DTIC FILE COPY

(2)

AD-A955 672

FG

DNA 3942F-SAN

ASSESSMENT OF WWMCCS PERFORMANCE IN A POST-NUCLEAR ATTACK ENVIRONMENT (U)

DTIC
ELECTE
DEC 2 8 1987
S D
D

Stanford Research Institute
333 Ravenswood Avenue
Menlo Park, California 94025

November 1975

Final Report for Period 21 January 1975—31 October 1975

CONTRACT No. 001-75-C-0217

THIS WORK SPONSORED BY THE DEFENSE NUCLEAR AGENCY
UNDER RDT&E RMSS CODE X367075469 Q94QAXDD00101 H2590D.

Prepared for
Director
DEFENSE NUCLEAR AGENCY
Washington, D. C. 20305

THIS DOCUMENT CONSISTS OF 230 PAGES,
COPY 28 OF 114 COPIES, SERIES A.

Reproduced From
Best Available Copy

[redacted]

[redacted]

Approved for public release.
DNA (FOIA 85-131)

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

87 12 11 067

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

Accesion For
NTIS CRA&I ✓
DTIC TAB ☐
Unannounced ☐
Justification
By per ltr
Distribution /
Availability Codes
Dist | Avail and / or Special
A-1 | 23

DTIC COPY INSPECTED 3

UNANNOUNCED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: DNA 3942F	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER: 19
4. TITLE (and Subtitle): ASSESSMENT OF WWMCCS PERFORMANCE IN A POST-NUCLEAR ATTACK ENVIRONMENT (U)	5. TYPE OF REPORT & PERIOD COVERED: Final Report ~~for Period~~ 21 Jan 75—31 Oct 75
	6. PERFORMING ORG. REPORT NUMBER: SRI Project 3984
7. AUTHOR(S): E. J. Baumann, H. Heubach, J. van der Laan, G. Carpenter, J. Owen	8. CONTRACT OR GRANT NUMBER(S): DNA 001-75-C-0217 NEW
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Stanford Research Institute, 333 Ravenswood Avenue, Menlo Park, California 94025	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: NWED Subtask Q94QAXDD001-01
11. CONTROLLING OFFICE NAME AND ADDRESS: Director, Defense Nuclear Agency, Washington, D.C. 20305	12. REPORT DATE: November 1975
	13. NUMBER OF PAGES: 230
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report)

16. DISTRIBUTION STATEMENT (of this Report)

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

This work sponsored by the Defense Nuclear Agency under RDT&E RMSS Code X360075469 Q94QAXDD0101 H2590D.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

CINCs' Emergency Relocation Sites	Post-nuclear Attack Environment
Communications Assessment	PRIME RATE
ICS EXPLAN	Radiation Fallout
Nuclear Blast Damage	SIOP Forces
POLE VAULT	WWMCCS

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

PREFACE (U)

(U) This working paper contains a technical evaluation of the World Wide Military Command and Control System (WWMCCS) performance in a post-nuclear attack environment. Special emphasis is placed on the ability of the WWMCCS to perform its post-attack, reconstitution, and redirection missions. A major goal of this effort is to establish a baseline from which more realism can be inserted into the performance of major WWMCCS evaluation exercises. Another goal in this effort is to provide a reference for the JCS Exercise Controllers that may be used in the planning, conduct and evaluation of the upcoming JCS Command Post Exercise.

(U) This work was performed by SRI under sponsorship of the Defense Nuclear Agency (DNA). It was prepared in support of the WWMCCS Evaluation Program directed by the Organization of the Joint Chiefs of Staff (WWMCCS Operation and Evaluation Division, J32).

CONTENTS

PREFACE 1

LIST OF ILLUSTRATIONS 5

LIST OF TABLES 11

I INTRODUCTION 1-1

II ANALYSIS TECHNIQUES AND CONSTRAINTS 2-1

A. Data Base 2-1

1. Facility Identification and Damage Assessment 2-1
2. Communication Connectivities 2-1

B. Method of Approach 2-3

1. General 2-3
2. Communication Systems and Networks 2-3
3. Identification of Nodes, Damage, and Residual System Performance 2-8
4. Fallout Hazards 2-14
5. Vulnerability of Generic Systems 2-17

III WWMCCS PERFORMANCE ASSESSMENT 3-1

A. Scenario Description 3-1

B. Physical Damage to Key Facilities 3-4

1. North American Theatre 3-4
2. European Theatre 3-4
3. Pacific Theatre 3-6

C. Emergency Relocation Sites and CINC's Communication Assets for POLE VAULT 3-7

D. Detailed Analysis of NCA and Theatre Communications 3-10

1. NCA Communications 3-10
2. European Theatre 3-14

III WWMCCS PERFORMANCE ASSESSMENT (Continued)

D (Concluded)

a. ANMCC to USCINCEUR/SHAPE 3-14
b. USCINCEUR to Forces 3-19

1) USCINCEUR to Major Subordinate Commands 3-19
2) USCINCEUR to Ground Forces 3-34
3) USCINCEUR to Naval Forces 3-39
4) USCINCEUR to Air Forces 3-42
5) SHAPE to Forces (NATO) 3-46
6) Fallout Hazards in the European Theatre 3-49

3. Pacific Theatre 3-51

a. NCA to CINCPAC 3-51
b. CINCPAC to Forces 3-58
c. Fallout Hazards in the Pacific Theatre . 3-82

6. NORAD (Cheyenne Mountain) 3-114

a. NCA to CINCNORAD 3-114
b. CINCNORAD to Assets 3-114

1) General 3-114
2) DSP Communications 3-114
3) MOLINK Status 3-125

8. Southern Theatre 3-133

9. Northern Theatre 3-133

10. Defense Civil Preparedness Agency 3-140

IV SYNOPSIS OF WWMCCS PERFORMANCE ASSESSMENT 4-1

A. Emergency Relocation Sites for POLE VAULT 4-1

B. CINCs' Communication Assets 4-1

C. NCA Communications 4-4

D. Status of Theatre Communications 4-8

1. General 4-8
2. European Theatre 4-9

b. SHAPE Communications 4-9
c. CINCEUR to Forces 4-10

3.

4. CINCSAC 4-17

b. CINCSAC to Forces 4-18

5. CINCLANT 4-18

b. CINCLANT to Forces 4-21

6. NORAD 4-21

a. ANMCC to NORAD 4-21
b. NORAD to Assets 4-23

7. REDCOM 4-23

b. CINCRED to Forces 4-26

8. Southern Theatre 4-27

9. Northern Theatre 4-28

10. Defense Civil Preparedness Agency 4-28

E. Fallout Hazards 4-30

REFERENCES R-1

GLOSSARY G-1

Reproduced From
Best Available Copy

ILLUSTRATIONS

II-B-3-1	NCA to USCINCEUR Connectivity	2-10
II-B-3-2	NCA to CINC Path Capability	2-13
II-B-4-1	Example of Radiation Fallout Patterns for United Kingdom	2-16
II-B-5-1	Matrix of Effects vs Assets	2-19
III-A-1	Number and Yield of NUDETS	3-2
III-B-1-1	Status of AUTOVON Switches and Ground Entry Points	3-5
III-D-1-1	NCA Communication Configuration	3-11
III-D-1-2	NEACP Communication Links	3-12
III-D-1-3	Detonations and Radiation Fallout in ANMCC Vicinity	3-13
III-D-2-1	Weighted Communication Capability--NCA to CINCEUR/SHAPE	3-15
III-D-2-2	NCA to CINCEUR Paths--Unstressed	3-16
III-D-2-3	NCA to CINCEUR Paths--Stressed	3-17
III-D-2-4	NCA to SHAPE Paths	3-18
III-D-2-5	EUCOM Unstressed C^3 Configuration	3-20
III-D-2-6(a)	Matrix and Status of USCINCEUR to Forces Communication Assets USCINCEUR TO USNAVEUR	3-25
III-D-2-6(b)	Matrix and Status of USCINCEUR to Forces Communication Assets USCINCEUR to USNAVEUR	3-26
III-D-2-6(c)	Matrix and Status of USCINCEUR to Forces Communication Assets USCINCEUR to USAFE	3-27
III-D-2-7	Estimates of Channel Capacity Between USCINCEUR and Forces	3-28
III-D-2-8	USCINCEUR to USAREUR Paths	3-29
III-D-2-9	USCINCEUR to USNAVEUR Paths	3-30

III-D-2-10(a)	USCINCEUR to USAFE Paths--Lindsey	3-31
III-D-2-10(b)	USCINCEUR to USAFE Paths--Boerfink	3-32
III-D-2-10(c)	USCINCEUR to USAFE Paths--Mobile	3-33
III-D-2-11	USCINCEUR/USAREUR to Forces Configuration--Unstressed	3-35
III-D-2-12	USCINCEUR/USAREUR to Forces Configuration--Stressed	3-36
III-D-2-13(a)	USAREUR to Corps Paths	3-37
III-D-2-13(b)	USCINCEUR/USAREUR to Corps Paths	3-38
III-D-2-14	USCINCEUR/USNAVEUR to Forces Configuration--Unstressed	3-40
III-D-2-15	USCINCEUR/USNAVEUR to Forces Configuration--Stressed	3-41
III-D-2-16	USCINCEUR/USAFE to Forces Configuration--Unstressed	3-43
III-D-2-17	USCINCEUR/USAFE to Forces Configuration--Stressed	3-44
III-D-2-18	EUCOM/USAFE to Airfield Paths	3-45
III-D-2-19	EUCOM/USAFE to Airfield Paths	3-47
III-D-2-20	NATO-Wide Communication System	3-48
III-D-2-21	ACE HIGH Network--Stressed	3-50
III-D-3-1	Weighted Communication Capability--NCA to CINCPAC	3-55
III-D-3-2	NCA to CINCPAC Paths--Unstressed	3-56
III-D-3-3	NCA to CINCPAC Paths--Stressed	3-57
III-D-3-4	Satellite Terminals, Subcables in Pacific--Stressed	3-59
III-D-3-5	CINCPAC to Forces C^3 Configuration--Unstressed	3-60
III-D-3-6	CINCPAC to Forces C^3 Configuration--Stressed	3-61
III-D-3-7	Matrix and Status of CINCPAC to Forces Communication Assets	3-63

III-D-3-8	Map of Radiation Hazards, CINCPAC Facilities, and Surviving Communications Assets--Hawaiian Islands	3-64
III-D-3-9	Map of Radiation Hazards, CINCPAC Facilities, and Surviving Communications Assets--Philippine Islands	3-65
III-D-3-10	Map of Radiation Hazards, CINCPAC Facilities, and Surviving Communication Assets--Taiwan	3-66
III-D-2-11(a)	Map of Radiation Hazards, CINCPAC Facilities, and Surviving Communication Assets--Korea	3-67
III-D-3-11(b)	Map of Radiation Hazards, CINCPAC Facilities, and Surviving Communication Assets--Japan	3-68
III-D-3-12	Map of Radiation Hazards, CINCPAC Facilities, and Surviving Communication Assets--Guam	3-69
III-D-3-13	PACOM Naval C^3 Configuration--Unstressed	3-75
III-D-3-14	PACOM Naval C^3 Configuration--Stressed	3-76
III-D-3-15	PACOM HICOM (HF/SSB/Voice) and FFN (HF/TTY) Communications Configuration	3-78
III-D-3-16	PACOM DCS HF Naval Communications Configuration	3-79
III-D-3-17	PACOM TACAMO B'CST Configuration	3-80
III-D-3-18	PACOM CSUB B'CST Configuration	3-81
III-D-4-1	Weighted Communication Capability--NCA to CINCSAC	3-84
III-D-4-2	NCA to CINCSAC Paths--Unstressed	3-85
III-D-4-3	NCA to CINCSAC Paths--Stressed	3-86
III-D-4-4	SAC C^3 Configuration--Unstressed	3-88
III-D-4-5	SAC C^3 Configuration--Stressed	3-89
III-D-4-6	Matrix and Status of SAC to Missile Forces Communication Assets	3-93
III-D-4-7	Matrix and Status of SAC to Bomber Forces Communication Assets	3-94

III-D-5-1	Weighted Communication Capability--NCA to CINCLANT	3-100
III-D-5-2	NCA to CINCLANT Paths--Unstressed	3-101
III-D-5-3	NCA to CINCLANT Paths--Stressed	3-102
III-D-5-4	LANTCOM Unstressed C^3 Configuration	3-104
III-D-5-5	LANTCOM Stressed C^3 Configuration	3-106
III-D-5-6	Matrix and Status of CINCLANT Communications Asset	3-107
III-D-5-7	LANTCOM HICOM Communication Network	3-109
III-D-5-8	LANTCOM FFN Communication Network	3-110
III-D-5-9	LANTCOM DCS HF Communication Network	3-111
III-D-5-10	LANTCOM TACAMO B'CAST Network	3-112
III-D-5-11	LANTCOM SUB B'CAST Network	3-113
III-D-6-1	Weighted Communication Capability--NCA to CINCNORAD	3-115
III-D-6-2	NCA to CINCNORAD Paths--Unstressed	3-116
III-D-6-3	NCA to CINCNORAD Paths--Stressed	3-117
III-D-6-4	Matrix and Status of NORAD Communication Asset	3-119
III-D-6-5	Map of NORAD Assets	3-120
III-D-6-6	RCC to NORAD Communication Configuration--Stressed	3-121
III-D-6-7	BMEWS to NORAD Communication Configuration--Stressed	3-122
III-D-6-8	DSP to ANMCC--NORAD Paths--Unstressed	3-123
III-D-6-9	DSP to ANMCC--NORAD Paths--Stressed	3-124
III-D-6-10	MOLINK Paths--Unstressed	3-126
III-D-6-11	MOLINK Paths--Stressed	3-127
III-D-7-1	Weighted Communication Capability--NCA to CINCRED	3-129

III-D-7-2	NCA to CINCNED Paths--Unstressed	3-130
III-D-7-3	NCA to CINCNED Paths--Stressed	3-131
III-D-8-1	Weighted Communication Capability--NCA to CINCSOUTH	3-134
III-D-8-2	NCA to CINCSOUTH Paths--Unstressed	3-135
III-D-8-3	NCA to CINCSOUTH Paths--Stressed	3-136
III-D-9-1	Weighted Communication Capability--NCA to CINCAL	3-137
III-D-9-2	NCA to CINCAL Paths--Unstressed	3-138
III-D-9-3	NCA to CINCAL Paths--Stressed	3-139
III-D-10-1	DCPA Regions and Radiation Fallout in CONUS	3-141
III-E-1-1	Radiation Fallout Contours for CONUS at PRIME RATE Plus One Day	3-143
III-E-1-2	Radiation Fallout Contours for CONUS at PRIME RATE Plus One Day--Assumed Ground Bursts on MM Missile Fields	3-144
III-E-1-3	Radiation Fallout Contours for Hawaiian Islands at PRIME RATE Plus Eight Days	3-145
III-E-1-4	Radiation Fallout Contours in Vicinity of Kunia at PRIME RATE Plus Eight Days	3-146
IV-C-1	NCA Communication Configuration	4-5
IV-C-2	NEACP Communication Links	4-6
IV-C-3	Burst Location and Fallout Contours in the ANMCC Region	4-7
IV-D-2-1(a)	Matrix and Status of USCINCEUR to Forces Communications Assets--USCINCEUR to USAREUR . . .	4-11
IV-D-2-1(b)	Matrix and Status of USCINCEUR to Forces Communication Assets--USCINCEUR to USNAVEUR . . .	4-12
IV-D-2-1(c)	Matrix and Status of USCINCEUR to Forces Communication Assets--USCINCEUR to USAFE	4-13
IV-D-2-2	Channel Capacity Estimates for USCINCEUR to Major Subordinate Commands	4-14
IV-D-3-1	Matrix and Status of CINCPAC to Forces Communication Assets	4-16

Reproduced From
Best Available Copy

IV-D-4-1(a)	Matrix and Status of CINCSAC to Missile Forces Communication Assets	4-19
IV-D-4-1(b)	Matrix and Status of CINCSAC to Bomber Forces Communication Assets	4-20
IV-D-5-1	Matrix and Status of CINCLANT to Forces Communication Assets	4-22
IV-D-6-1	Map of NORAD Assets	4-24
IV-D-6-2	Matrix and Status of CINCNORAD Communication Assets	4-25
IV-D-10-1	DCPA Regions and Radiation Fallout In CONUS	4-29
IV-E-1	Radiation Fallout Contours for CONUS Plus One Day	4-31
IV-E-2	Radiation Fallout Contours for CONUS with Assumed Ground Bursts Plus One Day	4-32

TABLES

II-B-2-1	Matrix of Communication Systems, Networks, and Characteristics	2-9
II-B-3-1	NCA to Theatre Communications Capability--Unstressed	2-12
III-C-1	Command and Alternate Command Locations	3-8
III-C-2	CINCs' Communication Assets	3-9
III-D-2-1	Status and Destruction Timeline of USCINCEUR Assets	3-21
III-D-3-1	Status and Destruction Timeline of CINCPAC Assets	3-52
III-D-3-2	Communications Facility Summary--Hawaii (Oahu)	3-70
III-D-3-3	Communication Facility Summary--Philippine Islands	3-71
III-D-3-4	Communication Facility Summary--Taiwan	3-71
III-D-3-5	Communication Facility Summary--Korea and Japan	3-72
III-D-3-6	Communication Facility Summary--Guam	3-73
III-D-3-7	Communications Facility Summary--Okinawa and Thailand	3-74
III-D-4-1	Status and Destruction Timeline of SAC Assets	3-90
III-D-5-1	Status and Destruction Timeline of CINCLANT Assets	3-103
III-D-6-1	Status and Destruction Timeline of NORAD Assets	3-118
III-D-7-1	Status and Destruction Timeline of CINCPLO Assets	3-132
IV-A-1	Command and Alternate Command Locations	4-2
IV-B-1	CINCs' Communication Assets	4-3
IV-D-2-1	Status of ANMCC to CINCEUR Communication Assets	4-9

IV-D-3-1 Status of ANMCC to CINCPAC Communication Assets . . . 4-15

IV-D-4-1 Status of ANMCC to CINCSAC Communication Assets . . . 4-17

IV-D-5-1 Status of ANMCC to CINCLANT Communication Assets . . 4-21

IV-D-6-1 Status of ANMCC to CINCNORAD Communication Assets . . 4-23

IV-D-7-1 Status of ANMCC to CINCRED Communication Assets . . . 4-26

IV-D-8-1 Status of ANMCC to USCINCSO Communication Assets . . 4-27

IV-D-9-1 Status of ANMCC to CINCAL Communication Assets . . . 4-28

Reproduced From
Best Available Copy

(U) The information in this report represents an estimate of the likely status of the WWMCCS that is consistent with current technology and with our understanding of the 1975 WWMCCS configuration.

PAGE 1-1 WAS DELETED

(U) Section IV provides an overview and synopsis of the WWMCCS status by theatre and is appropriate for POLE VAULT initial conditions.

PAGE 1-3 WAS DELETED

II ANALYSIS TECHNIQUES AND CONSTRAINTS (U)

(U) Some errors and omissions regarding locations of command headquarters, emergency relocation sites (ERS), and other key facilities are likely to be found in this report. They result because of recent changes in the C^3 structure and locations of designated ERS. The NMCSSC data base[1] used in this analysis was dated 10 March 1975.

(U) We have relied heavily on the Computer Science Corporation (CSC) data base[2] in our analysis of NCA to Theatre communications. The CSC data base was developed as a part of the DNA-sponsored

INCA program and is in a form particularly convenient for this analysis. It includes an identification of the nodes, intermediate points, routings, and the various systems that utilize the routings.

(U) Several supplementary sources were used to describe intra-theatre force connectivities for the Pacific and Europe. They include an analysis of European C^3 performed on the DNA INCA program,[4,5] charts showing the worldwide DCS connectivities,[6] Exercise POLE VAULT '76[7,8] documents provided to us by the OJCS to describe conditions for the POLE VAULT exercise, and, a document prepared by the United States Air Force Academy[9] that addresses our strategic C^3 system. Finally, our brief assessment of the DCPA communications was based on data provided to SRI by the OJCS.[10]

(U) Because the theatre connectivities were often derived from several independent sources, the connectivities may be subject to some errors in our interpretation. Such errors may affect the details of our communication analysis but not the substance.

1. (U) General

(U) The analysis procedures used to determine the WWMCCS status during PRIME RATE and at the onset of POLE VAULT involve four steps. These steps are as follows:

(1) Identify the communication systems and networks utilized by the NCA and by the Theatre Commander.

(2) Identify the routings for the various systems that support communications from NCA to CINC and from CINCs to forces and assess the facility damage to the nodes and to intermediate points along the paths.

(3) Assign a figure of merit to measure communication capability.

(4) Identify regions of intense radiation fallout.

PAGES 2-4 THROUGH 2-7
WERE DELETED

(U) The characteristics (transmission medium, information type, transmission rate, transmission security, and types of circuit) are summarized in Table II-B-2-1 for most of the above systems.

PAGES 2-9 AND 2-10
WERE DELETED

(U) Recognizing that there are several breakouts of these functions, we have used the following so-called Minimum Essential Functions:

(1) Situation Monitoring/Current Intelligence

(2) Forces and Resources Status Monitoring

(3) Attack Assessment

(4) Select, Execute, and Terminate

(5) Operations Monitoring

(6) Strategic Replanning and Retargeting

(7) Redirection and Reconstitution

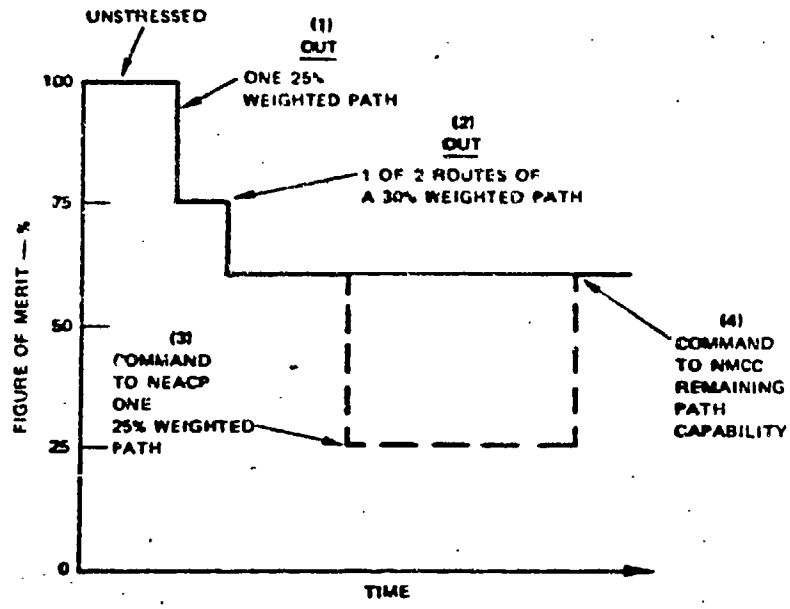
(8) Damage Assessment/Strike Assessment

(9) Civil Responsibilities.

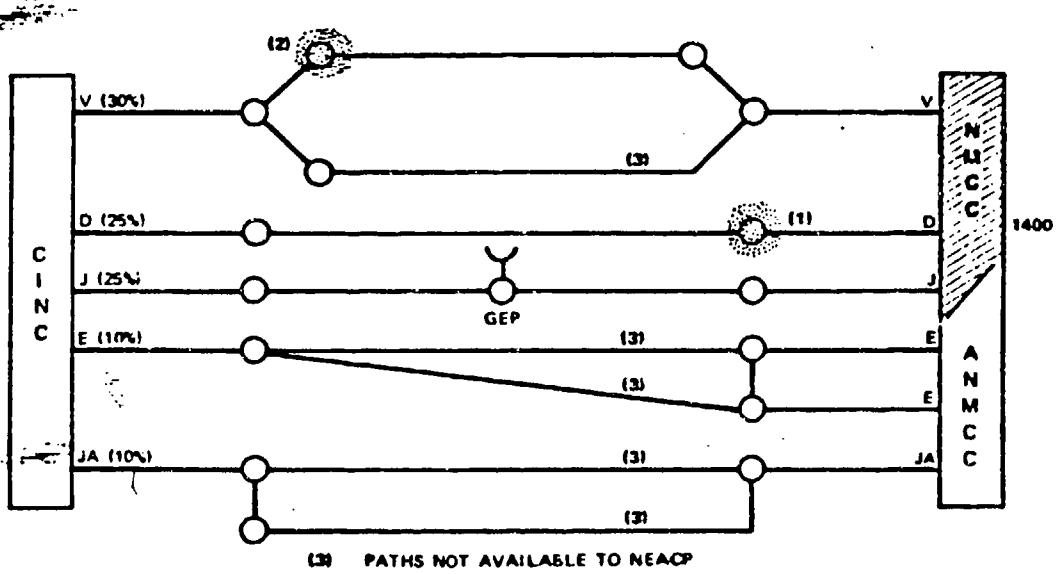
(U) The merit figure or weighting of the capability for each path (Table II-B-3-1, Column 4) was derived by dividing the number of MEFs (Minimum Essential Functions) carried on each path by the total number of MEFs carried by all paths to the appropriate CINC. Using Europe as an example, there are seven paths identified having specific routes that carry a total of 28 formatted MEF messages. The weighting for the individual paths (Column 4) was obtained by dividing the number of MEFs carried by that path by 28, thereby establishing a percentage for that path. This figure of merit allows us to measure the stress degradation in percent as a function of time with respect to the unstressed 100% capability. A hypothetical example* of the figure of merit is shown in Figure II-B-3-2. First, a 100% capability is shown for the unstressed NCA to CINC circuits shown in Figure II-B-3-2(b). At time notation (1) on the capability plot [Figure II B-3-2(b)] there is a loss of 25% capability in this instance meaning that one 25% weighted circuit is out. Figure II B-3-2(b) shows that the AUTODIN (D) circuit

*(U) This example was made up for illustrative purposes only. It is not a true representation of NCA to CINC capability.

PAGE 2-12 WAS DELETED



(a)



D AUTODIN
E EMATS
J JCSAN
JA JCS AUTOMATIC CONFERENCE ARRANGER
V AUTOVON

UNCLASSIFIED

(b)

FIGURE II-B-3-2 NCA TO CINC PATH CAPABILITY

(U)

was lost. At time notation (2) one of two possible routes for AUTOVON is out. This degrades that circuit by one-half (15%) of its 30% full capability. At time notation (3), the NMCC was destroyed and the NCA communications to the CINC are from the NEACP via the GEP. Since, in this example, the GEP is tied only to the JCSAN (J) circuit, NEACP does not have access to V, E, and JA, and the capability drops to the 25% level. The dashed line in the capability plot indicates the NCA communication capability from the NEACP only.

(U) There are no other outages shown in this example for the other circuits; thus, ESATS (E) and Automatic Conferencing Arrange [illegible] and the second AUTOVON route (V) retain their connectivity to the [illegible]. At time notation (4), command returns to the ANMCC and its capability then becomes that of the remaining circuits (JA, E, J, and V) and is measured at 60%. This procedure was used to provide a figure of merit of the communication capability for all CINCs. Detailed circuits for each CINC are also presented and node degradations are shown at selected time intervals by shading and removing the connecting circuit. The outage time of the node is also indicated.

4. Fallout Hazards (U)

(U) Any attempts at reconstructing communications must be tempered by the fallout hazards in the area under consideration--i.e., personnel cannot be expected to remain in the open areas indefinitely in order to work on their equipment. Depending on the intensity of the fallout, they can be expected to remain in shielded locations for part of each day, work in an unshielded area for another part of the day, and go through a decontamination process after exposure. The time of exposure should of course be dependent on the level of fallout. Exposure to 200 rads is rather serious. The urgency for site recovery may not

(U)

warrant such a risk. So then, one might wish to know how long the exposure period would be at H + 1 day in order to accumulate the limiting exposure of 200 rads for several dose rates as shown below:

Dose Rate (rads/hr)	Exposure Period (hrs)
50	4.5
10	34
2	Months

(U) An example of the fallout hazard assessment is shown in Figure II-B-4-1. It consists of the above isodose rate contours over areas of England where significant fallout occurred and potential radiation hazards exist at H + 8 days. The designated national command facilities and airfields in our data base are also included on the map.

(U) The SRI-developed Damage Assessment Computer Program (DACOMP) was used to compute the radiation dose rates in R/hr at 24 hours. A segment of the DACOMP[11] is the SEER II[12] fallout model, also developed at SRI.

(U) The contours of fallout, such as those illustrated in Figure II-B-4-1, were determined by using the typical meteorological conditions that existed in March 1975, the period over which the exercise took place. At the time that the fallout contours were calculated, JCS EXPLAN 008 (Ref. 7) was not available, so the standardized conditions adopted by the OJCS were not used.

PAGE 2-16 WAS DELETED

5. Vulnerability of Generic Systems (U)

(U) To assess the vulnerability of WWMCCS assets to nuclear effects, the assets can be conveniently divided into three categories according to their physical location in the three distinct regions of the environment:

(1) Satellites (space)

(2) Aircraft (atmosphere)

(3) Land-based (surface).

(U) Included in the third category are command posts, airfields, ground-based radio and radar systems, and satellite ground terminals.

(U) Similarly, the potential nuclear-induced degradations to C^3 assets are divided into three general areas:

(1) Physical damage

(2) Propagation failure

(3) Personnel injury.

PAGES 2-19 AND 2-20 WERE DELETED

III WWMCCS PERFORMANCE ASSESSMENT (U)

A. Scenario Description (U)

(U) The attack scenario associated with the PRIME RATE exercise is not a full-scale RISOP attack and was not intended to destroy U.S. C^3 capability. Rather, its purpose was to place stresses on the C^3 system. Connectivity existed between the NCA and all Theatre Commanders throughout PRIME RATE exercise and the onset of POLE VAULT.

(U) The sequence of events in the scenario developed over a period of several days. It commenced in Europe in early March 1975 with an attack by conventional weapons. An exchange of tactical nuclear weapons began on March 11 and the situation deteriorated until, finally, a large-scale worldwide nuclear attack was initiated at 1500 on 13 March, 1975--the time we refer to as H-hour. The number and yields of the nuclear detonations that occurred throughout the scenario are shown in Figure III-A-1 for the CONUS, European and Pacific theatres, respectively.

PAGES 3-2 AND 3-3 WERE DELETED

B. Physical Damage to Key Facilities (U)

(U) The following brief discussion identifies the facilities the destruction of which would have the greatest impact in determining the WWMCCS' status during PRIME RATE and at the onset of POLE VAULT.

PAGES 3-5 THROUGH 3-33
WERE DELETED

2) USC[illegible] to Ground Forces (U)

(U) The communications degradation/reconstitution applicable to ground forces are shown in the following figures:

- Figure III-D-2-11 - USCINCEUR/USAREUR to Forces Configuration--Unstressed
- Figure III-D-2-12 - USCINCEUR/USAREUR to Forces Configuration--Stressed
- Figure III-D-2-13 - USAREUR to CORPS Paths

PAGES 3-35 THROUGH 3-41
WERE DELETED

4) USCINCEUR to Air Forces (U)

(U) The status of communications between USCINCEUR and the Air Forces is shown in the following figures:

- Figure III-D-2-16 - USCINCEUR/USAFE to Forces Configuration--Unstressed
- Figure III-D-2-17 - USCINCEUR/USAFE to Forces Configuration--Stressed
- Figure III-D-2-18 - USAFE to Airfields Paths

PAGES 3-43 THROUGH 3-45
WERE DELETED

(U) Figure III-D-2-19 provides detailed descriptions of the communications links connecting USCINCEUR, USAFE, and the primary and alternate airfields.

PAGES 3-47 THROUGH 3-124
WERE DELETED

3) (U) MOLINK Status

(U) Negotiations between the United States and the USSR are conducted via the MOLINK. MOLINK routings are shown in Figures III-D-6-10 and 11 for the unstressed and stressed conditions, respectively. The Etam and Ft. Detrick SATCOM terminals remain operational on the CONUS side of the linkage. The status of the nodes on the USSR side after SIOP execution is not known to us (this situation is indicated by the use of quotation marks to highlight the "Moscow" node in Figure III-D-6-11).

PAGES 3-126 THROUGH
3-146 WERE DELETE

IV SYNOPSIS OF WWMCCS PERFORMANCE ASSESSMENT (U)

(U) The purpose of this synopsis is to provide an overview of the conditions at the beginning of POLE VAULT. Condensations of the detailed path/link analyses for each CINC are presented in the illustrations and tables in this section.

(U) Where a headquarters was destroyed, the information shown describes the communications to its alternates or to its Emergency Relocation Site (ERS). Also, where appropriate, the effects of fallout on WWMCCS facilities are described.

PAGES 4-2 THROUGH 4-7
WERE DELETED

D. Status of Theatre Communications (U)

1. General (U)

(U) This section is a synopsis of the communication assets available from NCA to the CINCs, and from the CINCs to their forces. They are categorized by CINC.

(U) An important point in the synopsis is that although connectivities are indicated for AUTOVON, AUTODIN, etc., our estimates for weighted communication capabilities may appear low. However, when we are taking into account physical damage, loss of alternate routes, etc., the number of available channels is significantly reduced, thereby causing low estimates of communication capability.

(U) A second point is that these tables assume that no C^3 reconstitution has taken place since PRIME RATE.

PAGES 4-9 THROUGH 4-34
WERE DELETED

REFERENCES

1. "Communication Outages--PRIME RATE '75 (U)," National Military Command System Support Center, Washington, D.C. (10 March 1975), SECRET.

2. M. R. Epstein, B. F. Adams, and S. Weisenfeld, "NCA Command and Control Vulnerability Assessment Methodology (U)" Interim Report Contract DNA001-75-C-0073, Computer Sciences Corporation, Falls Church, Virginia (May 1975), SECRET.

3. "MEECN Message Processing and Handling Near Term Network Improvements (U)," Naval Electronics Laboratory Center, San Diego, California (December 1973), SECRET.

4. "DAN INCA Program Sixth Coordination Meeting Minutes (U)," The BDM Corporation, Vienna, Virginia (May 1975), SECRET-RESTRICTED DATA.

5. "Minutes--DNA INCA Program Fourth Monthly Coordination Meeting (U)," Stanford Research Institute, Menlo Park, California (February 1975), SECRET-FORMERLY RESTRICTED DATA.

6. "DAC Chart Nos. 1-28," Defense Communications Agency, Washington, D.C. (July-October 1973), UNCLASSIFIED.

7. "Exercise POLE VAULT '76--JCS EXPLAN 0008 (U)," The Joint Chiefs of Staff, Washington, D.C. (15 June 1974), SECRET.

8. "Exercise POLE VAULT '76--Annex Y to JCS EXPLAN 0008 (U)," The Joint Chiefs of Staff, Washington, D.C. (undated), SECRET.

9. J. B. Tindall et al., "A Primer in Strategic Command and Control Communications," Research Report 73-5, United States Air Force Academy, Colorado Springs, Colorado (June 1973), UNCLASSIFIED

10. J. W. McConnell, "Memorandum for Director, Defense Communications Agency," Defense Civil Preparedness Agency, Washington, D.C. (17 September 1975), UNCLASSIFIED.

11. P. W. Wong and H. Lee, "Utilization of the SEER Fallout Model in a Damage Assessment Computer Program (DACOMP)," DNA 3608F, Final Report, DNA001-72-C-0169, Stanford Research Institute, Menlo Park, California (27 February 1975), UNCLASSIFIED.

12. H. Lee, P. W. Wong, and S. L. Brown, "SEER II: A New Damage Assessment Fallout Model," DNA 3005F, Contract DASA01-C-0121, Stanford Research Institute, Menlo Park, California (May 1972), UNCLASSIFIED.

GLOSSARY OF ABBREVIATIONS, ACRONYMS, AND CODE WORDS

AAFCE	Allied Air Forces, Central Europe (NATO)
ABNCP	Airborne Command Post
ACA	Automatic Conference Arranger (OJCS)
ACE HIGH	Allied Command, Europe, High Command Troposcatter Net (NATO)
ACFK	Alternate Command Facility, Kunia (PACOM)
ACTAN	Alternate CINCPAC TTY Alerting Network
ADIN	See AUTODIN
AFLANT	U.S. Air Force, Atlantic (LANTCOM)
AFREDCOM	U.S. Air Force, Readiness Command
ALCC	Airborne Launch Control Center (SAC)
ALCOM	Alaskan Command
ALCOP	Alternate Command Post
ALCS	Airborne Launch Control System (SAC)
ALFA NET	HF/SSB Communications Net (SAC)
ALT	Alternate
ALTCOM	Alternate Commander
ALTCOMLANT	Alternate Commander, Atlantic (LANTCOM)
AM	Amplitude Modulation
ANMCC	Alternate National Military Command Center (OJCS)
AREUR	See USAREUR
ARLANT	U.S. Army, Atlantic (LANTCOM)
ARPAC	U.S. Army, Pacific (PACOM)
ARREDCOM	U.S. Army, Readiness Command
AUTODIN	Automatic Digital Network (DCS)
AUTOSEVOCOM	Automatic Secure Voice Communications

AUTOVON	Automatic Voice Network (DCS)
AUXCP	Auxiliary [Airborne] Command Post (SAC)
AVON	see AUTOVON
A/C	Aircraft
A/G	Air-to-Ground
BAUD	Unit of signaling speed--the number of discrete signal events per second
BCA	Broadcast Control Authority
BMEWS	Ballistic Missile Early Warning System (NORAD)
BRAVO NET	HF/SSB Communications Net (SAC)
BRA-29	Special submarine HF receiver equipment
B'CST	Broadcast
CEMETERY NET	HF/SSB Communications Net (EUCOM)
CENTAG	Central Army Group Central Europe (NATO)
CINC	Commander-in-Chief
CINCAL	Commander-in-Chief, Alaskan Command
CINCEASTLANT	Commander-in-Chief, East Atlantic (EUCOM)
CINCEUR	See USCINCEUR
CINCHAN	Commander-in-Chief, Channel (NATO)
CINCLANT	Commander-in-Chief, Atlantic Command
CINCNORAD	Commander-in-Chief, North American Air Defense Command
CINCONAD	Commander-in-Chief, Continental Air Defense Command
CINCPAC	Commander-in-Chief, Pacific Command
CINCPACFLT	Commander-in-Chief, U.S. Pacific Fleet
CINCRED	Commander-in-Chief, Readiness Command
CINCSAC	Commander-in-Chief, Strategic Air Command
CINCSO, CINCSOUTH	See USCINCSO
CINCUSAFE	Commander-in-Chief, U.S. Air Force, Europe
CLARINET PILGRIM	Real-time relay of CSUB broadcast (PACOM)

COMANTDEFCOM	Commander, Antilles Defense Command (LANTCOM)
COMCENTLANT	Commander, Central [East] Atlantic (NATO)
COMCRUDESLANT	Commander, Cruiser-Destroyer Forces, Atlantic (LANTCOM)
COMEASTLANT	Commander, East Atlantic (LANTCOM)
COMFAIRWESTPAC	Commander, Fleet Air, Western Pacific
COMFAIRWING-LANT	Commander, Fleet Air Wing, Atlantic (LANTCOM)
COMIDFOR	Commander, Iceland Defense Forces (LANTCOM)
COMINEWARFOR	Commander, Mine Warfare Forces (LANTCOM)
COMKWESFOR	Commander, Key West Forces (LANTCOM)
COMMANDO ESCORT	Air Force HF/SSB Voice Network
COMNAVAIRLANT	Commander, Naval Air Forces, Atlantic
COMNAVAIRPAC	Commander, Naval Air Forces, Pacific
COMNAVFORJ	Commander, Naval Forces, Japan
COMPHIBPAC	Commander, Amphibious Forces, Pacific
COMSOLANT	Commander, South Atlantic (LANTCOM)
COMSUBEASTLANT	Commander, Submarine Forces, East Atlantic (EUCOM)
COMSUBFLOT 8	Commander, Submarine Flotilla 8 (LANTCOM)
COMSUBLANT	Commander, Submarine Forces, Atlantic
COMSUBPAC	Commander, Submarine Forces, Pacific
COMSUBRON 15	Commander, Submarine Squadron 15 (PACOM)
COMUSJ	Commander, U.S. Forces, Japan
COMWESTSEAFRON	Commander, Western Sea Frontier (PACOM)
CONAD	Continental Air Defense Command
CONUS	Continental United States
CP	Command Post
CRCS	Custodial Radio Control Station
CSF-8	See COMSUBFLOT 8
CSUB	Pacific Submarine Broadcast
CTAN	CINCPAC Teletype Alerting Network

CVA	Attack Aircraft Carrier
CVAN	CINCPAC Voice Alerting Network
C^3	Command, Control, and Communications
DCA	Defense Communications Agency
DCPA	Defense Civil Preparedness Agency
DCS	Defense Communications System
DIN	See AUTODIN
DNA	Defense Nuclear Agency
DSCS	Defense Satellite Communications System
DSP	Defense Support Program
EAM	Emergency Action Message
EAUXCP	East Auxiliary Command Post
EMATS	Emergency Message Automatic Transmission System (JCS)
EMP	Electromagnetic Pulse
ERCS	Emergency Rocket Communications System
ERS	Emergency Relocation Site
EUCOM	See USEUCOM
EUR ABNCP	Europe Airborne Command Post
EXPLAN	Exercise Plan
FFN	Fleet Flash Net, HF/TTY
FLEET B'CST	LF-HF Multi-Channel Fleet Broadcast
FM	Frequency Modulation
FRG	Federal Republic of Germany
GEP	Ground Entry Point
GREEN PINE	UHF Relay Stations
G/A	Ground-to-Air
HF	High Frequency
HICOM	High Command (Fleet HF/SSB/voice network)
INCA	Integrated Nuclear Communication Assessment
INTELSAT	International Telecommunications Satellite

JCS	Joint Chiefs of Staff
JCSAN	Joint Chiefs of Staff Alerting Network
JP RELAY	Joint Pacific Relay
KSUB	Mediterranean Submarine Broadcast (LANTCOM)
LANT ABNCP	Atlantic Airborne Command Post
LANTCOM	Atlantic Command
LANTFLT	U.S. Atlantic Fleet
LCC	Launch Control Center
LES-6	Lincoln Lab Experimental Satellite No. 6
LF	Low Frequency
LOS	Line of Sight
L/L	Land Line (cable, microwave, troposcatter)
MAUXCP	Mid Auxiliary Command Post
MAW	Military Airlift Wing
MCAF	Marine Corps Air Force
MEECN	Minimum Essential Emergency Communications Network
MEF	Minimum Essential Function
MM	Minuteman
MOLINK	Communication Link Between NCA and Moscow
MUX	Multiplex
NAF	Numbered Air Force
NAS	Naval Air Station
NATO	North Atlantic Treaty Organization
NAVCOMMSTA	Naval Communications Station
NAVEUR	U.S. Navy, Europe
NAVFORK	U.S. Naval Forces, South Korea
NAVRADSTA	Naval Radio Station
NCA	National Command Authority
NCMC	NORAD Cheyenne Mountain Complex
NCS	See NAVCOMMSTA

NEACP	National Emergency Airborne Command Post
NELC	Naval Electronics Laboratory Center
NMCC	National Military Command Center
NMCSSC	National Military Command Systems Support Center
NORAD	North American Air Defense Command
NSUB	Atlantic Submarine Broadcast
NUDET	Nuclear Detonation
NWCS	NATO-Wide Communications System
OJCS	Organization of the Joint Chiefs of Staff
OKINAPAC	U.S. Pacific Forces, Okinawa
OSUB	Atlantic Submarine Broadcast
OW	Orderwire--TTY/voice network utilized for coordination of communication link between two stations
PAC ABNCP	Pacific Airborne Command Post
PACAF	U.S. Pacific Air Forces
PACCS	Post-Attack Command and Control System
PACE	U.S. Pacific Electronic Asset Control Center
PACFLT	U.S. Pacific Fleet
PACOM	Pacific Command
PAS	Primary Alerting System
PTT	German National Telecommunications System (Bundespost)
RAF	Royal Air Force
RAN	Royal Australian Navy
RCAF	Royal Canadian Air Force
RCC	Regional Combat Center (NORAD)
REDCOM	Readiness Command
RISOP	Red Integrated Strategic Operations Plan
RTT, RATT	Radio Teletype
SAC	Strategic Air Command
SAC ABNCP	SAC Airborne Command Post

SAC TEL, STN	SAC Telephone
SACCS	SAC Automated Command and Control System
SACEUR	Supreme Allied Commander, Europe (NATO)
SACLANT	Supreme Allied Commander, Atlantic (NATO)
SAGE	Semi-Automatic Ground Environment
SASP	Special Ammunition Storage Point
SATCOM	Satellite Communications System
SATIN I	SACCS AUTODIN Teletype Interface Network
SEACOM	Southeast Asian Commercial Submarine Cable
SGEMP	System-Generated EMP
SHAPE	Supreme Headquarters, Allied Powers, Europe (NATO)
SHF	Super High Frequency
SHOC	Supreme High Command TTY Network (NATO)
SIOP	Single Integrated Operational Plan
SLBM	Submarine-Launched Ballistic Missile
SLFCS	Survivable Low-Frequency Communications System
SMS	Strategic Missile Squadron
SOUTHCOM	Southern Command
SPEOPS WG	Special Operations Wing
SSB	Single Side-Band
SSBN	Fleet Ballistic-Missile Submarine
STRAT WG	Strategic Wing (SAC)
TAC ALFT WG	Tactical Airlift Wing
TAC FTR WG	Tactical Fighter Wing
TAC RECON SQD	Tactical Reconnaissance Squadron
TACAMO	Navy Airborne VLF Communications System
TAINAPAC	U.S. Pacific Forces, Tainan AB, Taiwan
TAT	Trans-Atlantic Commercial Submarine Cable
TRANSPAC	Trans-Pacific Commercial Submarine Cable
TREE	Transient Radiation Effects on Electronics

TSUB	Caribbean Submarine Broadcast (LANTCOM)
TTY	Teletype
UHF	Ultra High Frequency
UK	United Kingdom of Great Britain
UPLINK	Ground-to-Air Transmission, as in TACAMO UPLINK B'CST
USAFE	U.S. Air Force, Europe
USAREUR	U.S. Army, Europe
USARHAW	U.S. Army, Hawaii
USARJ	U.S. Army, Japan
USARPAC	U.S. Army Pacific
USART	U.S. Army, Taiwan
USCINCEUR	U.S. Commander-in-Chief, European Command
USCINCSO	U.S. Commander-in-Chief, Southern Command
USEUCOM	U.S. European Command
USMACTHAI	U.S. Military Assistance Command, Thailand
VHF	Very High Frequency
VLF	Very Low Frequency
VON	See AUTOVON
WAUXCP	West Auxiliary Command Post (SAC)
WCP	Wing Command Post
WWABNCP	Worldwide Airborne Command Post (HF/SSB Communications Net)
WWMCCS	Worldwide Military Command and Control System

DISTRIBUTION LIST

DEPARTMENT OF DEFENSE

Office of the Joint Chiefs of Staff
3 cy ATTN: J-4
3 cy ATTN: J-5
10 cy ATTN: J-3, Mr. Toma

Director
Defense Civil Preparedness Agency
ATTN: TS (AED)

Commander
Defense Communications Agency
10 cy ATTN: Code 561

Defense Documentation Center
2 cy ATTN: TC

Director
Defense Intelligence Agency
ATTN: DT-1C1
ATTN: DI-7D
ATTN: DT-4

Director
Defense Nuclear Agency
ATTN: STSI
ATTN: DDST
ATTN: STRA
2 cy ATTN: STVL
3 cy ATTN: STTL

Commander in Chief
ADCOM
ATTN: APP

Commander
Field Command
Defense Nuclear Agency
ATTN: FCPR

Director
Joint Strategic Target Planning Staff, JCS
ATTN: JLTW

National Communications System
Office of the Manager
ATTN: NCS Operations

Director
National Security Agency
ATTN: P-32

Studies Analysis & Gaming Agency
Joint Chiefs of Staff
3 cy ATTN: Strat. Forces Division

Director
Telecommunications & Command & Control Systems
ATTN: Major General W. W. Wisman
ATTN: Mr. Stenbit
ATTN: Dr. Jordan

Chief
Livermore Division, FC DNA
Lawrence Livermore Laboratory
ATTN: FCPRL

DEPARTMENT OF DEFENSE (Continued)

Dir. of Defense Rsch. & Engineering
ATTN: XTA, Dr. Turner.

US REDCOM
ATTN: ACJ3

DEPARTMENT OF THE ARMY

Commander-in-Chief
U.S. Army Europe & Seventh Army
2 cy ATTN: AEGC-COC, MAJ Cobleigh

Deputy Chief of Staff for Operations & Plans
2 cy ATTN: DAMO-TCW

Commander-in-Chief
U.S. European Command
2 cy ATTN: ECJ350, MAJ Holstein
2 cy ATTN: SDCG-ECJ3-SP, MAJ Mariam

Commander
U.S. Army Communications Command
CONUS
ATTN: ACCMJ-T

Commander
Harry Diamond Laboratories
ATTN: AMXDO-NP

DEPARTMENT OF THE NAVY

Chief of Naval Operations
2 cy ATTN: NOP-094

Commandant of the Marine Corps
2 cy ATTN: MC-POM

Commander
Naval Communications Command
Naval Communications Command Headquarters
ATTN: CNTC

Commander-in-Chief
U.S. Atlantic Fleet
2 cy ATTN: CAPT Wigent

Commander-in-Chief
U.S. Pacific Fleet
5 cy ATTN: J-335, WWMCCS Plans

Commander
Naval Surface Weapons Center
ATTN: Code 1224

DEPARTMENT OF THE AIR FORCE

Air Force Weapons Laboratory, AFSC
ATTN: ELA
ATTN: EL
ATTN: ELC
ATTN: SUL

Assistant Deputy Chief of Staff Programs & Resources
2 cy ATTN: PRCCW, Maj A. J. Lyons

Reproduced From
Best Available Copy

This document is being sent to the below listed contractors for the use of the individuals listed. Recipient contractors are requested to validate individuals' clearances before forwarding document to same.

DEPARTMENT OF THE AIR FORCE (Continued)

Headquarters
Electronic Systems Division, AFSC
ATTN: MCAE, Lt Col Sparks

Commander-in-Chief
Strategic Air Command
5 cy ATTN: XPFS

Commander-in-Chief
U.S. Air Forces in Europe
2 cy ATTN: DOCS, Maj Shoemake

DEPARTMENT OF DEFENSE CONTRACTORS

The BDM Corporation
2 cy ATTN: J. Braddock

Computer Sciences Corporation
2 cy ATTN: Dr. Blank

General Electric Company
[illegible] Center for Advanced Studies
ATTN: DASIAC

DEPARTMENT OF DEFENSE CONTRACTORS (Continued)

International Business Machines Corp.
ATTN: Dr. Cook
ATTN: C. M. Johnson

R & D Associates
ATTN: Dr. Lelevier
ATTN: Dr. Gabbard
ATTN: Mr. Humphrey

Stanford Research Institute
ATTN: K. J. Baumann
ATTN: J. van der Laan
ATTN: J. Owen
ATTN: H. Hesbach
ATTN: G. Carpenter
6 cy ATTN: Mr. Walter Jaye

Reproduced From
Best Available Copy