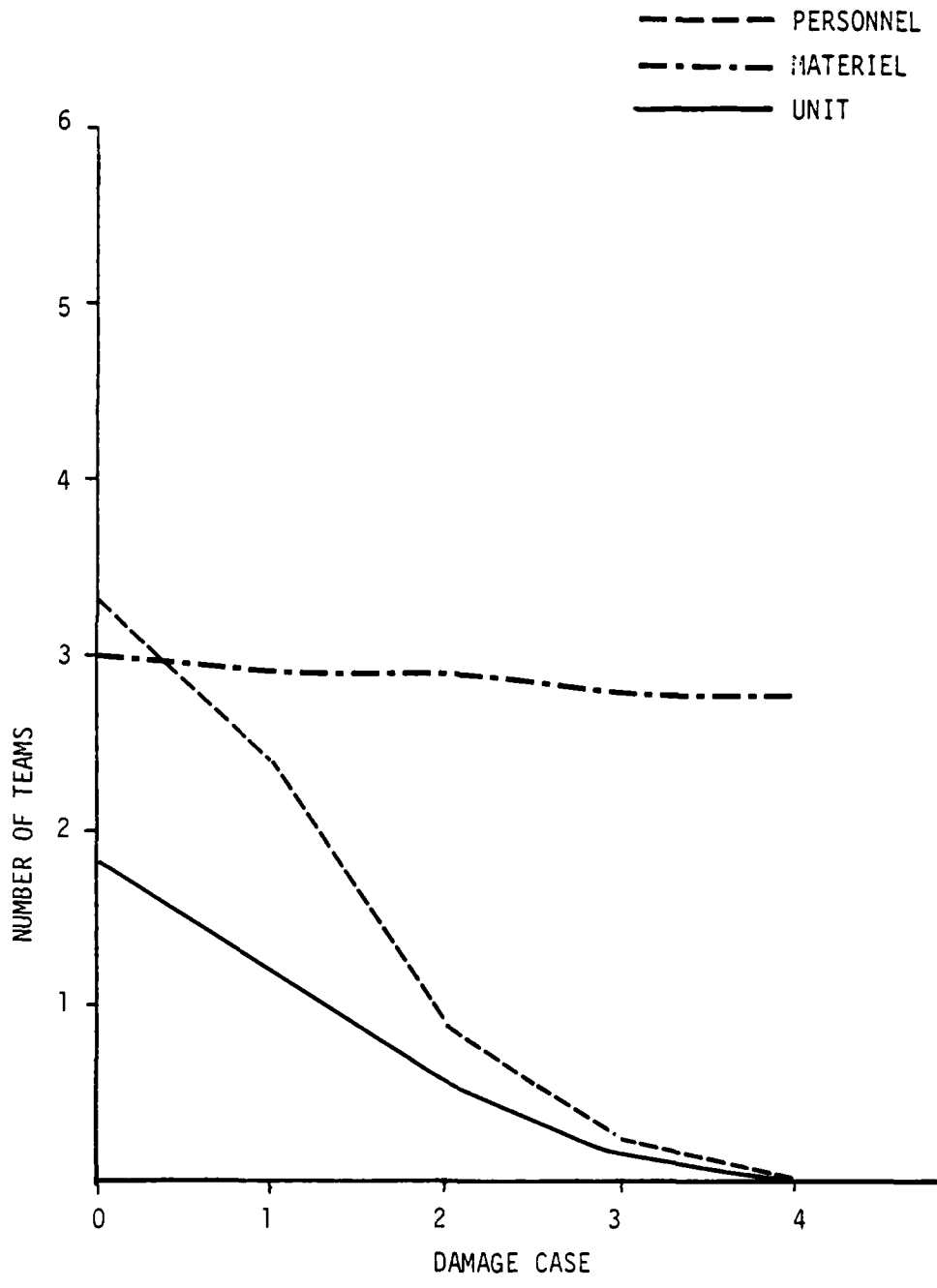


Figure 2-II-7. REDCON 3 - Unit Recovered Capability and Limiting Factor - HHC, Tank - Mission 1

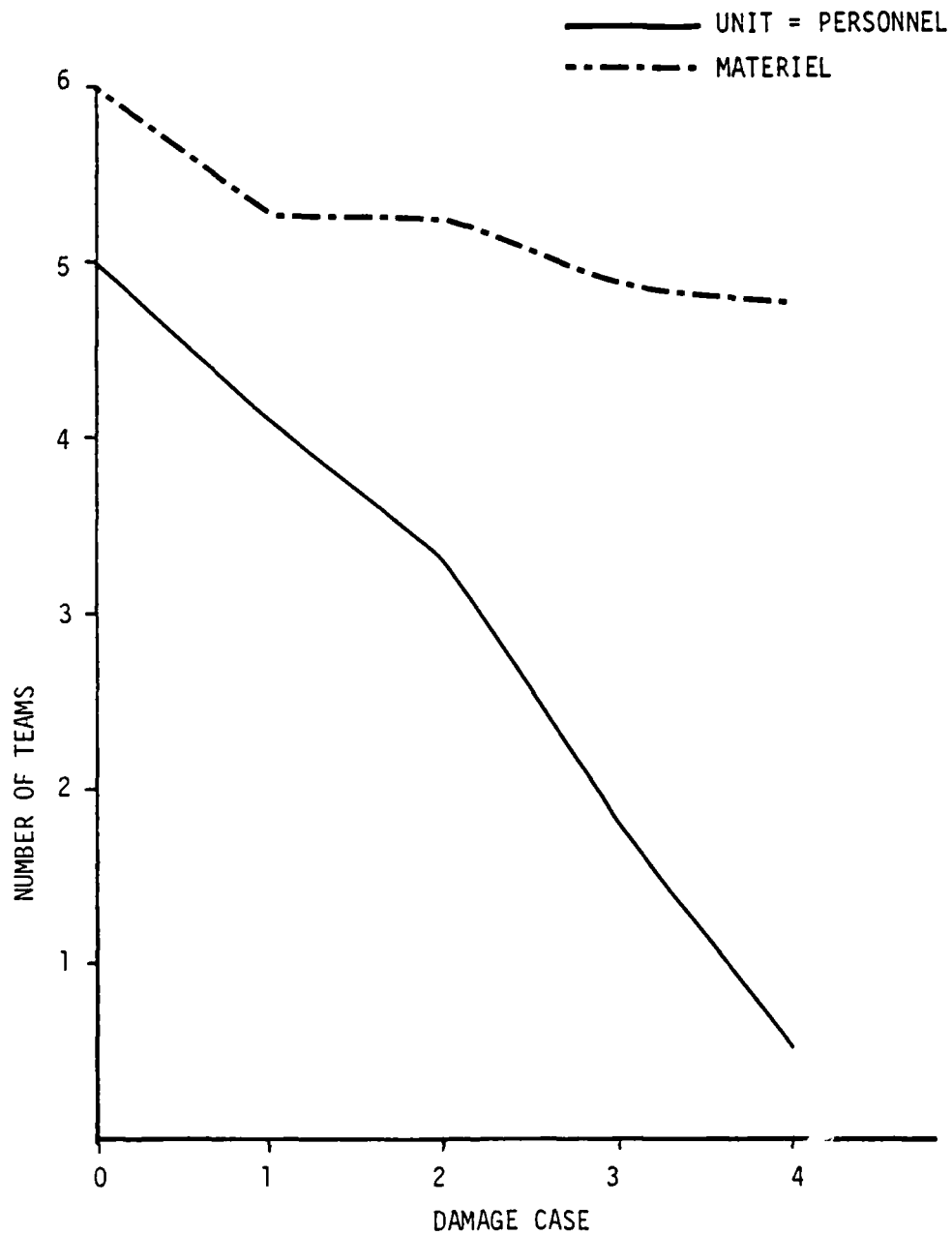


Figure 2-II-8. TOE - Unit Recovered Capability and Limiting Factor - IHC, Tank - Mission 2

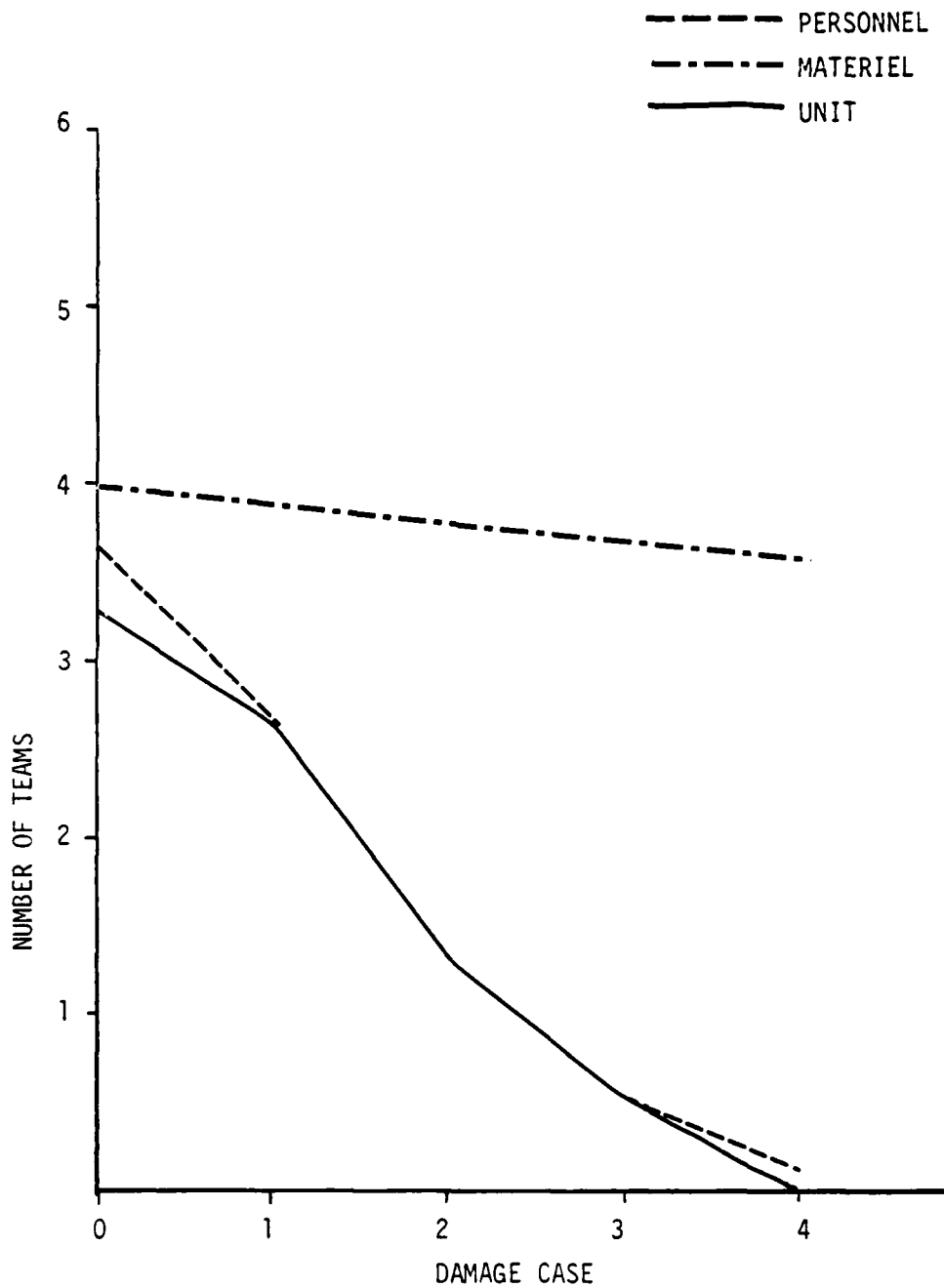


Figure 2-II-9. REDCON 1 - Unit Recovered Capability and Limiting Factor - HHC, Tank - Mission 2

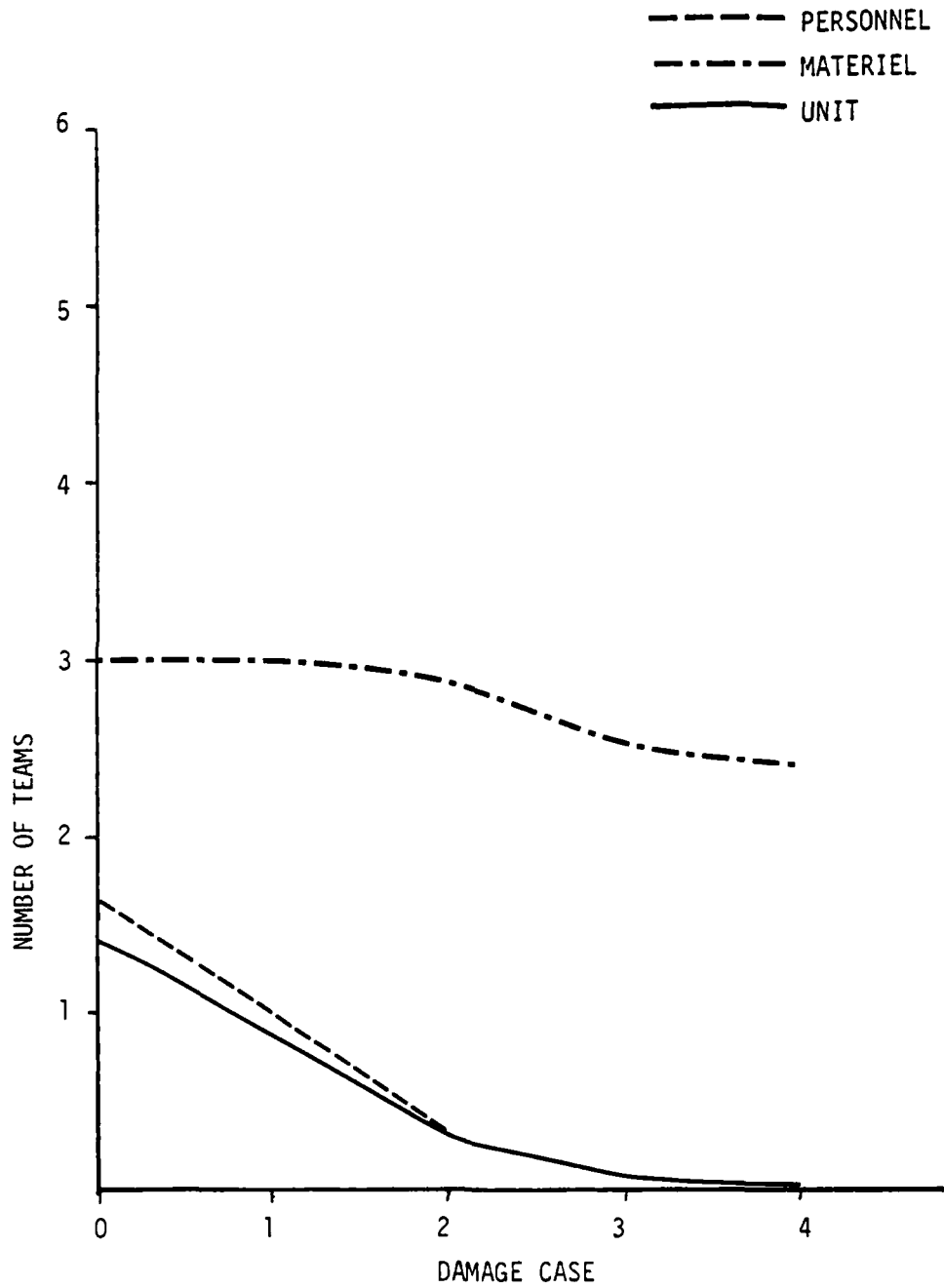


Figure 2-II-10. REDCON 2 - Unit Recovered Capability and Limiting Factor - HHC, Tank - Mission 2

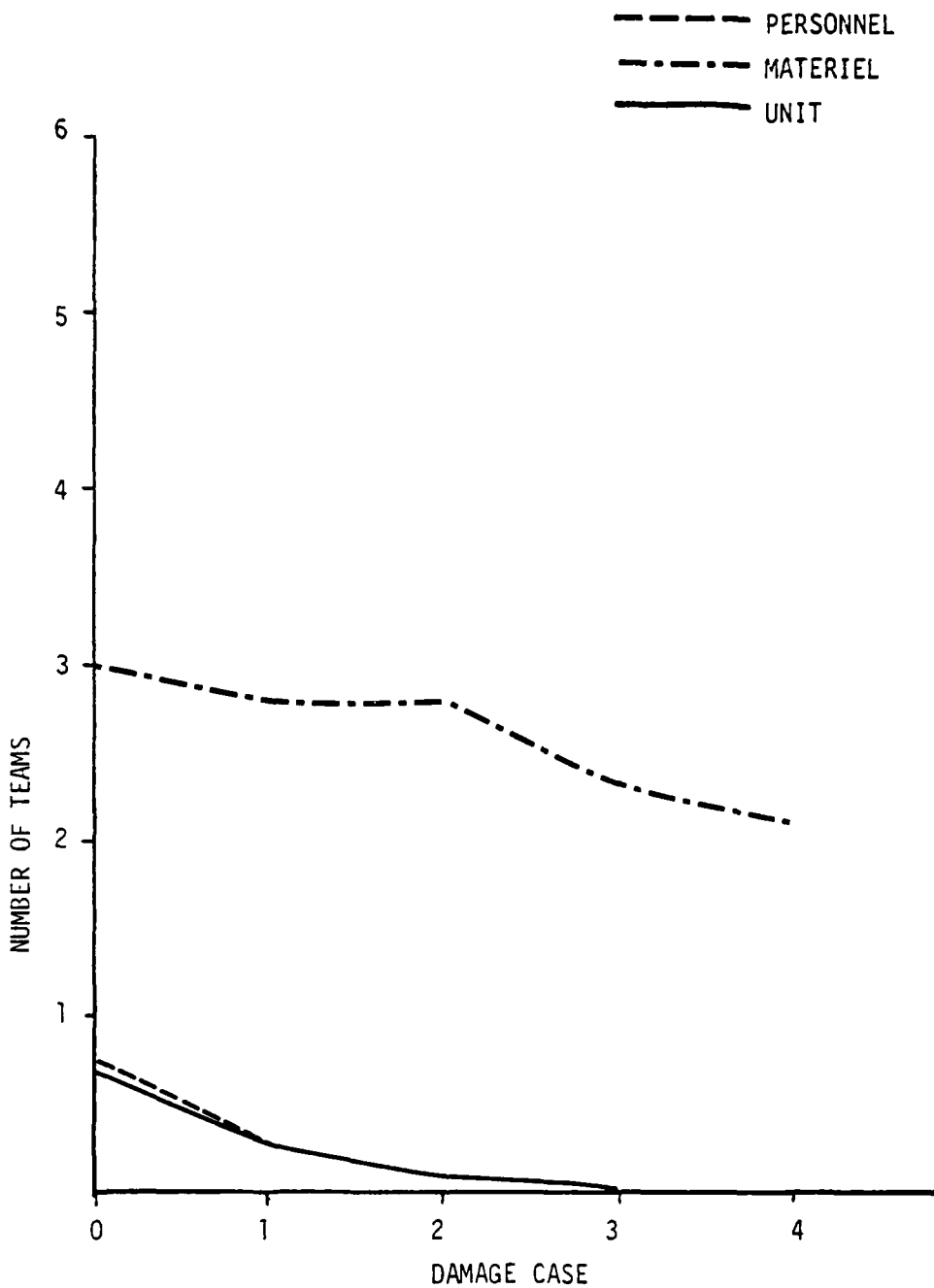


Figure 2-II-11. REDCON 3 - Unit Recovered Capability and Limiting Factor - HHC, Tank - Mission 2

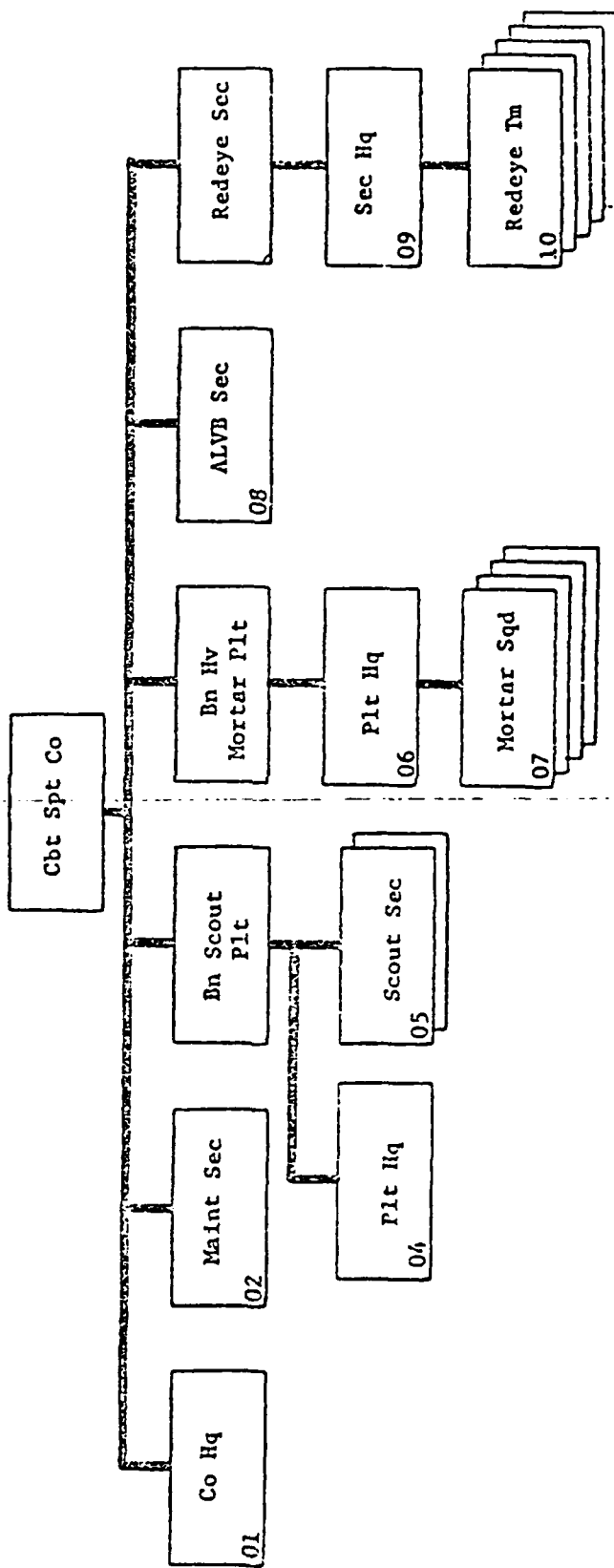


Figure 2-II-12. Combat Support Co, Tank Bn Organization Chart

Table 2-II-14. TOE Personnel Listing, Combat Support  
Company, Tank Bn

TOE 17-39H With Change 15

	PERSONNEL	TOE
1	CO	1
2	XO	1
3	1SGT	1
4	Supply SGT	1
5	Commo Chief	1
6	Armorer	1
7	PC Driver	6
8	Light Veh Driver	1
9	Motor SGT	1
10	Track Veh Mech	5
11	PLL Clerk	1
12	Rec Veh Op	2
13	Field C-E EQ Mech	1
14	PLT LDR (Scout)	1
15	PLT SGT	1
16	Driver	10
17	Scout	10
18	SEC LDR	2
19	SQD LDR	2
20	Scout Gunner	4
21	PLT LDR (Mortar)	1
22	FD Chief	1
23	FD Computer	2
24	RTO	1
25	SQD LDR	4
26	Gunner	8
27	Ammo Bearer	4
28	PLT SGT (Mortar)	1
29	AVLB Chief	1
30	AVLB Cmdr	1
31	Driver	2
32	SEC LDR, RED EYE	1
33	SEC SGT	1
34	Team Chief	5
35	Gunner	5

Table 2-II-15. Personnel Transfer Matrix, Combat Support Company, Tank Bn - TOE 17-039H

PERSONNEL	MIG. FOR 10 YEARS																																					
	TUE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
1 CU CPUR	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 CU AD	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 CU 1SGT	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 SUP SGT	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 CUHM CH	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 ARMURER	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 PC DRVR	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 LV DRVR	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 PTR SGT	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 TV MECH	5	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 PLL CLK	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 MECH UP	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 CE MECH	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 PL SGT	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 PS SGT	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 SGT URV	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 SCOUT	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18 SEC LDR	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 SDD LDR	2	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 SGT GUN	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 PGRT PL	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 FD CHF	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 Tr Camp	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 MEU	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 SDD LDR	4	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 GUNMER	4	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 ARMO RM	4	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28 FORT PS	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 AVLB CM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30 AVLB CM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31 LB DRVR	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32 AD LDR	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33 AD SGT	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34 AD TRCH	5	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35 AD GUN	5	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Table 2-II-16. Personnel - Essential Team Requirements,  
 Combat Support Co., Tank Bn - Mission 1

TEAM	1	2	3	4	5	6	7	8	9	10
TASK 1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0
3	1	1	1	1	1	1	1	1	1	1
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	2	2	3	3	4	4	5	5	6	6
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14	1	1	1	1	1	2	2	2	2	2
15	0	0	0	0	0	0	0	0	0	0
16	1	2	3	4	5	6	7	8	9	10
17	1	2	3	4	5	6	7	8	9	10
18	0	0	0	0	0	0	0	0	0	0
19	1	1	2	2	3	3	4	4	5	5
20	0	0	0	0	0	0	0	0	0	0
21	1	1	1	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1	1	1	1
24	0	0	0	0	0	0	0	0	0	0
25	1	1	1	2	3	3	4	4	5	5
26	1	1	1	2	3	3	4	4	5	5
27	1	1	1	2	3	3	4	4	5	5
28	0	0	0	0	0	0	0	0	0	0
29	1	1	1	1	1	1	1	1	1	1
30	0	0	0	0	0	0	0	0	0	0
31	1	1	1	1	1	1	1	1	1	1
32	1	1	1	1	1	2	2	2	2	2
33	0	0	0	0	0	0	0	0	0	0
34	1	2	3	4	5	6	7	8	9	10
35	1	2	3	4	5	6	7	8	9	10
TOTAL	19	23	29	36	45	51	60	64	73	77

Table 2-II-17. Personnel - Essential Team Requirements, Combat Support Co., Tank Bn - Mission 2

TEAM	1	2	3	4	5	6	7	8	9	10
TASK 1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0
3	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	2	2	3	3	4	4	5	5	6	6
8	0	0	0	0	0	0	0	0	0	0
9	1	1	1	1	1	1	1	1	1	1
10	3	3	3	3	3	3	3	3	3	3
11	0	0	0	0	0	0	0	0	0	0
12	2	2	2	2	2	2	2	2	2	2
13	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	2	2	2	2	2
15	0	0	0	0	0	0	0	0	0	0
16	1	2	3	4	5	6	7	8	9	10
17	1	2	3	4	5	6	7	8	9	10
18	0	0	0	0	0	0	0	0	0	0
19	1	1	2	2	3	3	4	4	5	5
20	0	0	0	0	0	0	0	0	0	0
21	1	1	1	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1	1	1	1
24	0	0	0	0	0	0	0	0	0	0
25	1	1	1	2	3	3	4	4	5	5
26	1	1	1	2	3	3	4	4	5	5
27	1	1	1	2	3	3	4	4	5	5
28	0	0	0	0	0	0	0	0	0	0
29	1	1	1	1	1	1	1	1	1	1
30	0	0	0	0	0	0	0	0	0	0
31	1	1	1	1	1	1	1	1	1	1
32	1	1	1	1	1	2	2	2	2	2
33	0	0	0	0	0	0	0	0	0	0
34	1	2	3	4	5	6	7	8	9	10
35	1	2	3	4	5	6	7	8	9	10
TOTAL	27	31	37	44	53	59	68	72	81	85



Table 2-II-19. Personnel Fill, Combat Support Company, Tank Bn. REDCON 2

EXCESS	TASKS																																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
35	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



Table 2-II-21. TOE Materiel Listing, Combat Support Company, Tank Bn

TOE 17-39H With Change 15

	MATERIEL	TOE
1	APC w/1a & 1b	3
2	APC (Scout) w/1c	4
3	APC (Scout) w/1d	4
4	Carrier, CP w/1a, 1e & FDC	1
5	Mortar Carrier w/1d	4
6	Rec Veh, full tracked	1
7	Armor Vehicle Launched Bridge	2
8	Truck, Utility $\frac{1}{4}$ Ton w/1a	2
9	Truck, Utility $\frac{1}{4}$ Ton w/1f	1
10	Truck, Utility $\frac{1}{4}$ Ton w/1d	5
11	Trailer, Cargo $\frac{1}{4}$ Ton	8
12	Truck, Cargo $1\frac{1}{4}$ Ton	1
13	Truck, Cargo $2\frac{1}{2}$ Ton	2
14	Trailer, Cargo $1\frac{1}{2}$ Ton	2

- a - AN/VRC-47
- b - AN/VRC-12
- c - AN/VRC-46
- d - AN/GRC-160
- e - AN/VRC-64
- f - AN/VRC-48

Table 2-11-22. Materiel Transfer Matrix, Combat Support Company, Tank Bn

MATERIEL	100%	REG FOR 10 TEAM MISSION															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14		
1 APC	5	1	1	0	0	30	-1	60	-1	0	0	0	0	15	30	0	
2 APC	0	5	5	15	0	0	30	-1	60	-1	0	0	0	0	15	30	0
3 APC	0	5	5	15	0	0	30	-1	60	-1	0	0	0	0	15	30	0
4 L&R, LP	1	1	1	15	15	0	-1	60	-1	-1	-1	-1	-1	-1	-1	-1	-1
5 COPTAR	0	5	5	15	15	-1	0	60	-1	-1	-1	-1	-1	-1	-1	-1	-1
6 MEC VEH	1	0	1	1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1
7 AVLN	2	1	1	1	-1	-1	-1	30	0	-1	-1	-1	-1	-1	-1	-1	-1
8 TRK UIC	2	1	1	1	-1	-1	-1	-1	-1	0	0	0	0	30	-1	0	0
9 TRK UIC	1	0	0	1	-1	-1	-1	-1	-1	0	0	0	0	30	-1	0	0
10 TRK UIC	5	10	10	-1	-1	-1	-1	-1	-1	0	0	0	0	30	-1	0	0
11 HEL UIC	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	90
12 TRK SUK	1	0	0	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	30	0
13 TRK 2.5	2	0	1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
14 I&L 1.5	2	0	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	0
		1	2	3	4	5	6	7	8	9	10	11	12	13	14		

team requirements are shown at Table 2-II-23 for mission 1 and Table 2-II-24 for mission 2. Table 2-II-25 shows the materiel fill which was used for the readiness condition representation.

c. Effect of Readiness Condition on Unit Capability

The results of the analysis of unit capability as a function of readiness condition are shown by Figures 2-II-13 and 2-II-14 for the two missions. The capability of this unit is clearly limited by materiel, in this case the mortar with its carrier. Unit capability for mission 1 is dominated by the materiel teams formed. In this case, the number of personnel teams formed is always greater than the materiel teams. In the mission 2 analysis unit capability was sometimes limited, in the fifty iterations of each condition, by personnel, therefore lowering the total unit capability. Both missions show the possibility of increasing personnel capability through cross-training, but this would offer very little improvement in total unit capability due to the materiel limitation.

Table 2-II-26 presents the possible range of capability of this unit, mission 2, if only one of the components, personnel or materiel, causes the particular REDCON rating. Full capability, 100%

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	6.0-8.0	4.0-6.0	4.0
Personnel Teams	6.9-9.0	5.3-6.9	4.1-5.3
Unit Teams	6.0-8.0	4.0-6.9	4.0-5.3
Unit Capability	75-100%	50-86%	50-66%
Overlap Range	75-86%		50-66%

Table 2-II-26. Unit Readiness Condition Capability Range, Combat Support Co, Tank Bn.



Table 2-II-23. Materiel-Essential Team Requirements, Combat Support Company,  
 Tank Bn - Mission 1

TASK	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	1	1	1	1
2	1	1	2	2	3	3	4	4	5	5
3	0	1	1	2	2	3	3	4	4	5
4	1	1	1	1	1	1	1	1	1	1
5	1	1	2	2	3	3	4	4	5	5
6	0	0	0	0	0	0	0	0	0	0
7	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1
9	0	0	0	0	0	0	0	0	0	0
10	1	2	3	4	5	6	7	8	9	10
11	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0

Table 2-II-24. Materiel-Essential Team Requirements, Combat Support Co, Tank Bn-  
Mission 2

TASK	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	1	1	1	1
2	1	1	2	2	3	3	4	4	5	5
3	0	1	1	2	2	3	3	4	4	5
4	1	1	1	1	1	1	1	1	1	1
5	1	1	2	2	3	3	4	4	5	5
6	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1
9	0	0	0	0	0	0	0	0	0	0
10	1	2	3	4	5	6	7	8	9	10
11	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1

Table 2-II-25. REDCON Materiel Listing, Combat Support Company,  
Tank Bn

	MATERIEL	REDCON		
		1	2	3
1	APC w/1a & 1b	3	3	2
2	APC (Scout) w/1c	4	3	3
3	APC (Scout) w/1d	3	3	3
4	Carrier, CP w/1a, 1e & FDC	1	1	1
5	Mortar Carrier w/1d	3	2	2
6	Rec Veh, full tracked	1	1	1
7	Armor Vehicle Launched Bridge	1	1	1
8	Truck, Utility ½ Ton w/1a	2	1	1
9	Truck, Utility ½ Ton w/1f	1	1	1
10	Truck, Utility ½ Ton w/1d	4	4	3
11	Trailer, Cargo ½ Ton	7	6	5
12	Truck, Cargo 1½ Ton	1	1	1
13	Truck, Cargo 2½ Ton	1	1	1
14	Trailer, Cargo 1½ Ton	1	1	1

- a - AN/VRC-47
- b - AN/VRC-12
- c - AN/VRC-46
- d - AN/GRC-160
- e - AN/VRC-64
- f - AN/VRC-48

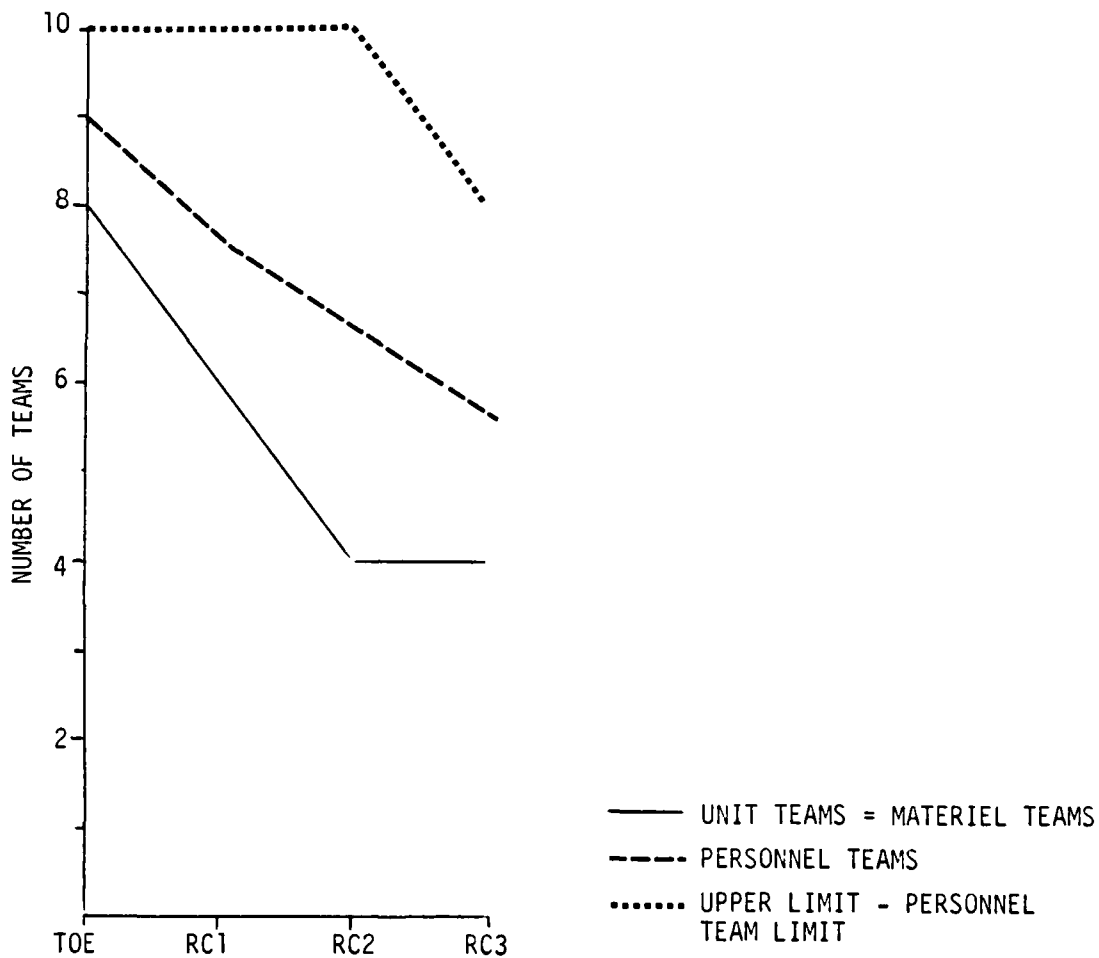


Figure 2-II-13. Unit Readiness Condition Capability and Limiting Factor - CSC, Tank Bn - Mission 1

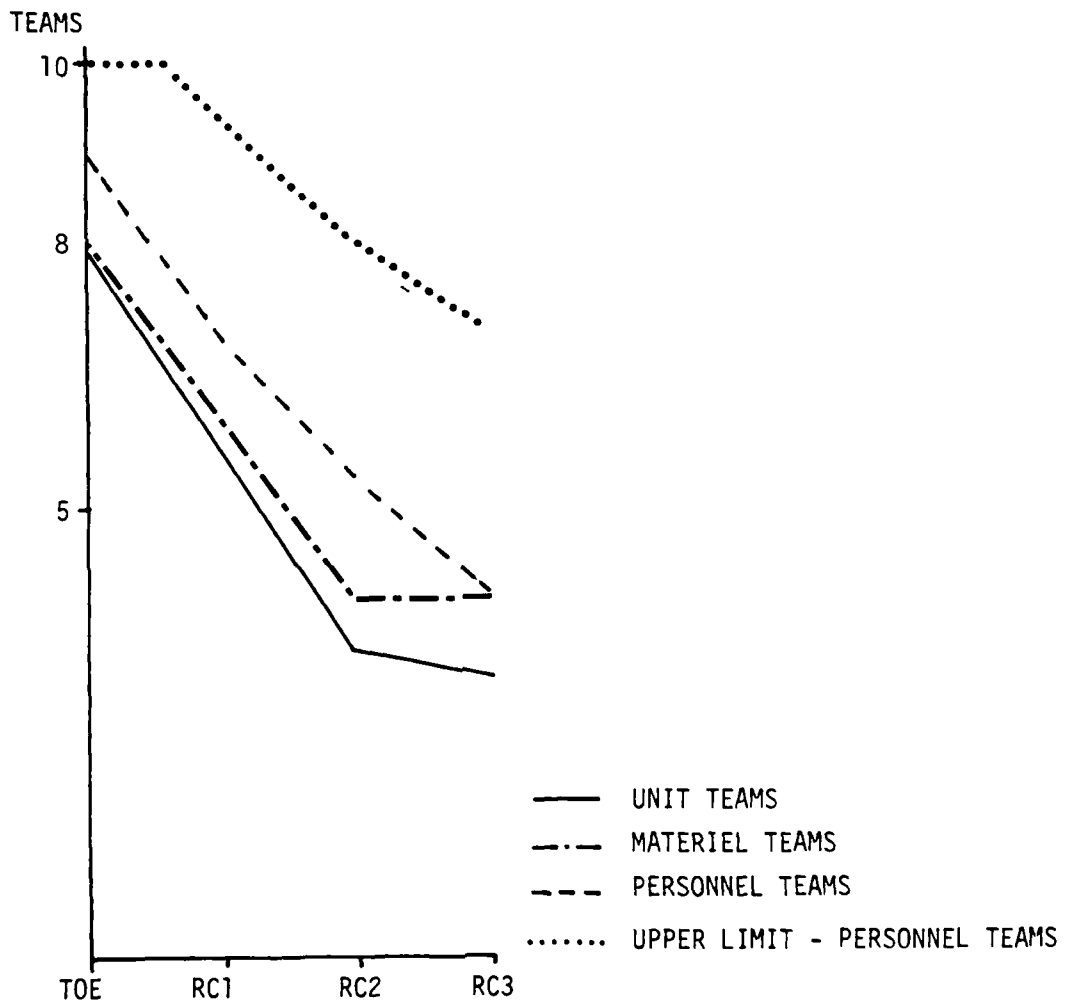


Figure 2-II-14. Unit Readiness Condition Capability and Limiting Factors--Combat Support Co., Tank Bn.

is the maximum unit teams of 8. The table shows a significant overlap of expected unit capability between the readiness conditions. In fact, the range of capability in REDCON 2 includes the full expected range of REDCON 3.

d. Recovered Capability After Damage in Various Readiness Conditions

The application of combat damage changes the view of what limits the capability of this unit. Figures 2-II-15 thru -19 show the results of the damage cases applied against the requirement to perform only the fire support mission, Mission 1. The additional requirement for unit maintenance and supply personnel for Mission 2 causes a further degradation in personnel teams. Personnel, therefore, becomes the limiting factor at much lower levels of damage, as shown by figures 2-II-20 thru -22. These cases illustrate that additional crosstraining might offer some improvement in unit capability in a combat situation.

3. TANK COMPANY, TANK BATTALION

Tank Company analysis was based on TOE 17-03H010 with change 15. The unit organization chart is shown at Figure 2-II-23.

a. Personnel

The personnel listing with TOE authorization is shown at Table 2-II-27. The personnel transfer capability matrix for these personnel is shown at Table 2-II-28. The essential personnel team requirements for mission 1 are at Table 2-II-29 and for mission 2 at Table 2-II-30. Mission 1 was defined simply as "shoot and move." Mission 2 adds organizational maintenance support requirements. The personnel fill used to represent the various readiness condition are shown at Tables 2-II-31 thru 2-II-33.

b. Materiel

The materiel listing with TOE authorization is shown at Table 2-II-34. The transfer matrix for this equipment is at Table 2-II-35. The materiel requirements for the essential teams are at

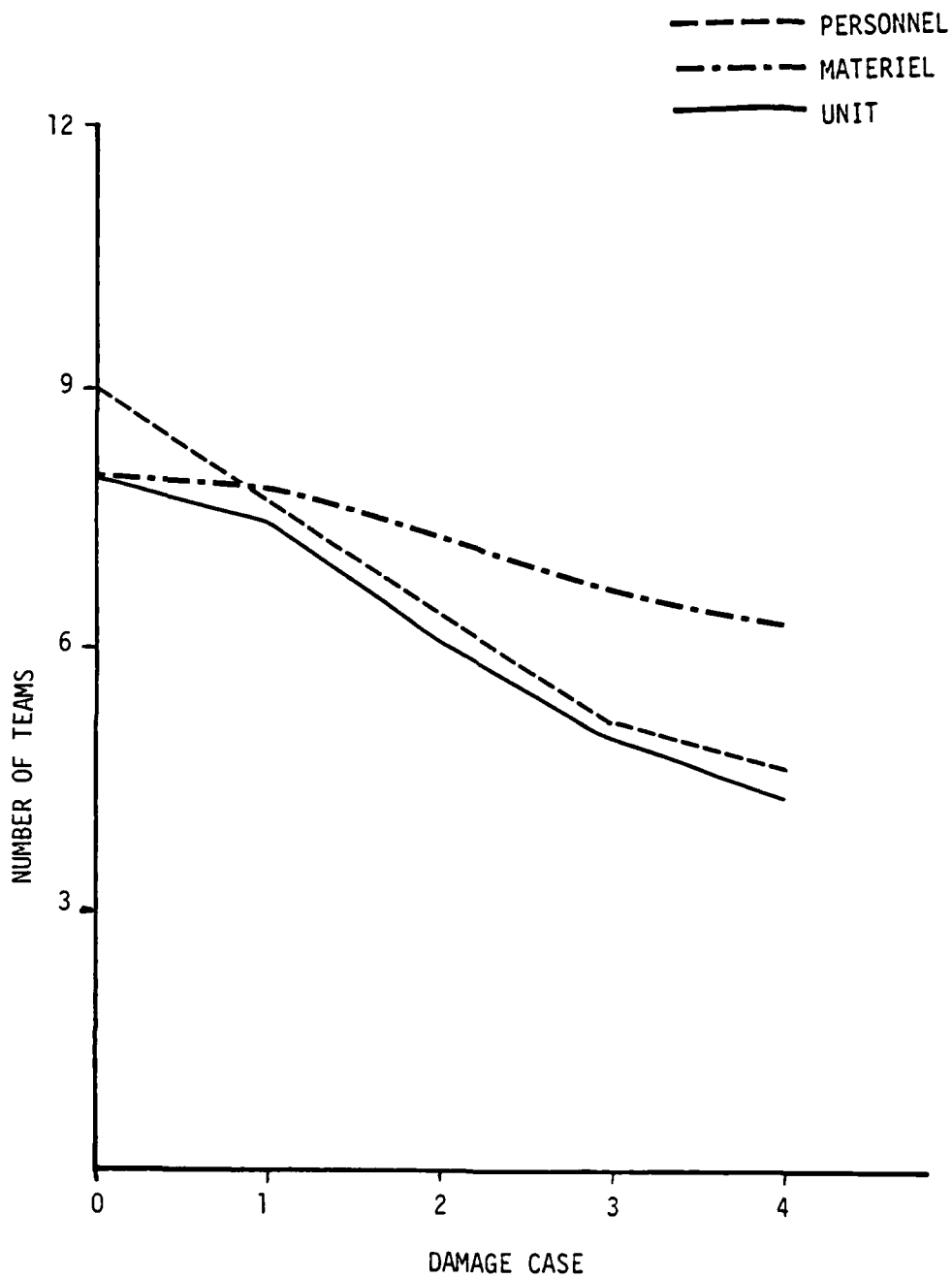


Figure 2-II-15. TOE - Unit Recovered Capability and Limiting Factor - CSC, Tank - Mission 1

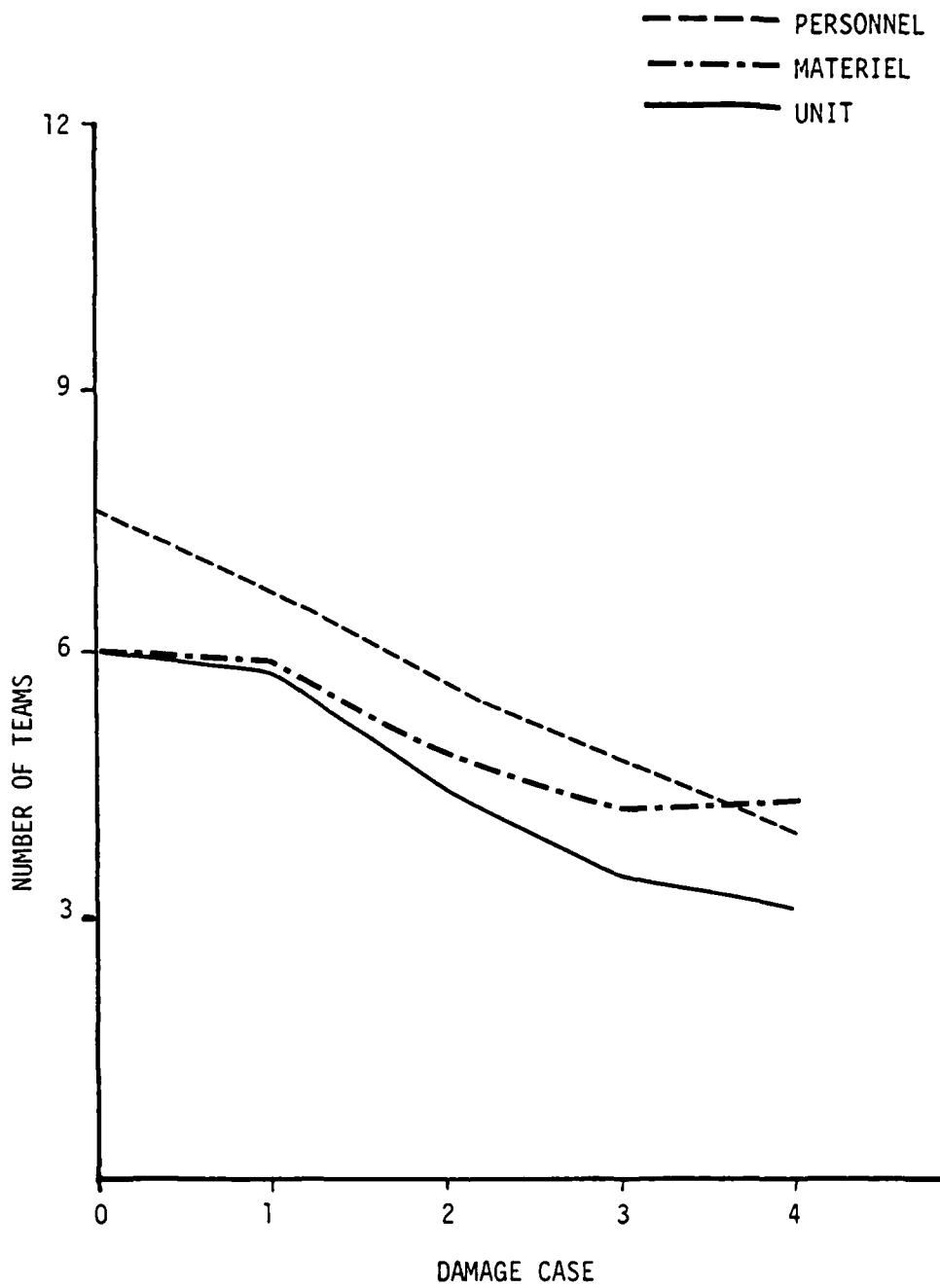


Figure 2-II-16. REDCON 1 - Unit Recovered Capability and Limiting Factor - CSC, Tank - Mission 1



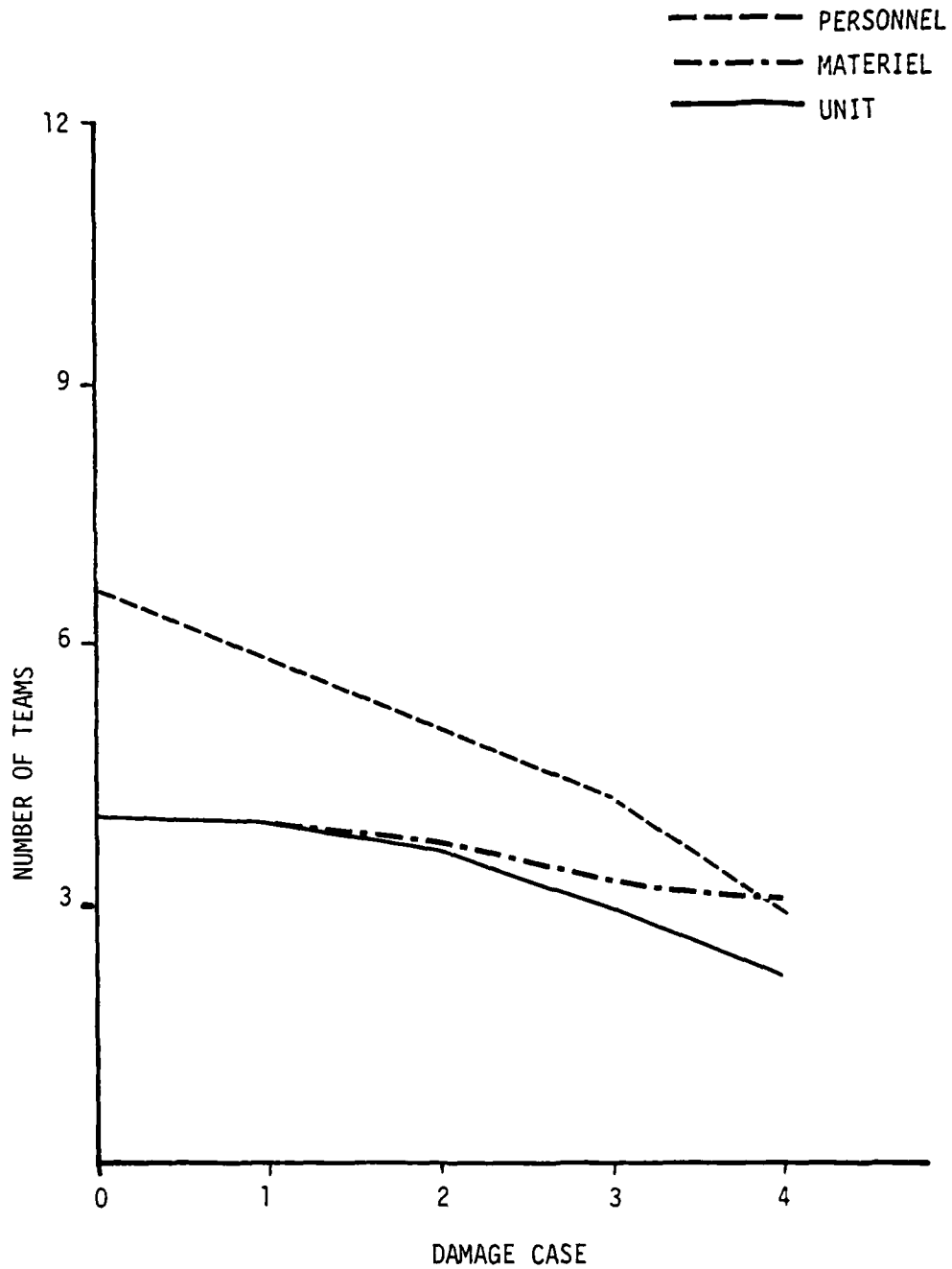


Figure 2-II-17. REDCON 2 - Unit Recovered Capability and Limiting Factor - CSC, Tank - Mission 1

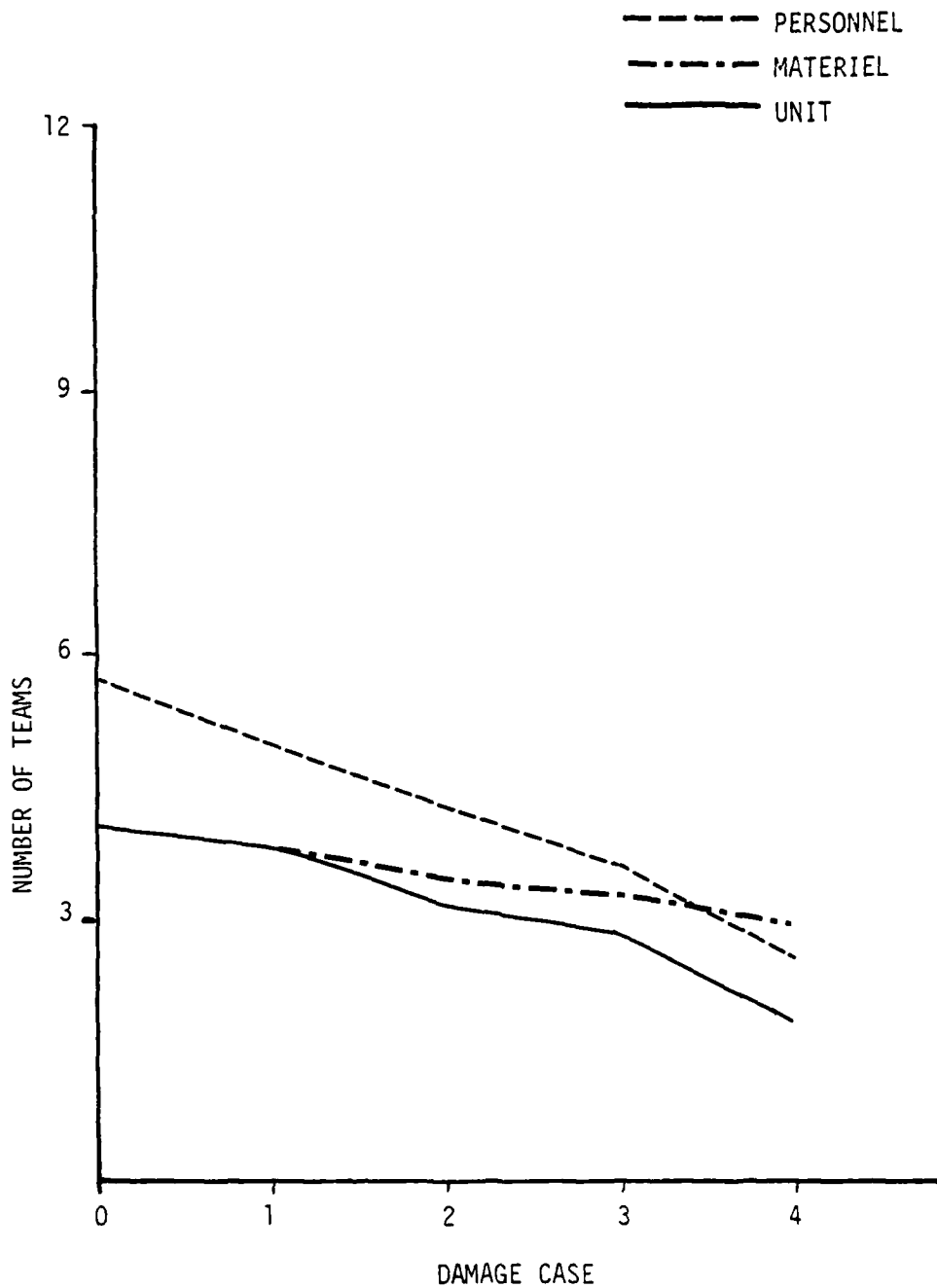


Figure 2-II-18. REDCON 3 - Unit Recovered Capability and Limiting Factor - CSC, Tank - Mission 1

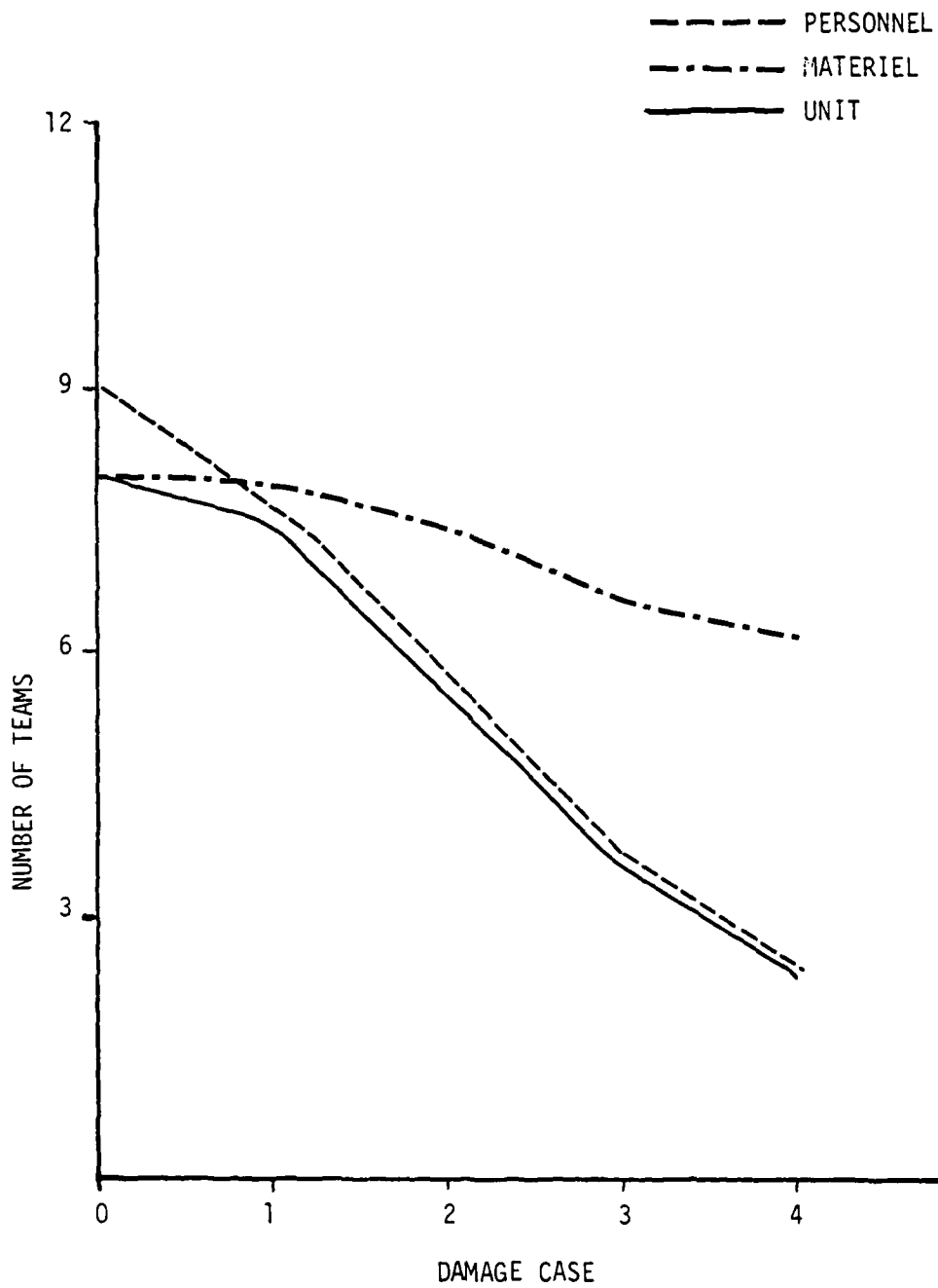


Figure 2-II-19. TOE - Unit Recovered Capability and  
Limiting Factor - CSC, Tank - Mission 2

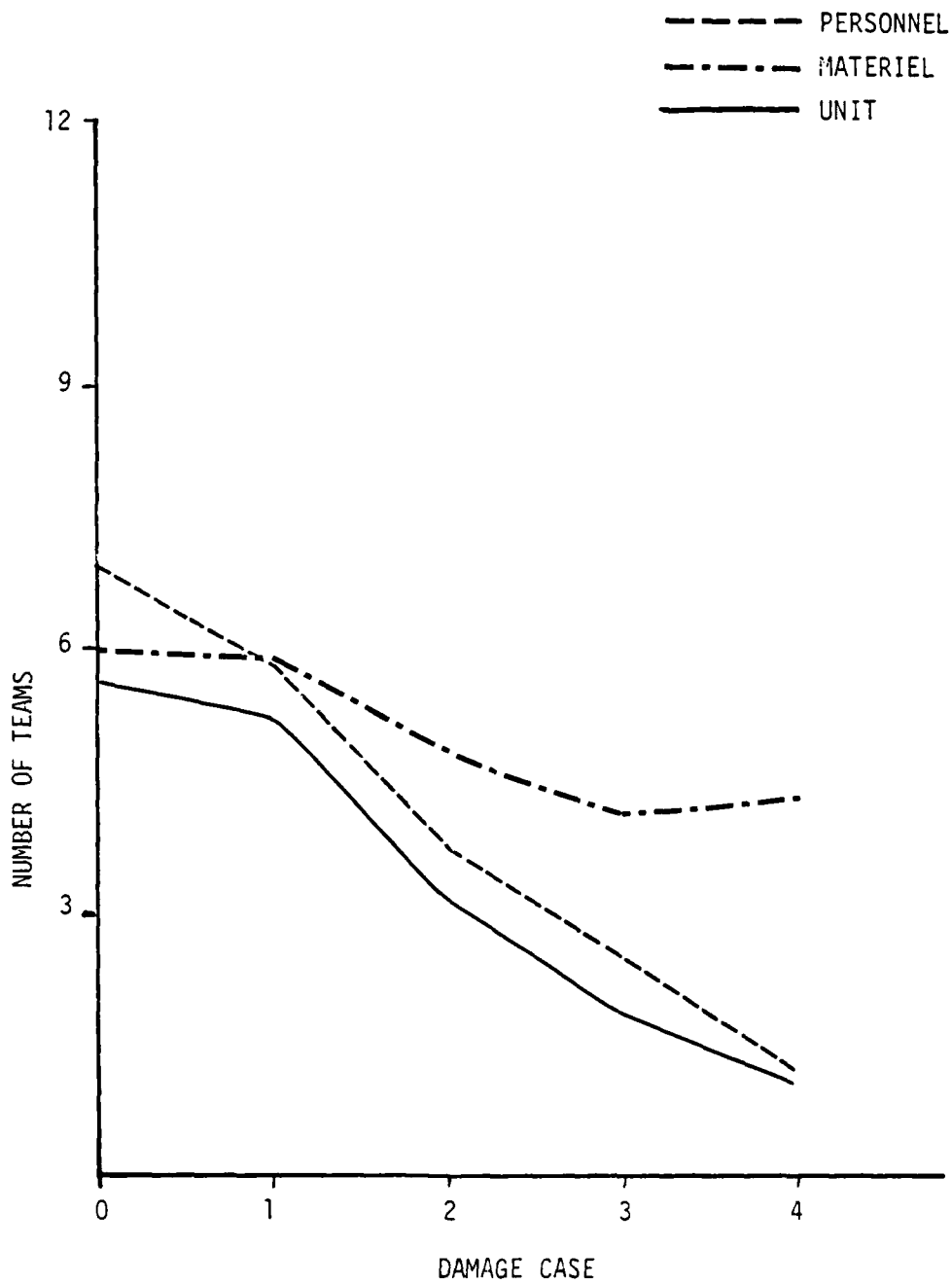


Figure 2-II-20. REDCON 1 - Unit Recovered Capability and Limiting Factor - CSC, Tank - Mission 2

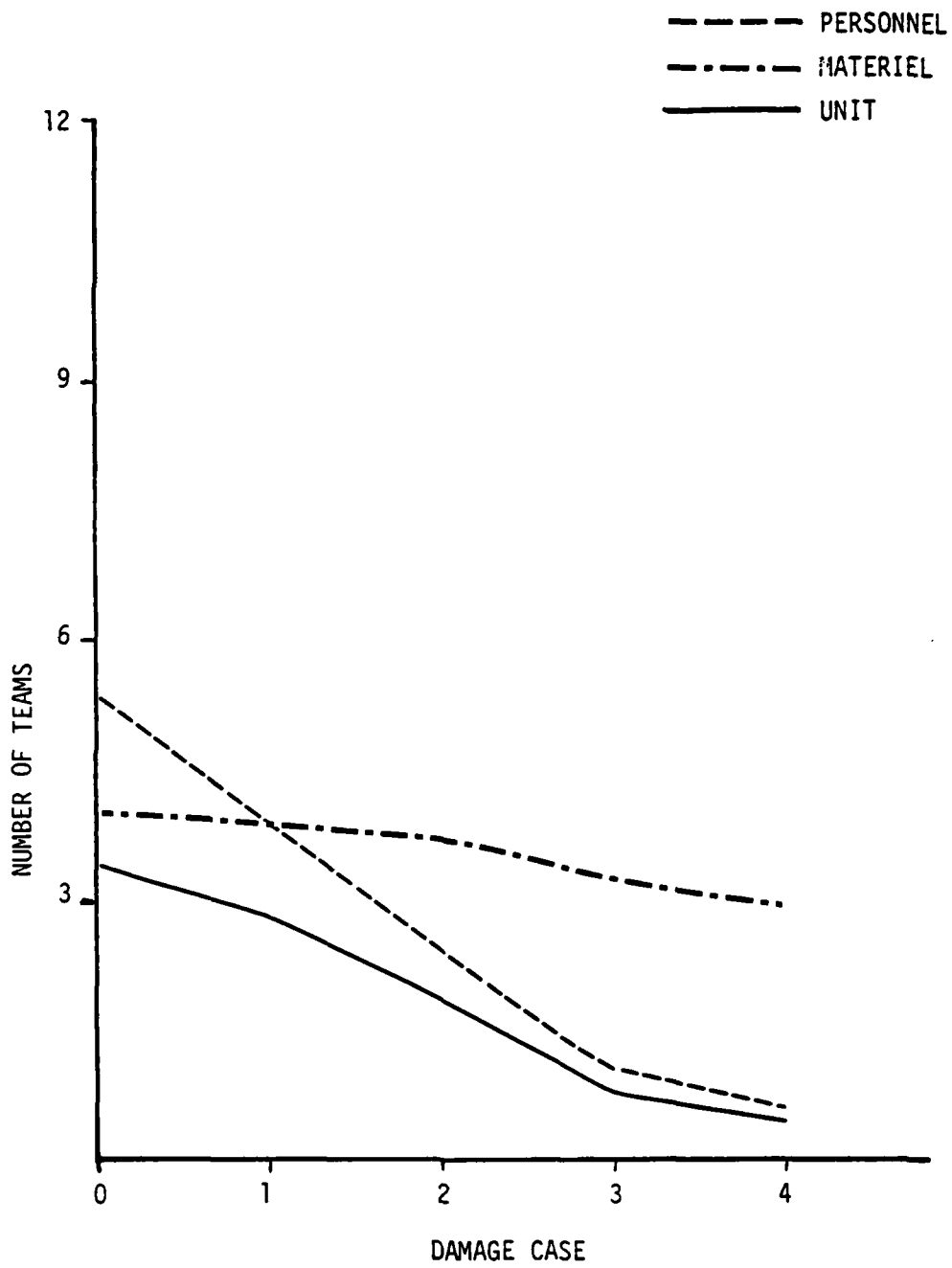


Figure 2-II-21. REDCON 2 - Unit Recovered Capability and Limiting Factor - CSC, Tank - Mission 2

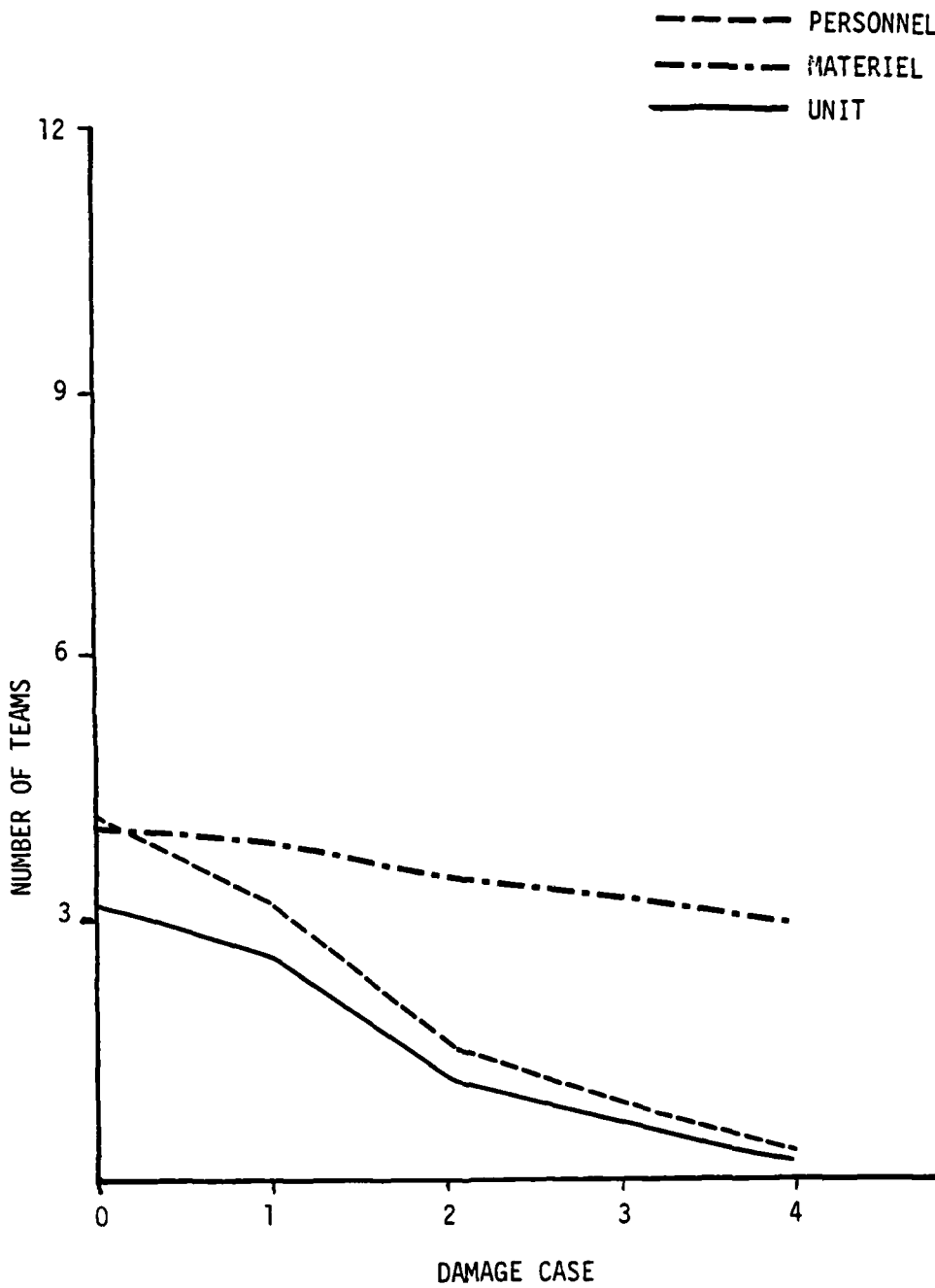


Figure 2-II-22. REDCON 3 - Unit Recovered Capability and Limiting Factor - CSC, Tank - Mission 2

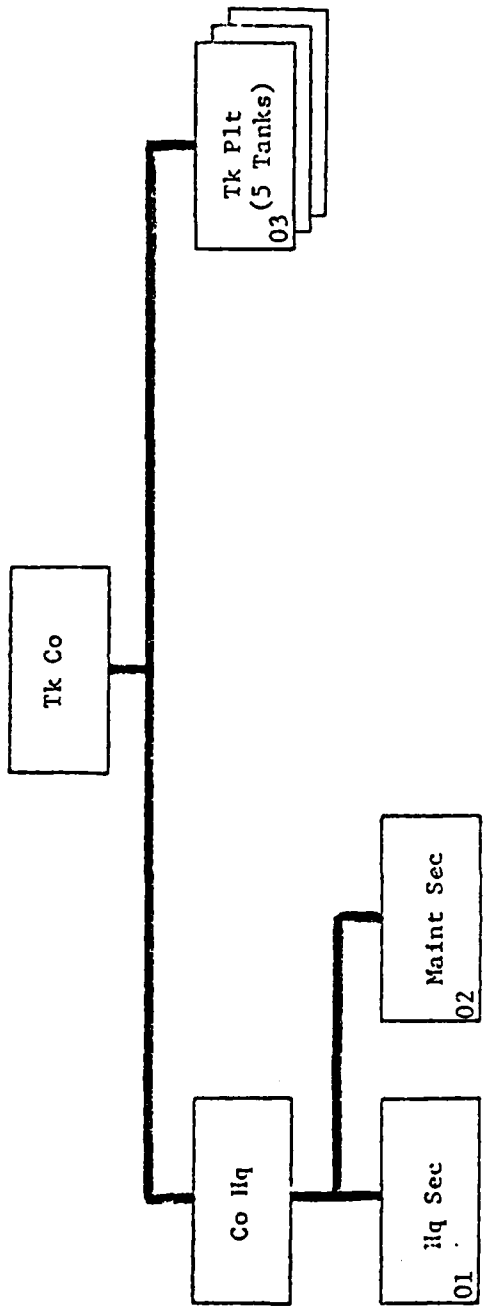


Figure 2-II-23. Tank Company, Tank Battalion Organization Chart

Table 2-II-27. TOE Personnel Listing, Tank Company, Tank Bn  
 TOE 17-37H With Change 15

	PERSONNEL	TOE
1	H1 Co CO	1
2	H2 XO	1
3	H3 1SGT	1
4	H4 Supply SGT	1
5	H5 Commo SGT	1
6	H6 Light Veh Driver	2
7	H7 Tank Cmdr	2
8	H8 Tank Gunner (Sr)	11
9	H9 Tank Loader	2
10	H10 Tank Driver (Sr)	6
11	M1 Motor SGT	1
12	M2 Rec Veh Op (Sr)	1
13	M3 Truck Veh Mech (Sr)	1
14	M4 Tank Turret Mech (Sr)	1
15	M5 Field C-E EQ Mech	1
16	M6 PLL Clerk (Driver)	1
17	P1 PLT LDR	3
18	P2 PLT SGT	3
19	P3 Tank Cmdr	9
20	P4 Tank Gunner (Jr)	6
21	P5 Tank Loader	15
22	P6 Tank Driver (Jr)	11
23	H4A Armorer	1
24	M2A Rec Veh Op (Jr)	1
25	M3A Track Veh Mech (Jr)	3
26	M4A Tank Turret Mech (Jr)	2



Table 2-II-28. Personnel Transfer Matrix, Tank Company.

TASK	TOE	MISSION	PERSONNEL																									
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
M1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M8	11	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
M9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M10	6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
M11	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
M12	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
M13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M17	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
M18	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
M19	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
M20	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
M21	15	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
M22	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
M23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M24	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M25	3	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
M26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL	88	83	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86

Table 2-II-29. Personnel - Essential Team Requirements, Tank Company - Mission 1.

TASK	TEAM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	2	3	4	4	4	5	6	7	7	7	7	8	9	10	10	10	11	12	13	13	13
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	2	3	3	3	3	4	4	4	4	4	4	5	6	6	6	6	7	7	7	7	7
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71	75	79	83	83

Table 2-II-30. Personnel - Essential Team Requirements, Tank Co - Mission 2.

TEAM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TASK 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TASK 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 8	2	3	4	4	4	5	6	7	7	7	8	9	10	10	10	11	12	13	13	13
TASK 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 10	2	3	3	3	3	4	4	4	4	4	5	6	6	6	6	7	7	7	7	7
TASK 11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TASK 12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TASK 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TASK 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 17	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4
TASK 18	0	1	1	1	1	1	2	2	2	2	3	3	3	3	3	3	4	4	4	4
TASK 19	0	0	1	2	3	3	3	4	5	6	6	6	7	8	9	9	9	10	11	12
TASK 20	0	0	1	2	2	2	2	3	4	4	4	4	4	5	6	6	6	6	7	8
TASK 21	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TASK 22	0	0	1	2	3	3	4	5	6	7	7	7	8	9	10	10	11	12	13	14
TASK 23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TASK 25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TASK 26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88



Table 2-II-32. Personnel Fill, Tank Company, Tank Bn. REDCON 2

		145-S																										
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
EXCESS	-----	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
4	-----	0	0	0	0	1	2	11	2	5	0	1	1	1	1	1	1	1	3	3	6	7	18	7	1	0	3	1
4	-----	0	0	0	1	1	0	11	3	6	1	0	0	1	1	0	0	3	3	3	4	7	16	6	0	0	3	3
3	-----	0	1	0	1	1	1	0	11	2	6	1	1	0	1	1	0	3	3	5	7	12	11	0	1	3	3	
1	-----	1	0	1	1	1	1	2	11	3	9	1	1	1	1	1	1	1	1	5	6	13	7	1	1	4	2	
4	-----	1	0	1	1	1	1	2	8	2	5	1	1	1	0	1	0	2	3	7	5	16	11	1	1	0	3	1
4	-----	1	1	1	1	1	1	0	4	2	6	1	0	1	1	0	3	3	4	4	5	16	8	1	0	3	3	
1	-----	1	1	1	1	1	1	2	11	3	4	0	1	1	1	1	1	1	2	6	6	14	10	1	1	3	1	
5	-----	0	0	1	1	1	2	11	0	6	0	0	0	0	0	1	1	1	3	8	5	18	8	0	1	4	3	
4	-----	0	0	1	1	1	0	2	10	2	5	1	0	0	1	1	1	1	3	5	7	18	10	0	0	3	0	
3	-----	0	1	1	1	1	1	3	11	1	6	1	0	0	1	1	1	1	3	5	5	15	9	0	1	4	3	
4	-----	0	1	1	1	1	1	0	11	2	6	0	0	1	1	0	2	3	7	4	18	10	0	1	4	0		
4	-----	0	0	1	1	1	1	3	0	11	3	0	0	1	1	1	1	1	3	4	4	13	13	1	1	4	0	
3	-----	1	1	1	1	1	1	2	10	3	3	0	0	1	0	1	1	1	3	9	7	11	11	0	1	3	3	
2	-----	1	1	1	1	1	1	2	11	0	6	0	0	1	1	1	1	1	3	3	7	14	10	1	1	4	2	
3	-----	0	1	1	1	1	1	1	16	1	6	0	1	0	0	1	0	3	2	8	6	14	13	1	1	0	1	3
2	-----	0	0	1	1	1	1	2	10	2	5	1	0	1	1	1	1	1	2	9	3	14	11	1	1	1	1	1
5	-----	1	0	1	1	1	1	2	6	1	6	0	0	0	0	1	1	1	2	4	5	18	7	0	1	3	3	
4	-----	1	0	1	1	1	1	2	0	8	1	0	1	1	0	1	1	1	2	4	7	10	13	1	1	2	3	
0	-----	0	1	1	1	1	1	2	7	2	6	1	1	0	1	1	0	2	1	4	5	15	11	0	1	2	2	
7	-----	1	0	1	1	1	1	0	2	0	5	6	1	1	0	0	0	1	3	7	7	14	5	1	0	4	3	
3	-----	1	1	0	1	1	1	0	11	1	5	0	1	0	1	1	1	1	3	4	3	17	11	1	0	3	3	
3	-----	1	1	1	1	1	1	1	7	1	6	1	1	1	1	1	1	1	2	8	4	14	10	1	1	2	1	
4	-----	1	1	1	1	1	1	3	0	4	0	5	1	1	1	1	1	1	2	8	4	14	10	1	1	2	1	
3	-----	0	0	0	0	0	3	1	10	3	6	1	0	0	1	1	1	1	2	8	7	11	10	1	1	3	1	
4	-----	1	0	1	1	1	1	1	11	1	4	1	1	0	0	1	1	1	3	4	2	16	13	1	1	4	3	
3	-----	0	1	1	1	1	1	3	2	11	1	5	0	0	1	1	1	1	3	6	7	14	8	1	0	3	3	
4	-----	1	1	1	1	1	1	1	11	2	6	1	0	0	1	1	1	1	3	3	6	18	9	1	1	1	1	
2	-----	1	1	1	1	1	1	0	2	0	5	6	1	1	0	1	0	0	3	4	6	15	8	1	1	4	1	
4	-----	1	1	1	1	1	1	0	3	2	11	1	0	0	0	1	1	1	3	7	6	17	8	1	1	1	1	
5	-----	0	1	0	0	1	1	2	11	3	5	0	0	0	1	1	1	1	2	4	5	12	13	1	1	3	1	
5	-----	1	0	1	1	1	1	3	0	4	0	1	1	0	0	1	1	0	3	7	2	14	10	0	1	4	3	
5	-----	1	0	1	1	1	1	3	0	2	6	1	1	1	1	1	0	0	2	7	7	18	5	1	1	2	2	
4	-----	1	1	1	1	1	1	2	10	3	2	1	1	1	1	0	0	1	3	8	2	18	11	1	1	4	2	
3	-----	0	0	1	1	1	1	0	0	0	3	5	0	1	1	0	1	1	3	1	4	7	15	7	1	1	4	2
4	-----	1	0	1	1	1	1	1	0	1	0	1	0	1	0	1	1	1	3	6	4	14	13	0	0	4	3	
4	-----	1	0	1	1	1	1	2	10	1	6	2	0	1	1	0	1	1	2	3	7	12	13	1	1	4	3	
4	-----	1	1	1	1	1	1	1	0	1	0	1	0	0	1	1	1	1	3	4	3	12	13	1	1	4	3	
4	-----	1	1	0	0	1	1	3	0	9	1	6	0	0	1	1	1	1	3	7	6	10	13	1	1	4	1	
3	-----	1	1	0	1	1	1	0	2	0	8	1	1	1	1	1	1	1	1	7	6	18	11	1	1	0	0	
5	-----	1	1	1	1	1	1	0	2	0	8	1	1	1	1	1	1	1	3	8	7	9	13	1	1	0	4	3
2	-----	0	1	0	1	1	1	2	1	0	1	4	1	1	1	0	0	0	3	8	7	15	10	1	0	2	3	
3	-----	1	1	1	1	1	1	1	11	3	6	0	1	1	1	1	0	0	2	3	6	11	10	1	1	4	3	
2	-----	1	1	1	1	1	1	0	2	11	1	1	0	0	1	0	1	1	1	3	4	5	16	9	1	1	2	3
3	-----	1	1	1	1	1	1	3	11	2	5	1	1	0	0	1	1	1	3	5	7	15	12	1	1	0	1	0
3	-----	0	1	1	1	1	1	1	1	1	1	2	0	0	1	1	1	1	3	4	6	16	9	1	1	0	3	
4	-----	0	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	3	4	6	15	11	1	1	0	3	
TOT =		1	1	1	1	1	2	2	11	2	6	1	1	1	1	1	1	1	3	4	6	15	11	1	1	1	3	

Table 2-II-33. Personnel Fill, Tank Company, Tank Bn. REDCON 3

TASKS	PERSONNEL																										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2-II-34. TOE Materiel Listing, Tank Company, Tank Bn

TOE 17-37H With Change 15

	MATERIEL	TOE
1	H1 Co CO Tank	1
2	H2 FO Tank	1
3	H3 Supply Truck, 2½ Ton	1
4	H4 Commo Trailer, 1½ Ton	1
5	H5 Utility Veh (w/AN/VRC-12)	1
6	H6 Utility Veh (w/AN/VRC-47)	1
7	M1 Maint Sec Carrier	1
8	M2 Recov Veh (M-88)	1
9	M3 Maint Truck, 2½ Ton	1
10	M4 Maint Trailer, 1½ Ton	1
11	M5 Maint Utility Veh (w/AN/VRC-47)	1
12	M6 Maint Utility Veh Trailer	3
13	P1 PLT LDR Tank	3
14	P2 PLT SGT Tank	3
15	P3 Tank	9
16	T1 Lchr, Smoke Screen	17
17	T2 Searchlight (w/AN/VSS-47)	17
18	E1 Ammo Increment	17
19	E2 Fuel Increment	17





Table 2-II-36 for mission 1 and Table 2-II-37 for mission 2. Table 2-II-38 provides a listing of materiel on-hand used for the representation of the readiness conditions.

c. Effect of Readiness Condition on Unit Capability

Figures 2-II-24 and 2-II-25 show the unit capability as a function of readiness condition for the two missions. In either mission, unit capability is limited by materiel with only a slight interaction of personnel at REDCON 3 for mission 2. Note also that the ability to form personnel teams is limited by total population and not by transferability of personnel, again with the slight variation at REDCON 3, mission 2. This is a result of the high degree of commonality of skills in the unit. Mission 2 shows the effect of requiring the technically skilled maintenance personnel, for which there are few, if any, substitutes in the unit. Materiel teams are always limited by the number of tanks in the unit.

The capability range of the various readiness conditions is shown at Table 2-II-39. The table shows values for mission 2 with maximum unit capability, 100%, equating to 16 teams. Not only does this unit have a wide overlap of capability, which covers all three readiness conditions, but the unit could be rated as REDCON 3 because of personnel and still remain 100% effective.

Table 2-II-39. Unit Readiness Condition Capability Range, Tank Company

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	14-16	12-14	11-14
Personnel Teams	19-20	16-19	13.7-16
Unit Teams	14-16	12-16	11-16
Unit Capability	88-100%	75-100%	69-100%
Overlap Range	88-100%		

Table 2-II-36. Materiel - Essential Team Requirements, Tank Company - Mission 1.

TASK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2-II-37. Materiel - Essential Team Requirements, Tank Company - Mission 2.

TASK	TEAM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	1	2	3	3	3	4	5	6	6	6	7	7	9	9	9	10	11	12
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2-II-38. REDCON Material Listing, Tank Company, Tank Bn

MATERIEL			REDCON		
			1	2	3
1	H1	Co CO Tank	1	1	1
2	H2	XO Tank	1	0	0
3	H3	Supply Truck, 2½ Ton	1	1	1
4	H4	Commo Trailer, 1½ Ton	0	0	0
5	H5	Utility Veh (w/AN/VRC-12)	1	1	1
6	H6	Utility Veh (w/AN/VRC-47)	0	0	0
7	M1	Maint Sec Carrier	1	1	1
8	M2	Recov Veh (M-88)	1	1	1
9	M3	Maint Truck, 2½ Ton	0	0	0
10	M4	Maint Trailer, 1½ Ton	1	1	1
11	M5	Maint Utility Veh (w/AN/VRC-47)	1	0	0
12	M6	Maint Utility Veh Trailer	1	1	1
13	P1	PLT LDR Tank	3	3	3
14	P2	PLT SGT Tank	3	3	3
15	P3	Tank	7	6	5
16	T1	Lchr, Smoke Screen	15	13	12
17	T2	Searchlight (w/AN/VSS-47)	15	13	12
18	E1	Ammo Increment	15	13	12
19	E2	Fuel Increment	15	13	12

d. Recovered Capability After Damage in Various Readiness Conditions

The results of the analysis of damage applied to the Tank Co are shown in the following figures; Figures 2-II-26 thru 2-II-29 show the various readiness condition cases for mission 1 and Figures 2-II-30 thru 2-II-33 for mission 2. Materiel is in all cases the limiting factor of unit capability. The large drop in materiel (unit) capability between damage case 2 and 3 is due to the large increase in materiel damage between the two cases (see Table 2-I-2). The large increase in materiel damage was driven by the requirement to increase personnel casualties from 20% to 30% which results in a high materiel damage probability. The mission 2 cases show some interaction between materiel and personnel, again showing the limited substitutes available from company assets for the maintenance personnel.

4. Units of the Tank Battalion-Comparison

The following analysis is limited to mission 2 of all units.

a. Effect of Readiness Condition

Figure 2-II-34 provides a comparison of unit capability for the units of the Tank Bn. Unit capability represents the total unit teams from previous figures converted to a percentage of the maximum unit teams formed in a TOE unit. The chart portrays graphically the wide variation in effect of the readiness condition criteria on different units. Figure 2-II-35 provides a comparison of the expected capability range, taken from Tables 2-II-13, 2-II-26, and 2-II-39, of the three units. This chart again shows the variation of readiness condition effect on the different units and indicates a low probability that the effectiveness of the units would be the same given the same REDCON. REDCON 3 shows no overlap of the effectiveness range of the three units.

Battalion effectiveness is a function of three components: command and control, services, and firepower elements. For these analyses no transfer of personnel was permitted between units. The battalion is

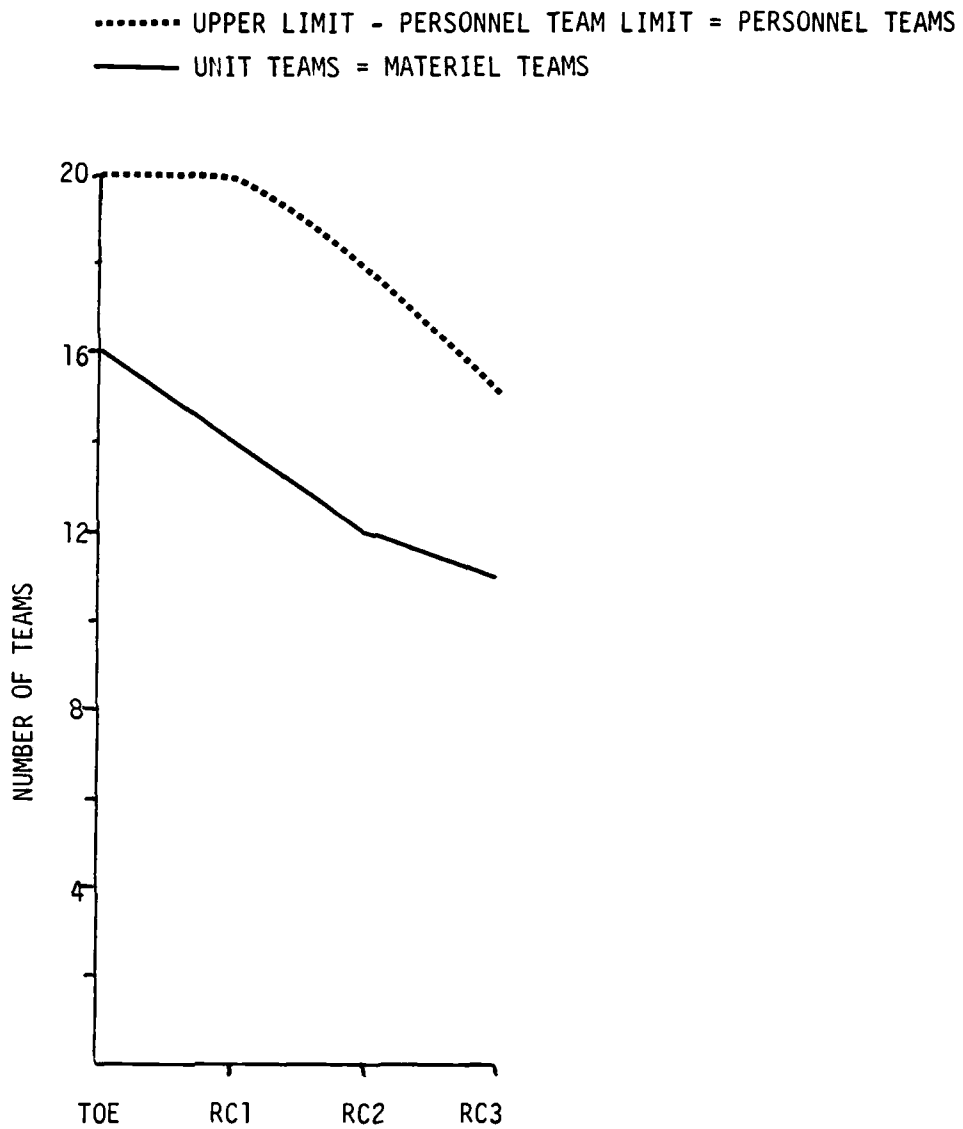
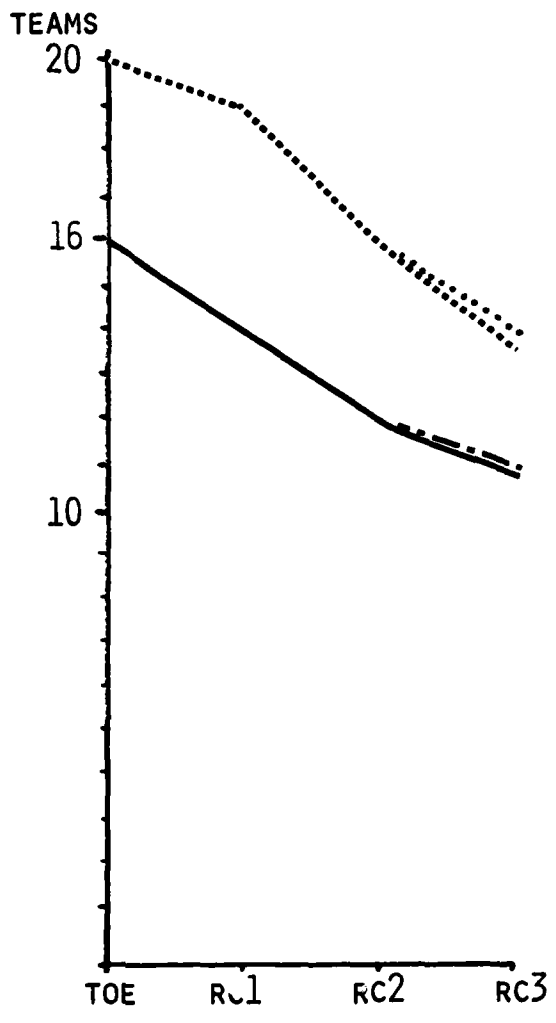


Figure 2-II-24. Unit Readiness Condition Capability and Limiting Factor - Tank Co-Mission 1



- UNIT TEAMS
- - - - MATERIEL TEAMS
- ..... PERSONNEL TEAMS
- ..... UPPER LIMIT - PERSONNEL TEAMS

Figure 2-II-25. Unit Readiness Condition Capability and Limiting Factors - Tank Co. - Mission 2

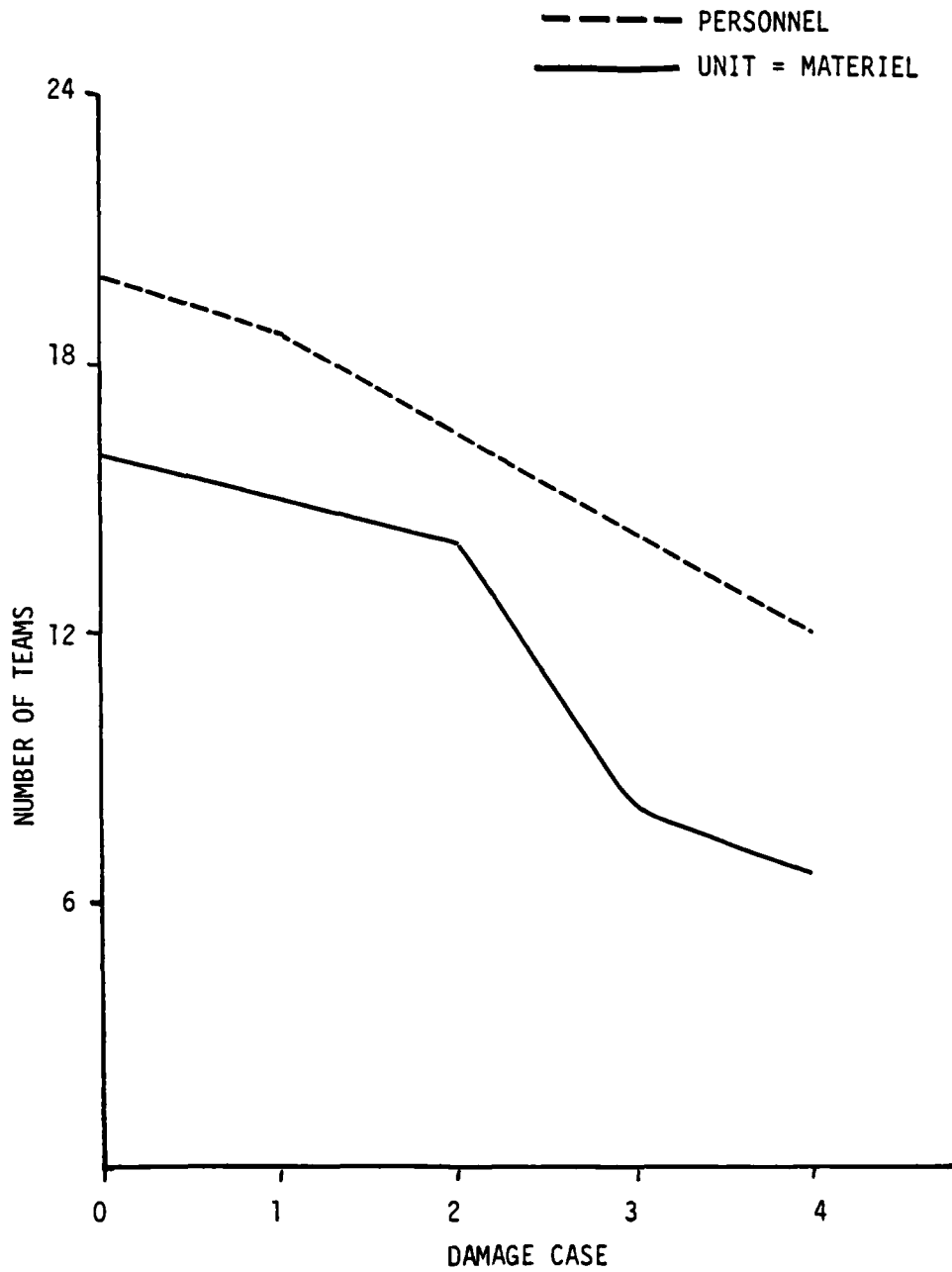


Figure 2-II-26. TOE - Unit Recovered Capability and Limiting Factor - Tank Co - Mission 1



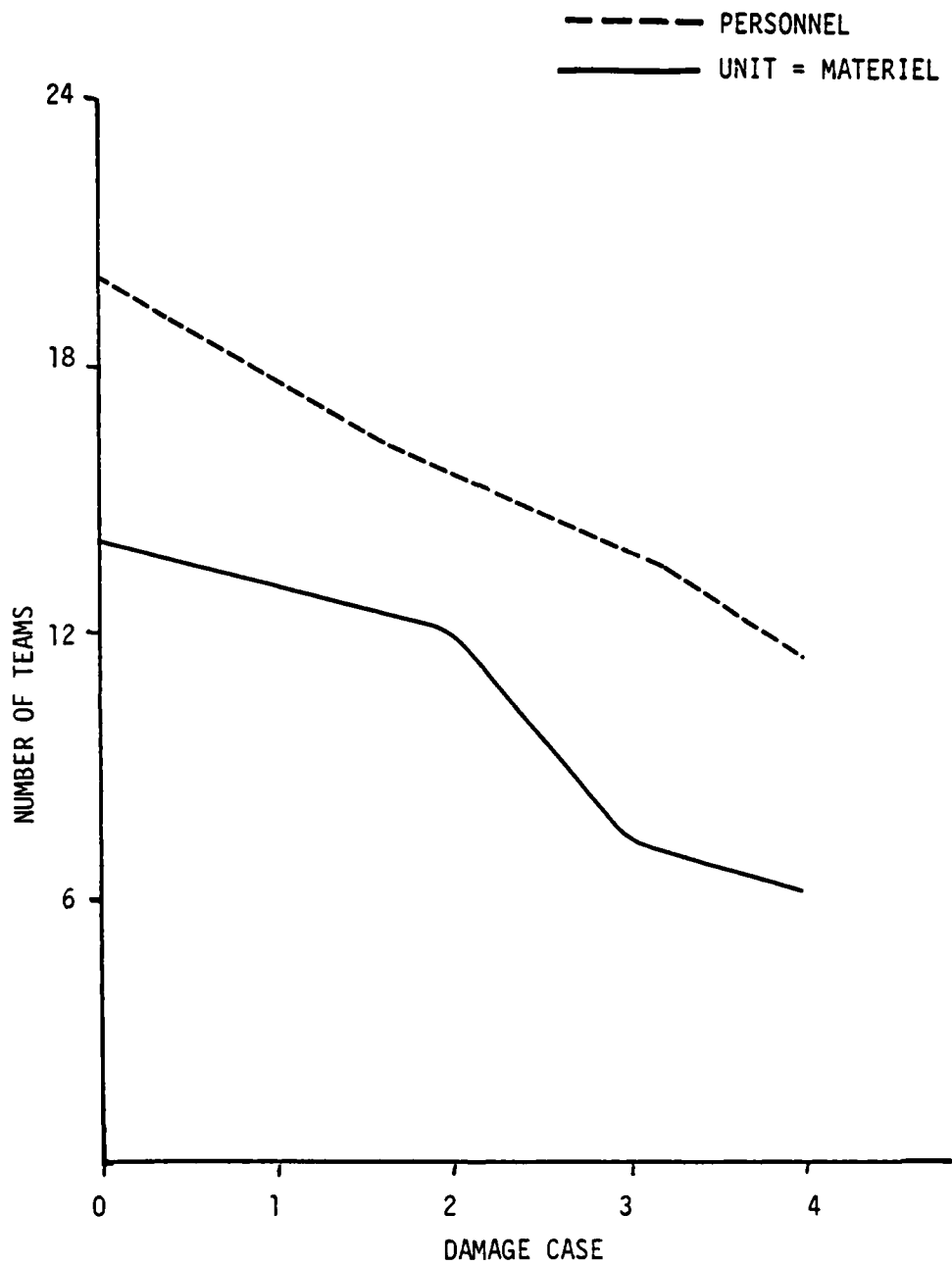


Figure 2-II-27. REDCON 1 - Unit Recovered Capability and Limiting Factor - Tank Co - Mission 1

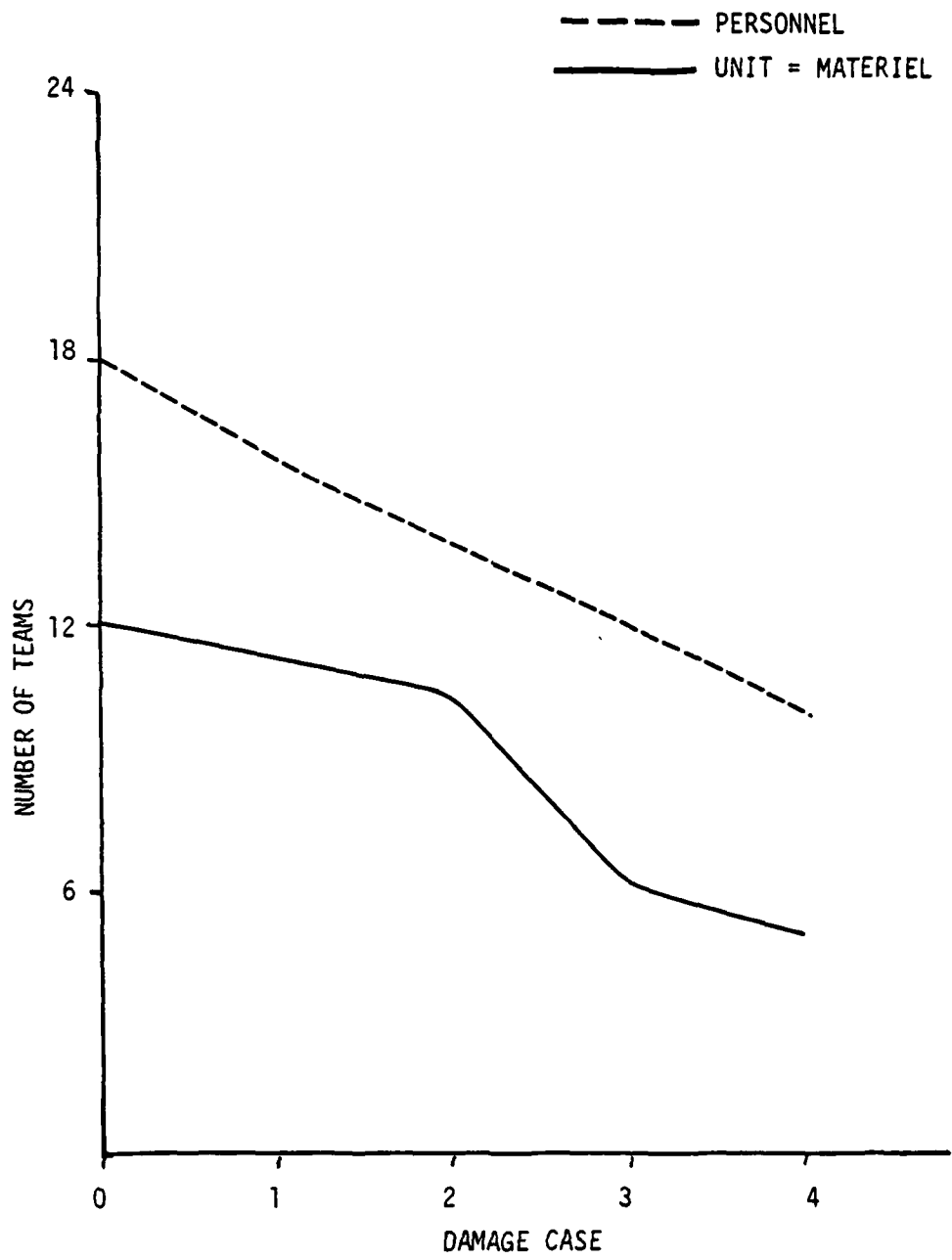


Figure 2-II-28. REDCON 2 - Unit Recovered Capability and Limiting Factor - Tank Co - Mission 1

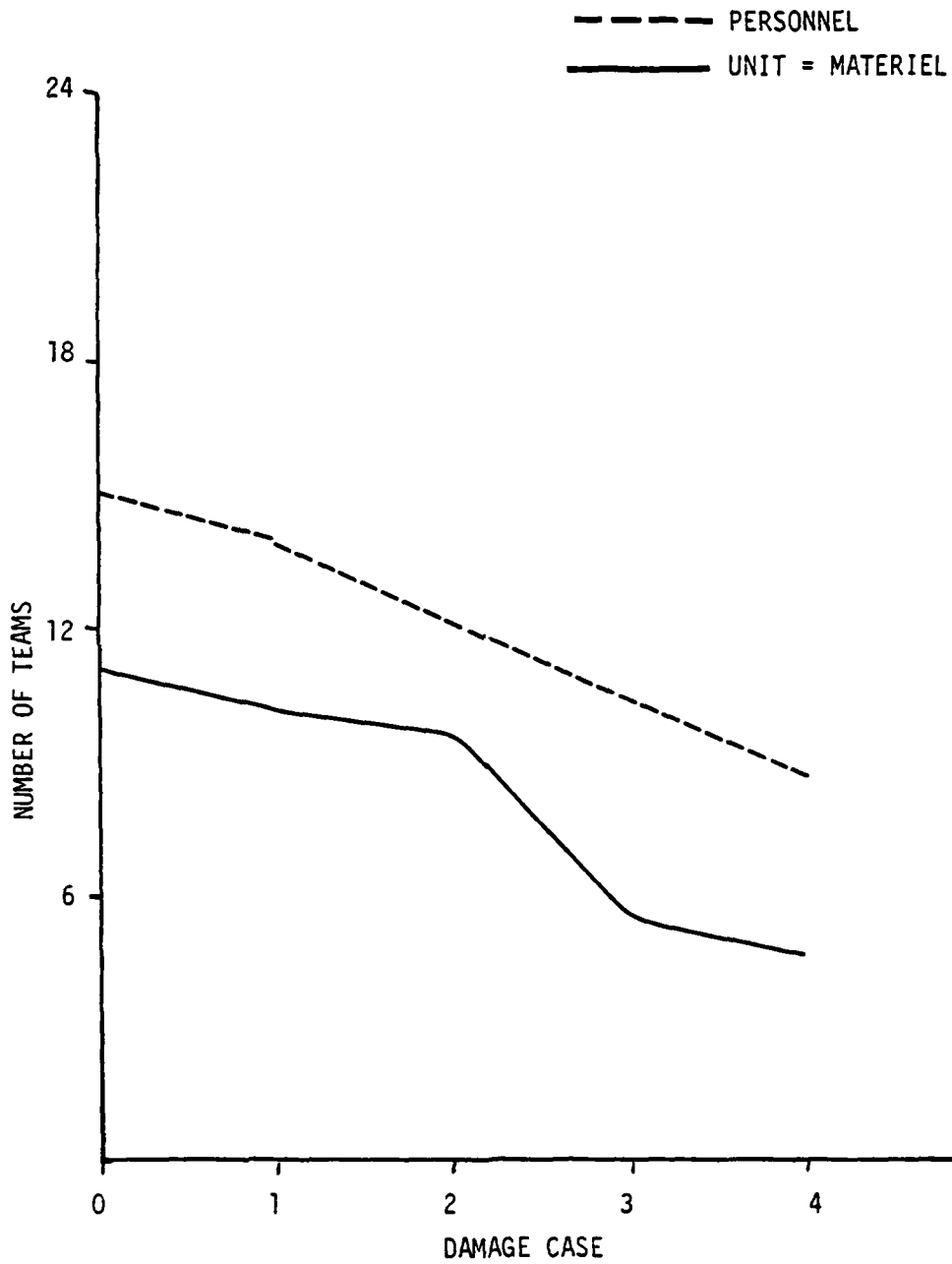


Figure 2-II-29. REDCON 3 - Unit Recovered Capability and Limiting Factor - Tank Co - Mission 1

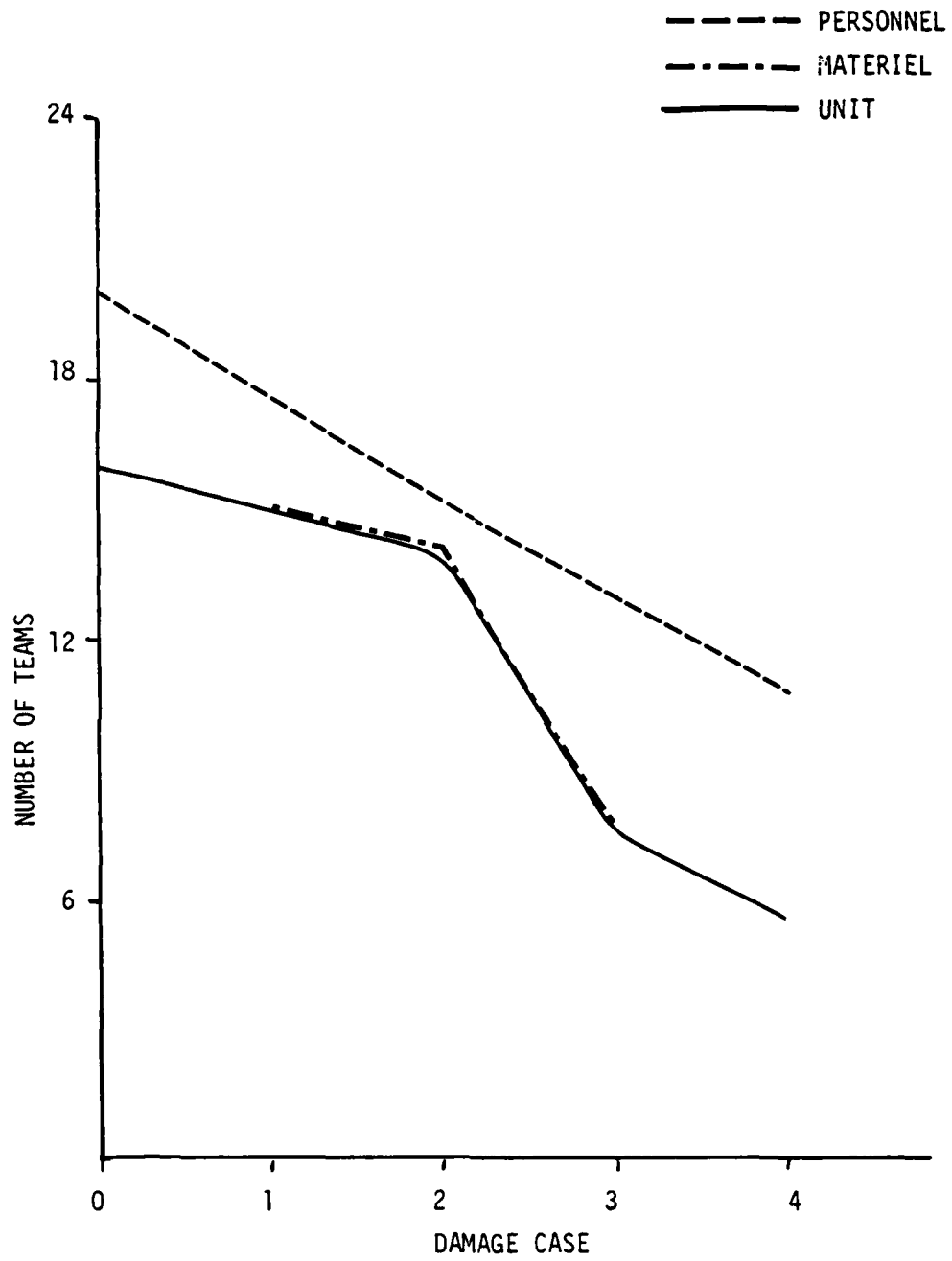


Figure 2-II-30. TOE - Unit Recovered Capability and Limiting Factor - Tank Co - Mission 2

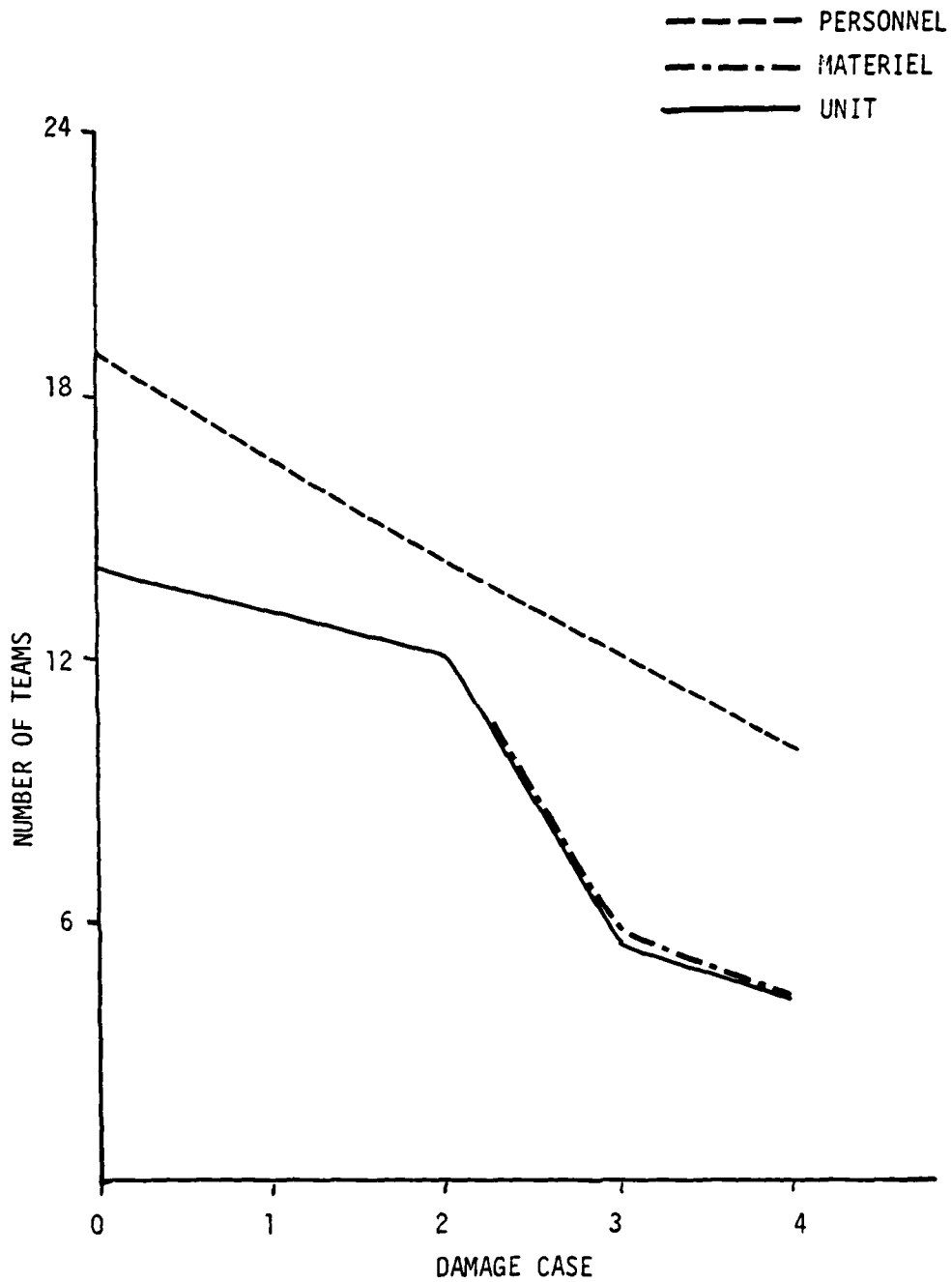


Figure 2-II-31. REDCON 1 - Unit Recovered Capability and Limiting Factor - Tank Co - Mission 2

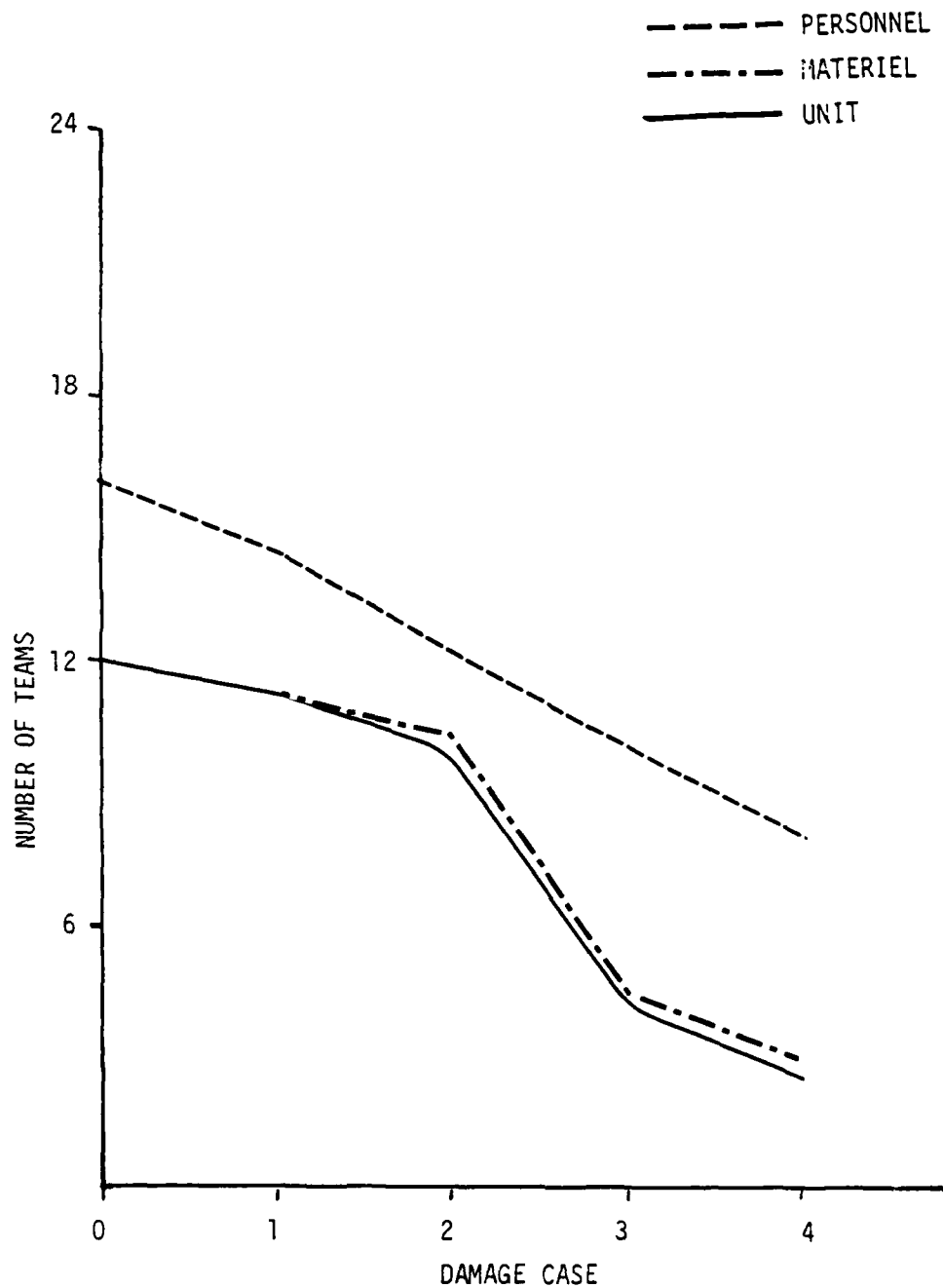


Figure 2-II-32. REDCON 2 - Unit Recovered Capability and Limiting Factor - Tank Co - Mission 2

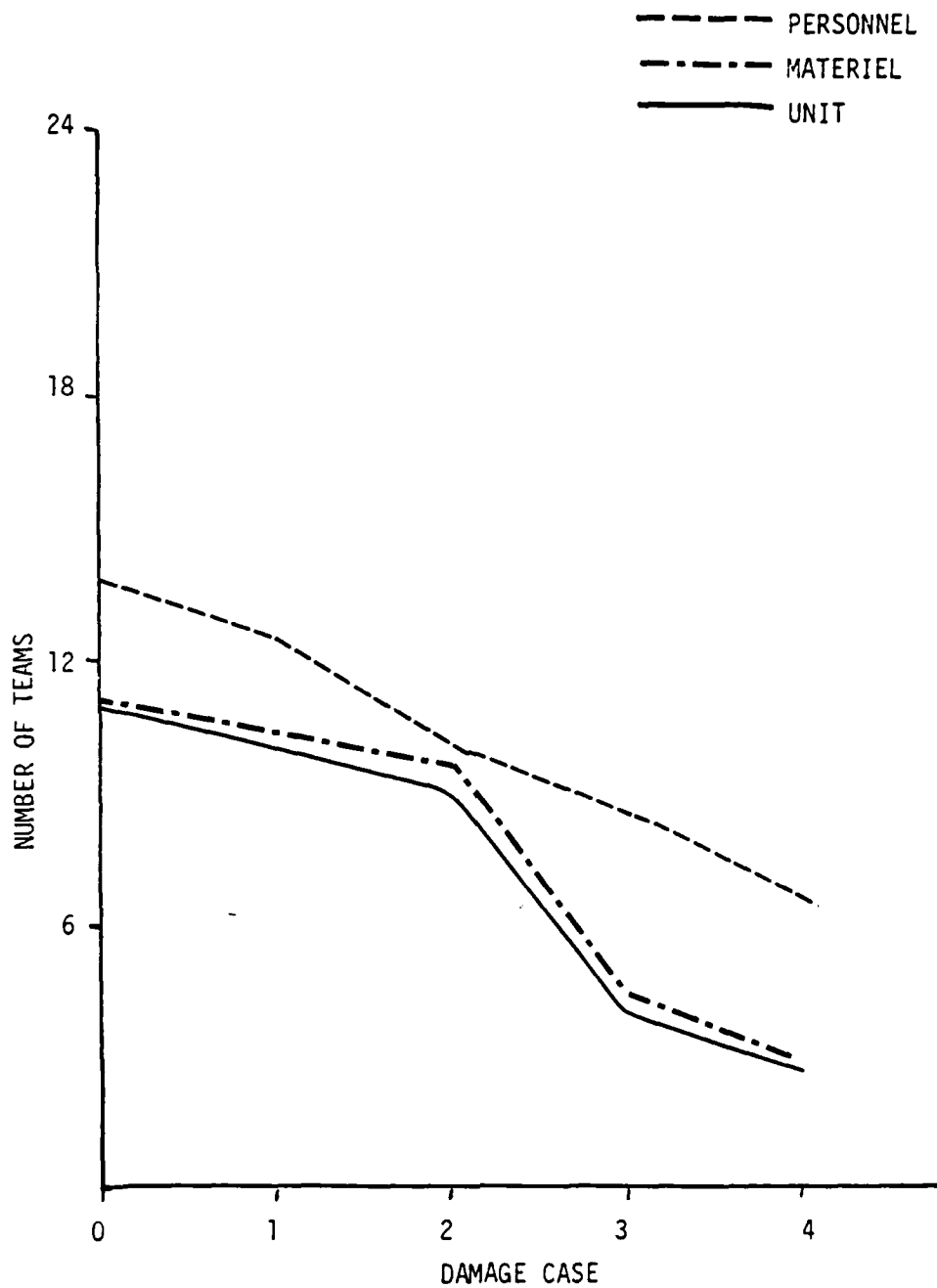


Figure 2-11-33. REDCON 3 - Unit Recovered Capability and Limiting Factor - Tank Co - Mission 2

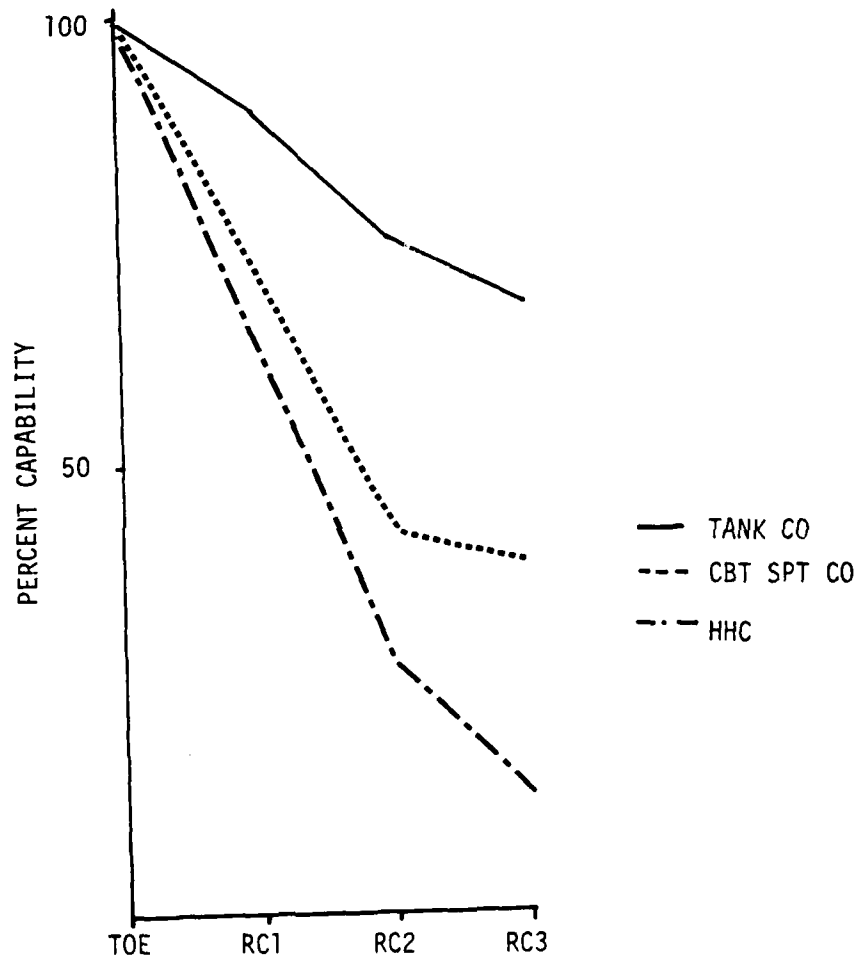


Figure 2-II-34. Comparison of Units of the Tank Bn, Capability at Different Readiness Conditions.



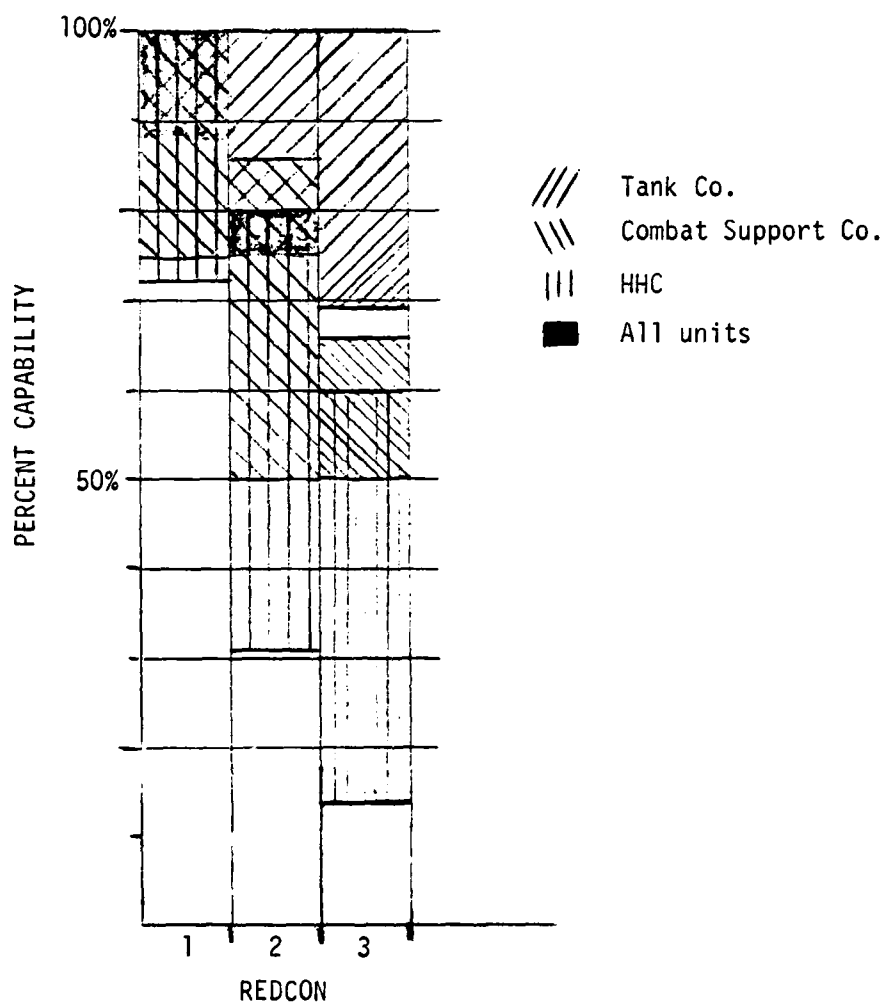


Figure 2-II-35. Units of the Tank Bn, Readiness Condition Capability Range Comparison

limited by the element at the lowest effectiveness. For example, from Figure 2-II-34, the HHC is the limiting element in all readiness conditions without damage.

b. Effect of Damage within Readiness Conditions

Figures 2-II-36 thru 2-II-39 provide a comparison of the Tank BN units capability after damage. The charts provide another indication of the effect of each readiness condition on each unit by the comparison of the zero damage points for each REDCON. These charts, as well as Figure 2-II-34, show that battalion effectiveness is likely to be most limited by the headquarters and that battalion effectiveness may be marked by degraded if the headquarters is at any level less than REDCON 1. This battalion starting at full TOE manning is likely to be an ineffective combat element at any damage level exceeding that represented by Case 2 (see Table 2-I-2). Battalions entering combat manned and equipped at the lower levels of REDCON 1, as represented by these values, are questionable with any damage exceeding Case 1.

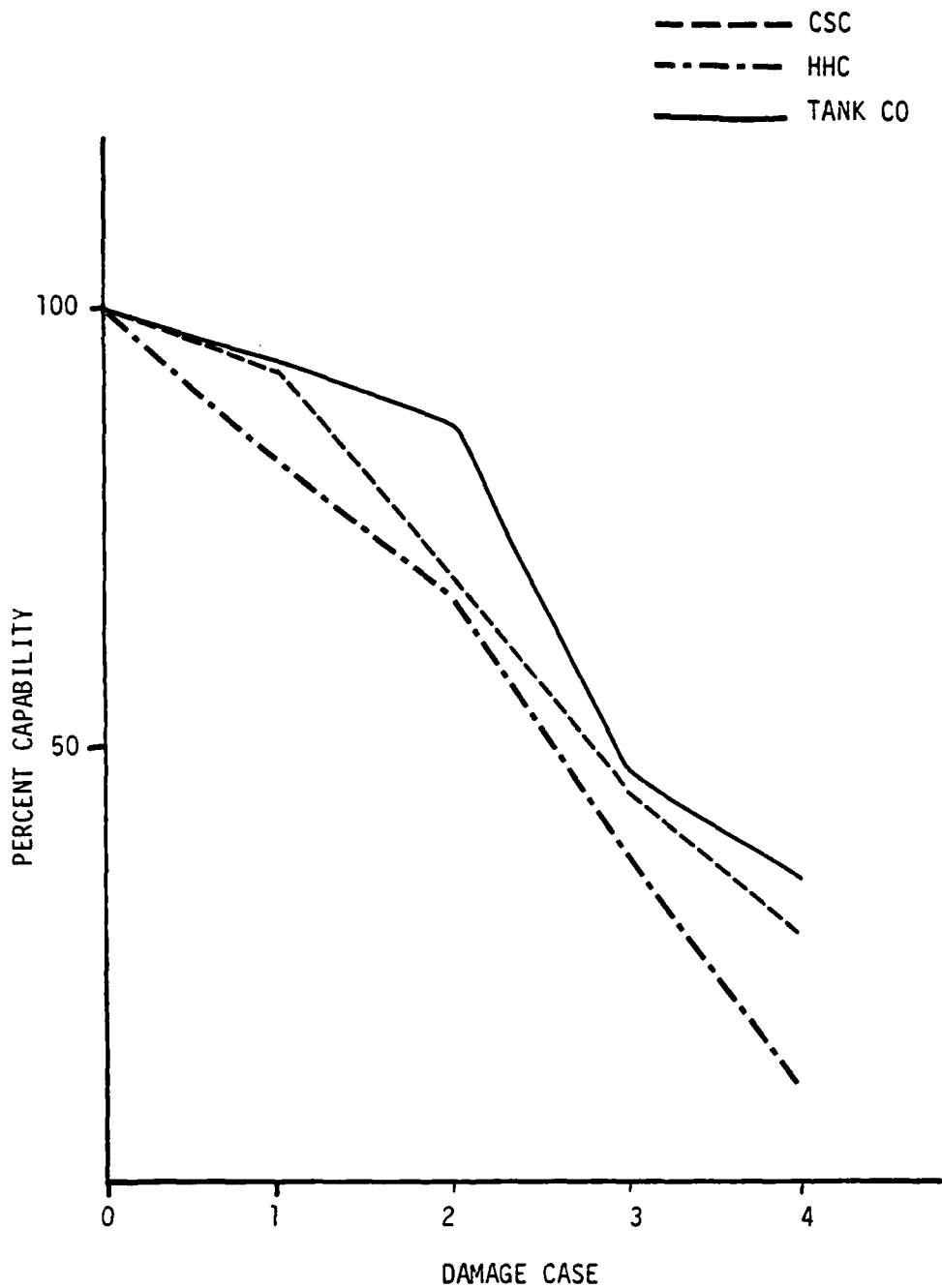


Figure 2-II-36. TOE - Comparison of Units of the Tank Bn - Unit Recovered Capability After Damage

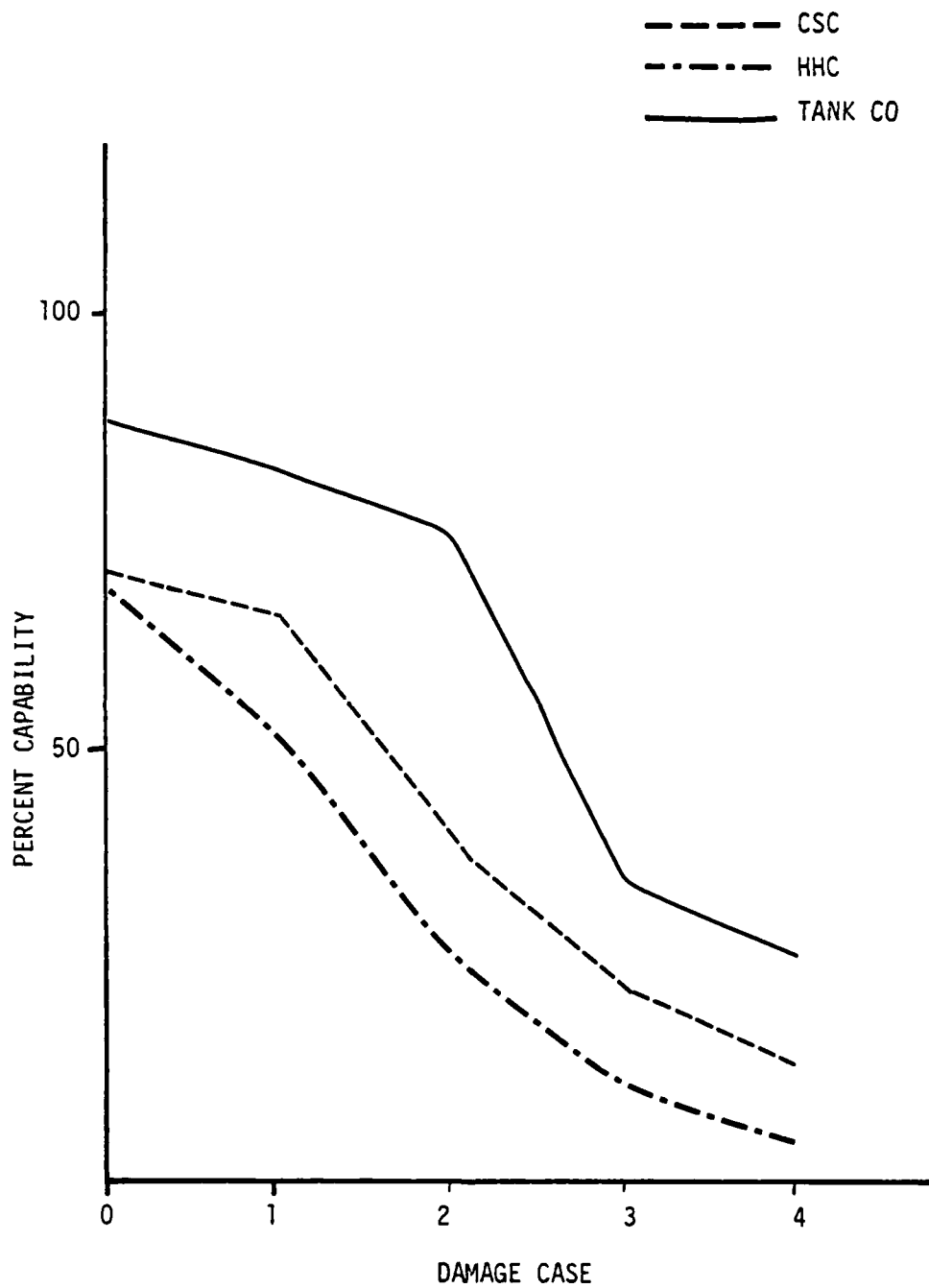


Figure 2-II-37. REDCON 1 - Comparison of Units of the Tank Bn - Unit Recovered Capability After Damage

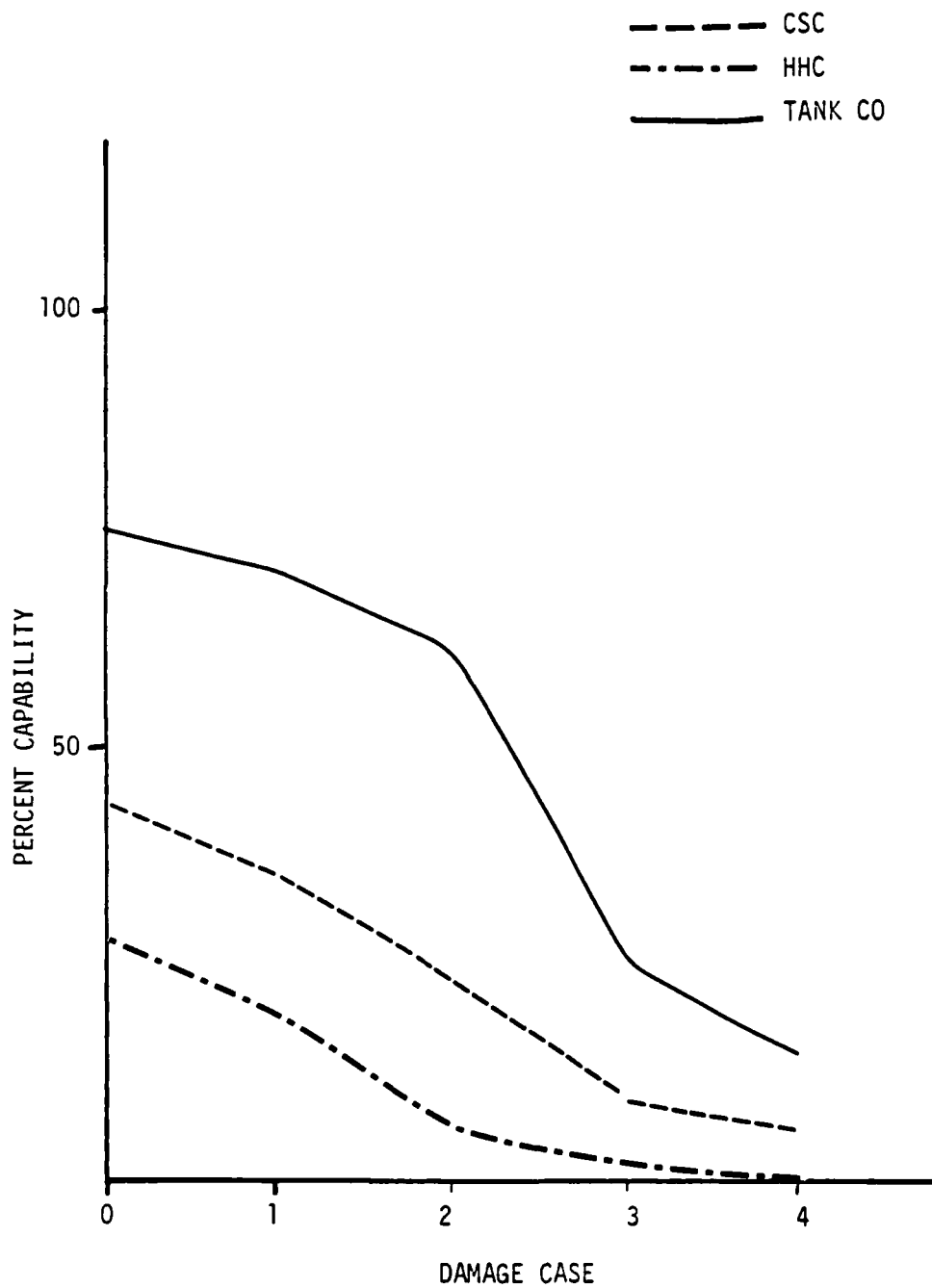


Figure 2-II-38. REDCON 2 - Comparison of Units of the Tank Bn - Unit Recovered Capability After Damage

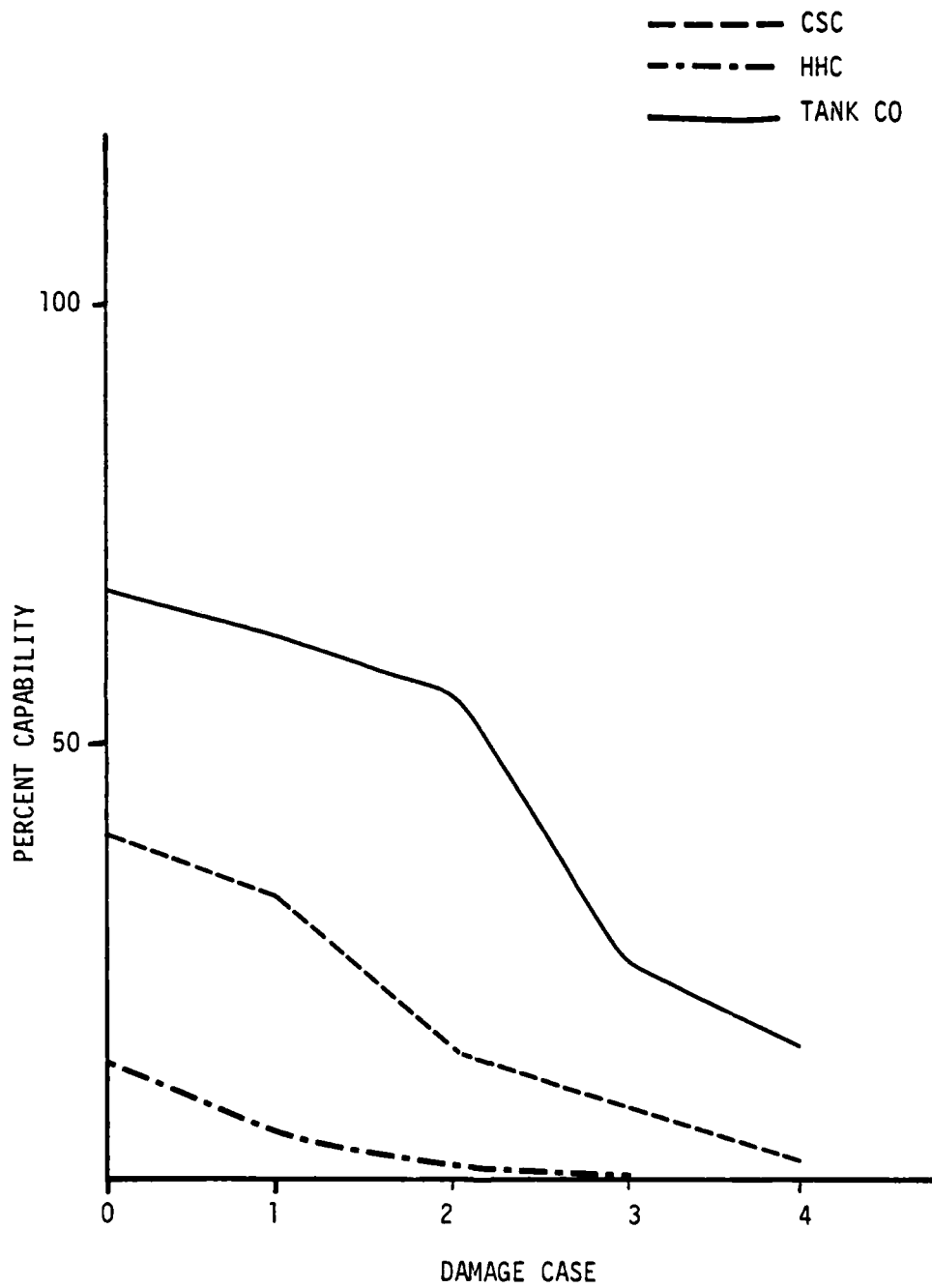


Figure 2-II-39. REDCON 3 - Comparison of Units of the Tank Bn - Unit Recovered Capability After Damage

### Section III. Infantry (Mechanized) Battalion.

#### 1. Headquarters & Headquarters Co, Inf Bn

Analysis of the Hq and Hq Co. Inf Bn was based on TOE 07-046H020 with change 16. The organization chart of this unit is shown at Figure 2-III-1. The medical platoon was not considered in this analysis.

##### a. Personnel

Table 2-III-1 is a listing of the personnel tasks with TOE authorizations used in this analysis. The transfer matrix for the personnel is provided at Table 2-III-2. The essential team requirements for personnel are shown at Table 2-III-3 for mission 1 and Table 2-III-4 for mission 2. Mission 1 is the command and control function only, while mission 2 includes the requirement to provide logistic and maintenance support to the units of the battalion. The various personnel fill configurations used for representation of the readiness conditions are provided at Tables 2-III-5 thru 2-III-7.

##### b. Materiel

Table 2-III-8 is a listing of the materiel items, with TOE authorizations, used in the analysis. Table 2-III-9 is the transfer matrix for these materiel items. The essential materiel team requirements for the two missions are shown in Tables 2-III-10 and 2-III-11. The equipment on-hand quantities used for the REDCON representations are shown at Table 2-III-12.

##### c. Effect of Readiness Condition on Unit Capability

The unit capability at full TOE and each REDCON is shown in Figure 2-III-2 for mission 1 and Figure 2-III-3 for mission 2. Unit capability for Mission 1 was in all cases limited only by personnel. The materiel required by command and control personnel was always available. The failures to complete this team were, in general, due to shortages of officers in the unit. Mission 2 shows a significant degradation of capability with each lower

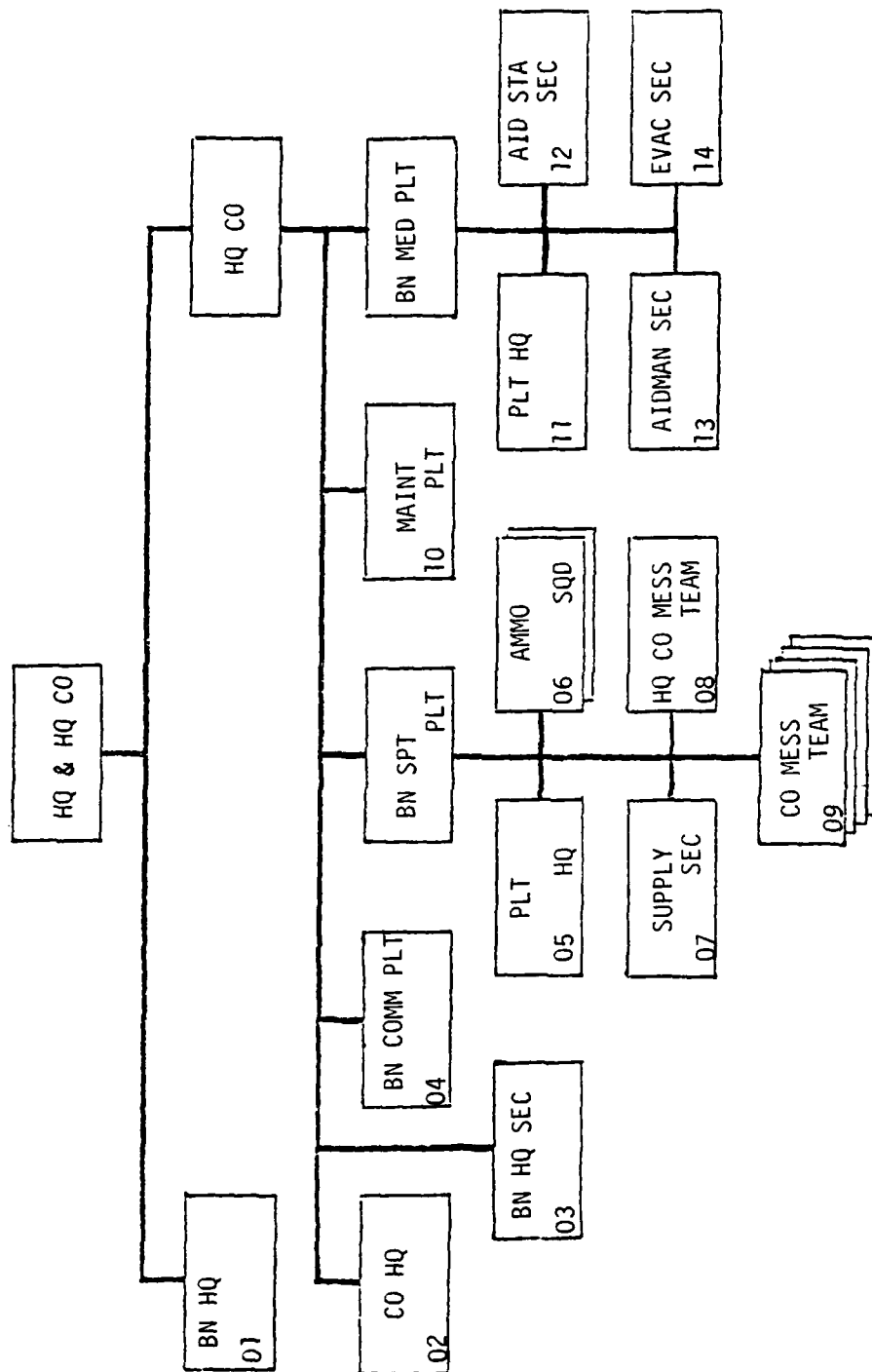


Figure 2-III-1. Headquarters & Headquarters Company, Infantry (Mech) Bn Organization Chart



Table 2-III-1. TOE Personnel Listing, HQ & HQ Company, INF BN (MECH)

TOE 07-46H020 With Change 16

	PERSONNEL	TOE
1	H1 Bn Co	1
2	H2 Bn Xo	1
3	H3 Bn Staff Officer	8
4	H4 Bn Staff NCO	9
5	H5 PC/Heavy Vehicle Driver	18
6	H6 Radio Operator	2
7	H7 Light Vehicle Driver	7
8	H8 Clerks	5
9	H9 Intel Analyst	2
10	C1 Co CO	1
11	C2 Co XO/PLT LDR	2
12	C3 1SGT	1
13	C4 Supply SGT	2
14	C5 General Supplyman	5
15	M1 Motor SGT	1
16	M2 Rcv SGY & Sr Rev VehOpr	3
17	M3 Track Veh Mech (Sr)	2
18	M4 EQ/PLL Clerk	1
19	M5 Track Veh Mech (Jr)	9
20	M6 Welder	1
21	M7 Rcv Veh Opr	3
22	M8 Auto Mnt Tech	1
23	C21 TAC Comm/RATT/TAC Wire Chf	3
24	C22 TAC Com Sys Op/ Mech	3
25	C23 TAC Wire Op (SWB/Wire)	9
26	AS1 Ammo Chf	1
27	AS2 LDR/Sr Hvy Veh Driver	5
28	AS3 Ammo Handler	3
29	-S1 Bn Supply Sgt (E-7)	1
30	FS1 Food Svc SGT	14
31	FS2 Cooks	15



Table 2-III-3. Personnel - Essential Team Requirements,  
Headquarters and Headquarters Co, Inf Bn -  
Mission 1.

TEAM	1	2	3	4	5	6
TASK 1	1	1	1	1	1	1
2	0	0	0	0	0	0
3	5	5	5	5	5	5
4	5	5	5	5	5	5
5	3	3	3	3	3	3
6	0	0	0	0	0	0
7	5	5	5	5	5	5
8	3	3	3	3	3	3
9	1	1	1	1	1	1
10	1	1	1	1	1	1
11	1	1	1	1	1	1
12	1	1	1	1	1	1
13	1	1	1	1	1	1
14	1	1	1	1	1	1
15	0	0	0	0	0	0
16	0	0	0	0	0	0
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	0	0	0	0	0	0
20	0	0	0	0	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	1	1	1	1	1	1
31	2	2	2	2	2	2
TOTAL	31	31	31	31	31	31

Table 2-III-4. Personnel - Essential Team Requirements,  
Headquarters and Headquarters Co, Inf Bn -  
Mission 2.

TEAM		1	2	3	4	5	6
TASK	1	1	1	1	1	1	1
	2	0	0	0	0	0	0
	3	5	5	5	5	5	5
	4	5	5	5	5	5	5
	5	6	7	10	12	15	17
	6	0	0	0	0	0	0
	7	5	5	5	5	5	5
	8	3	3	3	3	3	3
	9	1	1	1	1	1	1
	10	1	1	1	1	1	1
	11	1	1	1	1	1	1
	12	1	1	1	1	1	1
	13	1	1	1	1	1	1
	14	2	3	4	5	6	7
	15	1	1	1	1	1	1
	16	1	1	2	2	3	3
	17	1	1	2	2	3	3
	18	0	0	0	0	0	0
	19	3	5	7	9	11	13
	20	1	1	1	1	2	2
	21	1	1	2	2	3	3
	22	0	0	0	0	0	0
	23	1	1	1	1	1	1
	24	3	3	3	3	3	3
	25	0	2	4	5	5	5
	26	1	1	1	1	1	1
	27	1	2	3	4	5	6
	28	0	1	2	3	4	5
	29	1	1	1	1	1	1
	30	2	3	4	5	6	7
	31	5	8	11	14	17	20
TOTAL		54	66	83	95	111	122

Table 2-III-5. Personnel Fill, HQ & HQ Company, Inf Bn. REDCON 1

GRADE	MONTH																																									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31											
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1									
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
TOTAL	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31



Table 2-III-7. Personnel Fill, HQ & HQ Company, Inf Bn. REDCON 3

Task	Personnel Fill																																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31							
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31

Table 2-III-8. TOE Materiel Listing, HQ & HQ Company, INF BN (MECH)

TOE 07-46H020 With Change 16

	MATERIEL	TOE
1	Truck, Cargo 1½ ton	1
2	Truck, Cargo 1½ ton w/ 1f	1
3	Truck, Cargo 1½ ton w/ 1e & 1a	1
4	Truck, Cargo 2½ ton 6x6 w/e	7
5	Truck, Util ¼ ton w/ 1c	2
6	Truck, Util ¼ ton w/ 1b	3
7	Truck, Util ¼ ton w/ 1d	1
8	Truck, Util ¼ ton 4x4 w/e	2
9	Truck, Cargo 5 ton 8x8	6
10	Truck, Cargo 8 ton 4x4	5
11	Truck, Tank Fuel Svc	2
12	Truck, Wrecker 10 ton	1
13	Rcv Veh, FT (1t Armor) w/ 1d	2
14	Carrier, Personnel w/ 1h & 1a	2
15	Carrier, Personnel w/ intercom only	1
16	Carrier, Cmd Post w/2b, 1c, 1a, & 1j	1
17	Carrier, Cmd Post w/1b, 1c, 1a, & 1j	1
18	Carrier, Cmd Post w/1b & 1a	1
19	Carrier, Cmd Post w/1d, 1i, 1a, & 1g	1
20	Trailer, Cargo ¼ ton	7
21	Trailer, Cargo 1½ ton	7
22	Trailer, Water	5
23	Field Kitchen, Trlr Mtd	2
24	Range Outfit, Field	15
25	Immersion Heater	26
26	Generators	10
27	AN/PRC-77	3

a - AN/GRA-39	h - AN/VRC-12
b - AN/VRC-46	i - RTT
c - AN/VRC-47	j - TSEC/KY-38
d - AN/VRC-64	
e - AN/VRC-49	
f - AN/GRC-160	
g - AN/KW-7	



Table 2-III-9. Materiel Transfer Matrix, Headquarters and Headquarters Co, Inf 3n.

TASK	TOE	HEU FUH 6 TEAMS MISSION																												
		1	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	1	0	0	0	30	30	60	30	30	30	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	30	-1	-1	-1	
2	1	1	1	0	0	15	60	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	30	-1	-1	-1	
3	1	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	30	-1	-1	-1	
4	7	2	8	0	30	30	0	30	30	30	0	60	60	60	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	30	-1	-1	-1	
5	2	1	1	30	60	60	-1	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	30	-1	-1	-1	
6	3	2	2	30	60	60	-1	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	30	-1	-1	-1	
7	1	1	1	30	60	60	-1	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	30	-1	-1	-1	
8	2	0	3	30	60	60	-1	30	30	30	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	30	-1	-1	-1	
9	6	0	6	0	30	30	0	30	30	30	0	0	30	60	60	-1	-1	-1	-1	-1	-1	-1	0	0	0	30	-1	-1	-1	
10	5	0	6	0	30	30	0	30	30	30	0	0	60	60	60	-1	-1	-1	-1	-1	-1	-1	0	0	0	30	-1	-1	-1	
11	2	0	3	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
12	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	60	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
13	2	0	3	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
14	2	1	1	0	0	60	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	30	30	0	0	30	
15	1	0	0	0	30	30	60	30	30	30	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	30	-1	-1	-1	
16	1	1	1	-1	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
17	1	0	0	-1	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
18	1	0	0	-1	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
19	1	0	1	-1	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
20	7	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
21	7	1	7	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
22	5	0	6	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
23	2	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
24	15	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
25	26	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
26	10	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
27	3	0	0	-1	60	60	-1	60	60	60	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27

Table 2-III-10. Materiel - Essential Team Requirements,  
 Headquarters and Headquarters Co. Inf Bn -  
 Mission 1.

	TEAM	1	2	3	4	5	6
TASK	1	0	0	0	0	0	0
	2	1	1	1	1	1	1
	3	0	0	0	0	0	0
	4	2	2	2	2	2	2
	5	1	1	1	1	1	1
	6	2	2	2	2	2	2
	7	1	1	1	1	1	1
	8	0	0	0	0	0	0
	9	0	0	0	0	0	0
	10	0	0	0	0	0	0
	11	0	0	0	0	0	0
	12	0	0	0	0	0	0
	13	0	0	0	0	0	0
	14	1	1	1	1	1	1
	15	0	0	0	0	0	0
	16	1	1	1	1	1	1
	17	0	0	0	0	0	0
	18	0	0	0	0	0	0
	19	0	0	0	0	0	0
	20	0	0	0	0	0	0
	21	1	1	1	1	1	1
	22	0	0	0	0	0	0
	23	0	0	0	0	0	0
	24	0	0	0	0	0	0
	25	0	0	0	0	0	0
	26	0	0	0	0	0	0
	27	0	0	0	0	0	0

Table 2-III-11. Materiel - Essential Team Requirements,  
 Headquarters and Headquarters Co, Inf Bn -  
 Mission 2.

TEAM	1	2	3	4	5	6
TASK 1	0	0	0	0	0	0
2	1	1	1	1	1	1
3	0	0	0	0	0	0
4	4	4	6	6	8	8
5	1	1	1	1	1	1
6	2	2	2	2	2	2
7	1	1	1	1	1	1
8	1	1	2	2	3	3
9	1	2	4	5	7	8
10	1	2	3	4	5	6
11	1	1	2	2	3	3
12	0	0	0	0	0	0
13	1	1	2	2	3	3
14	1	1	1	1	1	1
15	0	0	0	0	0	0
16	1	1	1	1	1	1
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	1	1	1	1	1	1
20	0	0	0	0	0	0
21	3	3	5	5	7	7
22	1	2	3	4	5	6
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0

Table 2-III-12. REDCON Materiel Listing, HQ & HQ Company, INF BN (MECH)

	<u>MATERIEL</u>	<u>REDCON</u>		
		<u>1</u>	<u>2</u>	<u>3</u>
1	Truck, Cargo 1½ ton	1	1	1
2	Truck, Cargo 1½ ton w/ 1f	1	1	1
3	Truck, Cargo 1½ ton w/ 1e & 1a	1	1	1
4	Truck, Cargo 2½ ton 6x6 w/e	6	6	5
5	Truck, Util ¼ ton w/ 1c	1	1	1
6	Truck, Util ¼ ton w/ 1b	2	1	1
7	Truck, Util ¼ ton w/ 1d	1	1	1
8	Truck, Util ¼ ton 4x4 w/e	1	1	1
9	Truck, Cargo 5 ton 8x8	5	5	4
10	Truck, Cargo 8 ton 4x4	4	4	3
11	Truck, Tank Fuel Svc	1	1	1
12	Truck, Wrecker 10 ton	1	1	1
13	Rcv Veh, FT (1t Armor) w/ 1d	1	1	1
14	Carrier, Personnel w/ 1h & 1a	1	1	1
15	Carrier, Personnel w/ intercom only	1	1	1
16	Carrier, Cmd Post w/2b, 1c, 1a, & 1j	1	1	1
17	Carrier, Cmd Post w/1b, 1c, 1a, & 1j	1	1	1
18	Carrier, Cmd Post w/1b & 1a	1	1	1
19	Carrier, Cmd Post w/1d, 1i, 1a, & 1g	1	1	1
20	Trailer, Cargo ¼ ton	6	6	5
21	Trailer, Cargo 1½ ton	6	6	5
22	Trailer, Water	4	4	3
23	Field Kitchen, Trlr Mtd	1	1	1
24	Range Outfit, Field	13	12	10
25	Immersion Heater	23	21	18
26	Generators	9	8	7
27	AN/PRC-77	2	1	1

- |                |                |
|----------------|----------------|
| a - AN/GRA-39  | h - AN/VRC-12  |
| b - AN/VRC-46  | i - RTT        |
| c - AN/VRC-47  | j - TSEC/KY-38 |
| d - AN/VRC-64  |                |
| e - AN/VRC-49  |                |
| f - AN/GRC-160 |                |
| g - AN/KW-7    |                |

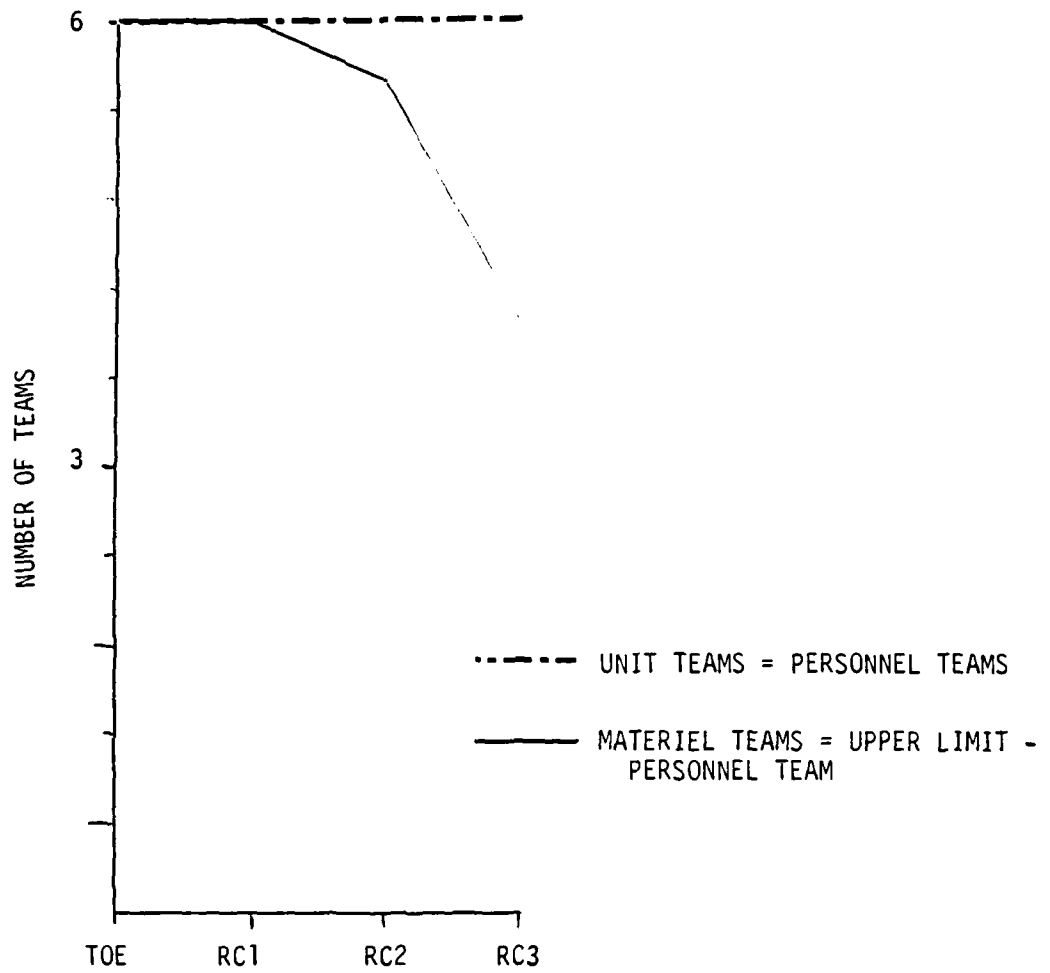


Figure 2-III-2. Unit Readiness Condition Capability and Limiting Factor - HHC, INF BN - Mission 1

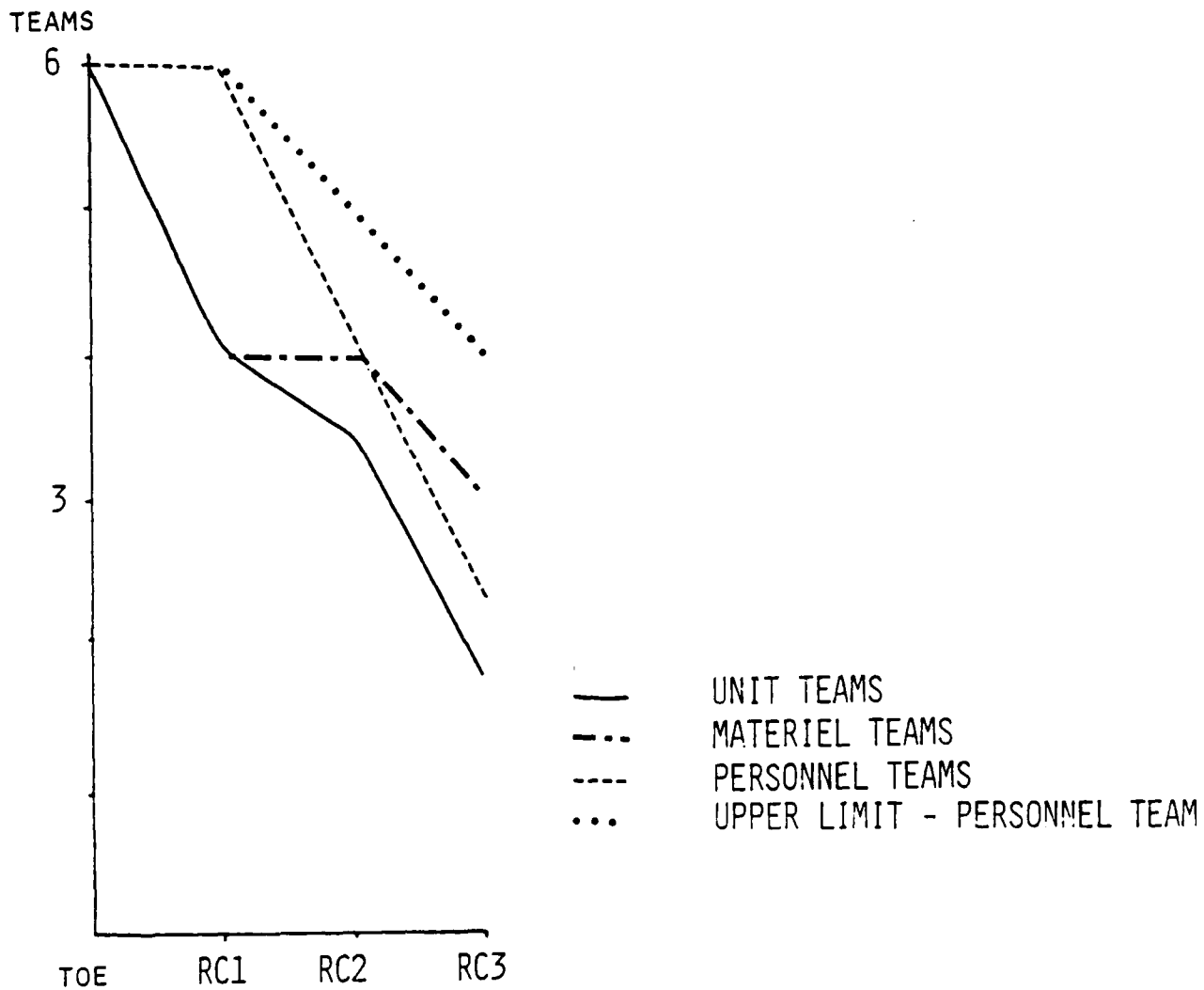


Figure 2-III-3. Unit Readiness Condition Capability and Limiting Factors--HHC, Inf (Mech) Bn. - Mission 2

readiness condition. Materiel is the limiting factor in REDCON 1 and REDCON 2. However, the average number of personnel teams formed at REDCON 2 is only slightly higher than the materiel teams, 4.2 vs 4.0. At REDCON 3 personnel limit the unit's capability. The upper limit of personnel teams is the number of teams that could be formed if all personnel present had the necessary (required) skills. This shows that some improvement of unit capability could be gained by increased substitutability of personnel in the unit.

The points on these charts represent the expected lower limit of capability for each condition. Since either personnel or materiel alone could cause a unit rating in any of the REDCONs, it is useful to look at the possible range of capability from those cases. Table 2-III-13 provides that comparison for mission 2, where six teams represents 100% unit capability. This chart shows that it is possible that a unit in any of the REDCONs might have a capability from 67-71%. It also shows that the possible range of unit capability is the same for REDCON 1 and 2.

Table 1-III-13. Unit Readiness Condition Capability Range, HHC, Inf Bn

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	4.0-6.0	4.0	3.0-4.0
Personnel Teams	6.0	4.2-6.0	2.3-4.2
Unit Teams	4.0-6.0	4.0-6.0	2.3-4.2
Unit Capability	67-100%	67-100%	39-71%
Overlap Range	67-71%		

d. Recovered Capability After Damage In Various Readiness Conditions

Figures 2-III-4 thru 2-III-7 show the effect of damage on the capability for command and control, mission 1. These charts

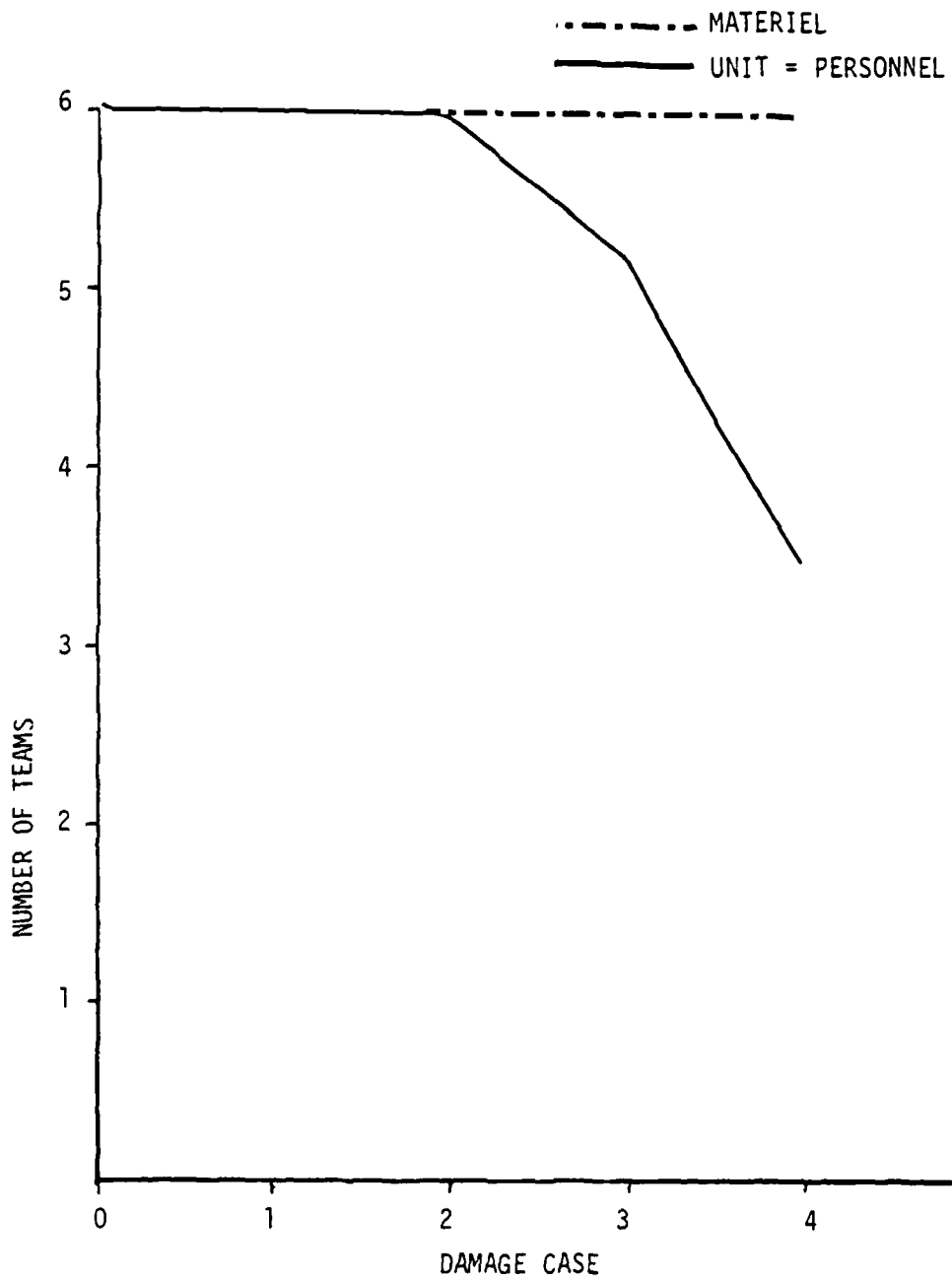


Figure 2-III-4. TOE - Unit Recovered Capability and Limiting Factor - HHC, INF - Mission 1



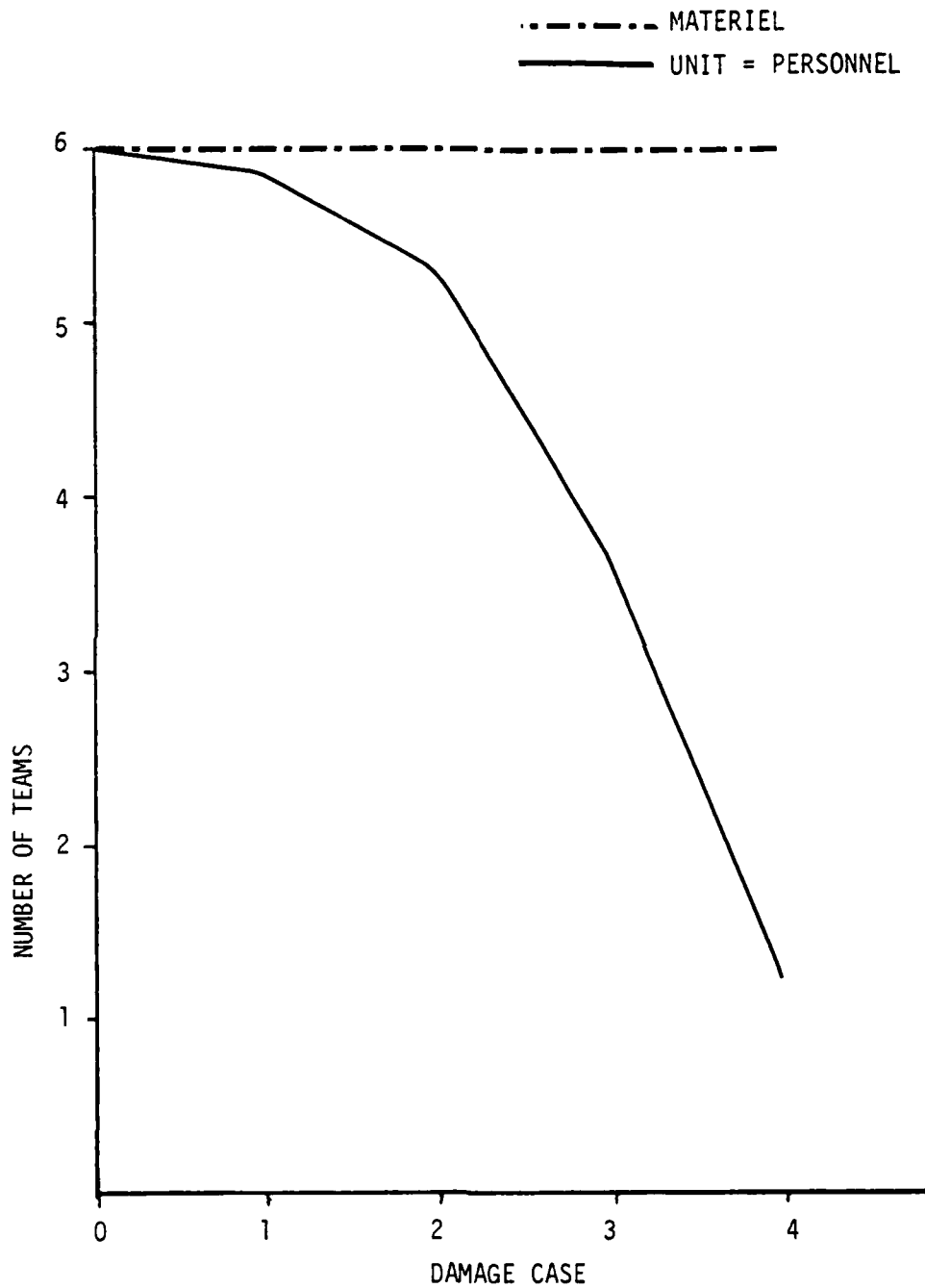


Figure 2-III-5. REDCON 1 - Unit Recovered Capability and Limiting Factor - HHC, INF - Mission 1

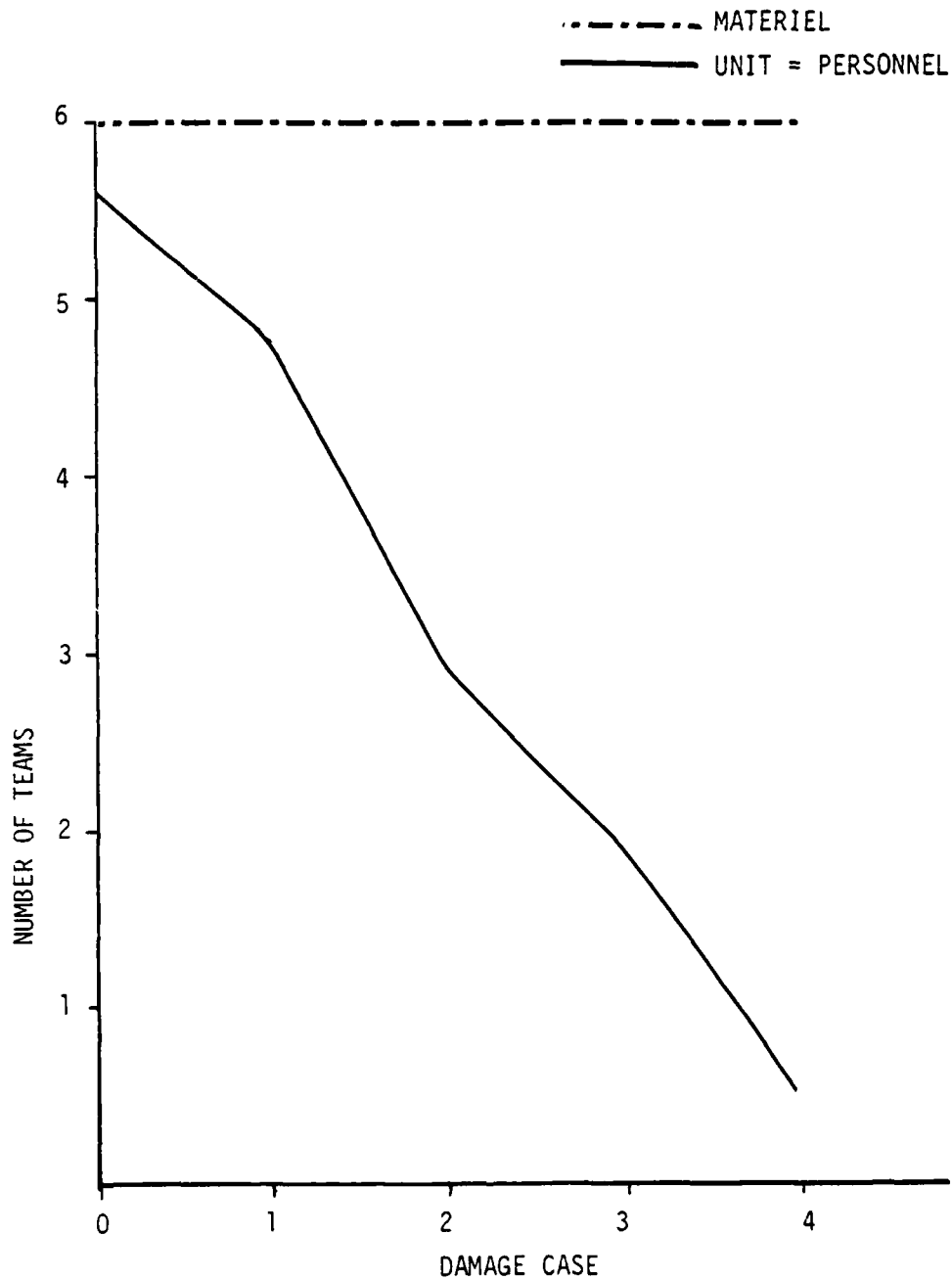


Figure 2-III-6. REDCON 2 - Unit Recovered Capability and Limiting Factor - HHC, INF - Mission 1

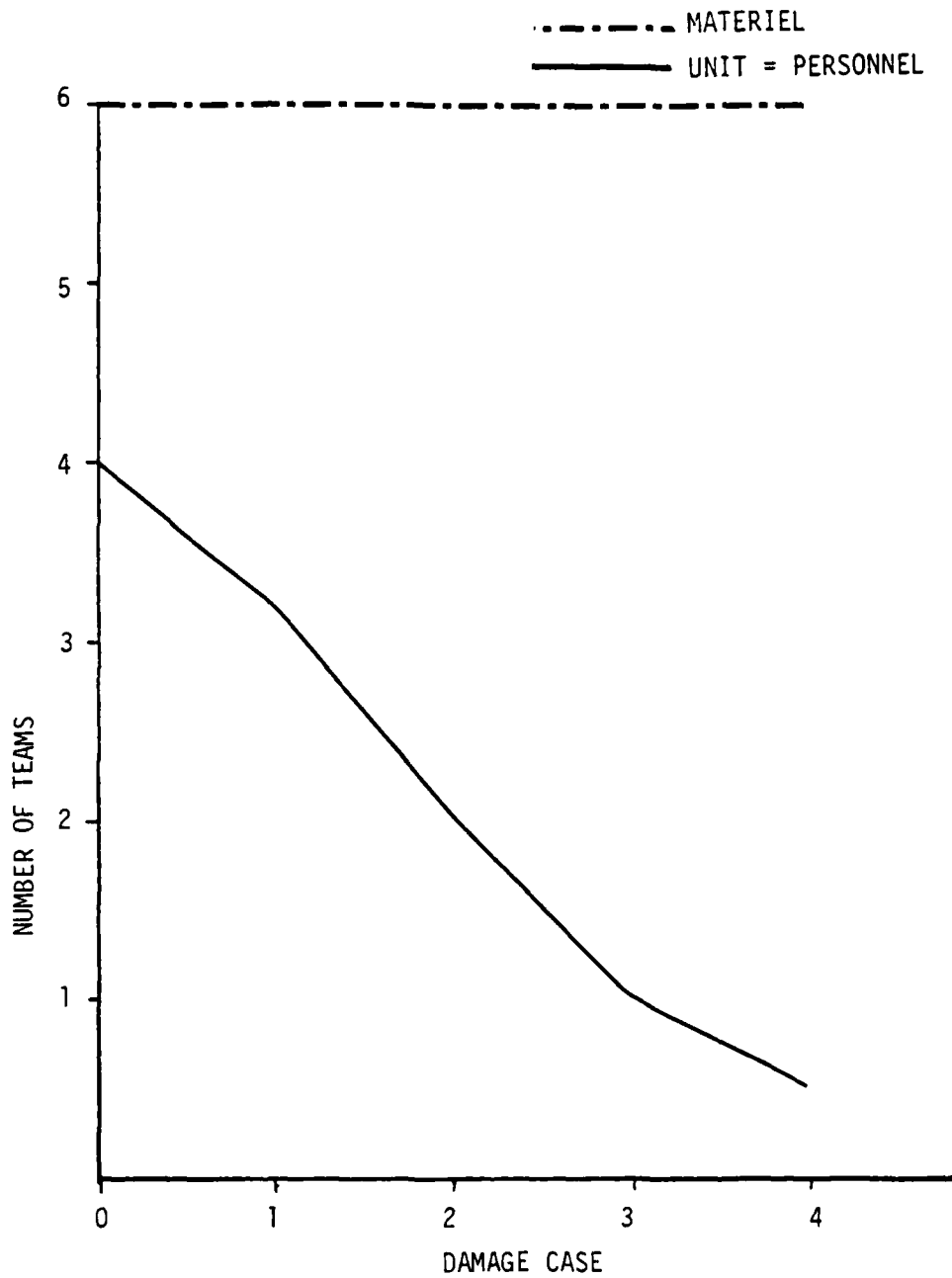


Figure 2-III-7. REDCON 3 - Unit Recovered Capability and Limiting Factor - HHC, INF - Mission 1

show that unit capability is limited by, and equal to, the personnel teams. The limited amounts of materiel required for this mission show no effect of either readiness condition or damage. Although only 22% of the unit's TOE personnel are required for this mission, the critical nature of those personnel is reflected in the significant degradation of capability shown in these cases. Figures 2-III-8 thru 2-III-11 show how the capability for mission 2 is affected by damage to the unit in each condition. Although REDCON 3 is the only condition in which capability is limited by personnel before damage, all conditions become personnel limited at very low damage levels. These charts indicate that the combat effectiveness of this unit is highly questionable for any length of time if its initial organization is anything less than full TOE.

2. Combat Support Company, Infantry (Mech) Bn

Analysis of the Combat Support Co, Inf Bn was based on TOE 07-048H030 with change 15. The organization chart for this unit is shown at Figure 2-III-12.

a. Personnel

The personnel tasks and TOE authorizations used for the analysis for this unit are shown at Table 2-III-14. Table 2-III-15 is the transfer matrix for these personnel. The essential personnel requirements for the teams are shown at Table 2-III-16 for mission 1 and Table 2-III-17 for mission 2. Mission 1 was defined as providing fire support for the battalion. Mission 2 added a requirement for organizational maintenance support. Tables 2-III-18 thru 2-III-20 show the configurations of personnel fill which were used for the representation of each REDCON.

b. Materiel

Table 2-III-21 is the listing of materiel items and TOE authorizations which were used. The transfer matrix for this materiel is shown at Table 2-III-22. The essential materiel team requirements for the two missions are shown in Tables 2-III-23 and 2-III-24. Table

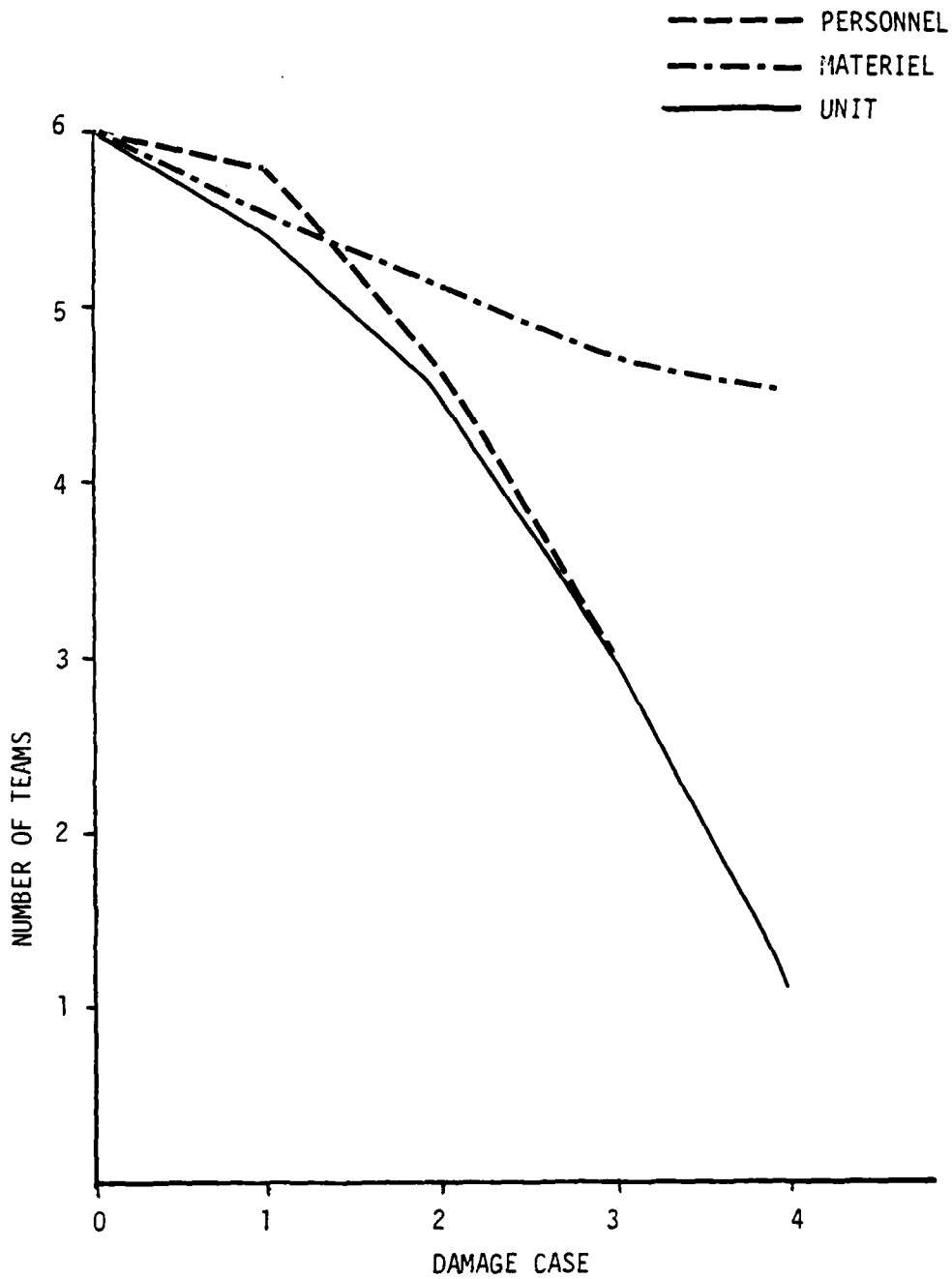


Figure 2-III-6. TCE - Unit Recovered Capability and Limiting Factor - HHC, INF - Mission 2

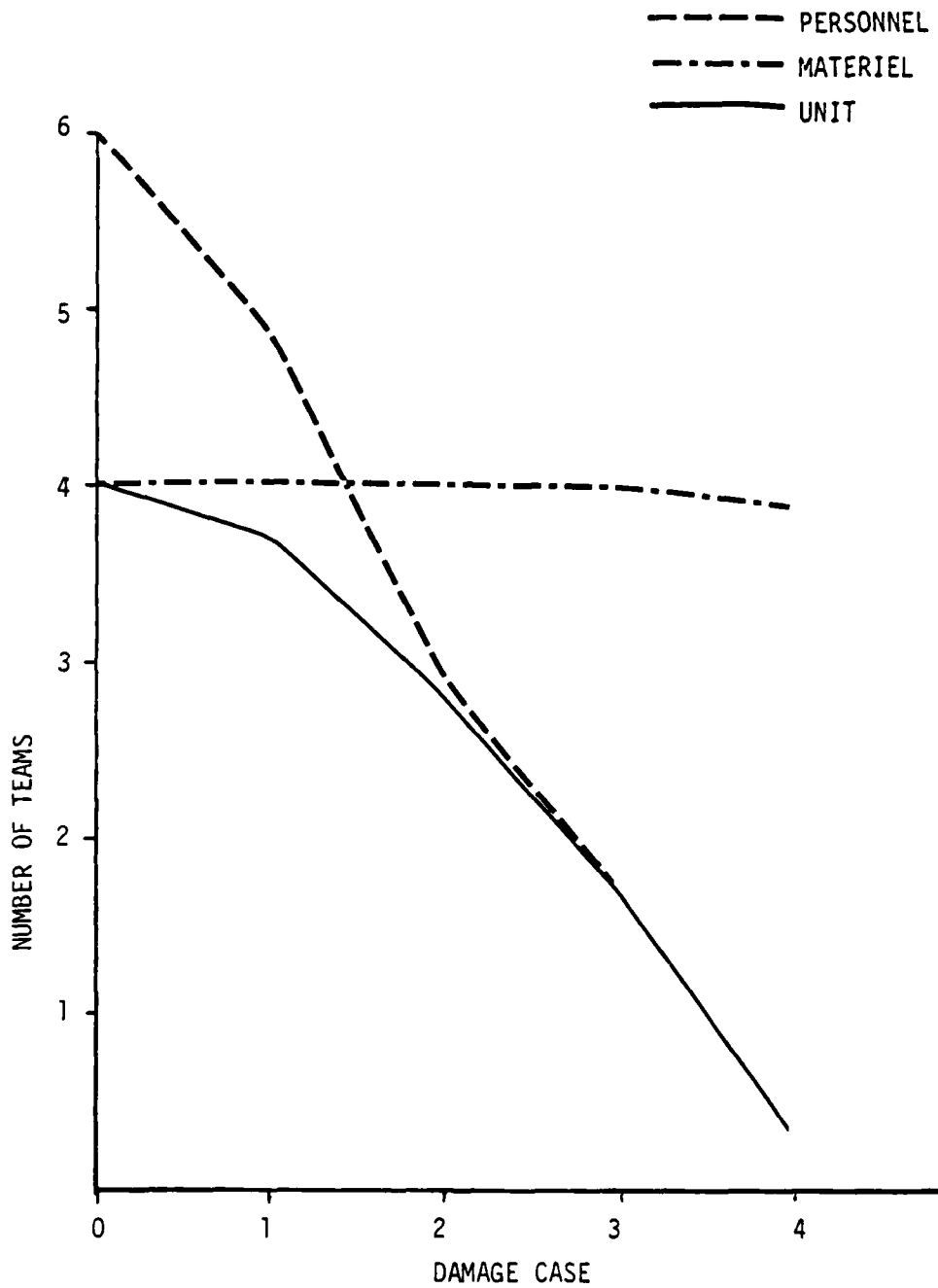


Figure 2-III-9. REDCON 1 - Unit Recovered Capability and Limiting Factor - HHC, INF - Mission 2

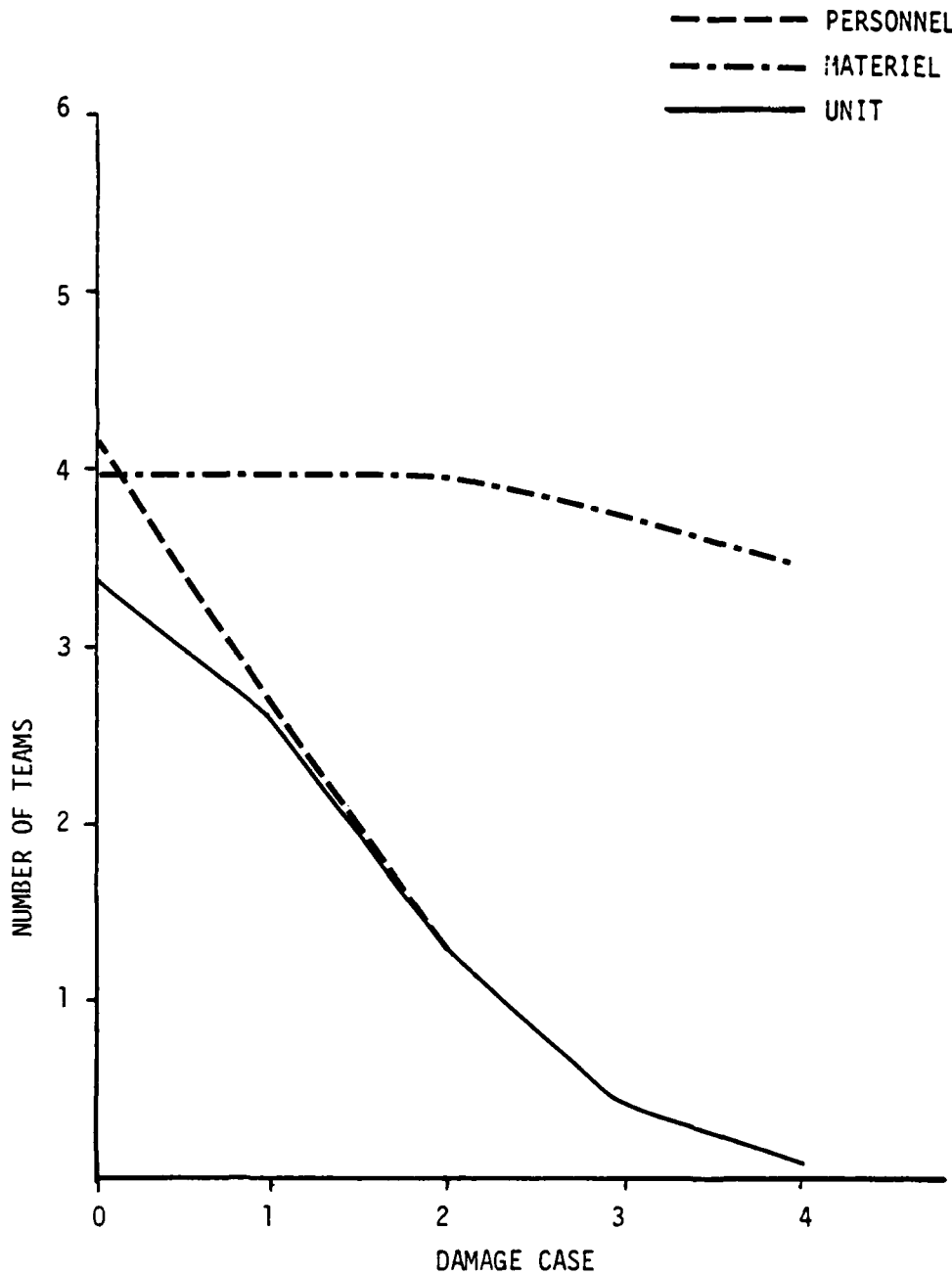


Figure 2-III-10. REDCON 2 - Unit Recovered Capability and Limiting Factor - HHC, INF - Mission 2

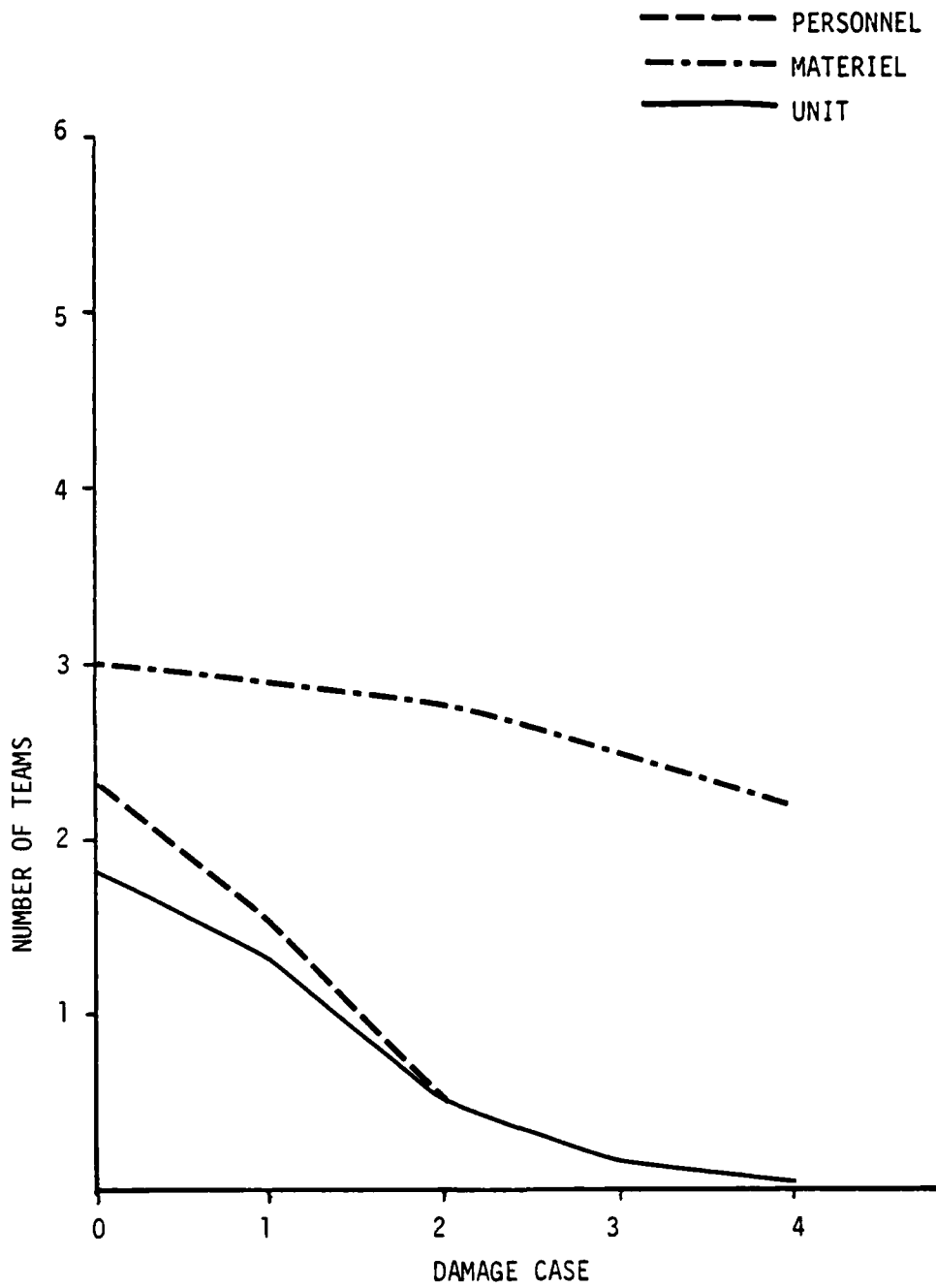


Figure 2-III-11. REDCON 3 - Unit Recovered Capability and Limiting Factor - HHC, INF - Mission 2



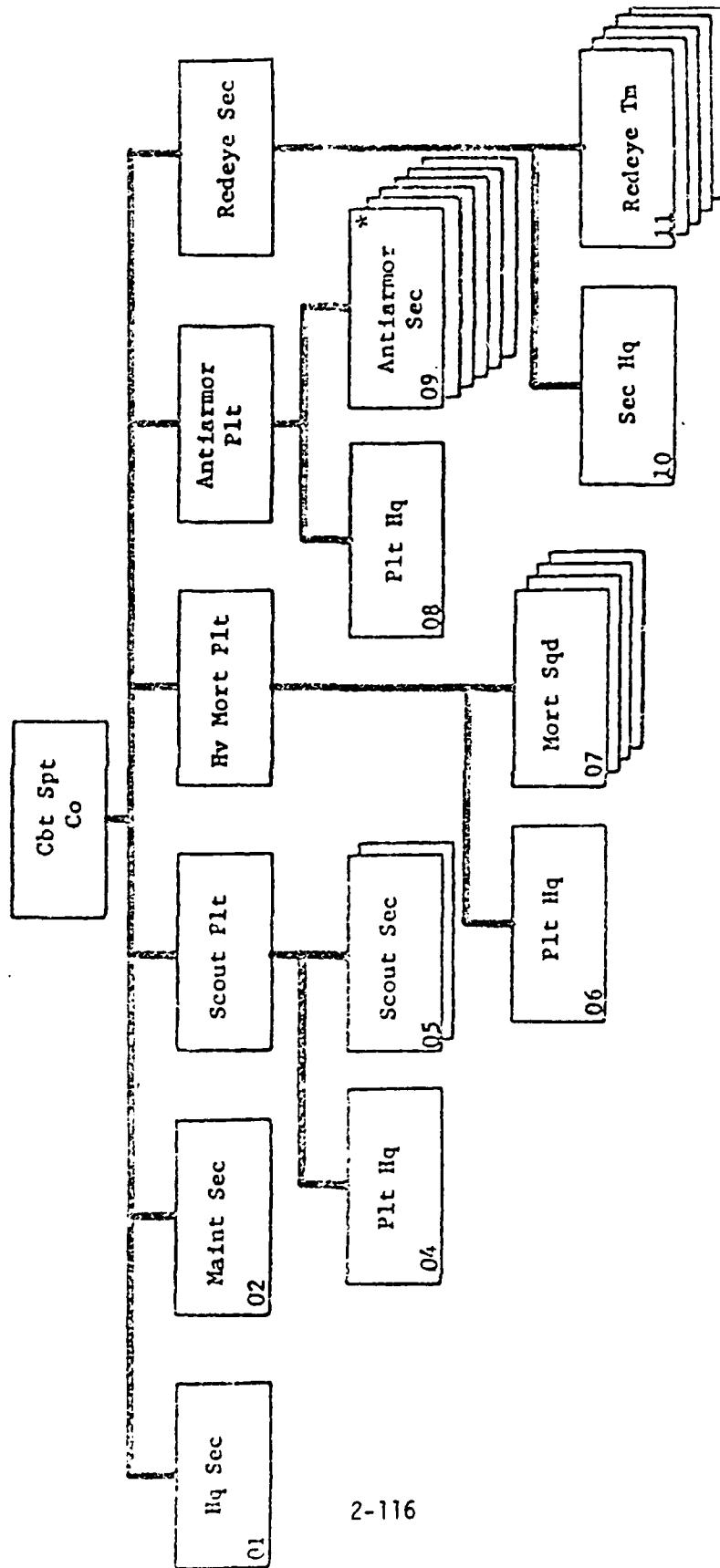


Figure 2-III-12. Combat Support Company, Inf (Mech) Bn Organization Chart

Table 2-III-14. TOE Personnel Listing, Combat Support Company, INF BN (MECH)  
 TOE 7-48H0 with change 15

		PERSONNEL	TOE
1	H1	CO/XO	2
2	H2	1SGT	1
3	H3	Supply SGT	1
4	H4	TAC Comm Chf	1
5	H5	Armorer	1
6	H6	PC Driver	29
7	H7	TAC Wire Opn Spec	1
8	H8	RTO/Lt Veh Driver	4
9	MN1	Motor SGT	1
10	MN2	Rcv Veh (Op (Sr)	1
11	MN3	Track Veh Mech (Sr)	2
12	MN4	EQ Mnt Clerk	1
13	MN5	TAC Comm Sys Op/Mech	1
14	MN6	TVM (Jr) & Rcv Veh Op (Jr)	11
15	SC1	PLT LDR (Scout)	1
16	SC2	PLT SGT (Scout)	1
17	SC3	Scout)	10
18	SC4	SEC LDR (Scout)	2
19	SC5	SQD LDR (Scout)	2
20	SC6	ASST SQD LDR	4
21	M01	PLT LDR (Mortar)	1
22	M02	PLT SGT (Mortar)	1
23	M03	Fire Direction Chf	1
24	M04	Fire Direction Computer	2
25	M05	SQD LDR (Mortar)	4
26	M06	Mortar Gunner	4
27	M07	Ammo Bearer/Asst Gunner	8
28	AT1	PLT LDR (Anti-Tank)	1
29	AT2	PLT SGT/SEC LDR (AT)	7
30	AT3	SQD LDR (AT)	6
31	AT4	Gunner/Asst Gunner	24
32	AD1	AD SEC LDR	1
33	AD2	AD SEC SGT	1
34	AD3	RED EYE Tm Chf	5
35	AD4	RED EYE Gunner/Lt Veh Driver	5



Table 2-III-16. Personnel - Essential Team Requirements,  
 Combat Support Company, Infantry Battalion -  
 Mission 1.

TEAM	1	2	3	4	5	6	7	8	9	10
TASK 1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	7	11	16	20	25	29	34	38	43	47
7	0	0	0	0	0	0	0	0	0	0
8	2	2	2	2	2	3	3	3	3	3
9	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0
15	1	1	1	1	1	1	1	1	1	1
16	0	0	0	0	0	0	0	0	0	0
17	1	2	3	4	5	6	7	8	9	10
18	0	0	0	0	0	0	0	0	0	0
19	1	1	2	2	3	3	4	4	5	5
20	0	0	0	0	0	0	0	0	0	0
21	1	1	1	1	1	1	1	1	1	1
22	0	0	0	0	0	0	0	0	0	0
23	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1
25	1	1	2	2	3	3	4	4	5	5
26	1	1	2	2	3	3	4	4	5	5
27	1	1	2	2	3	3	4	4	5	5
28	1	1	1	1	1	2	2	2	2	2
29	0	0	0	0	0	0	0	0	0	0
30	1	2	3	4	5	6	7	8	9	10
31	2	4	6	8	10	12	14	16	18	20
32	1	1	1	1	1	2	2	2	2	2
33	0	0	0	0	0	0	0	0	0	0
34	1	2	3	4	5	6	7	8	9	10
35	1	2	3	4	5	6	7	8	9	10
TOTAL	27	37	52	62	77	90	105	115	130	140

Table 2-III-17. Personnel - Essential Team Requirements,  
 Combat Support Company, Infantry Battalion -  
 Mission 2.

TEAM	1	2	3	4	5	6	7	8	9	10
TASK 1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	7	11	16	20	25	29	34	38	43	47
7	0	0	0	0	0	0	0	0	0	0
8	2	2	2	2	2	3	3	3	3	3
9	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1
12	0	0	0	0	0	0	0	0	0	0
13	1	1	1	1	1	1	1	1	1	1
14	4	4	4	4	4	4	4	4	4	4
15	1	1	1	1	1	1	1	1	1	1
16	0	0	0	0	0	0	0	0	0	0
17	1	2	3	4	5	6	7	8	9	10
18	0	0	0	0	0	0	0	0	0	0
19	1	1	2	2	3	3	4	4	5	5
20	0	0	0	0	0	0	0	0	0	0
21	1	1	1	1	1	1	1	1	1	1
22	0	0	0	0	0	0	0	0	0	0
23	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1
25	1	1	2	2	3	3	4	4	5	5
26	1	1	2	2	3	3	4	4	5	5
27	1	1	2	2	3	3	4	4	5	5
28	1	1	1	1	1	2	2	2	2	2
29	0	0	0	0	0	0	0	0	0	0
30	1	2	3	4	5	6	7	8	9	10
31	2	4	6	8	10	12	14	16	18	20
32	1	1	1	1	1	2	2	2	2	2
33	0	0	0	0	0	0	0	0	0	0
34	1	2	3	4	5	6	7	8	9	10
35	1	2	3	4	5	6	7	8	9	10
TOTAL	36	46	61	71	86	99	114	124	139	149









Table 2-III-21. TOE Materiel Listing, Combat Support Company, INF BN (MECH)

TOE 7-48H0 With Change 15

		MATERIEL	TOE
1	C1	APC w/lc, & lg	2
2	C2	APC w/li	1
3	C3	APC w/lc	1
4	C4	APC w/lf	8
5	C5	Carrier, CP w/le, lc, & lh	1
6	C6	Mortar Carrier w/lf	4
7	C7	Tow Carrier w/lf	12
8	C8	Rcv Veh (Med) w/lb	1
9	W1	Truck, Util $\frac{1}{4}$ ton w/lc, & lg	1
10	W2	Truck, Util $\frac{1}{4}$ ton w/lc	3
11	W3	Truck, Util $\frac{1}{4}$ ton w/la, & ld	1
12	W4	Truck, Util $\frac{1}{4}$ ton w/lf	5
13	W5	Truck, Cargo $1\frac{1}{4}$ ton w/le	1
14	W6	Truck, Cargo $2\frac{1}{2}$ ton	2
15	T1	Trailer, Cargo $\frac{1}{4}$ ton	10
16	T2	Trailer, Cargo $1\frac{1}{2}$ ton	2

a - AN/GRA-39  
 b - AN/VRC-46  
 c - AN/VRC-47  
 d - AN/VRC-48  
 e - AN/VRC-64  
 f - AN/GRC-160

g - TSEC/KY-38  
 h - FDC EQ  
 i - AN/VRC-12

Table 2-III-22. Materiel Transfer Matrix, Combat Support Company, Infantry Battalion.

TASK	TOE	REG FOR 10 TEAMS MISSION																	
		1	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	C1	1	1	0	0	15	30	-1	-1	60	0	0	15	15	15	60	0	0	0
2	C2	1	0	30	0	15	30	-1	-1	60	30	15	15	15	15	60	0	0	0
3	C3	1	0	15	0	0	15	30	-1	60	15	0	15	15	15	60	0	0	0
4	C4	8	20	30	0	15	0	30	-1	60	30	15	15	0	15	60	0	0	0
5	C5	1	1	15	-1	-1	0	-1	-1	60	15	-1	-1	-1	-1	-1	-1	-1	-1
6	C6	4	5	-1	-1	-1	-1	0	-1	60	-1	-1	-1	-1	-1	-1	-1	-1	-1
7	C7	12	20	-1	-1	-1	-1	-1	0	60	-1	-1	-1	-1	-1	-1	-1	-1	-1
8	C8	1	0	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1
9	W1	1	1	0	-1	-1	-1	30	-1	-1	-1	0	15	15	30	-1	0	-1	-1
10	W2	3	2	15	-1	-1	-1	30	-1	-1	-1	15	0	15	15	30	-1	0	-1
11	W3	1	0	30	-1	-1	-1	30	-1	-1	-1	30	15	0	15	30	-1	0	-1
12	W4	5	10	30	-1	-1	-1	30	-1	-1	-1	30	15	15	0	30	-1	0	-1
13	W5	1	0	30	-1	-1	-1	30	-1	-1	-1	30	15	15	15	0	60	0	0
14	W6	2	0	60	-1	-1	-1	60	-1	-1	-1	60	60	60	60	60	0	0	0
15	T1	10	10	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0
16	T2	2	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0

Table 2-III-23. Materiel - Essential Team Requirements, Combat Support Company, Infantry Battalion - Mission 1.

TASK	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	2	4	6	8	10	12	14	16	18	20
5	1	1	1	1	1	1	1	1	1	1
6	1	1	2	2	3	3	4	4	5	5
7	2	4	6	8	10	12	14	16	18	20
8	0	0	0	0	0	0	0	0	0	0
9	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	2	2	2	2	2
11	0	0	0	0	0	0	0	0	0	0
12	1	2	3	4	5	6	7	8	9	10
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0
15	1	2	3	4	5	6	7	8	9	10
16	0	0	0	0	0	0	0	0	0	0

Table 2-III-24. Materiel - Essential Team Requirements, Combat Support Company, Infantry Battalion - Mission 2.

TASK	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	2	4	6	8	10	12	14	16	18	20
5	1	1	1	1	1	1	1	1	1	1
6	1	1	2	2	3	3	4	4	5	5
7	2	4	6	8	10	12	14	16	18	20
8	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	2	2	2	2	2
11	0	0	0	0	0	0	0	0	0	0
12	1	2	3	4	5	6	7	8	9	10
13	0	0	0	0	0	0	0	0	0	0
14	1	1	1	1	1	1	1	1	1	1
15	1	2	3	4	5	6	7	8	9	10
16	1	1	1	1	1	1	1	1	1	1

2-III-25 shows the on-hand quantities of each materiel item which were used for the REDCON representation.

c. Effect of Readiness Condition on Unit Capability

Unit capability for each readiness condition, in terms of the number of teams formed, is shown at Figure 2-III-13 for mission 1 and Figure 2-III-14 for mission 2. For both missions, materiel limited the unit capability. The APC and TOW system were limiting items at all REDCONs; the mortar system was also limiting at REDCON 2 and 3.

Table 2-III-26 shows the expected range of capability of this unit. This capability range is obtained by assuming that either personnel or materiel, separately, cause the unit to be rated in a particular REDCON. This chart is for mission 2 only, with the maximum unit teams of five being 100% unit capability. As can be seen from Figure 2-III-14, the capability to form personnel teams is so much greater than the capability to form materiel teams that personnel could be below REDCON 3 and the unit still be 100% effective for this mission. There is no actual range between full TOE and minimum REDCON 1. The range is the same for REDCON 2 and REDCON 3.

Table 2-III- 26. Unit Readiness Condition Capability Range, Combat Support Co, Inf Bn

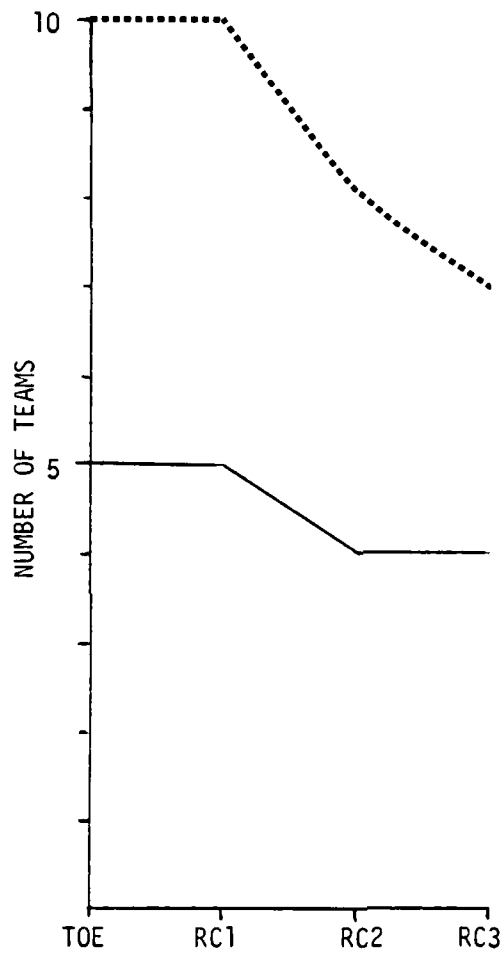
	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	5.0	4.0-5.0	4.0
Personnel Teams	9.0	4.0-9.0	5.6-7.8
Unit Teams	5.0	4.0-5.0	4.0-5.0
Unit Capability	100%	80-100%	80-100%
Overlap Range	80-100%		

Table 2-III-25. REDCON Materiel Listing, Rifle Company, INF BN (MECH)

			<u>REDCON</u>		
<u>MATERIEL</u>			<u>1</u>	<u>2</u>	<u>3</u>
1	H1	CO APC w/a,b,c,d, & e	1	1	1
2	H2	XO APC w/a,b,c,d, & e	1	1	0
3	H3	Truck, ¼ ton w/a & d	1	1	1
4	H4	Trailer, ¼ ton	1	1	1
5	H5	Truck, 2½ ton (Unit Supply)	1	1	1
6	H6	Trailer, 1½ ton (Unit Supply)	0	0	0
7	M1	Wrecker, FT (m88) w/c & j	1	1	1
8	M2	Truck, 2½ ton w/j,k, & l	1	1	1
9	M3	Trailer, 1½ ton w/ j,k, & l	1	1	1
10	M4	Truck, 2½ ton w/ j,k & l	1	0	0
11	R1	PLT LDR APC w/2f, 2g, & 2h	3	3	3
12	R2	RIFLE SQD APC w/f,g, & h	7	6	6
13	W1	Truck, ¼ ton w/h & i	2	1	1
14	W2	Trailer, ¼ ton	2	1	1
15	W3	Mortar Sec APC w/2h	1	1	0
16	W4	Mortar Carrier w/h,m, & n	3	2	2
17	W5	TOW Carrier w/h	1	1	1
18	E1	7.62 mm MG (M-50)	13	12	10
19	E2	MAWS (SU-36)	8	7	6
20	E3	RIFLE (M16A1)	138	122	107
21	E4	GL (M203)	19	17	15

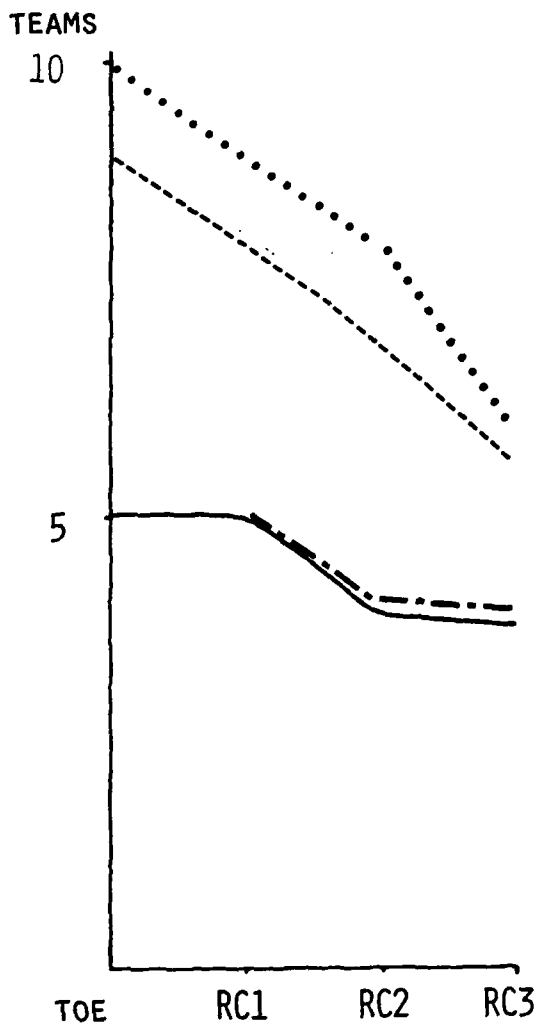
a - TSEC/KY-38  
 b - AN/GRA-39  
 c - AN/VRC-46  
 d - AN/VRC-47  
 e - AN/PRC-77  
 f - AN/PRR-9  
 g - AN/PRT-4

h - AN/GRC-160  
 i - AN/VRC-64  
 j - Shop Eq  
 k - Tool Kits  
 l - Parts Cabinets  
 m - Plotting Board  
 n - Aiming Circle



..... UPPER LIMIT-PERSONNEL TEAMS = PERSONNEL TEAMS  
 — UNIT TEAMS = MATERIEL TEAMS

Figure 2-III-13. Unit Readiness Condition Capability and Limiting Factor - CSC, INF BN - Mission 1



— UNIT TEAMS  
 -·- MATERIEL TEAMS  
 --- PERSONNEL TEAMS  
 ... UPPER LIMIT - PERSONNEL TEAM

Figure 2-III-14. Unit Readiness Condition Capability and Limiting Factors - Combat Support Co., Inf (Mech) Bn - Mission 2  
2-131



d. Recovered Capability After Damage in Various Readiness Conditions

The effect of the damage cases (see Table 2-I-2) on this unit when manned at full TOE and each of the readiness conditions is shown in Figures 2-III-15 thru 2-III-18 for mission 1 and Figures 2-III-19 thru 2-III-22 for mission 2. In the mission 1 cases the personnel capability is enough greater than the materiel capability that there is no interaction until the high damage levels are applied to a REDCON 3 unit. Mission 2 reflects the effect of the requirement for the less transferable maintenance skills. Although materiel is still generally the limiting factor there is interaction and unit capability and the average unit capability is reduced below the materiel limits.

3. Rifle Company, Infantry Battalion (Mechanized)

Analysis of the Rifle Company was based on TOE 07-047H020 with change 16. The organization chart for this unit is at Figure 2-III-23.

a. Personnel

The personnel and TOE authorizations used for this analysis are at Table 2-III-27. Table 2-III-28 is the transfer matrix for these personnel. Tables 2-III-29 and 2-III-30 show the essential personnel team requirements for mission 1 and mission 2. Mission 1 was defined as a basic combat requirement. Mission 2 required the addition of some organizational maintenance capability. The personnel fill configurations which were used to represent the three readiness conditions are shown in Tables 2-III-31 thru 2-III-33.

b. Materiel

Table 2-III-34 is a listing of the materiel items with TOE authorizations. The transfer matrix for these materiel items is displayed at Table 2-III-35. The essential team requirements for materiel for mission 1 are at Table 2-III-36 and for mission 2 at Table 2-III-37. The on-hand quantities of materiel which were used for the readiness condition representations are at Table 2-III-38.

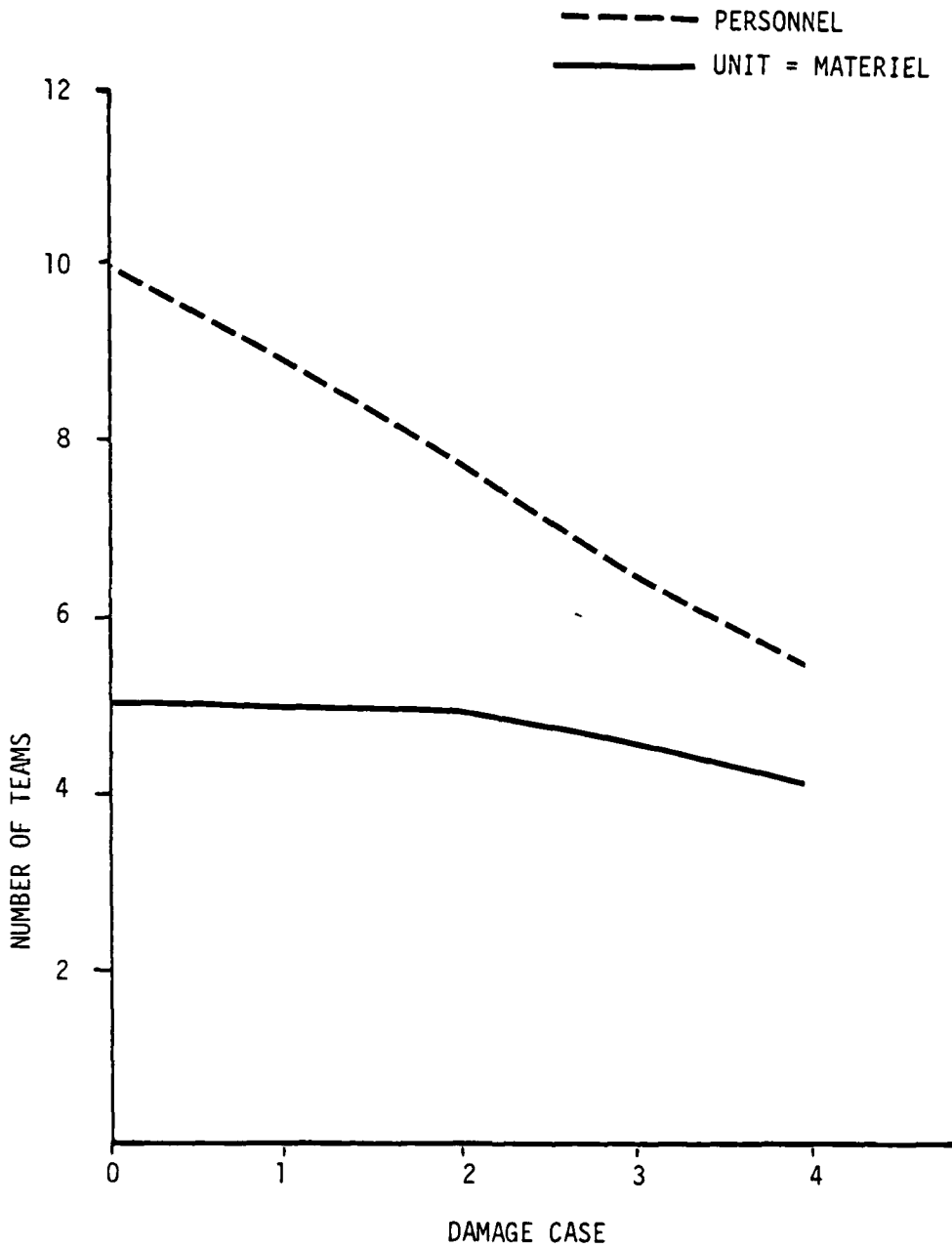


Figure 2-III-15. TOE - Unit Recovered Capability and Limiting Factor - CSC, Inf - Mission 1

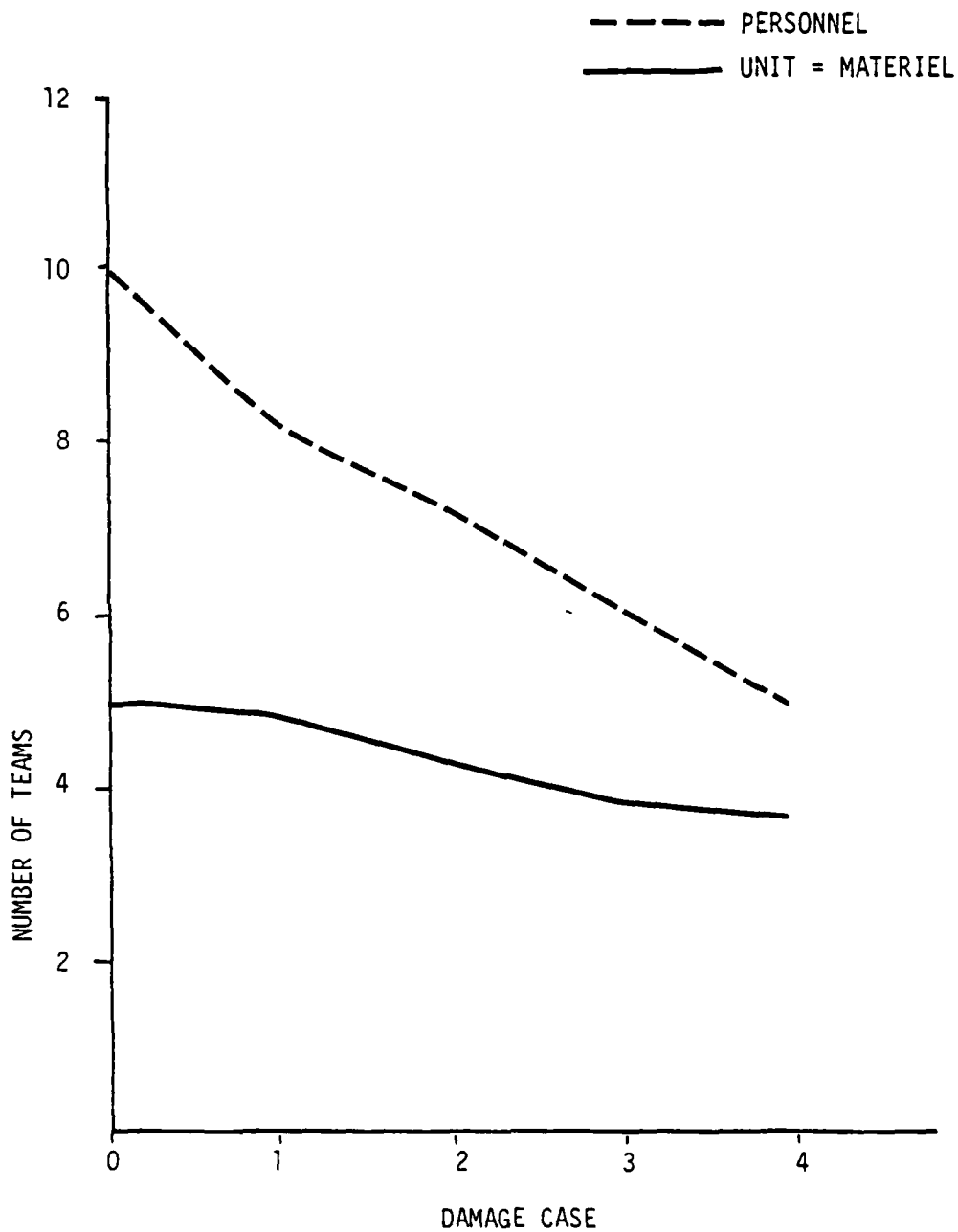


Figure 2-III-16. REDCON 1 - Unit Recovered Capability and Limiting Factor - CSC, Inf - Mission 1

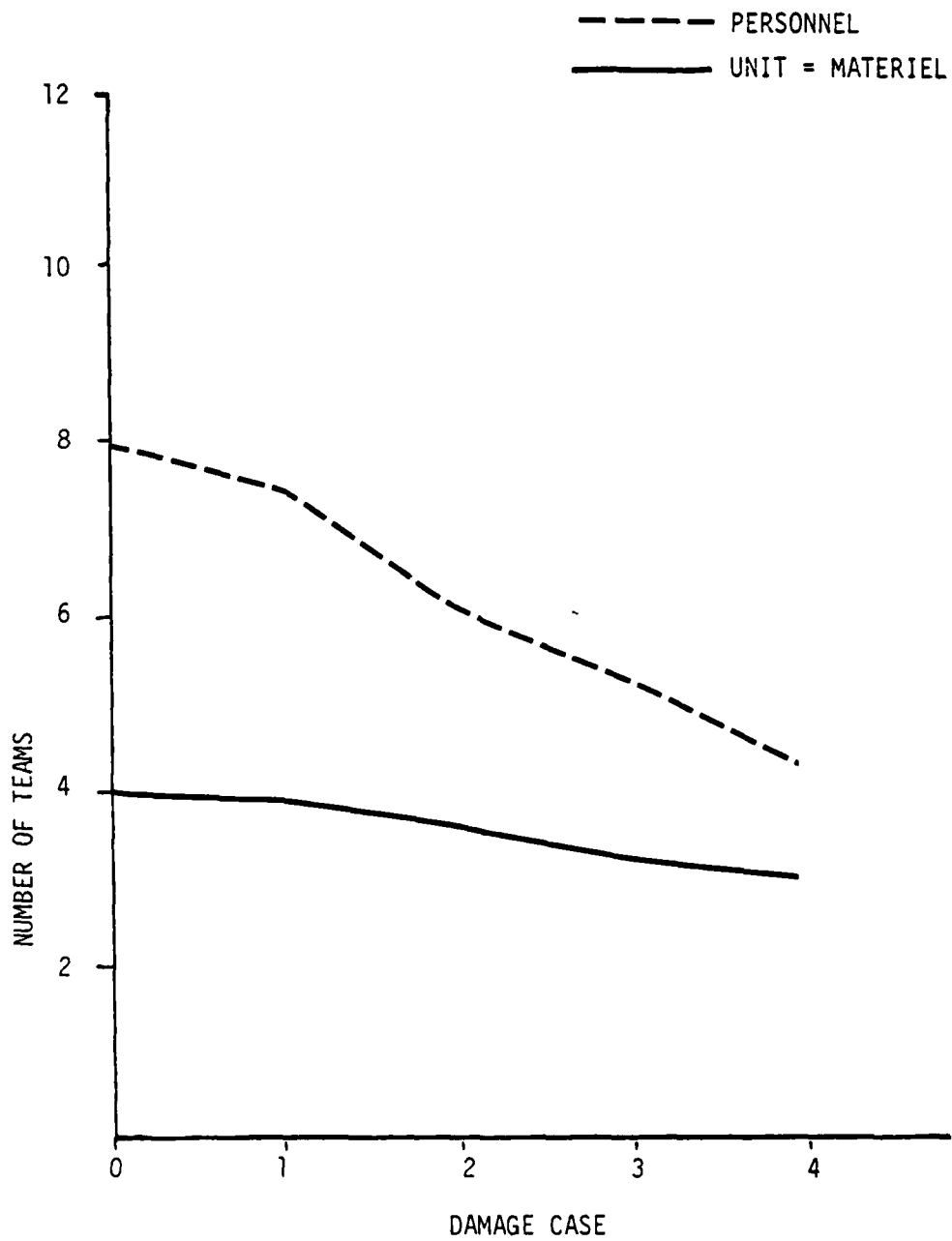


Figure 2-III-17. REDCON 2 - Unit Recovered Capability and Limiting Factor - CSC, Inf - Mission 1

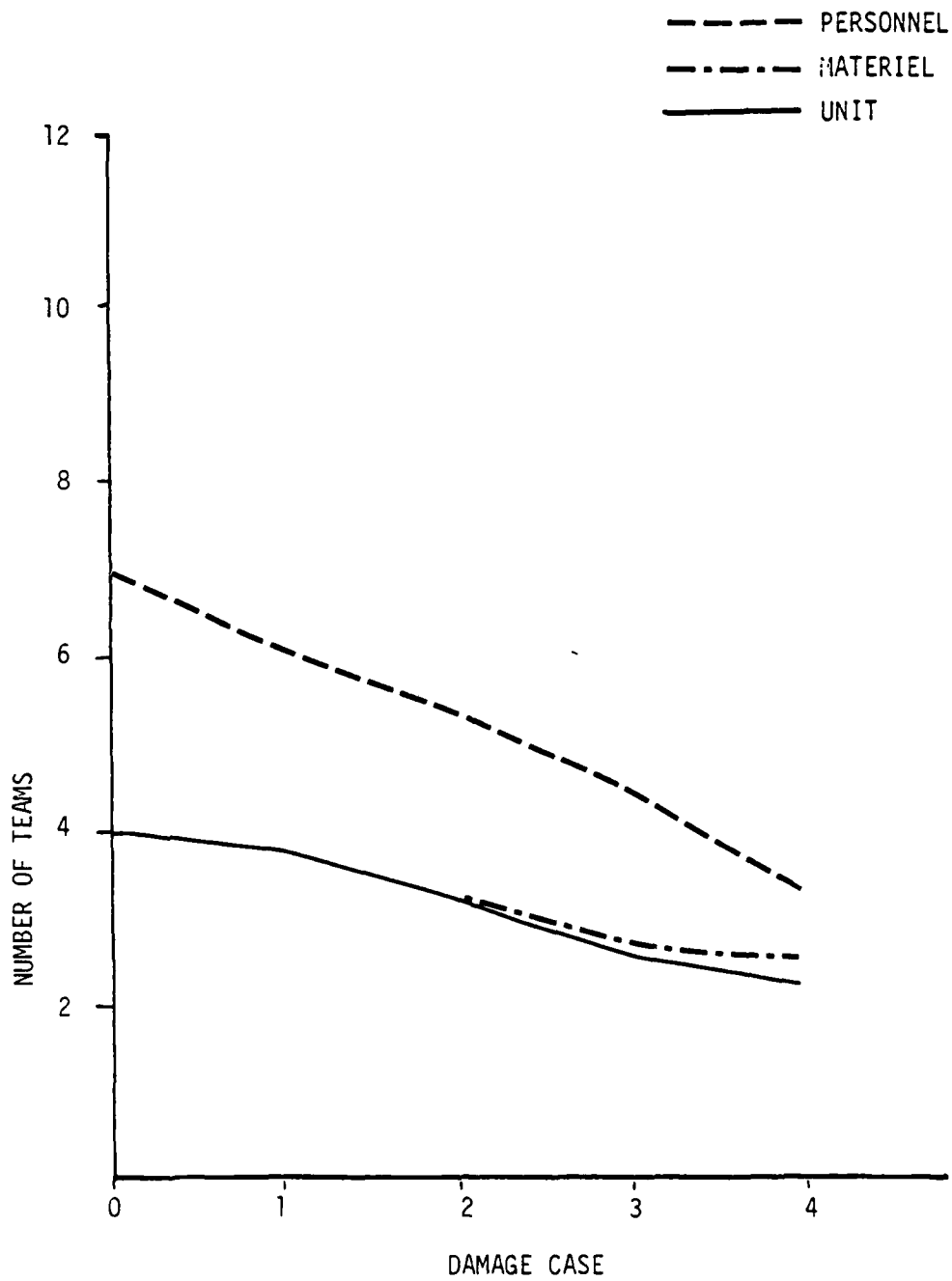


Figure 2-III-18. REDCUN 3 - Unit Recovered Capability and Limiting Factor - CSC, Inf - Mission 1

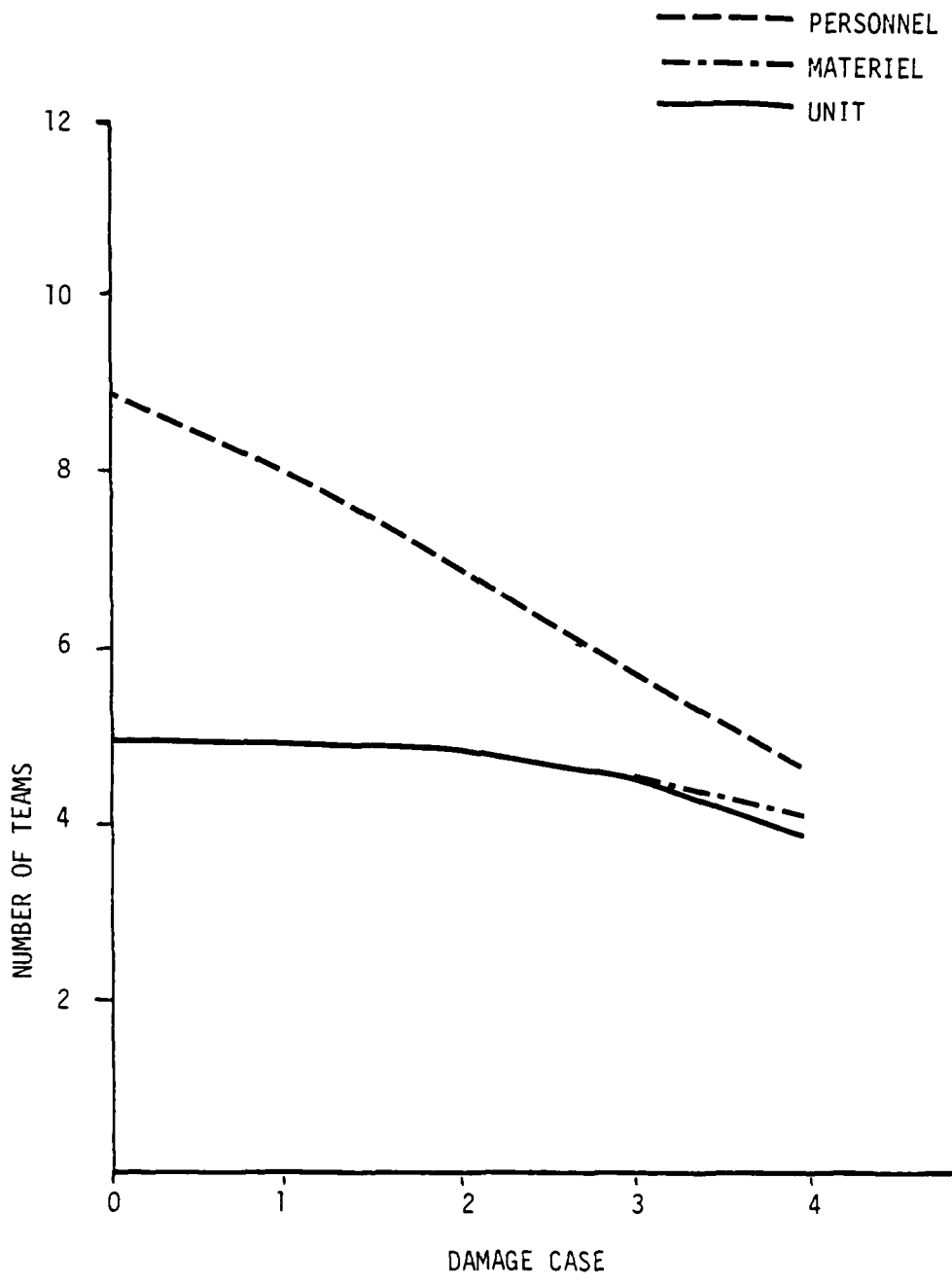


Figure 2-III-19. TOE - Unit Recovered Capability and Limiting Factor - CSC, Inf - Mission 2

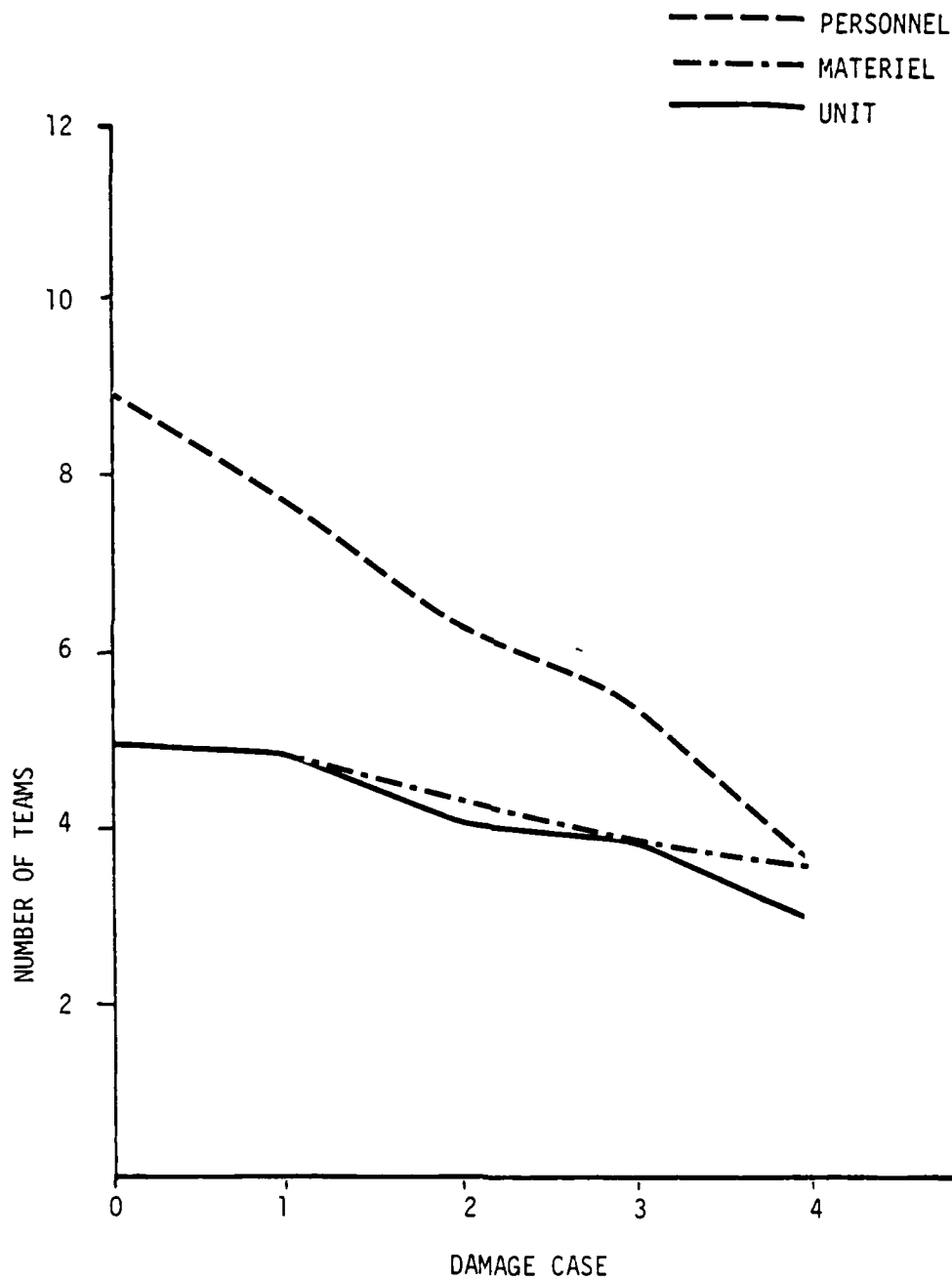


Figure 2-111-20. REDCON 1 - Unit Recovered Capability and Limiting Factor - CSC, Inf - Mission 2

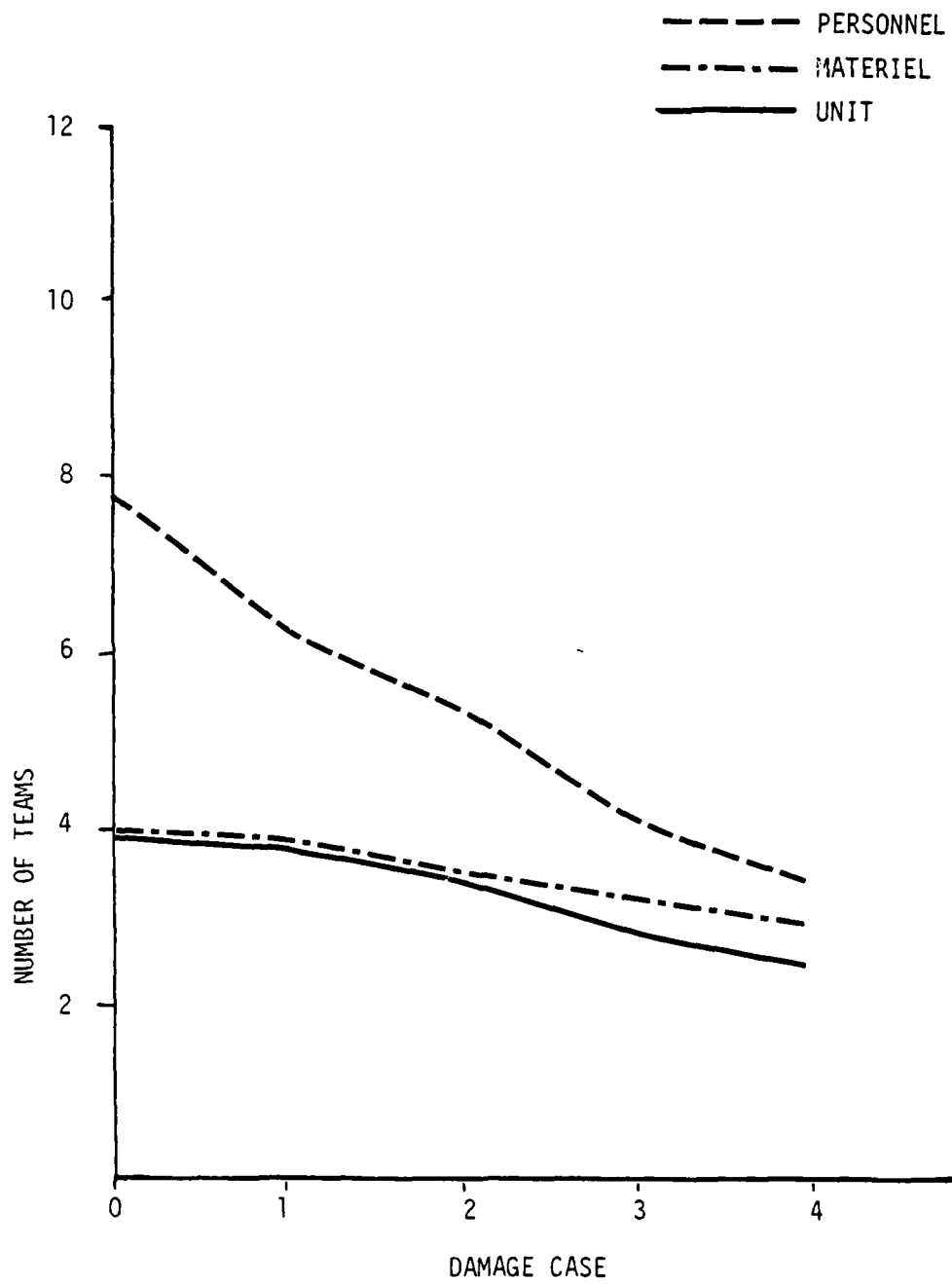


Figure 2-III-21. REDCON 2 - Unit Recovered Capability and Limiting Factor - CSC, Inf - Mission 2



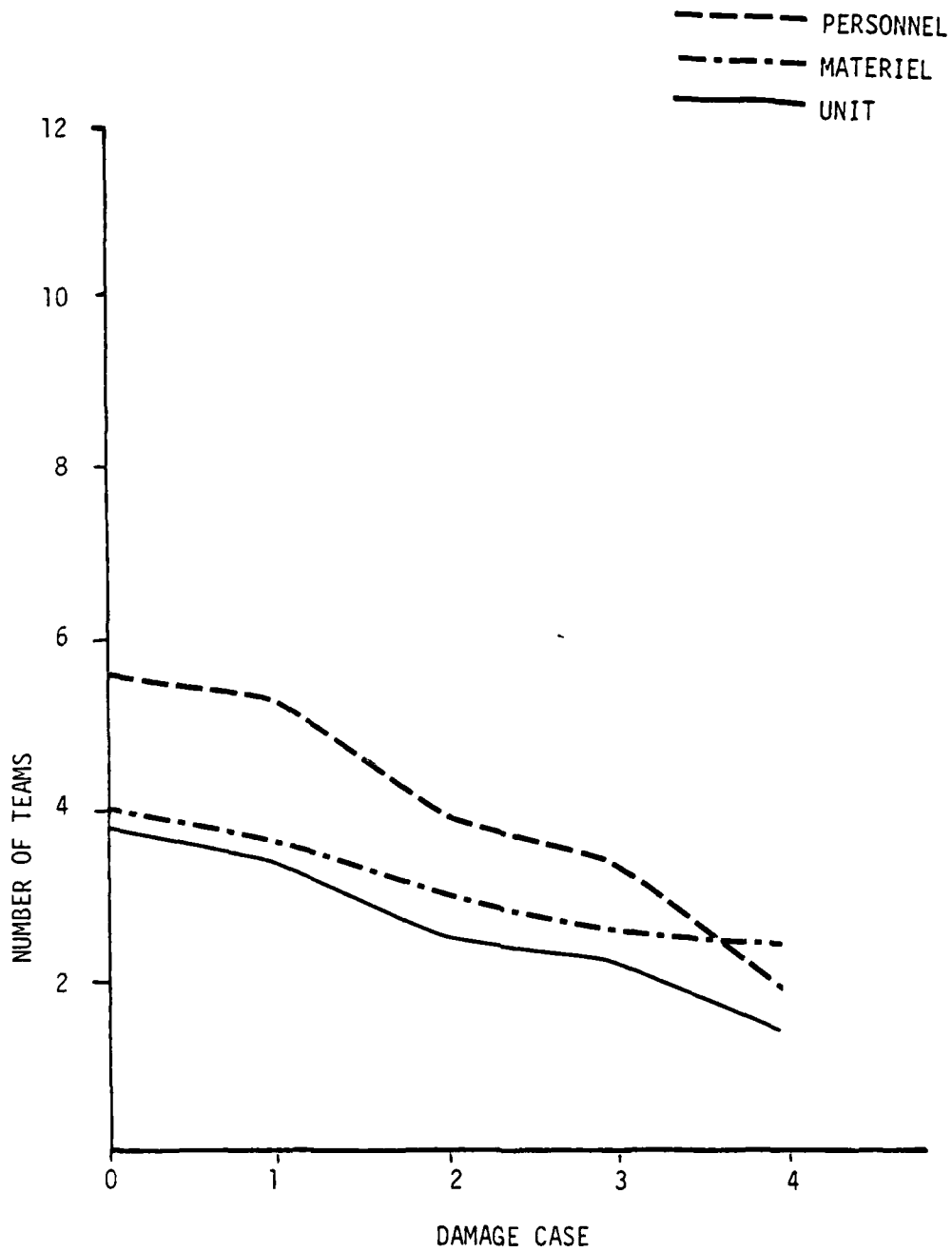


Figure 2-III-22. REDCON 3 - Unit Recovered Capability and Limiting Factor - CSC, Inf - Mission 2

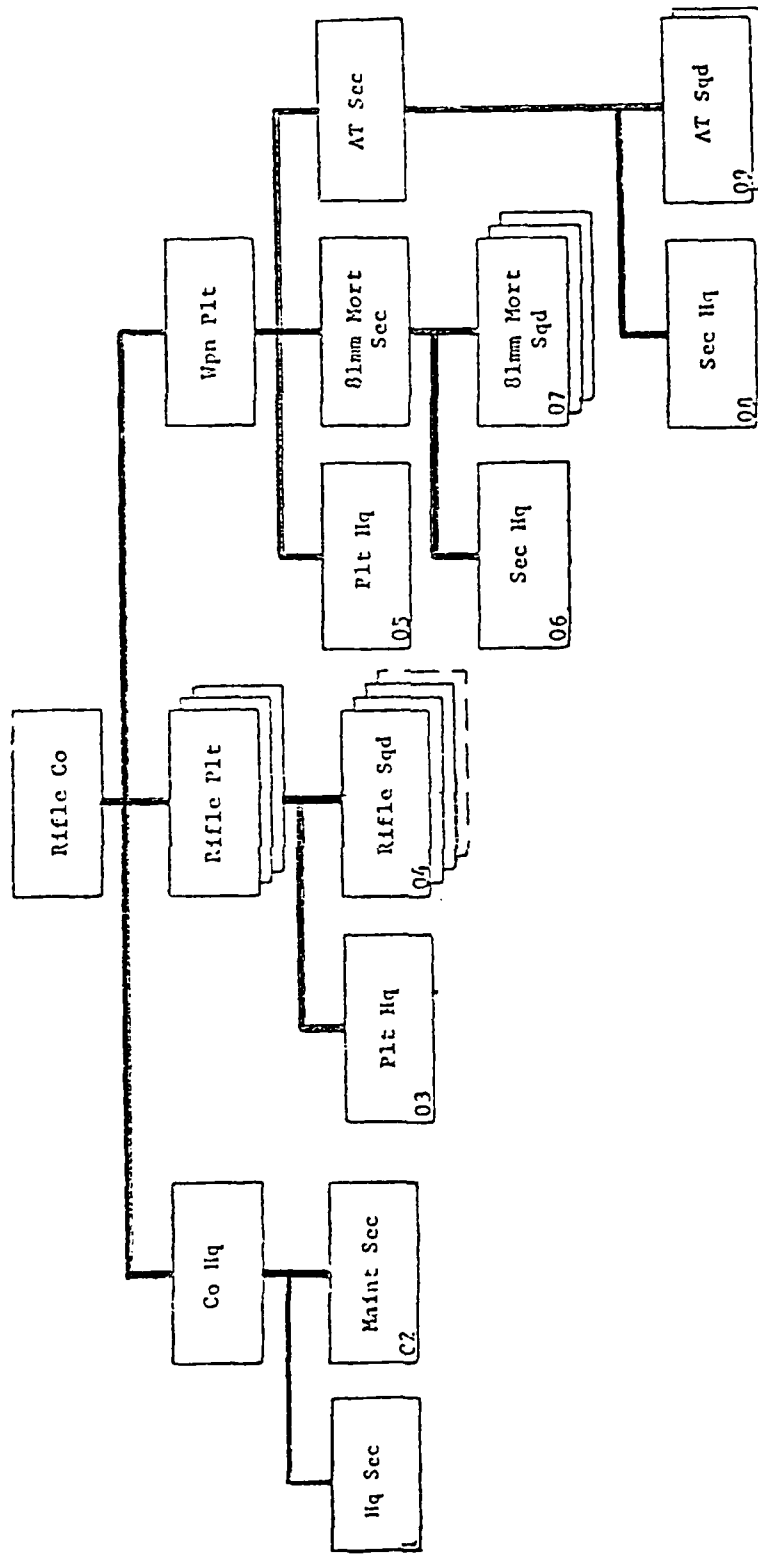


Figure 2-III-23. Rifle Company, Infantry Bn (Mechanized) Organization Chart

Table 2-III-27. TOE Personnel Listing, Rifle Company, INF BN (MECH)

TOE 7-47HO With Change 16

		PERSONNEL	TOE
1	H1	CO	1
2	H2	XO	1
3	H3	1SGT	1
4	H4	Supply SGT	1
5	H5	TAC Comm Chf	1
6	H6	Armorer	1
7	H7	PC Driver	20
8	H8	RTO	6
9	H9	General Supplyman	1
10	M1	Motor SGT	1
11	M2	Rec Veh Op (Sr)	1
12	M3	Track Veh Mech (Sr)	1
13	M4	EQ Mnt Clerk	1
14	M5	TAC Comm Mech	1
15	M6	Rec Veh Op	1
16	M7	Track Veh Mech	5
17	R1	PLT LDR (Rifle)	3
18	R2	PLT SGT	3
19	R3	Asst PLT SGT	3
20	R4	SQD LDR	9
21	R5	Team LDR	18
22	R6	Auto Rifleman	18
23	R7	Grenadier	18
24	R8	Rifleman	27
25	W1	PLT LDR (Weapon)	1
26	W2	PLT SGT	1
27	W3	SEC LDR (Mortar)	1
28	W4	Fire Direction Computer	2
29	W5	SQD LDR (Mortar)	3
30	W6	Mortar Gunner	6
31	W7	Ammo Bearer	3
32	W8	SEC LDR (AT)	1
33	W9	SQD LDR (AT)	1
34	W10	Tow Gunner	2
35	W11	Asst Gunner	2



Table 2-III-29. Personnel - Essential Team Requirements, Rifle Co - Mission 1.

TASK	TEAM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	5	6	6	7	7	7	10	10	10	11	12	13	13	16	16	17	17	18	18	22	22	23	23	24	24
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24
23	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24
24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	4	4
30	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	4	4
31	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	4	4
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
34	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
35	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
TOTAL	17	21	26	30	35	39	50	54	59	67	72	76	87	91	96	100	105	109	124	128	133	137	142	146	146

Table 2-III-30. Personnel - Essential Team Requirements, Rifle Co - Mission 2.

TASK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	5	6	6	6	7	10	10	11	12	13	13	13	16	16	17	17	18	18	22	22	23	23	24	24
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
23	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
35	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL	21	25	30	34	39	43	54	58	63	71	76	80	91	95	100	104	109	113	128	132	137	141	146	150



Table 2-III-32. Personnel Fill, Rifle Company, Inf Bn. REDCON 2

PROCESS	TAGS																																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
35	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



Table 2-III-33. Personnel Fill, Rifle Company, Inf. Bn. REDCON 3

EXCESS	TASKS																																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2-III-34. TOE Materiel Listing, Rifle Company, INF BN (MECH)  
 TOE 7-47HU With Change 16

		MATERIEL	TOE
1	H1	CO APC w/a,b,c,d, & e	1
2	H2	XO APC w/a,b,c,d, & e	1
3	H3	Truck, ½ ton w/a & d	1
4	H4	Trailer, ¼ ton	1
5	H5	Truck, 2½ ton (Unit Supply)	1
6	H6	Trailer, 1½ ton (Unit Supply)	1
7	M1	Wrecker, FT (m88) w/c & j	1
8	M2	Truck, 2½ ton w/j,k, & l	1
9	M3	Trailer, 1½ ton w/ j,k, & l	1
10	M4	Truck, 2½ ton w/ j,k & l	1
11	R1	PLT LDR APC w/2f, 2g, & 2h	3
12	R2	RIFLE SQD APC w/f,g, & h	9
13	W1	Truck, ½ ton w/h & i	2
14	W2	Trailer, ¼ ton	2
15	W3	Mortar Sec APC w/2h	1
16	W4	Mortar Carrier w/h,m, & n	3
17	W5	TOW Carrier w/h	2
18	E1	7.62 mm MG (M-50)	15
19	E2	MAWS (SU-36)	9
20	E3	RIFLE (M16A1)	153
21	E4	GL (M203)	21

- |               |                |
|---------------|----------------|
| a - AN/KY-38  | h - AN/GRC-160 |
| b - AN/GRA-39 | i - AN         |
| c - AN/VRC-46 |                |
| d - AN/VRC-47 |                |
| e - AN/PRC-77 |                |
| f - AN/PRR-9  |                |
| g - AN/PRT-4  |                |

Table 2-III-35. Materiel Transfer Matrix, Rifle Co - Base 2

TASK	MATERIEL	TOT	REQ FOR 24 TEAMS MISSION																						
			1	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	M1	1	1	1	0	0	0	-1	30	-1	-1	30	0	0	0	-1	0	30	-1	-1	-1	-1	-1	-1	-1
2	M2	1	0	0	0	0	-1	30	-1	-1	30	0	0	0	-1	0	30	-1	-1	-1	-1	-1	-1	-1	-1
3	M3	1	0	0	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
4	M4	1	0	0	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
5	M5	1	0	0	-1	30	-1	0	-1	-1	10	-1	-1	-1	-1	30	-1	-1	-1	-1	-1	-1	-1	-1	-1
6	M6	1	0	0	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
7	M1	1	0	0	-1	10	-1	-1	-1	0	-1	-1	-1	-1	10	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
8	M2	1	0	1	-1	30	-1	10	-1	-1	0	-1	-1	-1	30	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
9	M3	1	0	0	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
10	M4	1	0	0	-1	30	-1	10	-1	-1	10	-1	0	-1	-1	30	-1	-1	-1	-1	-1	-1	-1	-1	-1
11	M1	3	4	4	10	10	0	-1	30	-1	-1	30	-1	30	0	0	-1	0	30	-1	-1	-1	-1	-1	-1
12	M2	9	12	12	10	10	0	-1	30	-1	-1	30	-1	30	0	0	-1	0	30	-1	-1	-1	-1	-1	-1
13	M1	2	0	0	-1	10	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
14	M2	2	0	0	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
15	M3	1	0	0	30	30	0	-1	30	-1	-1	30	-1	30	10	0	0	-1	0	30	-1	-1	-1	-1	-1
16	M4	3	4	4	30	30	0	-1	30	-1	-1	30	-1	30	30	30	0	-1	0	0	-1	-1	-1	-1	-1
17	M5	2	3	3	30	30	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
18	E1	15	12	12	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1
19	E2	9	4	4	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
20	E3	153	153	153	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
21	E4	21	24	24	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Table 2-III-36. Materiel - Essential Team Requirements, Rifle Co - Mission 1.

TEAM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	3	4	4	4	4	4
12	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4
17	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
18	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12
19	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4
20	15	20	25	30	35	40	50	55	60	69	74	79	89	94	99	104	109	114	126	133	138	143	148	153
21	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Table 2-III-37. Materiel - Essential Team Requirements, Rifle Co - Mission 2.

TASK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4
12	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8	9	10	10	11	11	12	12	12
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4
17	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	3
18	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	12
19	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4
20	15	20	25	30	35	40	50	55	60	69	74	79	89	94	99	104	109	114	124	133	138	143	148	153	158
21	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24

Table 2-III-38. REDCON Materiel Listing, Combat Support Company, INF BN (MECH)

			REDCON		
MATERIEL			1	2	3
1	C1	APC w/lc, & lg	1	1	1
2	C2	APC w/li	1	1	1
3	C3	APC w/lc	1	1	1
4	C4	APC w/lf	7	6	5
5	C5	Carrier, CP w/le, lc, & lh	1	1	1
6	C6	Mortar Carrier w/lf	3	2	2
7	C7	Tow Carrier w/lf	11	9	8
8	C8	Rcv Veh (Med) w/lb	1	1	1
9	W1	Truck, Util ¼ ton w/lc, & lg	1	1	1
10	W2	Truck, Util ¼ ton w/lc	2	1	1
11	W3	Truck, Util ¼ ton w/la, & ld	1	1	1
12	W4	Truck, Util ¼ ton w/lf	4	4	3
13	W5	Truck, Cargo 1½ ton w/le	1	1	1
14	W6	Truck, Cargo 2½ ton	1	1	1
15	T1	Trailer, Cargo ¼ ton	9	8	7
16	T2	Trailer, Cargo 1½ ton	1	1	1

a - AN/GRA-39  
 b - AN/VRC-46  
 c - AN/VRC-47  
 d - AN/VRC-48  
 e - AN/VRC-64  
 f - AN/GRC-160

g - TSEC/KY-38  
 h - FDC EQ  
 i - AN/VRC-12

c. Effect of Readiness Condition on Unit Capability

Figures 2-III-24 and 2-III-25 show the effect of readiness condition on the Rifle Company for the two missions. The unit capability is always limited by materiel. At full TOE the capability is limited by the TOW and mortar systems. At each of the REDCONs it is limited by the TOW. This is a result of the essential team requirement of one TOW for nine infantry teams, or half of the unit's maximum capability, combined with the fact that the minimum for each REDCON was represented allowing one TOW in the unit. The personnel of this unit are very homogeneous in terms of skills. This is shown by the ability to form the maximum number of personnel teams possible within the strength of the unit in all readiness conditions. It can also be seen that personnel would be below the REDCON 3 minimum before it would affect the unit capability. Table 2-III-39 shows the expected range of unit capability for each readiness condition. The limits of the ranges shown are dominated totally by the TOW system and is the same for all REDCON's.

Table 2-III-39. Unit Readiness Condition Capability Range, Rifle Co

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	9-18	9	9
Personnel Teams	24	22-24	18-22
Unit Teams	9-18	9-18	9-18
Unit Capability	50-100%	50-100%	50-100%
Overlap Range	50-100%		

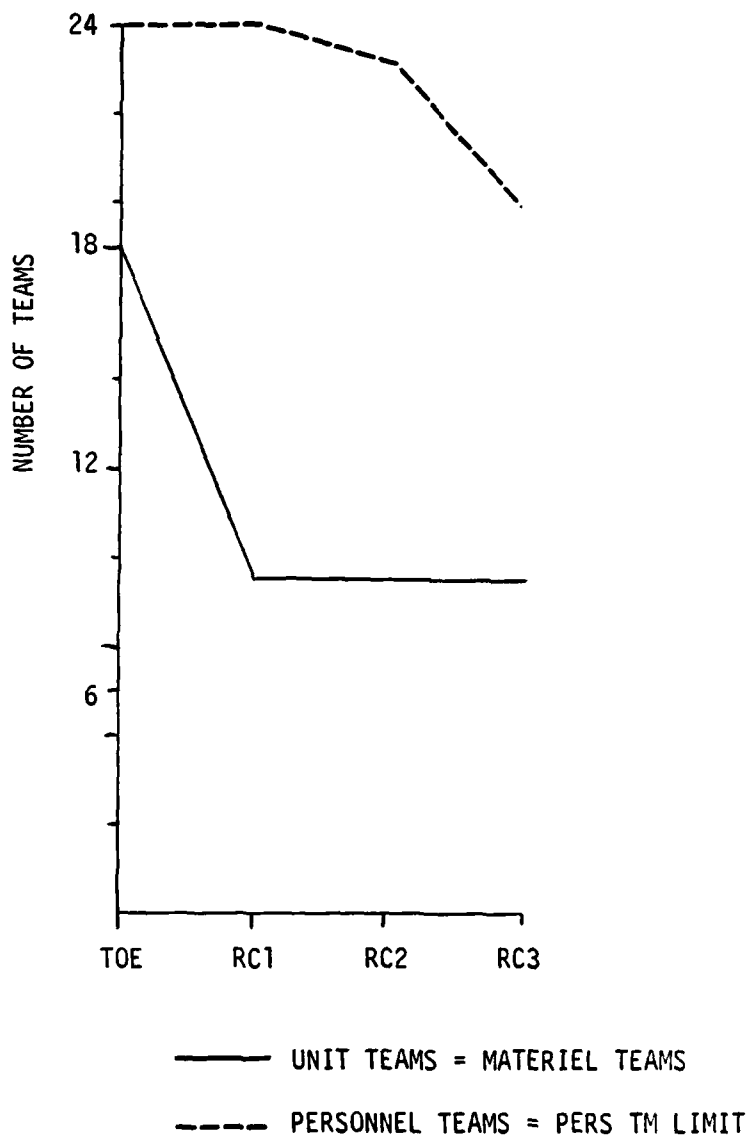
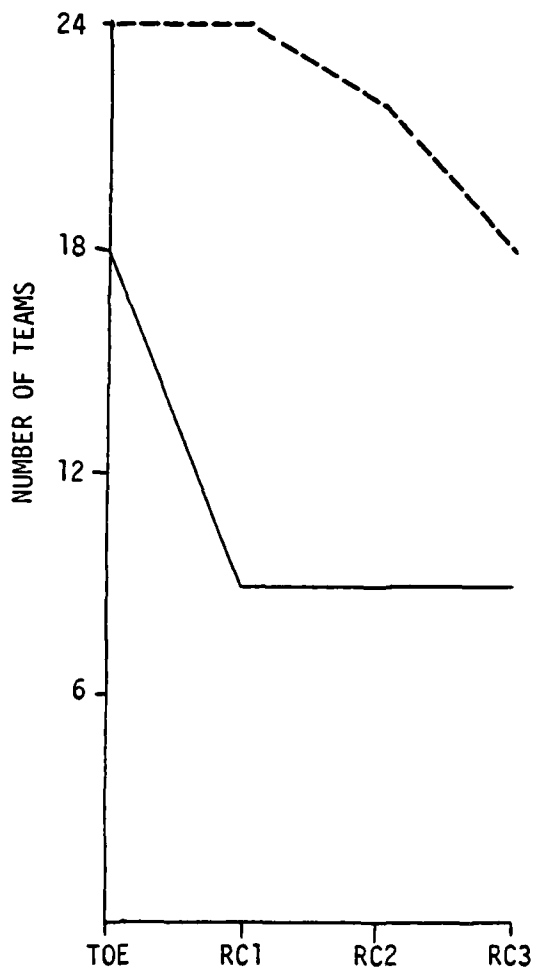


Figure 2-III-24. Unit Readiness Condition Capability and Limiting Factor - Rifle Co - Mission 1





— UNIT TEAMS = MATERIEL TEAMS  
 - - - PERSONNEL TEAMS = PERS TM LIMIT

Figure 2-III-25. Unit Readiness Condition Capability and Limiting Factor - Rifle Co - Mission 2

d. Recovered Capability After Damage in Various Readiness Conditions

The effect of damage on the Rifle Co. at TOE and each readiness condition is shown for mission 1 in Figures 2-III-26 thru 2-III-29. Mission 2 results are shown in Figures 2-III-30 thru 2-III-33. Materiel was in all cases the limiting factor to unit capability, although some cases did exhibit interaction with personnel, thus lowering the average unit capability below the materiel limit.

4. Units of the Infantry Battalion Compared

The comparison of units has been limited to the mission 2 cases. The maximum capability of each unit has been chosen as the basis of comparison and the capability of each unit is shown as a percentage of its maximum.

a. Effect of Readiness Condition

Figure 2-III-34 presents a comparison of the unit capability determined from the analysis of each unit at lower limit of each REDCON. The chart shows the very different effect that the readiness condition criteria have on different units. The range of capability of each unit, Tables 2-III-13, 2-III-26, and 2-III-39, is compared in Figure 2-III-35. This chart further amplifies the variability among the units and shows that if all units of the battalion are in the same readiness condition it is possible for them to have equal capability only in REDCON 2 or in REDCON 1 if all are at 100% effectiveness.

b. Effect of Damage Within Readiness Conditions

A comparison of the damage effects of units of the Infantry Bn is provided for TOE and each REDCON in Figures 2-III-36 thru 2-III-39. These figures show that the limiting element of this battalion can be expected to be the Hq and Hq Co. Even in REDCON 1 where its initial condition is significantly higher than the Rifle Co, it takes only a small amount of damage to reduce the capability of the Hq

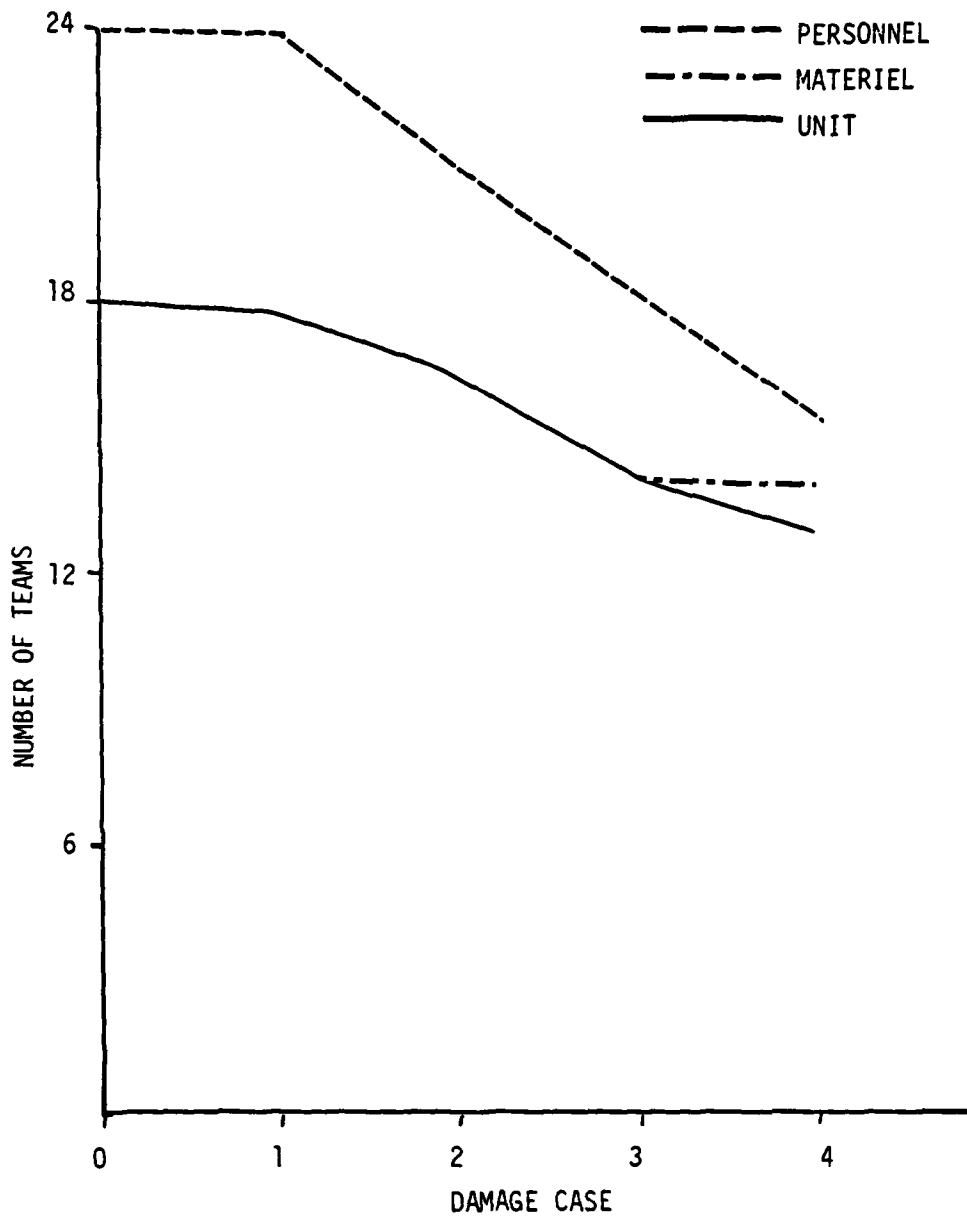


Figure 2-III-26. TOE - Unit Recovered Capability and Limiting Factor - Rifle Co - Mission 1

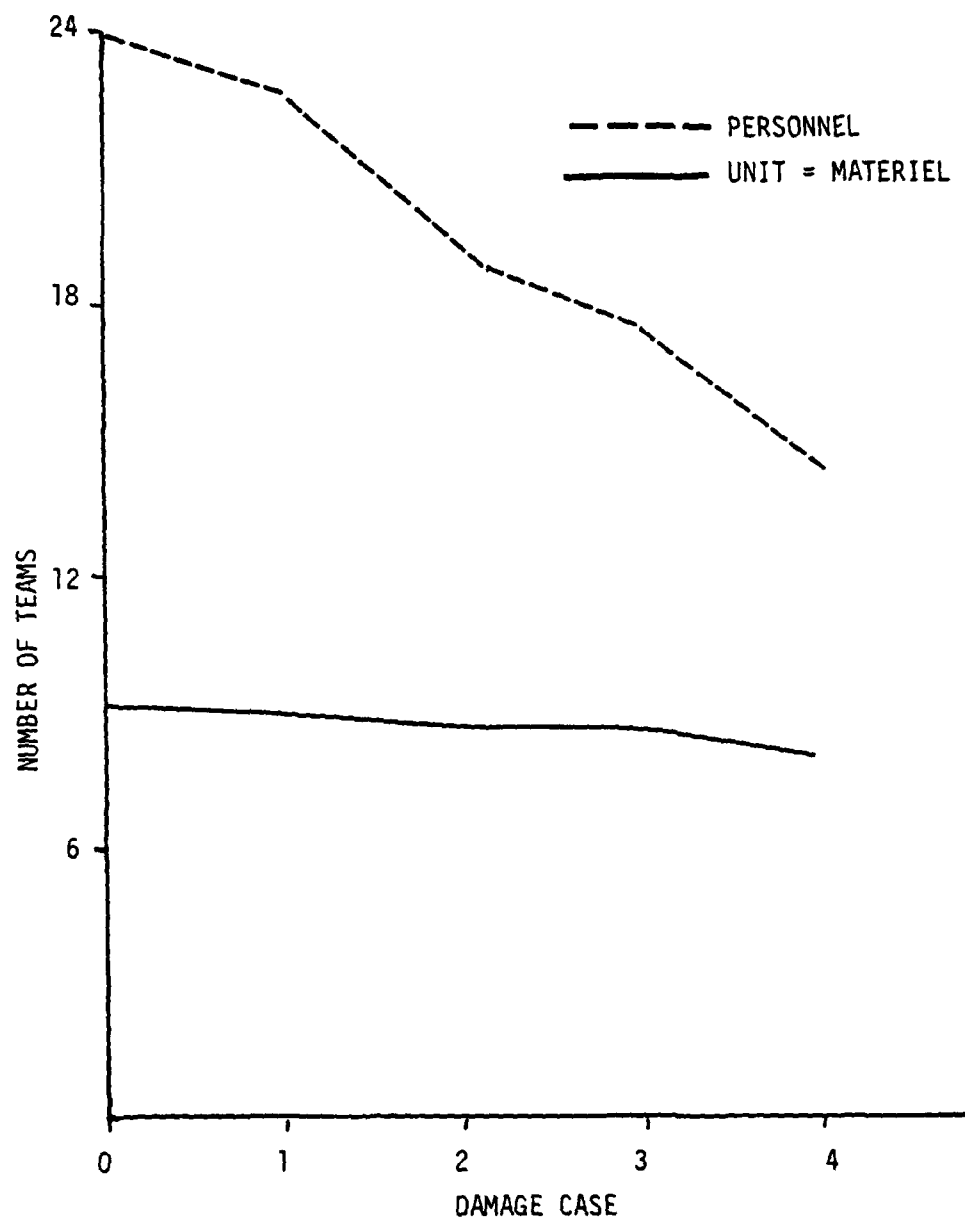


Figure 2-III-27. REDCON 1 - Unit Recovered Capability and Limiting Factor - Rifle Co - Mission 1

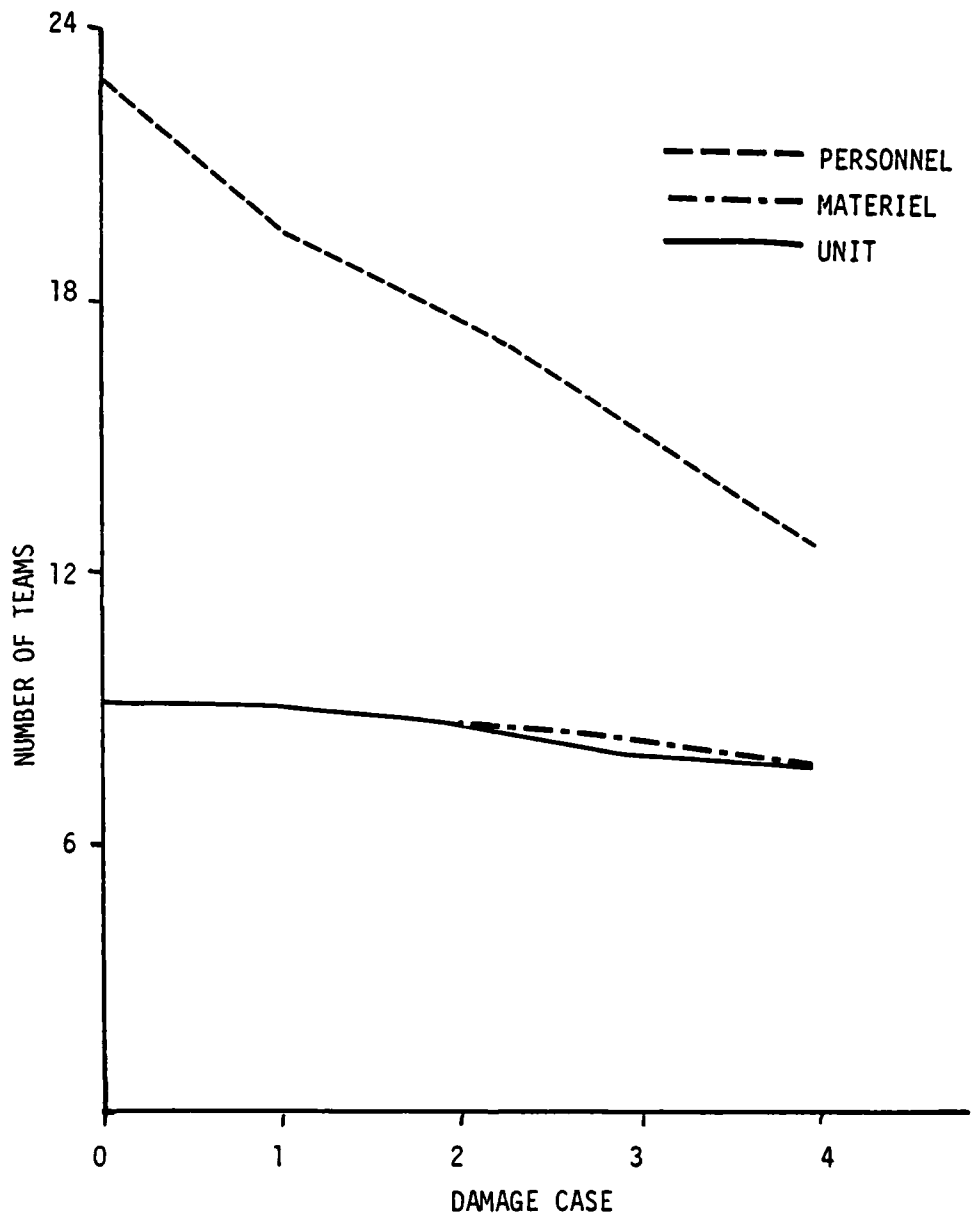


Figure 2-III-28. REDCON 2 - Unit Recovered Capability and Limiting Factor - Rifle Co - Mission 1

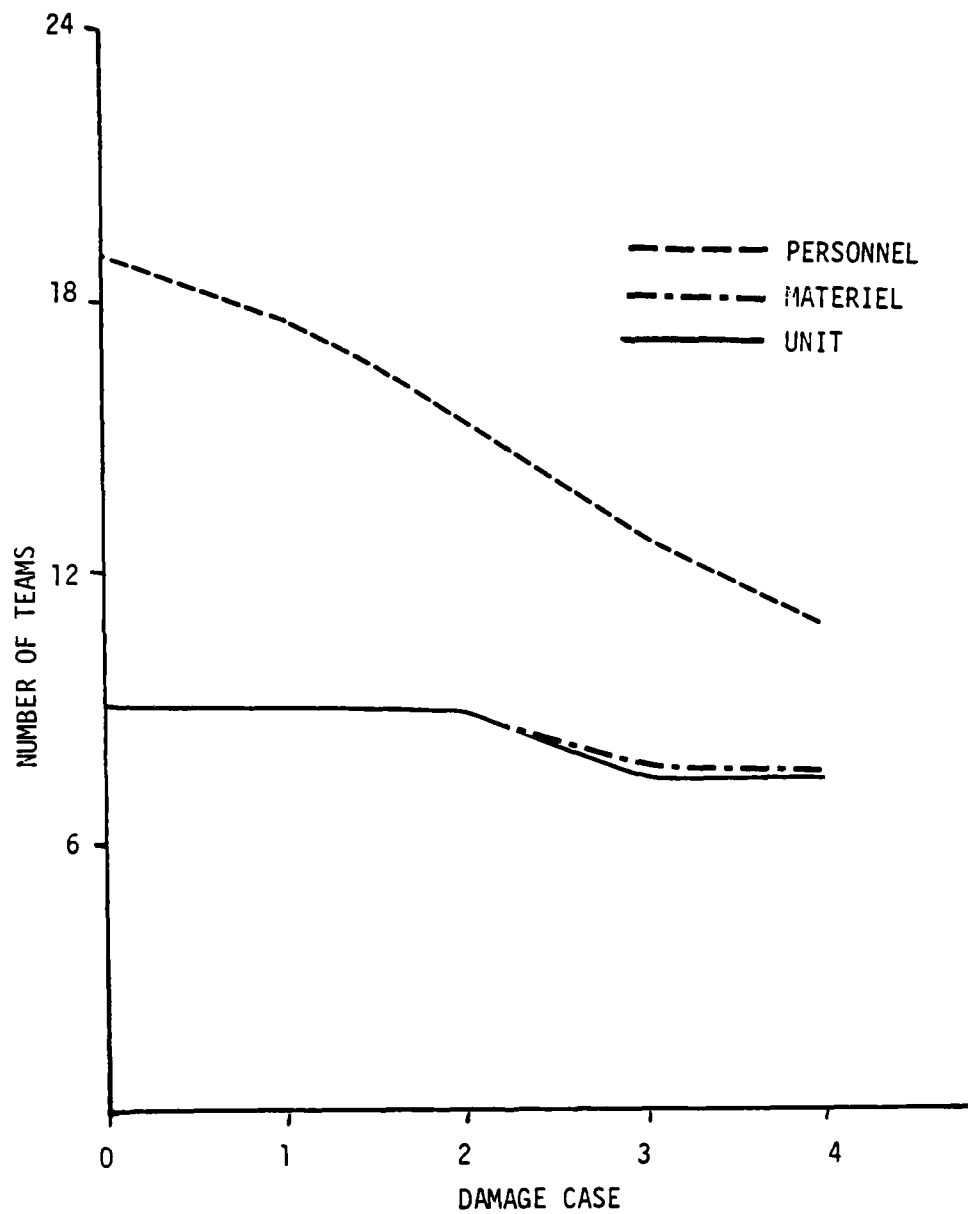


Figure 2-III-29. REDCON 3 - Unit Recovered Capability and Limiting Factor - Rifle Co - Mission 1

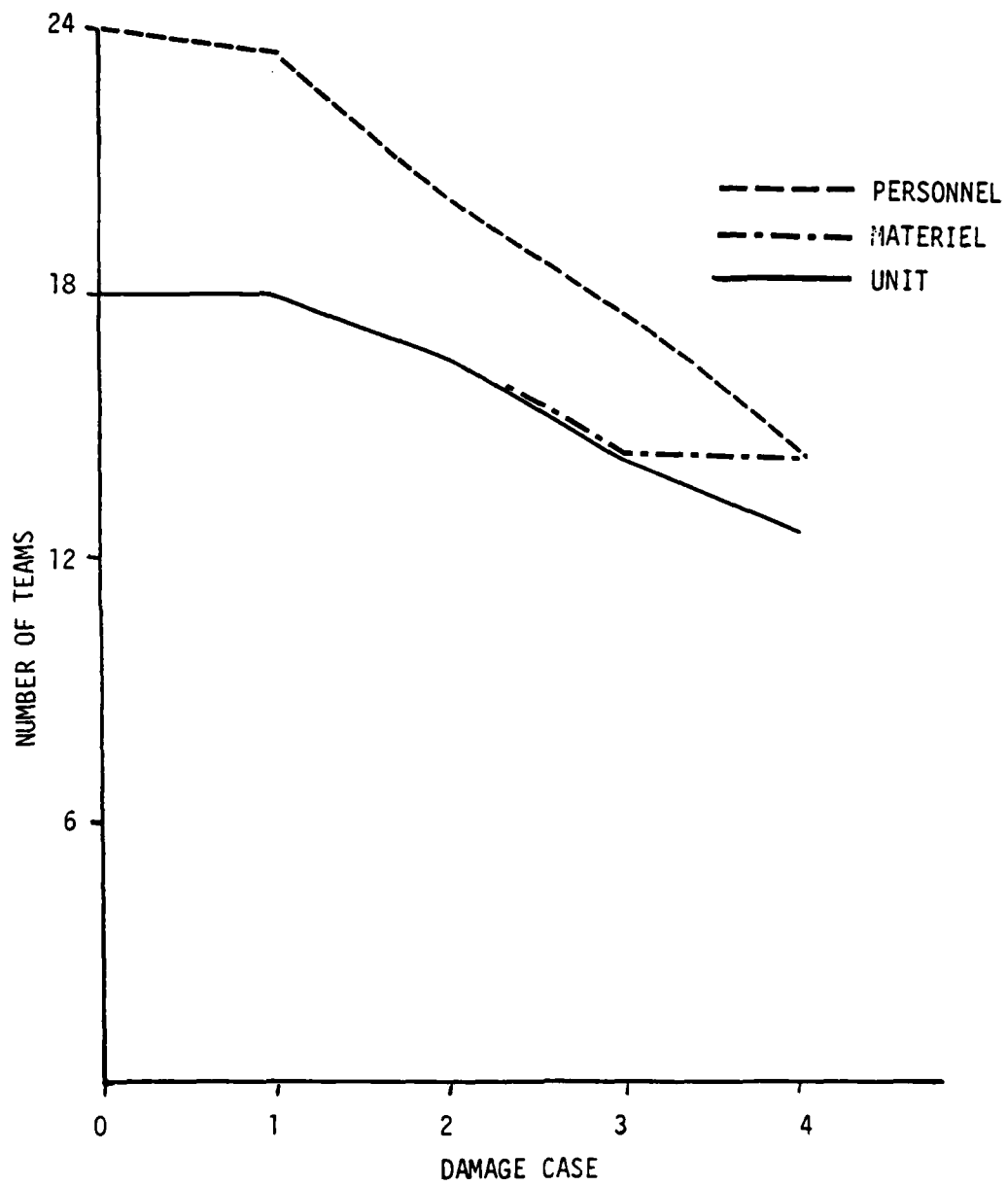


Figure 2-III-30. TOE - Unit Recovered Capability and Limiting Factor - Rifle Co - Mission 2

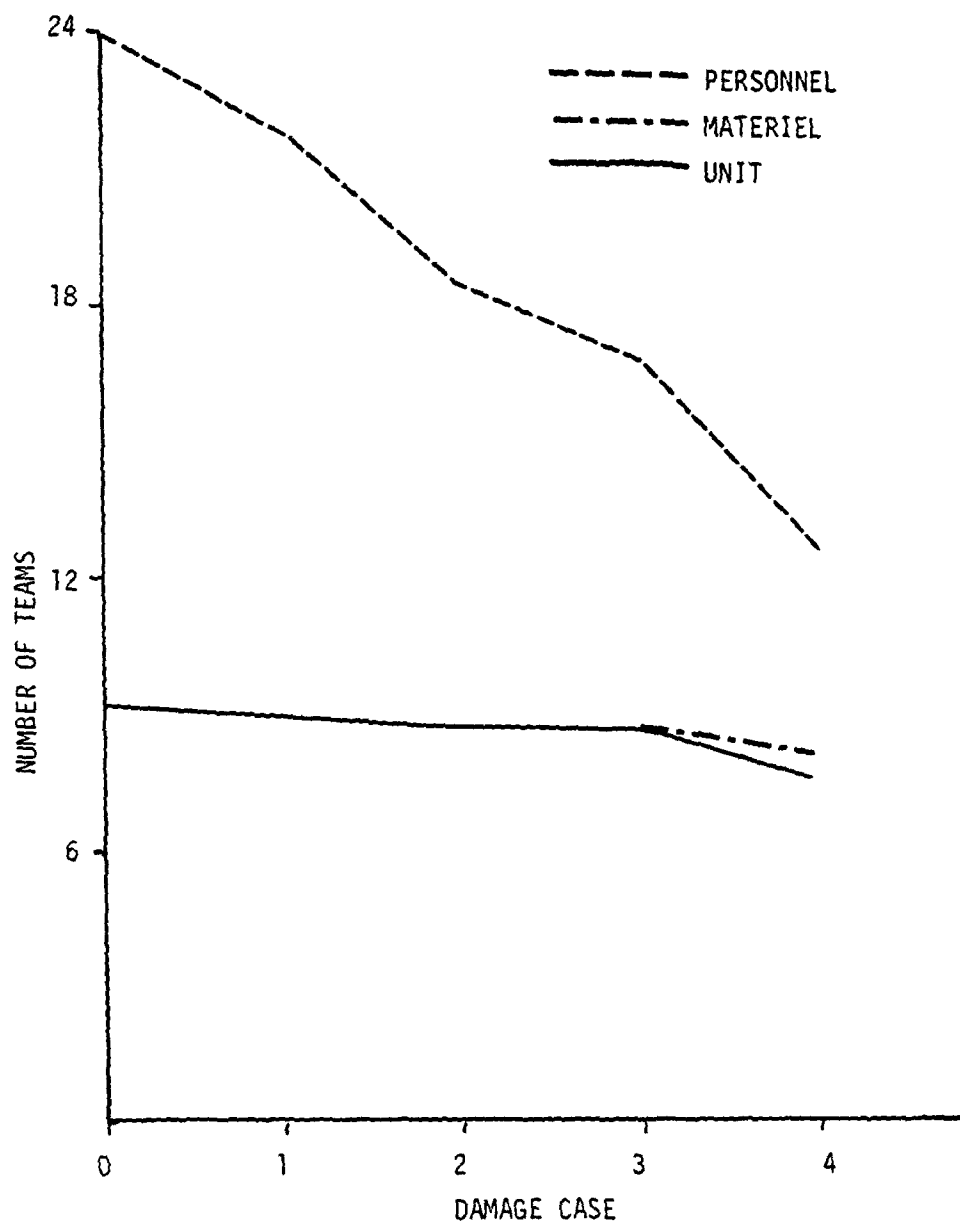


Figure 2-III-31. REDCON 1 - Unit Recovered Capability and Limiting Factor - Rifle Co - Mission 2



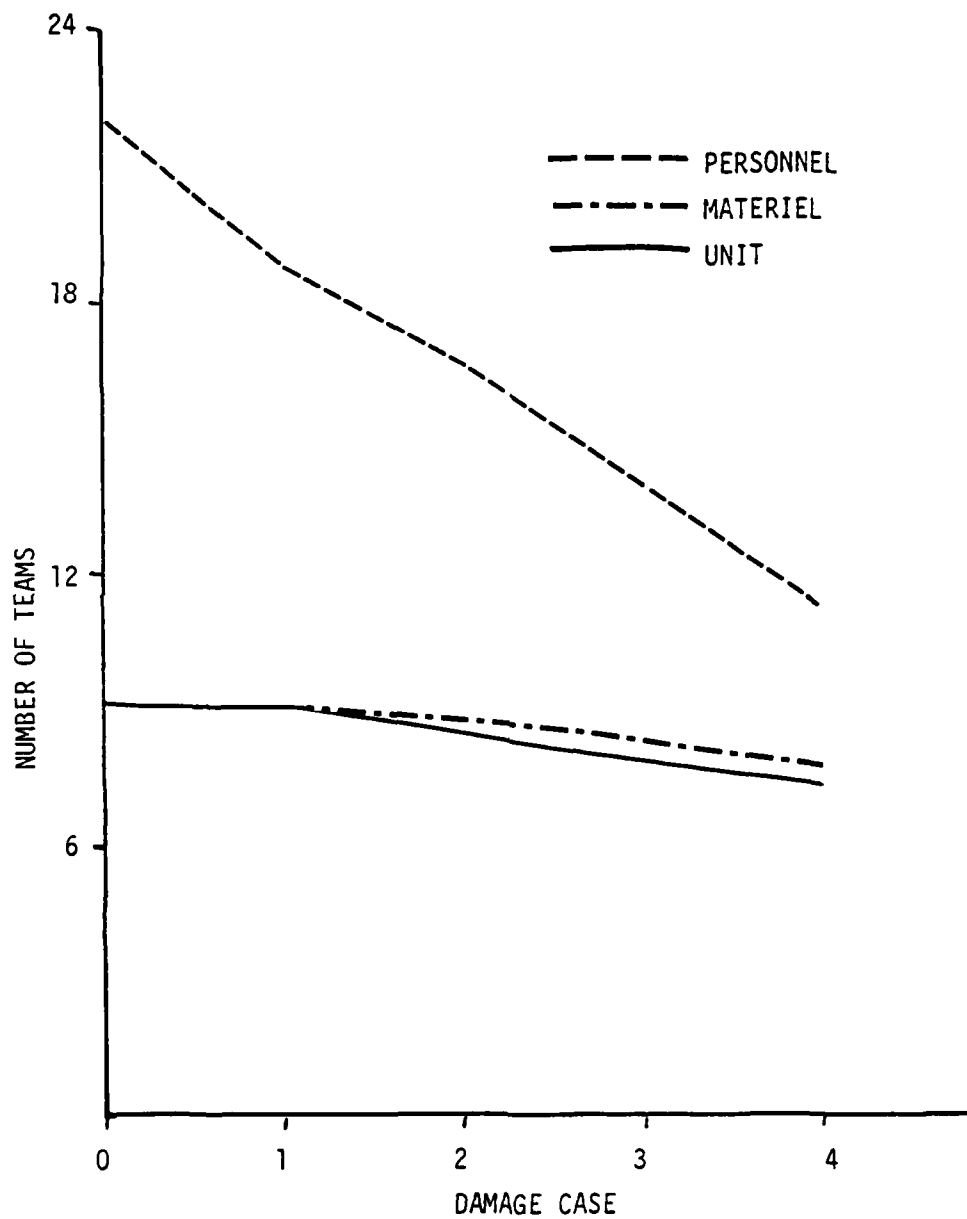


Figure 2-III-32. REDCON 2 - Unit Recovered Capability and Limiting Factor - Rifle Co - Mission 2

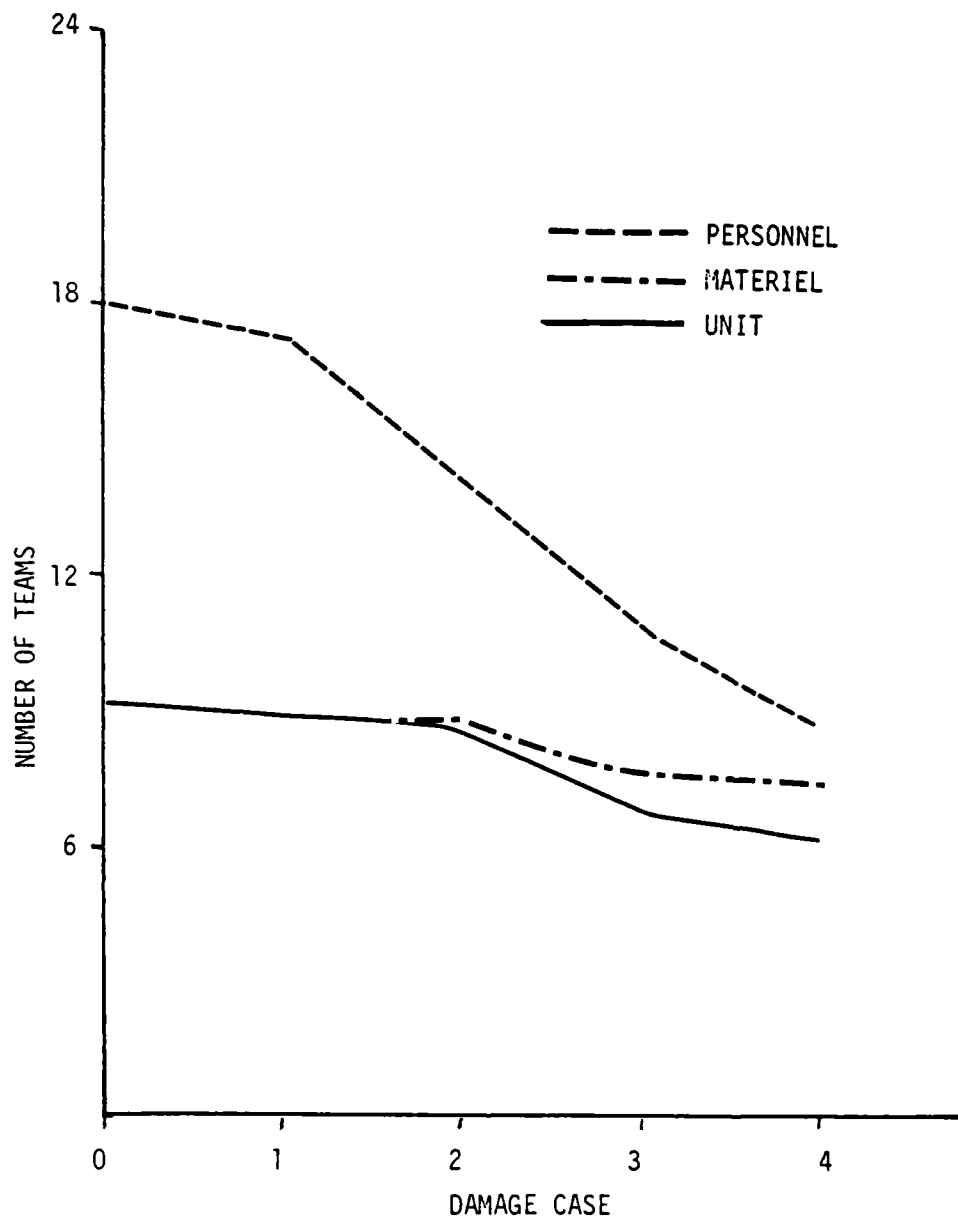


Figure 2-III-33. REDCON 3 - Unit Recovered Capability and Limiting Factor - Rifle Co - Mission 2

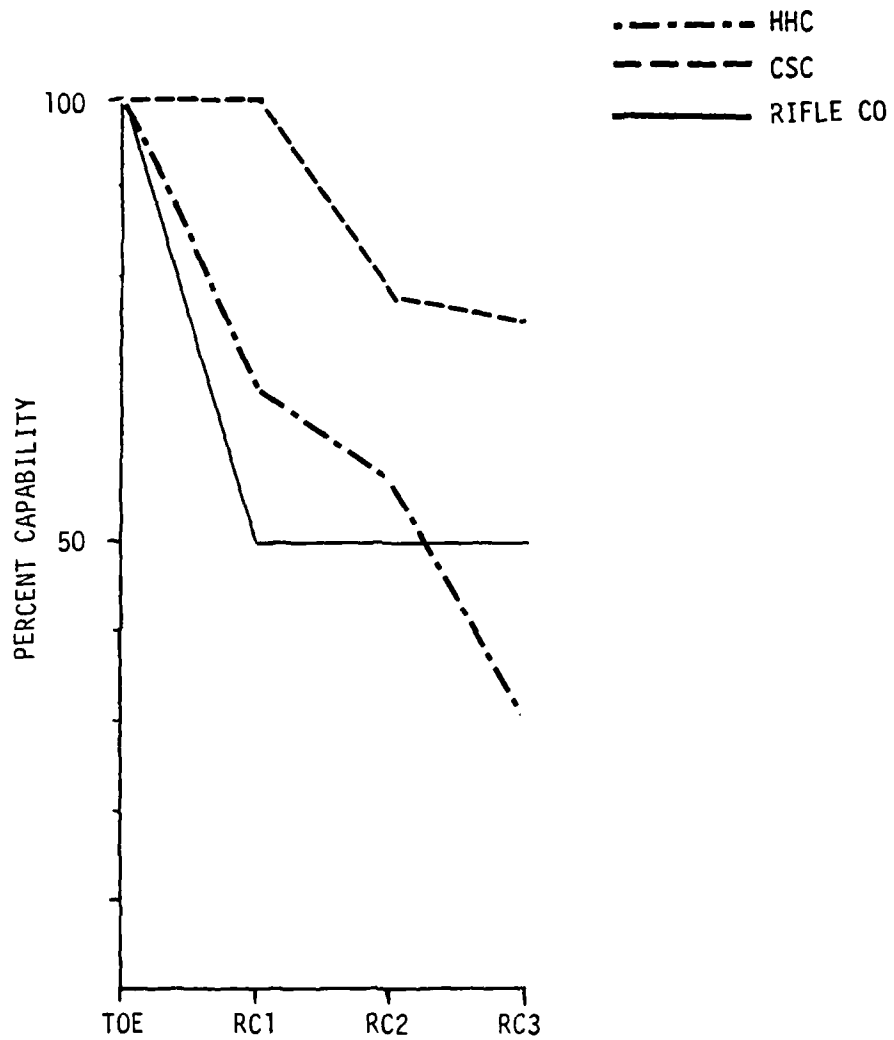
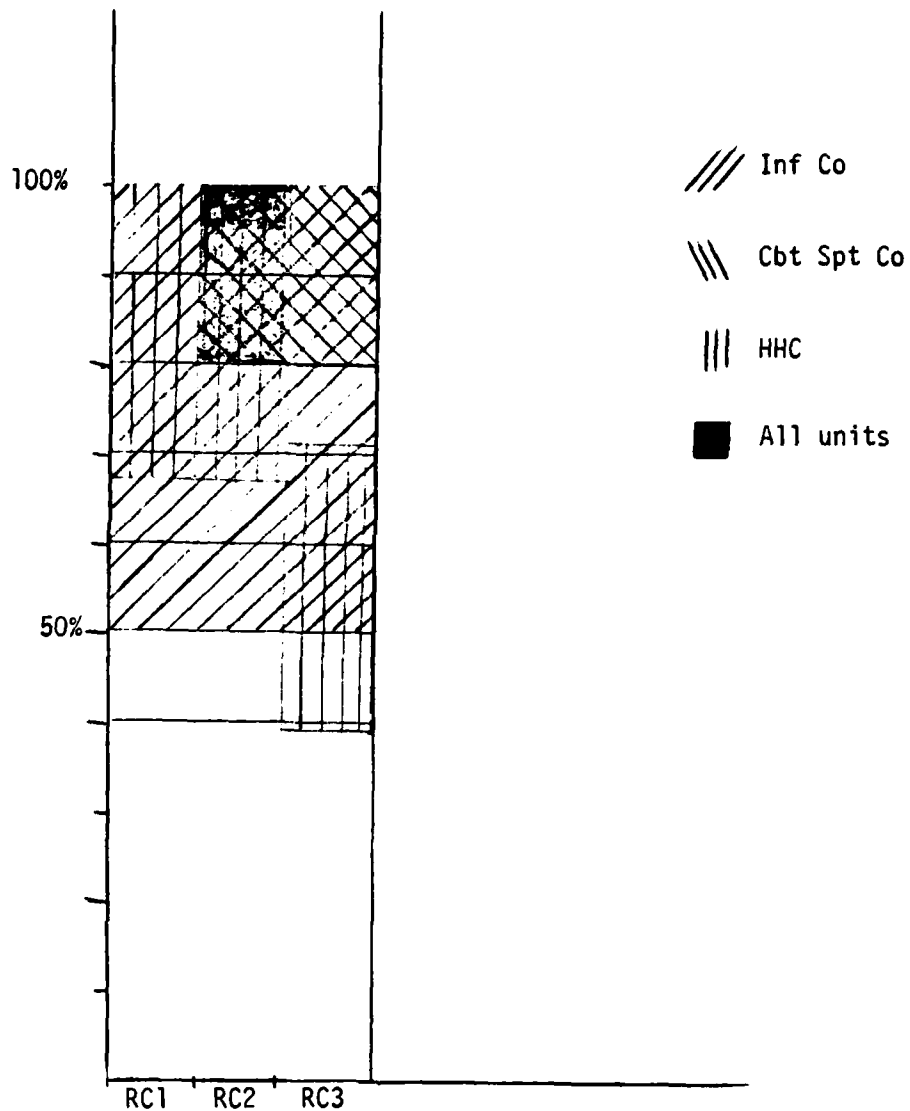


Figure 2-III-34. Comparison of Units of the Inf (Mech) Bn, Capability at Different Readiness Conditions

and Hq Co well below that of the Rifle Co. It seems significant to note that although materiel generally limits capability in two out of three type units, personnel is likely to limit overall capability the most since the Hq and Co is type personnel limited.



1 CBT SPT CO is at 100% and has no range in REDCON 1.

Figure 2-III-35. Range of Capability, Units of the Infantry Bn in Readiness Conditions

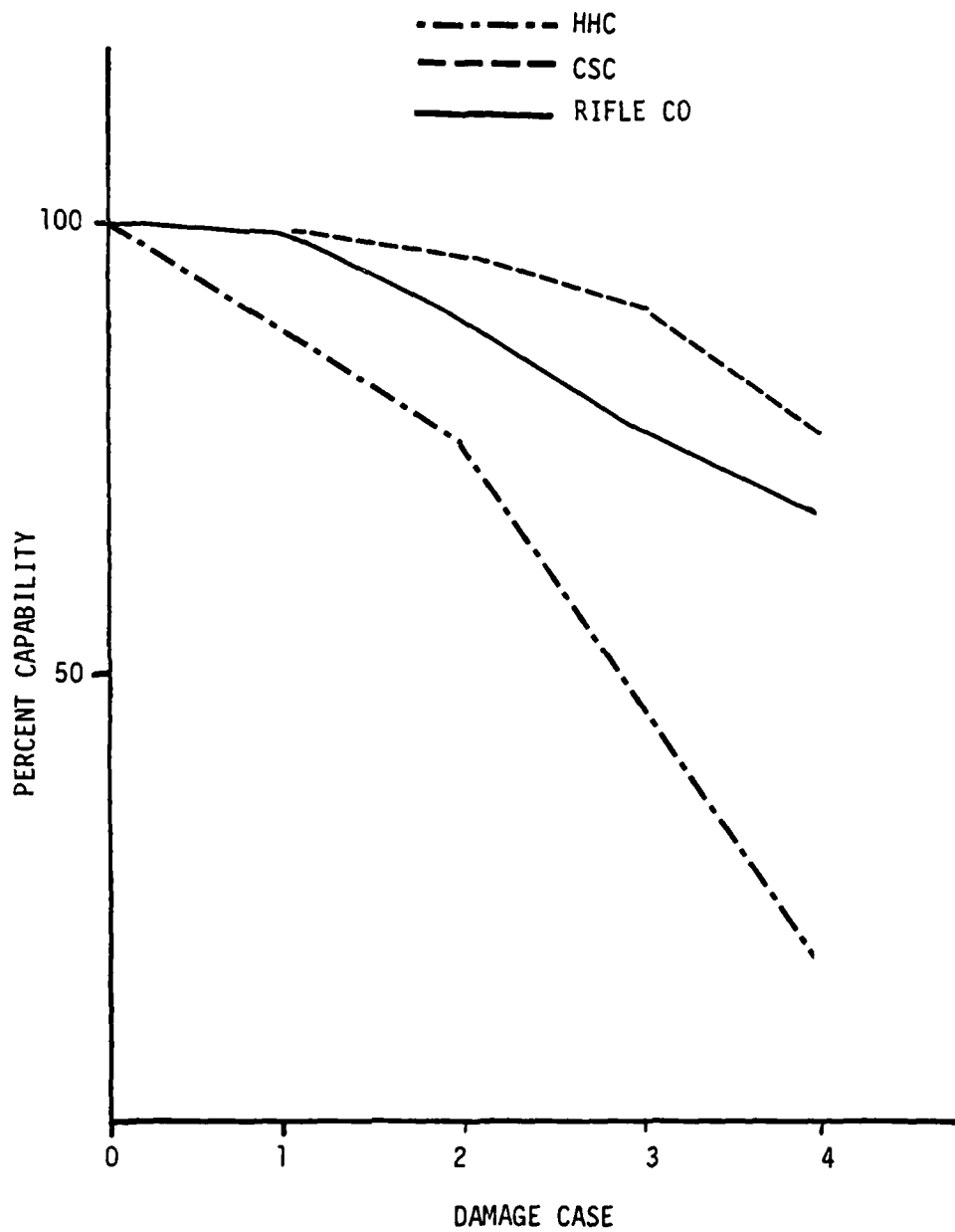


Figure 2-III-36. TOE - Comparison of Units of the Inf (Mech) Bn - Unit Recovered Capability After Damage

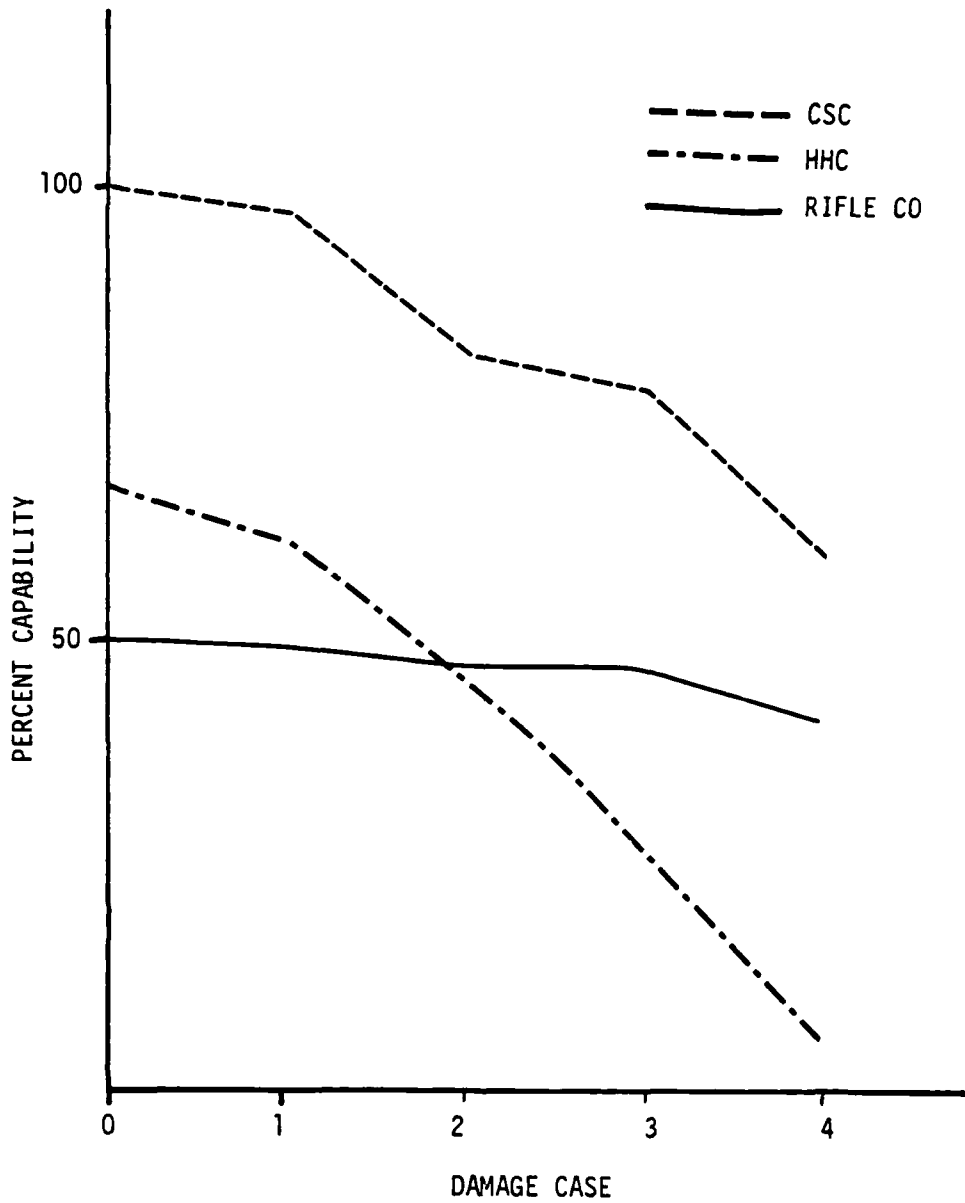


Figure 2-III-37. REDCON 1 - Comparison of Units of the Inf (Mech) Bn - Unit Recovered Capability After Damage

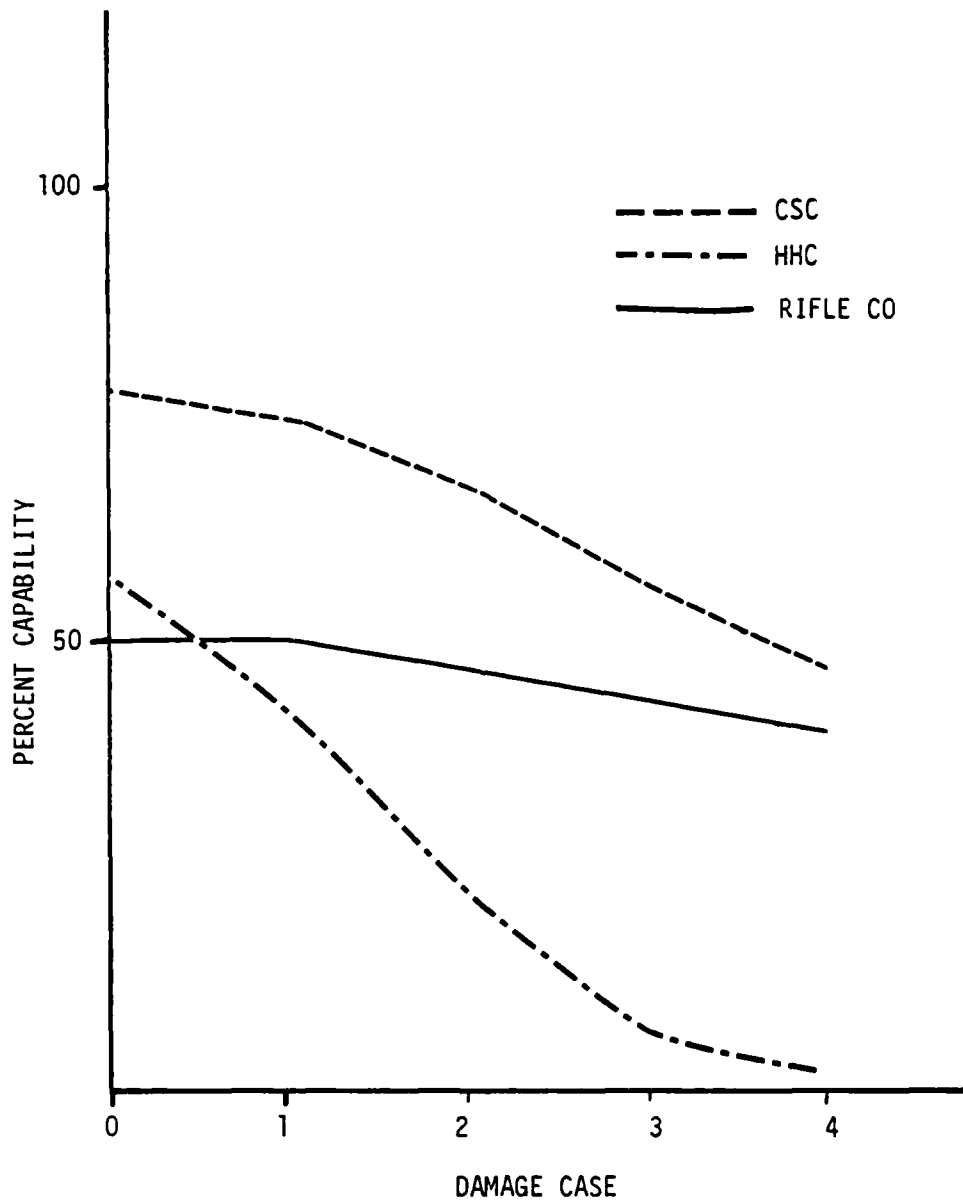


Figure 2-III-38. REDCON 2 - Comparison of Units of the Inf (Mech) Bn - Unit Recovered Capability After Damage



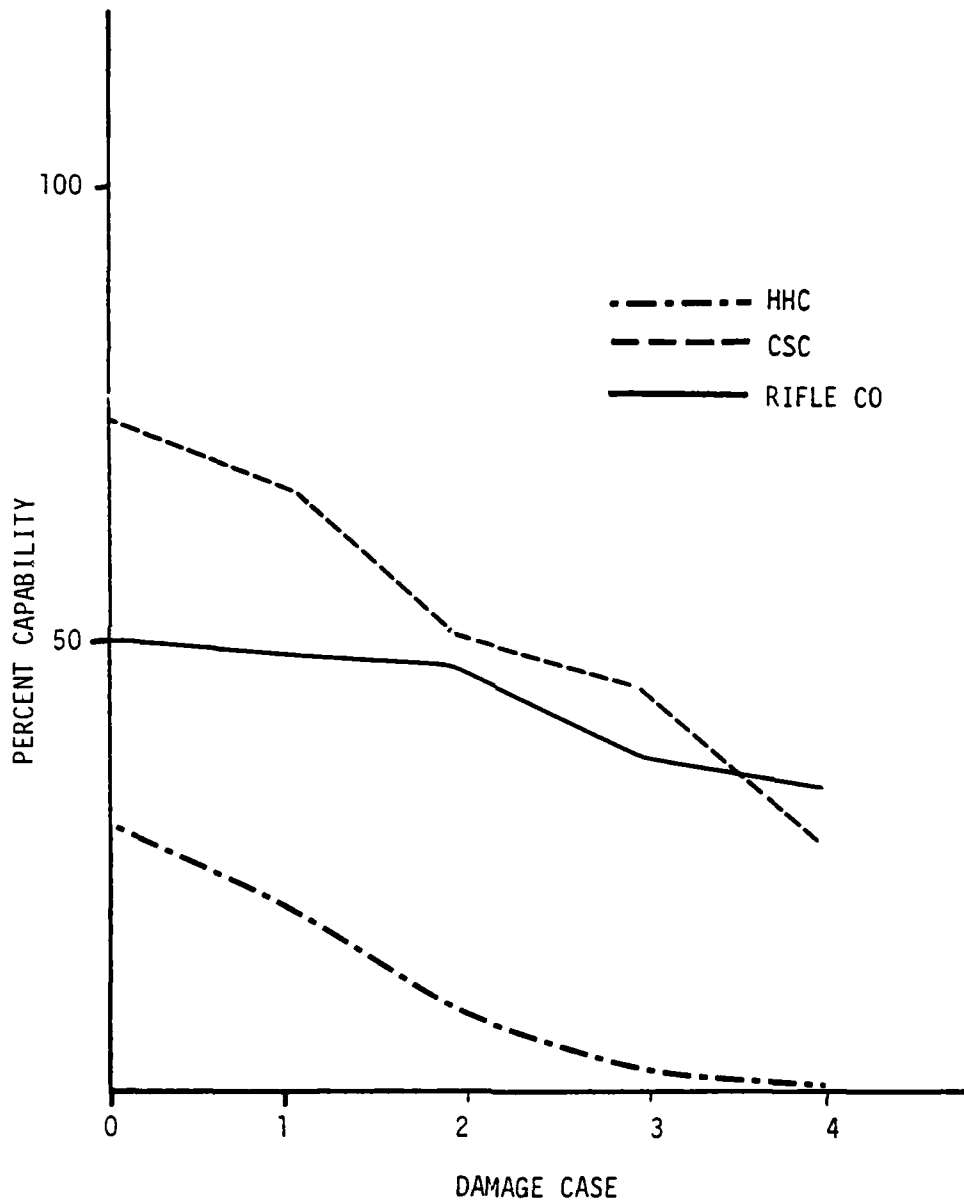


Figure 2-III-39. REDCON 3 - Comparison of Units of the Inf (Mech) Bn-  
Unit Recovered Capability After Damage

Section IV. Field Artillery Battalion (155mm, Self-Propelled).

1. HEADQUARTERS AND HEADQUARTERS BATTERY, FIELD ARTILLERY BN

Analysis of this unit was based on TOE 06-366H with change 17. The organization chart is shown at Figure 2-IV-1.

a. Personnel

The personnel listing used for the analysis is at Table 2-IV-1. Table 2-IV-2 is the transfer matrix which was developed for these personnel. The essential personnel team requirements for missions 1 and 2 are shown by Tables 2-IV-3 and 2-IV-4. Mission 1 was defined as command and control only and as such required generally only the higher echelon leadership of the battalion. Mission 2 includes the fire direction center, fire support teams, and air defense- that is the ability to provide services to supported units.

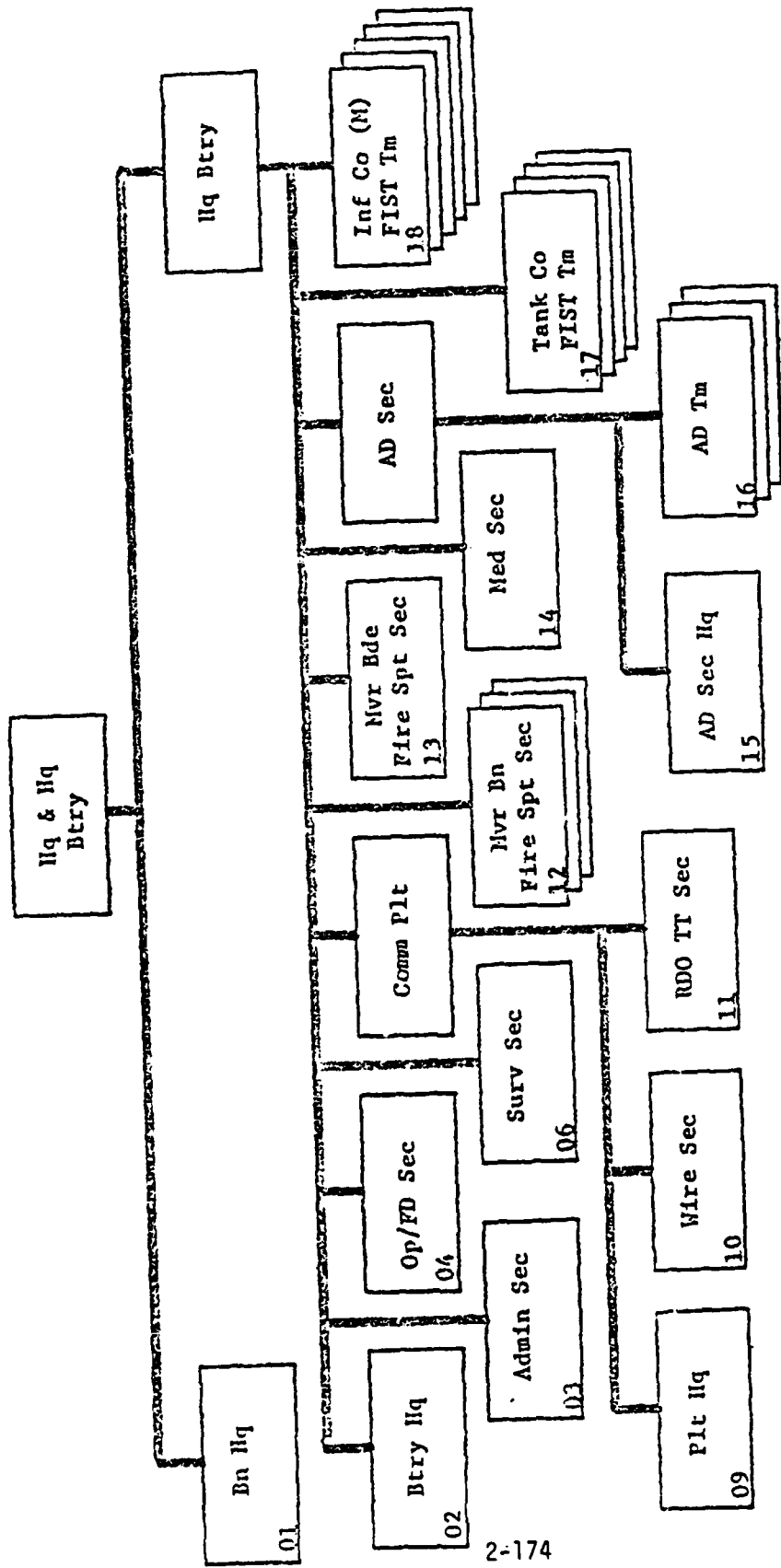
The personnel fill used for the representation of each of the readiness conditions is provided by Tables 2-IV-5, -6, and -7.

b. Materiel

The materiel listing, with TOE authorizations, is shown at Table 2-IV-8. Table 2-IV-9 is the transfer matrix used for these equipment items. The essential team requirements are shown at Table 2-IV-10, mission 1, and Table 2-IV-11, mission 2. Table 2-IV-12 shows the materiel on-hand quantities which were used for the readiness condition representations.

c. Effect of Readiness Condition on Unit Capability

Figure 2-IV-2 shows the unit capability, in terms of the number of teams formed, for the various readiness conditions. Only mission 2 results are shown. Mission 1 analysis resulted in maximum (6) team formation in every case, which is a reflection of the number of senior grade personnel in the unit which could perform the command functions. The chart shows that unit capability was limited by materiel, but at REDCON 2 and 3, the number of personnel teams formed is not much greater than the materiel teams. The chart



2-174

Figure 2-IV-1. Headquarters and Headquarters Battery, Field Artillery Battalion Organization Chart

Table 2-IV-1. TOE Personnel Listing, HQ & HQ Battery, FA BN, 155mm (SP)

TOE 6-366HO with change 17

PERSONNEL (LESS MEDICAL)			TOE
1	H1	BN CO/XO/ 3/FSO	4
2	H2	BN STAFF OFF	10
3	H3	BN STAFF NCO	11
4	H4	Clerks	7
5	H5	Lt Vehicle Driver/RTO	29
6	C1	Btry CO	1
7	C2	FD SVC Sergeant	2
8	C3	Motor Sergeant	1
9	C4	Supply Sergeant	1
10	C5	Armorer/EQ Mnt Clerk	2
11	C6	Cook	4
12	C7	Pwr Gen/Whl Veh Mech	5
13	C8	Track Veh Mech	5
14	FD1	CHF FD Computer/Ass't	2
15	FD2	FD Computer	4
16	FD3	Chart Operator	2
17	FD4	PC/Hvy Veh Driver	3
18	S1	CHF Surveyor/CHF of Party	3
19	S2	Survey Computer/Recorder	4
20	S3	Inst Opr/Rodman - Tapeman	4
21	C21	Comm PLT LDR	1
22	C22	TAC Comm CHF	2
23	C23	TAC Com Sys Op/Mech	3
24	C24	TAC Wire Opn Tm Chf	4
25	C25	Tac Wire Opn Spec	22
26	C26	RTT OPN SUPV/TM CHF	3
27	C27	RTT OPR	4
28	FSC1	Fire Support Sergeant (E7)	4
29	FSC2	Fire Support Specialist	17
30	AD1	AD SEC LDR	1
31	AD2	AD SEC Sergeant/Red Eye TM CHF	4
32	AD3	Red Eye Gunner	3
33	FST1	FIST TM LDR	9
34	FST2	Fire Support Sergeant (E6)	9
35	FST3	Forward Ovserver (E5)	15



Table 2-IV-3. Personnel - Essential Team Requirements,  
Headquarters and Headquarters Battery, FA  
BN - Mission 1.

TEAM	1	2	3	4	5	6
TASK 1	1	1	1	1	1	1
2	6	6	6	6	6	6
3	5	5	5	5	5	5
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	1	1	1	1	1	1
7	1	1	1	1	1	1
8	1	1	1	1	1	1
9	1	1	1	1	1	1
10	0	0	0	0	0	0
11	2	2	2	2	2	2
12	1	1	1	1	1	1
13	1	1	1	1	1	1
14	1	1	1	1	1	1
15	0	0	0	0	0	0
16	1	1	1	1	1	1
17	2	2	2	2	2	2
18	1	1	1	1	1	1
19	1	1	1	1	1	1
20	3	3	3	3	3	3
21	1	1	1	1	1	1
22	0	0	0	0	0	0
23	1	1	1	1	1	1
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	1	1	1	1	1	1
27	1	1	1	1	1	1
28	4	4	4	4	4	4
29	4	4	4	4	4	4
30	0	1	1	1	1	1
31	0	0	0	0	0	0
32	0	0	0	0	0	0
33	0	0	0	0	0	0
34	0	0	0	0	0	0
35	0	0	0	0	0	0
TOTAL	41	42	42	42	42	42

Table 2-IV-4. Personnel - Essential Team Requirements,  
Headquarters and Headquarters Battery,  
BA BN - Mission 2.

TEAM	1	2	3	4	5	6
TASK 1	1	1	1	1	1	1
2	6	6	6	6	6	6
3	5	5	5	5	5	5
4	1	2	3	4	5	6
5	3	6	9	12	15	18
6	1	1	1	1	1	1
7	1	1	1	1	1	1
8	1	1	1	1	1	1
9	1	1	1	1	1	1
10	0	0	0	0	0	0
11	2	2	2	2	2	2
12	1	1	1	1	1	1
13	1	1	1	1	1	1
14	1	1	1	1	1	1
15	1	2	3	4	5	6
16	1	1	1	1	1	1
17	2	2	2	2	2	2
18	1	1	1	1	1	1
19	1	1	1	1	1	1
20	3	3	3	3	3	3
21	1	1	1	1	1	1
22	0	0	0	0	0	0
23	1	1	1	1	1	1
24	1	2	3	4	5	6
25	1	2	3	4	5	6
26	1	1	1	1	1	1
27	1	1	1	1	1	1
28	4	4	4	4	4	4
29	4	4	4	4	4	4
30	0	1	1	1	1	1
31	0	1	2	3	4	5
32	0	1	2	3	4	5
33	0	3	6	9	12	15
34	0	3	6	9	12	15
35	0	4	6	10	14	16
TOTAL	48	68	85	104	123	140









Table 2-IV-8. TOE Materiel Listing, HQ & HQ Battery, FA BN, 155mm (SP)

TOE 06-366HO with change 17

MATERIEL (LESS MEDICAL)			TOE
1	C1	Carrier CP W/2a, 2b, 2j	1
2	C2	Carrier CP W/1a, 2b, 2l	2
3	C3	Carrier CP W/1a, 1e, 1j	4
4	C4	APC W/2a, 1c, 2f, 1g, 1j, 1m	4
5	C5	APC W/2a, 1c, 2f, 3g, 1j, 2m	5
6	W1	Truck, CGO 2½ Ton	2
7	W2	Truck, CGO 1½ Ton W/1o	4
8	W3	Truck, CGO 1½ Ton W/1p	1
9	W4	Truck, CGO 1½ Ton W/h, i	2
10	W5	Truck, CGO 1½ Ton W/2g, 1n	2
11	W6	Truck, CGO 1½ Ton, W/1a, 1b, 1j	1
12	W7	Truck, CGO 1½ Ton, W/1b	1
13	W8	Truck, Util ½ Ton	1
14	W9	Truck, Util ½ Ton W/1f	1
15	W10	Truck, Util ½ Ton W/1b	1
16	W11	Truck, Util ½ Ton W/1c, 1j	1
17	W12	Truck, Util ½ Ton W/1a, 1c, 1j	5
18	W13	Truck, Util ½ Ton W/1a, 1e, 1j	1
19	W14	Truck, Util ½ Ton W/1a, 1d, 1h	1
20	W15	Truck, Util ½ Ton W/1f, 1k	3
21	T1	Trailer, CGO ½ Ton	12
22	T2	Trailer, CGO 1½ Ton	1
23	T3	Trailer, Water	1
24	M1	Immersion Heater	10
25	M2	Fld Kitchen Trlr Mtd	2

a - AN/GRA-39  
 b - AN/VRC-46  
 c - AN/VRC-47  
 d - AN/VRC-48  
 e - AN/VRC-49  
 f - AN/GRC-160  
 g - AN/PRC-77  
 h - AN/KW-7

i - AN/GRC-142  
 j - TSEC/KY-38  
 k - FAAR SET  
 l - FDC EQ  
 m - Laser Range Finder  
 n - Survey EQ  
 o - Wire Opn Eq  
 p - Radio Maint Eq

Table 2-IV-9. Materiel Transfer Matrix, Headquarters and Headquarters Battery, FA Bn.

TASK	MICHILL		REG FOR		6 TEAMS		MISSION																										
	TUL	1	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25					
C1	1	1	1	0	30	30	60	60	-1	30	30	-1	0	0	-1	0	15	0	15	15	15	30	15	0	-1	-1	-1	-1					
C2	2	1	1	30	0	30	-1	-1	30	30	-1	0	15	-1	0	15	0	15	30	30	30	15	0	-1	-1	-1	-1	-1					
C3	4	0	0	30	30	0	60	60	-1	30	30	-1	0	15	-1	0	15	15	15	15	0	30	15	0	-1	-1	-1	-1					
C4	4	0	0	30	30	15	0	15	-1	30	30	-1	0	15	-1	0	15	0	0	15	30	0	0	-1	-1	-1	-1	-1					
C5	5	0	0	30	30	15	0	0	-1	30	30	-1	0	15	-1	0	15	0	0	15	30	0	0	-1	-1	-1	-1	-1					
M1	2	1	1	-1	-1	-1	-1	0	10	10	-1	0	-1	60	0	60	60	-1	-1	-1	30	0	0	30	-1	-1	-1	-1					
M2	4	0	6	-1	-1	-1	-1	60	0	10	60	0	60	60	0	60	60	-1	-1	-1	30	0	30	30	-1	-1	-1	-1					
M3	1	1	1	-1	-1	-1	-1	60	10	0	60	0	60	60	0	60	60	-1	-1	-1	30	0	30	30	-1	-1	-1	-1					
M4	2	1	1	-1	-1	-1	-1	60	10	0	60	0	60	60	0	60	60	-1	-1	-1	30	0	30	30	-1	-1	-1	-1					
M5	2	1	1	-1	-1	-1	-1	60	10	0	60	0	60	60	0	60	60	-1	-1	-1	30	0	30	30	-1	-1	-1	-1					
M6	1	0	0	30	30	30	60	60	-1	30	30	-1	0	0	0	15	0	15	15	15	30	15	0	-1	-1	-1	-1	-1					
M7	1	0	0	-1	-1	-1	-1	15	15	-1	0	30	0	0	0	15	0	30	30	30	60	15	0	-1	-1	-1	-1	-1					
M8	1	0	0	-1	-1	-1	-1	60	60	-1	30	-1	-1	0	0	60	60	-1	-1	-1	30	0	-1	-1	-1	-1	-1	-1					
M9	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	-1	-1	0	15	30	60	30	60	0	30	-1	-1	-1	-1	-1					
M10	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	30	-1	0	15	0	30	60	30	60	15	30	-1	-1	-1	-1					
M11	1	0	0	60	-1	30	60	60	-1	-1	-1	-1	30	30	-1	0	15	15	0	15	60	15	30	-1	-1	-1	-1	-1					
M12	5	5	5	30	-1	15	60	60	-1	-1	-1	-1	30	30	-1	0	15	15	0	15	30	15	30	-1	-1	-1	-1	-1					
M13	1	0	0	30	-1	0	60	60	-1	-1	-1	-1	30	30	-1	0	15	15	15	15	30	15	30	-1	-1	-1	-1	-1					
M14	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	-1	-1	0	15	15	30	30	30	0	15	30	-1	-1	-1	-1					
M15	5	0	5	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	-1	-1	0	15	30	60	30	30	0	30	-1	-1	-1	-1	-1					
M16	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	-1	-1	0	15	15	15	15	30	15	30	-1	-1	-1	-1	-1					
M17	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	-1	-1	0	15	15	15	15	30	15	30	-1	-1	-1	-1	-1					
M18	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	-1	-1	0	15	15	15	15	30	15	30	-1	-1	-1	-1	-1					
M19	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	-1	-1	0	15	15	15	15	30	15	30	-1	-1	-1	-1	-1					
M20	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	-1	-1	0	15	15	15	15	30	15	30	-1	-1	-1	-1	-1					
M21	10	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	-1	-1	0	15	15	15	15	30	15	30	-1	-1	-1	-1	-1					
M22	2	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	30	-1	-1	0	15	15	15	15	30	15	30	-1	-1	-1	-1	-1					
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25					

Table 2-IV-10. Materiel - Essential Team Requirements,  
Headquarters and Headquarters Battery,  
FA Bn - Mission 1.

TEAM	1	2	3	4	5	6
ASK 1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	1	1	1	1	1	1
7	0	0	0	0	0	0
8	1	1	1	1	1	1
9	1	1	1	1	1	1
10	1	1	1	1	1	1
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	1	1	1	1	1	1
15	0	0	0	0	0	0
16	0	0	0	0	0	0
17	5	5	5	5	5	5
18	0	0	0	0	0	0
19	0	0	0	0	0	0
20	0	0	0	0	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0

Table 2-IV-11. Materiel - Essential Team Requirements, Headquarters and Headquarters Battery, FA Bn - Mission 2.

TEAM	1	2	3	4	5	6
TASK 1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	0	0	0	0	0	0
4	0	1	3	4	5	7
5	0	2	3	5	7	8
6	1	1	1	1	1	1
7	1	2	3	4	5	6
8	1	1	1	1	1	1
9	1	1	1	1	1	1
10	1	1	1	1	1	1
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	1	1	1	1	1	1
15	0	0	0	0	0	0
16	0	0	0	0	0	0
17	5	5	5	5	5	5
18	0	0	0	0	0	0
19	0	0	0	0	0	0
20	0	1	2	3	4	5
21	1	2	3	4	5	6
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0

Table 2-IV-12. REDCON Materiel Listing, HQ & HQ Battery, FA BN, 155mm (SP)

MATERIEL (LESS MEDICAL)			REDCON		
			1	2	3
1	C1	Carrier CP W/2a, 2b, 2j	1	1	1
2	C2	Carrier CP W/1a, 2b, 2l	2	2	1
3	C3	Carrier CP W/1a, 1e, 1j	3	3	3
4	C4	APC W/2a, 1c, 2f, 1g, 1j, 1m	4	3	3
5	C5	APC W/2a, 1c, 2f, 3g, 1j, 2m	4	4	3
6	W1	Truck, CGO 2½ Ton	1	1	1
7	W2	Truck, CGO 1½ Ton W/1o	3	2	1
8	W3	Truck, CGO 1½ Ton W/1p	1	1	1
9	W4	Truck, CGO 1½ Ton W/h,i	2	2	2
10	W5	Truck, CGO 1½ Ton W/2g, 1n	2	2	2
11	W6	Truck, CGO 1½ Ton, W/1a, 1b, 1j	1	1	1
12	W7	Truck, CGO 1½ Ton, W/1b	1	1	1
13	W8	Truck, Util ½ Ton	0	0	0
14	W9	Truck, Util ½ Ton W/1f	1	0	0
15	W10	Truck, Util ½ Ton W/1b	1	1	1
16	W11	Truck, Util ½ Ton W/1c, 1j	1	1	1
17	W12	Truck, Util ½ Ton W/1a, 1c, 1j	4	4	3
18	W13	Truck, Util ½ Ton W/1a, 1e, 1j	1	1	1
19	W14	Truck, Util ½ Ton W/1a, 1d, 1h	1	1	1
20	W15	Truck, Util ½ Ton W/1f, 1k	3	3	3
21	T1	Trailer, CGO ½ Ton	11	9	8
22	T2	Trailer, CGO 1½ Ton	1	1	1
23	T3	Trailer, Water	1	1	1
24	M1	Immersion Heater	9	8	7
25	M2	Fld Kitchen Trlr Mtd	1	1	1

a - AN/GRA-39  
 b - AN/VRC-46  
 c - AN/VRC-47  
 d - AN/VRC-48  
 e - AN/VRC-49  
 f - AN/GRC-160  
 g - AN/PRC-77  
 h - AN/KW-7

i - AN/GRC-142  
 j - TSEC/KY-38  
 k - FAAR SET  
 l - FDC EQ  
 m - Laser Range Finder  
 n - Survey EQ  
 o - Wire Opn Eq  
 p - Radio Maint Eq

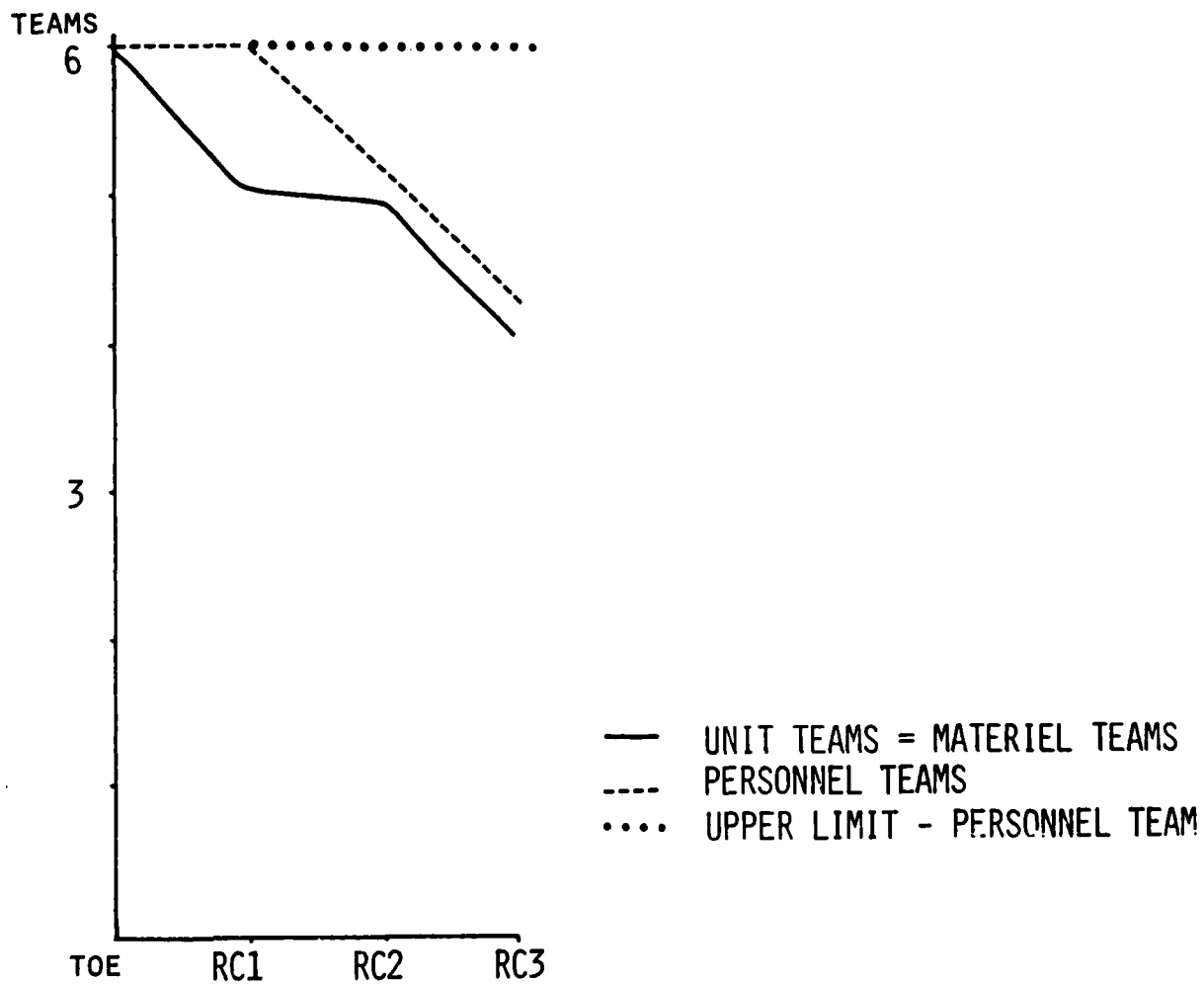


Figure 2-IV-2. Unit Readiness Condition Capability and Limiting Factors--Hq & Hq Battery, FA Bn. - Mission 2



also shows a possibility to increase personnel teams by additional crosstraining; however, without an increase of equipment, this would not gain unit capability in these no damage cases. The damage case results which follow indicate a possible gain in combat situation capability.

Consideration of personnel and materiel separately as causative for a particular REDCON rating yields expected ranges of capability as shown in Table 2-IV-13. Again, the table shows that a REDCON rating tells very little about a unit's capability. There is an overlap of capability, although small, included in all three REDCONs; but the major point from this table is that the capability range of both REDCON 1 and 2 is the same for this unit.

Table 2-IV-13. Unit Readiness Condition Capability Range, Hq & Hq Battery, FA Battalion

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	5.0-6.0	5.0	4.0-5.0
Personnel Teams	6.0	5.2-6.0	4.3-5.2
Unit Teams	5.0-6.0	5.0-6.0	4.0-5.2
Unit Capability	83-100%	83-100%	67-87%
Overlap Range	83-87%		

d. Recovered Capability After Damage in Various Readiness Conditions

The application of damage, Table 2-I-2, changes the limiting factor from materiel to personnel at very low damage levels as shown in Figures 2-IV-3 thru 2-IV-6. Thus we see that for a combat situation, increased transferability of personnel might increase the capability of this unit to maintain capability while sustaining casualties. Again, the mission 1 results show the unit capable of

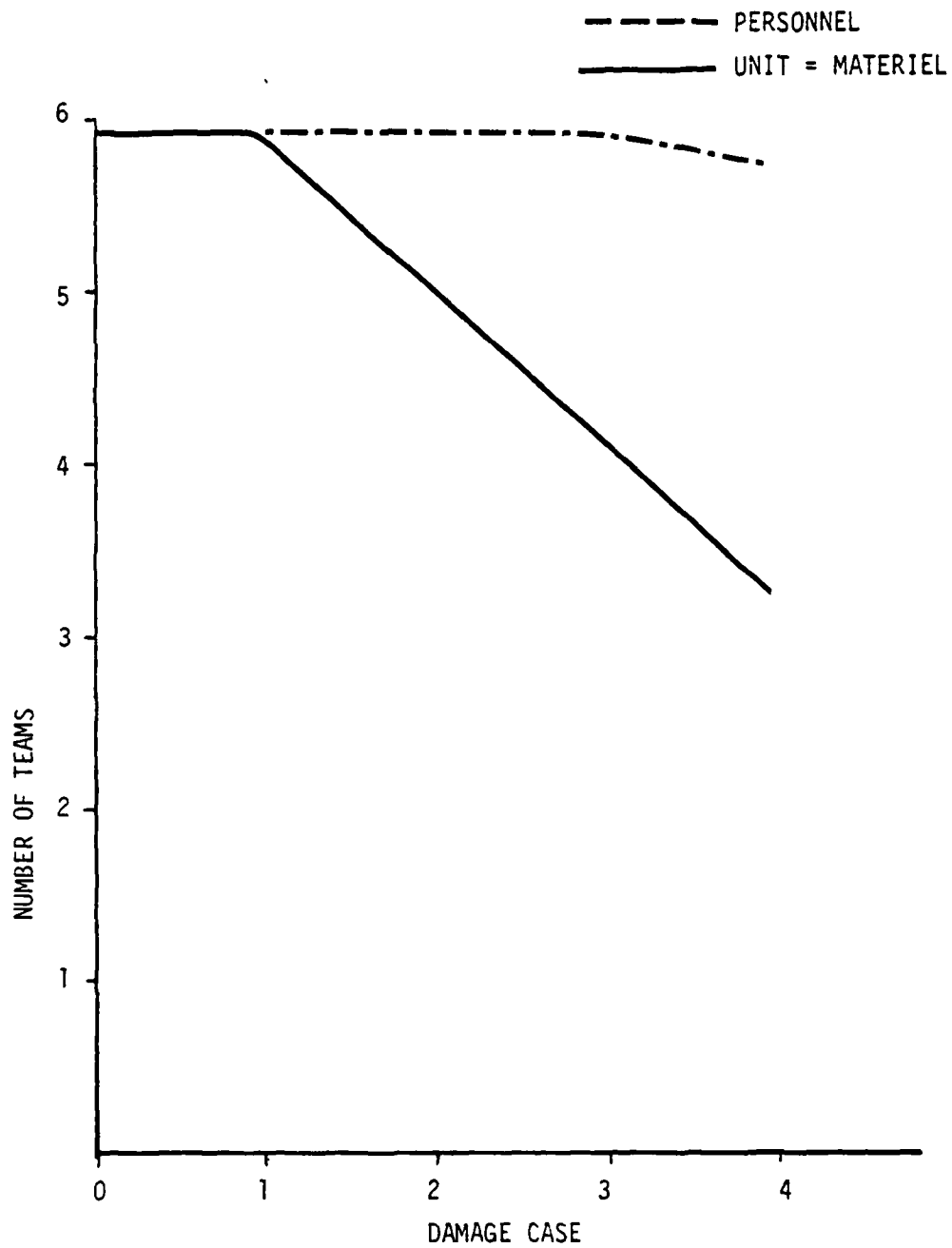


Figure 2-IV-3. TOE - Unit Recovered Capability and Limiting Factor - HQ BTRY, FA BN - Mission 2

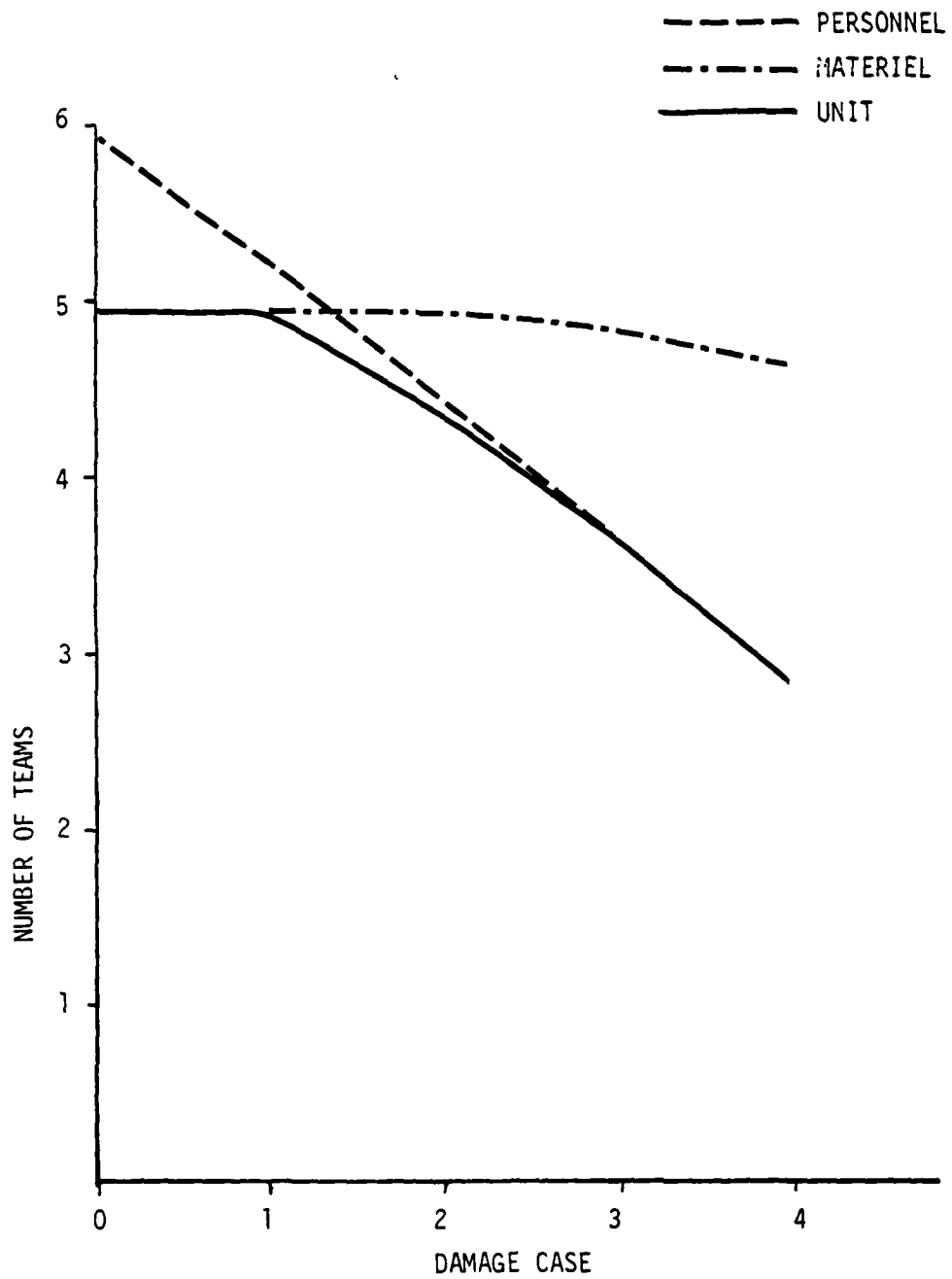


Figure 2-IV-4. REDCON 1 - Unit Recovered Capability and Limiting Factor - HQ BTRY, FA BN - Mission 2

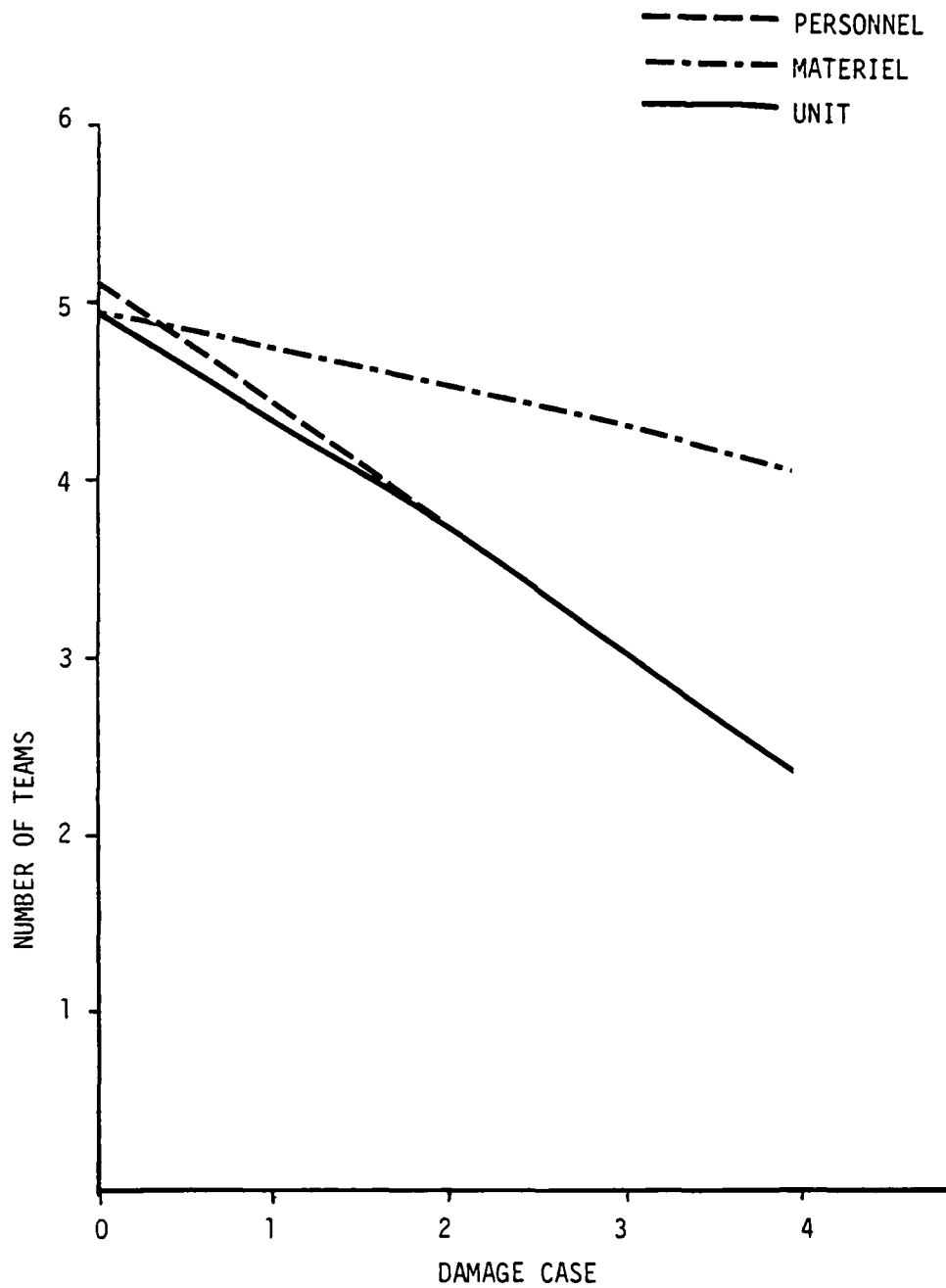


Figure 2-IV-5. REDCON 2 - Unit Recovered Capability and Limiting Factor - HQ BTRY, FA BN - Mission 2

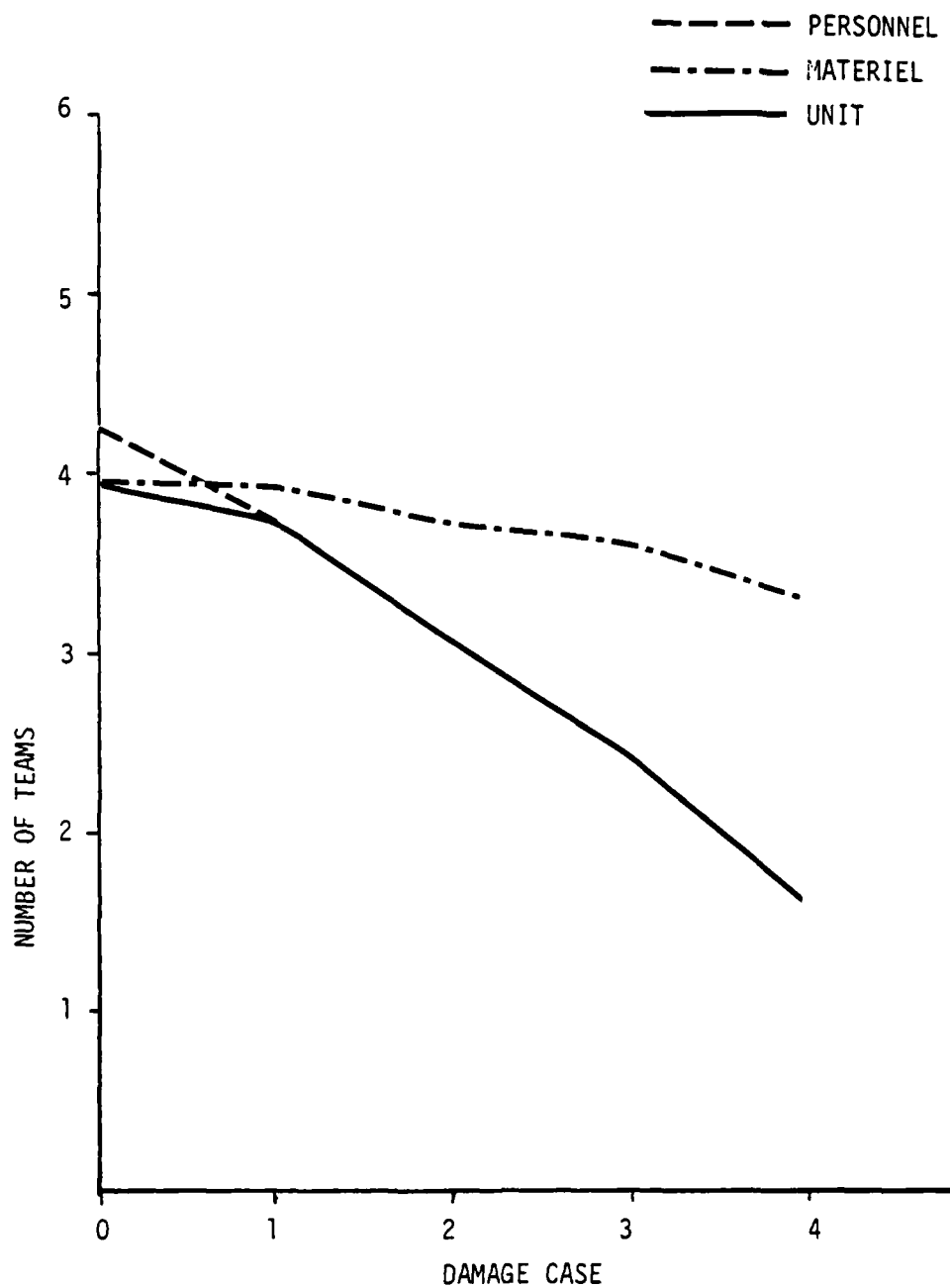


Figure 2-IV-6. REDCON 3 - Unit Recovered Capability and Limiting Factor - HQ BTRY, FA BN - Mission 2

maintaining the command function in the cases examined. Of the four unit conditions and four damage cases each, only one instance showed a slight reduction of capability in mission 1. That case was due to a shortage of staff officers.

2. SERVICE BATTERY, FIELD ARTILLERY BN

Analysis of this unit was based on TOE 06-369H with change 16. The organization chart is shown at Figure 2-IV-7.

The personnel listing with TOE authorizations for the Service Btry is at Table 2-IV-14. The transfer matrix for these personnel is at Table 2-IV-15. Table 2-IV-16 shows the essential personnel requirements for the unit teams. Only one mission for this unit was analyzed, that of providing support to units of the battalion. Tables 2-IV-17 thru 2-IV-19 show the personnel fill configurations which were used to represent the three readiness conditions.

b. Materiel

The materiel listing and TOE authorizations is shown at Table 2-IV-20. Table 2-IV-21 is the transfer matrix for these materiel items. The essential team requirements are shown at Table 2-IV-22. The on-hand quantities of materiel which were used for the representation of REDCONs is at Table 2-IV-23.

c. Effect of Readiness Condition on Unit Capability

Figure 2-IV-8 portrays the results of analysis of unit capability for each of the readiness conditions. The chart shows that materiel is the limiting factor of unit capability. It also shows a high degree of transferability among personnel. That is, the number of personnel teams formed is equal, or very close, to the maximum possible with the strength available.

Table 2-IV-26 shows the range of capability of this unit for each of the REDCONs. Unit 100% capability is defined as the maximum

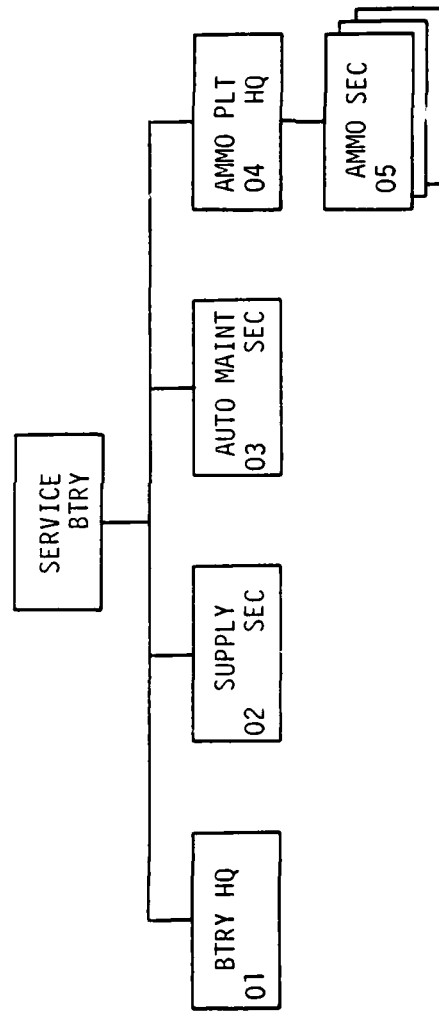


Figure 2-IV-7. Service Battery, Field Artillery Battalion Organization Chart

Table 2-IV-14. TOE Personnel Listing, Service Battery, FA BN, 155mm (SP)

TOE 06-369H000 with change 16

		PERSONNEL	TOE
1	C1	Btry CO	1
2	C2	1SGT	1
3	C3	Food Service Sergeant/1st Cook	2
4	C4	Supply Sergeant	1
5	C5	Motor Sergeant	1
6	C6	Armorer	1
7	C7	Cooks	2
8	C8	EQ Maint Clk/PLLClk	2
9	C9	Tac Wire Spec	1
10	C10	Pwr Gen and WVEH Mech	7
11	C11	Lt Vehicle Driver	4
12	S1	Bn Supply Sergeant	1
13	S2	General Supply Man (SR)	1
14	S3	General Supply Man	2
15	S4	Heavy Vehicle Driver	7
16	M1	Auto Maintenance Technician	1
17	M2	Motor Maintenance Sergeant	1
18	M3	Sr RCV Vehicle Op	1
19	M4	Sr TVM	1
20	M5	SR PWR Gen and WVEH Mech	2
21	M6	TVM	3
22	M7	RCV Veh Op	4
23	M8	Welder	1
24	A1	Ammo Officer	1
25	A2	Ammo Supply Sergeant	1
26	A3	Ammo Agent/Clerk	2
27	T1	Ammo Section Chief	3
28	T2	Sr Hvy Vehicle Driver	4
29	T3	Ammo Handler	9



Table 2-IV-15. Personnel Transfer Matrix, Service Battery, Field Artillery BN.

TASK	TUE	MID FEB 64 MISSION																														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29		
C1	1	0	0	-1	15	0	-1	15	15	0	-1	0	60	30	0	15	-1	15	-1	-1	0	-1	0	-1	15	15	0	0	15	0		
C2	1	15	0	60	15	0	-1	15	15	0	15	0	60	30	0	15	-1	15	-1	-1	0	-1	0	-1	15	15	0	0	15	0		
C3	2	-1	-1	0	30	-1	-1	15	-1	15	-1	0	-1	15	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0		
C4	1	-1	30	60	0	30	0	15	0	0	30	0	30	15	0	30	-1	-1	-1	-1	-1	-1	-1	0	-1	30	30	15	0	30	0	
C5	1	-1	30	-1	15	0	30	15	0	0	0	-1	30	0	0	30	15	0	30	0	0	0	0	0	30	-1	-1	15	0	15	0	
C6	1	-1	-1	-1	30	-1	0	30	15	0	-1	0	-1	60	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0		
C7	2	-1	-1	60	-1	-1	-1	30	-1	0	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0		
C8	2	0	-1	-1	-1	-1	-1	30	-1	0	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0		
C9	1	-1	-1	-1	-1	-1	-1	30	-1	0	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0		
C10	7	6	-1	-1	-1	60	30	-1	-1	0	-1	0	-1	-1	15	15	-1	60	-1	30	15	0	60	-1	-1	-1	-1	-1	-1	0		
C11	4	3	-1	-1	-1	-1	60	-1	-1	15	60	0	-1	-1	15	15	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0		
S1	1	-1	15	-1	0	30	0	15	0	0	30	0	0	0	30	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	15	15	0	0	15	0	
S2	1	0	-1	60	15	30	0	15	0	0	30	0	15	0	0	30	-1	-1	-1	-1	-1	-1	-1	0	-1	30	30	15	0	30	0	
S3	2	-1	-1	-1	-1	-1	-1	60	30	30	-1	0	-1	60	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	
S4	7	10	-1	-1	-1	-1	-1	-1	-1	-1	15	0	-1	-1	15	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	
M1	1	30	15	-1	15	0	30	15	0	0	0	60	30	0	0	0	0	0	0	0	0	0	0	0	0	0	15	15	0	0	15	0
M2	1	0	60	30	-1	30	0	30	15	0	0	0	60	30	0	0	0	0	0	0	0	0	0	0	0	0	15	15	0	0	15	0
M3	1	0	-1	-1	-1	-1	30	-1	15	-1	0	0	-1	-1	0	-1	-1	0	-1	30	0	-1	15	0	0	0	15	15	0	0	15	0
M4	1	-1	-1	-1	-1	30	15	30	15	30	0	0	-1	-1	0	30	15	0	0	0	0	0	0	0	0	15	-1	-1	-1	-1	15	0
M5	2	0	-1	-1	-1	15	30	15	30	0	0	0	-1	-1	0	30	15	0	15	0	15	0	0	0	0	15	-1	-1	-1	-1	30	0
M6	3	5	-1	-1	-1	-1	30	-1	-1	0	0	-1	-1	15	0	-1	-1	15	0	-1	30	30	15	0	0	30	-1	-1	-1	-1	15	0
M7	4	-1	-1	-1	-1	-1	-1	-1	-1	0	15	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	
M8	1	0	-1	-1	-1	-1	-1	-1	-1	0	15	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	
M9	1	0	15	15	-1	30	0	-1	15	15	0	-1	0	30	15	0	15	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	
M10	1	0	60	30	-1	15	15	30	0	-1	0	-1	0	30	15	0	15	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	
M11	1	0	-1	-1	-1	-1	-1	30	15	0	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	
M12	2	3	-1	-1	-1	-1	30	-1	15	30	15	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	
M13	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M14	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M15	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M16	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M17	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M18	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M19	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M20	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M21	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M22	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M23	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M24	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M25	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M26	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M27	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M28	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M29	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M30	3	-1	-1	-1	-1	-1	-1	30	-1	15	30	0	-1	0	-1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	64	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29		

Table 2-IV-16. Personnel - Essential Team Requirements, Service Battery, FA BN.

TEAM	1	2	3	4	5	6
ASN 1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	1	1	1	1	1	1
4	1	1	1	1	1	1
5	1	1	1	1	1	1
6	0	0	0	0	0	0
7	1	1	1	1	1	1
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	3	4	5	6	7	8
11	2	2	2	3	3	3
12	1	1	1	1	1	1
13	0	0	0	0	0	0
14	1	1	2	2	3	3
15	1	3	4	7	8	10
16	1	1	1	1	1	1
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	1	1	1	1	1	1
20	0	0	0	0	0	0
21	0	1	2	3	5	5
22	1	2	2	3	3	4
23	0	0	0	0	0	0
24	1	1	1	1	1	1
25	0	0	0	0	0	0
26	1	1	2	2	3	3
27	0	1	2	3	4	5
28	1	1	2	2	3	3
29	1	3	5	7	9	11
Total	21	29	38	48	58	65







Table 2-IV-20. TOE Materiel Listing, Service Battery, FA BN, 155mm (SP)

TOE 06-369H000 with change 16

	MATERIEL	TOE
1	TU1 Truck Util ½ Ton (ky28, ky38 AN/VRC46, AN/GRA39)	1
2	TU2 Truck Util ½ Ton (AN/GRC-160)	1
3	TC1 Truck Cargo 1½ Ton (KY28, KY38, AN/VRC46)	1
4	TC2 Truck Cargo 2½ Ton	6
5	TC3 Truck Cargo 2½ Ton W/WINCH	1
6	TC4 Truck Cargo 5 Ton (Fuel Svc Kit Mounted)	1
7	TC5 Truck Cargo 8 Ton	9
8	TF1 Truck Fuel Svc (2500 Gal)	2
9	TW1 Truck Wrecker 10 Ton	1
10	RV1 RCV Veh FT (AN/VRC-64)	2
11	TRL1 Trailer ½ Ton Cargo	1
12	TRL2 Trailer 1½ Ton (400 Gal) Water	1
13	TRL3 Trailer 1½ Ton Cargo	3
14	TRL4 Trailer 1½ Ton (Fuel Svc Kit Mounted)	1
15	TRL5 Trailer 1½ Ton (Ammo)	9
16	GEN1 Generators (All Types)	6

Table 2-IV-21. Materiel Transfer Matrix, Service Battery, Field Artillery Bn.

TASK	TUE	REN FOR 6 TEAMS MISSION	MATERIEL															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	IU1	1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
2	IU2	1	30	0	30	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
3	IC1	1	0	0	0	60	60	-1	-1	-1	-1	0	-1	30	-1	30	-1	-1
4	IC2	6	60	60	60	0	30	60	60	60	-1	-1	0	60	0	30	0	-1
5	IC3	1	0	60	60	0	0	60	60	60	-1	-1	0	60	0	30	0	-1
6	IC4	1	-1	-1	-1	30	0	-1	0	60	60	-1	-1	-1	0	-1	-1	-1
7	IC5	9	60	60	60	0	30	60	0	60	60	60	0	60	0	30	0	-1
8	IF1	2	3	-1	-1	-1	30	0	-1	0	-1	-1	-1	-1	-1	0	-1	-1
9	IV1	1	1	60	60	60	-1	0	-1	-1	-1	0	60	-1	-1	-1	-1	-1
10	KVI	2	3	30	15	30	-1	0	-1	-1	-1	0	-1	-1	-1	-1	-1	-1
11	IRL1	1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1
12	IRL2	1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1
13	IRL3	3	3	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	60	0	30	30
14	IRL4	1	1	-1	-1	-1	-1	-1	30	-1	30	-1	-1	-1	-1	0	-1	-1
15	IRL5	9	11	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	30	-1
16	GENI	6	4	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Table 2-IV-22. Materiel - Essential Team Requirements,  
Service Battery, FA BN.

TEAM	1	2	3	4	5	6
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	1	1	1	1	1	1
4	4	4	4	5	6	6
5	0	0	0	0	0	0
6	0	0	0	1	1	1
7	1	3	5	7	9	11
8	1	2	2	2	2	3
9	1	1	1	1	1	1
10	0	1	1	2	2	3
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	2	2	2	2	3	3
14	0	0	0	1	1	1
15	1	3	5	7	9	11
16	2	2	3	3	4	4



Table 2-IV-23. REDCON Materiel Listing, Service Battery, FA BN, 155mm (SP)

	MATERIEL	REDCON			
		1	2	3	
1	TU1	Truck Util ½ Ton (KY28, KY38 AN/VRC46, AN/GRA39)	1	1	1
2	TU2	Truck Util ½ Ton (AN GRC-160)	0	0	0
3	TC1	Truck Cargo 1½ Ton (KY28, KY38, AN/VRC46)	1	1	1
4	TC2	Truck Cargo 2½ Ton	5	5	4
5	TC3	Truck Cargo 2½ Ton W/WINCH	1	1	1
6	TC4	Truck Cargo 5 Ton (Fuel Svc Kit Mounted)	1	1	1
7	TC5	Truck Cargo 8 Ton	8	7	6
8	TF1	Truck Fuel Svc (2500 Gal)	1	1	1
9	TW1	Truck Wrecker 10 Ton	1	1	1
10	RV1	RCV Veh FT (AN/VRC-64)	1	1	1
11	TRL1	Trailer ½ Ton Cargo	1	1	1
12	TRL2	Trailer 1½ Ton (400 Gal) Water	1	1	1
13	TRL3	Trailer 1½ Ton Cargo	2	1	1
14	TRL4	Trailer 1½ Ton (Fuel Svc Kit Mounted)	1	1	1
15	TRL5	Trailer 1½ Ton (Ammo)	8	7	6
16	GEN1	Generators (All Types)	5	5	4

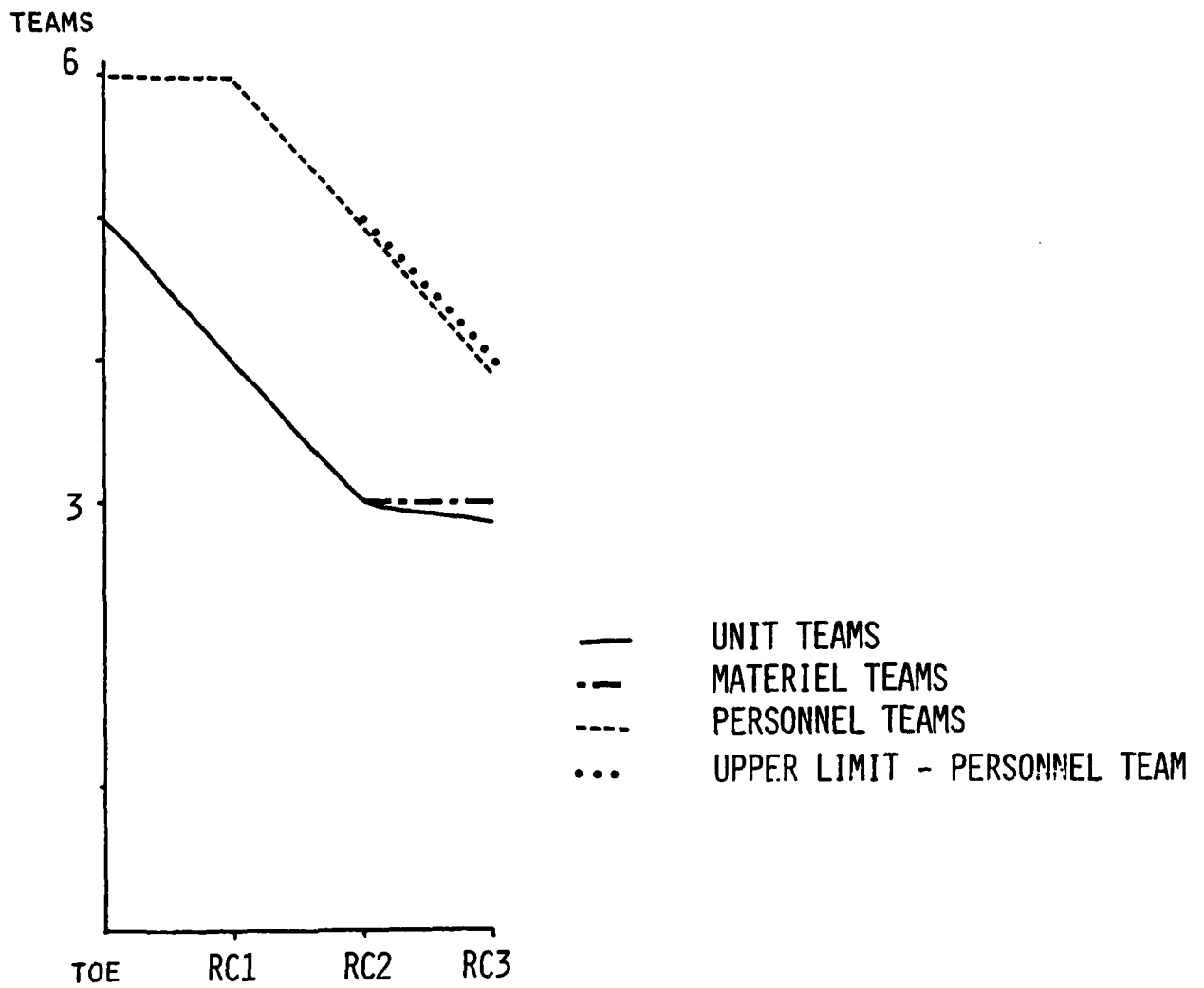


Figure 2-IV-8. Unit Readiness Condition Capability and Limiting Factors--Service Battery, FA BN.

unit teams, which was five. The table shows a very wide range of expected capabilities applicable to all three readiness conditions. It also shows the expected range of REDCON 2 and 3 to be the same. We also find that this unit in any readiness condition could, in fact, be fully effective.

Table 2-IV-24. Unit Readiness Condition Capability Range, Service Battery, FA Battalion

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	4.0-5.0	3.0-4.0	3.0
Personnel Teams	6.0	5.0-6.0	3.9-5.0
Unit Teams	4.0-5.0	3.0-5.0	3.0-5.0
Unit Capability	80-100%	60-100%	60-100%
Overlap Range	80-100%		

d. Recovered Capability After Damage in Readiness Conditions

Figures 2-IV-9 thru 2-IV-12 present the results obtained from application of damage to units in the various readiness conditions. These charts show that although materiel limits the unit capability in the no damage cases, very low casualty levels change the situation and personnel become the limiting factor. The personnel teams were generally limited by the absence of officers and senior grade personnel.

3. FIELD ARTILLERY BATTERY, FIELD ARTILLERY BATTALION

Analysis of the Field Artillery Battery was based on TOE 06-367H with change 25. The organization chart for this unit is shown at Figure 2-IV-13.

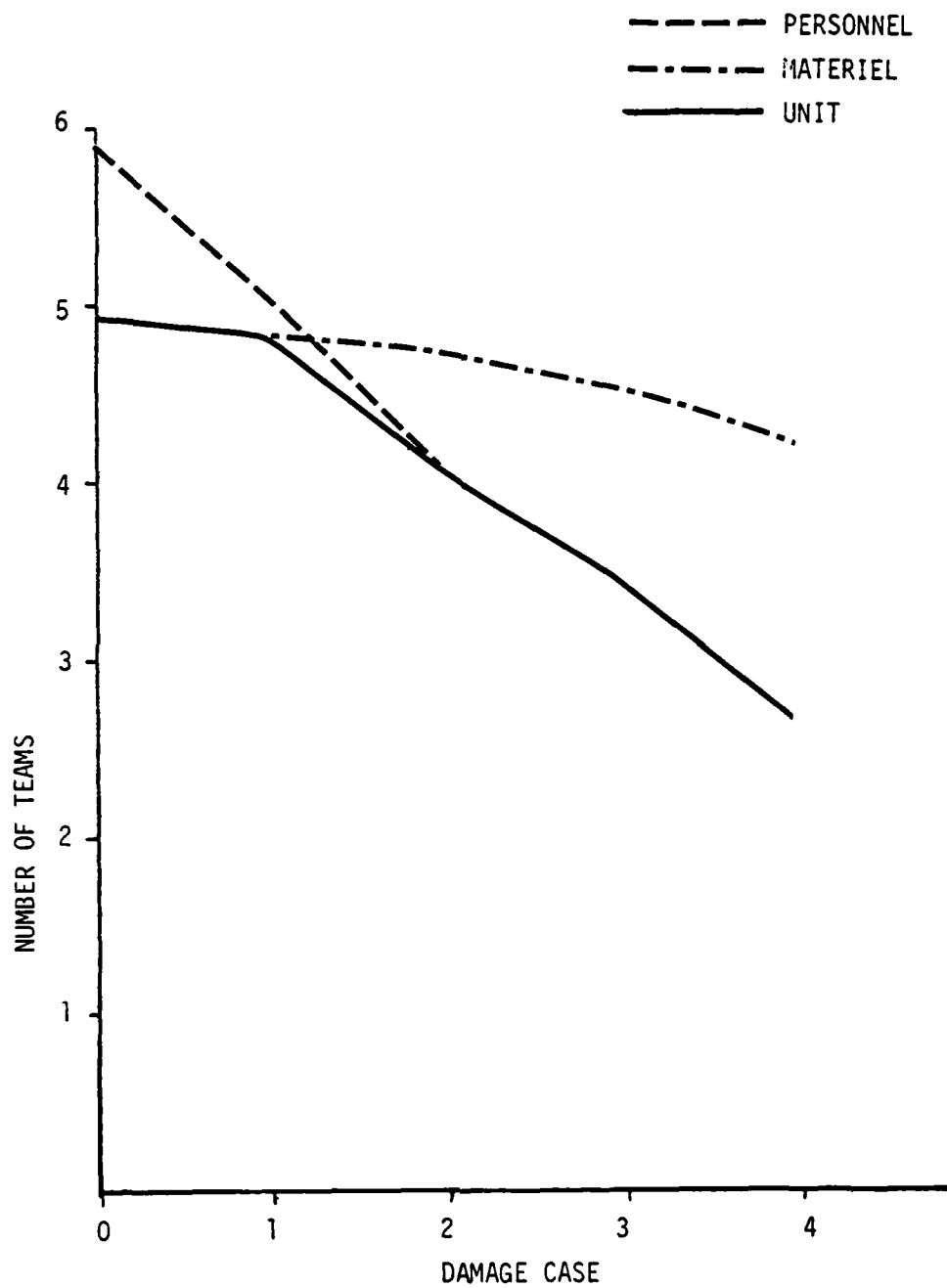


Figure 2-IV-9. TUE - Unit Recovered Capability and Limiting Factor - SVC BTRY, FA BN - Mission 2

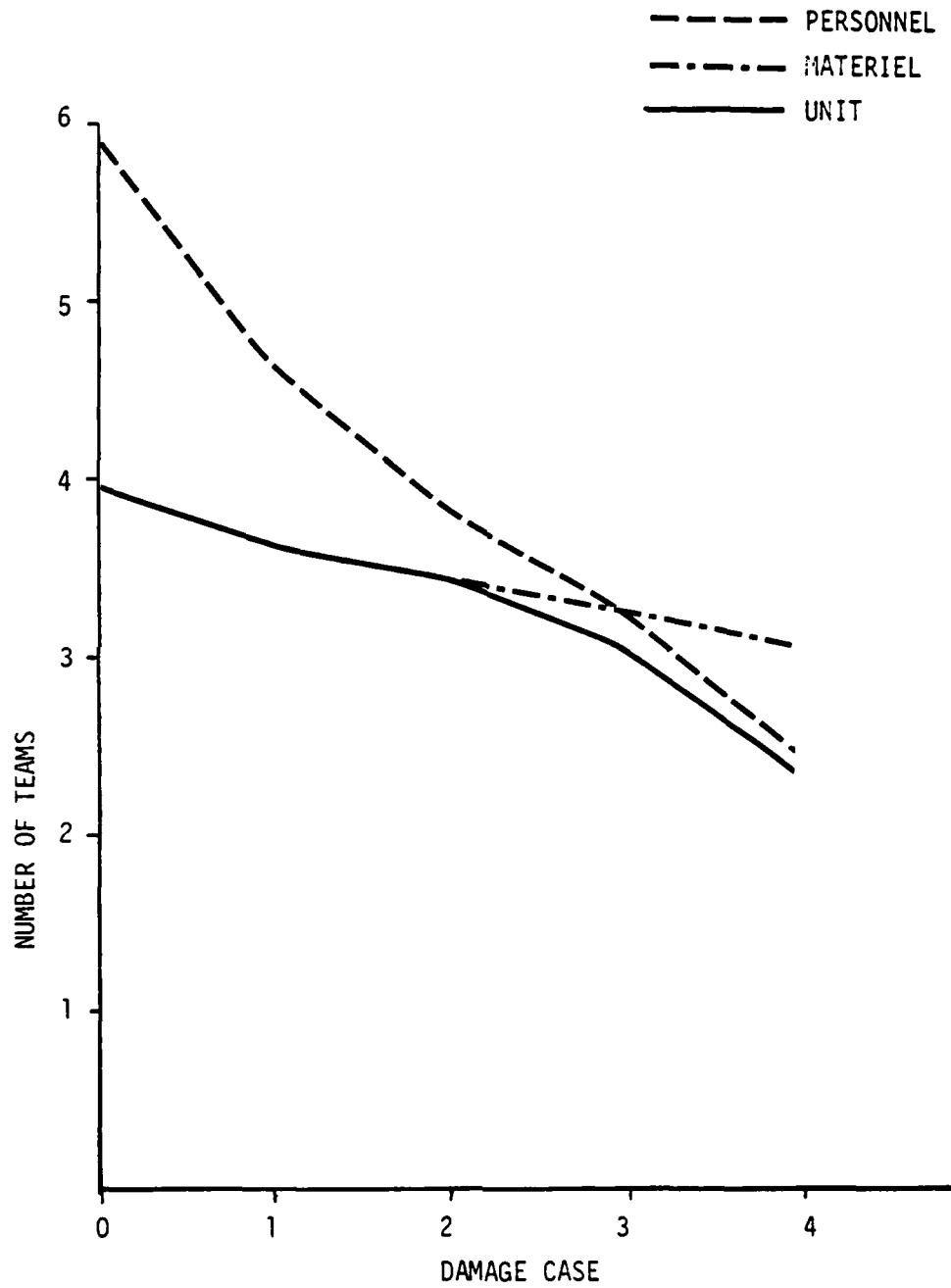


Figure 2-IV-10. REDCON 1 - Unit Recovered Capability and Limiting Factor - SVC BTRY, FA BN - Mission 2

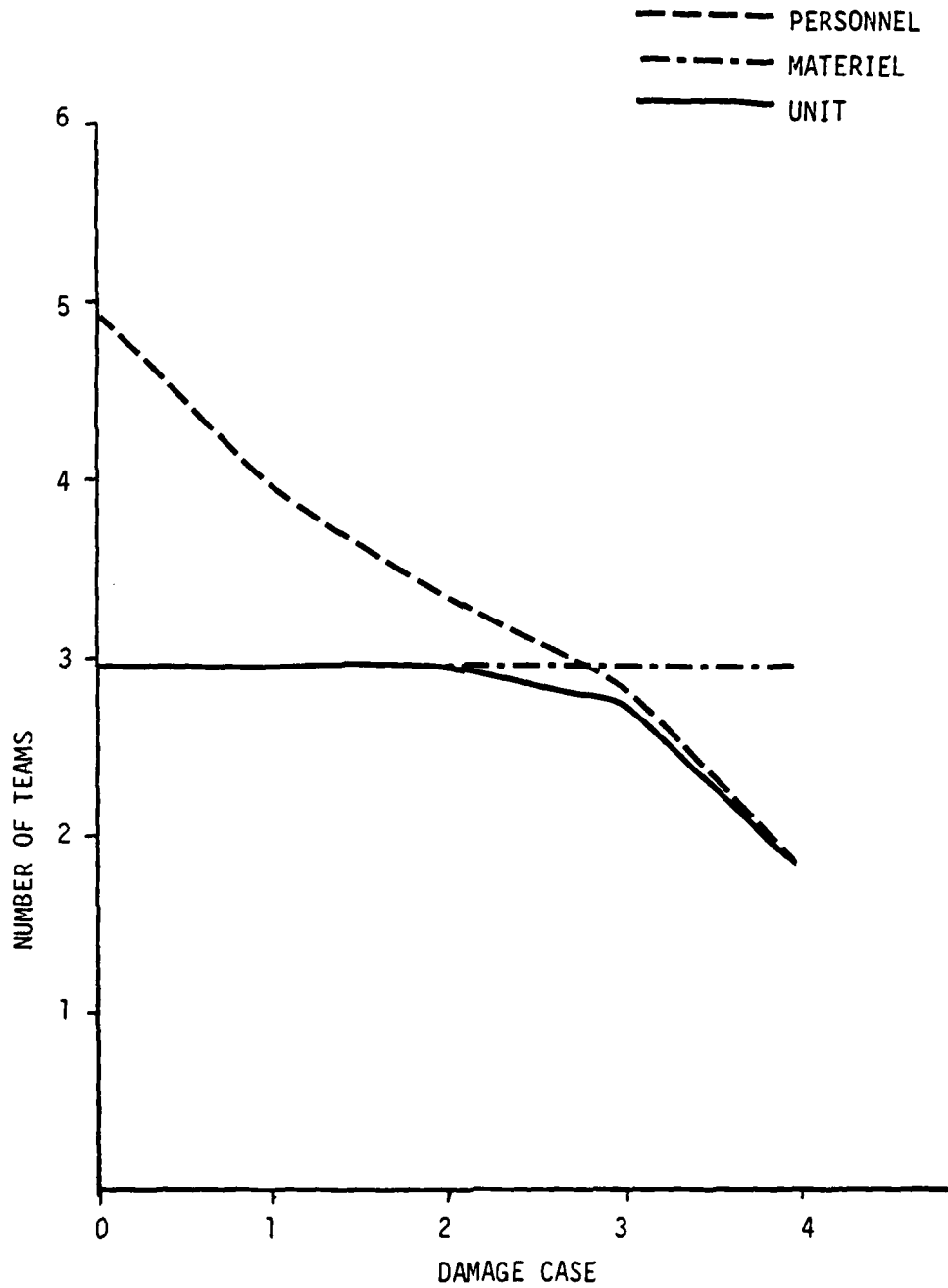


Figure 2-IV-11. REDCON 2 - Unit Recovered Capability and Limiting Factor - SVC BTRY, FA BN - Mission 2

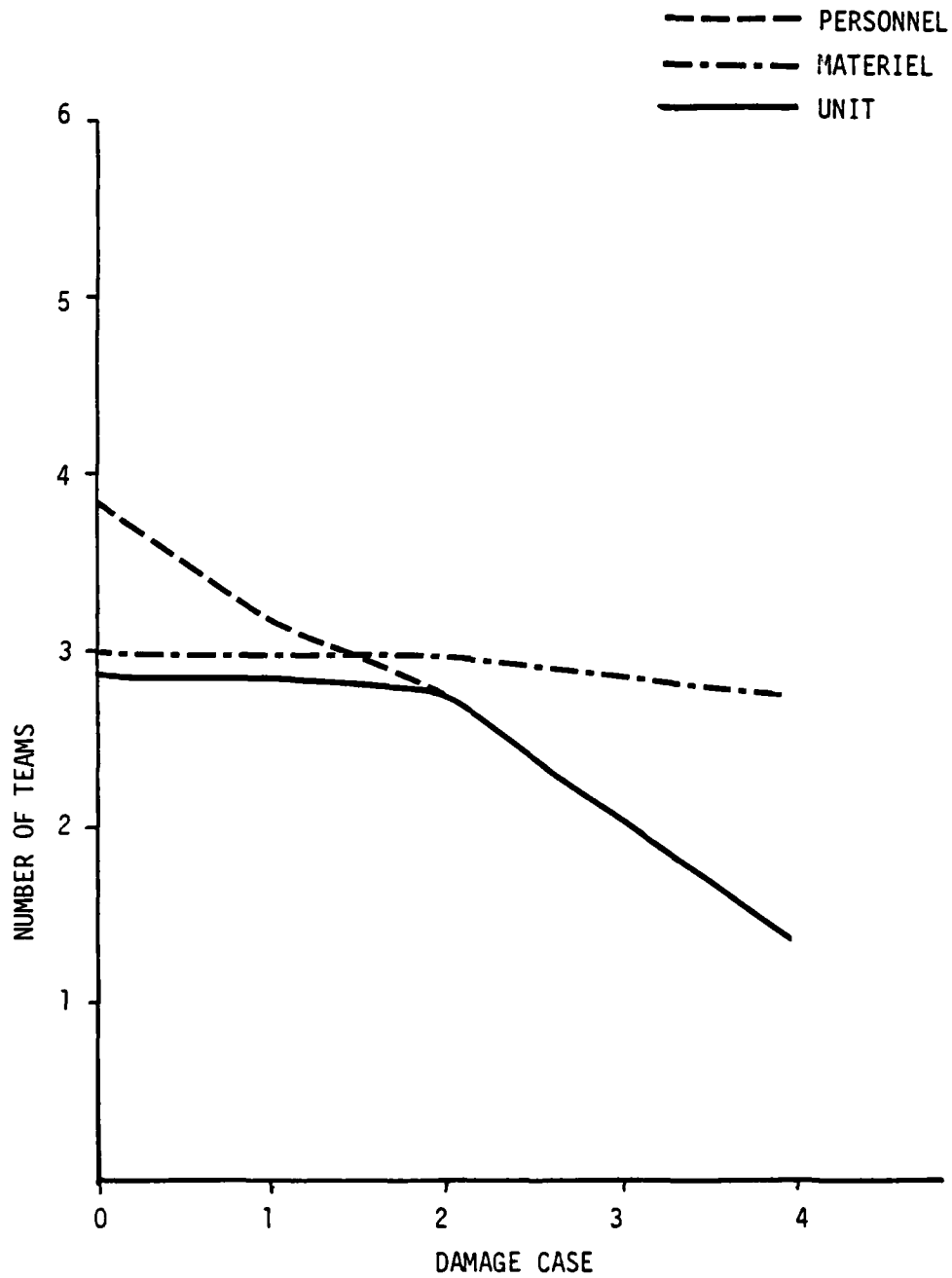


Figure 2-IV-12. REDCUM 3 - Unit Recovered Capability and Limiting Factor - SVC BTRY, FA BN - Mission 2

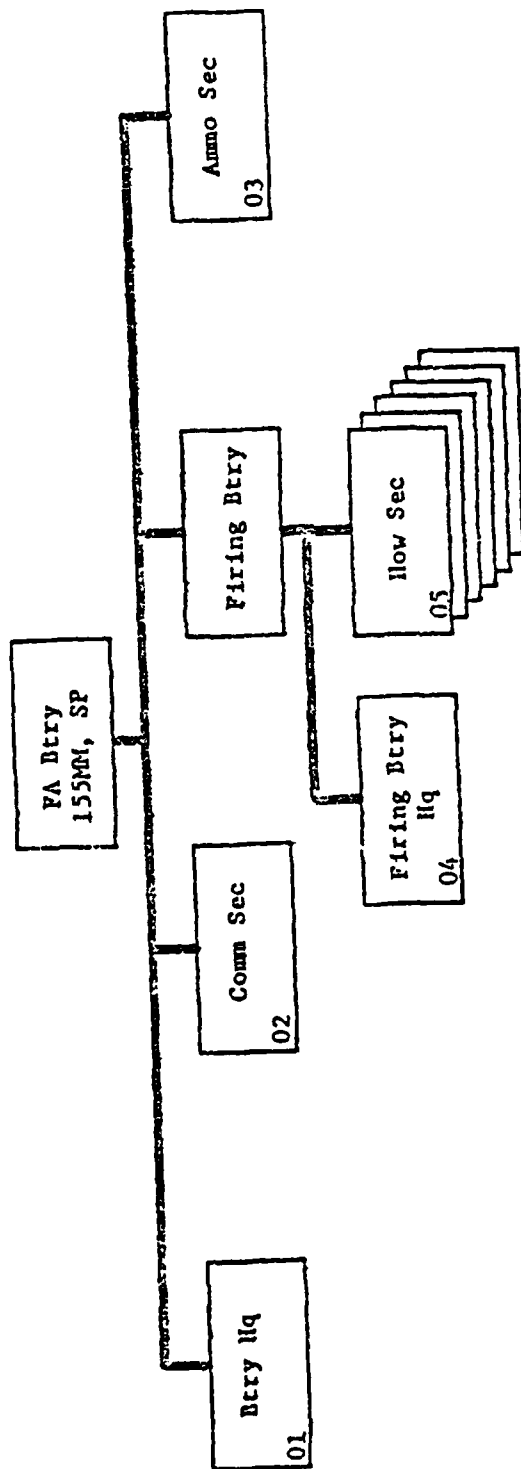


Figure 2-IV-13. Field Artillery Battery, FA Battalion Organization Chart



a. Personnel

The personnel listing and TOE authorizations are shown at Table 2-IV-25. Table 2-IV-26 is the transfer matrix for these personnel. Tables 2-IV-27 and 2-IV-28 show the essential personnel requirements for mission 1 and 2. Mission 1 is basically the firing mission and mission 2 adds the requirement for organizational maintenance support. Tables 2-IV-29 thru 2-IV-31 show the personnel fill variations which were used for the representation of the readiness conditions.

b. Materiel

The materiel listing and TOE authorizations are at Table 2-IV-32. The transfer matrix for the equipment items is at Table 2-IV-33. The essential materiel requirements are shown at Table 2-IV-34. Materiel items required were the same for both missions. Table 2-IV-35 shows the on-hand quantities of equipment which were used for the REDCON representations.

c. Effect of Readiness Condition on Unit Capability

The results of the analysis of unit capability at the various readiness conditions is shown by Figures 2-IV-14 and 2-IV-15. The capability is limited by the howitzer. There is, for the missions defined, a great capacity in the unit to form the personnel teams required. The requirement for maintenance personnel has only a slight effect on the number of personnel teams formed and because the materiel requirement is the same, unit capability is the same for the two missions.

Table 2-IV-36 presents the expected capability range of the Field Artillery Battery for each of the REDCON's. The personnel capability is so much higher than materiel capability that this unit could be well below REDCON 3 due to personnel and still maintain 100% capability if materiel were full up. The unit has a very large range of capability included in all readiness conditions. That range is equal to, and the same for, both REDCON 1 and REDCON 2.

Table 2-IV-25. TOE Personnel Listing, FA Battery, FA BN, 155 mm (SP)

TOE 06-367H0 with change 25

	PERSONNEL	TOE
1	BH1 Commander	1
2	BH2 First Sergeant	1
3	BH3 Food Service Sergeant	1
4	BH4 Motor Sergeant	1
5	BH5 Supply Sergeant	1
6	BH6 First Cook	1
7	BH7	0
8	BH8 Armorer	1
9	BH9 Cook	2
10	BH10 Equipment Clerk	1
11	BH11 Power Generator/Wheeled Vehicle Mechanic	1
12	BH12 Track Vehicle Mechanic	3
13	BH13 Light Vehicle Driver	1
14	CS1 Communications Chief	1
15	CS2 Wire Operations Specialist	2
16	FB1 Executive Officer	1
17	FB2 Fire Direction Officer	1
18	FB3 Chief of Firing Battery	1
19	FB4 Gunnery Sergeant	1
20	FB5 Chief of Firing Battery Computation	1
21	FB6 Fire Direction Computer	2
22	FB7 Chart Operator	3
23	FB8 Carrier Driver	1
24	FB9 FA Weapons Mechanic	2
25	HS1 Howitzer Section Chief	6
26	HS2 Gunner	6
27	HS3 Assistant Gunner	6
28	HS4 Cannoneer/Assembler	6
29	HS5 Cargo Carrier Driver	6
30	HS6 Motor Carriage Driver	6
31	HS7 Cannoneer	24
32	AS1 Ammunition Section Chief	1
33	AS2 Heavy Vehicle Driver (SR)	1
34	AS3 Heavy Vehicle Driver	4
35	AS4 Ammunition Handler	2



Table 2-IV-27. Personnel - Essential Team Requirements, FA Battery, FA Bn - Mission 1

TASK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																		
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0														
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0												
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																			
27	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																			
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10																			
30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																			
31	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40																			
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	13	18	24	29	35	40	46	51	57	62	68	73	79	84	90	95	101	106	112	117																			

Table 2-IV-28. Personnel - Essential Team Requirements, FA Battery, FA Bn - Mission 2

TASK	TEAM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20
27	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	10
30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20
31	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	40
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		17	22	28	33	39	44	50	55	61	66	72	77	83	88	94	99	105	110	116	121









Table 2-IV-32. TOE Materiel Listing, FA Battery, FA BN, 155mm (SP)

TOE06-367H0 with change 25

	MATERIEL	TOE
1	BH1 Truck, Utility ½ ton (W/CMD Radios)	1
2	BH2 Truck, Cargo 2½ ton 6x6 W/W	1
3	BH3 Truck, Cargo 2½ ton 6x6	2
4	BH4 Trailer, Water 1½ ton (400 gal)	1
5	BH5 Trailer, Cargo 1½ ton	1
6	FB1 Carrier, CP M577 (W/FDC + Radios)	1
7	FB2 Truck, Cargo 1½ ton (W/XO Radios)	1
8	FB3 Trailer Cargo 1½ ton	1
9	FB4 Aiming Circles	3
10	HS1 Howitzer, 155mm (SP) M109A1	6
11	HS2 Trailer, Ammo 1½ ton	6
12	HS3 Carrier, Cargo 6 Ton	6
13	AS1 Truck, Cargo 8 Ton	3
14	AS2 Trailer, Ammo 1½ ton	3

Table 2-IV-33. Materiel Transfer Matrix, Field Artillery Battery.

TASK	MATERIEL	REQ FOR 20 TEAMS MISSION															
		TUE	1 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	BH1	1	1	0	-1	-1	-1	-1	30	-1	-1	-1	-1	-1	-1	-1	-1
2	BH2	1	0	30	0	0	-1	-1	30	15	-1	-1	-1	-1	-1	60	-1
3	BH3	2	0	30	0	0	-1	-1	30	15	-1	-1	-1	-1	-1	60	-1
4	BH4	1	0	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
5	BH5	1	0	-1	-1	-1	-1	0	-1	-1	0	-1	-1	-1	-1	-1	-1
6	FB1	1	1	0	-1	-1	-1	-1	0	30	-1	-1	-1	-1	-1	-1	-1
7	FB2	1	1	0	30	30	-1	-1	30	0	-1	-1	-1	-1	-1	-1	-1
8	FB3	1	0	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	0	-1	-1	-1
9	FM4	3	1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1
10	HS1	6	20	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1
11	HS2	6	10	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0
12	HS3	6	10	60	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	30
13	AS1	3	0	60	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	30
14	AS2	3	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1

Table 2-IV-34. Materiel - Essential Team Requirements, FA Battery, FA Bn - Missions 1 & 2

TASK	TEAM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20
11	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	10
12	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	10
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2-IV-35. REDCON Materiel Listing, FA Battery, FA BN 155mm (SP)

	MATERIEL	REDCON			
		1	2	3	
1	BH1	Truck, Utility ½ ton (W/CMD Radios)	1	1	1
2	BH2	Truck, Cargo 2½ ton 6x6 W/W	1	0	0
3	BH3	Truck, Cargo 2½ ton 6x6	1	1	1
4	BH4	Trailer, Water 1½ ton (400 gal)	1	1	1
5	BH5	Trailer, Cargo 1½ ton	0	0	0
6	FB1	Carrier, CP M577 (W/FDC + Radios)	1	1	1
7	FB2	Truck, Cargo 1½ ton (W/XO Radios)	1	1	1
8	FB3	Trailer Cargo 1½ ton	1	1	1
9	FB4	Aiming Circles	2	1	1
10	HS1	Howitzer, 155mm (SP) M109A1	5	5	4
11	HS2	Trailer, Ammo 1½ ton	6	6	6
12	HS3	Carrier, Cargo 6 Ton	5	5	4
13	AS1	Truck, Cargo 8 Ton	2	1	1
14	AS2	Trailer, Ammo 1½ ton	2	1	0

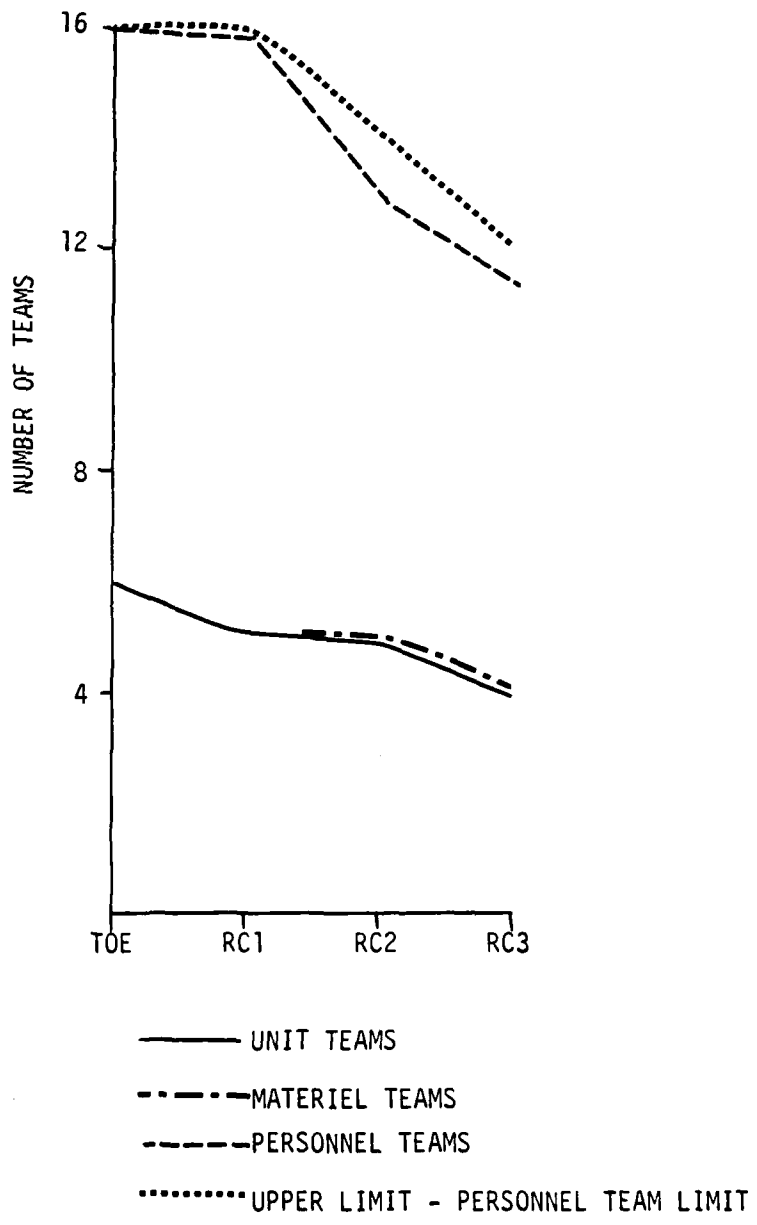


Figure 2-IV-14. Unit Readiness Condition Capability and Limiting Factor - FA BTRY - Mission 1

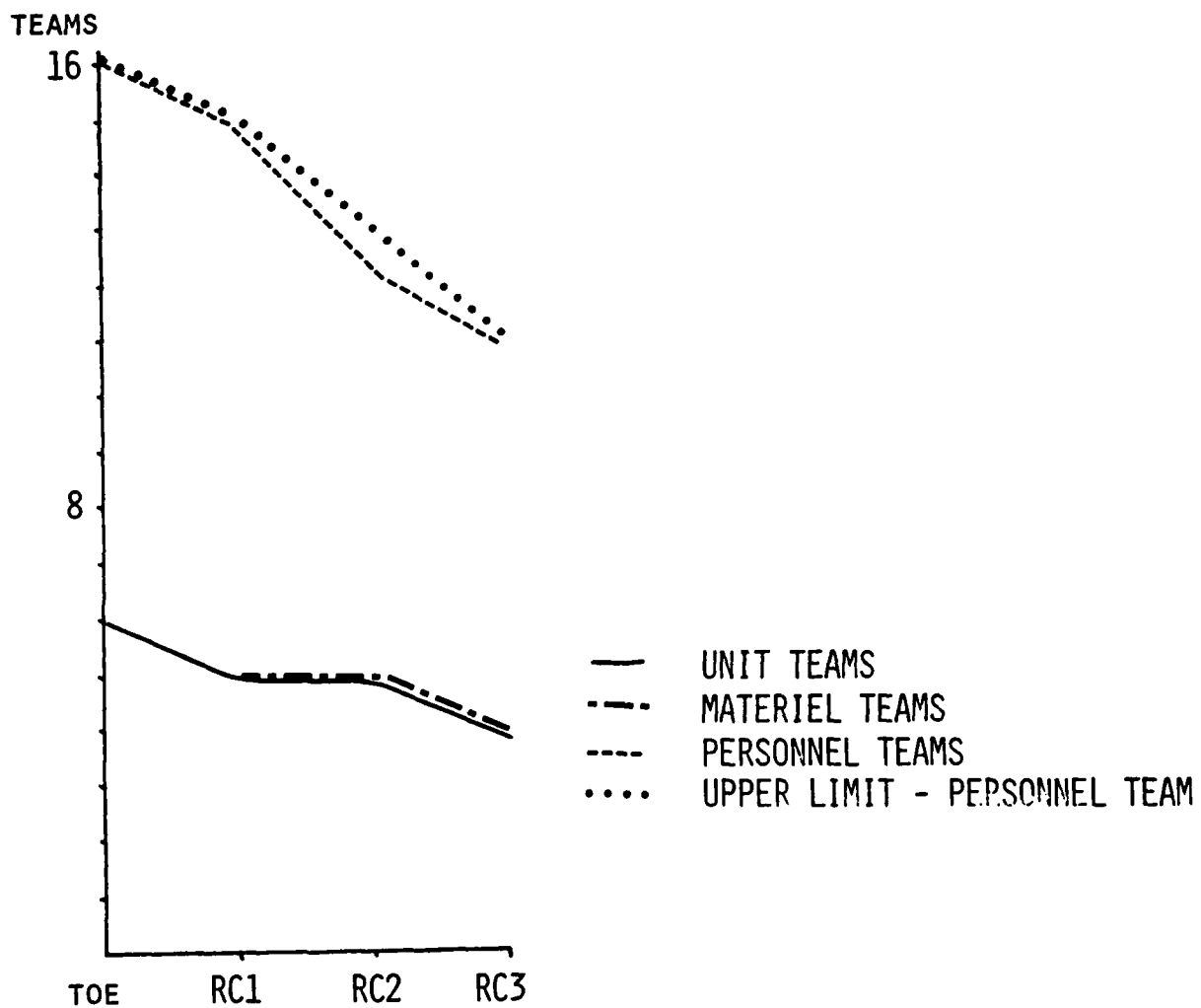


Figure 2-IV-15. Unit Readiness Condition Capability and Limiting Factors--Field Artillery Battery - Mission 2

Table 2-IV-36. Unit Readiness Condition Capability Range, Field Artillery Battery

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	5.0-6.0	5.0-6.0	4.0-5.0
Personnel Teams	14.9-16	12.4-14.9	10.7-12.4
Unit Teams	5.0-6.0	5.0-6.0	4.0-6.0
Unit Capability	83-100%	83-100%	67-100%
Overlap Range	83-100%		

d. Recovered Capability After Damage in Various Readiness Conditions

Figures 2-IV-16 thru 2-IV-19 show the teams which the Field Artillery Battery was able to reconstitute after damage to a unit in the various readiness conditions. Personnel teams formed for the two missions are shown. The requirement for maintenance personnel for mission 2 caused only a slight difference in the team capability. The materiel teams formed were equal for the two missions. The large difference between personnel teams and materiel teams allowed very little interaction and the unit capability was therefore the same for the two missions.

4. UNITS OF THE FIELD ARTILLERY BATTALION - COMPARISON

a. Effect of Readiness Condition

Figure 2-IV-20 provides a comparison of unit capability for units of the Field Artillery Battalion in the various readiness conditions. The chart shows that the Service Battery would be expected to be the limiter of battalion capability for all readiness conditions. This chart shows the expected minimum unit capability for each REDCON.

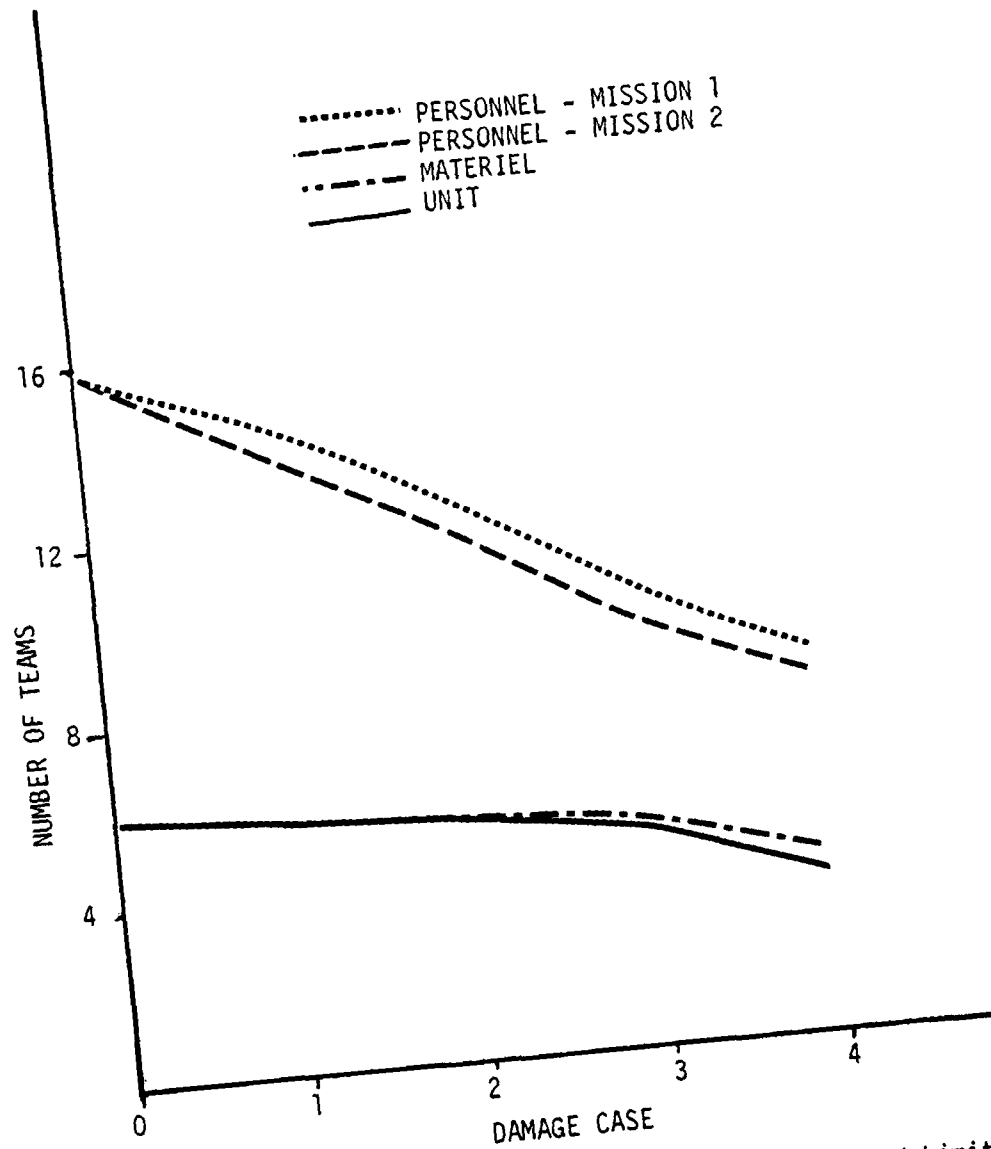


Figure 2-IV-16. TOE - Unit Recovered Capability and Limiting Factor - FA BTRY



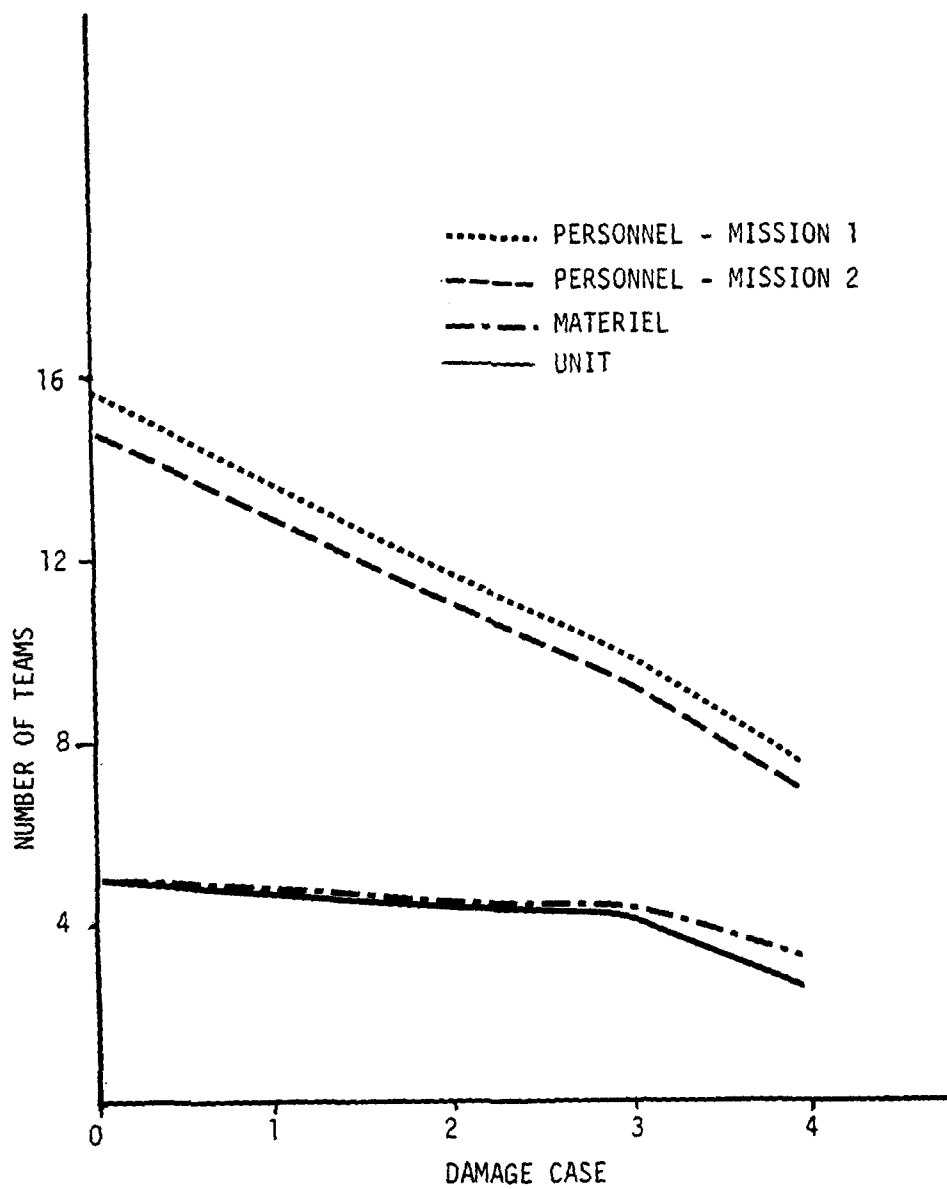


Figure 2-IV-17. REDCON 1 - Unit Recovered Capability and Limiting Factor - FA BTRY

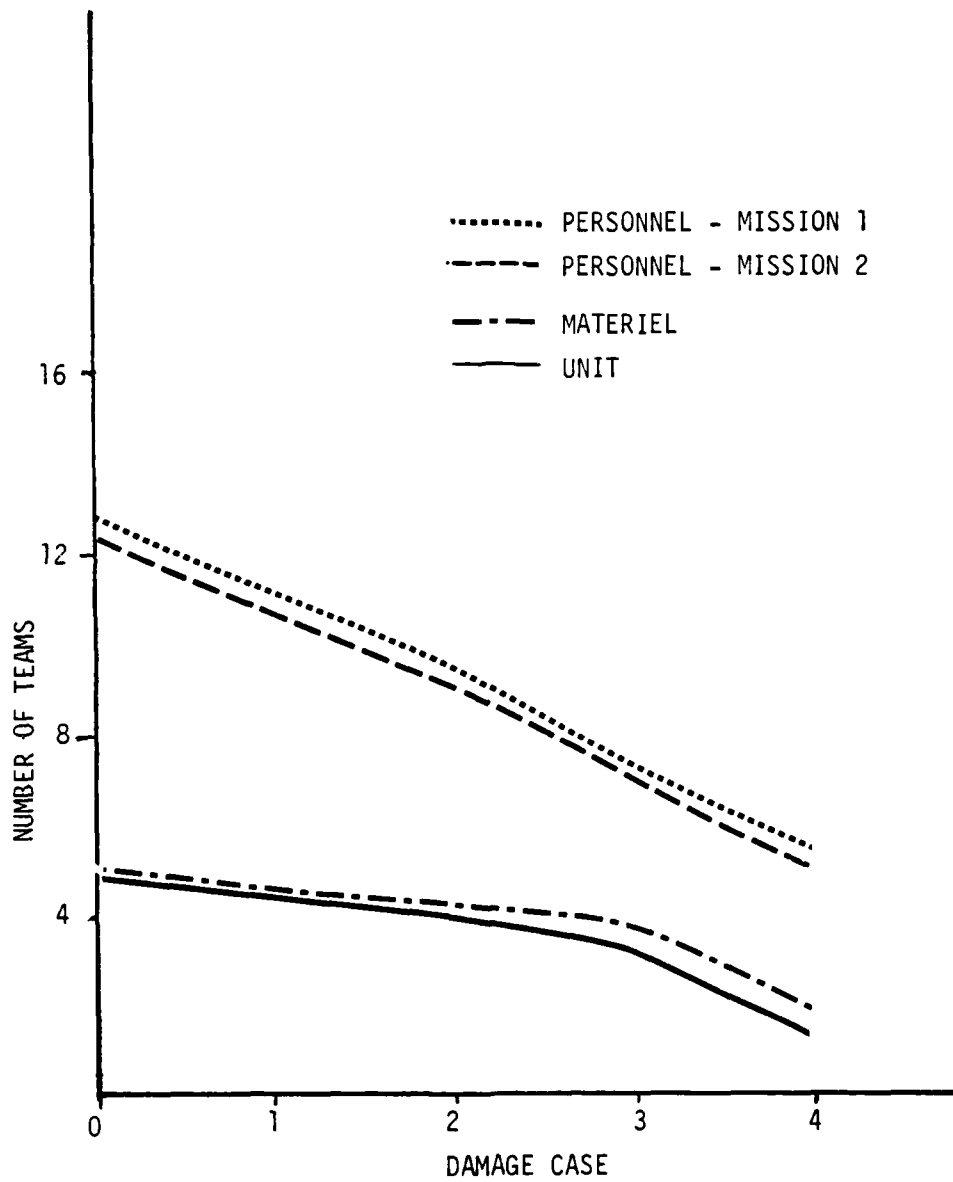


Figure 2-IV-18. REDCON 2 - Unit Recovered Capability and Limiting Factor - FA BTRY

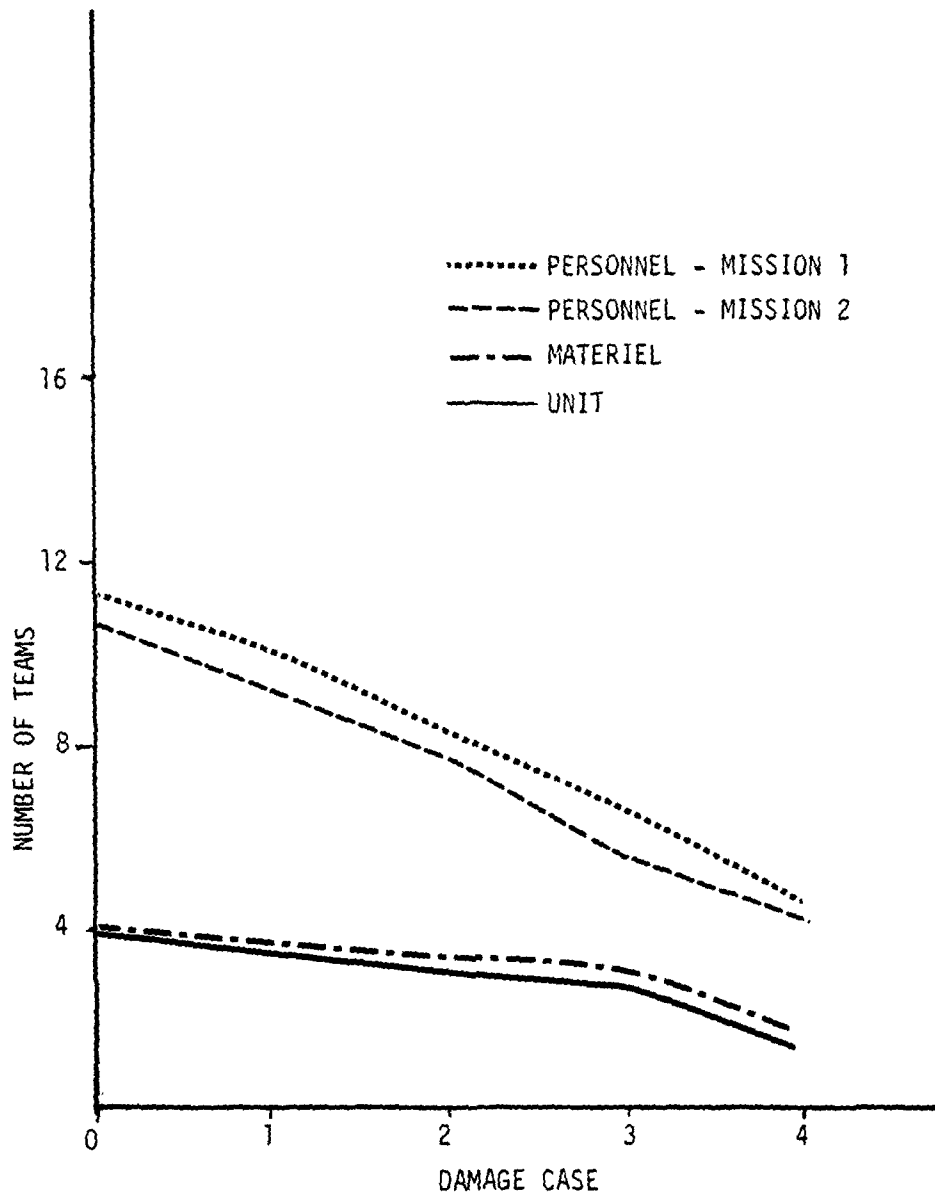


Figure 2-IV-19. REDCON 3 - Unit Recovered Capability and Limiting Factor - FA BTRY

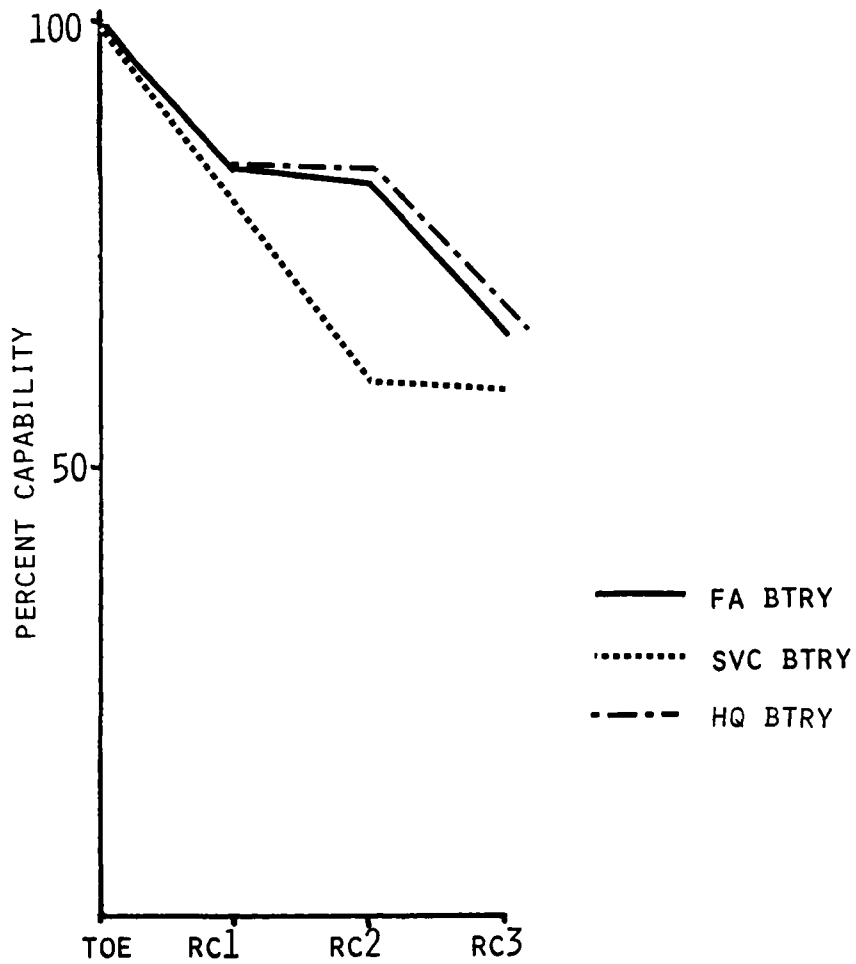


Figure 2-IV-20. Comparison of Units of the Field Artillery Bn, Capability at Different Readiness Conditions.

It is, therefore, useful to compare the expected capability range for each of the units. This comparison is provided at Figure 2-IV-21. This chart shows that there is, in each REDCON, a rather large range of capability overlap for the three units. Further, it shows that in REDCON 2 and 3 there is a high probability that the effectiveness of the Service Battery would be much lower than the other units of the battalion.

b. Effect of Damage Within Readiness Conditions

Figures 2-IV-22 thru 2-IV-25 provide comparisons of the damage effects on each of the units for each of the readiness conditions. These charts show that though the Service Battery is the limiter in the no damage cases, (see Table 2-I-2) quickly decreases the firing battery and headquarters capability to comparable levels.

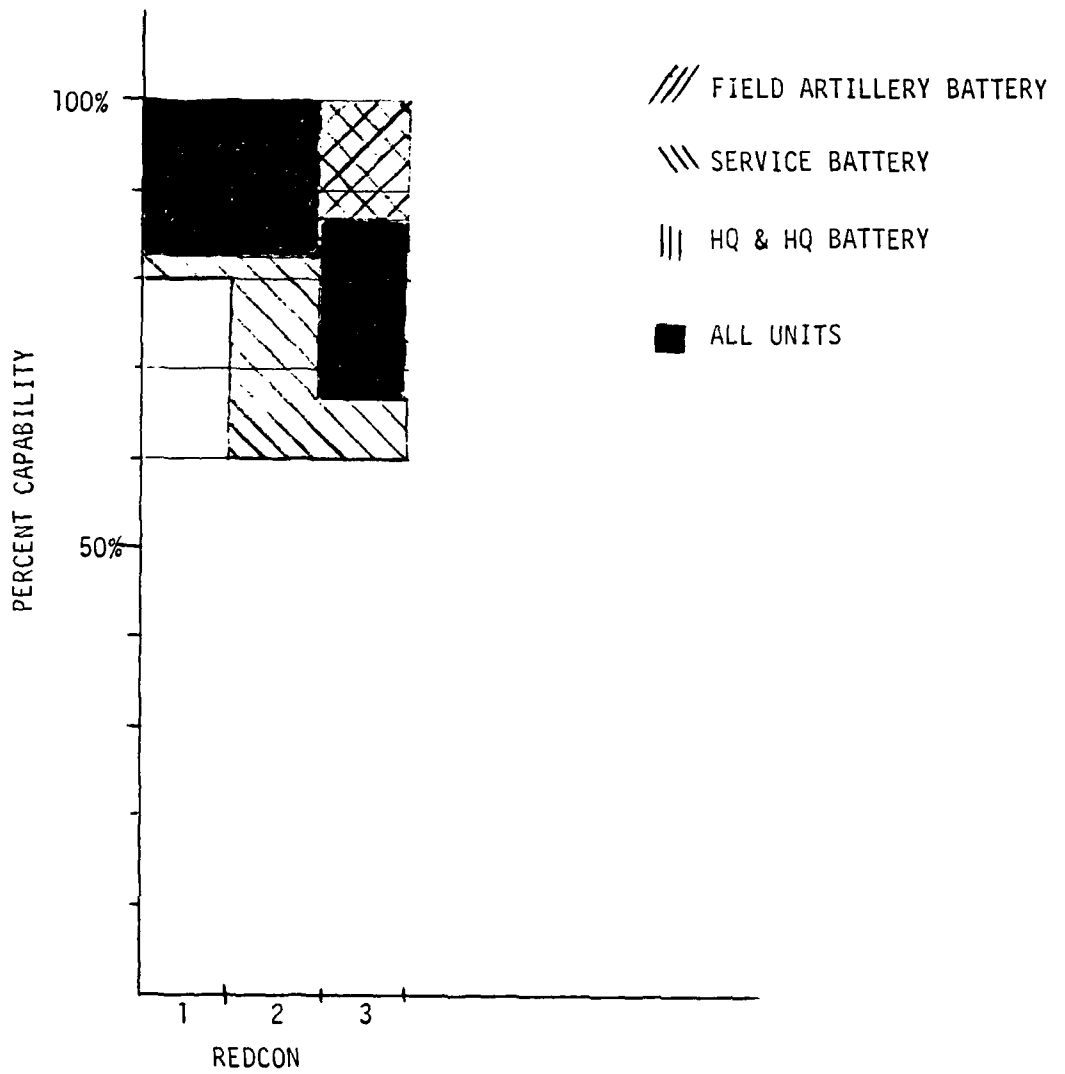


Figure 2-IV-21. Range of Capability, Units of the Field Artillery Battalion in Readiness Conditions

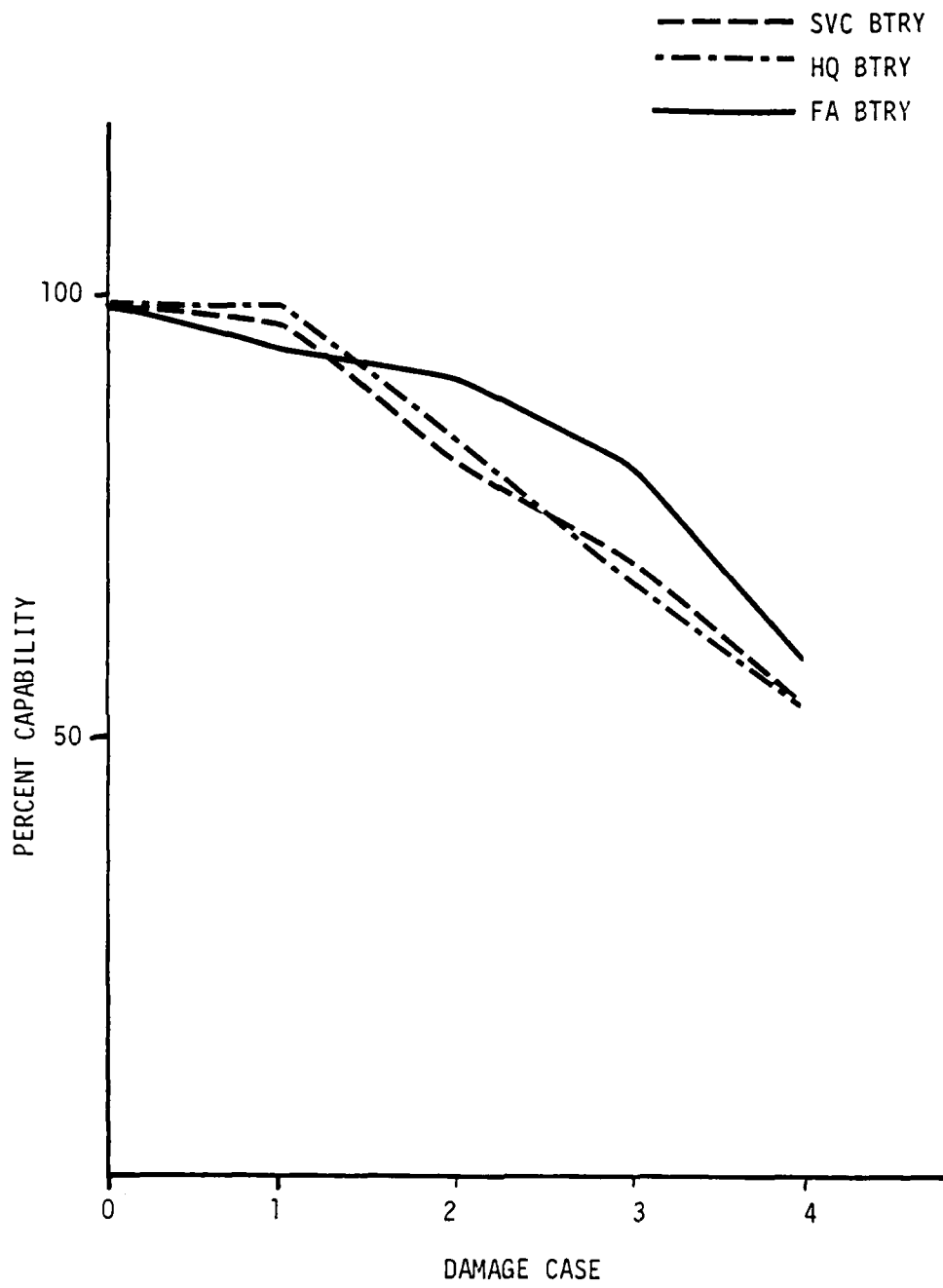


Figure 2-IV-22. TOE - Comparison of Units of the FA BN - Unit Recovered Capability After Damage

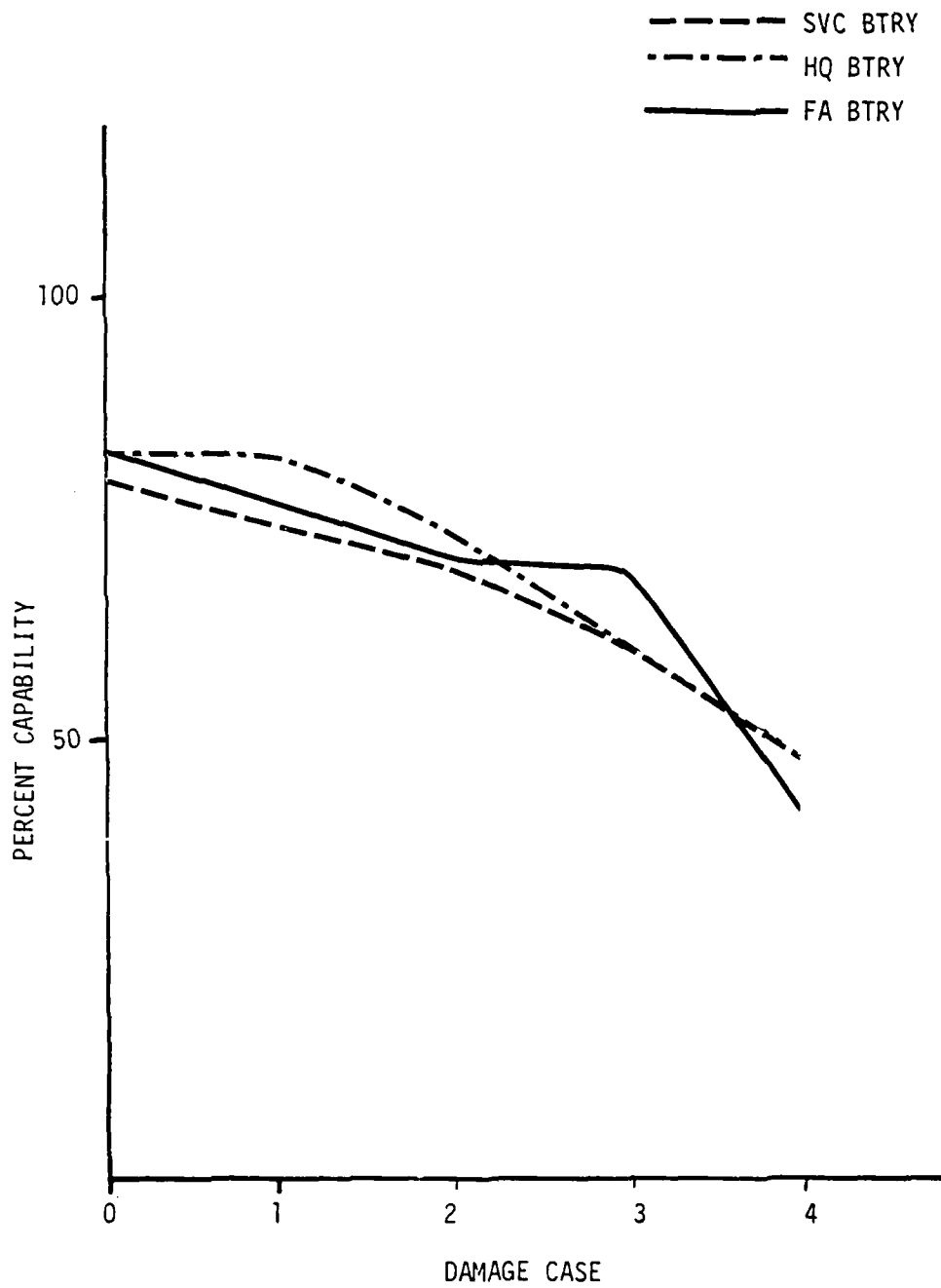


Figure 2-IV-23. REDCON 1 - Comparison of Units of the FA BN - Unit Recovered Capability After Damage



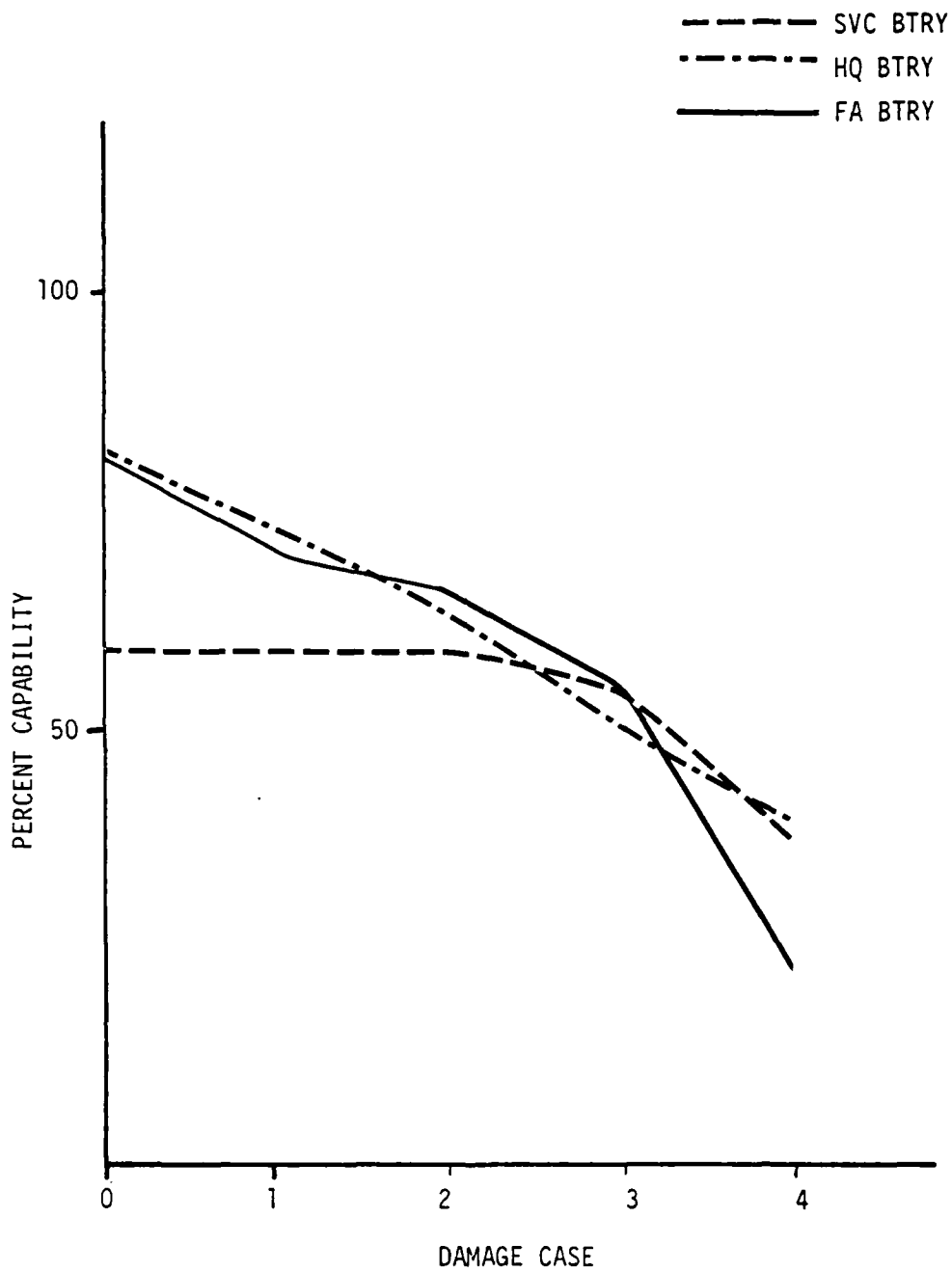


Figure 2-IV-24. REDCON 2 - Comparison of Units of the FA BN - Unit Recovered Capability After Damage

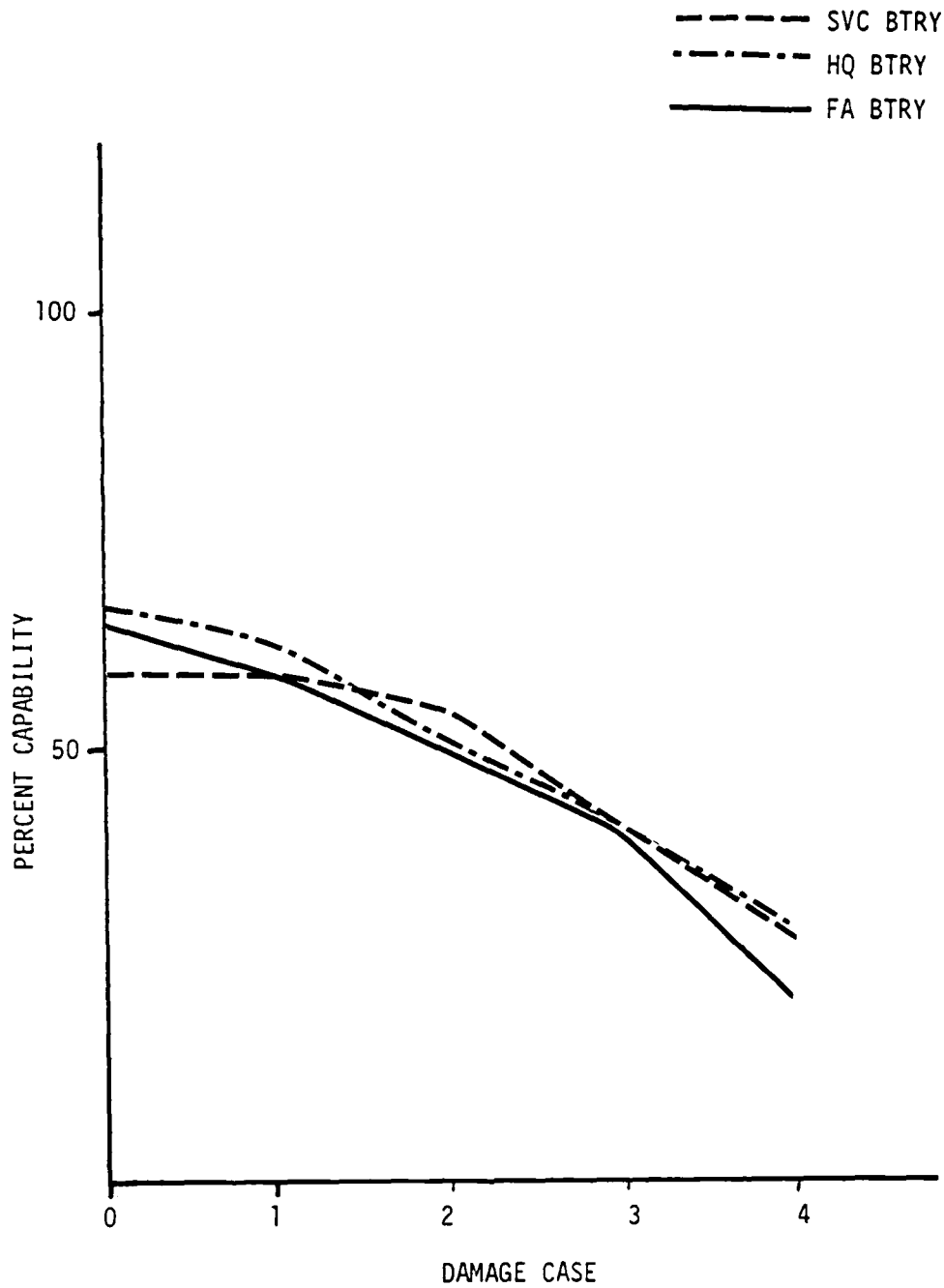


Figure 2-IV-25. REDCON 3 - Comparison of Units of the FA BN - Unit Recovered Capability After Damage

## Section V. Forward Support Company, Maintenance Bn.

Analysis of the Forward Support Company was based on TOE 29-037H0 with change 26. The organization chart for this unit is shown at Figure 2-V-1. Only one mission was defined and examined for this unit, that of support to a type combat brigade. The essential teams of the unit were built according to a priority provided by AMSAA. The first team provides support to artillery, the second and third team provide support for tank battalions and the fourth team provides support for mechanized infantry. This sequence was repeated  $1\frac{1}{2}$  times in order to describe a total of 10 teams, well above the unit's TOE capability.

### a. Personnel

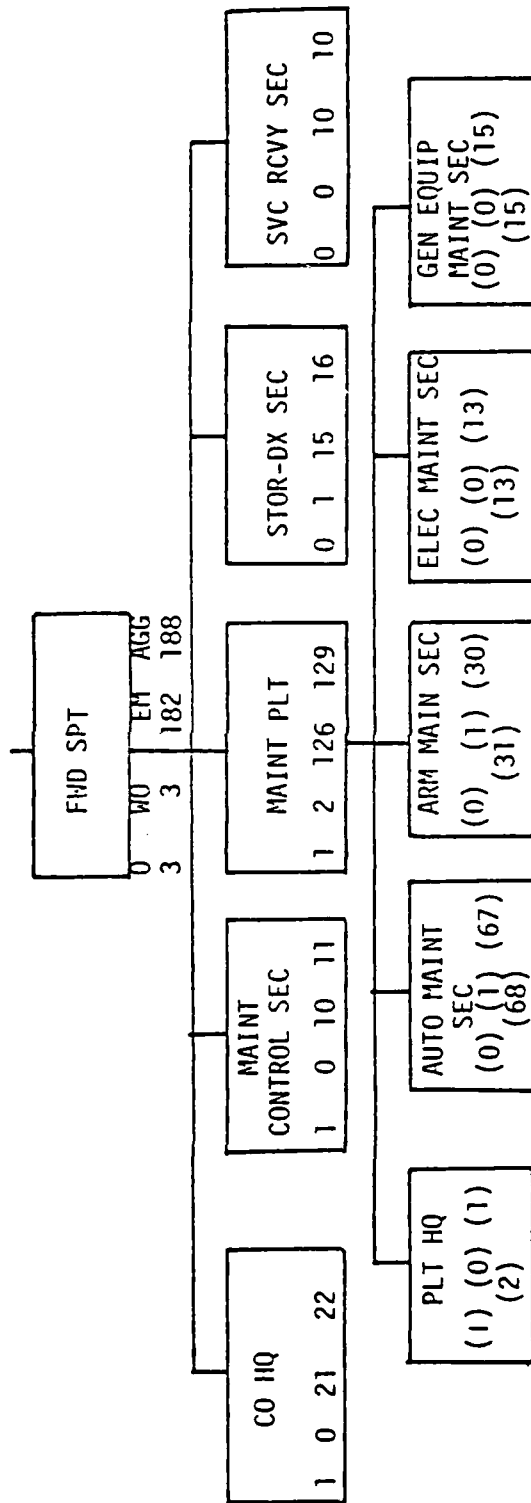
A listing of the personnel tasks with TOE authorizations used in the analysis is shown at Table 2-V-1. The transfer matrix for these personnel is at Table 2-V-2. The essential personnel team requirements are shown at Table 2-V-3. The personnel fill used for the representation of the three REDCON's are at Tables 2-V-4 thru 2-V-6.

### b. Materiel

The materiel listing with TOE authorizations is at Table 2-V-7. The transfer matrix for these materiel items is at Table 2-V-8 with the essential materiel team requirements at Table 2-V-9. Table 2-V-10 shows the materiel on-hand quantities used for the readiness conditions.

### c. Effect of Readiness Condition on Capability

Figure 2-V-2 shows the teams formed within this unit at TOE and the three readiness conditions. From the mission definition above, and the prescribed team build, a TOE company is capable of providing support to  $1\frac{3}{4}$  of the described type combat brigade. Materiel is the limiting factor in all cases with only a slight interaction with personnel at REDCON 3. At REDCON 2 and 3 the unit is not able to complete the fourth team which would be required for full brigade support. The failure to complete this team is due, in both cases, to a shortage of a parts van (protected items) and air compressors.



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Figure 2-V-1. Forward Support Company, Maintenance Battalion Organization Chart

Table 2-V-1. TOE Personnel Listing, Forward Support Company,

Maintenance Bn

TOE 29-37H0 With Change 26

	PERSONNEL	TOE
1	Commander	1
2	1SGT	4
3	Maintenance Officer	2
4	Inspector, Armament	1
5	Inspector, Power EQ	1
6	Inspector, Tank/Auto	3
7	Supply Spec	8
8	Maintenance Tech Officer	1
9	Auto Repairman (Sr)	13
10	Auto Repairman	53
11	Fuel/Electric System Repairman	7
12	Armament Tech Officer	1
13	Armament Maintenance FMN	1
14	Artillery Repairman	4
15	Fire Control Instrument Repairman	4
16	Tank Turret Repairman (Sr)	5
17	Tank Turret Repairman	14
18	Small Arms Repairman	2
19	Electric Repair Supv	1
20	Telephone EQ Repairman	2
21	Radio/TT Repairman	3
22	Special Electronic Device Repairman	7
23	General Maintenance FMN	1
24	Power Generator Repairman	15
25	Const EQ Repairman	3
26	CM/QM EQ Repairman	4
27	Supply Tech Officer	1
28	Supply Supv	1
29	Supply Spec	12
30	Vehicle Driver	3
31	Recovery/Service Supv	1
32	Metal Worker	4
33	Recovery Vehicle Operator	5



Table 2-V-3. Personnel - Essential Team Requirements,

Forward Support Co

	TEAM 1	2	3	4	5	6	7	8	9	10
TASK 1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	2	2	2	2	2	2	2	2	2	2
8	1	1	1	1	1	1	1	1	1	1
9	2	4	6	8	10	12	14	16	18	20
10	8	16	24	32	40	48	56	64	72	80
11	1	2	3	4	5	6	7	8	9	10
12	1	1	1	1	1	1	1	1	1	1
13	0	0	0	0	0	0	0	0	0	0
14	1	2	3	4	5	6	7	7	8	9
15	1	2	3	4	5	6	7	8	9	10
16	1	2	3	4	4	5	6	7	7	8
17	2	4	6	8	8	10	12	14	14	16
18	1	1	1	1	1	1	1	1	1	1
19	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1
21	1	1	1	1	1	1	1	1	1	1
22	0	1	2	4	4	5	6	8	8	9
23	0	0	0	0	0	0	0	0	0	0
24	1	2	2	3	4	5	5	6	7	8
25	0	1	1	1	1	2	2	2	2	2
26	1	1	1	1	1	1	1	1	1	1
27	1	1	1	1	1	1	1	1	1	1
28	0	0	0	0	0	0	0	0	0	0
29	1	2	3	4	5	6	7	8	9	10
30	2	2	2	2	2	2	2	2	2	2
31	1	1	1	1	1	1	1	1	1	1
32	1	1	1	1	1	1	1	1	1	1
33	1	1	1	2	2	2	3	3	3	3
TOTAL	34	54	72	93	108	128	147	168	181	200

Table 2-V-4. Personnel Fill, FWD SPT Company, Mnt Bn. REDCON 1

EXCESS	TASKS																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33		
9	0	4	2	1	0	1	10	1	13	55	7	1	1	4	2	5	9	2	0	0	3	6	1	10	3	2	1	0	13	4	1	4	5		
10	1	4	2	1	1	3	8	0	13	48	7	1	1	2	2	5	16	1	1	3	3	6	1	17	3	2	1	0	11	4	1	1	7		
6	1	3	2	1	1	3	8	1	12	57	7	1	0	3	4	5	14	1	1	3	3	4	1	14	3	2	1	0	10	4	1	1	5	6	
11	0	3	2	1	0	3	2	0	12	50	7	1	1	4	2	5	18	3	1	0	3	7	0	15	2	4	1	1	14	2	1	6	7		
9	1	4	2	1	0	3	5	1	12	60	5	1	0	4	4	12	1	1	1	0	2	6	1	15	3	5	1	1	12	2	1	4	6		
11	0	4	2	1	1	3	4	1	13	57	5	1	1	4	3	4	15	2	1	0	2	7	1	21	3	3	0	1	9	2	0	3	5		
7	1	4	2	0	1	1	10	1	13	52	7	0	1	3	3	5	14	3	1	0	3	7	0	17	3	4	1	1	10	3	0	6	2		
8	1	4	0	1	1	3	10	1	13	53	7	0	0	3	2	5	14	3	1	0	3	4	0	15	2	1	1	1	15	2	1	1	7		
10	1	2	2	0	1	3	4	0	13	57	7	1	1	3	4	3	12	2	1	2	3	5	1	20	3	1	1	0	12	3	1	4	6		
9	1	4	2	1	1	2	4	1	12	52	7	0	1	4	2	5	19	2	1	2	3	10	1	14	0	4	1	1	11	1	1	5	4		
12	0	2	2	1	1	3	11	1	13	50	7	0	1	2	2	5	19	3	1	1	3	10	1	11	3	2	1	1	11	3	1	4	3		
13	1	4	1	0	0	2	11	1	12	57	7	1	1	3	4	5	19	3	1	1	1	7	1	10	3	3	1	0	7	3	0	3	4		
11	1	4	1	0	0	3	6	1	13	52	7	0	1	4	2	5	19	3	0	0	3	10	1	12	3	4	0	1	12	0	1	3	7		
14	0	3	2	0	1	3	7	0	13	59	6	1	1	3	4	5	19	1	1	2	3	10	0	8	3	4	1	1	6	3	0	6	1		
15	0	4	2	1	1	3	9	1	13	66	7	1	0	4	4	3	12	2	0	3	2	5	0	13	3	3	2	1	0	6	1	1	4	5	
15	1	4	2	1	0	3	7	0	13	46	7	0	1	4	3	3	12	3	0	2	3	10	1	17	3	2	1	1	13	4	0	6	7		
16	1	4	2	0	1	3	7	1	13	56	4	1	1	4	4	4	17	2	0	3	3	4	0	16	3	5	1	1	0	16	4	0	5	2	
9	1	4	2	0	0	2	11	1	13	53	7	1	1	2	3	5	17	0	0	1	3	5	1	17	2	3	1	0	11	1	1	3	6		
12	0	4	1	0	1	3	3	1	13	55	7	0	1	4	4	3	17	3	1	3	3	5	0	12	2	6	1	1	13	3	1	1	7		
12	1	4	2	1	0	3	11	1	13	45	7	1	0	2	3	3	17	0	1	2	3	5	1	12	2	6	1	1	12	4	1	4	5		
8	1	3	0	1	1	3	0	1	13	55	7	1	1	4	4	4	16	1	1	1	2	3	0	15	3	3	0	6	1	1	2	4	1	5	
10	1	4	2	0	1	3	6	1	12	56	7	0	0	3	4	5	12	3	1	3	10	1	17	3	3	0	1	0	10	2	0	2	2		
12	0	2	2	1	1	3	11	0	13	56	7	1	1	4	1	5	12	1	1	3	3	8	1	10	3	4	1	1	10	2	0	6	3		
7	1	4	2	0	1	3	10	1	13	53	6	1	1	4	4	4	13	2	1	2	3	6	1	13	1	3	0	0	13	4	1	6	2		
6	1	4	2	1	1	3	11	1	13	56	7	1	1	4	4	4	12	1	1	1	5	0	19	1	1	5	0	1	10	0	1	1	3	5	
7	1	4	2	1	1	3	11	0	13	56	7	0	1	4	4	2	10	2	0	2	3	7	0	15	3	5	1	1	9	3	1	4	4	7	
9	1	2	2	0	1	3	10	1	12	49	7	1	1	4	3	4	17	1	1	2	3	6	0	13	3	4	1	1	11	2	1	4	7		
10	1	3	1	1	0	2	6	1	12	56	7	1	1	4	4	4	18	1	1	3	3	4	1	15	2	1	0	1	11	4	1	3	6	5	
13	1	3	1	1	0	1	1	0	1	12	50	7	1	1	3	4	4	19	3	1	3	7	1	19	3	5	1	1	9	2	1	4	6	7	
15	1	3	2	1	1	3	11	1	12	47	5	1	1	3	1	5	13	3	1	0	3	9	1	21	3	5	1	1	6	3	1	3	7	2	
15	0	4	2	1	1	3	6	1	12	63	7	1	0	4	3	4	16	0	0	3	7	1	6	2	4	1	0	12	1	1	6	2	2	2	
14	0	3	1	0	1	2	11	1	13	56	7	1	1	4	4	4	19	0	1	2	3	2	1	17	2	2	1	0	11	4	1	1	3	3	
13	0	4	2	1	1	2	10	1	13	55	7	1	0	4	2	4	8	3	1	2	2	9	1	10	3	3	0	1	17	1	1	4	6	2	
10	1	4	2	0	1	3	7	1	13	61	4	0	1	2	4	5	12	3	1	2	3	7	0	13	1	2	0	1	13	2	1	4	7		
8	1	4	2	0	1	3	9	1	13	56	4	0	1	3	4	3	14	3	1	1	3	6	1	14	2	4	1	1	6	4	1	4	7	7	
10	1	4	0	0	1	3	9	0	11	59	7	1	0	4	4	5	10	3	1	1	3	6	1	10	2	4	1	1	10	2	1	3	3	3	
13	1	3	2	0	1	3	6	0	13	59	6	1	0	1	3	5	13	3	0	2	3	8	1	8	2	5	1	1	11	4	1	6	2	2	
6	1	4	2	1	0	1	8	1	11	53	6	1	1	4	4	5	13	3	0	1	3	5	1	12	3	6	1	1	12	3	0	6	6	6	
13	0	4	1	1	1	3	11	1	13	46	7	0	1	4	4	5	16	1	1	4	4	12	1	1	7	1	0	1	10	4	0	1	4	2	
12	1	3	2	1	1	3	7	0	13	62	7	0	1	3	2	5	16	1	0	3	3	5	1	12	3	6	0	1	10	3	1	4	2	2	
12	1	4	2	1	1	3	6	1	12	51	7	0	1	4	4	2	5	16	1	1	1	9	0	18	3	5	0	1	15	4	1	1	7	7	
9	1	3	2	0	0	3	11	0	12	52	7	1	1	4	2	5	16	0	1	1	3	6	0	13	4	1	0	10	4	1	1	5	7	4	
9	0	4	0	1	1	3	11	0	13	54	7	1	0	3	4	5	10	3	1	1	3	6	0	13	3	6	1	0	12	2	1	6	4	4	
11	1	3	2	1	1	3	12	1	13	54	7	1	1	4	4	5	19	2	0	1	3	0	10	1	15	3	5	1	1	10	3	0	4	5	
8	1	4	1	0	0	3	8	1	13	55	6	0	1	4	3	5	19	1	1	1	3	4	1	15	3	1	1	1	11	3	0	6	6	6	
9	1	4	2	1	0	3	10	1	13	49	7	1	1	4	3	3	19	1	1	1	3	1	7	0	12	3	3	1	1	12	3	0	5	4	5
10	1	4	2	1	1	3	8	1	13	53	7	1	1	4	4	3	19	1	1	1	3	1	7	0	12	3	3	1	1	12	3	1	1	2	1

TOE =







Table 2-V-7. TOE Materiel Listing, Forward Support Company,  
Maintenance Bn

TOE 29-37H0 With Change 26

MATERIEL		TOE
1	Truck, Utility ¼ Ton w/AN/VRC-47	1
2	Truck, Utility ¼ Ton	2
3	Truck, Cargo 1½ Ton w/3/4 Ton Trlr	1
4	Truck, Cargo 2½ Ton (or 2½ Ton Van)	17
5	Auto Shop Tool Sets	2
6	Fuel/Electric Shop Tools	1
7	Maintenance Control Shop	1
8	Fire Control Instrument Shop	4
9	Welding & Machine Shop	1
10	Contact Maintenance Shop Set	3
11	Truck, Tractor 5 Ton	4
12	Truck, Wrecker 10 Ton	2
13	Crane, Wheel Mtd, RT 5 Ton	1
14	Rec Veh, FT (Med) w/AN/NRC-46	1
15	Trailer, Cargo FT ¼ Ton	3
16	Trailer, Cargo 1½ Ton	15
17	Trailer, Water (400 gallon)	1
18	Tool Kit, Mechanic (Lt Wt)	84
19	Tool Kit, Small Arms Repair	5
20	Tool Kit, Artillery Repair	5
21	Tool Kit, Fuel/Electric System Repair	7
22	Tool Kit, Turret Repair	19
23	Tool Kit, Electronic Eq	10
24	Tool Kit, Master Mechanic	2
25	Tool Kit, Welder	2
26	Shop EQ, I&FC Set FM	1
27	Shop EQ, Artillery Set	2
28	Shop EQ, Mechanical Mntnce	1
29	Electronic Shop, Semi-Trlw Mtd	3
30	Parts, S&P (Rugged)	2
31	Parts, Van (Protected Items)	3
32	AVLB Maintenance Set	1
33	Telephone Test Set	2
34	Generators (All Types)	16
35	Air Compressors (175 psi/15 cfm)	3



Table 2-V-9. Material - Essential Team Requirements, Forward Support Co.

TASK	TEAM 1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	2	3	5	6	8	9	11	12	14	15
5	1	1	1	2	2	2	3	3	3	3
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	1	1	2	2	3	3	4	4	5	5
9	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
11	1	1	1	1	1	1	1	1	1	1
12	1	1	1	2	2	2	3	3	3	3
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0
16	2	3	5	6	8	9	11	12	14	15
17	0	0	0	0	0	0	0	0	0	0
18	11	22	32	43	53	64	75	85	96	106
19	1	1	1	1	1	1	1	1	1	1
20	1	2	3	4	4	5	6	7	8	9
21	1	2	3	4	5	6	7	8	9	10
22	3	6	9	12	12	15	18	21	21	24
23	0	1	2	4	4	5	6	8	8	9
24	0	0	0	0	0	0	0	0	0	0
25	1	1	1	1	1	1	1	1	1	1
26	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0
29	1	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	2	2	2	2
31	1	1	1	2	2	2	3	3	3	3
32	0	0	0	0	0	0	0	0	0	0
33	1	1	1	1	1	1	1	1	1	1
34	1	2	3	4	5	6	7	8	9	10
35	1	1	1	2	2	2	3	3	3	3

Table 2-V-10. REDCON Materiel Listing, Forward Support Co, Mnt. Bn

	MATERIEL	REDCON		
		1	2	3
1	Truck, Utility ½ Ton w/AN/VRC-47	1	1	1
2	Truck, Utility ½ Ton	1	0	0
3	Truck, Cargo 1½ Ton w/3/4 Ton Trlr	1	1	1
4	Truck, Cargo 2½ Ton (or 2½ Ton Van)	15	13	12
5	Auto Shop Tool Sets	1	1	1
6	Fuel/Electric Shop Tools	1	1	1
7	Maintenance Control Shop	1	1	1
8	Fire Control Instrument Shop	3	2	1
9	Welding & Machine Shop	1	1	1
10	Contact Maintenance Shop Set	2	1	1
11	Truck, Tractor 5 Ton	3	2	1
12	Truck, Wrecker 10 Ton	1	1	1
13	Crane, Wheel Mtd, RT 5 Ton	1	1	1
14	Rec Veh, FT (Med) w/AN/NRC-46	1	1	1
15	Trailer, Cargo FT ¼ Ton	2	1	1
16	Trailer, Cargo 1½ Ton	13	12	10
17	Trailer, Water (400 gallon)	1	1	1
18	Tool Kit, Mechanic (Lt Wt)	76	67	59
19	Tool Kit, Small Arms Repair	4	4	3
20	Tool Kit, Artillery Repair	4	4	3
21	Tool Kit, Fuel/Electric System Repair	6	6	5
22	Tool Kit, Turret Repair	17	15	13
23	Tool Kit, Electronic Eq	9	8	7
24	Tool Kit, Master Mechanic	1	1	1
25	Tool Kit, Welder	1	1	1
26	Shop EQ, I&FC Set FM	1	1	1
27	Shop EQ, Artillery Set	1	1	1
28	Shop EQ, Mechanical Mntnce	1	1	1
29	Electronic Shop, Semi-Trlw Mtd	2	1	1
30	Parts, S&P (Rugged)	1	1	1
31	Parts, Van (Protected Items)	2	1	1
32	AVLB Maintenance Set	1	1	1
33	Telephone Test Set	1	1	1
34	Generators (All Types)	14	12	11
35	Air Compressors (175 psi/15 cfm)	2	1	1

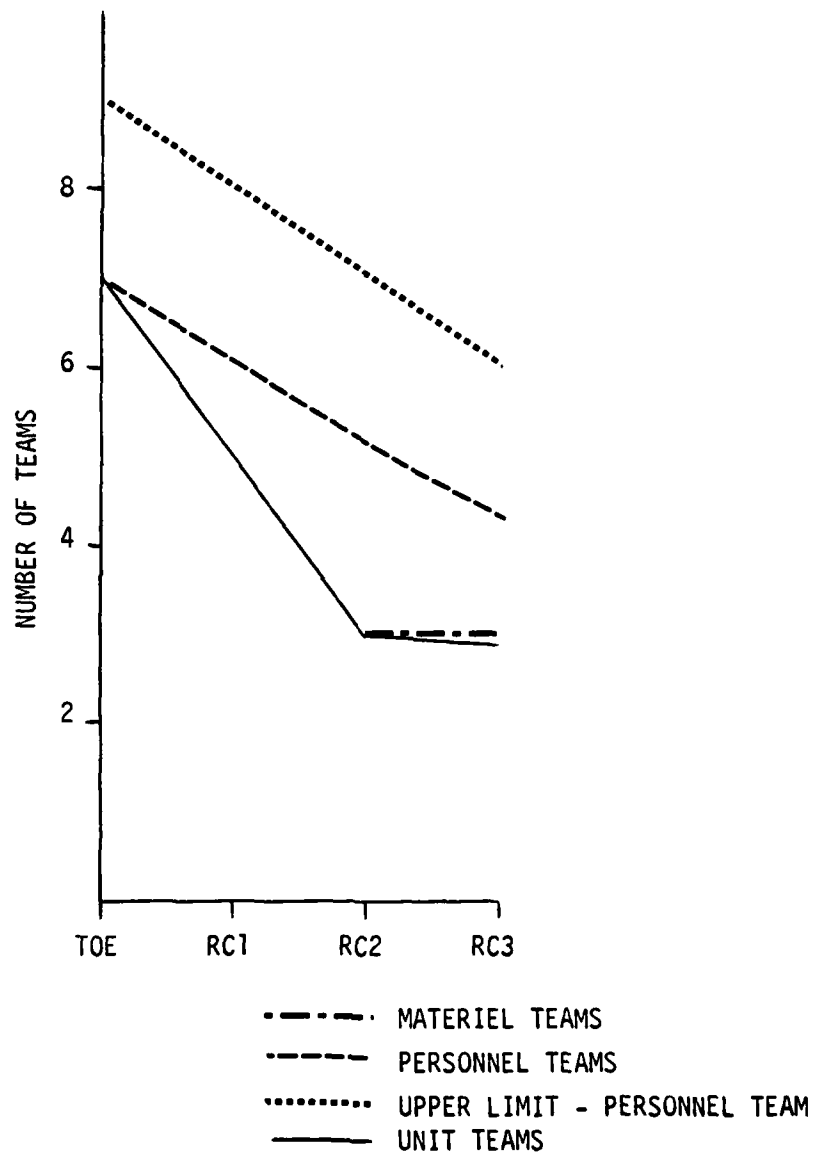


Figure 2-V-2. Unit Readiness Condition Capability and Limiting Factor - FWD SPT CO, Combined Arms Support

Table 2-V-11. Unit Readiness Condition Capability Range, Forward Support Company

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	5.0-7.0	3.0-5.0	3.0
Personnel Teams	6.1-7.0	5.1-6.1	4.4-5.1
Unit Teams	5.0-7.0	3.0-6.1	3.0-5.1
Unit Capability	71-100%	43-87%	43-73%
Overlap Range	71-87%		43-73%

Table 2-V-11, above, shows the expected capability range of this unit. Note the large overlap of capability between adjacent readiness conditions. The expected range of a REDCON 3 unit is entirely included in the range of a REDCON 2 unit. There is a small, 71-73%, range included in all three readiness conditions.

d. Recovered Capability After Damage

Figures 2-V-3 thru 2-V-6 show the teams which were reconstituted after the damage cases (see Table 2-I-2) were applied to units at full TOE and each of the readiness conditions. Figure 2-V-2 shows that with no damage applied, materiel was always the limiting factor, except at full TOE. When damage is applied, personnel quickly become the limiting factor.



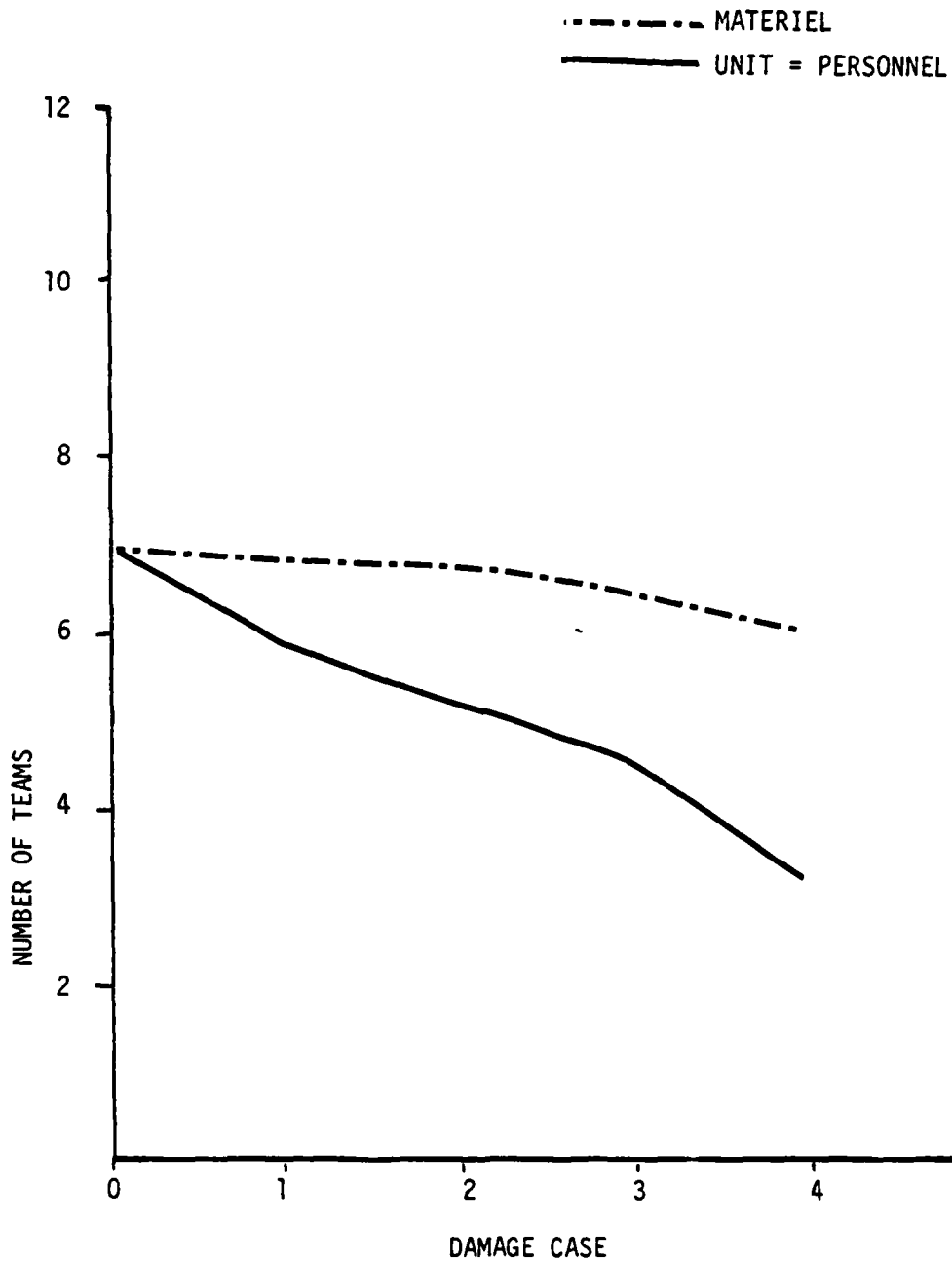


Figure 2-V-3. TOE - Unit Recovered Capability and Limiting Factor - FWD SPT CO - Combined Arms Support

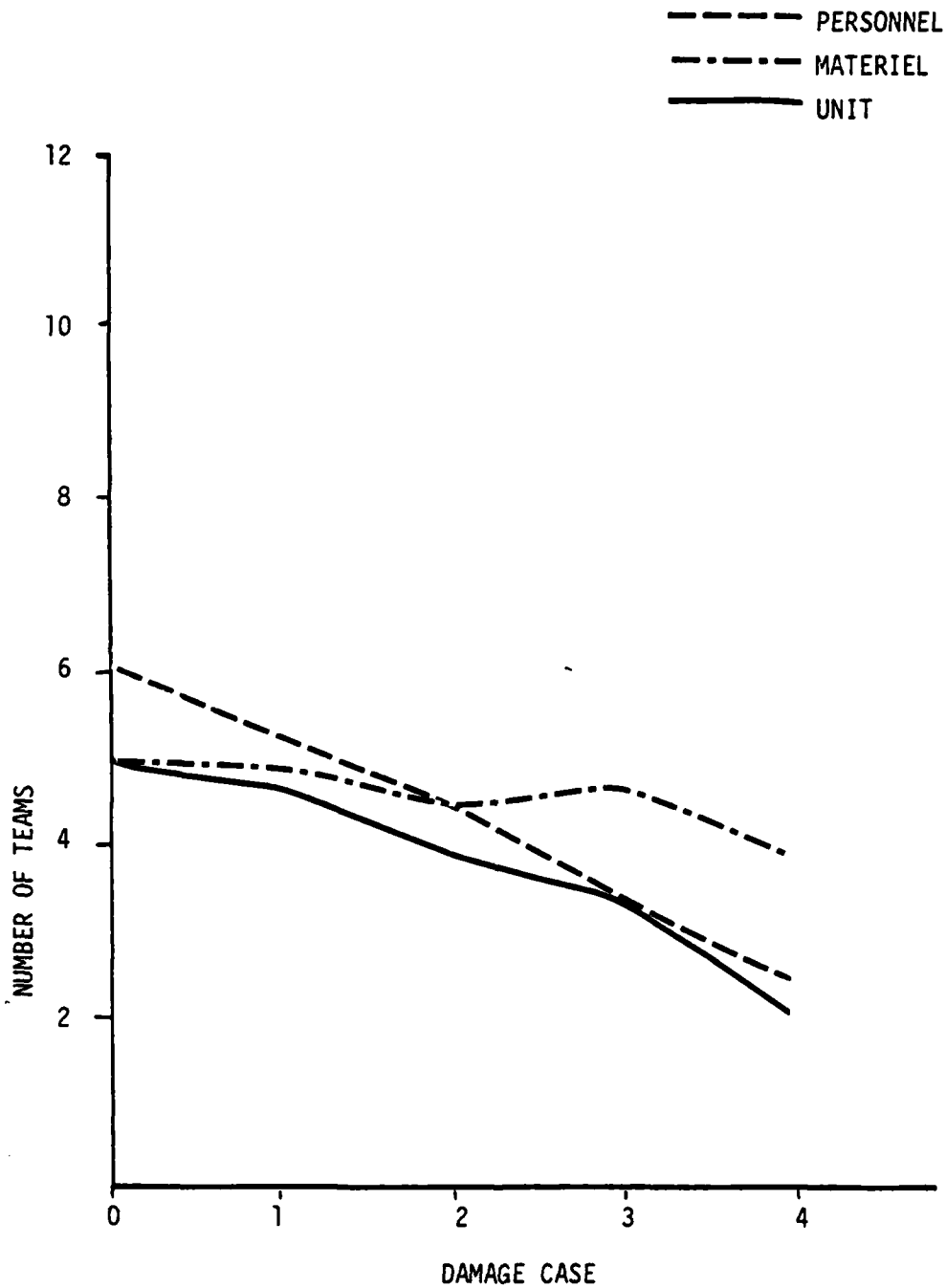


Figure 2-V-4. REDCON 1 - Unit Recovered Capability and Limiting Factor - FWD SPT CO - Combined Arms Support

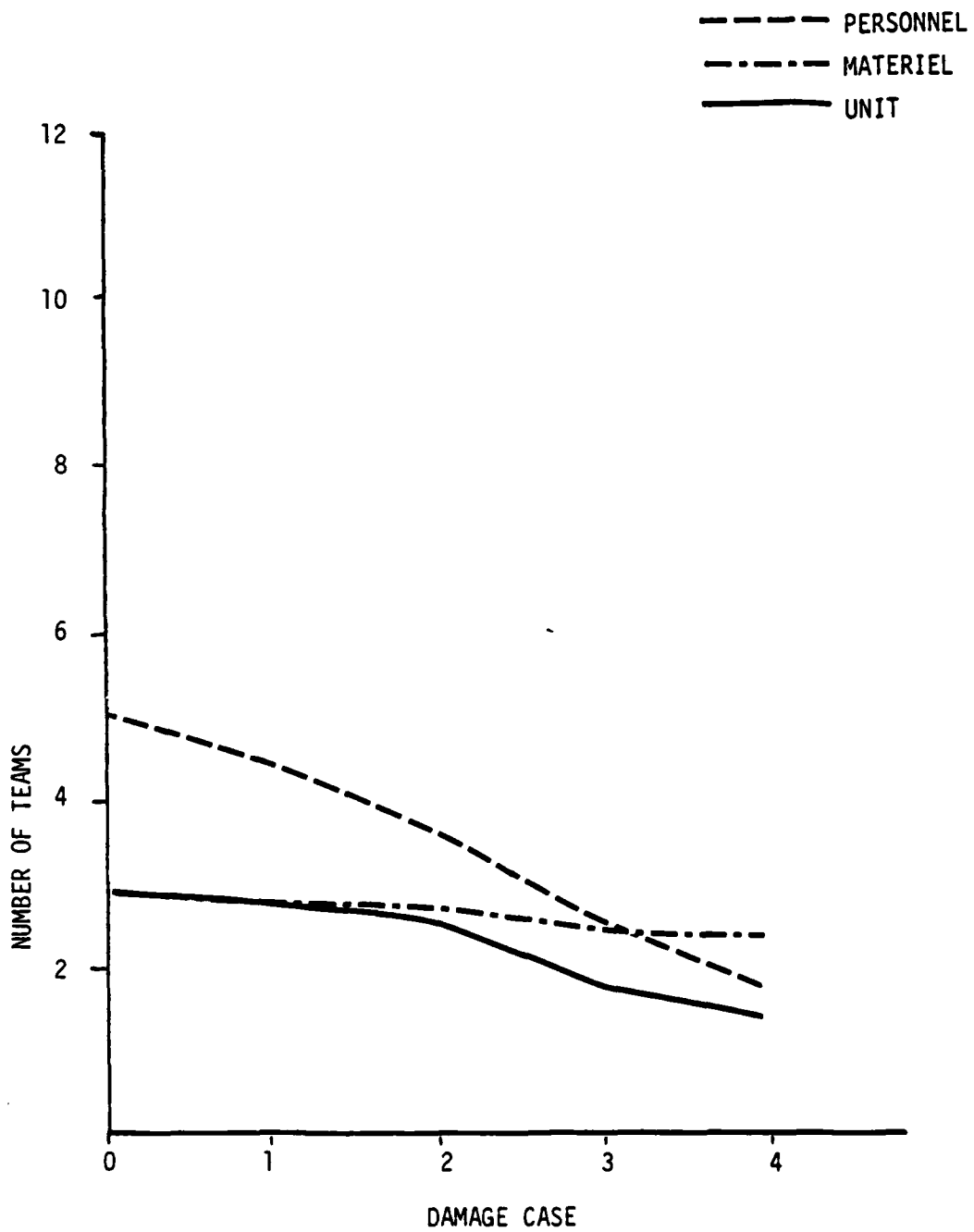


Figure 2-V-5. REDCON 2 - Unit Recovered Capability and Limiting Factor - FWD SPT CO - Combined Arms Support

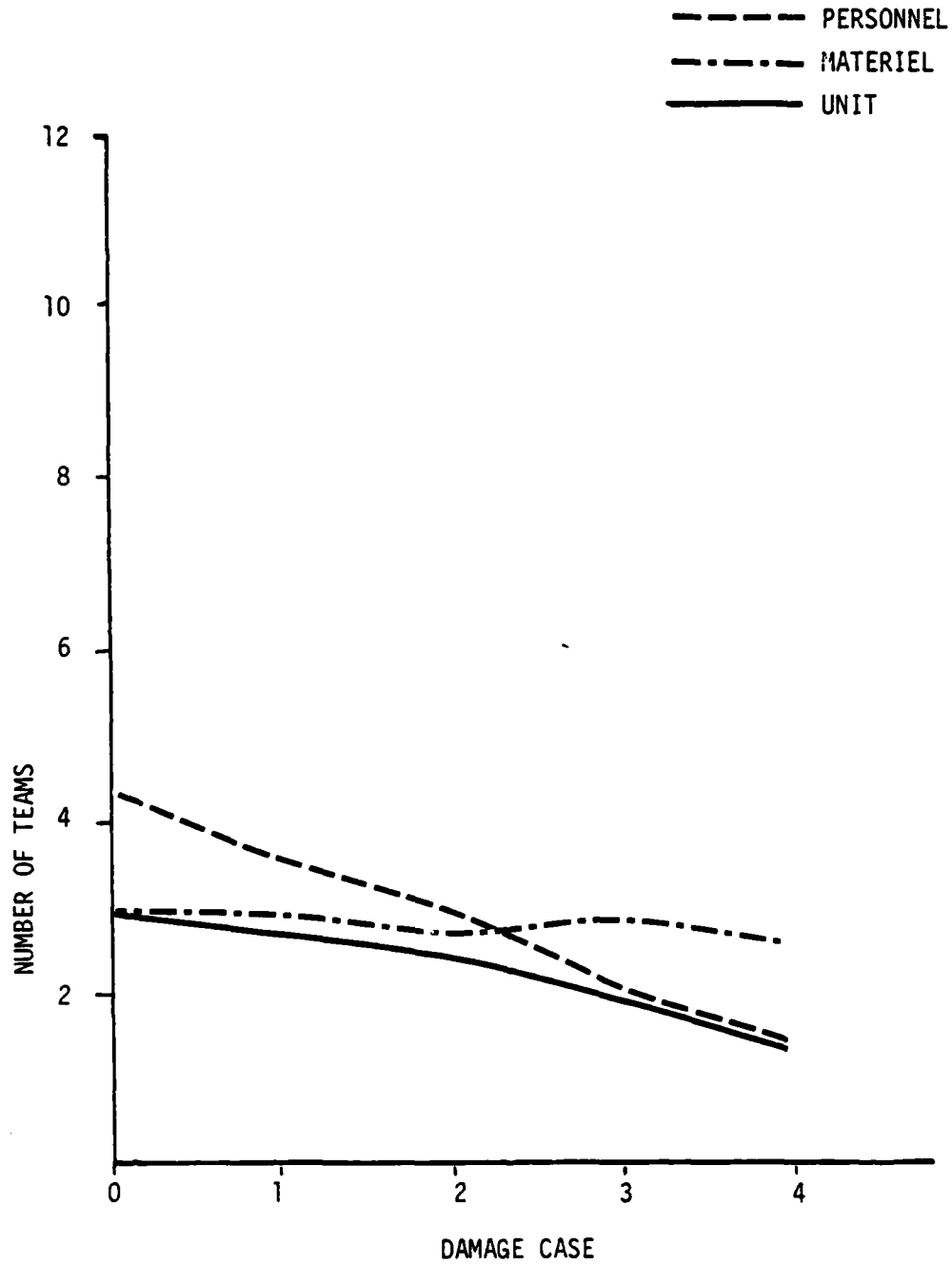


Figure 2-V-6. REDCON 3 - Unit Recovered Capability and Limiting Factor - FWD SPT CO - Combined Arms Support

Section VI. Battalion Comparison - Effect of Readiness Condition.

Figure 2-VI-1 provides a comparison of the effect of readiness condition on the line units of the three battalions analyzed in this effort. The Rifle Co. shows a dramatic effect between TOE and REDCON 1 due to the reduction of its TOW systems from two to one. While it is realized that this relation may not be exactly correct, the TOW system does represent a large capability for this unit in a defense against an armor attack.

A comparison of the support units is shown at Figure 2-VI-2. The function of the Service Btry is not common to that of the two Combat Support Companies but it is shown here for convenience of grouping. The Headquarters units are compared in Figure 2-VI-3.

These comparisons are provided to again show the variation in effect on unit capability which results from the application of the general criteria of AR 220-1. If the readiness conditions are to reflect a more accurate representation of the expected unit capability, the criteria must be more specific in terms of the items, personnel or materiel, which are essential to the mission performance of a particular unit.

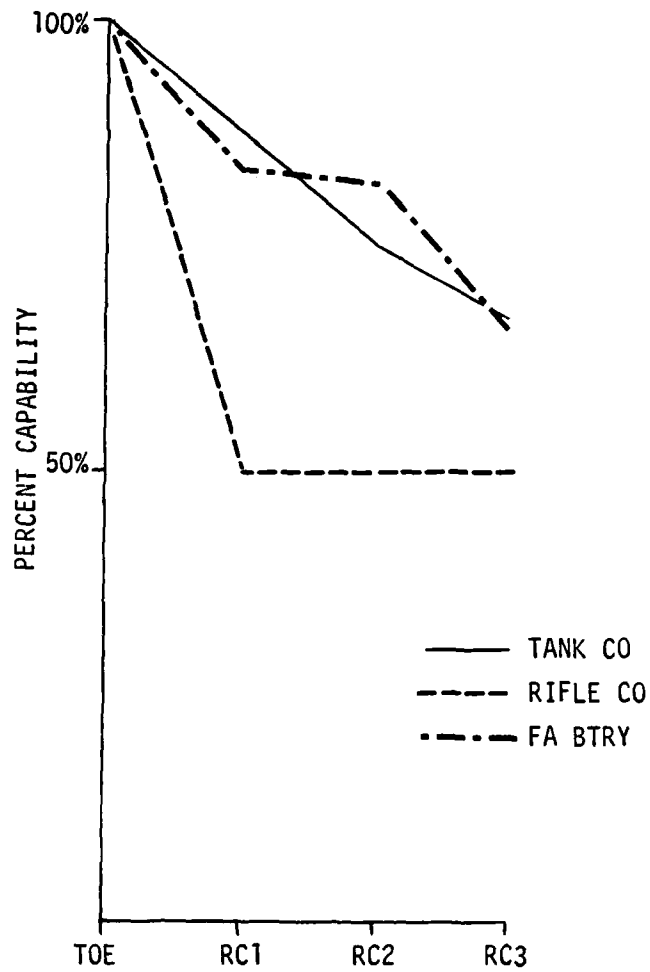


Figure 2-VI-1. Unit Comparison - Line Units, Capability at Different Readiness Conditions

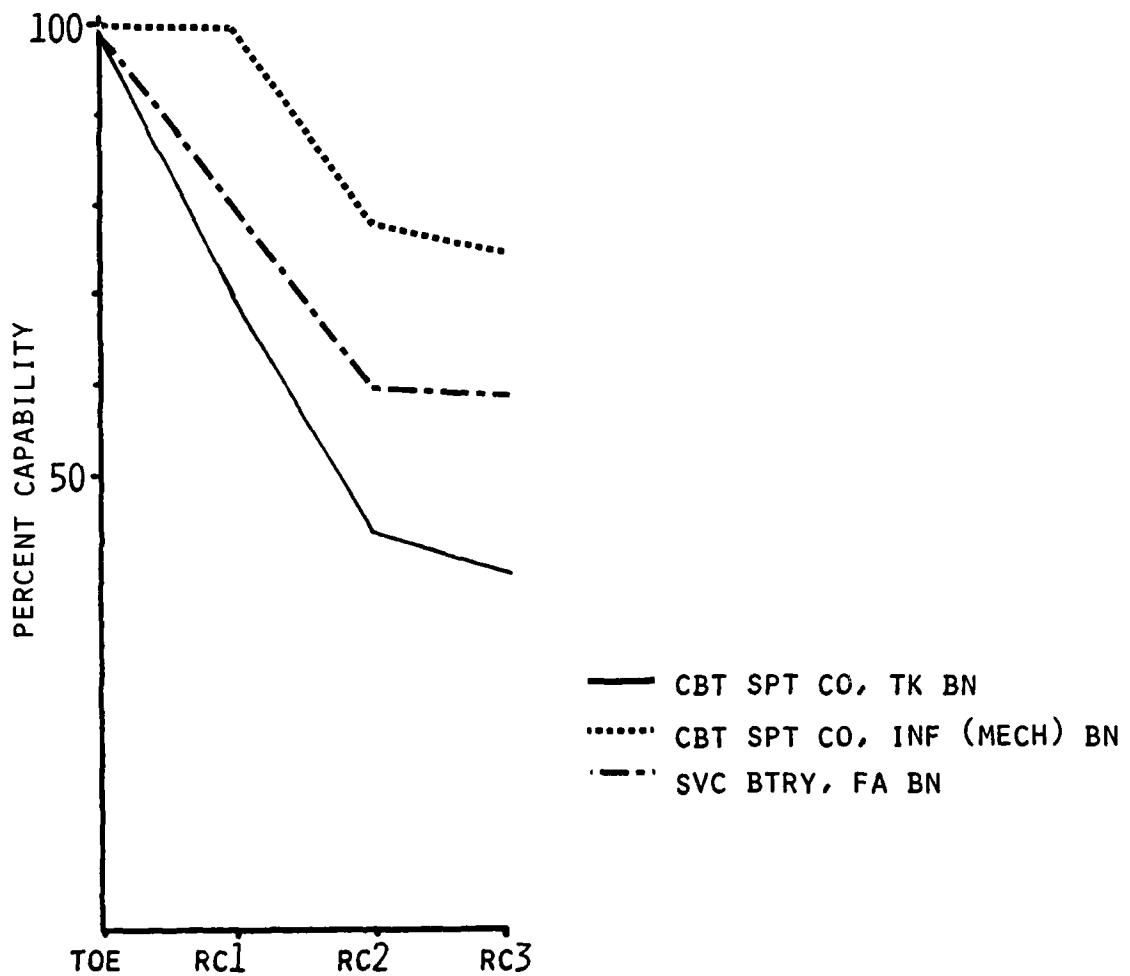


Figure 2-VI-2. Unit Comparison - Support Units, Capability at Different Readiness Conditions

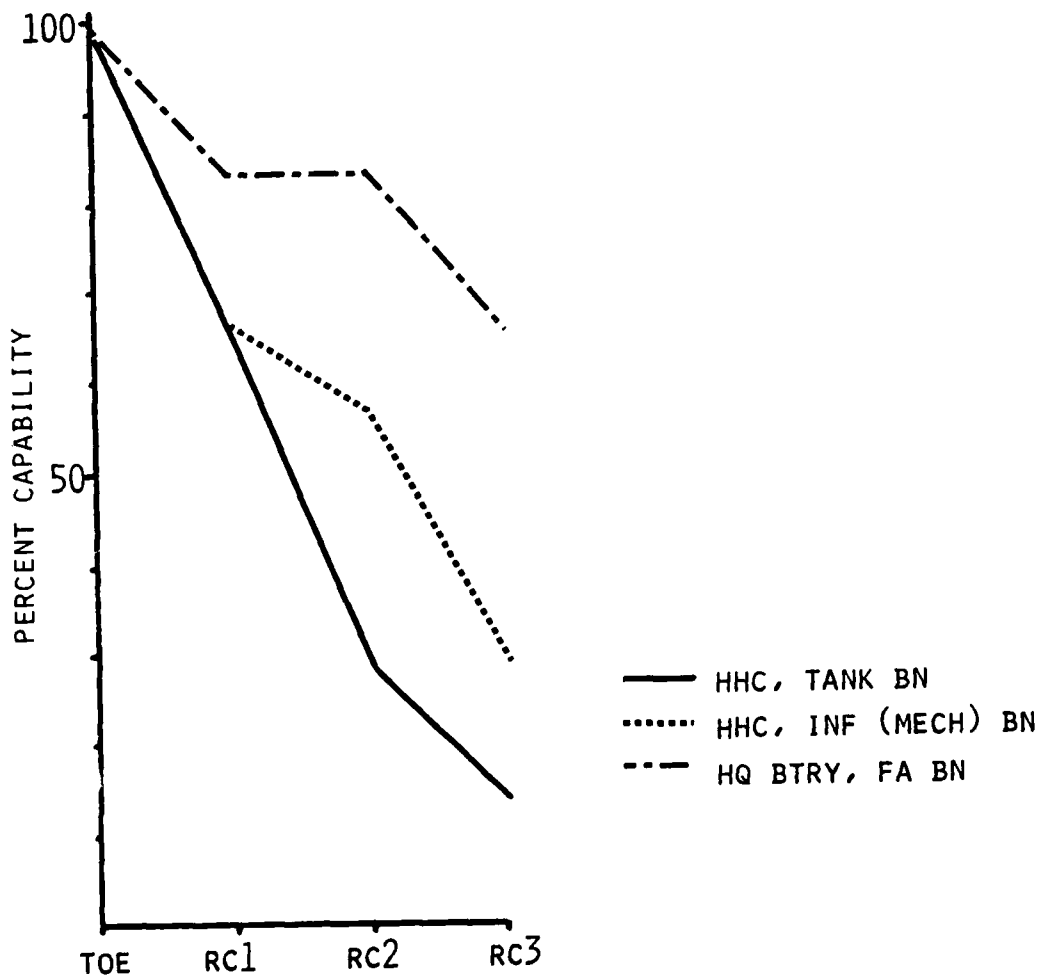


Figure 2-VI-3. Unit Comparison - HQ Units, Capability at Different Readiness Conditions



Chapter 3  
SUSTAINABILITY

Section I. Introduction.

1. GENERAL

This chapter examines the capability of units to endure on the battlefield following casualties and damage. It is difficult to predict the tempo of combat or the intensity that commanders will allow. Specific damage probabilities are scenario determined and subject to debate. It is useful to examine functional capability in terms of personnel and materiel with respect to a range of enemy action. From the ensuing data, any particular damage can then be related to the remaining capability of the unit. Sustainability is defined as the ability to withstand damage and maintain effectiveness.

Functional capability is plotted in terms of a percent of the maximum unit capability for Mission 2 as defined in Chapter 2. In most cases units were initially limited by materiel and were able to form some additional personnel teams; that is, more than 100% in relation to unit maximum.

Sustainability of units entering combat in different readiness conditions is determined; the effect of ammunition and fuel is investigated; limitations of both personnel skills and materiel items which precluded higher capability are determined.

Section II. Functional Capability Related to Probability of  
Damage

1. GENERAL

Current organizations are examined for their sustainability after combat degradation beginning at various readiness levels. One important result is the significant disparity in capability response of various units within battalions and among battalions.

2. READINESS CONDITION 1

The capability of units entering combat from this condition following degradation is at Table 3-II-1. Comparisons of type units are Figures 3-III-1, 3-II-2, and 3-II-3.

Table 3-II-1. Functional Capability of REDCON 1 Units.

REDCON 1									
FUNCTIONAL CAPABILITY (% OF UNIT MAX)									
PERSONNEL CASUALTIES* (%) :		10			20			30	
BATTALION	UNIT	PERSONNEL	MATERIEL	PERSONNEL	MATERIEL	PERSONNEL	MATERIEL	PERSONNEL	MATERIEL
TANK	HHC	53	77	26	76	10	73		
	CSC	73	74	47	61	32	52		
	TANK CO	103	82	89	75	75	35		
INFANTRY (MECH)	HHC	81	67	48	66	28	66		
	CSC	156	98	125	84	109	78		
	RIFLE CO	122	49	102	47	94	47		
FIELD ARTILLERY	HQ BTRY	89	83	75	83	61	82		
	SVC BTRY	94	75	79	70	66	66		
	FA BTRY	219	77	186	72	157	71		
(COMBINED ARMS SUPPORT)	FWD SPT CO	75	70	64	66	49	65		

\*With associated materiel damage.

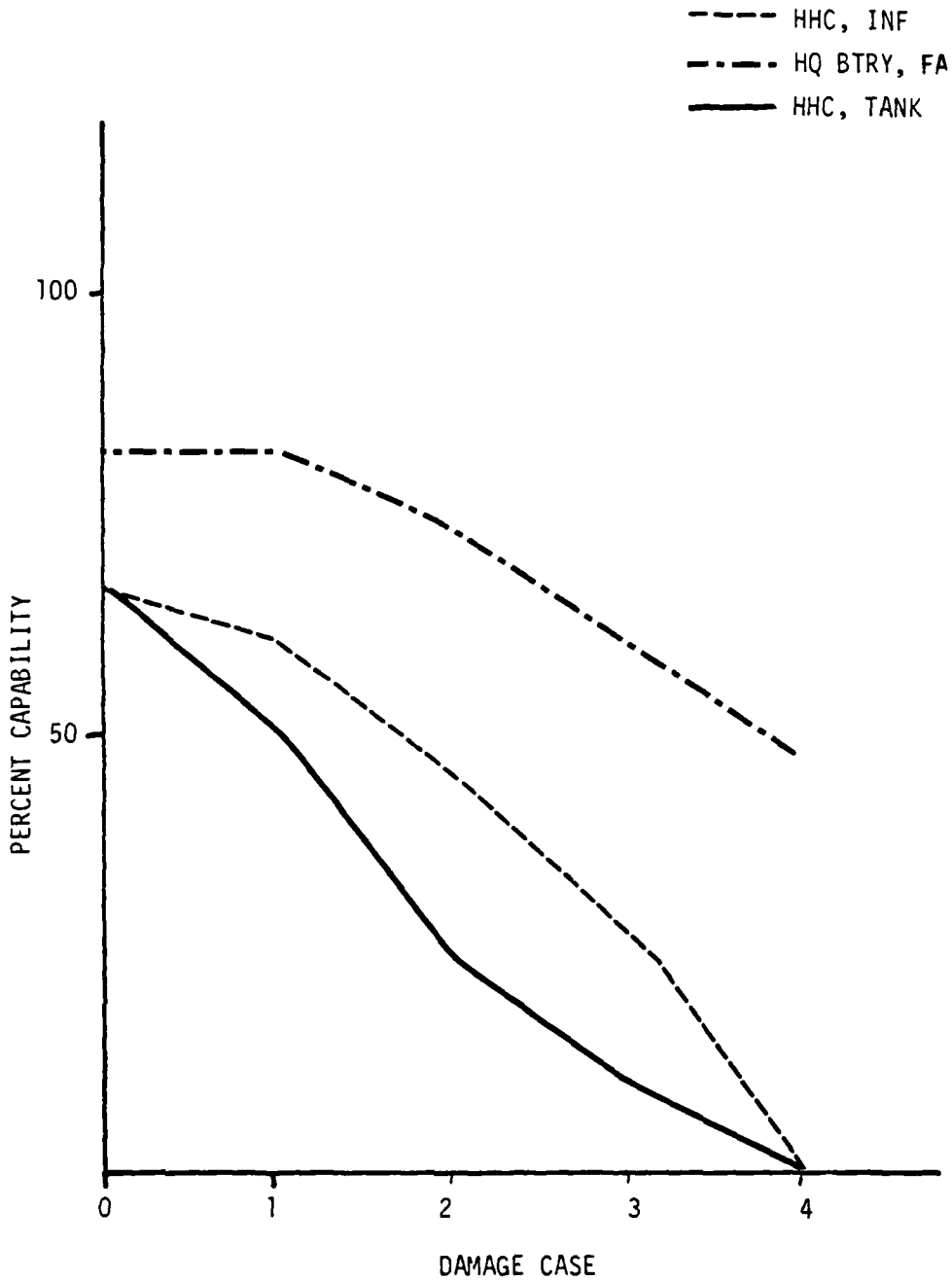


Figure 3-II-1. REDCON 1 - Comparison of Headquarters Units - Unit Recovered Capability After Damage.

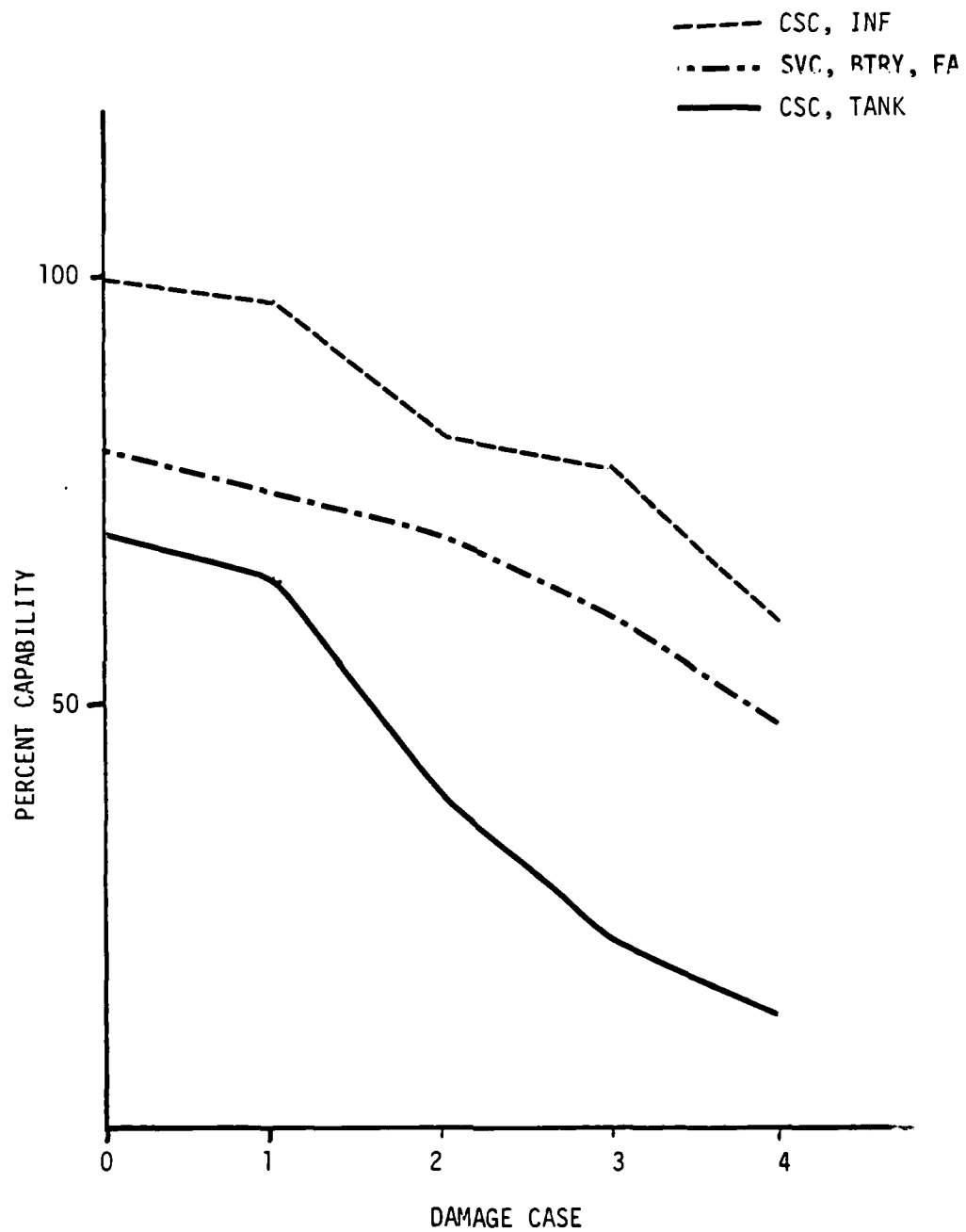


Figure 3-II-2. REDCON 1 - Comparison of Support Units - Unit Recovered Capability After Damage.

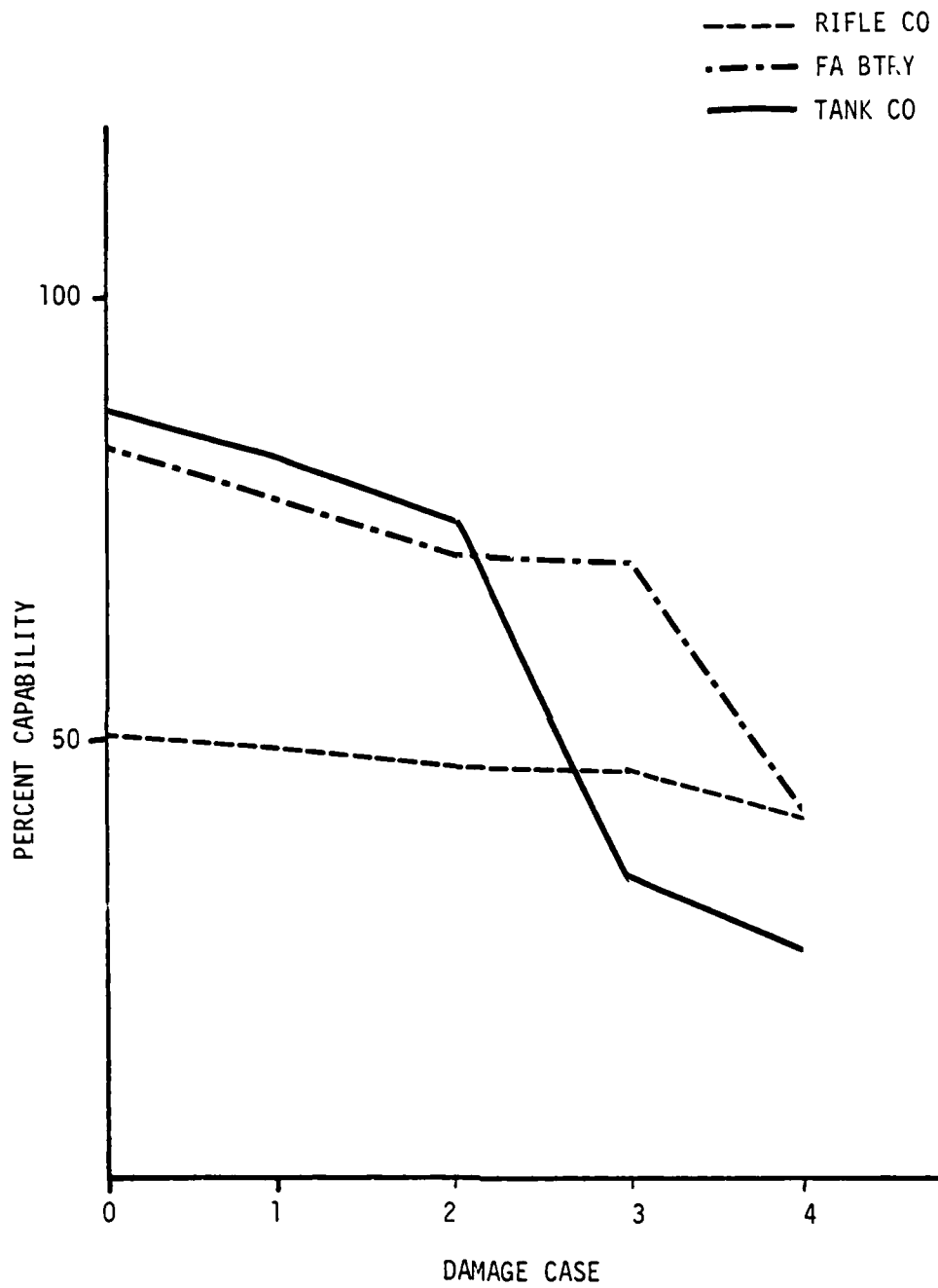


Figure 3-II-3. REDCON 1 - Comparison of Line Units - Unit Recovered Capability After Damage.

The command and control function as executed by the various HHC's in the type combat battalions is the main limitation. Unit capability is the lowest of either personnel team or materiel team capability. For example, in Table 3-II-1, the HHC of the Tank Battalion has a capability of 53% following 10% casualties with associated materiel damage. If this unit is incapable of performance, there is no battalion, but three independent tank companies.

The HH Battery of the Field Artillery is the most sustainable, while the HHC of the Mech Inf Bn and the Tank Bn are equal and very poor in sustainability.

When operating in a combined arms mode, the Rifle Company is the most sustainable of the fighting companies. The tank company is the least sustainable.

The Combat Support Company of the Tank Battalion is the least sustainable of this type unit with the Service Battery of the FA Battalion the most sustainable.

### 3. READINESS CONDITION 2

The capability of units to sustain themselves entering combat from this status is at Table 3-II-2. Comparisons of type units is at Figures 3-II-4, 3-II-5, and 3-II-6.

The headquarters of the battalion obviously requires replenishment before damage of any significance occurs. The only exception is the HHC of the FA BN which exhibits relatively strong sustainability.

The Forward Support Company is not able to sustain itself in supporting a brigade from this readiness condition.

### 4. READINESS CONDITION 3

All units except the HQ Btry, FA Bn and the Inf Battalion Combat Support Company require replenishment. This is apparent from their sustainability presented at Table 3-II-3, and Figures 3-II-7, 3-II-8, and 3-II-9.

Table 3-II-2. Functional Capability of REDCON 2 Units

REDCON 2									
FUNCTIONAL CAPABILITY OF REDCON 2 UNITS									
PERSONNEL CASUALTIES* (%)		10			20			30	
BATTALION	UNIT	PERSONNEL	MATERIEL	PERSONNEL	MATERIEL	PERSONNEL	MATERIEL	PERSONNEL	MATERIEL
TANK	HHC	20	59	5.6	58	1.2	51		
	CSC	49	49	29	47	13	40		
	TANK CO	90	70	76	64	63	28		
INFANTRY (MECH)	HHC	46	67	22	66	6.7	53		
	CSC	127	78	107	70	83	64		
	RIFLE CO	105	50	93	48	77	45		
FIELD ARTILLERY	HQ BTRY	75	80	64	76	51	74		
	SVC BTRY	80	60	67	60	57	60		
	FA BTRY	176	74	153	70	118	64		
(COMBINED ARMS SUPPORT)	FWD SPT CO	64	40	53	39	37	35		

\*With associated materiel damage.

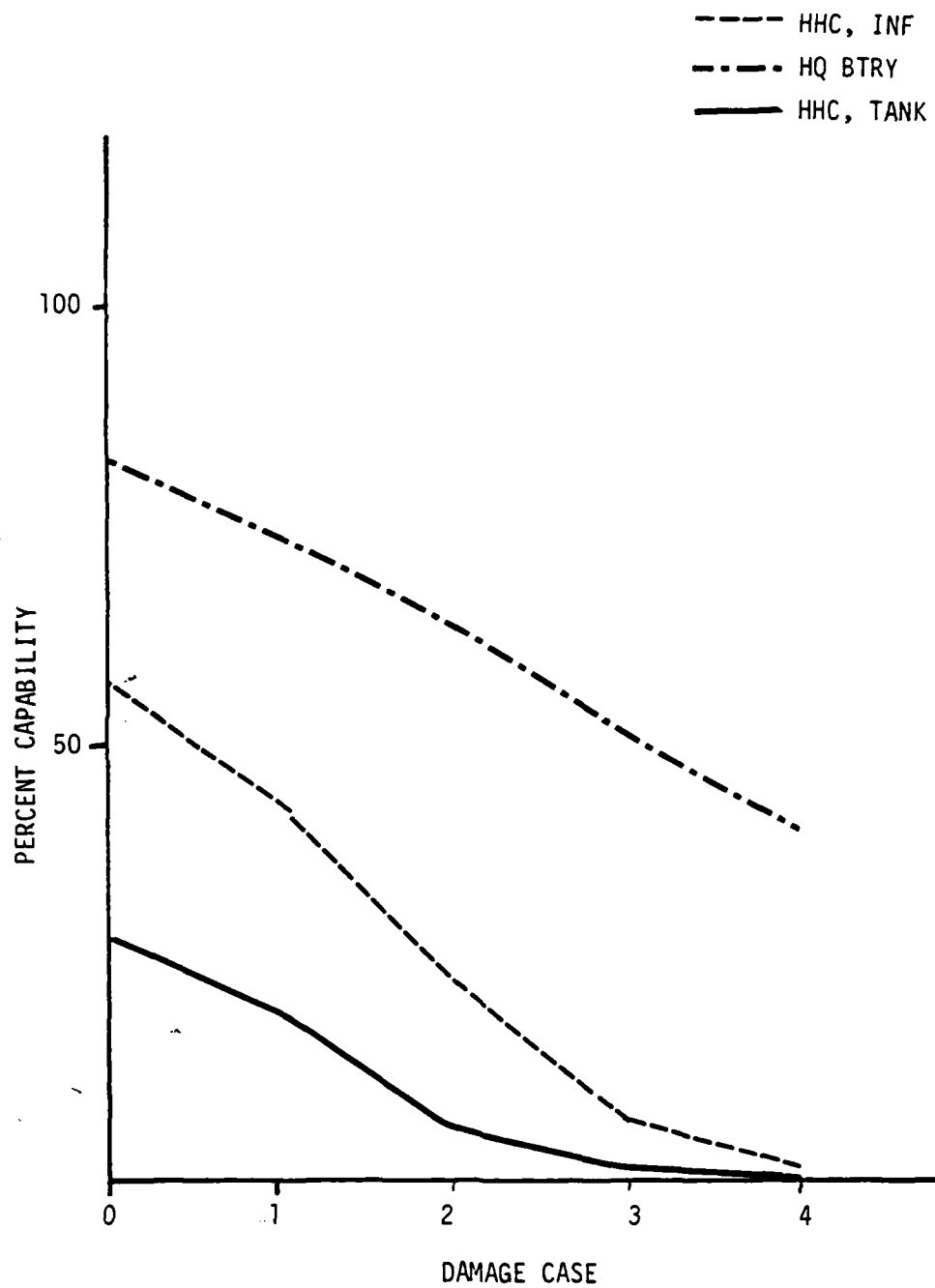


Figure 3-II-4. REDCON 2 - Comparison of Headquarters Units - Unit Recovered Capability After Damage.



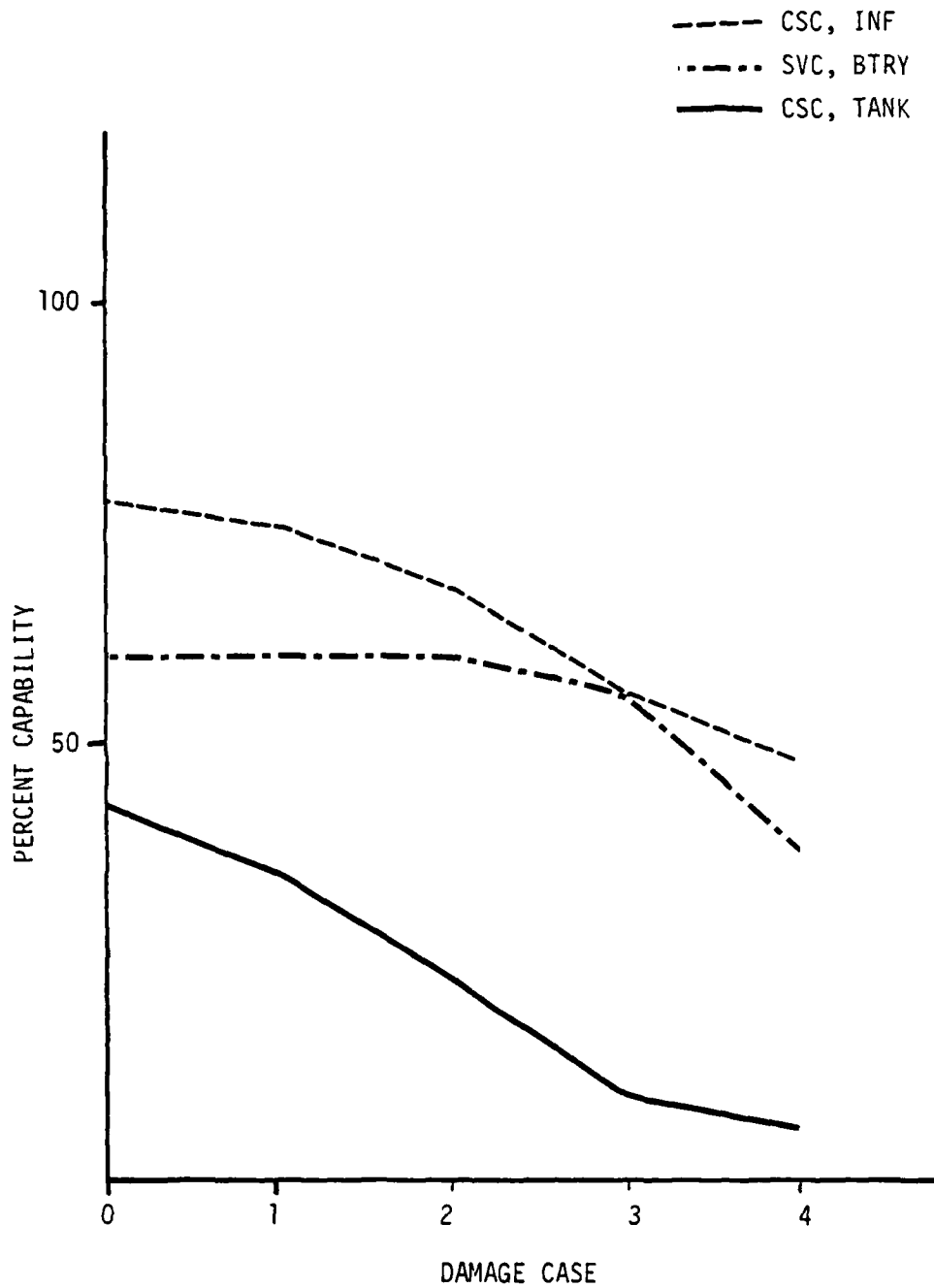


Figure 3-II-5. REDCON 2 - Comparison of Support Units - Unit Recovered Capability After Damage.

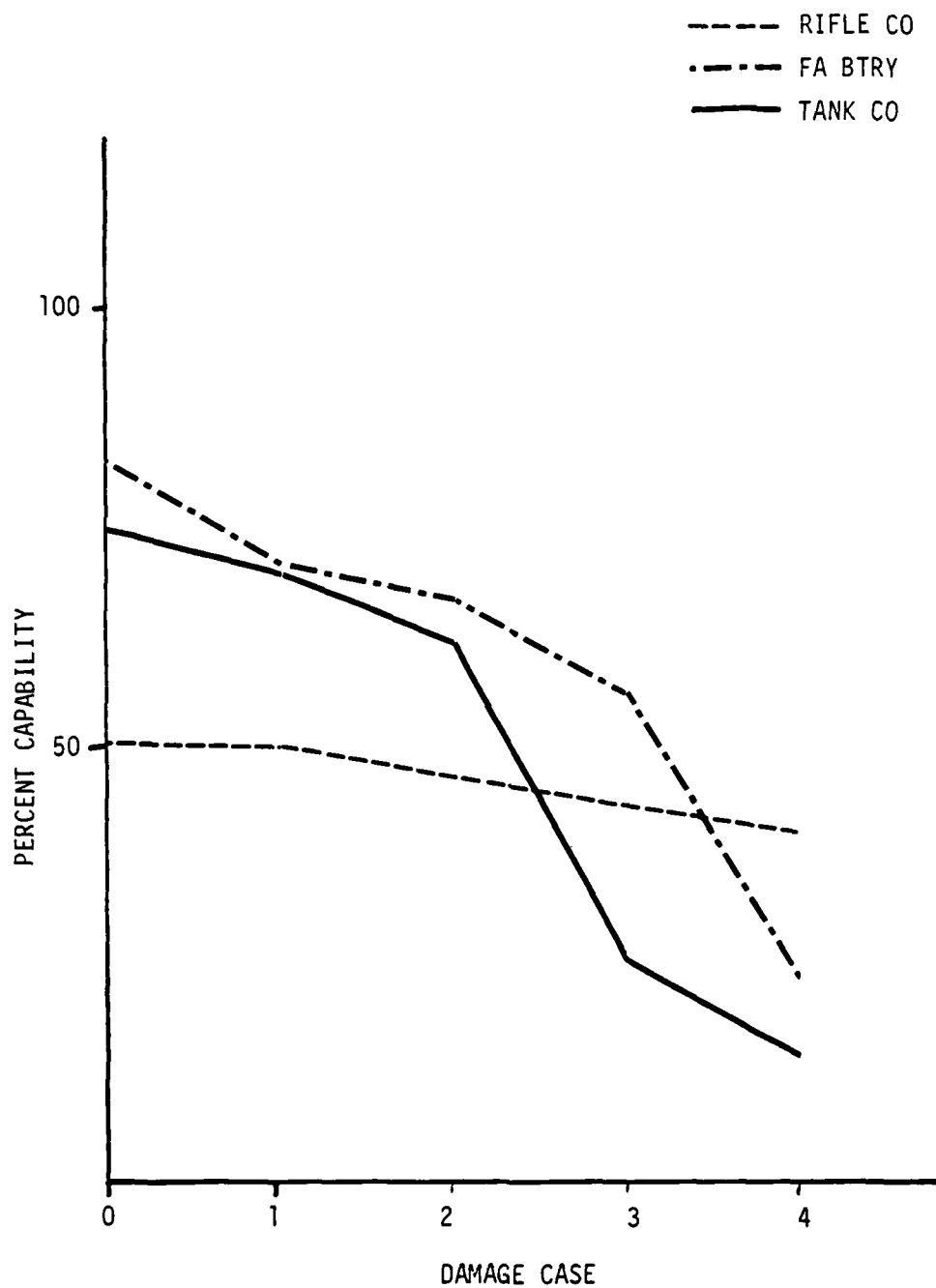


Figure 3-II-6. REDCON 2 - Comparison of Line Units - Unit Recovered Capability After Damage.

Table 3-II-3. Functional Capability of REDCON 3 Units

REDCON 3									
FUNCTIONAL CAPABILITY (% OF UNIT MAX)									
PERSONNEL CASUALTIES* (%) :		10			20			30	
BATTALION	UNIT	PERSONNEL	MATERIEL	PERSONNEL	MATERIEL	PERSONNEL	MATERIEL	PERSONNEL	MATERIEL
TANK	HHC	4.8	56	1.2	56	0	45		
	CSC	39	48	19	43	10	40		
	TANK CO	78	63.3	62	60	52	27		
INFANTRY (MECH)	HHC	24	49	8.0	47	2.0	42		
	CSC	105	74	78	59	68	52		
	RIFLE CO	96	49	79	49	61	42		
FIELD ARTILLERY	HQ BTRY	63	66	51	64	42	61		
	SVC BTRY	64	60	55	60	41	58		
	FA BTRY	153	63	128	55	91	52		
(COMBINED ARMS SUPPORT)	FWD SPT CO	52	41	41	39	29	38		

\*With associated materiel damage.

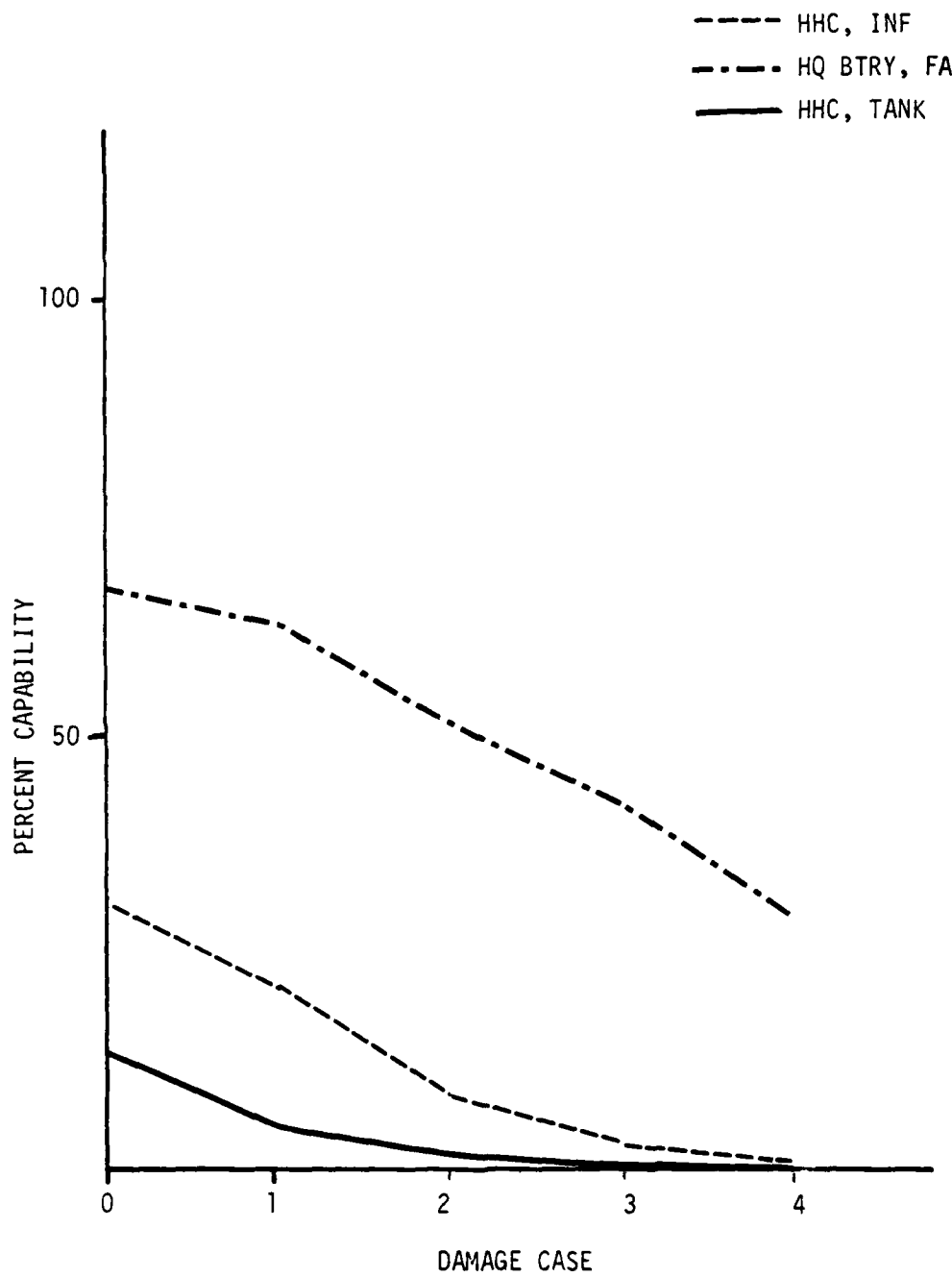


Figure 3-II-7. REDCON 3 - Comparison of Headquarters Units - Unit Recovered Capability After Damage.

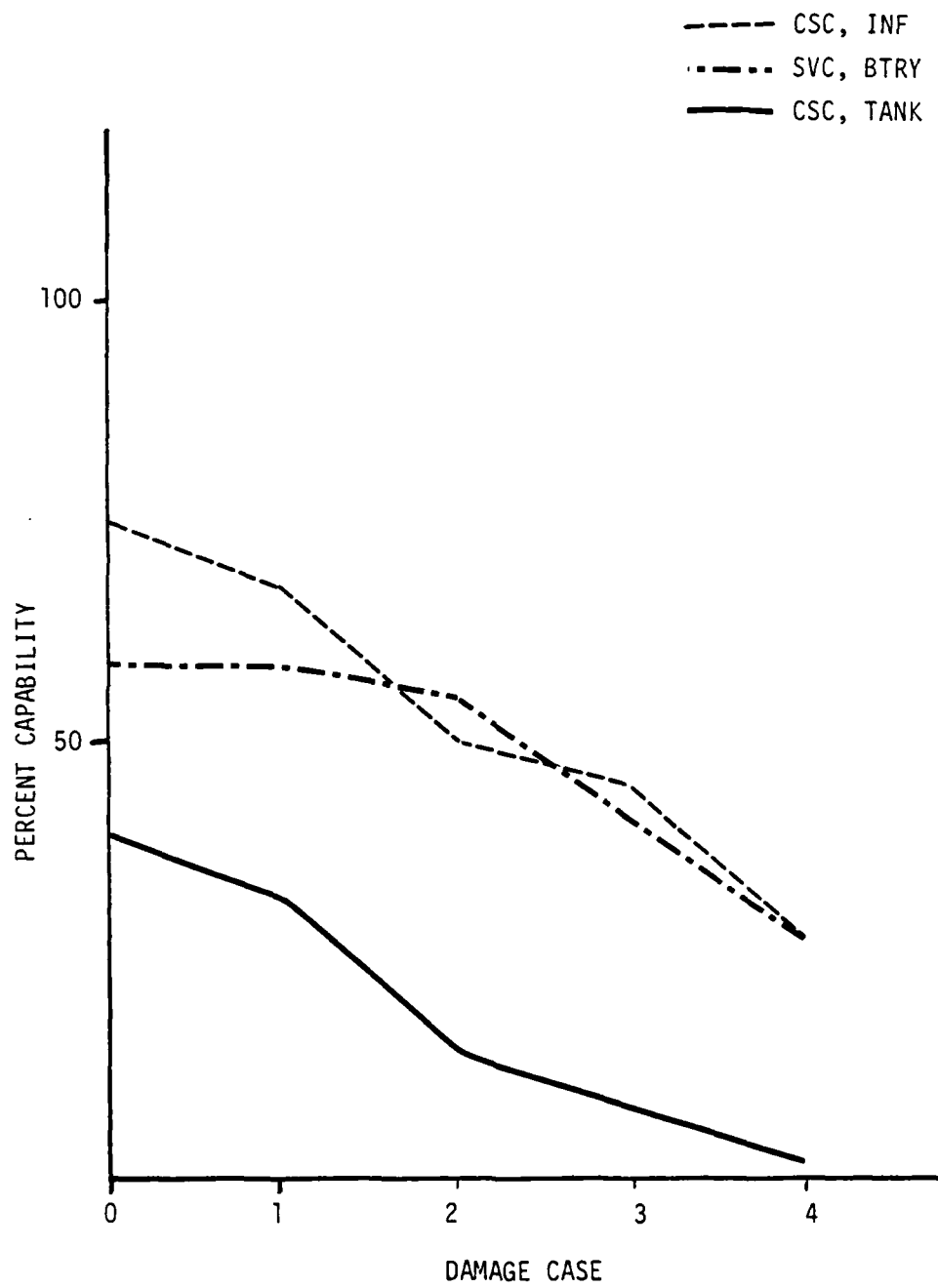


Figure 3-II-8. REDCON 3 - Comparison of Support Units - Unit Recovered Capability After Damage.

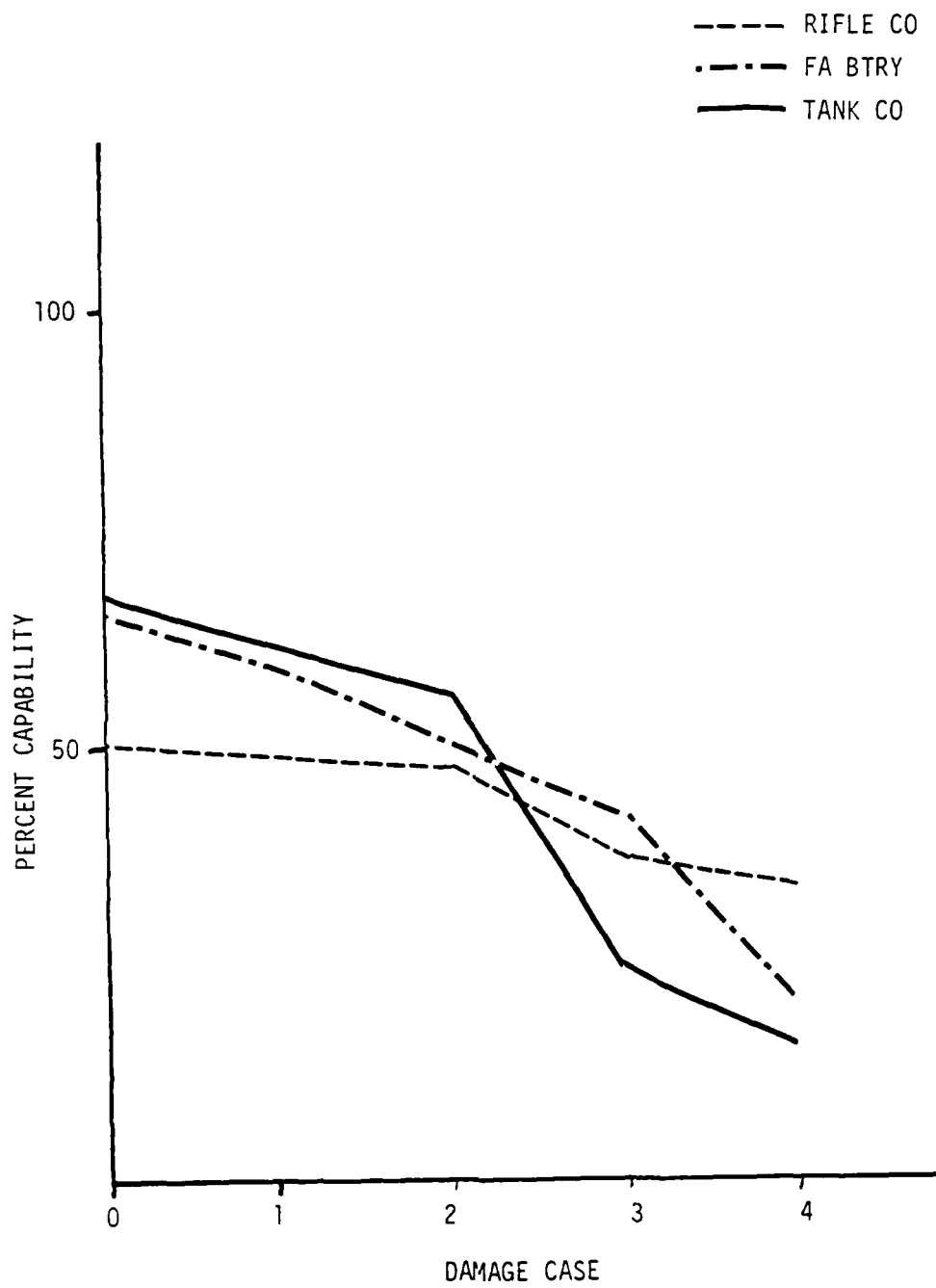


Figure 3-II-9. REDCON 3 - Comparison of Line Units - Unit Recovered Capability After Damage.

Section III. Critical Materiel and Personnel

1. GENERAL

The AMORE methodology identifies those personnel skills and materiel items that preclude additional capability. Following are those critical elements that are required to achieve higher combat capability by type unit. These critical skills and materiel items were selected for an examination of all readiness levels and damage combinations except where noted.

2.

MECH BN

Personnel

Materiel

RIFLE CO

Strength  
CO CMDR  
Motor Sergeant  
Rifle Platoon Leader and  
Tow Gunner at 40% damage

TOW  
Mortar  
APC

COMBAT SUPPORT CO

Strength  
Fire Direction Computer  
COMMO Systems Operator

APC  
TOW  
Mortar  
Wrecker

HQ & HQS CO

Strength  
Officers  
NCO Specialists

5-Ton Truck  
Fuel Service Truck  
8-Ton Truck  
Recovery Vehicle  
2½ Ton Truck

3.

TANK BN

Personnel

Materiel

TANK CO

Strength  
Tank Turret Mechanics and  
C-E Mechanic in Readiness  
Condition 3

Tank  
Maintenance Truck 2½-T

COMBAT SUPPORT CO

Air Defense Leaders and Gunners  
Truck Vehicle Mechanic  
Motor Sergeant  
Fire Direction Chief and Computer

Mortar  
APC  
AVLB  
Recovery Vehicle

HQS & HQS CO

Tank Turret Mechanic  
Motor Sergeant  
Welder  
Truck Master  
Bn Staff Officers  
Ammunition Specialist  
Tank Gunner  
Bn Cmdr  
Supply Sergeant

Tank  
5-Ton Truck  
Fuel Service Truck  
Recovery Vehicle  
8-Ton Truck  
Generator at 40%  
damage levels

4.

ARTILLERY BN

Personnel

Materiel

ARTILLERY BATTERY

Strength  
Commander  
Gunner  
Chart Operator  
Fire Director Officer  
Executive Officer  
Assistant Gunner  
Motor Sergeant in REDCON 3

Howitzer  
Aiming Circle



SERVICE BATTERY

Personnel

Strength  
Commander

Materiel

8-Ton Truck  
1½-Ton Truck  
Fuel Service Truck  
Recovery Vehicle  
10-Ton Wrecker  
5-Ton Truck

HQS & HQS BTRY

FIST TEAM LEADER  
STAFF OFFICERS  
Fire Direction Computer  
Motor Sergeant

APC  
½-Ton Truck

5.

FORWARD SUPPORT COMPANY

Personnel

Fire Control Instrument Repairman  
Tank Turret Repairman  
Small Arms Repairman  
Artillery Repairman  
Special Electronics Device Repairman  
Fuel/Electrics Systems Repairman  
Welder

Materiel

Tool Kit  
Parts Van  
Parts (S&P)  
Wrecker  
Compressor at  
High Damage Levels

#### Section IV. Baseline Performance Replenishment

##### 1. GENERAL

Sustainability was also examined with respect to two consumable commodities, ammunition and fuel. The Field Artillery Battalion (155 SP) was selected for the ammunition analysis due to its large requirement relative to other units. Similar reasoning resulted in selection of the Tank Battalion for analysis of fuel requirements. Sustainability was measured, in this analysis, as the length of time the unit could maintain an expected consumption rate before exhausting all available supplies. The first part of this analysis addressed the units capability to transport, handle, and store the commodity with its available assets. Unit sustainability was then examined for different re-supply rates.

Each unit was examined at full TOE, and as configured to minimum requirements for each REDCON. Unit capability to manage the commodity was examined for all damage cases applied to each of the above unit conditions. Sustainability was then examined for each unit condition, without damage and for damage case 1. (Refer to Table 2-I-2 for damage case definition.)

##### 2. AMMUNITION SUSTAINABILITY

a. Consumption - An expenditure rate of 158 rounds/tube/12 hrs, provided by ODCSLOG, was used for the computation of battalion expenditures. Using 135 lbs/round average weight yields an expected consumption for a full strength battalion of 192 stons per 12 hours of combat.

b. Capability - The battalion capability to transport ammunition was calculated by assuming vehicle capacity equal to its stated rating. The normal ammunition associated transport listed below has a capacity of 198 stons.

FIRING BTRY (X3)

8 Ton Truck 3 (9)  
1 1/2 Ton Trailer 9 (27)

SERVICE BTRY

8 Ton Truck 9  
1 1/2 Ton Trailer 9

In addition to those vehicles above, the battalion has several others that could be pressed into service for transport of ammunition if required. This additional available capacity, shown below, amounts to 162.75 stons, giving the TOE battalion a total maximum capacity of 360.75 stons for ammunition transport.

Additional Transport Capacity

FIRING BTRY (X3)

2 1/2 Ton Truck 3 (9)  
6 Ton Cargo Carrier 6 (18)  
1 1/2 Ton Trailer 2 (6)

SERVICE BTRY

1 1/4 Ton Truck 1  
2 1/2 Ton Truck 7  
1 1/2 Ton Trailer 3

Figure 3-IV-1 shows the effect of damage on this maximum capability for units entering combat at full TOE and each REDCON. These charts show that the unit in each condition has sufficient transport to supply the maximum expected requirement of the tubes that the unit started with. It also shows that transport should be considered if a unit in the lower REDCON's is to be brought up to strength in weapons. The capability of this battalion to handle ammunition was determined by equipment on hand. Personnel to drive the vehicles and handle the ammunition never limited this capability.

c. Sustainability - Figures 3-IV-2, -3, -4, and -5 display the time, in days, that the unit, in each condition, can maintain the stated consumption given various resupply rates. The battalion, in each of the conditions, was assumed deployed with the normal ammunition carriers fully loaded. The first period consumption was assumed to be that of all weapons initially available in the readiness condition. Losses and subsequent period consumptions were determined by the damage assessment. Table 3-IV-1 shows the deployed ammunition and first period, or no damage, consumption.

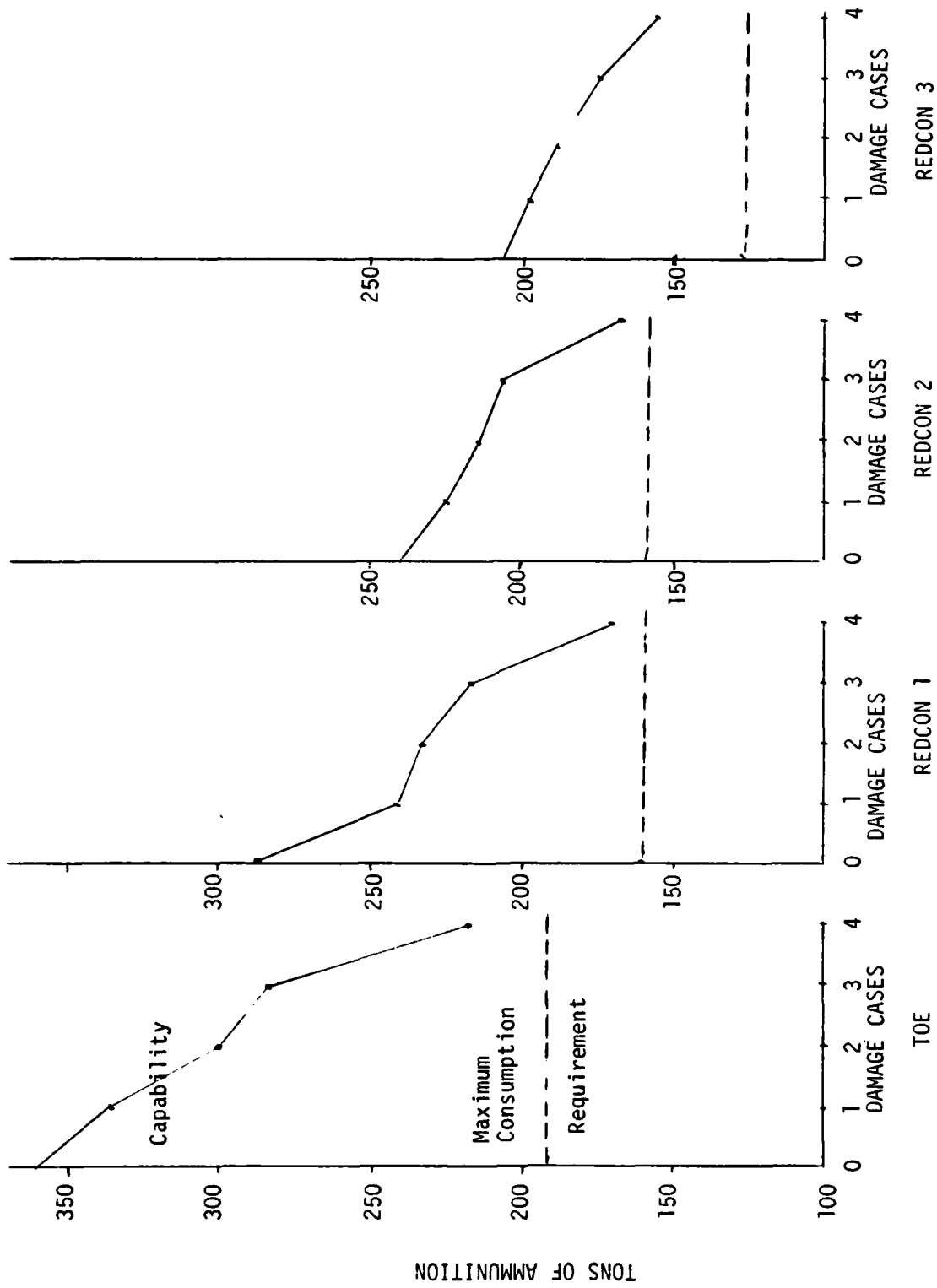


Figure 3-IV-1. Ammunition Capability and Requirements 155 SP Howitzer Battalion.

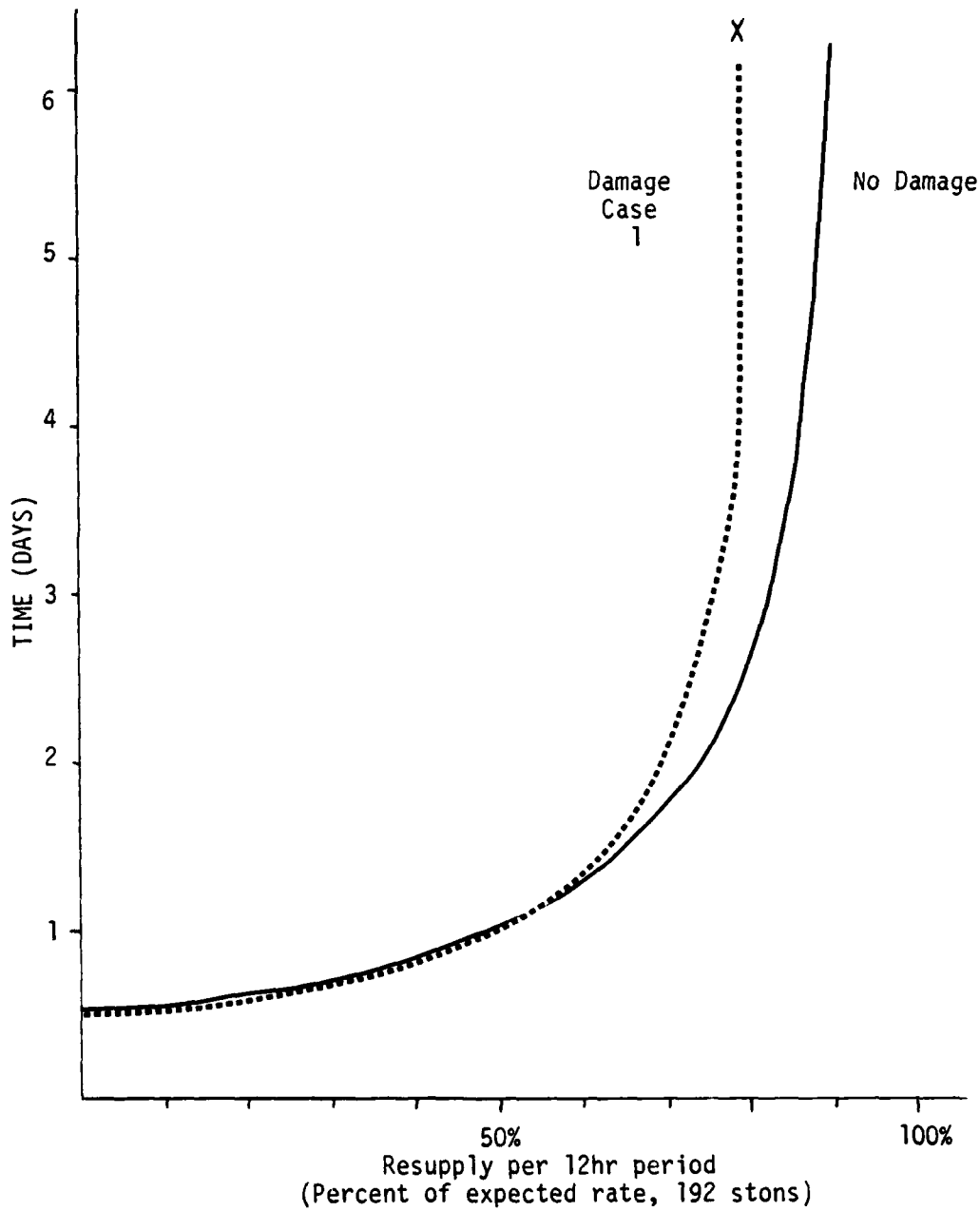


Figure 3-IV-2. Days of expected ammunition expenditure that can be sustained by various resupply rates, Artillery Bn at TOE

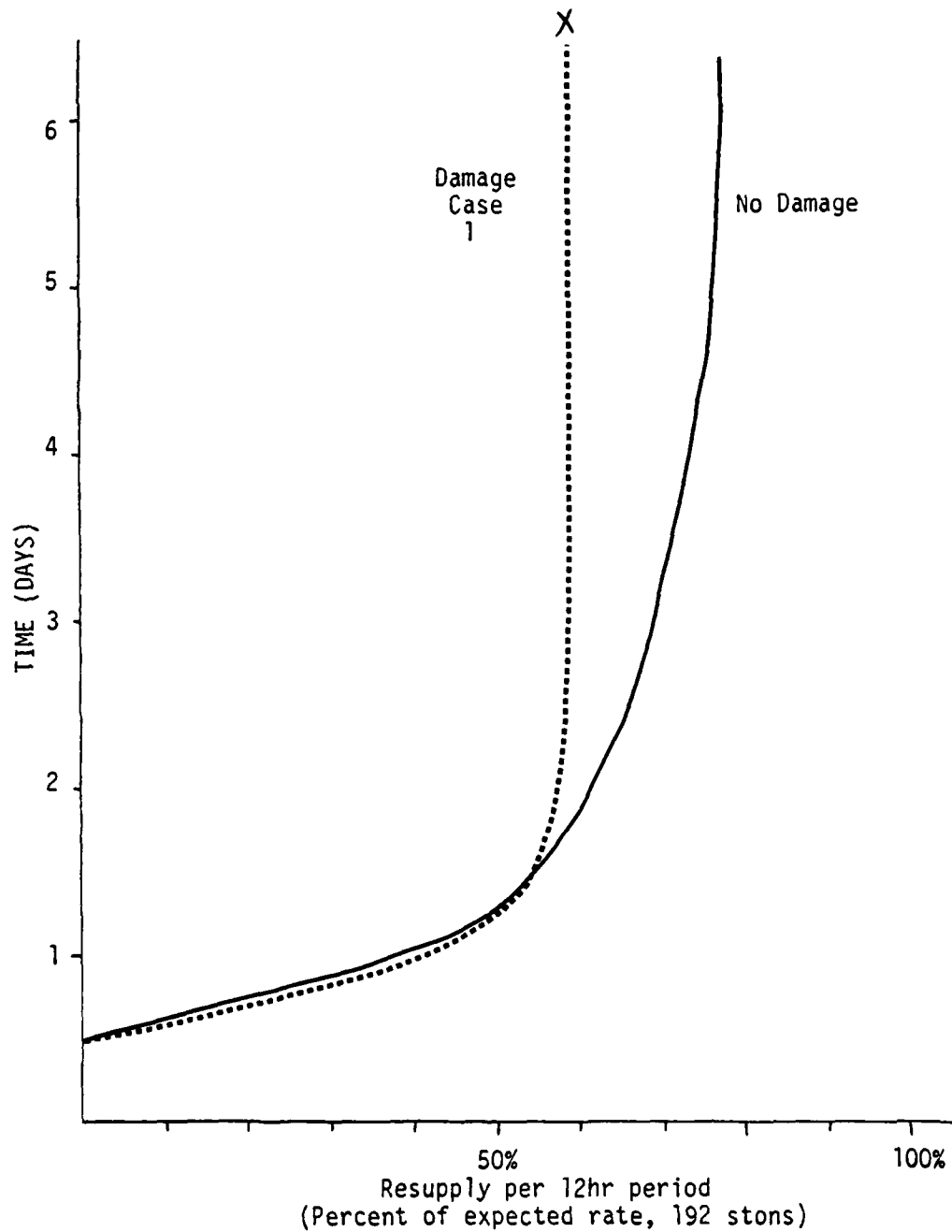


Figure 3-IV-3. Days of expected ammunition expenditure that can be sustained by various resupply rates, Artillery Bn at REDCON 1

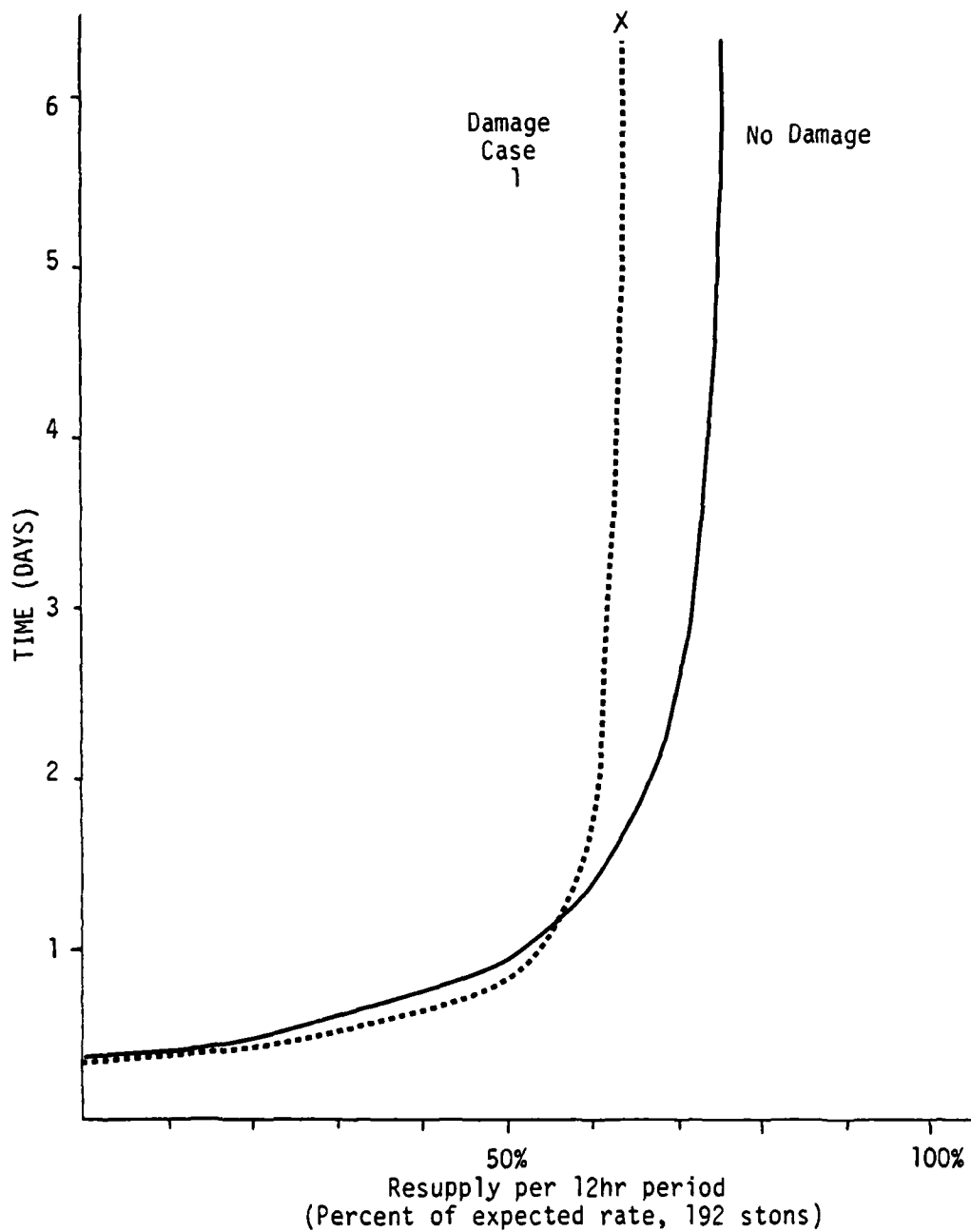


Figure 3-IV-4. Days of expected ammunition expenditure that can be sustained by various resupply rates, Artillery Bn at REDCON 2

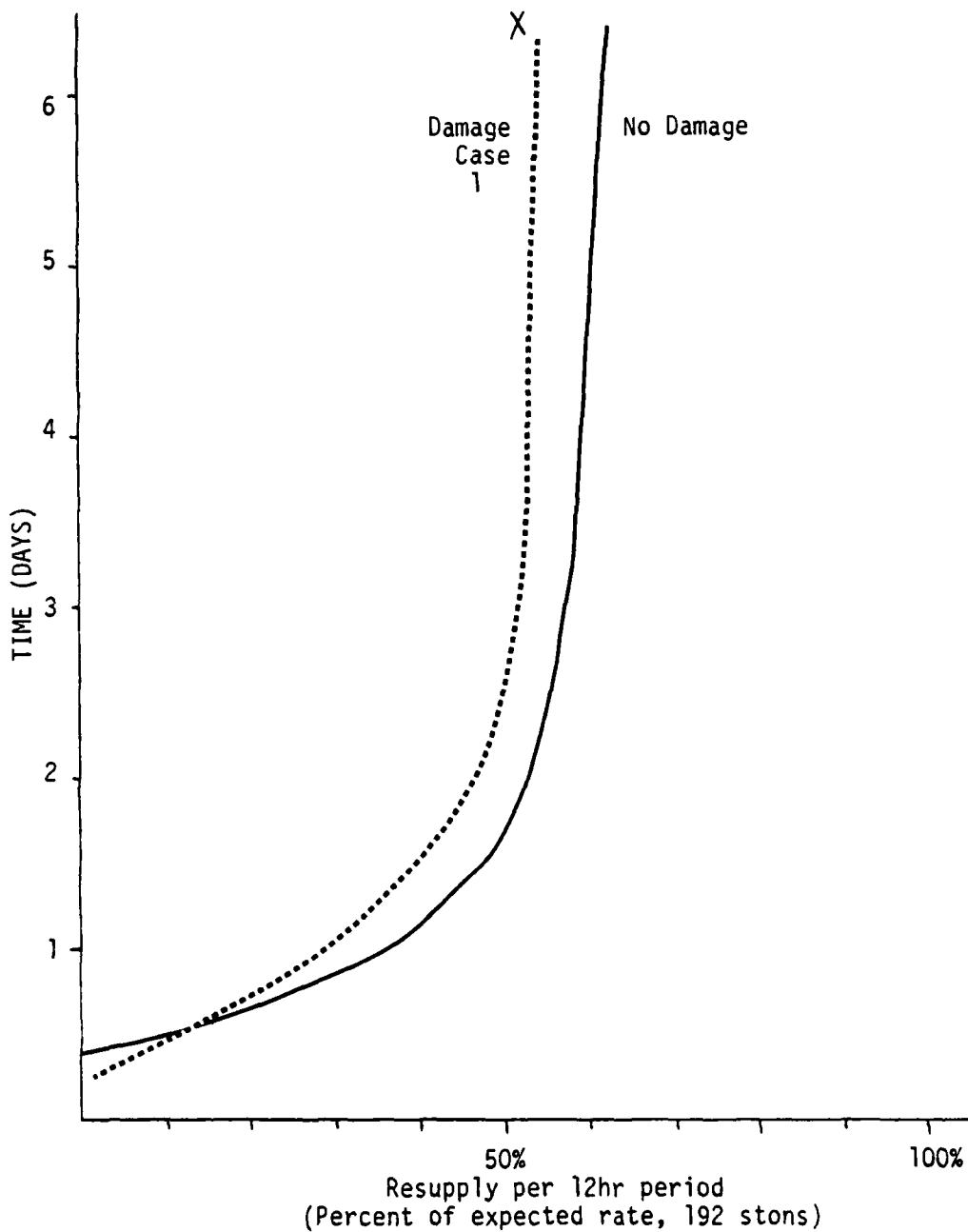


Figure 3-IV-5. Days of expected ammunition expenditure that can be sustained by various resupply rates, Artillery Bn at REDCON 3



Table 3-IV-1. Ammunition Deployed and Initial Consumption

	TOE	REDCON 1	REDCON 2	REDCON 3
Ammunition Deployed (stons)	198	160	122	108
Ammunition Consumption (stons/12 hrs)	192	160	160	128

From the figures we can see that without resupply the unit can maintain firing for 12.4 hours at full TOE. That is the maximum time, the minimum occurs at REDCON 2, when the normal transport capacity is allowed to drop significantly without a corresponding reduction in weapons. The figures further show that a significant level of resupply is required to gain any appreciable amount of sustainability. For example, the TOE unit, Figure 3-IV-2, with no damage applied gains only 12 hours of sustainability when resupply is increased from zero to 50%. However, a 10% increase of resupply from 60 to 70% gives it an additional 10.4 hours of sustainability.

The cases where damage was applied show very little difference from the no damage cases at low levels of resupply. This is because the sustainability time is short. When a resupply level is reached that allows the unit to continue for several periods the reduction of consumers becomes significant and lower levels of resupply are able to totally sustain the unit.

### 3. FUEL SUSTAINABILITY

a. Consumption - Consumption factors for an intense combat situation were determined for all equipment from FM 101-10-1 and modified by SB 710-2. This results in a total consumption rate of 22,425 gallons/day for the full strength Tank Battalion.

b. Capability - The battalions' total fuel capacity was determined by the on-hand number of fuel service vehicles, tank and pump units, and fuel pods. Vehicle fuel tanks were also included as storage or holding

capacity and represent 62% of the holding capacity of this unit. These capacities are shown below.

Vehicle Fuel Tanks	27,949 gals
Fuel Service Vehicles (4)	10,000 gals
Tank & Pump Units (4)	4,800 gals
Fuel Pods (4)	<u>2,400 gals</u>
Total Fuel Capacity	45,149 gals

Figure 3-IV-6 shows the effect of readiness conditions on this capability as well as the effect of damage on units in each of the conditions; TOE, REDCON 1, 2, and 3. The capability to transport, handle, and store was compared to the maximum expected consumption and proved to be sufficient in all cases. The capability was, in all cases, determined by equipment limitations and was not affected by personnel.

c. Sustainability - Figures 3-IV-7, -8, -9, and -10 show the results of the sustainability analysis. Units were assumed to deploy with all capacity "topped off". Table 3-IV-2 shows these amounts for units in each condition as well as the expected no damage consumption for a 12 hour period.

Table 3-IV-2. Fuel Deployed and Initial Consumption

	TOE	REDCON 1	REDCON 2	REDCON 3
Fuel Deployed (gals)	45,149	36,800	29,146	27,511
Fuel Consumption (gals/12 hrs)	11,212	9,593	8,268	7,625

The table shows a good correlation between fuel capacity and expected fuel consumption for all four unit conditions. The sustainability, without resupply, changes from 2.0 days for the full strength unit to 1.8 days for units in REDCON 2 and 3.

The sustainability charts again show, as with ammunition, that significant levels of resupply are required to gain appreciable sustainability, but at levels of resupply above 50% of consumption significant gains of sustainability result from small increases in resupply level.

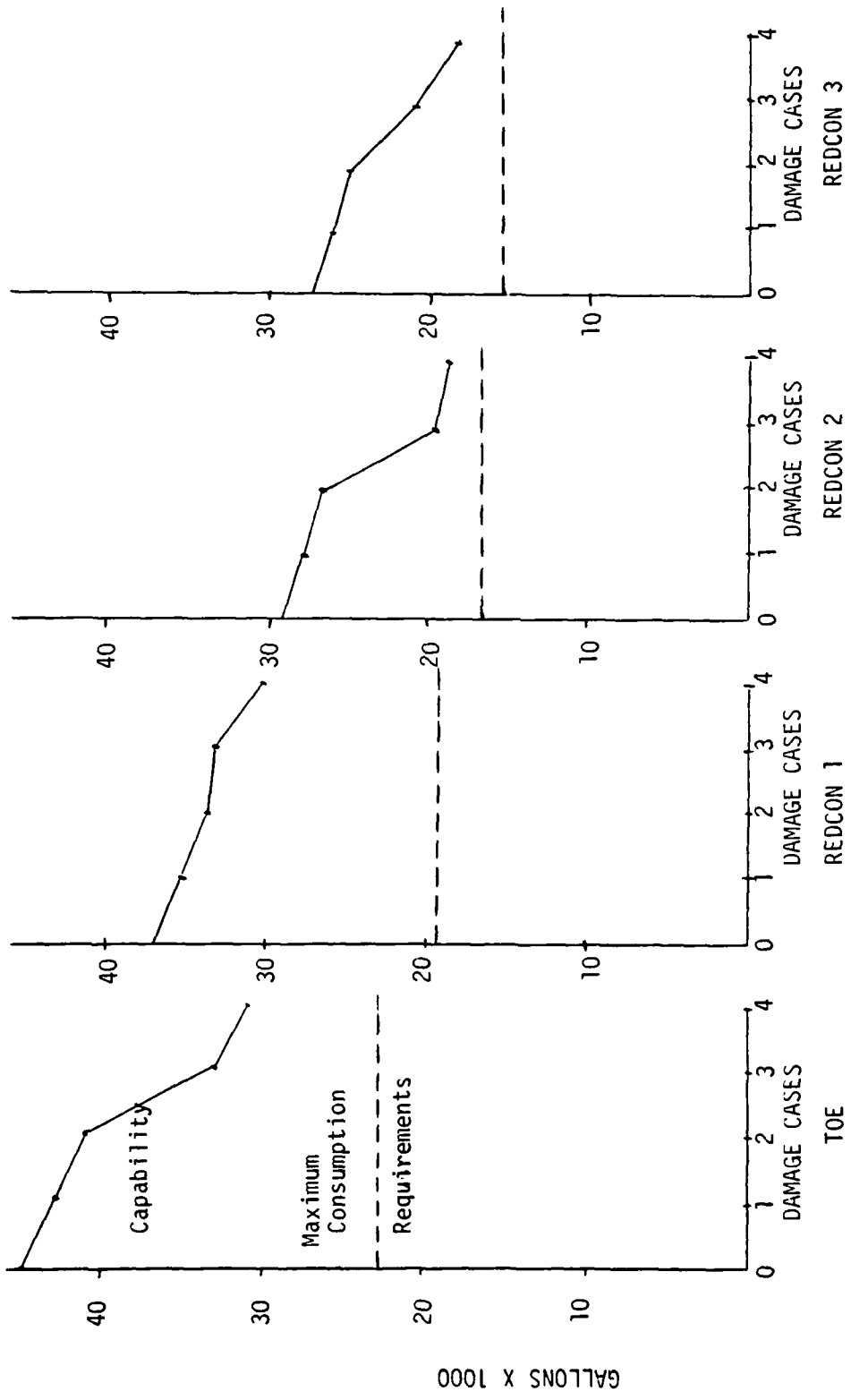


Figure 3-IV-6. Fuel Capability and Requirements, Armor Battalion

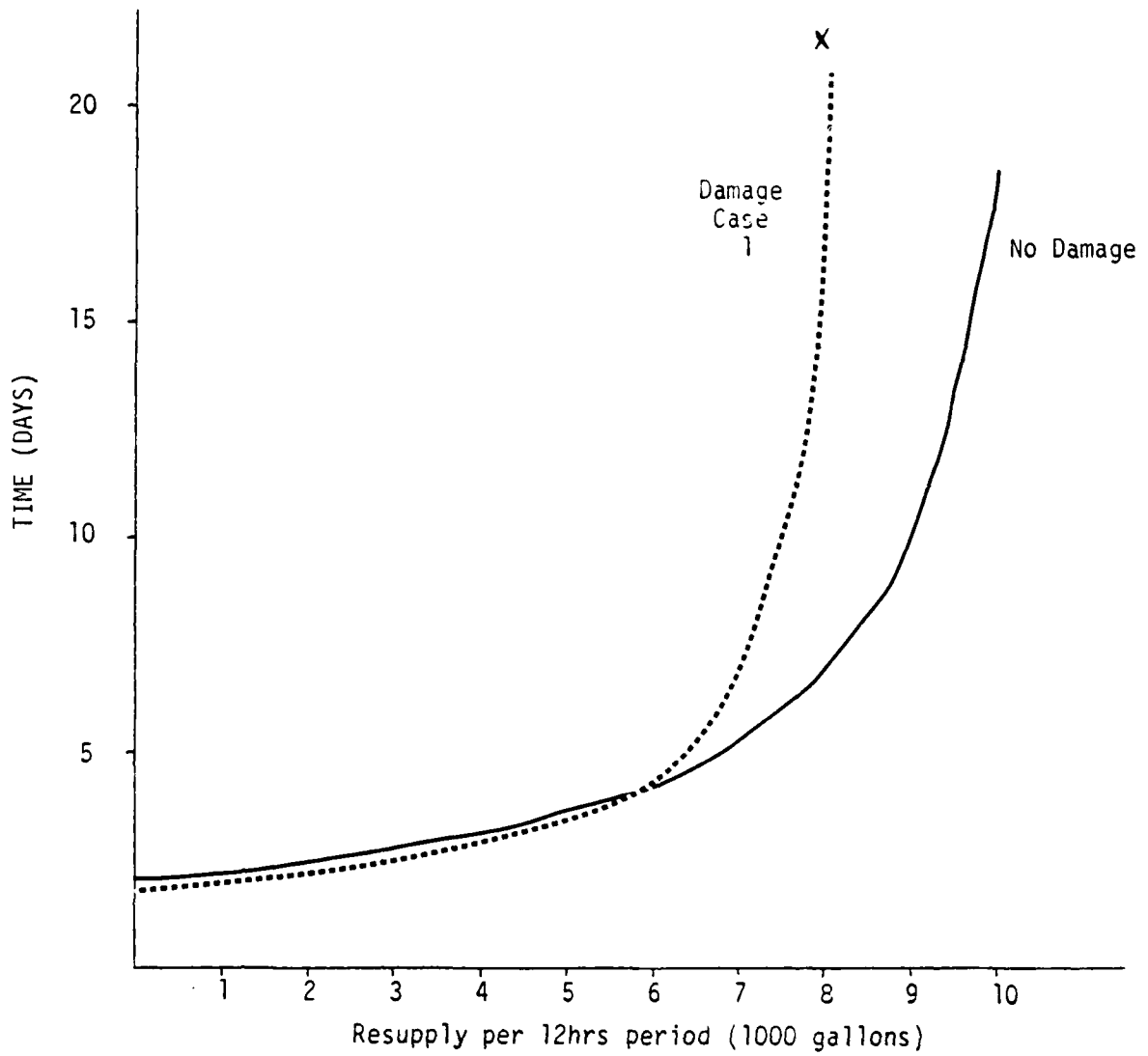


Figure 3-IV-7. Days of expected fuel consumption that can be sustained by various resupply rates, Tank Bn at TOE

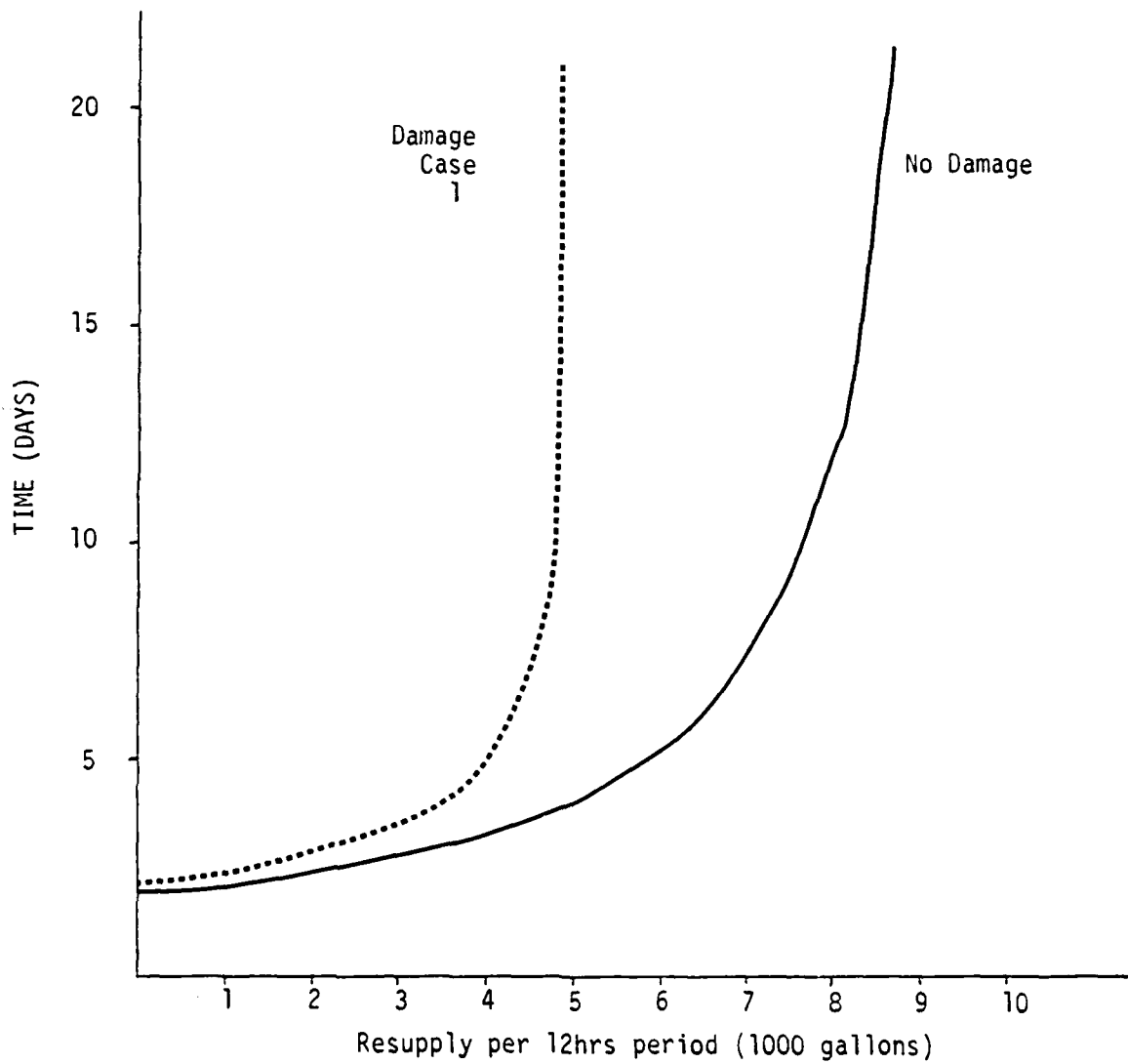


Figure 3-IV-8. Days of expected Fuel Consumption that can be sustained by various resupply rates, Tank Bn at REDCON 1

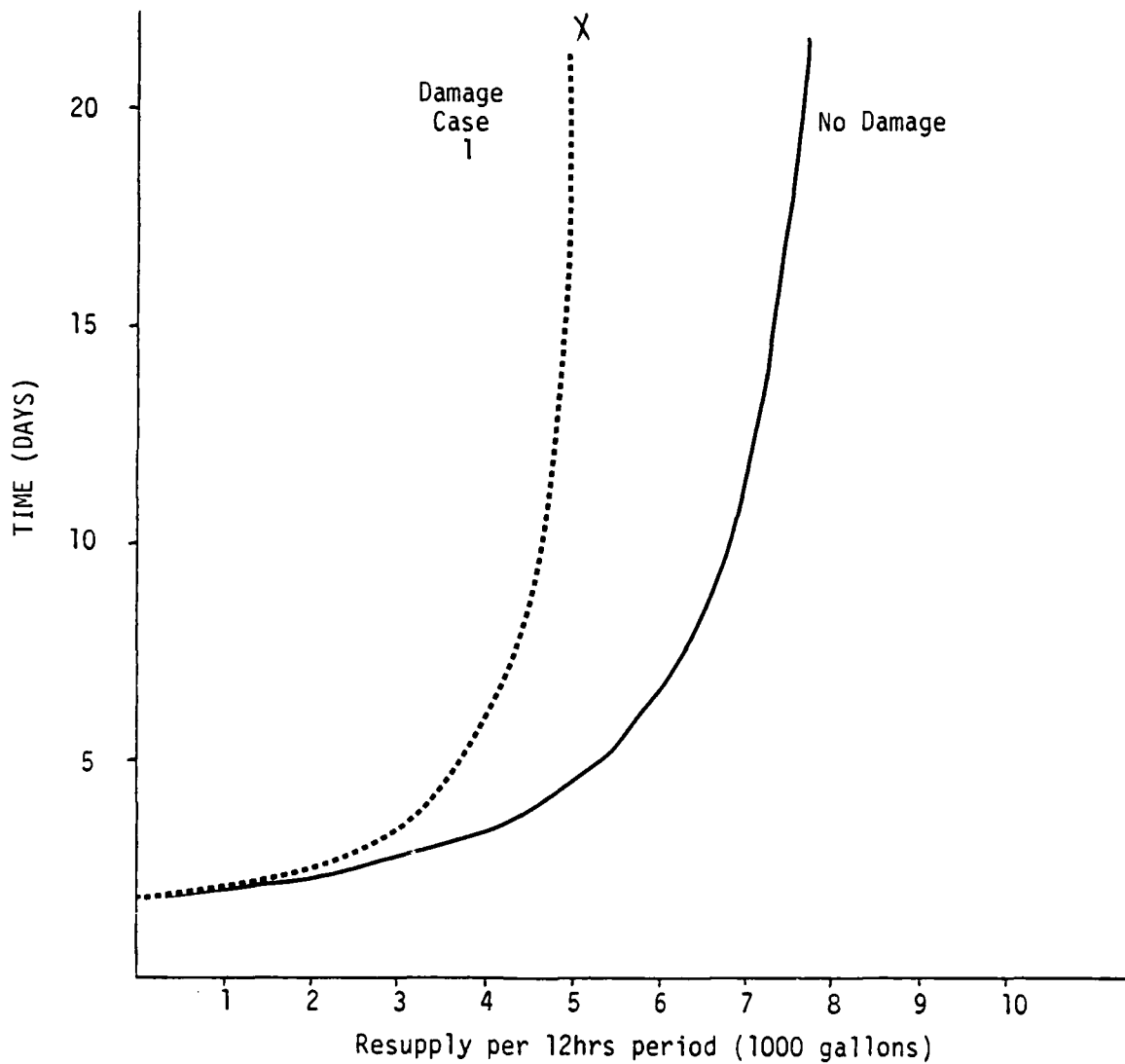


Figure 3-IV-9. Days of expected Fuel Consumption that can be sustained by various resupply rates, Tank Bn at REDCON 2

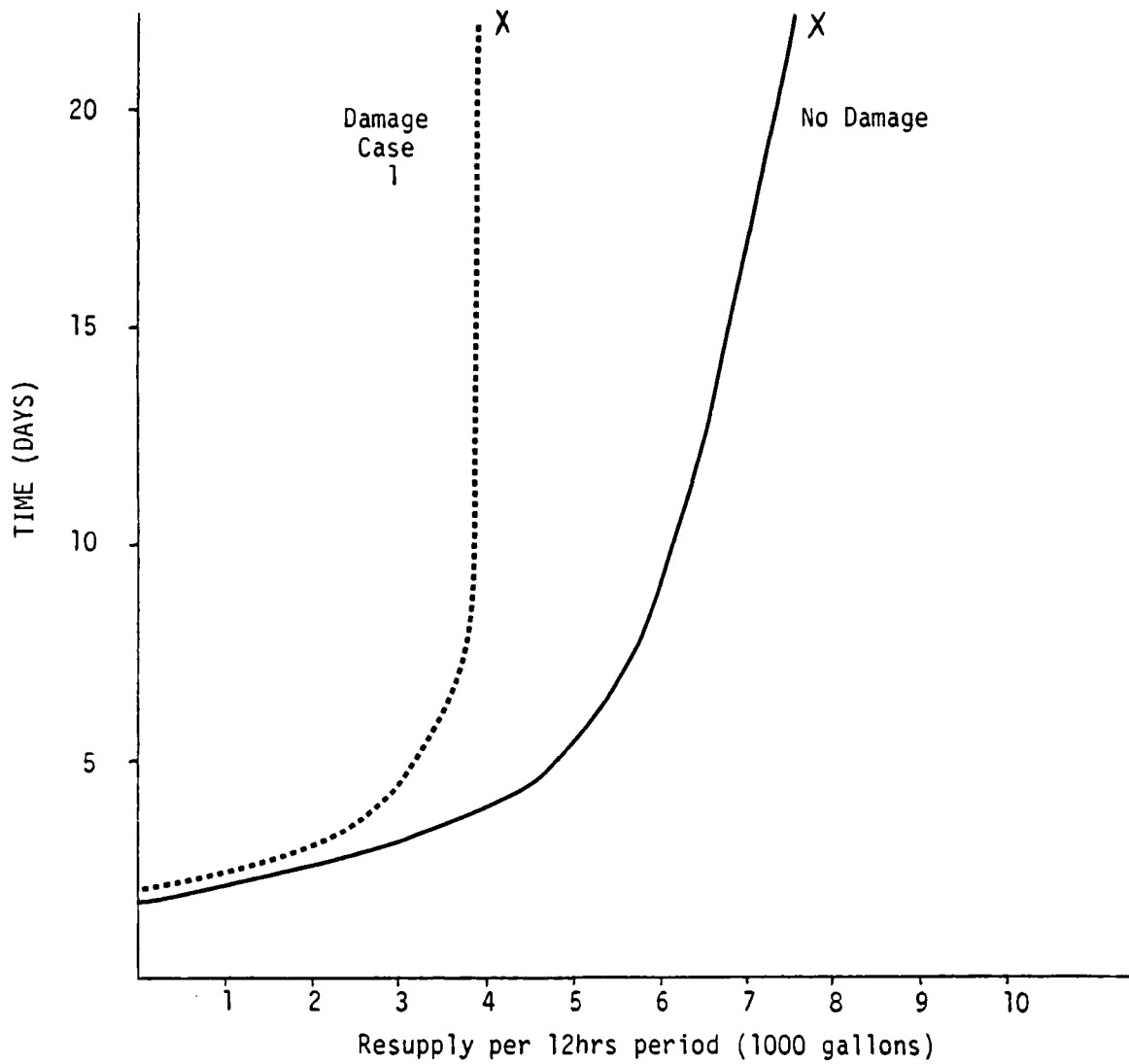


Figure 3-IV-10. Days of expected Fuel Consumption that can be sustained by various resupply rates, Tank Bn at REDCON 3

## Section V. Replenishment of Personnel

There are three broad ways to restore capability following degradation to personnel strengths: redistribution of remaining assets, replenishment from external resources, or a combination of these. Although perhaps impractical to be applied completely in combat and disruptive to unit cohesiveness, it appeared useful to set bounds on capability attainable by redistribution. This investigation was also important because of the possible lag time between shortages and replenishment.

Alignment in this context is a cross levelling process which transfers surplus personnel from those units exceeding a desirable capability to those units short in strength required to build the number of essential teams required for a given effectiveness level. This process was applied to the combat elements of an armored division (three artillery battalions, six tank battalions, and five mechanized infantry battalions) following a combination of damages as follows: 0%, 10% to all elements, 10% to all elements except 20% to two maneuver companies of tank and mechanized infantry battalions, 20% to all elements except 30% to two maneuver companies of tank and mechanized infantry battalion and 30% to all elements. The maximum capability of type combat battalions following realignment is at Figure 3-V-1. For this analysis it was assumed that battalions entered combat from Readiness Condition 2.

Table 3-V-1 displays the total number of personnel required to achieve 95% effectiveness. A proportion of skills according to TOE density is assumed. The Army is probably dependent on the magnitude of numbers of these types for estimating personnel replacement requirements for planning purposes.

When maximum unit effectiveness is limited by materiel, it is of course not necessary to replace personnel to achieve the absolute limit in personnel capability. For example, from Table 3-V-1, it requires 692 replacement personnel for the tank battalions in the



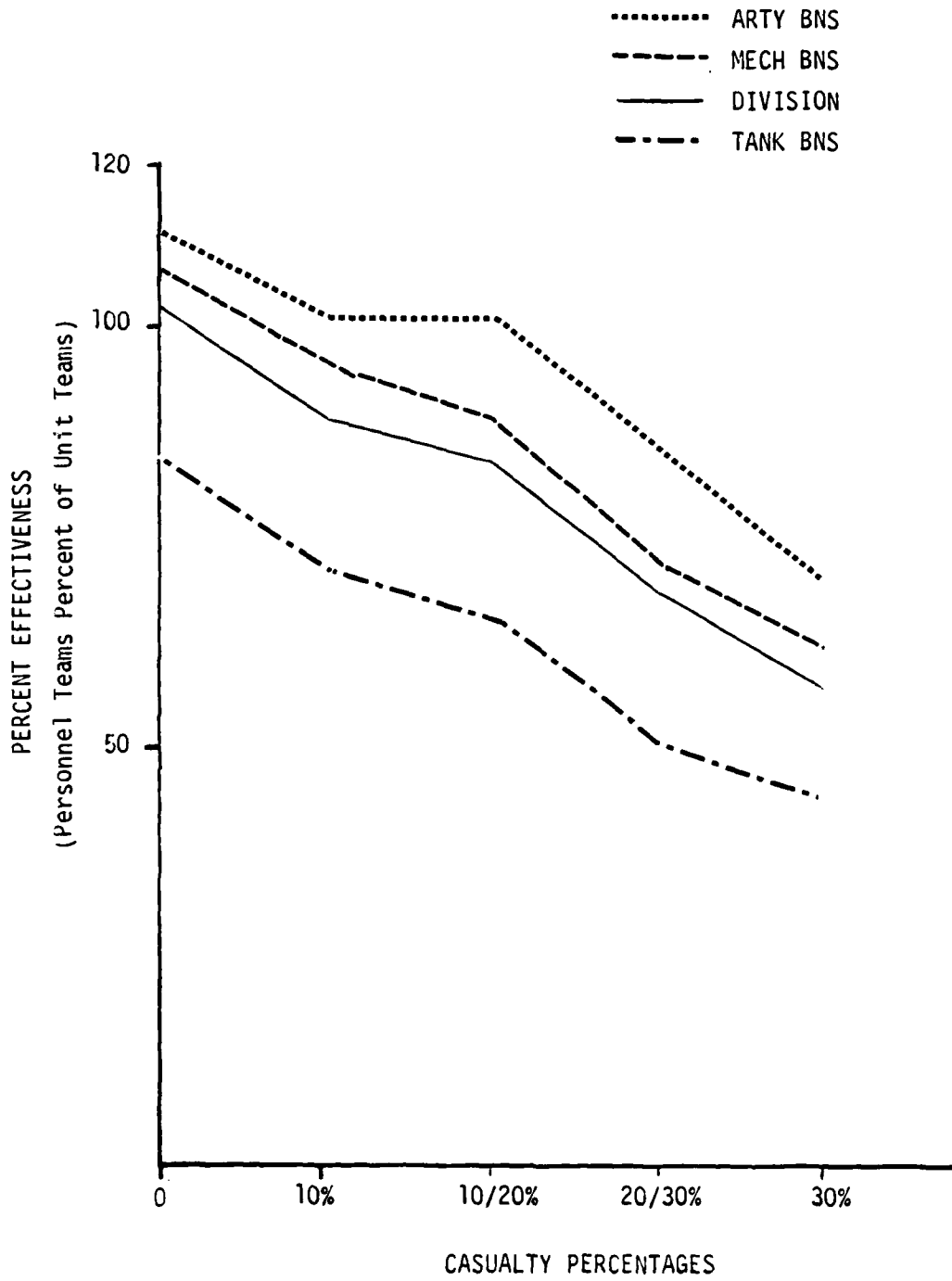


Figure 3-V-1. Maximum Effectiveness Following Realignment (REDCON 2 with casualty percentages)

armored division to achieve 95% effectiveness in personnel teams. However, these units are limited to 51% capability by materiel shortages following maximum substitutability of equipment. To realign to that capability in personnel requires 121 replacements and that is probably a reasonable planning factor with additional personnel considered only as replacement materiel resources become available.

The other type of combat unit generally limited by materiel is the artillery battalion at 30% personnel casualties with corresponding materiel damage. 26 replacements are required to bring these battalions up to 74% which is their maximum possible recovered effectiveness because of materiel limitations.

As an experiment the Hqs and Hqs Co of the Mechanized Infantry Battalion was analyzed to make more deliberate use of those skills limiting further effectiveness. Following the procedure described earlier, this unit at Readiness Condition 2 with 20% casualties can reconstitute to an effectiveness level of 24%. With replenishment based on skills according to TOE, it would require 41 replacements to achieve 95% effectiveness and 29 replacements to reach 70% effectiveness. Bringing the unit strength up with priority accorded to limiting skills (staff officers and noncommissioned officer specialists) 70% effectiveness can be achieved with 16 replacements - almost a 50% reduction in replacements required.

Table 3-V-1. Personnel Required to Achieve 95% Effectiveness  
(REDCON 2 with Casualty Percentages)

TYPE UNIT CASUALTIES	10%	10%/20%	20%/30% <sup>2</sup>	30% <sup>2</sup>
Tank Bns	347	438	692	857
Mechanized Infantry Bns	- 1	114	482	692
Artillery Bns	- 1	- 1	69	312
Armored Div	240	488	1243	1761

<sup>1</sup>Can align to 95% without replacements

<sup>2</sup>No transfers between type battalions

Chapter 4  
Sensitivity Results and Analyses

Section I. General.

This chapter investigates changes in various measures of effectiveness due to changes in input assumptions including changes in the substitutability of personnel occasioned by the impact of continuous, combat on human factors and inadequacy of training.

Section II. Continuous, Intense Operations.

The prospect of continuous operations with intense casualties raises the level of concern over human factors on combat effectiveness.

A review of literature was conducted on historical data and the results of laboratory and field tests on performance degradation as a result of continuous and intense combat. The following definition of intense combat was used in the review: conflict over an extended area where one force attacks its opponent continuously day and night without significant interruption. Intensity was the application of debilitating fire-power on the organization during successive time periods. Selected agencies were contacted and visited to determine the extent and to make use of past and on-going work.

No clear or absolute data was obtained except the general consensus that intensity and the stage of adaptation are operative on performance; anecdotal evidence is very limited; morale and leadership are highly operative and this compounds the problem of research via field tests and laboratory experiments in the determination of stress and fatigue factors from continuous operations. There is scientific evidence on the effect of sleep loss as a function of time, and considerable insights have been recently gained by study of human factors of the 1973 Mid-East War.

Applicable references from this search are at Annex A.

### Effect of Sleep Loss

The ability to learn and the capability of making decisions are the first tasks effected by sleep deprivation. Highly overlearned tasks are resistant to sleep loss, but cognitive skills are rapidly negated after 24 hours and non-existent after 72 hours. To measure these effects on the capability of an organization to reconstitute following casualties and damage, the ability of leaders in the Rifle Company to transfer to fill essential teams lacking critical skills is displayed at Figures 4-II-1, 4-II-2, and 4-II-3 for the unit entering combat from a Readiness Condition 2 and suffering 10%, 20%, and 30% casualties. The effect of increased reporting times and decision making was simulated by adding 30 and 60 minutes, and leaders, while capable of performing their own jobs, were not considered able to perform other tasks. Final overall capability is not significantly degraded, but the time for achieving maximum capability is significantly changed beyond the 30 and 60 minutes input. This time delay for reconstitution places the unit in a position highly vulnerable to enemy action while it is recovering from functional shock. Should it elect not to reorganize, it has almost no capability to fight. The same is true for the Combat Support Company at Figure 4-II-4, and the Headquarters and Headquarters Company at Figure 4-II-5. This sensitivity analysis reflects the upper bound of the possible impact of the effect of sleep loss within the range of 24-72 hours on leaders and the resultant delay of reorganization over time. This effect might be overshadowed by the effects of fatigue and stress.

### Fatigue and Stress

Fatigue manifests itself in decreased efficiency and a lack of improvisation particularly regards critical tasks. Stress is manifested in numerous ways and is discussed later.

In seeking data, it was determined that the parameters are generally researched from the aspects of physical, physiological, and psychological causes and manifestations of effect. Examples are:

Physical: temperature/physical load

— BASE CASE  
 - - - REDUCED LDR TRANS + 30 MIN DEC TIME  
 - . - . REDUCED LEADER TRANSFER  
 . . . . . REDUCED LDR TRANS + 60 MIN DEC TIME

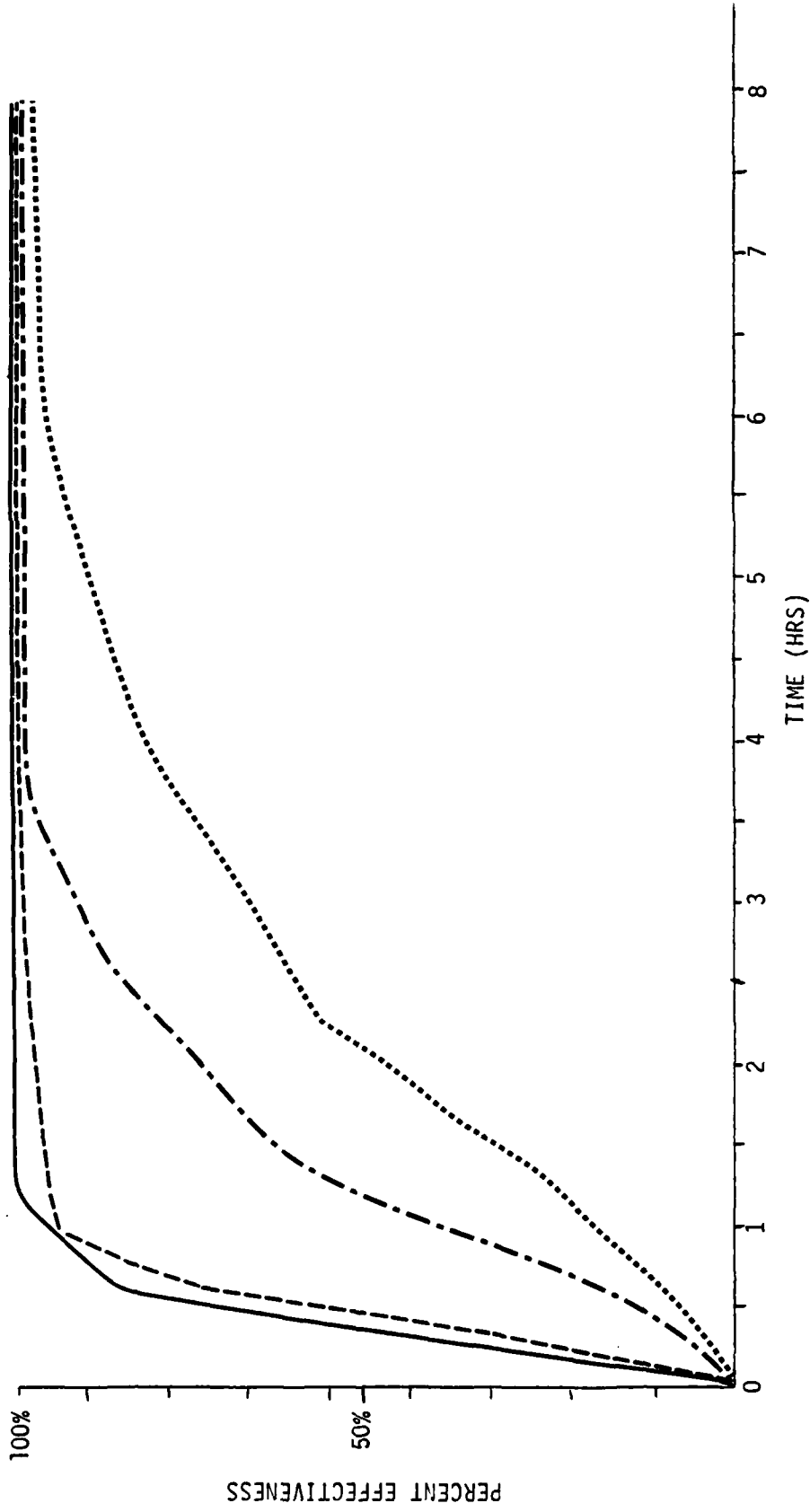


Figure 4-II-1. Rifle Co in Readiness Condition 2 (with 10% Special Damage)

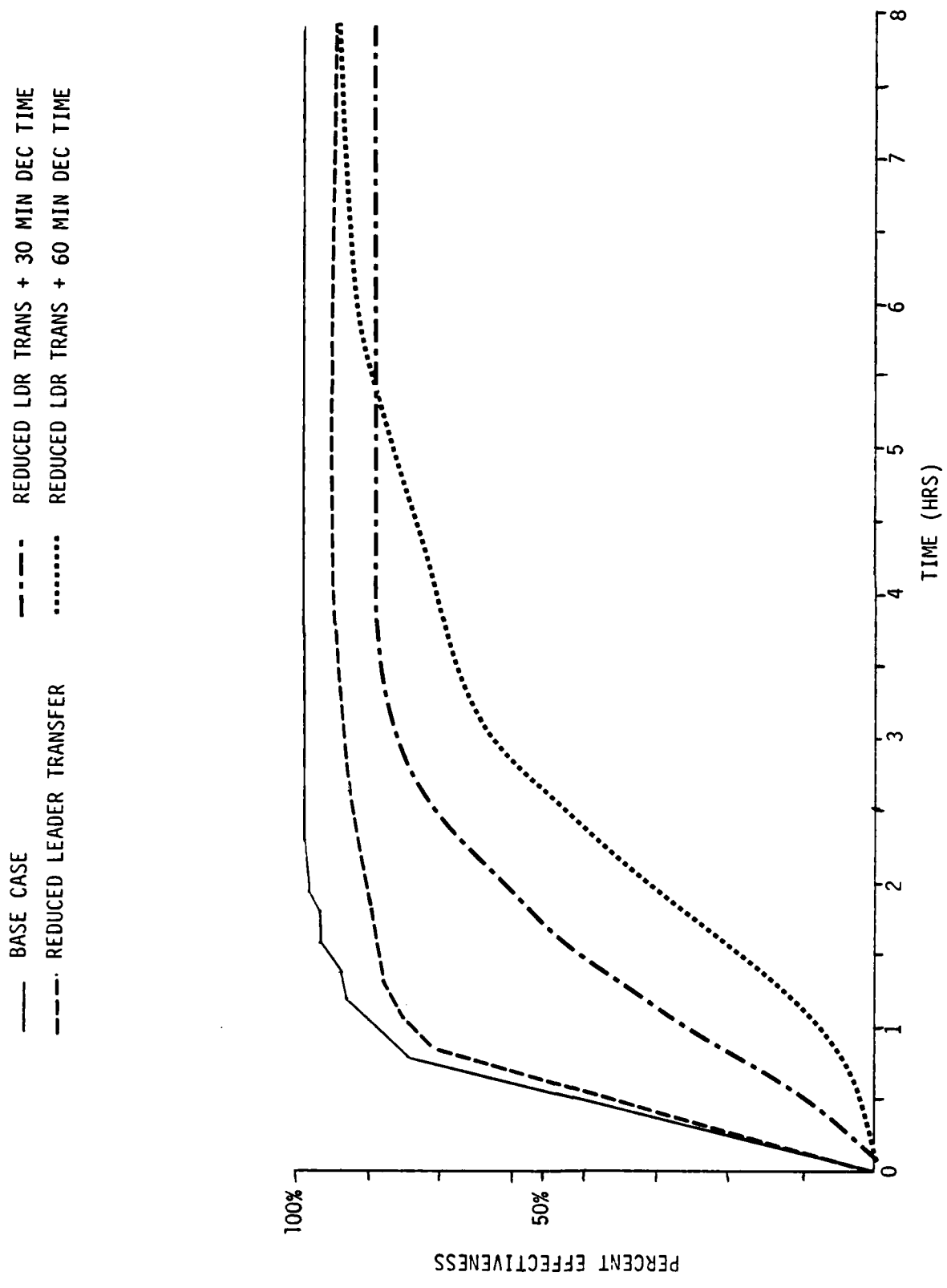


Figure 4-II-2. Rifle Co in Readiness Condition 2 (with 20% Special Damage)

——— BASE CASE  
 - - - - REDUCED LDR TRANS + 30 MIN DEC TIME  
 - - - - REDUCED LDR TRANS + 60 MIN DEC TIME  
 ..... REDUCED LEADER TRANSFER  
 ..... REDUCED LDR TRANS + 60 MIN DEC TIME

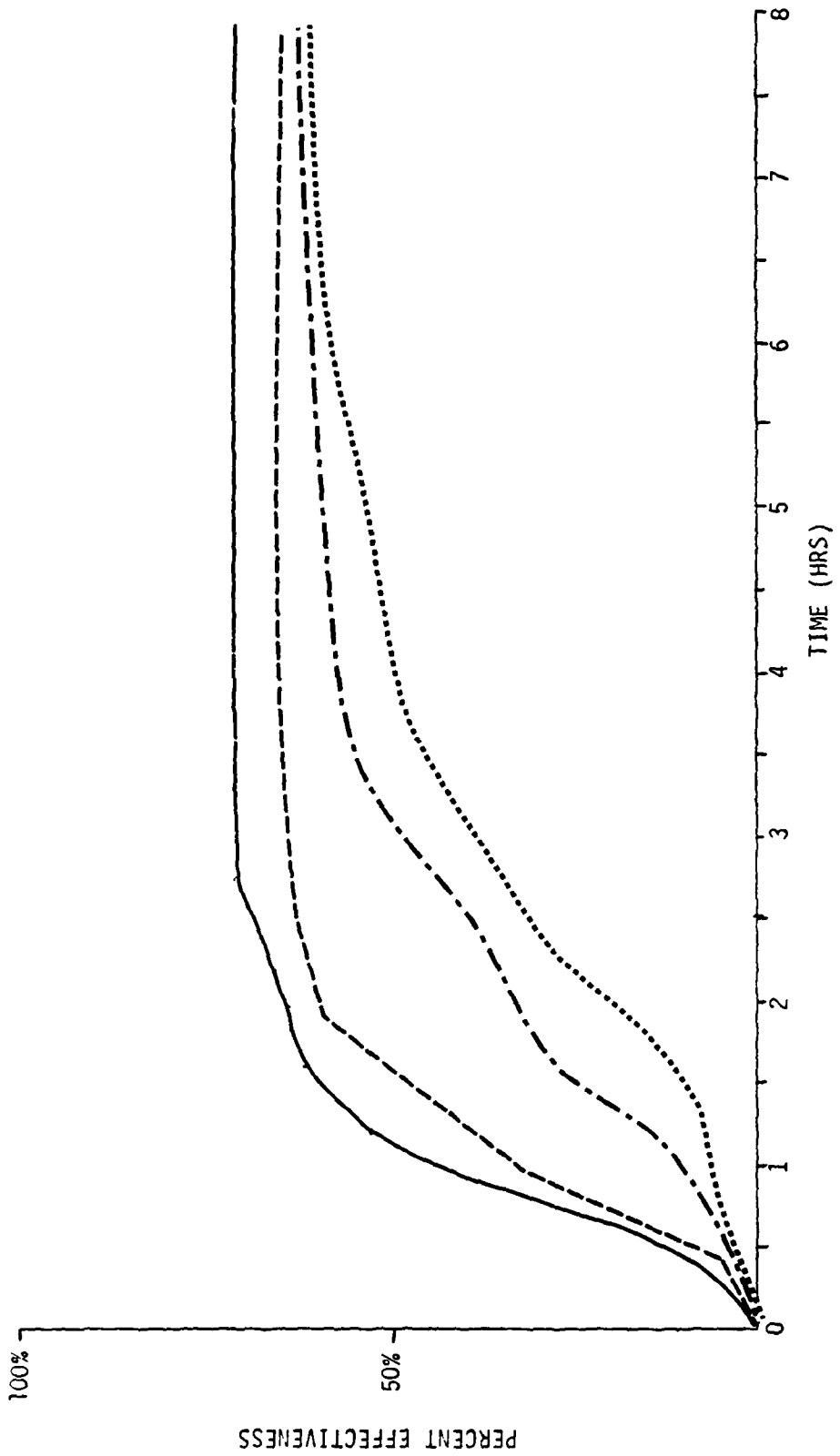


Figure 4-II-3. Rifle Co in Readiness Condition 2 (with 30% Special Damage)

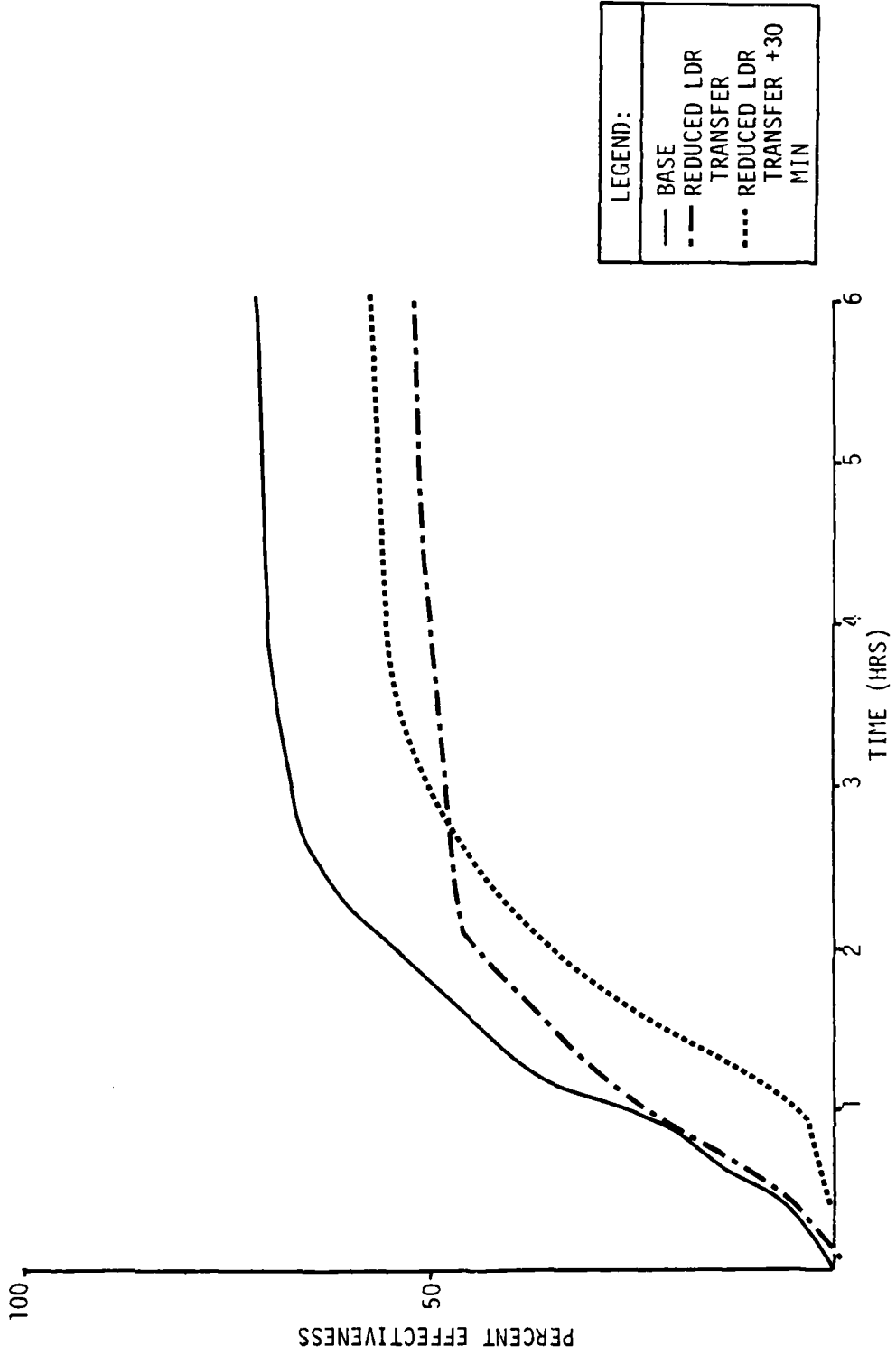


Figure 4-II-4. CSC, MECH BN - REDCON 2 - 10% Special Damage



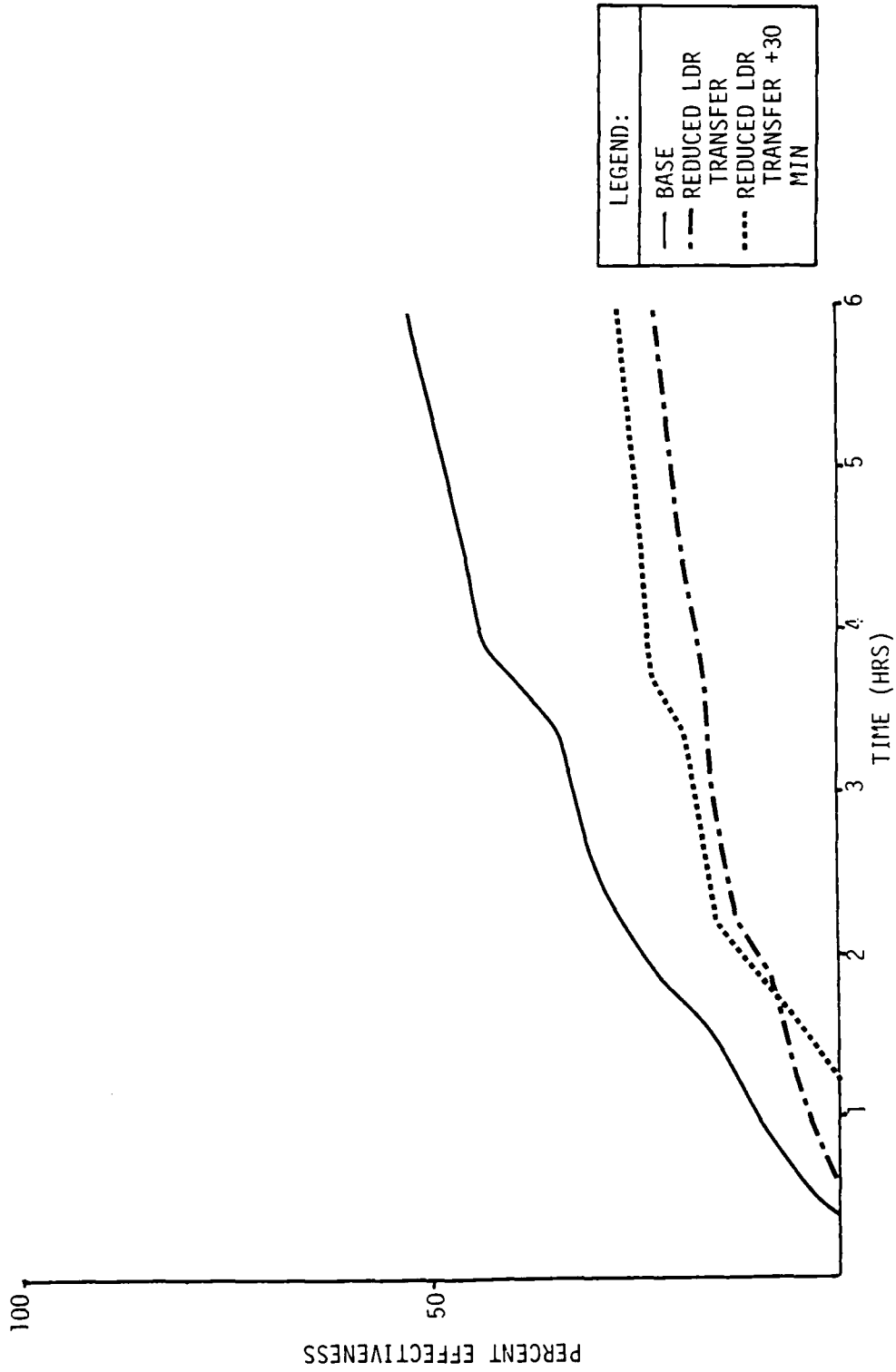


Figure 4-II-5. HHC, MECH BN - REDCON 2 - 10% Special Damage

Physiological: acclimation/physical conditioning

Psychological: training/motivation

Performance assessment is viewed as a rather difficult process as personnel who have tried to improve a personnel evaluation system can attest. Two broad areas of concern surfaced: the establishment of the criterion for successful completion of tasks and the diversified approach to research. To determine the effect of phenomenon or conditions on performance, the starting point for research must be clearly defined or the efforts will be spent on determining criteria. For example, when the criterion for evaluating a weapons crew is the completion of a certain firing table, time is usually not considered, and researchers doubt that this reflects combat effectiveness capability. The evaluation of the effects of stress and the measurement of performance requires as a start point the criterion for successful completion of tasks.

The professional scientific community that addresses these issues may be broadly characterized as medical, engineers, and psychologists. Each group concentrates their research in the areas of their skills. There is little evidence of amalgamating these efforts. Two exceptions are recent tests of a field artillery fire direction center and the planned test of a field artillery firing battery.

The interaction of physiological status and military performance continues to be defined by researchers and data is available as guidance to force designers. However, the interaction of psychological state and military performance is not well defined.

Research continues in these areas at the U.S. Army Research Institute of Environmental Medicine and the Army Research Institute field office at Ft. Rucker.

The only written documentation on policy found was in Army Regulation 95-1, Army Aviation: General Provisions and Flight Regulations which provides guidelines for rest and sleep in relationship to maximum flying hours for pilots.

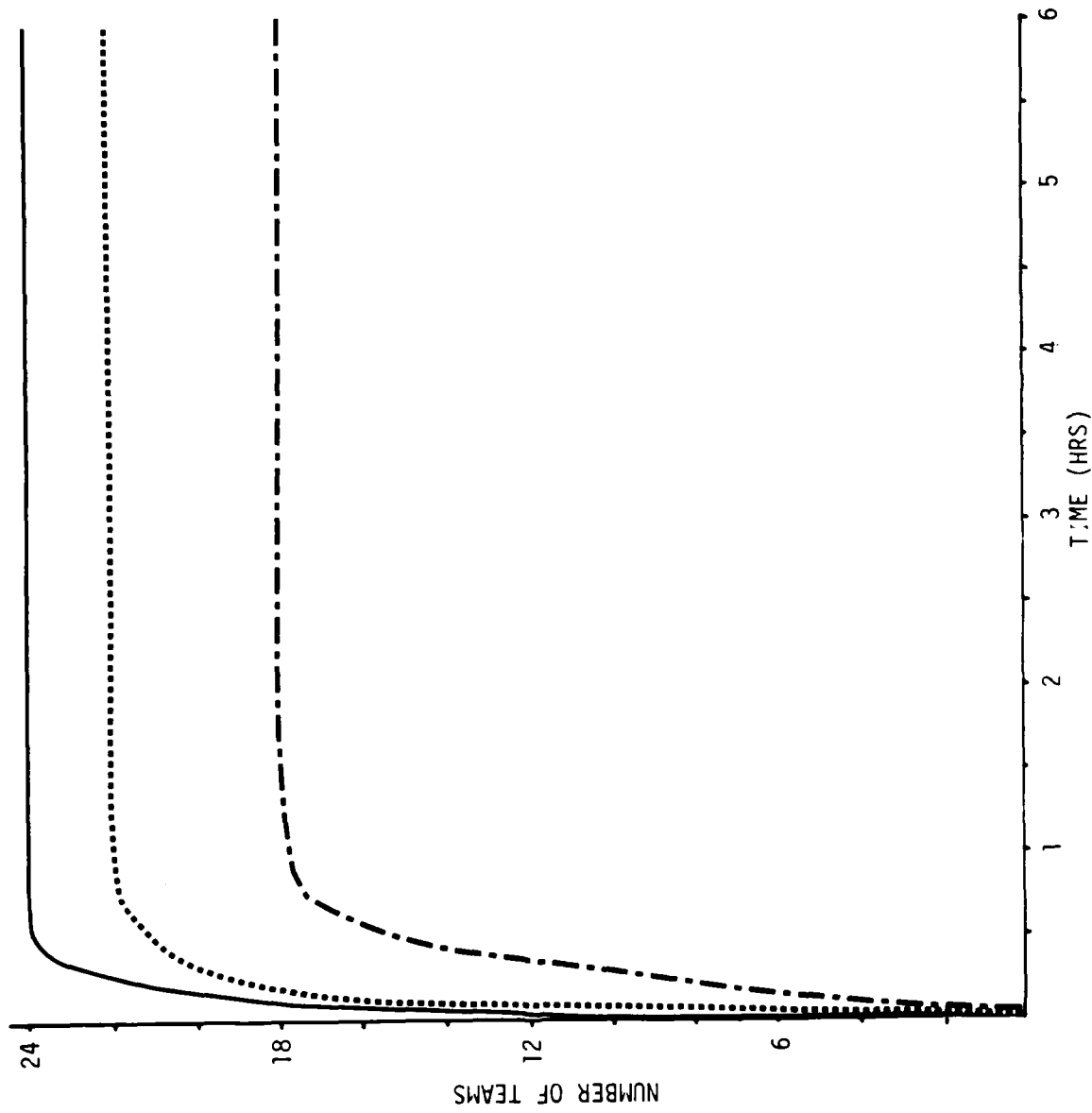
A prevalent conclusion in literature is the divergence between findings derived from field tests and those derived from laboratory conditions even when both apparently are well grounded. This is caused by different measures taken at different times and the inability to handle uncontrollable variables such as leadership and motivation.

#### Adaptation

Historical anecdotal evidence, controlled laboratory experiments, and field test results all corroborate that the introduction of new personnel into an existing organization does not restore performance effectiveness to that obtained prior to the shortage. There is additional historical evidence that new personnel are more susceptible to becoming casualties than seasoned personnel, but there is no quantified data on times of adaptation. Differences in individual and team effectiveness in combat over time as a function of combat experience could not be found.

To illuminate these issues where there was some data, AMORE was used with replacements capable of performing their assigned tasks, but unable to change to other positions. This seems reasonable as leaders and commanders do not know immediately the capabilities of new personnel and the replacement personnel have not adapted to the unit.

Figure 4-II-6 portrays one possible effect of this. The Mechanized Infantry Company was simulated to enter combat from a REDCON 3 status and either received replacements prior to entering combat or the shortfall could also generally simulate combat casualties. The company can reorganize without replacements to achieve 18 personnel teams. A full TOE with trained personnel is able to reach 24 teams with transfer when the unit is brought from REDCON 3 to full TOE strength. When replacement personnel cannot transfer, the unit achieves only 22 teams, a 10% degradation in capability. This is visually displayed at Figure 4-II-6.



LEGEND:	
—	BASE CASE #1 - TOE
.....	REPLACEMENT EX-CURSION
- - -	BASE CASE #1 - REDCON 3

Figure 4-II-6. Rifle Co - Personnel - Mission 2 - No Damage

### Stress and Combat Reaction Casualties

Historical evidence indicates that as personnel are incapacitated, some of those remaining, while physically unimpaired, are prevented from performing tasks. In recent years the term "Combat Reaction Casualties" has been applied rather than the old terminology of "shell shock". Studies of medical reports of WWII, Korea, and the 1973 Mid East War indicate that this phenomenon is a function of the following factors: risk is higher as intensity of combat increases, risk is highest for new personnel, risk is highest when on the defense, risk is highest for groups of people in units not able to return fire, and risks are higher for individuals exposed to trauma. It is informative when statistics on these personnel are related to statistics of personnel wounded. In WWII the ratio of wounded in action (WIA) to combat reaction casualties (CRC) was 3-1, and the magnitude was of 476,000 WIA's to 161,000 CRCs. During the Korean War the ratio was generally 4:1 and the Israelis experienced 3:1 in 1973. The Israel Defense Force had not experienced this in other conflicts and they attribute it to the factors described above.

The impact on this research has several dimensions. Casualty data was based on Joint Munitions Effectiveness Manuals, which does not include this type casualty. Additionally, these personnel would have an impact on replacements available when they return to duty quicker than WIA's.

There is some evidence that if these personnel are not treated in the same manner as other casualties, but are given rest out of action and an expectation of return to their unit, 80% could be returned at full capability within 72 hours.

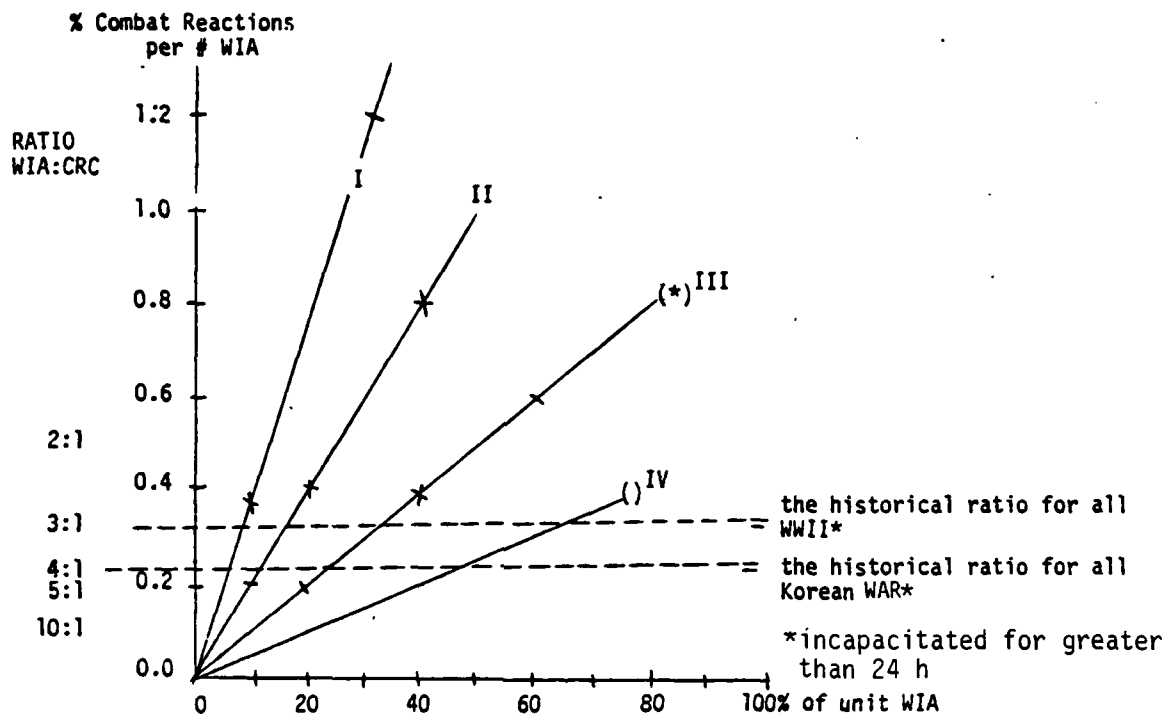
An examination of data was made with the assistance of personnel at the Army Research Institute of Environmental Medicine. Results are

displayed here to show the magnitude of possible impact of this type of human performance factor during continuous/intense combat. Figure 4-II -7 reflects preliminary estimation of personnel that might become CRC's as a function of casualties over time (WIA) and adaptability (combat experience). These estimates have been measured within the time constraints of this study and should not be considered as absolute.

Evidence indicates that CRC's will occur in the same teams as the WIAs and casualties accumulate over the period of continuous combat. For example, if there were 10% WIAs in the first 12 hours and 10% in the second 12 hours and 10% in the third 12 hours, 30% should be used for the third 12 hours. CRC's for new replacements without combat experience are computed at the Category I rate.

Using an appropriate number of additional "combat reaction" casualties in AMORE enabled us to quantify the impact of this particular dimension of human factors on unit combat effectiveness. For illustration, the Service Battery of the Field Artillery Battalion can reconstitute to an effectiveness of approximately 98% of original TOE capability following 10% personnel casualties with associated materiel damage from weapons effects. As presented earlier, this unit is materiel limited in the higher REDCON conditions. When expected "combat reaction" casualties are considered, the unit's reconstituted effectiveness drops to about 80-85% if it is experiencing combat for the first time.

On the other hand, units that are personnel limited will experience a much greater impact as a result of "combat reaction" casualties. For example, the HHC of the Tank Battalion can reconstitute to approximately 80% given the same level of attrition (10%) from weapon effects. However, it will be able to attain only 65% recovery of combat capability if "combat reaction" casualties (assuming inexperienced personnel) are also considered.



PRIOR COMBAT EXPERIENCE (starting at none):

- I = first 24 hr (or first battle, continuing until unit gets 12 hr respite)
- II = next seven days in combat
- III = next fourteen days in combat
- IV = succeeding combat

PRINCIPALS OF APPLICATION:

- a) CR's will be in the same section/squad as the WIA's.
- b) Casualties cumulate over a period of sustained combat e.g. if 10% in first 12hr and 10% in 2d 12hr & 10% in 3d 12hr, compute 2d 12hr CR rate for 20% WIA and 3d 12hr rate for 30% WIA
- c) When a unit gets a respite of 12hr or more, the casualties stop cumulating and start again at zero when combat resumes.
- d) If new replacements without prior combat experience are added to a unit with prior combat experience, CR's among the new men are computed at the Category I rate.
- e) As CR cases return to duty, they assume the same risk as their original teammates.

Figure 4-II-7. Estimation of Personnel Made Ineffective by Acute Combat Reactions as Function of Casualties (WIA) and Prior Combat Experience

A serious implication of this is the impact on organizational effectiveness concerning readiness and sustainability. The damage cases used in this study were based on Joint Munitions Effectiveness Manuals and therefore casualties from weapon effects along. Data from Figure 4-II-7 should be added to personnel casualties used in this study to include this effect. For example, a unit that is entering combat for the first time might expect an additional 12% casualties in terms of combat reaction casualties if there is intense combat without interruption and it receives 20% casualties from weapon efforts. A unit that has been in intense and continuous combat for several days might expect an additional 8% casualties if it received 20% casualties from weapon effects. As this study used a range of personnel casualties and associated materiel damage from 10-40% this information can be applied to the existing data when it is desired to study particular units in combat at various times.

### Section III. Investigation of Degraded Capability of Selected Skills

Recent studies by the Army brought to the attention of this research indicate that certain essential skills may not be capable of being filled in an emergency by personnel because of training deficiencies even though secondary MOS's indicate that capability. A sensitivity analysis was conducted to determine the impact of this on organizational effectiveness.

As a first trial for the Tank Company, the transfer matrix was adjusted to limit tank loaders and drivers to be capable of doing their own job, but capable of only transferring to light vehicle drivers and not capable of being gunners or performing other skilled tasks in the company. The results are displayed at Figure 4-III-1 and indicates little change in organizational effectiveness.



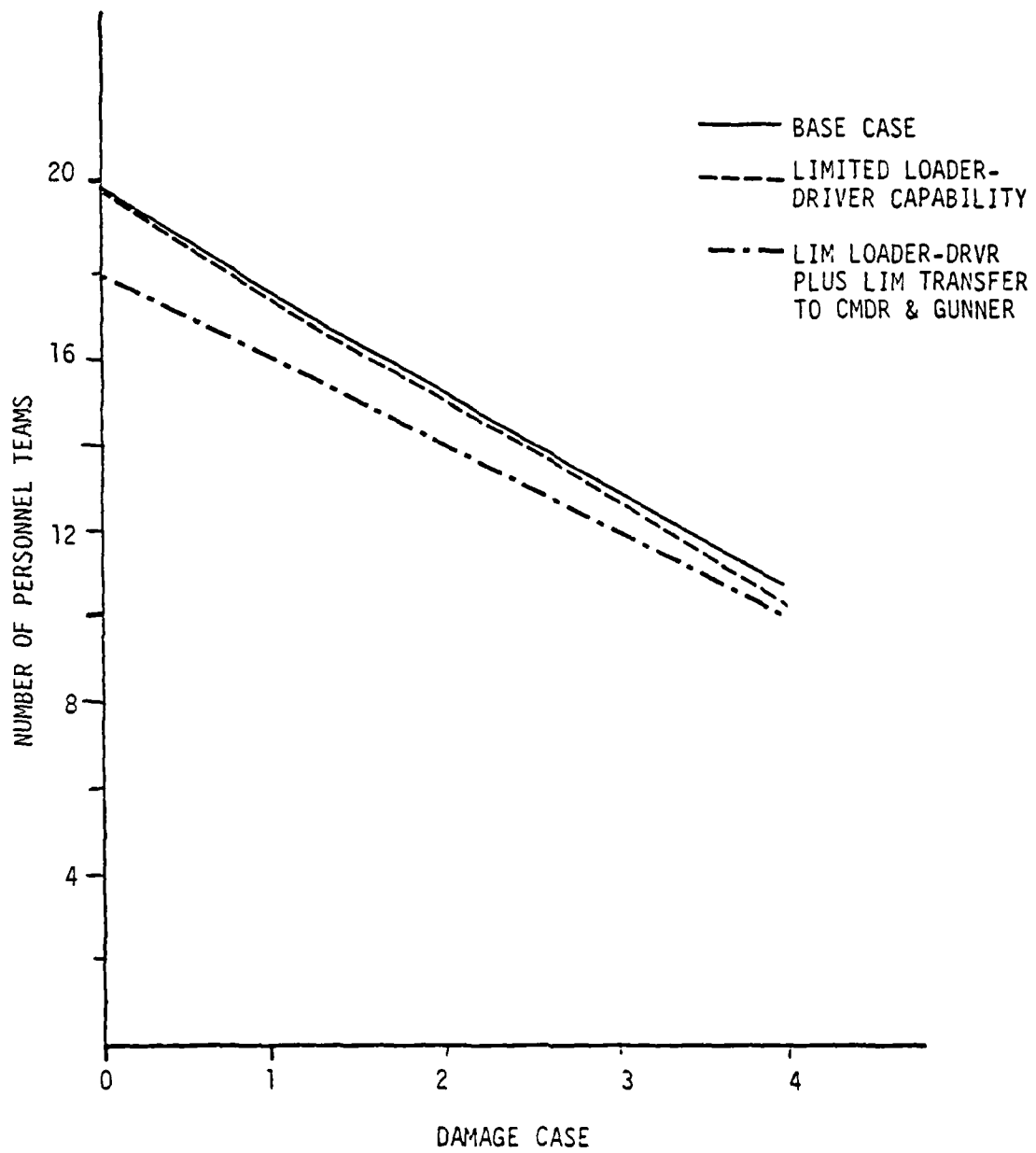


Figure 4-III-1. Training Deficiency Sensitivity

The transfer matrix was further adjusted to preclude company headquarters personnel from being commanders and gunners and in fact allowed only platoon leaders and sergeants, gunners, and tank commanders from being commanders and gunners. Results are at Figure 4-III-1. The company effectiveness is reduced by approximately 10% across all damage combinations.

## Chapter 5

### RESULTS

#### The Relation of the Current Readiness Rating System to Combat Capability

Current policy does not provide either contingency planners or resource managers the basis for estimating combat capability with any reasonable accuracy. For illustration, Table 5-1 displays a Tank Company reporting itself in various readiness conditions. Its capability at REDCON 1 could range from 88% to 100%. Its capability in REDCON 3 could range from 69% to 100%. Said another way, it could have 14 essential teams (88% effectiveness) and report in readiness condition 1, 2, or 3. This finding is typical of all the units examined in this study effort. Thus the statistical readiness category ascribed to any given unit, according to current policy, is a very poor indicator of its combat capability.

Table 5-1. Unit Readiness Condition Capability Range, Tank Company

	REDCON 1	REDCON 2	REDCON 3
Materiel Teams	14-16	12-14	11-14
Personnel Teams	19-20	16-19	13.7-16
Unit Teams	14-16	12-16	11-16
Unit Capability	88-100%	75-100%	69-100%
Overlap Range	88-100%		

It follows, also, that similar increments of resources (e.g., material, personnel strength, MOS fill) designed to attain a given higher readiness rating do not produce equivalent improvements in combat capability for different or even the same organization(s).

Accordingly, current readiness reporting criteria are ambiguous, unbalanced, and unrelated to combat capability; nor do they provide an effective basis for managing resources. New criteria based on the AMORE measure of combat effectiveness would be more meaningful, less ambiguous, and provide a more efficient means for the allocation of available resources.

Combat Sustainability of Units Categorized According to the Current Readiness Rating System

The study examined:

- Three type combat battalions
- Three readiness thresholds plus full TOE
- Four levels of combat degradation

and determined the ability of the units, in each of the conditions, to reconstitute combat capability.

The capability of the unit that could be marshalled over a period of time following initial damage was examined. A measure of sustainability was defined. It is defined as the ratio of percent loss in unit combat capability to the input percent combat attrition. For example, a unit suffering 20% combat attrition (people and related things) which can reconstitute its resources to 90% combat effectiveness has a net 10% loss in unit combat capability; its sustainability measure is  $\frac{.10}{.20} = .5$ . The smaller the ratio the more sustainable (using its internal resources) the unit. In other AMORE applications a ratio of 1.0 or less was considered acceptable.

In Table 5-2 these sustainability ratios are shown for the various components of the three battalions. Each ratio represents a combined ratio obtained through regression analysis of five damage conditions.

Table 5-2. Sustainability Ratios

UNITS	EFFECT OF DAMAGE TO UNITS AT:				EFF. OF REDCON
	TOE	REDCON 1	REDCON 2	REDCON 3	
TANK BN TANK CO	1.79	1.72	1.67	1.42	1.12
CSC	1.93	1.57	1.01	.98	2.10
HHC	2.25	1.74	.74	.43	3.00
MECH INF BN RIFLE CO	.86	.20	.27	.44	1.50
CSC	.53	1.00	.79	1.17	.97
HHC	2.03	1.57	1.48	.78	2.20
FA BN FA BTRY	.93	.89	1.33	1.07	1.06
SVC BTRY	1.17	.78	.48	.80	1.43
HHC	1.20	.92	1.09	.97	.99
FWD SPT CO	1.27	.96	.60	.65	2.02

The circled entries indicate the highest ratio (poorest sustainability) of the company sized elements within each battalion for each readiness condition.

Considering that these "worst" cases will dominate, the artillery battalion is the most sustainable organization and the tank battalion is the least sustainable organization.

Examining these measures for the individual battalion components reveals that for TOE and REDCON 1 units, the headquarters unit are the least sustainable. For REDCON 2 and REDCON 3 units the line companies are least sustainable, with the exception of the Rifle Bn. To better understand these findings the battalion components were studied from still another standpoint.

The following Table 5-3 shows the key limiting factor (Materiel or Personnel) which precluded further restoration of combat capability for each of the damage conditions considered. Limiting factors for the Forward Support Company are also shown.

Table 5-3. Summary of Limiting Factors  
 Personnel = P Materiel = M Equal = E

DAMAGE CASE	TOE					REDCON 1					REDCON 2					REDCON 3				
	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
Tank Co	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
CSC, Tank Bn	M	P	P	P	P	M	P	P	P	P	M	E	P	P	P	M	P	P	P	P
HHC, Tank Bn	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Rifle Co	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
CSC, Inf Bn	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	P
HHC, Inf Bn	E	M	P	P	P	M	M	P	P	P	M	P	P	P	P	P	P	P	P	P
Arty Btry	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Svc Btry, FA Bn	M	M	P	P	P	M	M	M	E	P	M	M	M	P	P	M	M	P	P	P
HHB, FA Bn	E	E	P	P	P	M	M	P	P	P	M	P	P	P	P	M	P	P	P	P
Fwd Spt Co	E	P	P	P	P	M	M	E	P	P	M	M	M	M	P	M	M	M	P	P

Note first that line companies are materiel dominated, whereas headquarters are generally people dominated. Combining that finding with the previous finding that TOE and REDCON 1 rated units are dominated by the capability of the headquarters, and REDCON 2 and 3 by line units provides a basis for establishing resource management priorities. That is, units in REDCON 1 should emphasize its personnel replacements with first priority to headquarters slots. Units in REDCON 2 or 3 should give priority to materiel replacements for line units. While such management priorities may not always provide the highest improvement in readiness rating they will provide the highest improvement in the combat level and sustainability of combat units.

Materiel criterion of the current readiness criteria has the most impact on combat capability. If a unit is in a given category because of the materiel criterion then its combat capability will be more greatly reduced than if it had been in other categories for other criteria.

The Forward Support Company can support a brigade if it enters combat from a REDCON 1 status. Materiel is the limiting factor which precludes brigade support in lower readiness conditions. Following damage

and casualties, however, personnel becomes the limiting factors which precludes full support to a brigade.

#### The Management of Critical Personnel Skills for Improving Combat Capability

It has been shown that combat capability can be improved by priority attention to personnel for certain units. Additional leverage can be attained by prioritizing replacement of skills critical to reconstitution and sustainability.

Random replacement of personnel or one geared to the strict TOE percentages ignores the criticality to combat effectiveness of certain positions identified by the AMORE process. For example, replenishment of the HHC of the Mechanized Infantry Battalion which entered combat at the REDCON 2 floor and suffered 20% casualties would require about 30 replacements to reach 70% combat effectiveness if replacements are based strictly on TOE distribution. On the other hand, if priority can be given to the critical skills identified in AMORE the same level of combat effectiveness can be attained with only 16 replacements; almost a 50% reduction. A management system geared to the latter approach is worthy of further consideration and effort.

#### Consumables Replacement and Sustainability

The impact on unit sustainability from external sources was examined in the context of ammunition replacement for the Field Artillery Battalion, and fuel resupply for the Tank Battalion. These units were examined to determine their ability to transport, handle, and store these commodities. The analysis showed that both units possessed sufficient receipt, handling, and storage capabilities to maintain quantities in accordance with unit requirements.

The analysis also examined the impact of varying resupply rates on the unit's ability to sustain combat. These analyses were made for units in each of the readiness conditions considering both no combat damage and Damage Case 1. Sample results obtained for the units at TOE are shown at Figures 5-1, Ammunition, and 5-2, Fuel.

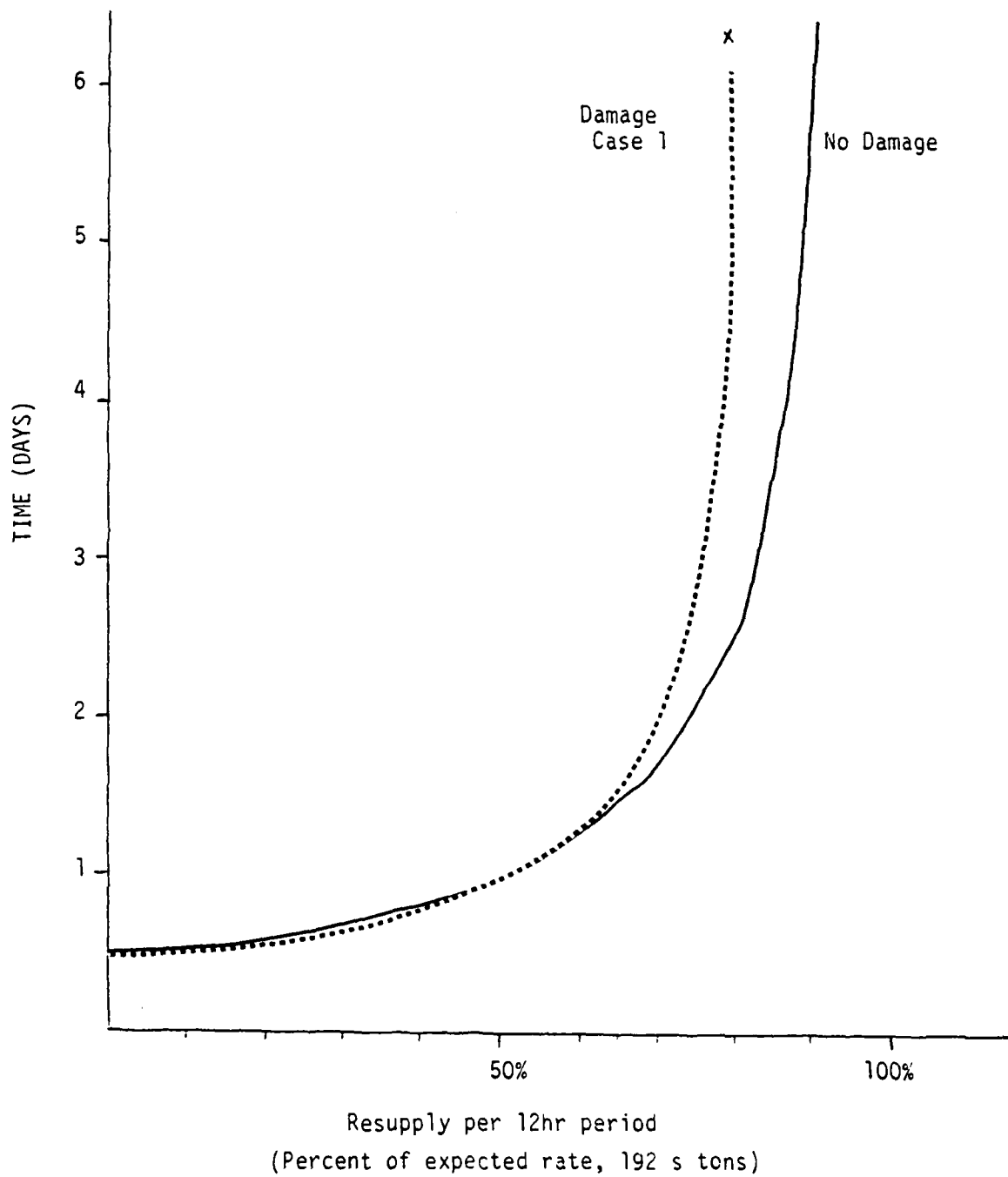


Figure 5-1. Days of expected ammunition expenditure that can be sustained by various resupply rates, Artillery Bn at TOE



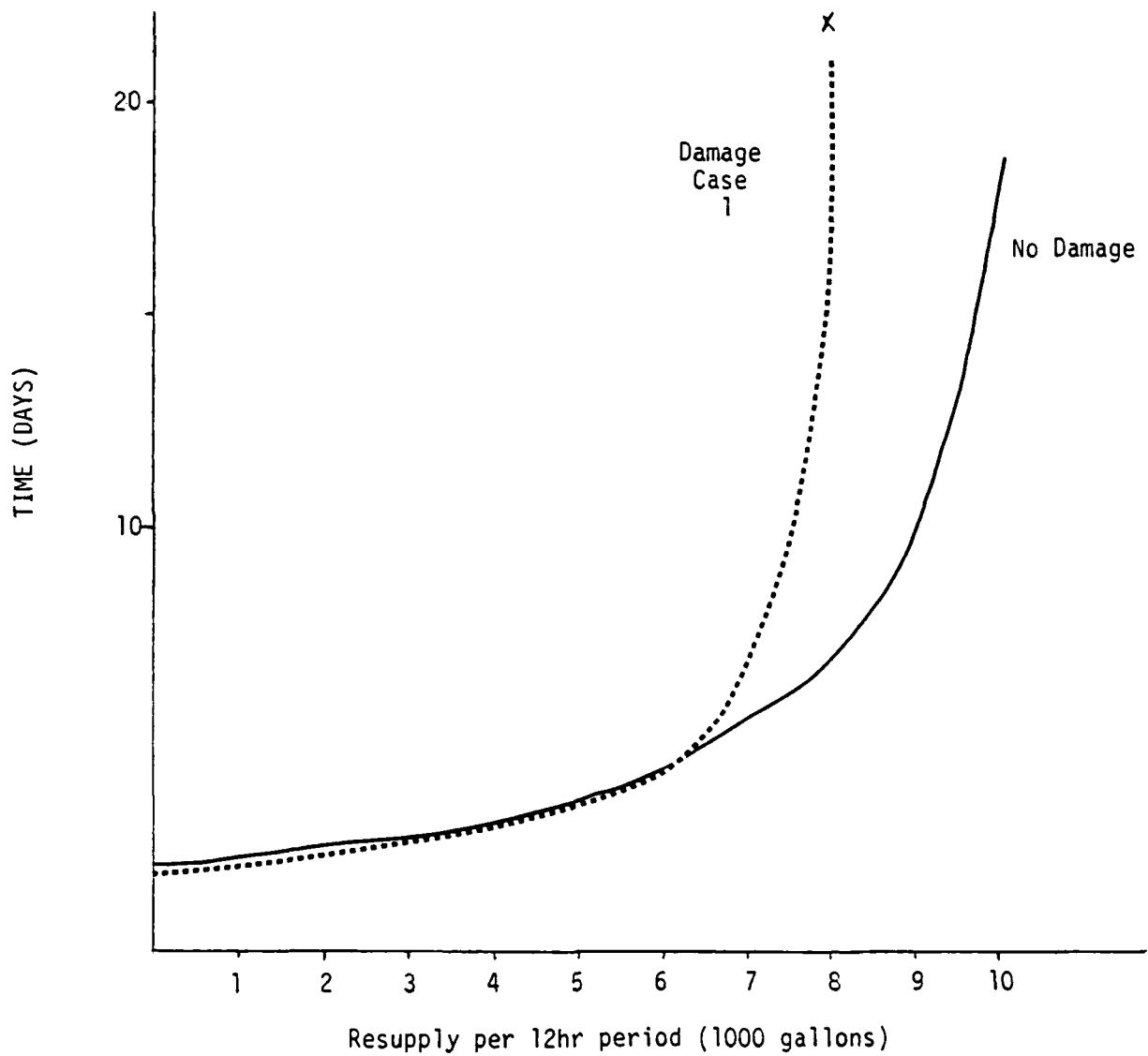


Figure 5-2. Days of expected POL consumption that can be sustained by various resupply rates, Tank Bn at TOE

The figures show the length of time that the unit can maintain a required consumption rate given a certain resupply rate. For example, the TOE Artillery Battalion can fire at its expected rate for only 12 hours if it receives no resupply. If the resupply is 50% of the daily planned resupply rate (192 stons) the battalion can fire for about 1 day, and if the rate is as planned it can sustain firing ad infinitum.

If this battalion has received damage equivalent to Case 1 in each 12 hour period there is little difference in the time it can continue to fight if the resupply rate is below 65%. However, when resupply is above 65% the combat attrition of weapons (approximately Case 3 damage), after 36 hours, becomes significant and a resupply rate of 80% will sustain the unit.

The TOE Tank Bn can sustain the expected fuel consumption rate with no resupply for two days. A resupply rate of 6500 gallons allows the unit to maintain that consumption for about 5 days. After approximately 5 days of sustaining damage at Case 1 levels, the reduction of consumers becomes a significant factor in lessening the requirement for resupply.

Considering the mix of unit readiness and combat casualty conditions likely to exist in a future conflict there appears to be some basis for considering a 15-25% drop in the currently planned ammo resupply rate without impacting on combat unit sustainability.

#### The Relation of Human Factors in Continuous Combat to Combat Capability

The prospect of continuous and intense operations raises concern about the impact of human factors as well as physical damage on combat capability. As a first cut this research attempted to determine the effects of stress, fatigue, and sleep loss on individuals and to quantify the resultant impact on organizational combat capability. Of special interest are those personnel who, while physically unimpaired, are for other reasons prevented from performing tasks. There is some material in the literature on human factors that correlates

casualties due to physical damage to "combat reaction" casualties. Ratios of combat casualties to "combat reaction" casualties varies from 10:1 to 1:1 depending on the combat experience of the unit and the intensity of combat.

The combat damage percentages used in the major portions of this study are based on Joint Munitions Effectiveness Manuals which compute only physical losses. In a come-as-you-are war, current battalions without combat experience can be expected to also develop a significant fraction of "combat reaction" casualties.

Using an appropriate number of additional "combat reaction" casualties in AMORE enabled us to quantify the impact of this particular dimension of human factors on unit combat effectiveness. For illustration, the Service Battery of the Field Artillery Battalion can reconstitute to an effectiveness of approximately 98% of original TOE capability following 10% personnel casualties with associated materiel damage from weapons effects. As presented earlier, this unit is materiel limited in the higher REDCON conditions. When expected "combat reaction" casualties are considered, the unit's reconstituted effectiveness drops to about 80-85% if it is experiencing combat for the first time.

On the other hand, units that are personnel limited will experience a much greater impact as a result of "combat reaction" casualties. For example, the HHC of the Tank Battalion can reconstitute to approximately 80% given the same level of attrition (10%) from weapon effects. However, it will be able to attain only 65% recovery of combat capability if "combat reaction" casualties (assuming inexperienced personnel) are also considered.

Degradation due to human factors can seriously impact the combat effectiveness of units. The AMORE method is uniquely structured to receive appropriate human factor input data and evaluate the resultant impact. Army human factors personnel should research available

literature or otherwise develop the types of data which can be input to AMORE for evaluation.

#### Future Developments

This was a pivotal effort in using the AMORE approach to evaluate the current readiness reporting system.

- The AMORE methodology can consider information concerning key personnel changes, personnel turbulence, equipment shortages, and individual/group performance in measuring unit effectiveness. This measure can provide better estimates of force capability to planners and assist in a more effective prioritization of limited resources to redress shortfalls in the effectiveness and sustainability of combat forces. AMORE should be exercised more fully to further establish its utility as a basis for restructuring our readiness reporting system and for managing resources.
- The AMORE methodology should be used further to help quantify issues such as morale, leadership, confidence, group cohesiveness, suppression, and stress.
- There are indications that management of personnel replacements should consider emphasis on the replacement of critical skills. This should be investigated further.
- There are indications that the supply of consumables, could be adjusted downward considering REDCON and damage conditions expected in a future conflict. This too deserves further study.

- Antitank weapons, recovery vehicles, and officer and noncommissioned officer specialists are critical limiting factors precluding restoration of combat capability following damage. Further study should quantify alternative means (such as redundancy, hardening, or cross-training) to improve combat capability redressing these problem areas.

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## Annex B

### ANALYSIS OF MILITARY ORGANIZATIONAL EFFECTIVENESS (AMORE) METHODOLOGY

#### B.1 GENERAL

The AMORE methodology examines the detailed anatomy of a unit in terms of the organization of its assets, including manpower (numbers, skill levels, transferability, and cross training), items of materiel (including repairability and substitutability), and spares. It is used to measure the capability of a unit to perform various missions (e.g., fire and move) after an attack has been inflicted, and also to test the organization's resiliency or ability to reconstitute itself. This procedure can determine the unit's critical survivability, level of recoverability, and rate of recovery as a function of time. The methodology takes into account the training of individual members of the unit, the functional components of the unit, and the interactions of functional components, as well as the impact of support, command, and control.

The remainder of this section presents a rather detailed description of this model, since it is central to the analyses conducted on the overall program described here.

#### B.2 INTRODUCTION AND BACKGROUND

In recent years, the Defense community has become increasingly interested in investigating weapon capability against small military units. Generally, it is desired to evaluate weapon effectiveness in terms of the denial of a specific combat objective. This problem encompasses two general areas of analysis. First, the determination of damage probabilities or coverages of particular weapons against particular target elements (such as artillery tube); second, the determination of the impact of these levels of damage on the ability of the target unit (such as an artillery battery) to conduct its mission.

The first of these areas is amenable to standard methods of treatment (e.g., through the use of the various JMEM<sup>4,5</sup> methodologies for conventional weapons or the PV manual<sup>6</sup>, or Army field manual FM101-31-2 for nuclear weapons). The problem of determining to what extent a given level of damage degrades a unit's capability to carry out its mission, on the other hand, is a problem of far greater complexity.

In the past, unit defeat criteria have been stated as fixed numbers that supposedly indicated the fractional number of target elements which had to be destroyed in order to render the attacked unit combat ineffective. Although these defeat criteria arose from historical data,<sup>7</sup> the rationale behind them has not been clear. Additionally, it was not clear whether the defeat criteria applied to personnel casualties, materiel losses, or a combination of the two. Other difficulties with this type of defeat criteria were that it was assumed that a defeated unit was defeated for all time and that a particular criterion was independent of the organization of the attacked unit. These caveats represent some rather severe restrictions.

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<sup>4</sup>Matrix Evaluator Computer Program User and Analyst Manual, Joint Technical Coordinating Group for Munition Effectiveness, 61JTCG/ME-72-11, 1974, Unclassified.

<sup>5</sup>Computer Program for General Full Spray Personnel Mean Area of Effectiveness Computations (U), 2 volumes, Joint Technical Coordinating Group for Munition Effectiveness, 61JTCG/ME-70-6-1, -2, 1977, Confidential.

<sup>6</sup>Physical Vulnerability Handbook - Nuclear Weapons (U), Defense Intelligence Agency, AP-550-1-2-69-INT, 1969, Confidential.

<sup>7</sup>Casualties as a Measure of the Loss of Combat Effectiveness of an Infantry Battalion, Dorothy Kneeland Clark, The Johns Hopkins University, ORO-T-289, 1954, Unclassified.

Over the past year, a unique methodology (AMORE) has been developed which addressed the problems posed above. This methodology addresses the following factors:

1. Combinations of personnel casualties and materiel damage.
2. Relationships of personnel casualties and materiel damage to the target's organizational structure.
3. Degradation of the unit in terms of firepower and mobility.
4. Reconstitution of the target's remaining assets as a function of time.

Additionally, the model examines the detailed anatomy of a unit in terms of the organization of its assets. Specifically, the numbers, skill levels, and transferability of personnel assets, as well as the numbers, substitutability, repairability, and spares of materiel assets are considered. Delayed personnel casualties (e.g., delayed radiation effects) can also be incorporated.

The model makes use of the data briefly described above to determine the target unit's capability immediately after suffering an attack, as well as the unit's rate of recovery as a function of time by relating these data to the functional components of the unit and their interactions with other functional components, as well as the impact of external support, command, and control.

### B.3 DEFINITION OF TARGET ORGANIZATION AND CAPABILITY

The key to the operation of the AMORE methodology is the recognition that military units are comprised of systems which provide critical functions (mission accomplishment) and more importantly which can continue to function under emergency conditions and under the most austere and difficult circumstances.

In order to evaluate the capability of such a system, the functional relationships of its constituent elements must be determined. This can be generally accomplished by analyzing the Table of Organization and Equipment (TO&E) or other functional organization representation (TOA) of the subject unit. This examination permits a logical breakout of the organization into its component functional elements which, acting in concert, enable the unit to perform a range of missions.

The procedure outlined above determines those functional teams required to perform a specific mission. For example, an artillery battery is subdivided into crews, fire direction, and headquarters elements along with their corresponding equipment. This array of personnel and equipment serves to define the asset requirements for full mission capability and reflects the relationships between the various components. Thus, in the artillery example posed above, crews operate the artillery pieces but require the command and control function of the headquarters and fire direction elements to function effectively.

The next question addressed by the methodology is what particular elements of the unit as described above are absolutely necessary for a specific mission accomplishment. Thus, for this hypothetical example, an artillery TO&E crew might consist of half a dozen personnel, but only four are needed for combat operation at maximum rate of fire for a specified time period. Similarly, three personnel might be assigned to the fire direction function but one man is sufficient for combat fire direction. This minimum complement of personnel and equipment is clearly dependent upon the nature and duration of the mission under consideration and serves to define a "bare bones" unit able to carry out specified tasks.

This "bare bones" unit consists of essential teams of each functional type for the mission at hand. These teams provide the norm by which less than complete unit capability is measured. In the artillery example described above, six tubes are supported by one headquarters element (one man), and one fire direction element (one

man), as well as an appropriate stock of ammunition for the conduct of the mission at hand. If capability of this unit is to be measured as the number of rounds delivered on targets (with maximum capability being six tubes firing at their maximum rates of fire), the lowest level of capability consists of functional teams comprised of one command team, one fire direction team, and one tube and crew. The number of tubes and crews functional describe the fractional capability of the unit as shown in Figure B-1. It is assumed that incomplete functional teams do not contribute to unit capability for the specified task.

	NUMBER OF FUNCTIONAL TEAMS					
	1	2	3	4	5	6
COMMAND GROUP	1	1	1	1	1	1
FIRE DIRECTION	1	1	1	1	1	1
CREWMEN	4	8	12	16	20	24
TUBES	1	2	3	4	5	6
CAPABILITY	.167	.333	.500	.667	.833	1.0

Figure B-1. Complement of personnel and equipment for various capabilities.

Thus, minimum essential teams such as these provide the method by which the model calculates unit capability as a function of personnel and equipment available. Different team structures can be described for different mission roles (e.g., fire and movement), permitting independent assessments of the unit's capability to perform these roles.

#### B.4 METHODOLOGY

To determine the number of functional teams which are operational at any moment in time, the AMORE methodology employs a number of statistical and operations research techniques. It is important



that it is the potential unit capability which is being measured in the methodology. Potential capability may differ from the actual capability in that the unit commander may not optimize the use of his resources and thereby reduce his capability below the level that might be obtained. It is not the intent of the methodology to guess what decisions a unit commander might make, but rather to evaluate the maximum capability that could be achieved.

The problems addressed in the methodology include:

1. Evaluation of personnel casualties and materiel damage resulting from an attack.
2. Determination of the maximum unit capability using remaining resources.
3. Minimization of the time to achieve the maximum capability.
4. Presentation of the unit's capability as a function of time.
5. Analysis of the unit's organizational strengths and weaknesses.

The probabilities of personnel incapacitation and light, moderate, and severe materiel damage (distinguished by their time-to-repair properties) are required inputs to the model. Associated with each personnel skill and materiel type are different damage probabilities, due to inherent differences in personnel postures and equipment vulnerabilities. Using a Monte Carlo technique a pseudo-random number is chosen for each person and piece of equipment. By comparing the pseudo-random number with the input probabilities personnel are divided into two categories: survivors and casualties, and materiel is divided into four categories: survivors, lightly damaged, moderately damaged and severely damaged (severely damaged materiel by definition cannot be repaired within the unit, but requires a higher level maintenance capability or is beyond any repair). In this research surviving equipment was considered as being repairable by operators, repairable by the unit, or not unit repairable.

After the attack some teams which were previously operational have lost essential team members and are no longer capable of performing their task. The number of teams which remain operational are the measure of the unit's initial capability. To regain the team's functional status those essential team members which were lost must be replaced. Thus, regrouping of personnel and materiel to maximize the number of functional teams is one of the commander's main objectives. A second, concurrent objective is to minimize the average time required to reach this maximum capability.

Personnel are essential in the functional team because the skills they possess are required to perform a given task (i.e., an artillery gunner must be capable of firing the tube). Any other individual trained to perform the same task could be substituted for the required team member. The time necessary to make the substitution depends on how proficient the replacement is at coming up-to-speed on performing the new task as well as the average distance he must travel to reach the new team.

A transfer matrix provides the means of indicating which tasks a particular class of personnel or items of materiel is capable of performing. Thus, the transfer matrix for personnel has a row and column for every skill type. The entries in the matrix are the time in minutes required on the average for a person to substitute from a skill in row  $i$  to a skill in column  $j$ . If the personnel in row  $i$  are not trained to perform the task in column  $j$  this fact is indicated in the matrix.

Similarly, a materiel transfer matrix contains a column for each type of equipment. However, unlike the personnel transfer matrix, there are three rows for every materiel type. One set of rows is for undamaged equipment; a second set is for lightly damaged equipment; and a third set is for equipment with moderate damage. (Severely damaged equipment cannot be made operational within the resources of the

host unit and, therefore, is not considered.) The entries in the materiel matrix represent the average time in minutes required to physically move the materiel to where it is needed, assemble it (including the time required for mounting, dismounting, or any other handling), and repair it if necessary. Transfers that are not permitted are flagged to prevent their assignment.

The problem of unit reorganization then becomes one of making the optimal personnel and materiel assignments based on the transfer matrices to fulfill the commander's two assumed objectives. A transportation algorithm was selected to accomplish this task. The transportation algorithm rather than a general linear programming algorithm was used because of the supply and demand nature of the problem as well as the requirement that all of the assignments must be integers<sup>8,9</sup>. The number of surviving personnel and materiel (including lightly and moderately damaged materiel) for each skill or equipment type is the number of personnel or materiel for each skill or equipment type necessary to build a given number of functional teams. The transfer matrix becomes the cost matrix with illegal transfers having a large artificial cost.

To fulfill the commander's second objective, the transportation algorithm is used to minimize the average time required to meet a certain capability level measured in terms of functional teams. To determine the maximum capability level that can be achieved (the commander's first objective), a series of transportation problems are solved. In each problem the demands are increased by adding the requirements for one more functional team. If an illegal transfer is

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<sup>8</sup>Operations Research, Holden-Day Incorporated, F.S. Miller and G. J. Lieberman, 1974, p. 109-119.

<sup>9</sup>"Algorithms for the Assignment and Transportation Problems," J. Munkres, Society for Industrial and Applied Mathematics, Journal, Vol 5, No. 1 (March 1957), p. 32-38.

necessary to satisfy the demands for that capability level, then that level cannot be achieved. (This is because the artificial cost associated with illegal transfers is much larger than any of the other costs, and only when no other assignments are possible will such a transfer be made.) In practice, rather than trying to build sequential numbers of teams until either the maximum number of teams is reached or an unsuccessful attempt is made, a binary search is implemented to reduce the number of times the transportation algorithm must be used.

It is realistic to minimize the average time to complete all transfers and not the actual time because the actual time is not available to the commander prior to his making his decisions. However, it is the actual time when the replacement reached its destination which will affect the unit's capability over time. A technique using pseudo-random numbers determines the actual time for each transfer based on the mean transfer time and its assumed exponential distribution.

After the simulated attack the commander starts receiving damage reports on his unit. Before he can decide which transfers and repairs to make to optimize his recoverability, he must collect and analyze this information. The average time required for these decisions is a function of the type of unit and the degree to which it has been damaged, and is a required input for the model methodology. The same technique used to calculate the actual return time from the average return time is used to determine the actual commander's decision time (called the commander's delay time in the model). All transfers have this calculated decision time added to their return time, and it is this composite time which is used to determine actual transfer arrival times.

Because of the stochastic processes used in the methodology, a single iteration of the entire procedure is insufficient, and a number of iterations are necessary for meaningful results. The solution obtained after each iteration of the procedure is statistically averaged with the previous solutions. Typically 100 iterations are necessary

before the results converge to within a statistically acceptable limit. Implementation of a variance reduction technique using complementary pseudorandom numbers reduces the number of iterations that are required.<sup>10</sup>

A block diagram of the AMORE software is shown in Figure B-2.

Figure B-3 provides a summary readiness of the AMORE process. The blocks are coded with either a U, for user input; or an M, for mode processing.

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<sup>10</sup>Op. Cit, Miller, p. 635-641.

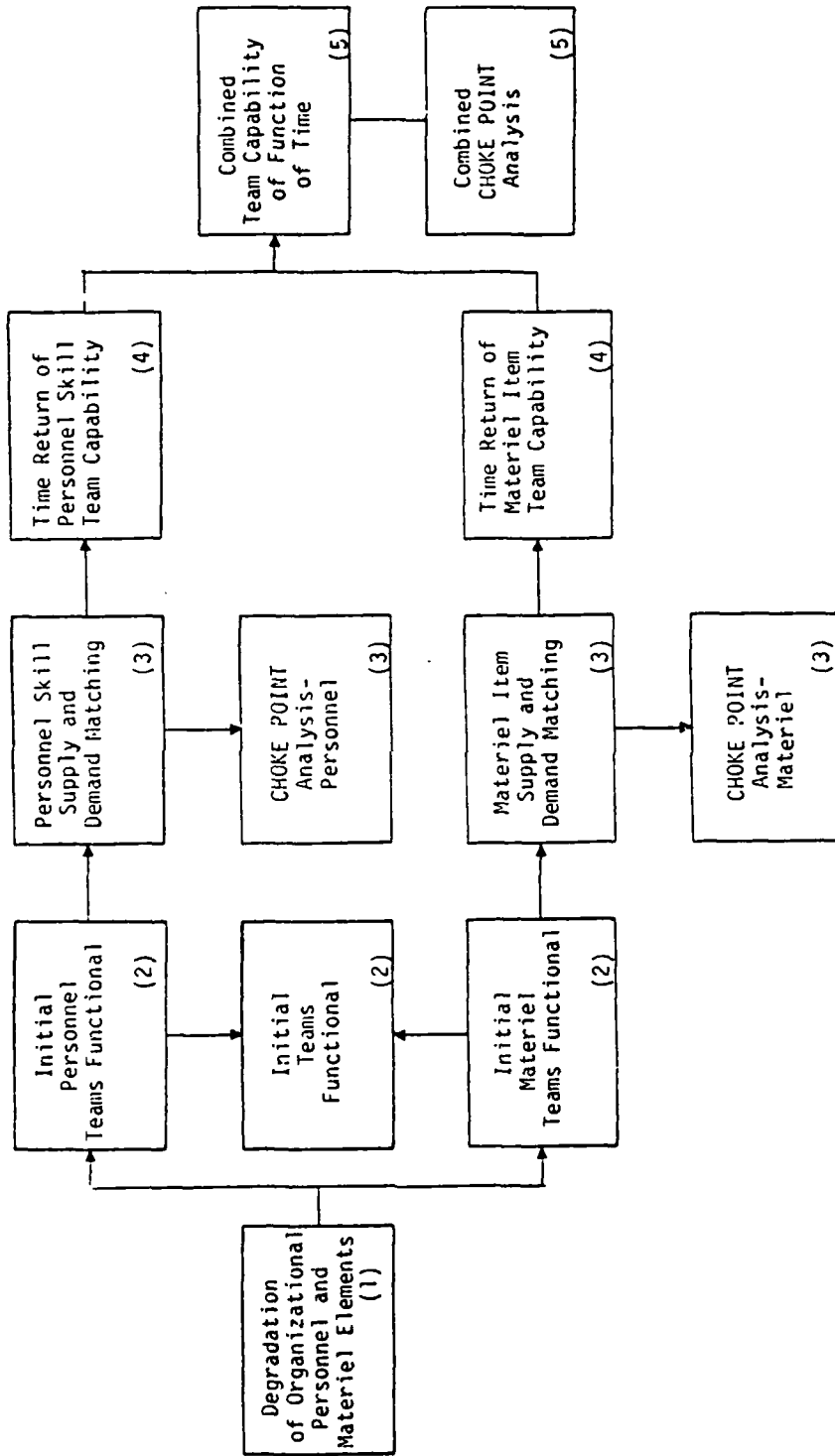


Figure B-2. AMORE software process

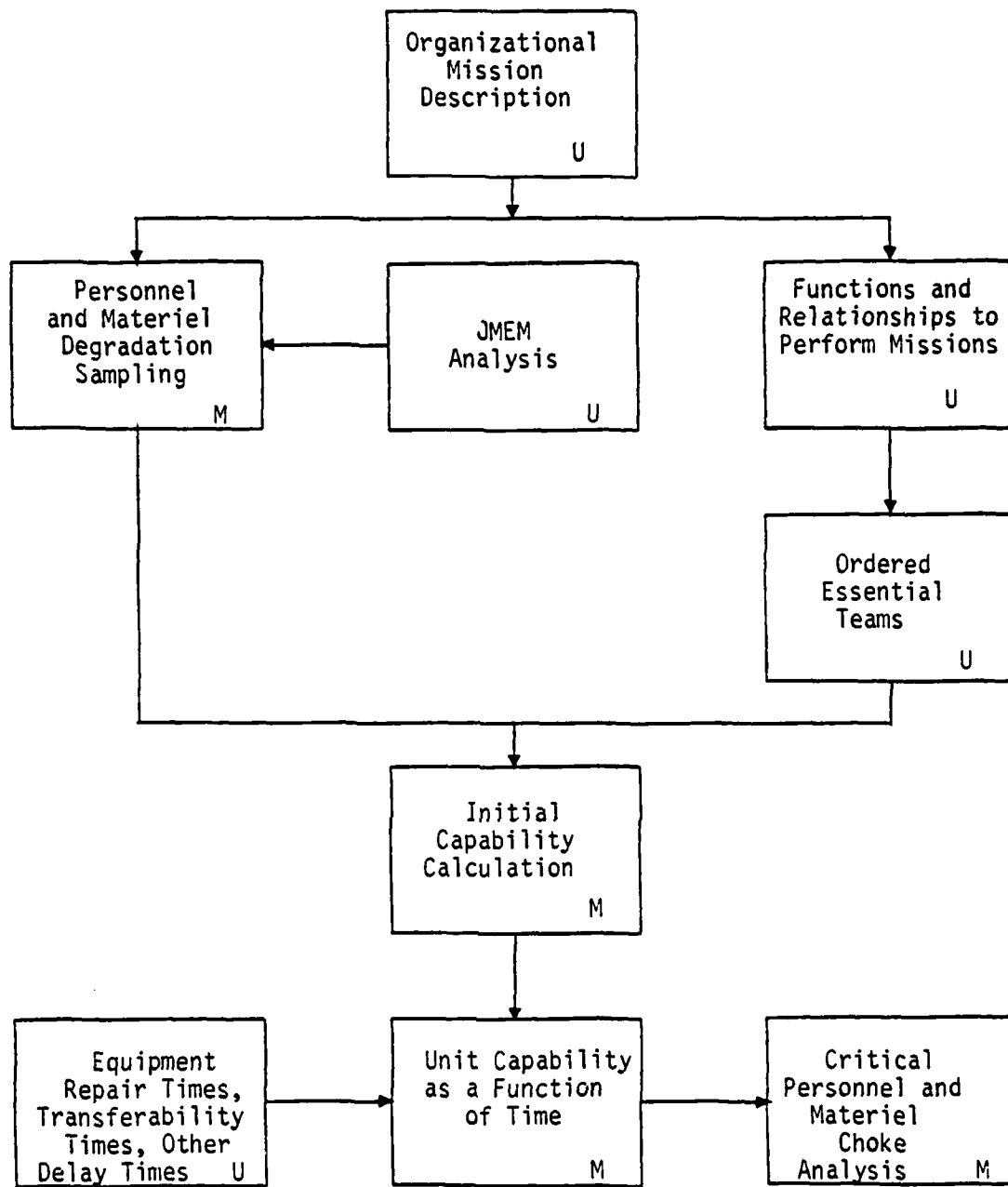


Figure B-3. The AMORE Process

ANNEX C  
COMMENTS ON DRAFT FINAL REPORT



**DEPARTMENT OF THE ARMY**  
**OFFICE OF THE DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS**  
**WASHINGTON, D.C. 20310**

REPLY TO  
ATTENTION OF:  
DAMO-ZD

18 September 1979

Science Applications Incorporated  
8400 Westpark Drive  
McLean, Virginia 22102

Dear Sirs:

WE have reviewed the draft final report "Military Organizational Effectiveness/Readiness and Sustainability." Comments are attached as an inclosure.

Sincerely,

A handwritten signature in cursive script, appearing to read "E. B. Vandiver III".

E. B. VANDIVER III  
Technical Advisor to the  
Deputy Chief of Staff for  
Operations and Plans

Incl  
as



## COMMENTS

1. Provide explanation of assumptions about distribution of losses for each overall loss level.
2. Table 2-LL-34. Correct quantity for materiel lines 13 and 14.
3. Table 2-II-36. Column totals have no meaning. In this case they represent only tank totals but the use is inconsistent with other similar tables.
4. The linearity assumption should also be investigated further. This is particularly true in command and control elements. For example, in your analysis of HHC, Tank Battalion for Mission 1 Team 1 consisting of 36 personnel and 12 items of equipment is matched in effectiveness contribution by Team 2 which consists of 3 personnel. This is typical of headquarters elements. The extreme case is for HHC, Mech Inf Bn where Teams 1-6 for Mission 1 are defined with Teams 2-5 requiring no additional personnel or equipment. In the analysis our understanding is that the unit was rated as having either zero or six teams. Curves providing the number of teams available for each case were derived by replicating 50 times. Although expected values sometimes take values which are impossible for single iterations, the possible deviations in this case are probably too large to be meaningful. The problem is much worse when the expected number of teams is converted to a percentage effectiveness in chapter 3. We understand that the teams were defined to be compatible with Mission 2 examinations. The purpose and effects of these teams should be explained.
5. Some of the personnel and equipment transfer matrices have entries whose logic is unclear. The proponent schools should examine these closely in future studies.