PONAST II

VOLUME V

METHODOLOGY

55

23 May 1973

(U) Although this JCS study involved the participation of OSD, OEP, CIA, DCPA, DIA, DCA, and State Department, with contributions from 24 other departments and agencies, it does not necessarily represent the views of the Secretary of Defense or the heads of the other participating or contributing departments and agencies.

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METHODOLOGY

CHAPTER I--INTRODUCTION

A. (U) GENERAL

This volume describes the management approach taken for the production of FONAST II, the key study inputs and the analytical procedures used in the study. It also contains observations on the methodology of post-nuclear attack analysis. The organization of Volume V differs somewhat from the organization of previous volumes. Following this introduction, the next three chapters correlate with three of the basic volumes (II, III, and IV) of the study.

Chapter I - Introduction
Chapter II - Preattack Measures (Volume II)
Chapter III - National Survival (Volume III)
Chapter IV - National Recovery (Volume IV)
Chapter V - Post-Nuclear Attack Analysis Methodology

In Chapters II through IV, the topical organization of the paragraphs and the titles are the same as those in the volume being described. Thus, the reader may quickly identify the methodology used in any particular section of a basic volume. Titles for basic volume paragraphs which require no methodology discussion are omitted from this volume. In some instances, additional subordinate paragraphs are introduced to deal with differing elements of the methodology used for the particular paragraphs of the basic volumes. The titles for such paragraphs are enclosed in parentheses to distinguish them from the main outline titles of the basic volumes, which are underscored. In the final chapter, observations on the methodology of post-nuclear attack analysis are listed. It is intended that these observations could be used to benefit the methodology for future studies, thereby answering a specific

requirement of the study's Terms of Reference* which state, "develop analytical proceudres for future studies of this type."

B. MANAGEMENT METHODOLOGY

1. (U) The JCS PONAST II directive established a management plan that provided for a steering group and for a working level committee to be responsible for producing the study. The steering group, or Planning Board as it was called, was chaired by the Chief, Studies, Analysis, and Gaming Agency, Organization of the Joint Chiefs of Staff, and included senior members from the organizations that were directly involved or had a collateral interest in the study's outcome (Figure V-1a). The Production Committee (working level) consisted of representatives of the agencies that would perform the study's analyses and evaluations. Also shown in Figure V-1a are the various subcommittees that were formed and the agencies primarily responsible for the subject area. Each of these subcommittees had representatives from other agencies, as appropriate. Membership of the Planning Board and the Production Committee is shown in Figure V-1b. The first task of the Production Committee which began meeting about once a week in June of 1970 was to examine PONAST I as a point of departure for PONAST II. This task was made easier since a number of participants from the original study were assigned to PONAST II. At the early meetings, Terms of Reference, a detailed outline for the study report, and various analytical concepts and guidelines were developed. Subsequently these were approved by the Planning Board. Six basic subcommittees were formed to cover the range of postattack analyses. These were:

*Terms of Reference--Appendix A to Volume I.

FIGURE V-1a

PONAST II ORGANIZATION

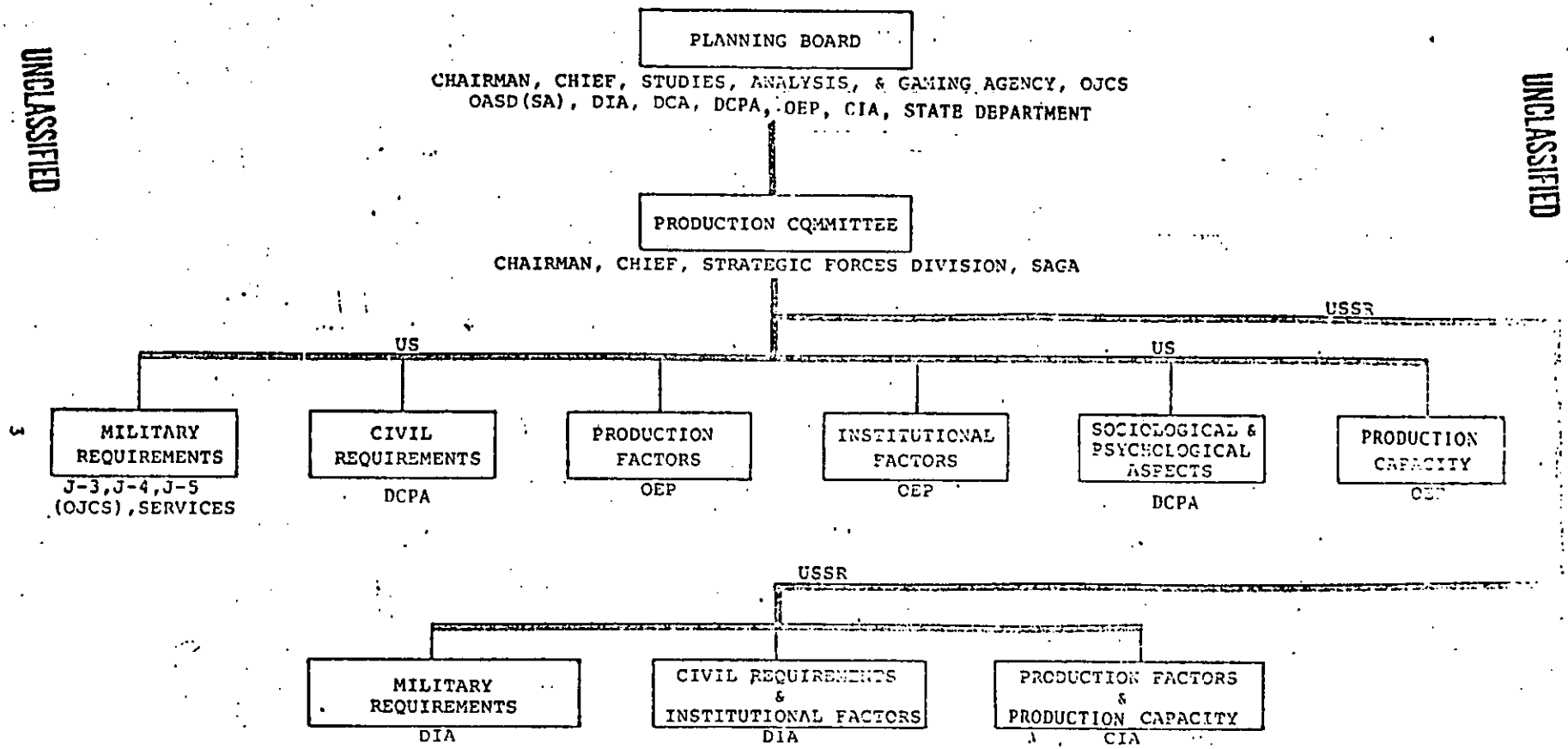

FIGURE V-1 a

FIGURE V-1b

PONAST II PLANNING BOARD MEMBERS

Chairman	BG Harold A. Strack, USAF RADM James W. Nance, USN, (until Jan 72) RADM David H. Bagley, USN, (until Sep 70)
OEP	Dr. James C. Pettee*
State	Dr. Benson D. Adams Mr. Leon Sloss* (until Mar 71)
CIA	Dr. Rush V. Greenslade*
OSD(SA)	Mr. Norman Haller Mr. Edward C. Aldridge (until Jun 72) Mr. Charles Bernstein (until Jun 70)
DIA	Dr. Edgar L. Haff, Jr.
DCA	CDR John L. Head, USN Mr. Reynold Thomas, Jr. (until Jun 70)
DCPA	Mr. Walmer E. Strope*

PONAST II PRODUCTION COMMITTEE MEMBERS

Chairman	CAPT Charles Priest, Jr., USN COL James Carbine, USAF, (until Oct 72) COL Robert A. Novotny, USAF, (until Mar 71)
OEP	Dr. James C. Pettee* and Mr. Wayne Althaus
CIA	Mr. Fred Denton* Mr. James Noren* (until Nov 71)
OSD(SA)	CAPT Anson G. Parish, USAF, (beginning Dec 72)
DIA	Mr. Emanuel Fusfield and Mr. Dennis Ring
DCA	Mr. Carroll G. Thompson
DCPA	Mr. Jack C. Greene* and Mr. Sam Wilson
Military	CAPT Charles Priest, Jr., USN CAPT Joseph Cady, USN, (until Feb 71)

*Participated in PONAST I.

- Military Requirements
- Civil Requirements
- Production Factors
- Institutional Factors
- Sociological and Psychological Aspects*
- Production Capacity

Each of these subcommittees was divided to cover the US and USSR, with the USSR being evaluated by CIA/DIA. Further subdivision was required in the US Production and Institutional Factors Subcommittees to cover appropriate functional specialization.

2. (U) A flow chart was designed to identify key dates and help avoid bottlenecks. Weekly meetings provided progress reviews for the Production Committee and a basis for periodic reports to the Planning Board. The detailed outline mentioned above proved to be a significant management aid. It not only formed the basis for writing the respective volumes, but also guided the analytical efforts.

3. (U) In a study of this complexity, it was necessary to prepare briefings on special subjects in order that divergent views and approaches could be resolved. The permanent working members made frequent progress reports to the Production Committee. In late December 1971, permanent members of the Production Committee began meeting daily to write the final report. Overall, the study required 36 months to complete.**

4. (U) Contributions from the various agencies to the study are summarized in Figure V-2.

*A subcommittee on Sociological and Psychological Aspects was formed only for the US.
**A summary of manpower and computer time expenditures appears as Appendix A.

FIGURE V-2

CONTRIBUTING DEPARTMENTS AND AGENCIES

	Contribution*		
	VOL II	VOL III	VOL IV
Production Committee Members			
Studies, Analysis, and Gaming Agency (OJCS)	DAE	DAE	DAE
Office of Emergency Preparedness	DAE	DAE	DAE
Defense Civil Preparedness Agency	DAE	DAE	DAE
Defense Intelligence Agency	DAE	DAE	DAE
Central Intelligence Agency	DAE	DAE	DAE
National Military Command Systems Support Center (DCA)		DA	D
Organization of the Joint Chiefs of Staff (J-3)	DAE	DAE	DAE
Other Departments and Agencies			
Agriculture		DA	
Commerce			
Bureau of the Census		D	D
Bureau of Domestic Commerce		DA	A
Bureau of Economic Analysis			DA
Maritime Administration	DA	DA	
Defense			
OJCS (J-4, J-5)	DAE	DAE	DAE
Army	DAE	DAE	DAE
Navy	DAE	DAE	DAE
Air Force	DAE	DAE	DAE
Marine Corps	DAE	DAE	DAE
Defense Communications Agency		DAE	
Defense Nuclear Agency		D	
Health, Education, and Welfare			
Public Health Service		DA	DA
Housing and Urban Development		DA	DA

CONTRIBUTING DEPARTMENTS AND AGENCIES (Cont)

	Contribution*		
	VOL II	VOL III	VOL IV
Interior			
Defense Electric Power Administration		DA	D
Office of Oil and Gas		DA	D
Office of Minerals and Solid Fuels		DA	
Labor		DA	DA
Transportation			
Office of Emergency Transportation		DA	A
Federal Aviation Administration		DA	
Federal Highway Administration		DA	
Treasury		D	
Atomic Energy Commission		DA	A
Civil Service Commission	DA	DAE	
Council of Economic Advisors			A
Federal Communication Commission		D	
Federal Home Loan Bank Board		DA	
Federal Power Commission		D	
Federal Reserve Board		DA	
General Services Administration		DA	
Interstate Commerce Commission		D	
National Communications Service		DA	
Office of Telecommunications Policy		DA	
Selective Service System		A	
United States Postal Service		D	
Veterans Administration		D	

* D = Contributed Data
A = Conducted Analysis
E = Participated in Editorial Development

FIGURE V-2 (Cont)

CHAPTER II--PREATTACK MEASURES (VOLUME II)

PART I. INTRODUCTION

(U) The paragraph numbers and titles of this chapter follow those used in Volume II. Only those paragraphs of the basic volume which require methodological explanation are covered in the following discussion. As appropriate, these discussions identify the information sources and describe the line of analysis used or reference the model applied in the corresponding Volume II paragraph.

PART II. SCENARIO A WORLD EVENTS

(U) The Post-Nuclear Attack Study II (PONAST II) considered three alternative versions of the [redacted] nuclear exchange. In two cases (Scenarios A and B), where a buildup of tensions was involved prior to the nuclear exchange, much of the scenario of Exercise HIGH HEELS-71* was used to provide a basis for specifying the international prewar conditions, mobilization of reserve forces, measures taken at increasing DEFCONs, and deployment of forces. In the mobilization of US forces, the exact numbers of men and types of units used for HIGH HEELS-71 were used for the PONAST II buildup, although some modifications were necessary to allow for the shorter buildup period of PONAST II. (The PONAST II attacks took place on 5 January 1971, whereas the HIGH HEELS-71

*JCS Exercise Op-Plan/-71 of Exercise HIGH HEELS-71.

attack took place on 4 February 1971.) Key dates were established for guidance in the development of more detailed scenarios. This specific methodology for alternative cases, Scenarios B and C, is given in Part VI, below.

PART III. PREATTACK CONTROL IMPLEMENTATION

A. (U) UNITED STATES

The following references were used in describing government actions under the various conditions or as background in assessing the probable survival of agency emergency operating sites and key personnel:

a. Current authorities which might be used in a period of increasing tension, such as the Defense Production Act, the Credit Control Act of 1969, and the Economic Stabilization Act of 1970.

b. The National Plan for Emergency Preparedness (December 1964). This plan describes the responsibilities of Federal, State, and local governments under emergency conditions.

c. Certain published directives providing guidance to Federal agencies under emergency conditions including OEP Defense Mobilization Order 8500 1A (4 Nov 64), "Guidance on Priority Use of Resources in Immediate Postattack Period", (29 FR 15123, 10 Nov 64), and OEP Circular 8500.5 (12 Aug 66), "General Guidance for Resource Management in Natural Emergencies".

d. Federal Emergency Plan D (March 1970). This plan covers Federal actions for a nuclear war situation.

e. Resource Mobilization Plan for Limited War (April 1967). This plan describes Federal actions for war situations other than nuclear war.

f. Emergency Plan for Contingencies Short of a Plan D Situation (November 1968). This plan, currently under revision, includes draft legislation, executive orders and regulations for emergency situations, including nonwar situations, which may require resource mobilization.

g. Government Continuity Plans established by the departments and agencies of government pursuant to OEP directives. These include establishment of lines of succession for principal offices, predelegation of emergency authorities, maintenance of emergency operating facilities, arrangement for safeguarding essential records, and plans for emergency relocation of officials to emergency operating facilities.

B. (U) USSR

Based on the deteriorating world situation, the USSR was assumed to have begun timely relocation of key governmental personnel to alternate control facilities. Another assumption of Scenario A was that the dispersal of all key agencies was accompanied by an urban evacuation.

[redacted]

PART IV. MILITARY PREATTACK MEASURES

A. (U) UNITED STATES

(References.) The following references were used extensively in developing the military posture assumed to exist at the time of the nuclear exchange:

[redacted]

f. Emergency Plan for Contingencies Short of a Plan D Situation (November 1968). This plan, currently under revision, includes draft legislation, executive orders and regulations for emergency situations, including nonwar situations, which may require resource mobilization.

g. Government Continuity Plans established by the departments and agencies of government pursuant to OEP directives. These include establishment of lines of succession for principal offices, predelegation of emergency authorities, maintenance of emergency operating facilities, arrangement for safeguarding essential records, and plans for emergency relocation of officials to emergency operating facilities.

B. [redacted] USSR

PART IV. MILITARY PREATTACK MEASURES

A. (U) UNITED STATES

(References.) The following references were used extensively in developing the military posture assumed to exist at the time of the nuclear exchange:

[redacted]

[redacted]

• HIGH HEELS-71.

• The Joint Assessment Data Base (JAD) of May 1970.

• Force Status and Identity Reports (FORSTAT) from OJCS (J-3).

• The Status of Forces File (FORSA).

1. (C) Mobilization

a. (C) General

(1) (U) (Military Posture Determinations.) The mobile units data base (FORSA) included information on ships, planes, ground transport, and maneuver units. This data base was modified to correspond to the mobilization actions by the Services and the Operational Commanders for Exercise HIGH HEELS-71. Also the mobile units were assigned to locations determined by the actions taken by the commanders as a result of the Defense Condition in effect at the time [redacted], and by the mission of the particular unit. Since HIGH HEELS-71 was designed to exercise the higher echelon of Command and Control, and because it was not a war game which examined the force movements in detail, the FORSA modifications were not complete. The synthetic updates and the omission of some vital dispersals and deployments of units and major equipment in the FORSA generated certain inaccuracies. Although this could have caused problems in the subsequent analysis, they largely were avoided by use of judgment and reference to knowledgeable Service and Joint Staff personnel for resolution.

(2) (U) (Military Installations.) A military subset of JAD was selected that included military installations, with detailed information on their vulnerability numbers,

[redacted]

protection factors, functions, and primary capacity in each chosen category. Shortfalls were found in the JAD due to its not being up-to-date. It also contained inaccuracies as to completeness, geographic locations, and assets of personnel and capacity. This also was a source of problems in the subsequent analyses, but corrections were made as errors were discovered.

(3) (U) (Transportation.) To determine military transportation capability prior to the exchange, the existing military transportation facilities were enumerated and added to the data base. These included Military Airlift Command (MAC) aircraft, Military Sealift Command (MSC) ships, and US Navy amphibious and service ships.

b. (U) Army Mobilization. The mobilized reserve forces were stationed at appropriate installations in consonance with HIGH HEELS-71. The unmobilized reserve forces and individual reserve replacements were treated as part of the civilian communities in which they resided.

c. (U) Navy Mobilization. All Naval Reserve units were considered recalled. The remaining reserves were the nondrilling Standby Reserves and the Retired and Fleet Reserves. The best available breakdown of their location was by State. Reserve procedures are under change and exact data should be available from automated files in the future.

d. (U) Air Force Mobilization. All Air Force Reserve and Air National Guard units were placed on active duty at their home stations. Nondrilling Standby and Retired Reserves were not called up; however, some 34,500 individual wartime augmentees were ordered to active duty.

e. (U) Marine Corps Mobilization. The Fourth Division (USMC Reserve) and Fourth Air Wing (USMC Reserve) units and filler units were activated to form the IV MAF and to increase the TOE of regular units.

2. (U) Defense and Readiness Conditions. The progression from low to high readiness conditions in PONAST II closely paralleled that of HIGH HEELS-71, although the interval was compressed as was the buildup period.

3. (U) Deployments. The deployment of US forces in the pre-attack period of PONAST II was in accordance with existing plans. The deployment of all Reforger, Crested Cap, dual-based units, and 30 percent of LOC/port units was considered accomplished prior to the exchange. The PACOM forces with dual commitments had reverted to their SIOP roles several days before the nuclear attack.

4. [redacted] Procurement/Logistics

(2) (U) Procurement of updated long lead-time equipment items, especially for newly activated units, was still in the "paper" stages, while consumables and short lead-

time items were either coming "off the shelf" or were being made more plentiful through increased production from existing sources.

b. (C) (Status of Supply Support)

(1) (C) The resupply to US forces in both theaters and the supply to US allies used the following assumptions:

(c) Supplies for allies were furnished in much the same way as was that of supplies for US forces, based on NATO and other written agreements.

(2) (U) (POL and Ammunition)

(a) The primary source of information on military petroleum stocks was the monthly Petroleum Products Summary, OJCS (J-4), of 31 December 1970. This information was used to establish the amounts of petroleum, by type, available worldwide at the time of the nuclear exchange.

(b) The OJCS (J-4) summaries of the Worldwide Controlled Air Munitions Report for December 1970 were used to establish the levels of supply of air munitions by major commands at the time of the exchange. As these were normal peacetime figures, an upward adjustment was made to compensate for increased stockage levels as a result of the buildup.

(c) The US Army provided a 31 December 1970 recapitulation of the Army ground munitions status, by region.

[redacted]

It was assumed that there was no significant increase in tonnage prior to the nuclear exchange.

(3) (U) (Supply Support (DSA).) The Defense Supply Agency (DSA) installations and materiel were made a part of the data base extracted from the JAD for analysis in PONAST II. Detailed information on the status of DSA supply levels as of 31 December 1970 was made available by that organization. A reduction of supply levels would no doubt have been experienced due to the mobilization, but the exact extent could not be determined. Therefore, it was assumed that a reasonable amount of increase in the pipeline volume would have occurred and DSA stock levels would have remained high.

B. USSR

1. (U) (References.) The following references were used extensively in developing the military posture existing at the time of the nuclear exchange:

b. HIGH HEELS-71.

c. Soviet Aircraft Order of Battle, AP-240-2-46-70-INT, DIA, 1 October 1970.

[redacted]

d. Eurasian Target Data Inventory Handbook, AP-540-2-1-INT, DIA, February 1970.

e. Eurasian Target Data Inventory, Volume II, Categorical Listing, AP-540-1-1-71, DIA, January 1971.

f. Red Integrated Strategic Offensive Plan (RISOP-71), Red Naval Plan, Studies, Analysis, and Gaming Agency, OJCS, 1971.

g. Automated Naval Order of Battle (Ships), Volume I, USSR, AP-230-3-4C-70-INT, DIA, November 1970.

h. "Current Soviet and Eastern European Naval Order of Battle," S-2514/DI-3A3, DIA, 1 January 1971.

i. Fact Book, Communist World Forces, AP-647-1A-70-INT, DIA, 1 October 1970.

j. Military Intelligence Summary, Section I, USSR and Mongolia, DIA-210-6-1-71-INT, DIA, 1 January 1971.

k. Defense Intelligence Projections for Planning, Soviet Military Force Through Mid-1980, (DIPP 71), DIADE-TCS-066-71, DIA, March 1971.

2. (C) (Military Posture Determinations)

PART V. CIVIL DEFENSE

A. UNITED STATES

1. (U) (General.) Preattack actions were based on current civil defense doctrine, guidance, and emergency operations plans. As appropriate, experience gained during periods of high international tension, such as the Cuban crisis and during major natural disasters, was drawn upon.

2. (U) Civil Defense Training. DCPA receives program management information from some 4,400 local governments on a semiannual basis. Included is the number of trained personnel available in full-time paid and volunteer emergency personnel categories for each of the major functional areas. Approximately 90 percent of the US population resides within the jurisdiction of these local governments.. In determining the trained personnel available at the beginning of the scenario crisis, it was assumed that the communities furnishing program data were typical of the remaining communities in per capita strength in regular departments, such as police and fire, and in personnel strength required in all areas. In these cases, the data on available personnel and requirements were multiplied by 10/9ths to represent an adjusted national total. It was further assumed, that in functional areas unique to civil defense, such as radiological monitoring and shelter management, the only

communities active were those that furnished program data. Hence, the total personnel strength reported as available was assumed to be the national total in these areas. It was also considered that significant efforts to train required personnel would begin when the Federal government suggested initiation of increased readiness measures to State and local governments. Existing DCPA Instructions automatically initiate actions with the declaration of [redacted] Scenario A was selected to represent the case of automatic notification on declaration of DEFCON 2 and Scenario B was selected to represent optional notification on declaration of [redacted] (Scenario C was the total surprise case). The number of personnel trained during the crisis was calculated on the basis of the number of qualified instructors available, the length of the course--shortened where possible to accelerate production--and the period of time between the assumed notification and the attack.

3. (U) Shelter Construction and Improvisation. The number of expedient family shelters constructed and the amount of improvement to residential basements were estimated by a panel of DCPA research, technical, and program experts. Their judgment was based on the following: (a) a study of expedient shelter construction in five widely differing counties conducted for DCPA by the Corps of Engineers; (b) the availability of suitable building materials; (c) the Home Fallout Protection Survey conducted in 28 States (homes which provide reasonably adequate fallout protection without modification as well as those which could be readily improved); and (d) public response and interest in home shelter development during the Berlin and Cuban crises.

9. (U) Voluntary Evacuation of Cities. Scientists of the DCPA staff and their contractors have developed a consensus

relating to voluntary evacuation based on research of public attitudes and perceptions and the Cuban crisis experience. This consensus is that some 5 to 10 percent of the people in metropolitan areas would voluntarily leave publically perceived target areas and take up temporary residence in less populous areas with relatives or friends, or in vacation homes. A 10 percent evacuation was assumed for Scenario A, 5 percent for Scenario B, and no voluntary evacuation for Scenario C. The evacuation actions were simulated as follows: In Scenario A, the daytime population of each urban Standard Location Area (SLA) in SMSAs over 100,000 population was reduced by 10 percent. (An SLA is a census tract in the urban areas and minor civil divisions elsewhere.) The population reductions from all these SMSAs within a State were aggregated and then distributed to nonevacuated SLAs in that State in proportion to their resident populations. In Scenario B, five percent of the resident population of each urban SLA in SMSAs over 100,000 population was distributed in a similar manner.

B. [redacted] USSR

PART VI. OTHER SCENARIOS

(U) The analytical methodology used for Scenarios B and C was similar to that for the basic Scenario A attack. However,

in Scenario C, mobilization was not a factor; there had been no increased [redacted] and, therefore, no military deployments, population dispersals or government relocations. Events were assumed to be just what they were in fact on 5 January 1971. Thus, the real-world FORSTAT was applicable, as was the daytime unmoved population data base.

CHAPTER III--NATIONAL SURVIVAL (VOLUME III)

PART I. INTRODUCTION

(U) The paragraph numbers and titles of this chapter follow those used in Volume III. Only those paragraphs of the basic volume which require methodological explanation are covered in the following discussion. As appropriate, these discussions identify the information sources and describe the line of analysis used or reference the model applied in the corresponding Volume III paragraph.

PART II. ANALYSES--SCENARIO A

A. UNITED STATES

1. [redacted] Population Survival

a. [redacted] Attack Impact

(2) (U) Detailed data on the population of census tracts in urban areas and minor civil divisions in non-urban areas were not available from the 1970 Census in time for this study. Therefore, the 1960 population damage assessment data base was used as a point of departure. (This is contained in OEP category PPH, described on page XIII-1 of the Resource Data Catalog subsequently published by OEP as ISG-101, January 1972.) That 1960 data base was systematically brought into agreement with the published aggregate results of the 1970 population counts. States were divided into their separate Standard Metropolitan Statistical Area (SMSA) components and non-SMSA balance. The 230 SMSAs used are those 228 defined in Standard Metropolitan Statistical Areas published by the Bureau of the Budget in 1967 as modified by the addition of two in 1969. The 20 largest SMSAs in the nation were subdivided by counties. For each subdivision, thus established, the official 1970 population was related to the 1960 population to determine a growth ratio for the subdivision. The applicable growth ratio was applied to the population and housing data fields in each individual SLA record. This yielded SMSA, State, Region, and US totals consistent with the 1970 published Census and distributed locally on a residential basis.

(3) (U) For the daytime population distribution, data used were derived by DCPA from an estimate of numbers of people present during daytime hours in census tracts in central cities of SMSAs. This estimate, originally prepared for use in a 1965 DCPA study, was updated to reflect 1970 population. The daytime population of the central city SLAs having been increased in this manner, the number of

residents in each suburban SLA was reduced proportionately so that the total SMSA daytime population was equal to the total 1970 resident population of the SMSA. In some states several geographically close SMSAs were taken as a group to arrive at appropriate adjustments of suburban population data.

(4) (U) Population data used for calculation of casualties from the three PONAST attacks are summarized in the following table.

TABLE 1

ESTIMATED 1970 POPULATION

(Millions)

	ATTACK SCENARIO		
	A	B	C
Total US	203	203	203
Within SMSAs	119	124	132
Central Cities	79	61	88
Suburbs	40	63	44
Outside SMSAs	84	79	71

Scenario B population data in the table are from the residential distribution as previously described modified by transferring five percent of SMSA populations to non-urban areas in each state in proportion to the resident population of the non-urban areas to simulate voluntary preattack evacuation. Scenario A and C data are the daytime distribution, modified for Scenario A by transferring 10 percent of SMSA populations to non-urban census tracts and minor civil divisions to simulate voluntary preattack evacuation.

(voluntary evacuation and daytime displacement) DCPA applied a third adjustment factor in population distribution for movement to shelter after warning. This was derived from the movement-to-shelter subroutine of the DCPA DASH model. This subroutine operates on three variables: the time of warning, the time population begins to move and the weapon arrival times in the attack scenario. The overall model developed for DCPA is described in DASH, A System to Produce Detailed Assessments of the Hazards of Nuclear Attack, Volumes I-IV published (October 1971) by Systems Sciences, Inc., Bethesda, MD. In Scenario A, first notice

Using these warning time factors, the DASH model simulated

the movement of the population to existing shelter. This simulation followed guidance for community shelter planning and was interrupted in each locality whenever an arriving weapon affected the SLA. The DASH model applies the weapon effects to those people still moving to shelter. The net effect of this was to simulate movement of persons without shelter to available shelter in accordance with DCPA doctrine to the extent that warning time and weapon arrival permitted. Thus, the 1970 population, reallocated among the SLAs to reflect voluntary evacuation, daytime displacement and postwarning movement to shelter, was entered in a data field in OEP category PPH where it was called "moved population."

(6) (U) DCPA made available data on the availability of classes of blast protection afforded by residences and structures identified in the National Fallout Shelter Survey (NFSS). In order to make use of this information in the study, the READY model was modified to accept five blast protection resource items for each SLA.

(7) (U) The shelter availability data, forwarded by DCPA with the moved population data, reflected 31 direct effects protection classes and eight radiation PF categories. Of the 31 direct effects classes, 27 related to a wide range of hardened shelter facilities suitable for a blast program study. But since for the Scenario A base case less than five percent of the population could reach such shelter, these were consolidated into one class. This resulted in five classes which are shown in the following table with their vulnerability numbers (VN) for mortality and for injury. These VNs were assigned on the basis of the thresholds specified by DCPA for each effect (mortality or injury) in each class.

TABLE 2

DIRECT EFFECTS SHELTER CLASSES

Class Number	Shelter Type	Mortality VN	Injury VN
1	Special Facility and Underground	.25P0	25P0
2	Below Ground, NFSS Building	13P0	08P0
3	Basements, 1-2 Story Residences	12P0	08P0
4	Above Ground, NFSS Building	10P0	05P0
5	Above Ground, 1-2 Story Residences and Persons Enroute to Shelter	08P0	03P0

For each SLA the population (as moved) was distributed among the spaces available in the five shelter classes beginning with the first and filling each successive class in turn. The resulting distribution was then available for evaluating population and related resources in the READY analysis program after application of the weapons effects assessment.

(9) (U) Of the eight fallout protection factor (PF) classes for which DCPA provided shelter space availability data, one (PF class 1) covered all home basement spaces while the other seven covered NFSS building spaces. For a current situation problem in the absence of any shelter development programs, about 60 percent of the population must rely on residential basements for the best available shelter. DCPA surveys have shown great variation by Region in the extent and class of basement shelter available. To take advantage of the data on these variations, whatever number of spaces were reported by DCPA as available in PF Class 1 for a particular SLA were distributed among three new PF classes according to percentages shown in the following table as applicable for the SLAs in each of the eight DCPA Regions. The distribution shown is taken from a DCPA table, dated 1/28/69, titled "1975 US Residential Population Percentage Distribution by PF, NFPS Complete".

TABLE 4

PERCENT REDISTRIBUTION OF

PF CLASS 1 SPACES BY DCPA REGION

DCPA Region	New PF 1	New PF 2	New PF 3	Old PF 1
1	18	73	9	100
2	19	72	9	100
3	22	78	0	100
4	10	84	6	100
5	25	75	0	100
6	12	85	3	100
7	24	76	0	100
8	17	80	3	100

The subdivision of DCPA PF 1 into three classes increased the total number of classes to 10, with the highest numbered having the highest protection. An eleventh class was added to which all persons without shelter were assigned. The following table shows the fallout protection factor (PF) used for each of the 11 established PF classes. These are higher than those used by DCPA to the extent that they allow for terrain shielding.

TABLE 5

PROTECTION FACTORS BY PF CLASSES

Class #	PF	Class #	PF	Class #	PF
1	3.0	5	100.1	9	715.0
2	14.3	6	143.0	10	1430.0
3	28.6	7	214.5	11	3.0
4	57.2	8	357.5		

For each SLA the population was distributed among the spaces available in the 11 PF classes in the order of their protection factors, beginning with the highest (that is, PF Class 10). As with the direct effects classes, the resulting distribution was then available for use for evaluating population and related resources in the READY analysis program after application of the weapons effects assessment. The only other adjustment or change in fallout effects assessment from the basic READY parameters and procedures outlined in TR-24 was in the "K" factor in the equation relating radiation field intensities to weapon yield. In keeping with current usage this factor was reduced from 2400 to 2000, the units of which are R per hour per Kt per square mile.

(10) (U) The weapons effects assessment subroutine of the READY system was used to determine at what percentage

rate the population associated with each mortality VN was expected to be killed outright or fatally injured. This subroutine was similarly used to determine at what percent rate those associated with each injury VN was expected to be injured. The blast fatality rate for a particular injury VN was assumed to be the equivalent of the percent probability of moderate damage for a resource of the same VN. The revision in the READY assessment of severe and moderate damage is set forth later in the description of facility damage assessment. No changes other than the formulation of fallout shelter protection levels and the reduction of the "k" factor in the WSEG-10 radiation distribution formula were adopted for radiation impact assessment procedures. In all other respects the procedures were those described in TR-24.

(11) (U) The items for which summary totals are shown under (1) Levels and (2) Casualty Causes are given in listings prepared in the "Summary Analysis of Casualties" format. Figure V-3 is a sample.

(12) (U) The items for which summary totals are shown under (3) Survivor's Radiation Doses are given or derived from those shown in listings prepared in the "Summary Analysis of Survivor's Dose" format. Figure V-4 is a sample.

b. (U) Time Projection

(1) The determination of how the population casualty status changes over time requires a set of casualty class distribution factors for a representative series of dates. Figure V-5 shows the set of factors in READY for the status classes used in the Summary Analysis of Effectives and in the Summary Analysis of Medical Status.

UNCLASSIFIED

FIGURE V-3

UNCLASSIFIED

FORMAT..S4C
PROJECT.PONAST II

ATTACK...141
DATE...9 APRIL 1973

READY SUMMARY ANALYSIS OF CASUALTIES

CATEGORY PPH SMSA 1971 ESTIMATES - OCD MOVEMENT OF 0% MOVED POPULATION

COLUMN	(1) PREATTACK TOTAL (12+6+10)	(2) TOTAL KILLED (13+4+5)	(3) KILLED DIRECT EFFECTS	(4) DIRECT INJ-FATAL FALLOUT	(5) KILLED FALLOUT ONLY	(6) NON-FATAL INJURIES (17+8+9)	(7) DIRECT INJURED ONLY	(8) DIRECT-FALLOUT INJURED	(9) INJURED FALLOUT ONLY	(10) NOT AFFECTED
CLASS 2CCO ALL SEAS										
OF % MOVED POPULATION	7E1939	240771	188198	19048	33525	123433	82288	27430	13715	397730
% OF PREATTACK TOTAL	100.0	31.6	24.7	2.5	4.4	16.2	10.8	3.6	1.8	52.2
NATIONAL TOTAL										
OF % MOVED POPULATION	2031167	1100892	830797	83278	186867	339205	219366	75153	44686	591069
% OF PREATTACK TOTAL	100.0	54.2	40.9	4.1	9.2	16.7	10.8	3.7	2.2	29.1

FIGURE V-3

UNCLASSIFIED

FIGURE V-4

UNCLASSIFIED

ATTACK...1AI
DATE...9 APRIL 1973

FORMAT..S4SD
PROJECT.PONAST II

READY SUMMARY ANALYSIS OF SURVIVORS DOSE

CATEGORY PPH SMSA 1971 ESTIMATES - OCD MOVEMENT OF 0% MOVED POPULATION

COLUMN	(1) PREATTACK TOTAL	(2) DEATHS FROM ALL CAUSES	(3) SURVIVORS ERD RANGE 200 - 600 ROENTGENS	(4) SURVIVORS ERD RANGE 100 - 200 ROENTGENS	(5) SURVIVORS ERD RANGE 50 - 100 ROENTGENS	(6) SURVIVORS ERD RANGE 25 - 50 ROENTGENS	(7) SURVIVORS ERD RANGE 0 - 25 ROENTGENS	(8) SURVIVORS ERD RANGE 0 - 200 ROENTGENS	(9) TOTAL SURVIVORS (COL 3 THRU 7)
CLASS 2000 ALL SEAS									
OF % MOVED POPULATION	761934	233914	54859	33525	18286	66288	355062	973161	528020
% OF PREATTACK TOTAL	100.0	30.7	7.2	4.4	2.4	8.7	46.6	62.1	69.3
AVERAGE ER DOSE-ROENTGENS			368	171	62	39	10	26	43
NATIONAL TOTAL									
OF % MOVED POPULATION	2031167	883558	113745	99527	75153	154369	704815	1033864	1147609
% OF PREATTACK TOTAL	100.0	43.5	5.6	4.9	3.7	7.6	34.7	50.9	56.5
AVERAGE ER DOSE-ROENTGENS			343	158	69	32	9	23	61

FIGURE V-4

FIGURE V-5

CASUALTY STATUS TIME-PHASING FACTORS

POSTATTACK STATUS	CASUALTY CLASS	CASUALTY CLASS DISTRIBUTION - AS OF: D#1	D#2	D#15	D#30	D#90	D#180	D#365
A. DEAD								
1. FROM ATTACK	Killed-Direct	.950	.993	.997	1.000	1.000	1.000	1.000
	Killed-Fallout	.090	.234	.600	.740	1.000	1.000	1.000
2. OTHER CAUSES	Injured-Direct	.000	.001	.003	.005	.008	.010	.020
	Injured-Fallout	.000	.000	.001	.003	.005	.008	.020
	Not Affected	.001	.002	.003	.005	.010	.015	.020
B. FATALLY INJURED								
1. INPATIENTS	Killed-Direct	.047	.005	.003	.000	.000	.000	.000
	Killed-Fallout	.295	.404	.280	.250	.000	.000	.000
2. OUTPATIENTS	Killed-Direct	.003	.002	.000	.000	.000	.000	.000
C. POTENTIAL SURVIVORS								
1. INPATIENTS	Injured-Direct	.001	.705	.412	.180	.150	.050	.020
	Injured-Fallout	.007	.154	.194	.396	.282	.113	.005
	Not Affected	.006	.006	.006	.005	.005	.005	.005
2. OUTPATIENTS	Injured-Direct	.992	.250	.110	.026	.018	.012	.009
	Not Affected	.025	.025	.025	.020	.020	.015	.010
3. INEFFECTIVES	Killed-Fallout	.015	.012	.005	.000	.000	.000	.000
	Injured-Direct	.002	.009	.105	.025	.030	.037	.040
	Injured-Fallout	.092	.101	.086	.078	.054	.032	.010
	Not Affected	.053	.052	.049	.043	.040	.040	.030
4. EFFECTIVES	Killed-Fallout	.600	.350	.115	.010	.000	.000	.000
	Injured-Direct	.005	.035	.460	.764	.794	.892	.911
	Injured-Fallout	.901	.745	.719	.523	.659	.847	.985
	Not Affected	.915	.915	.915	.921	.922	.925	.935

FIGURE V-5

A sample of the format for the former is shown in Figure V-6, and the later in Figure V-22.

(2) These factors were provided as provisional substitutes by E. Struxness, M.D. and P. Kaetzel of the Public Health Service (PHS) to be used in lieu of those provided for exercise purposes in 1957 by P. VanZandt, M.D. of PHS.

(3) "Effectives" refers to survivors in good health who are able to function in daily life. Preattack, they are estimated to constitute 95.5 percent of the population. The balance consists of inpatients (0.5 percent), outpatients (1.0 percent), and other ineffectives (3.0 percent). The latter includes both the permanently disabled who are not medical patients and the temporarily indisposed.

FIGURE V-6

UNCLASSIFIED

FORMAT..SAE
PROJECT.PONAST II

ATTACK...1AI
DATE...9 APRIL 1973

READY SUMMARY ANALYSIS OF EFFECTIVES

CATEGORY HMD MEDICAL MANPOWER ** DATA FIELDS 01 PHYSICIANS

COLUMN	(1) PREATTACK TOTAL	(2) PREATTACK EFFECTIVES	(3) EFFECTIVES D + 1	(4) EFFECTIVES D + 15	(5) EFFECTIVES D + 30	(6) EFFECTIVES D + 90	(7) EFFECTIVES D + 180	(8) EFFECTIVES D + 365
CLASS 4A WASHINGTON								
01 PHYSICIANS	4708	4496	3159	2698	2420	2523	2815	2891
% OF PREATTACK TOTAL	100.0	95.5	67.1	57.3	51.4	53.6	59.8	61.4
% OF PREATTACK EFFECTIVES		100.0	70.2	60.0	53.8	56.1	62.6	64.3
CLASS 4C OEP REGION 10 -- NORTHWEST STATES AND ALASKA								
01 PHYSICIANS	8396	8018	5810	4895	4836	5029	5239	5432
% OF PREATTACK TOTAL	100.0	95.5	69.2	58.3	57.6	59.9	62.4	64.7
% OF PREATTACK EFFECTIVES		100.0	72.4	61.0	60.3	62.7	65.3	67.7
NATIONAL TOTAL								
01 PHYSICIANS	278378	265851	160624	111073	97989	100494	115527	117754
% OF PREATTACK TOTAL	100.0	95.5	57.7	39.9	35.2	36.1	41.5	42.3
% OF PREATTACK EFFECTIVES		100.0	60.4	41.7	36.8	37.8	43.4	44.2

FIGURE V-6

(4) The level of recovery prognosis built into the factors in Figure V-5 between fatally injured and the potentially-surviving injured (both direct and fallout) does not distinguish between the levels of medical care provided. This is in contrast to the medical recovery model developed for DCPA and PHS by Research Triangle Institute (RTI). The application of that model in the estimation of the epidemic threat to Michigan, Louisiana, Detroit and New Orleans is described later in the discussion of local viability. Data acquisition and operational limitations did not permit the application of the RTI model to all SMSAs. Although not variable, recovery prognoses implicit in the provisional factors provided by the PHS officials are based on the assumption of severely limited medical service for attack casualties. These factors make no allowance for the impact of possible epidemics of communicable diseases fostered by the post-attack environment such as are addressed in the study of the two state and two city samples.

c. (U) Geographical Shifts. The geographical groupings (SMSAs and Uniform Federal Regions) on which these summaries are based are built into the structure of the OEP category PPH data, as described in the Resource Data Catalog.

d. (U) Long-Range Radiation Damage*

(1) The estimates of long-term adverse health effects due to radiation exposure are generally speculative, in that there are insufficient concrete data to fully

*Stephen L. Brown, and others, PONAST Support Studies (Menlo Park, California: Stanford Research Institute, June 1972).

confirm the relationships. For this reason, the calculated long-term adverse health effects of the postulated PONAST attack should be considered more from the standpoint of possible rather than probable.

(2) Genetic Damage. The number of genetic deaths arising from chronic ionizing radiation exposures was estimated using the following equation:

$$Ngd = 0.19\ b_1\ D/100 \qquad (1)$$

where: b_1 is the number of first generation births, and D is the chronic exposure dose in roentgens (R) for a uniformly exposed population.

(3) Induced Neoplasms. The doubling dose equation used to predict radiation induced neoplasms (other than thyroid) is:

$$N = N^* \times 10^{-6} \times \frac{D}{D_d} \times P_s \qquad (2)$$

where: N^* is the annual incidence rate of spontaneous neoplasms per million of population; D is the exposure dose in roentgens; D_d is the doubling dose; and P_s is the surviving population. To predict radiation induced thyroid neoplasms, equation (2) was altered to:

$$N_t = F_o N_o^* \cdot \frac{D_e+D_i}{D_{do}} + F_y N_y^* \cdot \frac{D_e+D_i}{D_{dy}} P_s \times 10^{-6} \qquad (3)$$

where: F_o and F_y are the old and young population fractions; D_e and D_i are the external and internal exposure doses; and D_{do} and D_{dy} are the doubling doses for the old and young, respectively.

(4) Induced Leukemia. Equation (2) was used to predict the annual rate of radiation induced leukemia. The doubling dose was assumed to be 50R.

(5) Life Shortening. The estimated life shortening, extrapolated from animal experimental data, was seven to 12 days per roentgen.

(6) Other Long-Term Effects. Other long-term adverse health effects resulting from radiation exposures, such as: anemia, cataracts, retarded development in children, and fetal development damage were assumed to have a doubling dose of 5 rads.

e. (U) Alternate Shelter and Evacuation

(1) (U) Alternate population casualty calculations, designed to investigate the utility and cost of various improved civil defense programs, were made using essentially the same methodological procedures as in the base case. However, in the place of READY, these calculations were performed by the National Civil Defense Computation Facility (NCDCF) using the DASH program. This program included dynamic assessment of casualties to a moving population as appropriate. Documents describing the DASH-model are cited above.

(2) (U) The types of improved shelter hypothesized in the three improved shelter postures examined, together with the order in which they were filled in each type of geographic area, are set forth below in Figures V-7 through V-10. Geographic areas are coded as follows: SMSC = Central City of SMSAs; SMSU = Balance of the urbanized area of SMSAs; SMSR = non-urban areas of SMSAs; and REST = the balance of the country outside SMSAs.

FIGURE V-7

EXISTING SHELTER PROGRAM

TYPE OF SHELTER SPACE	SHELTER ALLOCATION PRIORITIES			
	SMSC	SMSU	SMSR	REST
NATIONAL FALLOUT SHELTER SURVEY				
NFSS/BG, SF. 25-1,500 psi	1	1	1	1
NFSS, EXIST/BG, NSF. 7-21 psi	2	2	2	2
NFSS FUTURE/BG, NSF. 7-21 psi	--	--	--	--
PVK, EXIST. 7-21 psi	--	--	--	--
PVK, FUTURE. 7-21 psi	--	--	--	--
NFSS, EXIST/AG. 5-12 psi	3	3	3	3
NFSS, FUTURE/AG. 5-12 psi	--	--	--	--
RESIDENCES				
RES, BG.* 10 psi/29PF	4	4	4	4
RES, BG (SLANT).* 17 psi/100PF	--	--	--	--
RES, AG. 5 psi/3PF	5	5	5	5
BLAST SLANTING				
BLAST SLANT. 25 psi/250 PF				
BLAST SLANT. 90 psi/350 PF				
SPECIAL PURPOSE BLAST				
RFC BLAST. 72 psi/2000PF				
RFC BLAST. 300 psi/3000PF				
FALLOUT				
SPF. 5 psi/100PF				
EXPEDIENT				
EXP. 3 psi/100PF				

* Includes all homes with basement, to extent required.

NOTES: SF = Special facilities, mines, caves, tunnels
NFS = Other NFSS facilities
AG, BG = Above ground, below ground
RFC = Reinforced concrete and special purpose blast shelter
SMSC, SMSU, SMSR = SMSA Central city, suburban, and rest of SMSA
REST = non-SMSA pop/area
For movement to shelter, CSP times and modes of travel apply.
Movement to shelter is restricted to movement within central cities and within counties.

FIGURE V-7

FIGURE V-8

IMPROVED SHELTER PROGRAM S-1

TYPE OF SHELTER SPACE	SHELTER ALLOCATION PRIORITIES			
	SMSC	SMSU	SMSR	REST
NATIONAL FALLOUT SHELTER SURVEY				
NFSS/BG, SF. 25-1,500 psi	1	1	1	1
NFSS, EXIST/BG, NSF. 7-21 psi	2	2	2	2
NFSS FUTURE/BG, NSF. 7-21 psi	3	3	3	3
PVK, EXIST. 7-21 psi	4	4	4	4
PVK, FUTURE. 7-21 psi	--	--	5	5
NFSS, EXIST/AG. 5-12 psi	7	7	7	7
NFSS, FUTURE/AG. 5-12 psi	8	8	8	8
RESIDENCES				
RES, BG. 10 psi/29PF	--	--	--	--
RES, BG (SLANT). 17 psi/100PF	6	6	6	6
RES, AG. 5 psi/3PF	9	9	9	9
BLAST SLANTING				
BLAST SLANT. 25 psi/250 PF	--	5		
BLAST SLANT. 90 psi/350 PF	5	--		
SPECIAL PURPOSE BLAST				
RFC BLAST. 72 psi/2000PF				
RFC BLAST. 300 psi/3000PF				
FALLOUT				
SPF. 5 psi/100PF				
EXPEDIENT				
EXP. 3 psi/100PF				

FIGURE V-8

FIGURE V-9

IMPROVED SHELTER PROGRAM S-2

TYPE OF SHELTER SPACE	SHELTER ALLOCATION PRIORITIES			
	SMSC	SMSU	SMSR	REST
NATIONAL FALLOUT SHELTER SURVEY				
NFSS/BG, SF. 25-1,500 psi	1	1	1	1
NFSS, EXIST/BG, NSF. 7-21 psi	2	2	2	2
NFSS FUTURE/BG, NSF. 7-21 psi	3	3	3	3
PVK, EXIST. 7-21 psi	4	4	4	4
PVK, FUTURE. 7-21 psi	--	--	5	5
NFSS, EXIST/AG. 5-12 psi	--	--	7	7
NFSS, FUTURE/AG. 5-12 psi	--	--	8	8
RESIDENCES				
RES, BG. 10 psi/29PF	--	--	--	--
RES, BG (SLANT). 17 psi/100PF	6	6	6	6
RES, AG. 5 psi/3PF	--	--	--	--
BLAST SLANTING				
BLAST SLANT. 25 psi/250 PF	--	5	--	--
BLAST SLANT. 90 psi/350 PF	5	--	--	--
SPECIAL PURPOSE BLAST				
RFC BLAST. 72 psi/2000PF	7	7	--	--
RFC BLAST. 300 psi/3000PF	--	--	--	--
FALLOUT				
SPF. 5 psi/100PF	--	--	9	9
EXPEDIENT				
EXP. 3 psi/100PF				

FIGURE V-9

FIGURE V-10

IMPROVED SHELTER PROGRAM S-3

TYPE OF SHELTER SPACE	SHELTER ALLOCATION PRIORITIES			
	SMSC	SMSU	SMSR	REST
NATIONAL FALLOUT SHELTER SURVEY				
NFSS/BG, SF. 25-1,500 psi	--	--	1	1
NFSS, EXIST/BG, NSF. 7-21 psi	--	--	2	2
NFSS FUTURE/BG, NSF. 7-21 psi	--	--	3	3
PVK, EXIST. 7-21 psi	--	--	4	4
PVK, FUTURE. 7-21 psi	--	--	5	5
NFSS, EXIST/AG. 5-12 psi	--	--	7	7
NFSS, FUTURE/AG. 5-12 psi	--	--	8	8
RESIDENCES				
RES, BG. 10 psi/29PF	--	--	--	--
RES, BG (SLANT). 17 psi/100PF	--	--	6	6
RES, AG. 5 psi/3PF	--	--	--	--
BLAST SLANTING				
BLAST SLANT. 25 psi/250 PF	--	--	--	--
BLAST SLANT. 90 psi/350 PF	--	1	--	--
SPECIAL PURPOSE BLAST				
RFC BLAST. 72 psi/2000PF	--	--	--	--
RFC BLAST. 300 psi/3000PF	1	2	--	--
FALLOUT				
SPF. 5 psi/100PF	--	--	9	9
EXPEDIENT				
EXP. 3 psi/100PF	--	--	--	--

FIGURE V-10

(4) (U) Evacuation postures were calculated by first removing either 70 percent or 100 percent as specified, of the population of each standard location in the urbanized area of each SMSA, over 100,000 population. The "evacuees" were distributed among the non-SMSA SLAs in the State, in proportion to the pre-evacuation population of these SLAs. The population was then sheltered as shown in Figures V-11 through V-14. It was assumed that the evacuation was completed prior to January 5 and that movement to shelter began on warning as outlined above in the improved shelter cases.

(5) (U) Costs of Alternative Civil Defense Programs. In programs providing improved shelter or shelter of at least 40 PF for the entire population, shelter is the most costly element of the program. However, to make any shelter system workable there are other requirements such as an attack warning system, emergency operations systems, support, and research and development.

(6) (U) Costs of the alternative programs are summarized in Figures V-15 through V-17. Figure V-15 reports the cost of the existing program from FY 1962 through FY 1971. This was primarily a program of locating and planning for the use of fallout protection in existing structures. Figure V-16 provides the estimated additional Federal costs if the current austere program had been adapted to the more comprehensive programs sufficiently long ago to have them in place for the PONAST attacks. Figure V-17 costs are GNP costs. They reflect the sum of the costs

FIGURE V-11

EVACUATION PROGRAM E-1

Exact mirror of Soviet evacuated posture in Scenario A

TYPE OF SHELTER SPACE	SHELTER ALLOCATION PRIORITIES			
	SMSC	SMSU	SMSR	REST
Single Purpose Blast Shelter (25 psi, 100 PF)	1	1	1	-
Single Purpose Fallout Shelter (8 psi, 20 PF)	-	-	-	1

NOTES: 70% of SMSA population is evacuated to area of each State outside SMSA's.

SMSA = Standard Metropolitan Statistical Areas
SMSC, SMSU, SMSR = Central city, suburban, and rest of SMSA
REST = Area outside SMSA's

FIGURE V-11

FIGURE V-12

EVACUATION PROGRAM E-2

70% of urbanized population of SMSAs dispersed to 100 PF rural shelter; 30% of urbanized population in NFSS below grade space in SMSAs; non-urbanized population in 100 PF shelter

TYPE OF SHELTER SPACE	SHELTER ALLOCATION PRIORITIES			
	SMSC	SMSU	SMSR	REST
NATIONAL FALLOUT SHELTER SURVEY				
NFSS/BG, SF. 25-1,500 psi	1	1	1	1
NFSS, EXIST/BG, NSF. 7-21 psi	2	2	2	2
NFSS FUTURE/BG, NSF. 7-21 psi	3	3	3	3
PVK, EXIST. 7-21 psi	4	4	4	4
PVK, FUTURE. 7-21 psi				
NFSS, EXIST/AG. 5-12 psi				
NFSS, FUTURE/AG. 5-12 psi				
RESIDENCES				
RES, BG. 10 psi/29PF			5	
RES, BG (SLANT). 17 psi/100PF				
RES, AG. 5 psi/3PF				
BLAST SLANTING				
BLAST SLANT. 25 psi/250 PF				
BLAST SLANT. 90 psi/350 PF				
SPECIAL PURPOSE BLAST				
RFC BLAST. 72 psi/2000PF				
RFC BLAST. 300 psi/3000PF				
FALLOUT				
SPF. 5 psi/100PF				6
EXPEDIENT				
EXP. 3 psi/100PF (Performance of EXP will be assumed same as SPF.)				

FIGURE V-12

FIGURE V-13

EVACUATION PROGRAM E-3

(70% of urbanized population of SMSAs dispersed to rural areas. All population in S-3 shelter appropriate to their new location)

TYPE OF SHELTER SPACE	SHELTER ALLOCATION PRIORITIES			
	SMSC	SMSU	SMSR	REST
NATIONAL FALLOUT SHELTER SURVEY				
NFSS/BG, SF. 25-1,500 psi			1	1
NFSS, EXIST/BG, NSF. 7-21 psi			2	2
NFSS FUTURE/BG, NSF. 7-21 psi			3	3
PVK, EXIST. 7-21 psi			4	4
PVK, FUTURE. 7-21 psi			5	5
NFSS, EXIST/AG. 5-12 psi			7	7
NFSS, FUTURE/AG. 5-12 psi			8	8
RESIDENCES				
RES, BG. 10 psi/29PF			--	--
RES, BG (SLANT). 17 psi/100PF			6	6
RES, AG. 5 psi/3PF			--	--
BLAST SLANTING				
BLAST SLANT. 25 psi/250 PF		--		
BLAST SLANT. 90 psi/350 PF		1**		
SPECIAL PURPOSE BLAST				
RFC BLAST. 72 psi/2000PF	--			
RFC BLAST. 300 psi/3000PF	1**	2**		
FALLOUT				
SPF. 5 psi/100PF			9	9
EXPEDIENT				
EXP. 3 psi/100PF (Performance of EXP will be assumed same as SPF.)				

FIGURE V-14

EVACUATION PROGRAM E-4

100% of urbanized population dispersed to rural areas.
All population in 40+ PF Fallout Shelter

TYPE OF SHELTER SPACE	SHELTER ALLOCATION PRIORITIES			
	SMSC	SMSU	SMSR	REST
NATIONAL FALLOUT SHELTER SURVEY				
NFSS/BG, SF. 25-1,500 psi				1
NFSS, EXIST/BG, NSF. 7-21 psi				2
NFSS FUTURE/BG, NSF. 7-21 psi				3
PVK, EXIST. 7-21 psi				4
PVK, FUTURE. 7-21 psi				5
NFSS, EXIST/AG. 5-12 psi				
NFSS, FUTURE/AG. 5-12 psi				
RESIDENCES	ALL POPULATION EVACUATED FROM SMSA's.			
RES, BG. 10 psi/29PF				
RES, BG (SLANT). 17 psi/100PF				
RES, AG. 5 psi/3PF				
BLAST SLANTING				
BLAST SLANT. 25 psi/250 PF				
BLAST SLANT. 90 psi/350 PF				
SPECIAL PURPOSE BLAST				
RFC BLAST. 72 psi/2000PF				
RFC BLAST. 300 psi/3000PF				
FALLOUT				
SPF. 5 psi/100PF				6
EXPEDIENT				
EXP. 3 psi/100PF — Performance of EXP will be assumed same as SPF.				

FIGURE V-15

COST OF EXISTING CIVIL DEFENSE PROGRAM,
FY 1962 THROUGH FY 1971

(MILLIONS)

COST ELEMENT	COST
TOTAL	$1,073.7
Shelter	356.7
Warning	20.6
Emergency Operations	118.2
Research and Development	89.6
Support	488.6

NOTE: STRATCOM costs for civil defense communications and warning systems are not included.

FIGURE V-15

FIGURE V-16

ESTIMATED ADDITIONAL FEDERAL COSTS
IF THE CIVIL DEFENSE PROGRAM HAD BEEN EXPANDED

(MILLIONS)

COST ELEMENT	SHELTER PROGRAM S-1	S-2	S-3	EVACUATION PROGRAMS E-1&E-2	E-3	E-4
TOTAL	$3,082	$7,696	$32,328	$5,573	$18,975	$8,987
Shelter	2,492	6,941	31,193	4,983	18,030	8,397
Warning	380	380	380	380	380	380
Emergency Operations	70	185	480	70	330	70
Research and Development	65	90	125	65	110	65
Support	75	100	150	75	125	75

FIGURE V-17

ESTIMATED ADDITIONAL GNP COSTS
IF THE CIVIL DEFENSE PROGRAM HAD BEEN EXPANDED

(MILLIONS)

COST ELEMENT	SHELTER PROGRAM S-1	S-2	S-3	EVACUATION PROGRAMS E-1&E-2	E-3	E-4
TOTAL	$7,239	$11,810	$32,882	$5,596	$19,401	$8,397
Shelter	6,649	11,055	31,747	5,006	18,456	8,397
Warning	380	380	380	380	380	380
Emergency Operations	70	185	480	70	330	70
Research and Development	65	90	125	65	110	65
Support	75	100	150	75	125	75

FIGURE V-17

of Figure V-16 and the costs to homeowners of improving the protection afforded by their home basements.

(7) (U) Elements of Costs. Shelter costs in the existing program cover surveys of existing structures to locate fallout shelter, marking and provisioning of shelter facilities, shelter use planning, and architect and engineering support. Program S-1 adds portable ventilation devices for below ground shelter, subsidies for slanting new construction to obtain improved dual-use shelter from blast and fire effects, and upgrading of home basements. Programs S-2 and S-3 and evacuation program E-3 add to Program S-1 special purpose fallout shelter and special purpose blast shelter to constitute full shelter programs.

(8) (U) Warning in the existing program consists of land-line national warning system with reliance on sirens to warn the public. The other programs add the Decision Information Distribution System (DIDS) which is a nation-wide teletype and voice warning system to all levels of government. In addition to providing the transmitters and receivers for Federal, State and local governments (including siren activators), the warning system with DIDS would provide receivers for congregate facilities such as industrial plants, schools and large apartment houses. Costs of all of these and of completing the outdoor siren warning coverage are included in the costs shown in Figures V-16 and V-17. All families are assumed to receive warning through DIDS-activated devices built into TV sets.

(9) (U) Emergency Operations costs include Federal, State, and local Emergency Operating Centers; fixed, mobile and aerial radiological monitoring; civil defense communications

systems; protection for Emergency Broadcast System stations; damage assessment capability; and the like.

(10) (U) Research and development costs are those required to improve and simplify civil defense techniques and systems.

(11) (U) Support costs include matching funds to State and local governments, information activities, training and education, and government.

2. (U) Continuity of Government

a. (Definition.) For the purposes of this study continuity of government is defined as the continued existence and operation with some significant degree of effectiveness of the various levels of government. This includes the Presidency, his executive offices, the Executive, Legislative, and Judicial branches of government, and extends to the operations of State governments. It focuses on the survival of key government officials and emergency relocation sites and on provision for a capability by civil agencies of the Executive Branch to carry out the functions that would directly contribute to national survival and security during and after nuclear attack. It includes consideration of the relocation of key elements of government, the survival of persons in the line of succession to the President, communications with the President, interagency communications, communications to the field, transportation, type and level of skilled personnel required and available, the necessity of establishing new centers of government, the attack effects on current operating offices, and related topics.

b. (Source Material.) The inputs for the continuity of government analysis included: (1) the PONAST Scenarios summarized in Volume II, (2) the statement of government

emergency plans summarized in "Federal Emergency Plan D" (SECRET) by OEP (March 1970) and "The National Plan for Emergency Preparedness" published by OEP in 1964, (3) policy guidance in the OEP memo to Defense Coordinators issued in August 1970 by the Assistant Director of Government Preparedness entitled "Guidance for Essential Functions," and (4) the germane READY model computer runs. The latter are summarized as follows:

TABLE 6

READY COMPUTER RUNS FOR CONTINUITY OF GOVERNMENT

Subject	OEP Category	Catalog* Reference	Format**	CLSFN	Scenario(s)
Presidential Succession	GPS	New	SAPOS	S	A, C
Presidential Succession	GSP	New	PAEDAC	TS	A, C
Executive Hqs-Space	GFN	II-1	SAPOS	S	A, C
Executive Relocation Sites	GER	II-5	PAEDAC	TS	A, C
OEP/OCD Regional Offices	425	React	PAEDAC	S	A, C
Federal Field Offices	GFB	II-1	SAPOS	S	A, C
Federal Field Relocation	GEF	II-17	SAPOS	S	A, C
State Government Location	GES	II-19	PAEDAC	S	A, C

*Resource Data Catalog, published as ISG-101 by OEP (January 1972).
**Formats described in paragraph d. (Analysis), below.

c. (Assumptions)

(1) The terms of the basic scenario were observed: the Federal Government national and field offices and the State offices were at a _____ posture at the time of the attack, government agencies' dispersal to relocation sites had taken place, and 80 percent of the professional staff and 50 percent of the clerical staff assigned to the sites in an attack situation were in place as of 5 January 1971.

(2) Cabinet secretaries, presidential advisers and other key White House staff were assumed to be positioned according to plans existing on 5 January. The President was assumed to be aloft in his command aircraft. This assumption was coordinated with the military subcommittee.

(3) The following criteria were used to classify a given agency or facility as "operable":

(a) The physical facility is undamaged or sustains only light damage, and

(b) Total casualties inside the facility are 10 percent or less.

(4) Communications capability after the attack was made the subject of the separate analysis by the Office of Telecommunications Policy (OTP) and the National Communications System (NCS) assisted by the AT&T.

(5) Consistent with the results of the Human Sciences Research, Inc. study,* it was assumed that the fabric of the nation as a society was not entirely disrupted and

*Bruce C. Allnutt, A Study of Consensus on Psychological Factors Related to Recovery from Nuclear Attack (McLean, VA: Human Sciences Research Inc., May 1971).

the population, after the first shock of attack, was able psychologically and emotionally to cope with the situation.

d. (Analysis)

(1) The analysis was based on review of the computer printouts summarized in Table 6, above. The formats employed included the Summary Analysis of Postattack Operability and Survival (SAPOS) which is illustrated in Figure V-18 and the Point Analysis of Experience, Damage and Casualties (PAEDAC) which is illustrated in Figure V-19. The SAPOS format is an entirely new one in the READY system. It was devised to show, as graphically as possible, the operational capabilities of various classes of emergency or other operating facilities in the immediate postattack environment. Hence, the facilities being summarized are distributed not only on the basis of operability but those that are operable are further divided between those that are "threatened" and those that are "safe." In this context, operations are "threatened" if there is an Equivalent Residual Dose (ERD) in excess of 175R in the operating areas of the facility. The Point Analysis format, previously used, also was revised to show more explicitly the operating conditions and attack effects at the location.

(2) Initial decisions on the relocation of Government headquarters after attack were made from the data available in the printouts. Where this data was not adequate, information was obtained from the Defense Coordinator of the agency concerned. This was particularly significant when the prime relocation site was not operable and information was needed on the agency plans to relocate

UNCLASSIFIED

FIGURE V-18

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PAGE.. 10

FORMAT..SAPOS
PROJECT.PONAST II

ATTACK...14I
DATE...9 APRIL 1973

READY SUMMARY ANALYSIS OF POSTATTACK OPERABILITY AND SURVIVAL
CATEGORY GFO NATIONAL GOVERNMENT. GSA ASSIGNED SPACE BY BUILDING .. DATA FIELDS OF TOTAL SPACE OF TOTAL FED PERSONNEL

COLUMN	(1) PREATTACK TOTAL (2.3.4)	(2) OPERATING AREAS DISRUPTED BY DIRECT EFFECTS (0.5.M.F)	(3) OPERATING AREAS DISRUPTED BY FALLOUT ERD> 200R	(4) TOTAL OPERABLE AREAS (5.6)	(5) THREATENED OPERABLE AREAS LIGHT AND UNDAMAGED ERD≥ 175R	(6) SAFE OPERABLE AREAS UNDAMAGED ERD< 175R	(7) SURVIVAL INSIDE AVAILABLE SHELTER FATAL DIRECT EFFECTS	(8) FATAL FALLOUT	(9) TOTAL INJURED	(10) NOT AFFECTED
CLASS A REGION 10										
OF 04 TOTAL SPACE	891104	297629	96239	497236	107824	389412				
% OF PREATTACK TOTAL	100.0	33.4	10.8	55.8	12.1	43.7				
OF 06 TOTAL FED PERS	29624						3436	948	2814	22426
% OF PREATTACK TOTAL	100.0						11.6	3.2	9.5	75.7
NATIONAL TOTAL										
OF 04 TOTAL SPACE	2122001	980364	265251	876386	195224	681162				
% OF PREATTACK TOTAL	100.0	46.2	12.5	41.3	9.2	32.1				
OF 06 TOTAL FED PERS	781819						249400	82873	94600	354946
% OF PREATTACK TOTAL	100.0						31.9	10.6	12.1	45.4

FIGURE V-18

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FIGURE V-19

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PAGE.. 10

FORMAT..PAEDAC
PROJECT.PONAST II

ATTACK...1AI
DATE...9 APRIL 1973

READY POINT ANALYSIS OF EXPERIENCE, DAMAGE AND CASUALTIES

CATEGORY HHD MEDICAL MANPOWER ** DATA FIELDS 01 PHYSICIANS 02 DENTISTS 03 VETERINARIANS 04 PHARMACISTS 05 ENVIRONMENTAL HEALTH PERSONNEL 06 TOTAL REGISTERED NURSES 07 ACTIVE REGISTERED NURSES

DOMINANT WEAPON		FALLOUT UNSHIELDED		DAMAGE LEVEL	DAMAGE PROBABILITY IN PERCENT			ACCESS DATE (D+)			TOTAL OUTSIDE CASUALTY RATE(%)		TOTAL INSIDE CASUALTY RATE(%)	
OVER-PRESSURE (PSI)	YIELD IN KILOTONS	ERD IN ROENTGENS	INTENSITY IN R/HR	PROB.50	DES SEV	MOD LIGHT		FOR USE (DAYS)	FOR RETRIEVAL (DAYS)	FOR LOCAL VIABILITY (DAYS)	FATAL	NON FATAL	FATAL	NON FATAL
PHILADELPHIA PA				CC26750000000026750 Z18 N44229 E4843 VN 9 7										
7.8	5000	1274	2571	SEVERE	0	79	94 100	**	21	60	49	37	25	17
PHILADELPHIA PA				CC26750000000026750 Z18 N44223 E4859 VN 165 162										
7.5	5000	1274	2571	FIRE	0	10	46 100	**	21	60	47	45	21	15
PHILADELPHIA PA				CC26750000000026750 Z18 N44222 E4854 VN 165 162										
8.0	5000	1274	2571	MODERATE	0	12	50 100	**	21	60	52	41	37	26

55a

FIGURE V-19

to other places. Insofar as possible, the actual plans of agencies were used.

(3) The initial decisions by the Continuity of Government subcommittee on the locations of agencies postattack were made without considering the factor of communications. A separate study group on communications then reviewed the tentative decisions in light of that factor. Adjustments were then made in the initial decisions if they were incompatible with communications capability. The degree of capability to communicate with the public was considered as a prime factor.

(4) In the analysis of the capability of State governments to operate, a decision was first made on the effect of the attack on the State capitols and on the prime relocation sites. If these were not operable, review was made of other State offices which survived. Such offices include the Civil Defense Headquarters, the highway department relocation sites, or some other branch of the State government. Failing to find any operating site by these procedures a decision was made that the nearest sizable town in a clear zone as far as attack effects were concerned would serve as a State headquarters. These decisions were then considered when information became available on the communications factor. It is recognized that from a personnel and facilities standpoint it is difficult to operate a State headquarters from a totally unprepared location and time would be needed for the development of an effective organization.

(5) The initial decisions for the D+1 situation were restudied to apply to a D+90 time frame. New locations were selected for some agencies, particularly when the

D+1 location did not provide enough room for continued, expanded operations.

(6) After the Study Group on Government Continuity had concluded its analysis of the surviving governmental resources, the report was studied by the entire PONAST Institutional Factors Subcommittee to reach a composite judgment on the ability of the agencies of the Federal Government to perform essential functions as defined in OEP guidance.

(7) To the extent possible, conclusions were placed in a time frame. As examples, the Subcommittee was asked to judge when the first national assessment was possible, when the President could talk directly to the Nation by radio or TV, etc.

e. (Divergencies)

(1) There were two major divergencies or analytical excursions from the basic line of study. One of these involved the Presidential line of succession as specified in Scenarios A and C. In Scenario A, the key personnel were assumed to have relocated in accordance with established emergency plans. In Scenario C, key personnel were assumed to be at their headquarters offices when the surprise attack occurred.

(2) The other major divergency involved a key facility. Due to a difference in the vulnerability numbers assigned to the facility in the two different data bases used affecting the weapons assigned, the OEP computer showed the facility as operational while the output produced by the Department of Defense showed a 90 percent probability of severe damage. The study report uses the DOD finding as being the more realistic.

3. (U) Military

a. (U) Service Residuals

(1) (U) (References.) The following references were used in developing the damage assessment and survivability of US forces worldwide:

(a) PONAST I, dated 31 October 1969.

(c) The JAD data base.

(d) The FORSTAT data base.

(e) NMCSSC computer printouts of the data bases placed against the nuclear laydown.*

(f) DIA Physical Vulnerability Handbook.

(g) BuPers Report M-520.

(h) SECNAV E XOS 695 DETAIL.

(i) OPNAV Notice C3110.

(j) OPNAV Notice C5400.

(k) DCSPER 46 Report.

*NMCSSC data processing methodology is summarized in Appendix B.

(4) (U) Command, Control, and Communications (C^3)

(a) General. The Service C^3 situations was analyzed individually by each Service. In addition to the C^3 methodologies listed below there have been offshoot studies of broad area communications, command, and control made by other agencies of the Government. They are included in other portions of this study.

(b) Army C^3. The DCA analysis of the DCS was furnished to the Assistant Chief of Staff for Communications-Electronics Office. The DCA analysis was considered applicable to the Army's communication survivability in that the Army relies on long-haul DCS communications systems, e.g., AUTOVON, AUTODIN, and AUTOSEVOCOM.

(c) Navy/Marine Corps C^3. A special damage assessment of Naval Communications Facilities was obtained from NMCSSC. The DCA analysis of the DCS and the damage assessment of Naval Communications Facilities were provided to the Naval Communications Command through OPNAV with a request for an evaluation of the capabilities of the intra-Navy communications.

This formed the basis for Naval C^3. A detailed analysis was provided for the Scenario A attack by that command. Since the damages in Scenarios B and C were, with few exceptions, the same as that of A, they were evaluated within the study group.

(d) Air Force C^3. Communications degradation assessment was accomplished utilizing the JAD data base as evaluated by NMCCS. Air Force communications personnel, both at HQ USAF and HQ SAC, analyzed these tables using a 50 percent DE criterion for facility destruction in evaluating the effects on C^3. Their analysis was aided by the inclusion of DCA, Navy, and Army Reports on residual C^3 capability.

(5) (U) Supply Support

(a) General. There is no all inclusive data base or series of data bases that account for military supplies. As improvements are made in the JAD and the FORSTAT data bases, they should become more useful in analyzing supply residuals. The Service supply residuals were determined through methodologies that varied among the Services.

(b) Army Supply Support

1. (Army POL Inventory.) POL storage residuals were determined by use of NMCSSC/JAD run output and the "average DE" method.

2. (Army Conventional Ammunition.) Ammunition inventories in the Asian and European land mass were considered lost. A cost of $1,684 was applied per short ton lost worldwide.

3. (Army Supplies and Spare Parts.) Department of the Army Worldwide Asset Position as of

31 December 1970 was the basis for determining depot losses. Supplies on hand in depots in the Asian and European land mass were considered lost.

(c) Navy/Marine Corps Supply Support

1. The analysis of supply support remaining in the Navy was made based on the damage assessment to the JAD data base, augmented with the quantity and value of spare parts, ammunitions, and POL obtained from inventories provided by OPNAV (OP 04). A listing was obtained from OP 403 which provided POL inventories by location and type of fuel (AVGAS, JP4, JP5, Diesel, Fuel Oil Navy and Distillate). OP 403 extended the inventory in barrels to a cost figure. The JAD damage assessment was compared to this listing to obtain the amount and cost of lost POL. Where the JAD sometimes split the POL on a base to above ground and underground, each with its own VN number, it was necessary if only a portion was lost, to use the JAD capacity figures to obtain a ratio of destroyed POL on the base. This ratio was then applied to the inventory from the OP 403 listing.

2. (Navy Conventional Ammunition.) Prices and weights of ammunition stored in major CONUS and overseas bases were obtained from Mechanicsburg through OP 04. Ammo was segregated to Air, Gun & Depth Charge, SUS material, U/W Torpedo ASROC, Mines. To complete the analysis, the cost of ship's expendable ordnance was obtained from the Navy Program Factors book (OP 90P).

3. (Navy Supplies and Spare Parts.) A central accounting of supplies is available only at the Supply Center, Depot, NARF, or Shipyard level. OP-04 estimates that this represents 95 percent of the total costs of all naval supplies. Spare parts, etc., on ships are considered expended and not within the inventory system. A cost of supplies in the above named facilities was obtained through OP 04 and assessed to the installation.

(d) Air Force Supply Support

1. The evaluation of supply support and its overall effect on the Air Force was obtained by close evaluation of destroyed base facilities in the JAD. Review of the JAD by DCS/Supply & Logistics provided the dollar value of goods destroyed and an estimate of US capability to support a residual force with surviving supplies.

2. (Motor Vehicles.) Residual motor vehicles assigned to the Air Force were determined by Logistics Command via DCS/Supply and Services. They provided a current listing of vehicle count and monetary value by base. The JAD attrition of major bases was then reviewed for lost or surviving vehicles and the values calculated.

3. (Non-Nuclear Munitions.) The sources of this evaluation were the Worldwide Controlled Air Munitions Report dated 19 January 1971 and the Worldwide S-18 Munitions Ton Report of 5 February 1971. Use of these two documents permitted accounting for munitions as a base to use against the JAD. This allowed the identification of shortages and dollar value losses for munitions.

(8) (U) Military Installations

(a) General. Primary assessment of military installations was made through use of the JAD data base.

(b) Army Installations

1. (Status of Active Army Installations)

a. (Facility Destruction.) Determined by use of NMCSSC/JAD run output and the "average DE" method.

b. (Fatality Rates for Main Port Areas.) From NMCSSC/JAD runs.

c. (Fatality Rates for Dispersal Areas.) From Army runs.

d. (Army Installations Destroyed.) From NMCSSC/JAD runs.

e. (Status of Major Army Headquarters.) Based on physical damage from NMCSSC/JAD runs and "average DE" method, and NMCSSC/JAD fatalities output.

(c) Navy/Marine Corps Installations. Installations were evaluated from the results of the damage assessment of the Naval installations in the JAD. While these data included the major installations, it is apparent that an intensive review of the data is highly desirable. Analysis was augmented by installation information obtained from OPNAV. A special report was obtained through OP 44 and NAVFAC. It was prepared in Port Hueneme and was a listing of all Navy installations sorted in state or territory/country order and arranged by type of installation within the state. Current replacement costs of Class 2 real property were broken out to: a. Family Housing, b. POL Facilities,

c. Ship Support Facilities, d. All other functions. These costs were then totaled for the facility and totals were provided by state or territory/country and finally a grand total. Along with the output, the multipliers for computing May 1971 replacement cost of the property was provided. For example, taking 1971 as a 1.0 base, 1958 costs were multiplied by 1.566 for permanent and 1.594 for semi-permanent and temporary property. The same data were obtained for Marine Corps properties.

(10) Unmobilized Reserve and National Guard

*Detailed methodology for assessing this requirement is contained in Appendix C.

4. [redacted] Local Viability*

a. (U) Radiation Denial

(1) In damage assessment studies the denial of free access to a facility or to a particular land area generally has been established in terms of a schedule of permissible

*Standard local viability time-classes used were: Class 1--D+1 day, Class 2--D+15 days, Class 3--D+30 days, Class 4--D+90 days, Class 5--D+180 days, Class 6--D+365 days, Class 7--D+18 months.

access times depending on the standard intensity levels which are expressed in roentgens per hour as of one hour after detonation (SI=R/hr at H+1). As a rule, the effort was made to delay the access time so that the radioactivity decay will lower the radiation intensity to an extent that exposure to it would not induce sickness. The formulation of an access schedule requires data and assumptions about: (1) the previous doses received, (2) the doses required to produce radiation sickness, and (3) the effective protection factor (24 hour) that would be afforded when the facility or area is put to the contemplated use.

(2) The determination of the local viability date for an SMSA requires a forecast of how long after the attack the SMSA can be expected to resume intraurban circulation and activity without widespread restriction from persisting fallout radiation. This restriction is expected to take longer than would be necessary simply to avoid radiation sickness on the part of the great bulk of the population. This is so for several reasons: (1) in the absence of widespread adequate instrumentation there would be only inprecise and unreliable information on the doses individuals had received; also the vagaries of erratic distribution of radiation intensities would not be known, (2) individuals have no way of knowing in advance how much more or less than the average sickness threshold radiation dose each could tolerate without becoming sick, and (3) many individuals might refuse to risk additional exposure even when the prospect of radiation sickness is minimal; also some would refuse to expose themselves even to very low doses, because of possible long-range effects such as

leukemia, life shortening and genetic damage. This latter reluctance could be increased because of widespread observable radiation sickness among both those who will eventually die and those who eventually will recover.

(3) In keeping with the foregoing considerations, the following decision rules were adopted to determine the period of local viability denial due to fallout radiation:

(a) If during the shelter period 40 percent or more of the nonfatally injured (including nonfatally irradiated) survivors received a sickness dose of radiation (200 R or greater) it was assumed that more than 180 days would be required for viability. On this basis, the sixth (D+365) of the standard local viability classes was selected.

(b) If during the shelter period between 20 and 40 percent of the nonfatally injured survivors had received a sickness dose of radiation it was assumed that more than 90 days would be required for viability and the fifth (D+180) standard class was selected.

(c) If less than 20 percent of the nonfatally injured survivors had received a sickness dose but if 20 percent or more of the nonfatally injured survivors had received a submarginal sickness dose (100 to 200 R) it was assumed that:

1. If of the SMSA land area 20 percent or more had a standard intensity of 1000 R/hr or more, the standard class 4(D+90) should apply;

2. If of the SMSA land area less than 20 percent had a standard intensity of 1000 R/hr or more, the standard class 3(D+30) should apply.

(d) If less than 20 percent of the nonfatally injured survivors had received a sickness dose and less than 20 percent had received a submarginal sickness dose it was assumed that the viability would occur at a time when the combination of shelter doses and post-shelter doses would not exceed an ERD of 175R, which is 25R below the assumed sickness threshold dose. (This could allow an accumulation of as much as about 235R over a one month period, and 610R over one year. The exact relationship between ERD and total accumulated dose may be calculated according to the following assumptions:

1. Ten percent of the injury attributed to the dose is irreparable,

2. The remaining 90 percent is repaired at the rate of 2.5 percent per day,

3. Recovery is continuous during protracted exposure,

4. Fallout radiation dose rates follow a $t^{-1.2}$ decay scheme.)

Table 7 was used for applying the criterion of keeping the ERD to 175R or less.

TABLE 7

MAXIMUM STANDARD INTENSITIES (R/HR)* FOR SMSA VIABILITY

Denial Termination Class	ERD Dose (R) in Shelter			
	20	40	60	80
1(D+1)	730	660	590	520
2(D+15)	3,150	2,970	2,780	2,570
3(D+30)	5,090	4,866	4,610	4,040
4(D+90)	12,020	11,690	11,330	10,930
5(D+180)	27,640	26,680	25,650	24,530
6(D+365)	132,340	129,460	126,416	123,120
	ERD Dose (R) in Shelter			
	100	120	140	160
1(D+1)	440	360	270	170
2(D+15)	2,350	2,100	1,810	1,430
3(D+30)	4,040	3,710	3,310	2,770
4(D+90)	10,490	9,980	9,360	8,470
5(D+180)	23,280	21,830	20,035	17,870
6(D+365)	119,480	115,340	110,310	103,260

These maximum standard intensities are computed on the assumption that: (1) the maximum ERD in shelter does not exceed that in the column heading, (2) the total ERD does not exceed 175R, (3) the stay time after shelter emergence is not limited, and (4) the effective around-the-clock protection factor (PF) after emergence is approximately four. An effective PF is derived for factory workers and for truckers and deliverymen from the PF assumptions given in Table 8.

*Standard Intensity (SI) in Roentgens per hour as normalized to H+1 hour.

TABLE 8

ELEMENTS OF AROUND-THE-CLOCK EFFECTIVE PFs

Class of Operators	In Residence Time (HR)	PF	At Work Time (HR)	PF	Commuting Time (HR)	PF	Effective PF
Factory worker	14	5	8	5	2	.2	4.44
Trucker & Delivery-man	15	5	9	2.5	0		3.63

The effective 24 hour PF can be readily calculated since the reciprocal of the effective 24 hour PF is the sum of the fraction of the day's time in each element divided by the PF for that element. The effective PF for the truckers and deliverymen, being the lower, is controlling for local viability. It is assumed that 3.63 could be raised up to 4.0 by selective decontamination and personnel rotation with factory workers.

(4) These decision rules were applied for each SMSA to determine which of the standard local viability dates should apply. This application required data on the level of casualties and the shelter radiation doses among the survivors in each SMSA. The former is provided by the SAC (see Figure V-3) and the latter by the SASD (see Figure V-4). The SASD format distributes the survivors among five shelter dose groups. The maximum doses for each of the five ranges are: 25R, 50R, 100R, 200R, and 600R, respectively. The Summary Analysis of Land Analysis of Land Scheduled Availability (SASLAV) format which is illustrated in Figure V-20 provided the basis for determination of the fractions of SMSA land area above 1000 R/hr.

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FIGURE V-20

UNCLASSIFIED

PAGE.. 10

FORMAT..SASLAV
PROJECT.PONAST II
ATTACK...1AI
DATE...9 APRIL 1973

READY SUMMARY ANALYSIS OF SCHEDULED LAND AVAILABILITY

CATEGORY PPH POPULATION.HOUSING.AREA.LABOR 1970 ESTIMATES..TEN DATAFLDS(1.2.3.6 IN 100S 4.5 TENTHS SQ MI 7.8.9.10 UNITS OF LAND(1969)

COLUMN	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	PREATTACK TOTAL	H+1 DOSE RATE 0- 100	H+1 DOSE RATE 101- 300	H+1 DOSE RATE 301- 1000	H+1 DOSE RATE 1001- 3000	H+1 DOSE RATE 3001- 5000	H+1 DOSE RATE 5001- 10000	H+1 DOSE RATE 10001- 30000	H+1 DOSE RATE 30001- 99999
CLASS 84 OREGON									
OF 04 - LAND(1969)	710059	443786	103668	73136	56094	33375	0	0	0
% OF PREATTACK TOTAL	100.0	62.5	14.6	10.3	7.9	4.7	0.0	0.0	0.0
CLASS 85 WASHINGTON									
OF 04 - LAND(1969)	619901	292593	184111	65710	60130	17357	0	0	0
% OF PREATTACK TOTAL	100.0	47.2	29.7	10.6	9.7	2.8	0.0	0.0	0.0
NATIONAL TOTAL									
OF 04 - LAND(1969)	23245824	10158925	4230740	4742148	2580286	534654	604392	348687	46492
% OF PREATTACK TOTAL	100.0	43.7	18.2	20.4	11.1	2.3	2.6	1.5	0.2

FIGURE V-20

b. (U) Casualty Impact Status (CIS). The seven CIS classes, among which the SMSAs are distributed, are distinguished in terms of the maximum percentage level of fatalities and of total casualties in the respective SMSAs. These levels are shown in the footings for each class in Figure III-7 of Volume III. The applicable distribution is shown in a computer run of the Summary Analysis of Area Casualty Impact Status (SAACIS) format. This is illustrated in Figure V-21. CIS classes were used as the basis for estimating the requirement for military support to civil authority.

c. [redacted] Local Government Capabilities

(1) (U) General

(a) As set forth in the preattack scenario, it was assumed that all local governments having emergency operating centers had moved to them prior to the attack. DCPA maintains a data base of State and local government emergency operating centers, including those planned, under construction, and operational. For the PONAST study, this data base was edited to extract a data base of those emergency operating centers which were operational on 5 January 1971, or which could have been made so during the scenario crisis period. The data base contains engineering estimates of physical vulnerability and fallout radiation protection factors for each facility.

(b) The Scenario A attack was run against this edited data base. Governments in EOCs with moderate or greater damage were considered inoperative. Those with light damage or less were considered to be operational unless they had an inside ERD greater than 450R. Those that had an inside dose of 200 to

FIGURE V-21

UNCLASSIFIED

FORMAT..SAACIS
PROJECT.PONAST II

ATTACH...1AI
DATE...9 APRIL 1973

READY SUMMARY ANALYSIS OF AREA CASUALTY IMPACT STATUS

SHSA 1970 ESTIMATES (CD MOVEMENT INDIA

IMPACT CLASS MAX TC,MAX FTL,DIR	(1) (0,0,-)		(2A) (10,5,-)		(2B) (10,5,+)		(3A) (25,10,-)		(3B) (25,10,+)		(4A) (50,25,-)		(4B) (50,25,+)		(5) (75,50)		(6) (90,75)		(7) (100,100)	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
SHSA GREATER THAN ONE MILLION	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	12	21.0	14	24.5	31	54.3
SHSA BETWEEN ONE MILLION AND 250 THOUSAND	2	1.8	3	2.7	3	2.7	4	3.6	2	1.8	11	10.0	6	5.5	17	15.5	24	22.0	37	33.9
SHSA LESS THAN 250 THOUSAND	12	18.4	4	6.1	3	4.6	6	9.2	4	6.1	8	12.3	9	13.8	6	9.2	3	4.6	10	15.3
ALL SHSA'S	14	6.0	7	3.0	6	2.5	10	4.3	6	2.5	19	8.2	15	6.4	35	15.1	41	17.7	78	33.7

FIGURE V-21

450R were considered to need temporary management support because of radiation illness.

[redacted] In the case of SMSAs in which there are no prepared emergency operating centers, the survival of local government was estimated on the basis of casualty levels, number of weapons impacting and any other data or local knowledge available on the SMSA in question. These estimates were made by a panel of DCPA professionals knowledgeable in State and local government and emergency operations.

(2) (C) Military Support of Civil Authority

d. (U) Life Support Capabilities

(1) Medical and Health Care

(a) Attack Casualty Load. For the local viability assessment the determination was made of the date for which the medical deficit disappeared. This deficit was the amount by which casualties who were still sick or injured as of a particular date exceeded the case caring capability of the surviving physicians in good health as of that date. The numbers of persons sick or injured on the selected dates in each SMSA were taken from the Summary Analysis of Medical Status (SAMS). Figure V-22 illustrates one page of output in that format. The other side of the comparison requires the

FIGURE V-22

UNCLASSIFIED

FORMAT..SAMS
PROJECT.PONAST II

ATTACK...14I
DATE...9 APRIL 1973

READY SUMMARY ANALYSIS OF MEDICAL STATUS

CATEGORY PPM SMSA 1971 ESTIMATES - OCD MOVEMENT OF 0% MOVED POPULATION

COLUMN	(1) PREATTACK TOTAL	(2) DEATHS FROM ALL CAUSES	(3) ATTACK AFFECTED SURVIVORS: BLAST IN-PATIENTS	(4) FALLOUT IN-PATIENTS	(5) BLAST OUT-PATIENTS	(6) UNAFFECTED SICK OR INJURED: UN-AFFECTED IN-PATIENTS	(7) UN-AFFECTED OUT-PATIENTS	(8) UN-AFFECTED ILL SURVIVORS	(9) TOTAL IN-PATIENTS (3+4+6)	(10) SURVIVORS IN GOOD HEALTH
NATIONAL TOTAL										
DATA FIELD 0% MOVED POPULATION										
D + 1	2031167	385610	24374	223428	131870	2031	12187	60935	249833	1190732
D + 2	2031167	527792	81247	355298	20312	2031	12187	60947	438576	971353
D + 15	2031167	822155	40623	274052	14218	2031	12187	40623	316706	825278
D + 30	2031167	934025	20312	304675	2031	1986	8125	37921	326973	722092
D + 90	2031167	1137142	20312	70935	2031	1986	8125	20312	93233	770324
D + 180	2031167	1137269	6094	35468	710	1986	6094	17321	43548	826225
D + 365	2031167	1147454	2031	320	274	1986	4062	9117	4337	865923

number of able-bodied physicians by SMSA on each selected date. This is shown by Summary Analysis of Effectives (see Figure V-6) on OEP category HMD, Health Manpower described on page XI-1 of the Resource Data Catalog. The time-phasing for both sides of the comparison was governed by the factors in Figure V-4. The actual matching of the casualty caseload with the available physicians, by SMSA, was made by special computer physician supply-requirement comparison for each SMSA. Output of this special type run is illustrated in Figure V-23. The establishment of a deficit or surplus in this comparison required the use of factors representing the assumed average load carrying capability of the physicians through the postattack period. These factors, provided for this study by the Public Health Service, are shown in the following table.

TABLE 9

POSTATTACK PHYSICIAN CASELOAD LIMITS

Postattack Date	Maximum Physician Daily Casualty Caseload
D+1	90
D+15	72
D+30	72
D+90	60
D+180	60
D+365	60

(b) Epidemic Threat. For two states and the major city in each, estimates of deaths from communicable and infectious diseases during the first year postattack were produced with a postattack health prognosis model

FIGURE V-23

UNCLASSIFIED

FORMAT..M S-RC
PROJECT.PONAST II

ATTACK...1AI
DATE...9 APRIL 1973

TIME PERIOD NO	D. (DAYS)	DOCTORS IN GOOD HEALTH	FATALLY INJURED	TOTAL INPATIENT SURVIVORS	TOTAL OUT-PATIENT SURVIVORS	TOTAL SURVIVORS REQUIRING CARE	DOCTORS REQUIRED	DOCTOR SHORTAGE	DOCTOR SURPLUS
CLASS 1000		ALL SMSA'S							
1	1	97953	1327162	137612	7906820	9371594	104129	56176	0
2	15	93721	798791	4635117	1010367	6444225	89503	45782	0
3	30	92675	687997	2727843	723462	4139302	57490	14815	0
4	90	94174	0	1973169	429661	2402825	40047	0	4127
5	180	95437	0	905724	238472	1144196	15070	0	26367
6	365	96396	0	428634	92167	520801	8680	0	37716

FIGURE V-23

UNCLASSIFIED

called "Total Emergency Health Care System Model" developed by Research Triangle Institute of Research Triangle Park, NC for DCPA. The model and its application are described in Pyecha, J. N. and other, Alternative Designs for Systems for Providing Postattack Medical Care, Final Report OU-407, Research Triangle Institute, (October 1970). The analysis used in the PONAST problem is described in a classified RTI report.*

(2) Sustenance

(a) Food

1. For food requirement base the numbers of survivors as of D+30 were taken for each SMSA from the time-phased listing in the Summary Analysis of Survivors (SAS) format illustrated in Figure V-24. This reflects the application of the casualty status time-phasing factors tabulated in Figure V-5.

2. The local availability of food supplies at D+30 was estimated from three sources: home supplies, retail stocks, and wholesale inventories. The survival of home supplies was assumed to correlate with the survival of residential housing in the SMSAs. Housing survival was assessed on the inventory of dwelling units contained in data field 2 of OEP category PPH described on page XIII-1 of the Resource Data Catalog (ISG-101). The results were tabulated by SMSA in the radiation-constrained Summary Analysis of Scheduled

*J. N. Pyecha, A. W. Voors, and R. O. Lyday, The Health-Related Effects of Nuclear Attack on the States of Michigan and Louisiana, (Research Triangle Park, NC: Research Triangle Institute, 31 May 1972).

FIGURE V-24

UNCLASSIFIED

FORMAT..SAS
PROJECT.PONAST II

ATTACK...18I
DATE...9 APRIL 1973

READY SUMMARY ANALYSIS OF SURVIVORS

CATEGORY OF NATIONAL GOVERNMENT. GSA ASSIGNED SPACE BY BUILDING .. DATA FIELDS OF TOTAL SPACE OF TOTAL FED PERSONNEL

COLUMN	(1) PREATTACK TOTAL	(2) DEATHS FROM ALL CAUSES	(3) SURVIVORS D + 1	(4) SURVIVORS D + 15	(5) SURVIVORS D + 30	(6) SURVIVORS D + 90	(7) SURVIVORS D + 180	(8) SURVIVORS D + 365
CLASS A3 REGION 10								
OF OF TOTAL FED PERS	29624	16589	16886	11553	10368	10665	11850	12942
% OF PREATTACK TOTAL	100.0	56.0	57.0	39.0	35.0	36.0	40.0	42.0
NATIONAL TOTAL								
OF OF TOTAL FED PERS	381819	201073	207328	255655	233764	245491	283018	293182
% OF PREATTACK TOTAL	100.0	51.3	52.1	32.7	29.9	31.4	36.2	37.5

FIGURE V-24

UNCLASSIFIED

Accessibility for Production (SASAP-R) format, a sample of which is shown in Figure V-25. This format introduces, for the first time in this methodology discussion, distinctions among the classes of damage to facilities. These are discussed in Appendix D. The format of Figure V-25 also takes into account the time-phasing of availability among the scheduled accessibility dates which was governed solely by fallout radiation denial. The threshold Standard Intensities used for the respective accessibility dates are summarized in the following table.

TABLE 10

RADIATION THRESHOLDS FOR HOUSING ACCESS

Access Date	Standard Intensity (R/HR at H+1)
D+1	1,470
D+15	6,400
D+30	10,350
D+90	24,490
D+180	56,290
D+365	215,730

These were based on an assumed permissible additional dose of 175 ERD, an average around-the-clock protection factor of 7.15 including terrain shielding, and a stay time of one year.*

3. The estimates of retail food supplies are based on the assessed-time-phased access to retail

*A better set of radiological criteria would have been limiting the total ERD (including both shelter and subsequent dose) to 175R, and to use an around-the-clock effective PF of four. Such criteria would have delayed the housing availability dates, but not to an extent that would change the overall local viability date for each SMSA.

UNCLASSIFIED

FIGURE V-25

UNCLASSIFIED

FORMAT..SASAP-R
PROJECT.PONAST II
ATTACK...1AI
DATE...9 APRIL 1973

READY SUMMARY ANALYSIS OF SCHEDULED ACCESSIBILITY FOR PRODUCTION
CATEGORY E4Q ANTHRACITE CAPACITY BY GEOGRAPHIC AREA-DATA IN TONS/DAY AND DAILY LABOR FORCE

COLUMN	(1) PREATTACK TOTAL (2+4+10)	(2) DESTROYED OR SEVERE DAMAGE	(3) MODERATE OR FIRE DAMAGE	(4)	(5)	(6) LIGHT OR NO DAMAGE	(7)	(8)	(9)	(10)
			ACCESSIBLE FOR REPAIR D + 90	ACCESSIBLE FOR REPAIR D + 365	ACCESSIBLE FOR USE D + 1	ACCESSIBLE FOR USE D + 15	ACCESSIBLE FOR USE D + 30	ACCESSIBLE FOR USE D + 90	ACCESSIBLE FOR USE D + 180	ACCESSIBLE FOR USE D + 365
CLASS 1200 SIZES PRODUCED AT ANTHRACITE BREAKERS IN TONS/DAY-1-CHESTNUT AND LARGER										
DATA FIELD 1	15991	1551	1311	1935	7612	8395	10138	12505	12505	12505
% OF PREATTACK TOTAL	100.0	9.7	8.2	12.1	47.6	52.5	63.4	78.2	78.2	78.2
NATIONAL TOTAL										
DATA FIELD 1	71601	5155	5656	6015	41099	41099	50908	60288	60431	60431
% OF PREATTACK TOTAL	100.0	7.2	7.9	8.4	57.4	57.4	71.1	84.2	84.4	84.4

FIGURE V-25

UNCLASSIFIED

food stocks. The data base for this is data field 1 (retail sales) for establishments showing sales in Standard Industrial Classification (SIC) 54, food stores and SIC 591, drug stores. These data are from OEP category RCE, Retail Trade, described on page VIII-3 of the Resource Data Catalog (ISG-101). The results are tabulated by SMSA in the Summary Analysis of Scheduled Retrievability (SASR) format, a sample of which is shown in Figure V-26. The time-phasing of the availability among the scheduled retrievability dates was governed solely by fallout radiation denial. The thresholds used for the respective retrievability dates are summarized in the following table.

TABLE 11

RADIATION THRESHOLDS FOR FOOD STOCK RETRIEVAL

Retrieval Date	Standard Intensity (R/HR at H+1)
D+1	6,240
D+3	21,940
D+6	49,610

These were based on an assumed permissible additional dose of 175 ERD, an average around-the-clock protection factor of 7.15 including terrain shielding, and a stay time of four hours.*

4. Wholesale food stocks were assessed from the same format used for retail food: SASR, illustrated in Figure V-26. The data used were the

*See footnote on previous page. As with housing, using more stringent criteria would have delayed the food stock retrieval date but not to an extent that would delay overall viability dates.

UNCLASSIFIED

FIGURE V-26

UNCLASSIFIED

FORMAT..S4SR
PROJECT.PONAST II

ATTACK...14I
DATE...9 APRIL 1973

READY SUMMARY ANALYSIS OF SCHEDULED RETRIEVABILITY

CATEGORY 4S0 FOOD STORAGE FACILITIES-BE4YS, GRAIN AND ROUGH RICE.. THREE DATA FIELDS DIUGSA CAPACITY 1000 BU

COLUMN	(1) PRE4TT4CK TOTAL	(2) DESTROYED	(3) SEVERE DAMAGE	(4) SEVERE DAMAGE	(5) MODERATE OR FIRE DAMAGE	(6) MODERATE OR FIRE DAMAGE	(7) MODERATE OR FIRE DAMAGE	(8) LIGHT OR NO DAMAGE	(9) LIGHT OR NO DAMAGE	(10) LIGHT OR NO DAMAGE
			ACCESS-IBLE FOR SALVAGE D + 1	ACCESS-IBLE FOR SALVAGE D + 6	ACCESS-IBLE FOR SALVAGE D + 1	ACCESS-IBLE FOR SALVAGE D + 3	ACCESS-IBLE FOR SALVAGE D + 6	ACCESS-IBLE FOR RETRIEVAL D + 1	ACCESS-IBLE FOR RETRIEVAL D + 3	ACCESS-IBLE FOR RETRIEVAL D + 6
CLASS C4221GRE COMMERCIAL OFF-FARM GRAIN STORAGE WAREHOUSES										
OF 01 UGS4 C4P 1000	4091952	4092	192322	196414	425563	433747	433747	3371768	3404504	3457699
% OF PRE4TT4CK TOTAL	100.0	.1	4.7	4.8	10.4	10.6	10.6	82.4	83.2	84.5
NATIONAL TOTAL										
OF 01 UGS4 C4P 1000	4098878	4099	192647	196746	426283	434481	434481	3377475	3410266	3463552
% OF PRE4TT4CK TOTAL	100.0	.1	4.7	4.8	10.4	10.6	10.6	82.4	83.2	84.5

FIGURE V-26

UNCLASSIFIED

beginning inventory (data field 2) and ending inventory (data field 3) for establishments showing inventories in SIC 504, Groceries and Related Products, and SIC 5022, Drugs, Proprietaries and Drug Sundries, in OEP category WCE, Wholesale Trade, described on page VIII-1 of the Resource Data Catalog (ISG-101).

(b) Water

1. (Availability.) The data used in the hand analysis cited in the footnote were taken from OEP categories HWL and HWS dealing respectively with large and small water systems. These categories are described in the Resource Data Catalog (ISG-101) at pages XII-1 and XII-3, respectively.

2. (Contamination.) The consideration of water contamination was limited to surface water sources contaminated by fallout deposited directly into the reservoirs of 185 of the larger communities in the US. Communities that presently utilize ground water, totally or partially, were assumed to have adequate supplies of relatively clean water for drinking. A relationship between Standard Intensity and the concentration of biologically important radionuclides in drinking water was derived from Lee, H. "Vulnerability of Municipal Water Facilities to Radioactive Contamination from Nuclear Attack," Stanford Research Institute (March 1964). The relationship included a consideration of the surface area and volume of the reservoir, radionuclide solubility and time water consumption is begun. The amount

of water consumed per day was assumed to be one liter and the period of ingestion from the first to the 183d day after the attack.

3. (Organ Doses from Contaminated Food and Water.) The absorbed dose in various body organs from ingested radionuclides in food and water was computed by an analytical procedure described in Hopkins, George et al "A Survey of the Long-Term Postattack Recovery Capability of CENUS (U)", SRI Project No. IMU-4500, Stanford Research Institute, December 1963 (Secret). The absorbed organ doses are a function of the ingestion rate of the radionuclides, the time of beginning ingestion, and the time to which the dose is calculated.

(3) Physical Protection

(a) Housing. The housing status for each SMSA was determined from the comparison of the number of survivors with the available housing by SMSA and by time period. The number of survivors by area and time period were shown in the Summary Analysis of Survivors (SAS) format a sample of which was shown in Figure V-24. This reflects the application of the casualty status time-phasing factors tabulated in Figure V-5. The housing availability was determined from the SASAP-R summary of dwelling units described above in paragraph (2) under 2.a. Food. The actual time-phased comparison of housing requirements and supplies by SMSA was provided in a special summary format for Housing Supply-Requirement Comparison (HS-RC) a sample of which is shown in Figure V-27. "Displaced persons"

FIGURE V-27

UNCLASSIFIED

FORMAT..H S-RC
PROJECT.PONAST II

ATTACK...14I
DATE...9 APRIL 1973

TIME PERIOD NO	TIME PERIOD (DAYS)	HOUSING AVAILABLE FOR REPAIR	HOUSING AVAILABLE FOR USE	PRE-ATTACK OCCUPANTS OF AVAILABLE UNITS	TOTAL SURVIVORS REQUIRING HOUSING	PERSONS OCCUPYING AVAILABLE UNITS	DISPLACED PERSONS	DISPLACED PERSONS-NUMBER OF AREAS WITH	DISPLACED PERSONS-NUMBER OF AREAS WITHOUT	LONG-TERM CAPACITY OF AVAILABLE UNITS	PERSONS REQUIRING BILLETS	BILLET CAPACITY OF HOUSING UNITS	PERSONS REQUIRING OTHER BILLETS
CLASS 1000 ALL SMSA'S PRE-ATTACK POPULATION = 1269233 HOUSING = 465799													
1	1	37198	64820	207424	712829	301826	411003	172	58	330582	382247	136122	246125
2	15	39771	82242	263174	698767	329512	369255	164	66	419434	279333	172708	106625
3	30	43827	86917	278134	697129	334618	362511	158	72	443277	253852	182526	71326
4	90	46496	89112	285158	674899	367981	306918	142	88	454471	220428	187135	33293
5	180	46496	89112	285158	672113	367981	304132	131	99	454471	217642	187135	30507
6	365	46496	89112	285158	671821	367981	303840	125	105	454471	217350	187135	30215

FIGURE V-27

UNCLASSIFIED

are survivors in the locality whose own housing is not available. "Long-term capacity" is the number who could be accommodated at two per bedroom in all locally available housing units. "Billeting capacity" is the number who could be accommodated at two per finished room other than kitchen or bathroom in all locally available housing units.

e. (U) Production Support Capabilities. The assessment of the SMSA requirement for manpower, transportation connections, and electric power was derived from the summarization of the usage data appropriate for each for all surviving operable (light or no damage) manufacturing establishments in each SMSA. The establishment damaged status was assessed on the Census of Manufactures data in OEP category MEI, Manufacturing Establishments described on page VII-1 of the Resource Data Catalog (ISG-101). The file consisted of data from the 1966 Annual Survey of manufacturing establishments with more than 100 employees. The manpower requirements were based on average total employment (data field 7) of the surviving operable establishments. The transportation connection requirement was based on their value of shipments (data field 1). The electric power requirement was based on their purchased electricity (data field 8). The SASAP-R format (Figure V-25) was used.

(1) Labor Force Adequacy. The local availability of a manufacturing labor force was assessed from a SAE format run (Figure V-6) for the census classification "craftsmen and operators" (data field 8) in OEP category PPH described on page XIII-1 of the Resource Data Catalog (ISG-101).

(2) Local Transportation Adequacy. Two categories were processed in the search for evidence of surviving local

capabilities to connect with transportation service in and out of the locality. The SASR format (Figure V-26) was used to summarize at the SMSA level: (1) railroad facilities (bridges, tunnels, yards, shops) number of records from OEP category TRG described on page IV-17 of the Resource Data Catalog (ISG-101), and (2) motor gasoline in storage in January from OEP category EJA, data field 1, identified on page V-18 of the Resource Data Catalog (ISG-101).

(3) Electric Power Availability. Electric power availability was represented by surviving electric power generating capacity assessed from nameplate capacity installed as of 31 December 1968 (data field 3) in OEP category EEG and electric substation capacity assessed from nameplate capacity installed as of 31 December 1968 (data field 3) in OEP category EET. These categories are described on pages V-1 and V-3, respectively, of the Resource Data Catalog (ISG-101). The availability of these capacities was summarized by the 26 Federal Electric Supply Areas which divide the US into the operating electric grids by which they are served. These are described in the Interior Department Manual (1967), Chapter 5, Part 190: "Emergency Organization". On the assumption that the electric grids were restored where damaged, the availability of electric power was assumed to depend on the availability, by electric power supply area, of surviving generating capacity summarized in the SASAP-R format (Figure V-25); and the availability, by electric power supply area, of surviving substations summarized in the SASR format (Figure V-26). In order to match this for a supply-to-requirement comparison, it was necessary to

aggregate by power supply area the power requirements as reflected in the purchased electricity (data field 8) by surviving manufacturing establishments (category MEI). Thus the adequacy of electric capacity for the requirements in the SMSAs could be assessed only at the power supply area level because it was only there that it could be compared with the available power supply.

f. (U) Net Local Viability. In order to systematize the selection of a single local viability date (LVD) for an SMSA, the following procedure was used. First the listing for each of the 230 SMSAs of the actual values from Scenario A for the 34 indicators identified in Figure V-28 was prepared. Copies were distributed to members of a local viability task group. This task group included representatives from DCPA (then OCD), HEW, HUD, Agriculture, Labor, Commerce, Transportation, Interior, the OEP staff and from the PONAST Civil Requirements, Institutional Factors, and Sociological and Psychological Aspects Subcommittees. As the second step in the procedure based on this listing of indicators for each SMSA and from general knowledge, the task group members prepared 13 columns of findings on each SMSA which constituted the criteria for SMSA LVDs listed in Figure III-A-37. The origin and basis for the figures are more fully explained below in Figure V-29 in which the criteria were grouped into three categories according to their content and basis of application. Category one is comprised of the first five criteria listed which were technical SMSA characterizations selected for reproduction from the 34 indicators identified in Figure V-28. Category two is composed of the next three criteria listed which were judgmental viability ratings provided by the responsible-agency representatives based on their evaluation of the prospects

FIGURE V-28

Local Viability Indicators

Indicator Number	Paragraph-Topic Indicator Name	Content/ Category	Source or Format
	4a - Radiation Denial		
1	Availability Date	Radiation Availability Code	Table 6
2	Average Dose	R/PFH-moved	SASD (V-5)
	4b - Casualty Impact Status		
3	Fatality/Casualty Class	CIS Class Code	Figure III-7
	4c - Local Government Capabilities		
4	DAI Civil Control	Percent Civil	Fig.III-A-35,Col.2&Col.1
5	DA90 Civil Control	Percent Civil	Fig.III-A-35,Col.3&Col.1
6	Local Government Status	Survival Class	Figure III-A-34, Col.1
	4d(1) Medical and Health Care		
7	Physician Capability _ Caseload	Date of No Deficit	M S-RC (V-23)
8	Physician Capability _ Caseload # 100	Date of Small Deficit	M S-RC (V-23)
	4d(3)(a) Housing		
9	Billeting Capacity _ Req.	Date of No Deficit	H S-RC (V-27)
	4d(2)(a) Food		
10	DAI Food Req.	% of Pre/PFH-moved	SAS (V-24)

Indicator Number	Paragraph-Topic Indicator Name	Content/ Category	Source or Format
11	D#15 Food Req.	% of Pre/PFH-moved	SAS (V-24)
12	D#30 Food Req.	% of Pre/PPH-moved	SAS (V-24)
13	D#90 Food Req.	% of Pre/PFH-moved	SAS (V-24)
14	D#6 Home supplies	% of Pre/PPH-2	SASAP-R (V-25)
15	D#6 Retail supplies	% of Pre/RCE-1	SASR (V-26)
16	D# Wholesale supplies	% of Pre/WCE-2	SASR (V-26)
	4d(2)(b) Water		
17	D#30 Water Status	Surplus or Deficit	Manual W S-RC
	4e(1) Labor Force Adequacy		
18	D#365 Labor Force Req.	% of Pre/MEI-7	SASAP-R (V-25)
19	Labor Force Available	Craftmen & Operators(100)/PPH-8	SAE (V-6)
20	D#30 Labor Force Adequacy	%:% of Pre/PPH-8 & % of Pre/MEI-7	SAE; SASAP-R
21	D#365 Labor Force Adequacy	%:% of Pre/PPH-8 & % of Pre/MEI-7	SAE; SASAP-R
	4e(2) Local Transportation Adequacy		
22	D#30 Trans. Connection Req.	% of Pre/MEI-1	SASAP-R (V-25)
23	D#365 Trans. Connection Req.	% of Pre/MEI-1	SASAP-R (V-25)
24	D#6 RR Facilities Available	% of Pre/TRG-0	SASR (V-26)

FIGURE V-28 (CONT)

UNCLASSIFIED

Indicator Number	Paragraph-Topic Indicator Name	Content/ Category	Source or Format
25	D/6 Pol. Products Available	% of Pre/EJA-1	SASR (V-26)
	4e(3)Electric Power Availability		
26	SMSA D/1 EP Req.	% of Pre/MEI-8	SASAP-R (V-25)
27	SMSA D/30 EP Req.	% of Pre/MEI-8	SASAP-R (V-25)
28	EPArea D/1 EP Req.	% of Pre/MEI-8	SASAP-R (V-25)
29	EPArea D/15 EP Req.	% of Pre/MEI-8	SASAP-R (V-25)
30	EPArea D/30 EP Req.	% of Pre/MEI-8	SASAP-R (V-25)
31	EPArea D/1 EP Gen. Avail.	% of Pre/EEG-3	SASAP-R (V-25)
32	EPArea D/15 EP Gen. Avail.	% of Pre/EEG-3	SASAP-R (V-25)
33	EPArea D/30 EP Gen. Avail.	% of Pre/EEG-3	SASAP-R (V-25)
34	EPArea D/30 EP Sub. Avail.	% of Pre/EET-3	SASR (V-26)

FIGURE V-28 (CONT)

UNCLASSIFIED

FIGURE V-29

ORIGINS OF LVD CRITERIA

Criterion No.	Criterion Name	Originating Agency	Source or Basis
1	Radiation Avail. Date	DCPA (then OCD)	Figure V-28, Column 1
2	Casualties Impact Status	OEP	Figure V-28, Column 3
3	Local Government Survival	DCPA (then OCD)	Figure V-28, Column 6
4	Medical Viability Date	PHS/HEW	Figure V-28, Column 7
5	Housing Viability Date	HUD	Figure V-28, Column 9
Judgmental - Functional Capability			
6	Transport In and Out	ODT/TRANS.	RR fac, MOGAS, and private auto
7	Local Government Operations	DCPA (then OCD)	Figure III-A-34, Viability Group B
8	Industrial Production	BDC/Commerce	Operability of surviving capacity
Judgmental - Overall Capability			
9	General Viability	Agriculture	Capability to support production
10	General Viability	Labor	Capability to support production
11	General Viability	PHS/HEW	Capability to support production
12	General Viability	HUD	Capability to support production
13	General Viability	OEP Staff	Capability to support production

FIGURE V-29

UNCLASSIFIED

for their respective function of primary concern. The last five criteria are judgmental ratings intended to reflect not only the function in which the agency represented was primarily responsible, but also other factors reflected by all 34 indicators. The final column of Figure III-A-37 gives the resulting LVDs, for each SMSA, coded from one through seven. The first six numbers are for the same six time periods D+1 through D+365 shown in Figure V-6. For SMSAs deemed not viable as of D+365 it was agreed that they should be assumed to become viable six months later at D+545. The Chairman of the Subcommittee provided a tentative consensus list of LVDs intended to reflect a weighting of the above mentioned 13 criteria. With minor modifications, the proposed schedule was agreed to by all participating representatives and used in the study.

5. (U) Production Capability of the Surviving Economy

a. Manpower. The labor force availability percentages in Table 31 of Volume III are taken from the runs made with the SAE format (Figure V-6) for various categories. The employed-labor-force figure is from the assessment of OEP Category LFI described on page IX-6 of the February 1971 edition of the Resource Data Catalog (ISG-101). Since the file used 1963 data, the percentages resulting from the assessment were applied to 1970 data from the Bureau of Labor Statistics. Similarly, the assessment of the potential additional elements of an augmented labor force was keyed to the assessment of the aggregated Augmented Labor Force Potential in data field 9 of Category PPH described on page XIII-1 of the current (January 1972) Resource Data Catalog (ISG-101). The percentage manpower availability by industry summarized in Table 32 of Volume III was derived

by the application of a specially constructed procedure for the assessment of manpower classed both by industry and by occupation. The results are summarized in a special manpower format, a sample of which is shown in Figure V-30. The data used for the assessment by industry are from the 1963 Category LFI described above. The resulting percentages were applied to the current data for 1970 supplied by the Bureau of Labor Statistics. The assessment of labor force availability by occupation summarized in Table 33 of Volume III was similarly derived from the assessment summarized in the manpower format applied to the 1963 data on Selected Occupations Employed in the US Labor Force in OEP Category LFO described on page IX-1 of the February 1971 edition of the Resource Data Catalog (ISG-101).

b. Resources

(1) Raw Materials

(a) Agriculture

1. Food Animals. The inventories for poultry, swine, and dairy cattle are from data fields 1, 6, and 4, respectively, of OEP Category ALS, "Livestock Inventories and Sales," described on page VI-1 of the current (January 1972) Resource Data Catalog (ISG-101). This is 1964 Census of Agriculture data carried in county detail and distributed among 11 shelter classes by the Department of Agriculture. The data on beef cattle on farms and ranches are 1970 data shown in State detail in "Cattle, Sheep, and Goat Inventory" LvGn 1 (72) while the data on feeder cattle are from "Cattle on Feed" MvAn 2-1 (1-70). Both of these bulletins are published by the USDA,

UNCLASSIFIED

FIGURE V-30

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PAGE.. 10

ATTACK...1AI
DATE...9 APRIL 1973

FORMAT..MANPOWER
PROJECT.PONAST II
LFG - 1968 FEDERAL CIVILIAN EMPLOYMENT
FPH - 1968 RESIDENTIAL POPULATION IN HUNDREDS

DATA FIELDS USED		KILLED FIRST DAY	FATALLY INJURED	ABLE-BODIED SURVIVORS D+1	D+2	D+15	D+30	D+90	D+180	D+365	PREATTACK TOTAL
CLASS 0 NATIONAL TOTAL											
TOTAL.ALL BRANCHES	#	523005	409191	1387455	1365776	1506689	1563597	1601535	1634053	1663962	2709873
OF 1	%	19.3	15.1	51.2	50.4	55.6	57.7	59.1	60.3	61.4	100.0
AGRICULTURE	#	7966	7222	64680	63406	69672	71477	80824	83172	87408	106207
OF 1	%	7.5	6.8	60.9	59.7	65.6	67.3	76.1	78.5	82.3	100.0
AIRFORCE	#	65235	57349	76731	74592	84984	87425	103734	107209	113091	267355
OF 1	%	24.4	21.6	28.7	27.9	31.6	32.7	38.8	40.1	42.3	100.0

FIGURE V-30

UNCLASSIFIED

Statistical Reporting Service, Crop Reporting Board. The assessments for poultry, swine, and dairy cattle are taken from a run of a special subroutine of the READY model designed originally to assess radiation damage to livestock on a county basis. The output of this "livestock" subroutine is provided in a special format illustrated in Figure V-31. The assessment of beef cattle is the weighted total of the separate assessments of "feeder" and "other" cattle. These assessments were made with a special version of READY "livestock" subroutine adapted to apply to State data and using only three classes of protection for which the protection factor value is adjusted to reflect beta radiation damage in addition to gamma. The lethal dose (LD) levels for the various classes of livestock are shown in the following table.

TABLE 12

LIVESTOCK LETHAL DOSE (Gamma only)

Livestock Species	Dose (ERD) for Percent Lethality at 30 Days				
	0	25	50	75	100
Cattle	250	325-375	450-550	585-615	650
Swine	300	350-400	450-600	685-715	800
Poultry	300	400-500	600-700	785-185	900

Because of dissatisfaction with the results of the initial assessment of cropland denials and the original beef cattle assessment based on data in Category ALS, an ad hoc PONAST committee was formed to review the assessment procedures and assumptions for agricultural production. The group was chaired by the Chairman of the PONAST Production Committee

UNCLASSIFIED

FIGURE V-31

UNCLASSIFIED

FORMAT..LIVESTOCK
PROJECT.PONAST II

ATTACK...1AI
DATE...9 APRIL 1973

CATEGORY ALS LIVESTOCK INVENTORIES - JAN. 1970 ESTIMATES .. TWO DATA FIELDS ALL IN 1000 HEAD 01-CATTLE AND CALVES ON FEED 02-BEEF CATTLE AND CALVES

	PREATTACK TOTAL	KILLED OR WILL DIE BY D + 30			TOTAL SURVIVORS ON D + 30
		UNAVAILABLE FOR SALVAGE	AVAILABLE FOR SALVAGE	TOTAL	
OEP REGION 8					
105					
OF 1 - CATTLE AND CALVES ON FEED (1000S)	600	19	88	107	493
%	100.0	3.1	14.8	17.9	82.1
OF 2 - BEEF CATTLE AND CALVES (1000S)	6272	482	1073	1555	4717
%	100.0	7.7	17.1	24.8	75.2
NATIONAL TOTALS					
OF 1 - CATTLE AND CALVES ON FEED (1000S)	13249	702	5459	6161	7088
%	100.0	5.3	41.2	46.5	53.5
OF 2 - BEEF CATTLE AND CALVES (1000S)	83243	5328	36127	41455	41788
%	100.0	6.4	43.4	49.8	50.2

FIGURE V-31

and included persons from OEP, DCPA, Agriculture, Univ. of Tenn./AEC Agr Radiation Laboratory, and Stanford Research Institute. The factors shown in Table 13 were agreed to for use in assessing beef cattle.

TABLE 13

BEEF CATTLE ASSESSMENT FACTORS

Factors	Pasture	Pens	Barns
Protection Factor	1.5	2.0	3.0
Beta Multiplier*			
Winter	.5	.8	1.0
Summer	.3	.8	1.0
Beef Cattle Distribution			
Feeders	8%	84%	8%
Others	65%	20%	15%

The special version of the livestock subroutine was adapted to the use of these factors in assessing the beef cattle.

2. Crops. The data and assessment of crops were provided by the Stanford Research Institute in a research contract with DCPA. The sources and methodology are described in Part IV, pp 31 to 50 of the report referred to in the footnote on page 35. The distribution of radiation intensities by States from the PONAST problem, using the SASLAV format (Figure V-20), was provided by OEP to SRI for use in making the crop assessments.

*These multipliers are used to adjust the lethal dose values of Table 12 which apply to gamma radiation only so as to account for additional damage from beta radiation.

NOTE: Beginning with paragraph '(b) Minerals" to the end of paragraph A, UNITED STATES the source data and formats used in support of each paragraph of the outline are summarized in Figure V-32. In some instances supplemental information is given in footnotes, and in others reference is made to more extended textual descriptions of the line of analysis included in the paragraphs cited.

5b(3)(g) (U)1. Telephone. The American Telephone and Telegraph Company (AT&T) agreed, on request of the Office of Telecommunications Policy, to provide an assessment of the telephone communication potential for the postattack situation posed in PONAST II. AT&T was provided with certain study inputs and asked for certain study contributions.

a. (Information Inputs.) In connection with the study of a communications, command, and control study by CONAD based on the INDIA attack problem under study in PONAST Scenario A, AT&T was given information on damage to its facilities throughout the US. OEP also provided the assessment of damage to all facilities listed in OEP category DCA, Defense Communications Facilities which is described on page I-19 of the Resource Data Catalog (ISG-101). The results were presented in the PAEDAC format illustrated in Figure V-19. AT&T also was given lists of the least affected SMSAs identified by the CIS assessment, described in paragraph 4.b. above, Casualty Impact Status (CIS), which included those having less than 50 percent

FIGURE V-32

Source Data and Formats for Paragraph A-5, Production Capability of the Surviving Economy

Subparagraph No.	Title	Activity/Function	Category & Data Field	ISG-101 Page No.	Format Name	Format Figure
a	Manpower	See Par. A5a, Manpower, page 101 , above				
b	Resources					
(1)	Raw Materials					
(a)	Agriculture	See Par. A5b(1)(a), Agriculture, p. 102, above				
(b)	Minerals	Ore Processing/Type	MMP/1, 2, 3	VII-9	SASAP-R	V-25
(2)	Fuel & Energy					
(a)	Solid Fuels					
1	Coal	Bituminous/Daily Capacity	EBT/2,3	V-21	SASAP-V*	V-33
		Anthracite/Daily Capacity	EAG/1	V-23	SASAP-V	V-33
2	Coke	Coke/By-product Capacity	MCG/1	V-25	SASAP-V	V-33
(b)	Oil and Gas					
1	Petr. Rfg.	Refining/Crude Throughput Capacity	ERB/2	V-9	SASAP-V	V-33
2	POL Storage	Products Storage-Jan/3 products	EJA/2,3,4	V-17	SASR	V-26
3	Natural Gas	LPG/All Products	ERN/9	V-5	SASAP-V	V-33
(c)	Electric Power	EP Generation/Capacity	EEG/3	V-1	SASAP-R	V-26

* Summary Analysis of Scheduled Availability for Production--Viability format illustrated in Figure V-33. The availability schedule is controlled by the local viability dates of the SMSA's for resources therein and by radiation denial termination date for non-SMSA resources.

Subparagraph No.	Title	Activity/Function	Category & Data Field	ISG-101 Page No.	Format Name	Format Figure
b (3)	Transportation and Communication					
(a)	Railroads	RR Facilities/Daily Capacity	TRG/2	IV-17	SASR	V-26
		Barrier Crossing/Bridge or Tunnel	JRX/o	*	PAEDAC	V-19
(b)	Motor Carrier	Motor Vehicles/Trucks	THT/1	IV-35	SASR	V-26
		Highway Bridges in MI & KY	THB/o	**	PAEDAC	V-19
(c)	Inland Waterway	IWW/Locks	TWI/o	IV-13	SASR	V-26
(d)	Pipelines	Gas PL/Stations	EPG/o	V-7	SASAP-R	V-25
		Crude PL/Capacity	EPC/1	V-13	SASAP-R	V-25
		POL PL/Capacity	EPP/1	V-15	SASAP-R	V-25
(e)	Maritime					
1	Ocean Shipping	Ships in Port ***				
		Reserve Fleet/Ships	TFR/1	IV-7	SASR	V-26
2	Ports	Port Facilities/Berths	TPP/2	IV-9	SASAP-V	V-33
		Deep Waterways/Locks	JDL/o	****	SASR	V-26
(f)	Air	Safe Haven Airports/AP	TAC/o	IV-23	SASR	V-26
		A/C Overhaul Bases/facility	TAO/o	IV-31	PAEDAC	V-19
(g)	Telecommunications					
1	Telephone	Analysis provided by AT&T; for description see far A5b(3)(g) 1 Telephone on p.107, above				
2	Telegraph	Switching Centers/facility	DCA/o	I-19	PAEDAC	V-19

* Special list of bridges and tunnels prepared for HAZARD-69.
** Updated input provided by Federal Highway Administration, DOT for Michigan and Kentucky.
*** Assessed from ship-in-port inventory supplied by Maritime Administration, Commerce.
**** Special list for HAZARD-69 of locks in Panama Canal, St. Lawrence Seaway, Welland Canal, and Sault Ste. Marie.

FIGURE V-32 (CONT)

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Subparagraph No.	Title	Activity/Function	Category & Data Field	ISG-101 Page No.	Format Name	Format Figure
(h)	Postal Service	Mail Handling/Center	GPG/1,2,3	II-9	SASAP-V	V-33
		Mail Service/Garage	GPV/o	II-9	SASAP-V	V-33
(4)	Manufacturing					
(a)	Overall	Mfg.Capacity/Total Output	MIO/1	VII-21	SASAP-V	V-33
(b)	Hardest Hit Sectors	Mfg. Capacity/Sector Output	MIO/1	VII-21	SASAP-V	V-33
		Mfg. Capacity/SIC Output	MEI/1	VII-1	SASAP-V	V-33
		Defense Mfg./DOD Employees	MDP/1	*	SASAP-V	V-33
		Nuc Warhead/AEC facility	MAF/o	VII-11	SASAP-R	V-25
		Nuc Warhead/AEC supplier	MAS/o	VII-13	SASAP-R	V-25
(c)	Possible Mfg.Sector Production	First Quarter Production Potential			ROPE **	
(d)	Sur.Capacity for Mil. Support	Nuc. Power Plant/AEC facility	MAF/o	VII-11	SASAP-R	V-25
		Nuc. Power Plant/AEC supplier	MAS/o	VII-13	SASAP-R	V-25
c	Services					
(1)	National Health Care Capability					
(a)	Summary	See Par. A5d(1) Medical and Health Care, page 81, above.				
(b)	Physician Workload	See Par. A5d(1) Medical and Health Care, page 81, above.				
(c)	Hospital Beds	Hospitals/expanded bed capacity	HHH/3	XI-3	SASAP-R	V-25
(d)	Med.Supplies &Eqp.	Emergency Medical Stockpile/inventory	JDS/1	***	SASR	V-26

* Special list of DOD contractors provided exclusively for PONAST by OSD-SA.
** A model devised for DCPA by Research Analysis Corporation to project first three months postattack production by I-O sectors.
*** Special stockpile location list developed for HAZARD-69.

FIGURE V-32 (CONT)

Subparagraph No.	Title	Activity/Function	Category & Data Field	ISG-101 Page No.	Format Name	Format Figure
(2)	Income Maintenance	For Displaced Persons see Part A5d(3)(a)	Housing, page 92, above.			
		Welfare Service/personnel	HNW/1,2	II-23	SAE	V-6
(3)	Higher Education	Univ & Colleges/personnel	NEC/1,2,6	XI-7	SAE	V-6
(4)	Commercial Service and Trade (Table 50)					
		Retail Trade/sales	RCE/1	VIII-3	SASAP-V	V-33
		Wholesale Warehousing and Trade/sales	WCE/1	VIII-1	SASAP-V	V-33
		Selected Services/sales	RSE/1	VIII-5	SASAP-V	V-33
d	National Economic Control Institutions					
(1)	Information Systems	Census HQ Relo/site	GER/o	II-1	PAEDAC	V-19
		Census Field Offices/floorspace	GFB/1	II-1	SAPOS	V-18
		Postal Service/facility	GPG/1,2,3	II-9	SASAP-V	V-33
		Public Employment Offices/office	LEO/o	II-25	SASAP-V	V-33
(2)	Ownership and Management Control					
		Corporation Offices/employment	NCE/1	VIII-7	SASAP-V	V-33
		Mfg Capacity/sales	MIO/1	VII-21	SASAP-V	V-33
(3)	The Financial System - see Par. A5(d)(3), The Financial System, page 112, below.					
(a)	Federal Reserve System	Fed Res Sys/system availability	FRB/o	X-1	SASAP-V	V-33
		Fed Res System/facility	FRB/o	X-1	PAEDAC	V-19
(b)	Com'l Bank System	Commercial Banks/deposits	FCB/2	X-3	SASR	V-26
(c)	Savings & Loan Banks	FedHmLnBnk Board/S&L capital	FSL/3	X-7	SASAP-V	V-33
(4)	Government - see Par A2, Continuity of Government, page 51, above.					
e	Social and Psychological Factors - see Par A5e, Social and Psychological Factors, page 117, below.					

FIGURE V-32 (CONT)

total casualties and also less than 25 percent fatalities. A second list included those not eligible for the first list but with less than 75 percent total casualties and less than 50 percent fatalities.

b. (Study Contributions.) AT&T provided summaries of the surviving and potential connectivity for long-line service among the SMSAs of the first list. Estimates on the status of local telephone service were provided for both SMSA lists. An estimate of the cost of rebuilding the damaged telephone network was also provided.

5d (3) (U) The Financial System

(a) (Essential Functions of the Financial System)

1. The nation's monetary system is a support function rather than a producer. Further, the monetary system in a postattack environment would be critical only in those areas where some organized economic activity was possible; it would not be immediately essential in those areas where rescue and survival activities were predominant. Therefore, in assessing the effects of a nuclear attack on the financial system, it was necessary to measure the system's surviving capacity to provide the services judged to be essential in the relatively undamaged areas.

2. The preattack planning documents of the Federal financial agencies included statements of policy to the effect that in a postattack situation the nation would continue to rely upon the preattack

system of exchange, supplemented where necessary by direct and selective controls. The essential services to be performed by the banking system would include the distribution of currency and coin, the clearing of checks, and the extension of credit, all within regulations already promulgated by the Department of the Treasury.

3. The essential functions of the Federal Reserve Banks are related to those of the commercial banks; that is, to provide the support needed to carry out the postattack functions mentioned above. In addition, the Reserve Banks, under certain specified circumstances, would exercise functions of monetary policy normally reserved to the Federal Reserve Board and the Federal Open Market Committee.

4. Postattack, both the Federal Reserve Banks and the commercial banks would need adequate pre-attack records, a minimum staff of trained personnel, safe office space, and some office machinery (the machine requirements would seem primitive in terms of present computerized bank operations). Also required would be a reserve supply of currency at the Federal Reserve Banks, since commercial banks cannot be expected to hold on hand a supply of currency to meet emergency requirements. (The Federal Reserve Banks have, in fact, built up a two-year supply of currency at normal rates of use.)

(b) (Assumptions and Ground Rules)

1. In estimating the ability of the Federal Reserve System to carry out essential functions in a postattack economy, primary emphasis was given to the survival of preattack locations, including Federal Reserve Banks and branches. Where these buildings were destroyed or rendered unusable, attention was given to the condition of Reserve Bank relocation sites. (If all offices in a given Federal Reserve district were destroyed, surviving offices in an adjoining district might have been able to carry out the essential functions until operating offices could be reestablished.)

2. The reserve currency supply is held in vaults of Federal Reserve Banks and branches. In estimating the postattack availability of the currency supply, the following criteria were used:

a. If the building was severely damaged, the currency was assumed to have been destroyed.

b. If damage was moderate (or fire likely), the currency would be available with some delay (it was assumed that the vault would survive, but that it might take a substantial effort to get to it).

c. If the damage was light, or there was fallout only, the currency would be immediately available. (Quick sorties could be made even into areas of heavy fallout to recover currency if necessary.)

3. Another important element in the postattack institutional arrangements of the Federal Reserve

System is the system of agent banks. These are banks that have been named by Federal Reserve Banks in each district to take over, on an area basis, the functions of cash disbursement and check collection if the Reserve Bank is unable to carry out these functions. In assessing the ability of the agent bank system to operate postattack, an estimate was made of the percentage of banks that survived.

(c) (Source Material.) The OEP files contain the names and locations of 13,078 commercial banks out of a total number of 14,222 on 31 December 1967. In addition, the files contain the names and locations of 7,397 of 18,519 branch banks on 31 December 1967. The file includes the branch banks in States with 100 or more branch banks and with more than 10 branches in counties other than the county in which the head office is located, as well as branch banks in banking systems with three or more branches. All of the major branch banking systems outside metropolitan areas are included in this file.

(d) (Rationale for Analysis)

1. The commercial banking system is sufficiently dispersed that it may be assumed that banks will survive wherever there is a surviving capability for organized economic activity. However, since banks vary widely in size, a clear picture of postattack capacity cannot be obtained merely by counting the number of banks that survived.

2. Therefore, surviving banking capacity was taken to be the level of surviving deposits in

areas of light damage or no damage, and where fallout would permit some activity shortly after an attack. This method provided a reasonable estimate of surviving capacity at the national and the Federal Reserve district level but not at levels below the Federal Reserve district.

3. Cash held in vaults of commercial banks was not used in estimating postattack capacity because the figures are highly variable. The branch figures are used to adjust for potential overstatements of damage in areas where branch banking is important.

4. In estimating the postattack capacity of the monetary system, all of the data described above had to be integrated. Since it did not seem likely that the commerical banking system would have suffered such damage that the support of the Federal Reserve System was not needed, nor was it likely that the Federal Reserve System could provide support to all banks in all areas at all times, care was taken to consider the central banking and the commercial banking categories as a unit.

(e) (Limitation of Data)

1. Data for the commercial banking system included vault cash and deposit figures which were five years old. However, as explained above, the procedure for estimating surviving capacity depends more upon relationships among banks than upon the absolute figures; for this reason, it is believed that even the five-year old data probably gave a fairly accurate postattack picture.

2. Further, the data for the commercial banking system include deposit figures for the branch banks in the head office figures. Thus, destruction of the head office of an extensive branch banking system, such as Bank of America, exaggerates the damage done to the system. Adjustments can be made by use of the branch category, but this is tedious and time-consuming at lower levels of disaggregation.

e. (U) Social and Psychological Factors. A special study* was conducted concerning the probable social and psychological consequences of nuclear war and its impact on national recovery. The study sought to determine the critical social and psychological factors, and where feasible to specify them in a form appropriate for input to postattack systems studies. In the course of the study, a selected panel of 30 experts was used. The panel included scientists who have been involved in disaster or postattack research, Federal officials in agencies dealing with civil defense and emergency preparedness, and military officers whose responsibilities include planning for the nuclear war contingency. The panel members were asked for their projections about the state of society during a postattack period. Then, using a modification of the Delphi technique, the panelists considered and evaluated the total set of projections, thereby producing a list of social and psychological factors considered critical to recovery from nuclear attack. A range of attacks including

*See footnote page 53 for reference.

[redacted]

one that could produce as many as 70 percent casualties was considered. An attempt was made to quantify the effects of these factors on variables such as the postattack availability of labor. Countermeasures to reduce dysfunctional effects were recommended.

B. USSR

*See Appendix B.

[redacted]

CHAPTER IV--NATIONAL RECOVERY (VOLUME IV)

PART I. INTRODUCTION

(U) The paragraph numbers and titles of this chapter follow those used in Volume IV. Only those paragraphs of the basic volume which require methodological explanation are covered in the following discussion. As appropriate, these discussions identify the information sources and describe the line of analysis used or reference the model applied in the corresponding Volume IV paragraph.

PART II. UNITED STATES

A. (U) NATIONAL ECONOMIC GOALS, OBJECTIVES, AND GUIDEPOSTS.

The goals, objectives, and guideposts were adapted from the approved Terms of Reference (see Volume I, Appendix A), PONAST I, and preliminary statements developed by the PONAST II Production Committee.

B. PRINCIPAL PRODUCTION CONTROLS AND CONSTRAINTS

1. (U) Interindustry Model of the Economic Structure

a. Basic Input-Output (I-O) Table. The 86 sector input-output tables of the 1958 US economy published by the Office of Business Economics (OBE),* Department of Commerce in the September 1963 issue of the Survey of Current Business constitutes the basic I-O model for the US economy. Though the more disaggregated table for 1963 had been published by OBE in time for this study, the 1958 table was used for two reasons.

*As of 1 Jan 72, OBE became the Bureau of Economic Analysis (BEA).

The OBE has not published the benchmark data in 1963 prices which are used for the 1963 prices necessary for a direct restatement of 1970 (in this case) prices in 1963 constant dollars. Also the computer programming required to handle the reformulation of final demand for the larger table had not been completed by OEP. The relative stability of I-O coefficients utilized in the study is supported, among other sources, by: Carter, Anne P., Statistical Change in the American Economy, Harvard University Press (1970).

b. I-O Table Modifications. Certain modifications in the published OBE table were made by OEP to facilitate the formulation of the restatements of the final demand. These include changes in the handling of imports, research and development and scrap. These modifications are described in Schulman, A. A., Demand Impact Transformation Tables (DITT), REG-106, OEP (February 1970). Four changes in the inter-industry coefficients in the modified basic table, which had been made for PONAST I, were retained: (1) Wooden Containers (I-O 21) was combined with Lumber and Wood Products (I-O 20); (2) one-half of the demand of Maintenance and Repair (I-O 12) for paint was reassigned from Paints (I-O 30) to Value Added, in effect, by halving the I-O 30 input coefficient of I-O 12; (3) one-sixth of the coefficient requirement for Metal Containers (I-O 39) by Food Processing (I-O 14) was reassigned to Paperboard Containers (I-O 25) and one-third was reassigned to Glass (I-O 35) (one-half of the original requirement by this food industry for metal containers remained); and (4) Printing and Publishing (I-O 26) and Radio and TV Broadcasting (I-O 67) were combined with Business Services (I-O 73). These adjustments are described in THE POST MODEL, An Illustrative Application, TR-72, OEP (June 1970), page 2.

2. (U) Sector Capacity

a. Concept of Capacity. The highest total output (output for both final and indirect demands) for a sector in recent years is taken as the best available estimate of capacity. For this study, the total output for 1970 (the full year preceding the attack) is the highest and hence used, except for Ordnance (I-O 13), Electronics (I-O 56) and Aircraft (I-O 60) for which the 1969 output was significantly higher and therefore used. The indirect (or intermediate) demands included in these totals were generated from the estimate of final demand for those years based on GNP control values which were published by the Department of Commerce in the April 1971 issue of the Survey of Current Business. The method by which the estimated final demand bills of goods and the indirect demands were generated is described in REG-106, cited above. The resulting sector totals of pre-attack capacity, in constant 1958 dollar values, are shown in the first column of Figure IV-A-1 in Volume IV, Appendix A.

c. Availability of Surviving Capacity

(1) Surviving Operable Capacity

(a) Manufacturing. For damage assessment purposes the preattack plant capacities of all 50 manufacturing sectors were distributed geographically over the resource locations provided in OEP resource category "Selected Interindustry Sector Capacities" designated MIO and described on page VII-21 in Resource Data Catalog, published by OEP as ISG-101 (January 1972). The Summary Analysis of Scheduled Availability format of READY damage assessment output aggregated those plants in each sector that received light or no damage and were available according to the local viability dates for the SMSAs involved.

(b) Extractive and Service Activities. The residual capacities for the agricultural sectors (1 through 4) were derived by application of the survival percentages in the livestock and land-use categories which had been assessed in the survival analysis. The preattack capacities for the metal ore and coal extraction sectors (5, 6, and 7) were included in the category MIO and, hence, were assessed with the manufacturing resources. The survival percentage for oil and gas (sector 8) was estimated to be a weighted average of the survival percentages of the other three mineral extraction sectors (5, 6, and 7). For the two remaining extractive sectors (9 and 10) covering stone, clay, and chemical minerals, and for all 16 of the construction and service sectors (11, 12, 65, 66, and 68 through 79) no resource category data was developed to systematically provide the required survival information. In the absence of such, an indirect assessment procedure was developed based on population survival in urban and non-urban areas. The first step was to divide the preattack capacity for each of the 18 sectors in question between SMSA and non-SMSA locations. This was done with the use of data and procedures for making geographical distribution of all sector total outputs described in Multiregional Distribution Tables for Economic Variables published as ISG-107 by OEP (October 1970). For each sector, the percent of total SMSA population which survived with no observable attack effects was applied to the SMSA portion of preattack sector capacity in order to estimate the surviving SMSA component. Similarly, the surviving non-SMSA component was assessed from

the non-SMSA population experience. The final seven sectors (I-O 80 through 86), were assumed to survive in proportion to population survival and later modified by increases adopted to match estimated requirements.

(2) Repairable Moderate Damage. The assessment of moderate damage, aggregated by date of availability for repair, was provided in the same READY model format that provided the light or no damage assessments for the three extractive and 50 manufacturing sectors. For those construction and service sectors for which the surviving operable capacity was assessed by application of the population survival rate to the preattack capacity, the share of the resource total subject to moderate damage was determined by applying the percent of the population subject to non-fatal injury by the attack. This assessment also was made separately for the SMSA and non-SMSA resources.

C. (U) FORMULATION OF FINAL DEMAND

In general the procedure was to formulate and convert the applicable activity estimates to I-O final demand vectors by the application of the DITT coefficients as previously referenced.

1. (U) Basic Personal Consumption and Government (Non-Defense). The classification of the expenditures for postattack personal consumption and for non-defense governments (Federal, State, and local) was made in terms of the activities listed in Tables A-1, A-6, and A-7 in the DITT Guidebook (REG-106). The estimated 1965 per capita expenditure for each activity was derived from historical analysis developed in OEP. Each activity expenditure was adjusted by a priority factor which represented that part of the preattack per capita expenditure which was considered essential to sustain the health of the

population and the vigor of those who produce. Such factors, originally developed for PONAST I, are listed with the 1965 activity expenditure level and the resulting per capita expenditure rate for each activity in The Post Model (TR-72), Table IV C, pp 27-29. PONAST II used these 1965 priority factors with three exceptions: (1) a factor of .25 was substituted for .00 for activity 92242 (Tobacco Products); (2) activity 97101 (Federal and Non-Defense Compensation) was changed from .25 to 1.00 at the suggestion of the Department of Labor representatives; and, (3) the factor for 92247 (Drugs) was changed from .90 to 1.10 and that for 92340 (Physicians, Dentists, and Hospitals) from 1.00 to 1.10 at the suggestion of DHEW representative. These three sets of changes were agreed to by the PONAST Production Capacity Subcommittee. For each activity, the number of survivors was multiplied by the resulting basic per capita activity expenditure. These total activity expenditures were applied to the DITT matrix to obtain the final demand bill of goods distribution to the sectors of the I-O table.

2. (U) Military Support. The military pay and O&M expenditure requirements were derived from the 1970 per capita expenditure for those items applied to the total numbers in the postattack armed forces. The R&D expenditures were related to the preattack expenditure totals. See Appendix E.

3. (U) Foreign Trade. The total 1970 imports and exports for Northern North America, Southern North America, and South America are shown in the December 1970 issue of the Highlights of US Exports and Import Trade, FT990, Bureau of the Census. The amounts shown were assigned to DITT activities and converted to constant (1958) dollars by the use of estimated index numbers for the DITT activities. These estimates for exports and imports were applied separately to the DITT matrix and the resulting

bills of goods were combined into a net foreign trade balance for each I-O sector. For those sectors where the postattack economy was tight, no exports were permitted.

4. (U) Stockpile Availabilities for Inventory Change

a. Strategic Materials Stockpile. The basic damage assessment for the selected items from the national strategic and critical materials stockpiles was made in terms of the physical units represented by the OEP category WSS (Federal Inventories of Strategic and Critical Materials) described on pages XIV-1 of the Resource Data Catalog. The residual quantities shown in the assessments were converted to constant dollars by use of unit prices provided for this purpose by the Stockpile Policy Division, OEP. (The analysis showed that there were no postattack requirements for any of these stockpile items.)

b. DOD Machine Tool Stockpiles. Basic data on DOD machine tool stocks were taken from a three-page exhibit of "Department of Defense Industrial Plant Equipment Inventory Data" dated 1971 which was provided by the Stockpile Policy Division, OEP. The exhibit used was labeled Format D and the indicated reports control symbol was DD-I&L(Q)749.

5. (U) Investment. For all types of investment (including repair of moderate damage, routine equipment replacement, and new construction) it was necessary to estimate the amount of investment required to provide a particular amount of production capacity. Historical capital-to-output ratios were used for these purposes. They are shown for each sector in column 8 of Figure IV-A-1 in Volume IV, Appendix A. For the manufacturing sectors, these consisted of the average of the ratios for constituent SIC industries weighted by the share of the sector capacity represented by each industry. The ratios reflect the

D. (U) FORMULATION OF A RECOVERY PRODUCTION PLAN.

The procedure by which the recovery production plan was formulated is described in considerable detail in the Volume IV discussion under this heading. In summary, the final solution is reached through successive approximations (iterations) to find a succession of feasible annual final demand stipulations which, in as few years as possible, will (1) meet the basic commitments, (2) provide the necessary investments, and (3) satisfy the reconstruction requirements established by the objectives. To be feasible the aggregate of the final demands for any one year must not produce indirect (interindustry) demands which when added to the final demand for any sector requires a total output that exceeds the available sector capacity. This comparison of total output to available capacity was accomplished for each year with a modified version (omitting the linear programming feature) of the POST model which was developed for this purpose by OEP. The operations of the POST model is described in Operational OEP Nuclear Contingency Models published by OEP as ISP-107 (April 1971).

E. (U) THE RECOVERY PRODUCTION PLAN

The final results of the iterations for each of the recovery years, which were accepted as fulfilling the requirements of a recovery production plan, are summarized in the Volume IV discussion under this heading. Full sector detail for all years are given in Volume IV, Appendix A, Figures IV-A-5 and IV-A-6, respectively, for Final Demand Required and Capacity Utilization. Full POST model computer output runs from which these figures were copied and which also include statements on Capacity Analysis and Final Demand Satisfied are on file in OEP.

PART III. USSR

A. NATIONAL ECONOMIC GOALS AND OBJECTIVES

1. (U) The task of Volume IV was to construct a multiyear plan for the recovery of the Soviet economy to its preattack state, while simultaneously maintaining at least a minimum per capita level of consumption and rebuilding the armed forces. The basic tool used for the analysis was the reconstructed Soviet input-output table in producers prices for 1966. This table was used to calculate the total impact on all sectors of the economy by production in any given sector. In general, it connected the specified expenditures for consumption and military support with the postattack capacities of the sectors which were estimated in Volume III. Residual capacities available were then calculated. The second part of the problem was to use these residual capacities for investment to rebuild the economy as rapidly as possible. For this purpose, a capital stock table was used in connection with the input-output table.

CHAPTER V--POST-NUCLEAR ATTACK ANALYSIS METHODOLOGY

A. INTRODUCTION

1. (U) Response to the Third PONAST Objective. The third objective, stated in the study terms of reference (Volume I, P. A-1), was "To continue the development of the analytical procedures for post-nuclear attack study." It is the purpose of this chapter to indicate the general pattern that the study of the prospective postattack environment has taken in the two PONASTs that have now been completed and to indicate what development in the line of analysis as between PONAST I and II has been achieved and what preparation and further development is required for its continuation.

2. (U) Purpose of Post-Nuclear Attack Analysis. As a source of direction for the pattern of analysis and as a frame of reference for identifying progress in the development of the line of analysis, it is necessary to determine what the purpose is that it is intended to serve.

The PONAST I purpose was stated thus:

> The stated purpose of the PONAST was to assess the world environments resulting from two hypothetical general wars which included strategic and theater nuclear operations, in order to examine possible follow-on military and non-military operations in the period to the termination of the wars. A derived purpose of the study was to develop an analytical procedure which would facilitate the accomplishment of any similar study.

The corresponding statement of PONAST II objectives is restated in full as follows:

> 1. Assess the capability, following a strategic nuclear exchange, of the US and the USSR to: (1) survive; (2) continue the conflict; and (3) recover.

2. Provide a basis for determining what actions could be taken to enhance survivability, reconstitution and rehabilitation of the US in the trans-attack/postattack period, placing major emphasis upon US civil/industrial reconstitution and the associated military requirements.

3. To continue the development of the analytical procedures for post-nuclear attack study.

The common purpose of these studies was to evaluate the post-attack capabilities and enhance the analytical abilities for doing so. The evaluation of the postattack capabilities provides the basis for identifying opportunities for improving preparedness which was the additional purpose stated for PONAST II.

B. (U) PATTERN OF ANALYSIS

In response to the common purpose, a recognizable pattern of analysis was evolved for the conduct of these studies which can serve as the means for evaluating the capabilities of the residual elements of national strength following a massive nuclear exchange. The following examination of the approach and scope of the pattern of analysis and of the participation in it is intended to show how the evaluation of the residual strength is accomplished and to shed light on its role in nuclear contingency policy development.

1. (U) Approach. The analysis goes about the task of evaluating the residual elements of national strength by testing their adequacy for the attainment of national objectives. The test procedures necessarily involve the use of assumptions which then remain as conditions to the findings of the tests. The nature of the tests and the role of the assumptions are examined in turn.

a. Test of Surviving Capabilities

(1) The adequacy of the principal elements of national strength remaining after a massive nuclear attack is established by testing them against the

national objectives. In PONAST I terms, this test was a determination as to whether "forced termination" was threatened. In PONAST II, the test was the determination as to whether the nation could survive, continue the conflict, and recover. In either case, the test consisted of a finding as to whether any of the objectives were jeopardized by deficiencies in such vital elements of national strength as population, government, military forces, local viability, or production capability including manpower, physical resources, institutional fabric, and psychological state of mind.

(2) An examination of the nature of the testing applied in the two PONASTs reveals more fully the central theme that provided the direction for the pattern of analysis and frame of reference for identifying progress in its development. In PONAST I, those military capabilities of the adversaries designed for use against military capabilities were tested by gaming the theater war in Europe, the war on the high seas, and the counter-force attacks involved in the nuclear exchange. The effectiveness of the part of the attack designed for use against nonmilitary capabilities (attacks on counter-value targets in the nuclear exchange) was assessed in terms of the evaluation of the surviving nonmilitary capabilities. This was accomplished by testing them for the threat of "forced termination." The nature of these tests is summarized in the PONAST I study approach, which stated:

> 1. (U) The analytical approach developed was: to assess as many military and nonmilitary capabilities of the adversaries as possible, and to test these capabilities to see if they met national objectives. The test of the military capabilities lay in war

gaming the adversaries in opposition. The test of the nonmilitary capabilities lay in the determination of whether any vital element of national power had failed to rise to a minimum requirements threshold, including one for vital military support. Such failure would have forced termination. The test of the effects of military capabilities applied against nonmilitary capabilities was derived from the outcome of the test of the resulting nonmilitary residuals.

The definition of "termination," which was an essential part of the testing involved in this approach, was stated as follows:

> c. Termination. The final cessation of hostilities mutually agreed to by the principal adversaries. The threshold of forced termination was defined as that point at which the prospects for either adversary became so dismal that it was clear to its national authority that the continuation of the conflict could only worsen its condition. At that point, it was presumed the authority would feel compelled to agree to termination.

(3) In PONAST II, the capacity to survive and to continue the conflict was assessed in the analysis of national survival, which was provided in Volume III, and the capacity to recover, which was assessed in Volume IV. The implicit test applied to population was as to the sufficiency of the survivors to preserve the national entity. The test applied to government was to confirm the preservation of national leadership and the survival of at least marginal capacity for the direction of both military and civilian emergency operations. In the absence of any gaming tests of the military residuals available following theater campaigns or war on the high seas after the nuclear exchange, the PONAST I results were used to assess the replacement requirements called for in the PONAST II economic analysis. The residuals from the nuclear exchange were summarized and characterized generally for their defensive and offensive capabilities, though they were not tested in a follow-on exchange.

As with PONAST I, the test of the military capability applied in the nuclear exchange against nonmilitary strength (countervalue targets) of the adversary lay in the outcome of the test of the nonmilitary residual capabilities of the adversary.

(4) The adequacy of the producing capability of the surviving economy is not tested in the aggregate against the requirements of the national objectives until the requirements are compared with capacities for feasibility after the recovery period has been entered. The transition from the survival to the recovery period is marked by the shift in primary dependence for meeting national requirements from surviving inventories to postattack production. Short of that stage, however, the postattack remainder of the principal elements of production are compared with their own preattack magnitudes: (1) to provide civilian and military nuclear contingency planners with an insight into the character and magnitude of their postattack problems, (2) to reveal a possible threat to survival or recovery, and (3) to summarize the time-phased availability for all sector production capacities as required for the formulation of the recovery plan. The second purpose above, which among the three, most closely approximates being a test for forced termination, is stated thus:

> The second purpose is to ascertain whether the available residual in any vital category may be so low that it could be said to be a threat either directly to national survival or to the reorganization of the economy and the institution of the recovery phase.

(5) Once the recovery period has been initiated, the feasibility of meeting all economic requirements derived from the national objectives can be tested directly against the available capacity of all essential segments of the

economy. The first priority goal of national recovery is to sustain national survival and to maintain the integrity of the national economy, thereby permitting it to address the recovery goal. Two survival support objectives requiring first priority support from the economy are described thus:

> a. Civil Survival Support. This direct objective is to maintain a standard of living sufficient to preserve the health of the population and the vigor of those who produce.
>
> b. Military Survival Support. This direct objective is to maintain and support the military forces at least at the level required to preserve the national independence and territorial integrity...

The failure to maintain survival support as defined would threaten a breakdown of the national economy or a fatal weakening of military support, either of which could threaten forced termination.

b. Role of Assumptions. Because the attainment of the national objectives involves a response to them through time, the tests (such as those identified above) devised to assess the adequacy of the available capability must involve the simulation of the action required in order to measure the performance. The mere summation of capabilities cannot provide the necessary attainment test, except as some vital element of capability is observed to have been so reduced that it becomes apparent that the required action dependent upon it would not be possible. If such deficiency is not apparent, then the adequacy of the residual capacity can be measured in the absence of the actual event only by projecting a simulation of the attainment effort. This introduces many areas of uncertainty, especially where choices of alternative courses of action must be made and where human behavioral response is involved. It becomes

necessary to make assumptions about the courses of action followed and to fill the uncertainty gaps where the basis of action cannot be measured. Only thus can a framework be developed by which the various isolated applications of quantifiable capabilities can be tied together into a coherent whole as required to test whether or not the objectives can be attained. But the inclusion of such assumptions limits the study as a prognosis of the outcome of the conflict. On the other hand, conclusions that rest directly on comparisons among capability and requirement assessments do provide benchmarks within the range of possibilities.

2. (U) Scope. As between PONAST I and II, variations in scope of the case studies undertaken resulted in differences in the purposes to which the results of the analyses apply.

a. Military Capability Assessment. In PONAST I, the opposing military forces available after the nuclear exchange in the European Theater and on the High Seas were gamed to test their capabilities to attain the national objectives at stake. The results of the war at sea were not conclusive, except to establish the amount of the additional losses. The outcome of the European campaign was determined by the relative rates of advance based on the assumed effectiveness of the "fire power potential," specifically assessed for the purpose, possessed by the two sides. No assumptions about course-of-action choices or human-response factors were included. On completion of the study, it was concluded that the war game results reached could have been equally well estimated from a simple comparison of the opposing forces surviving the nuclear exchange. Because the considerable analytical

effort expended on the military gaming was judged not to have produced illuminating results, no such effort was directed to be taken for PONAST II. Unless new and promising procedures are devised for the comprehensive gaming of theater wars, it seems unlikely that any effort to test post-nuclear-attack theater military capabilities beyond a direct comparison of the size of opposing forces would be worth the time and effort.

b. Residual Nuclear Strike Capability. A complete assessment of the residual capability to continue the conflict would necessarily include the assessment of the capability to strike again. This would require, first, a determination of what nuclear strike capability remained after the initial exchange. Beyond that, the evaluation of such surviving capability could be made only by the same procedures used to assess the effectiveness of the strike forces used in the initial exchange. The effectiveness of that part of the capability in damaging civil elements of national strength would require a new survival and recovery analysis of the nation based on the residuals following the second exchange. In PONAST I this was carried to the point of determining expected residuals from alternate possible uses of the residual attack capabilities. No gamed results were obtained and no assessment was made of the prospects for survival and recovery. The examination of a possible second exchange as a part of PONAST II was not feasible. Although a decision to mount follow-on exchanges after a first one may be even more remote than the chance that the first would be mounted, at least theoretically, the full assessment of an existing or prospective nuclear

attack capability cannot be made except through the examination of the prospective results of its full application.

c. Unrecovered Losses. As indicated in the discussion of the approach, the analysis focused on what could be done with surviving capabilities to repair or replace some of the damaged capabilities in the pursuit of the stated national objectives. Incidental to the determination of the available residuals, the losses both in population and resources were first assessed. To these, PONAST II added estimates of other long-term damage to the population from radiation exposure which did not affect the immediate residuals for survival and recovery. The systematic assessment of these types of damage to population and resources would contribute to a comprehensive base for evaluating any reduction in damage attributable to an armament or disarmament measure.

d. Geographic Scope. PONAST I evaluated not only US and USSR impact but, to a somewhat lesser degree, that for Canada and Eastern Europe and, to a still lesser degree, Western Europe and China. The PONAST II analysis was confined primarily to the US and USSR although some limited allowance was made for foreign trade. Based on the experience of PONAST I, it was judged that a full-scale analysis of the residual capabilities of the allied and satellite nations was not warranted. In any case, the assessment of the residual world position of these principal adversaries after such an exchange would require the inclusion of the post-nuclear exchange capabilities not only of the allied and satellite nations, but also of the principal non-involved powers.

e. Alternative Considerations. As indicated earlier, a PONAST analysis requires the construction of a sufficiently developed framework to relate the residual capabilities to the attainment of the national objectives. The validity of the findings from a single such framework, even subject to the acceptability of the assumptions used, is limited to the circumstance illustrated by the particular case. Wider application required consideration of alternative frameworks. The need for looking at alternative cases was recognized in PONAST I which provided paralled examination of two versions of the exchange (1966 capabilities). PONAST II examined expected differences from the prime case, which received full treatment, for two other versions of the exchange (early 1971 capabilities). PONAST II also looked at the alternate effects on population from the attacks considered associated with a series of different civil protection postures. This provided an indication of the range of different population survival rates which might be expected from the various protection programs examined. As conceived, the PONASTs have been an extension of the gamed exchanges. As such, they illuminate the implications of those military nuclear attack plans and provide explicit visualization of the nuclear attack contingency facing nonmilitary emergency preparedness planning. Of course, a finding of the possible range of expected savings for different civil protection programs or any finding of the full range on any other attack-effects contingency as a basis for preparedness planning requires estimates of the expected effects from a full spectrum of the plausible attack

formulations that any nuclear exchange with the applicable capabilities might take. To avoid basing nonmilitary nuclear contingency preparedness planning on the particular attack pattern that would be expected from a predicted circumstance of precipitation and a presumed set of attack objectives, the planning base must reflect the range of contingencies inherent in plausible kinds of attack precipitation circumstances and objectives. It is important not only that the plausible alternatives be included in the planning base to show the range of the threat but also that the relative prospects of different types of attacks be taken into consideration. Similarily, evaluation of the targeting in the nuclear exchanges studied would require comparison of the results with those of plausible alternatives. If PONAST II had been directed to provide an evaluation of alternative weapon system compositions, not only would more alternative attack designs have had to be assessed, but also alternative compositions of the weapon system would have had to be reflected. Thus, the limited and conditional assessments of the selected elements of residual strengths and capabilities of the two adversaries, that were developed from the scenarios examined in these studies, afford only a part of the comparative analysis required as a prognosis of nuclear hazard or as a test of the attack designs or weapons systems capabilities involved.

3. (U) Participation. As indicated in the discussion of scope, the determination of exclusions and inclusions and the balance of emphasis among the subjects included in a study as complex and wide ranging as this is influenced very considerably by the degree of participation in the

study effort on the part of the agencies concerned with the various elements. Some such differences may be observed between PONAST I and II. For example, PONAST I had some treatment of the impact of the exchange on world power positions, whereas no such contribution was made or treatment included in PONAST II. The inclusion in the second study of the examination of alternative civil protection programs and of the long-range medical effects of radiation was made possible by the increased effort by DCPA in PONAST II. The scope of treatment of attack implications in some resource areas shifted. For example, the analysis for civil aviation was more limited in PONAST II, whereas the analysis of the impact on government was greatly expanded by the substantial effort in PONAST II by the Civil Service Commission. In both studies, the subjects of medical, housing, and banking operations received substantial treatment by virtue of contributions to the scenario analysis in those subject areas from PHS, HUD, and FRB, respectively. While uniformity in the balance of emphasis on various aspects of this line of analysis may be a desirable objective, the quality and perceptiveness of the results are of greater importance to its purpose. Any move toward uniformity of treatment should be directed toward strengthening the understressed aspects of the entire effort.

C. (U) ANALYTICAL DEVELOPMENT ACHIEVED

With the above described pattern of analysis as a frame of reference, the improvements that have been achieved in keeping with the third (procedure development) objective of PONAST II can be identified. The areas in which significant improvements or extensions of the analysis in PONAST II over that in PONAST I include those identified below. The precise

nature of the improvement can best be ascertained by comparing the study results in the subject area together with the descriptions of the procedures used in the respective "Methodology" volumes of the two studies.

1. (U) Preattack Events and State of Affairs. The more fully developed description of the events and state of affairs preceeding the nuclear exchanges studied gave a better basis for positioning (for attack assessment purposes) and otherwise fixing the state of preparedness for: (1) the military forces command structure, (2) the President, his successors and other primary elements of government, and (3) the population. These descriptions drew on the stated assumptions for the particular RISOP included in the respective nuclear exchange and, for those scenarios involving a period of tension, the descriptions utilized those applicable portions of crisis management and force postures developed for the Unified and Specified Command Exercise HIGH HEELS 1971 sponsored by the Joint Chiefs of Staff.

2. (U) Population Impact. The techniques for assessing the impact on populations were improved for both sides and facilitated comparison. Increased sensitivity to the local availability of blast and fallout protection was achieved on both sides, particularly for the USSR. A procedure for examining population impacts for alternative conditions of evacuation and shelter on both sides provided new insights into the comparative effectiveness of such programs.

3. (U) Secondary and Delayed Health Impacts. An improved technique was used to assess the threat of epidemics among survivors in sample US States and SMSAs. Also, the assessment of the less-than-lethal radiation exposures to US survivors, together with the assessment of their longer-term consequences, was added to the heretofore standard which was merely an assessment of the numbers of radiation casualties and fatalities.

4. (U) Agriculture Impact. New criteria were introduced to improve the assessments of radiation effects on livestock, crops, and agricultural activity in the US.

5. (U) Local Viability. A procedure was developed on the US side for systematically establishing a date for each SMSA when production from surviving industrial capacity therein reasonably could be assumed to become available for the national economy.

6. (U) Facility Damage. The technique for assessing the impact on the various facility categories was improved on the US side by using "expected values" as against "cookie-cutter" values. This improvement also increased comparability with the USSR summaries.

7. (U) Self-Generated Production. A tentative estimate was developed on the US side of the total production by sector that could be expected during the first three months postattack on the assumption of a self-direction by the plant managers.

8. (U) Service and Control Institutions. On the US side, survival assessment, though in many cases provisional, was used for the first time for many service and economic control institutions.

9. (U) Psychological Impact. First use was made of a modified Delphi technique to obtain consensus views of scientists and civil and military authorities concerned with nuclear attack problems on the force of various basic psychological considerations on the US side.

10. (U) Military Recovery Requirements. For both sides, more comprehensive and systematically constructed statements were developed of the military reconstruction requirements, as defined for the study, and of the requirements for current military support throughout the recovery period.

11. (U) Economic Capacity. For the first time, an input/output model of the Soviet economy was used in assessing its postattack production capability. Also the Soviet data base was improved.

12. (U) Recovery Plan Formulation. A principal improvement in technique on both sides was the full structuring of plans in sector detail for meeting the explicit recovery requirements from surviving operable capacity, plus that repaired or newly constructed as a part of the plan. This improved technique afforded this study a sharper contrast between the alternative scenarios examined.

13. (U) Scenario Comparisons. Instead of generating a full analytical treatment of all alternative scenarios considered, particular subject areas pertinent to key differences in the scenarios were selected for comparison among or between them with respect to their prospects for national survival or recovery. This avoided the necessity for a full scale treatment of any but the prime scenario.

D. [redacted] PREPARATION AND DEVELOPMENT REQUIRED

(U) From the experience gained in the production of the two PONASTs and the continued development in the analytical capabilities of the participants in connection with their respective nuclear contingency preparedness obligations, it is possible to identify numerous ways in which preliminary preparation and analytical development measures would significantly improve or expedite this line of analysis. The following descriptions of such measures are arranged in the topic sequence followed in the study, namely: preattack, survival, and recovery. Under each, those relating only to the US are followed by those relating only to the USSR with measures applicable to both coming last.

1. [redacted] Preattack Analysis Measures

a. (U) Preattack Scenario Data Bases. The availability the HIGH HEELS 1971 exercise involving participation by US commands on a worldwide basis, reflecting mobilization, force postures, and military locations for the US as a result of increased readiness conditions, was a significant aid to this study. Despite certain errors and other limitations, the use of this Exercise provided added realism and credibility, and saved many hours of effort by the PONAST committee members and NMCSSC in constructing and processing a data base for the study. HIGH HEELS 1971 also was useful in defining civil readiness conditions. Any future study of this type should take full advantage of timely similarly available exercise information which can be tailored or adapted to its needs.

c. (U) Study Ground Rules. Detailed ground rules for any future post-nuclear attack study should be developed in advance covering at least the following: (1) delineation of the objectives, scope, and approach of the study, (2) selection of the preattack scenarios and weapon laydowns and the extent to which these can be drawn from current exercises and war simulations, (3) an adequately assessed and agreed summary of the nature, implications, and prospective execution of civil preparedness plans for the protection of the populations and (4) the assumptions not implicit in the foregoing sources necessary to fix the location and state

[redacted]

of readiness of the armed forces, government, and the population at the time of the nuclear exchange.

2. [redacted] Survival Analysis Measures

a. (U) Assessment of Casualties from Direct Effects. The use of blast protection classes responsive to differences in peak overpressure in the assessment of direct (or prompt) effects casualties (as was employed for PONAST II) gives a more reliable estimate than the use of a single distribution curve for all protection conditions (as was used for PONAST I). The improvement of the PONAST II approach lies in the recognition of differences in the protection characteristics of built-up areas reflecting the types of construction shown in the National Fallout Shelter Survey (NFSS) data and the distribution of people above or below ground level within buildings. The degree of improved reliability should be systematically examined not only for validity but for an indication of the magnitude and direction of differences in the resulting estimates. Also, opportunities should be explored for further increasing the reliability and sensitivity of the blast protection characterizations that may be feasible.

b. (U) Availability, Utilization and Effectiveness of Radiation Protection. There should be a reexamination of the appropriateness of all assessment procedures involving the availability and utilization of fallout radiation protection and associated denial times. Revisions were adopted in the course of the conduct of the PONAST II study in: (1) the radiation exposures credited to persons not assumed to be in NFSS shelters; (2) the combinations of accumulated dose and levels of radiation intensity under which it was assumed people would emerge from shelter; and (3) dose considerations for post-shelter activities.

[redacted]

c. (U) Military Personnel Casualty Assessment for High-DEFCON Situations. To the extent possible and where dispersal plan data bases are available, damage assessments should be conducted using the locations of the dispersed forces with their varying vulnerability factors and not just against "flagpole" locations as given in the FORSA or JAD data bases (see Volume III, Part II, paragraph A.3.(2) footnote).

d. (U) Evaluation of Major Equipment Residuals. To improve the accuracy of and time required for military damage assessments in future studies of this nature, it would be most helpful to have in the FORSA file better locations of forces and equipment data. For example, and similar to the observation above, if precise locations of individual ships in ports or the fact of their dispersal to sea could be stated in the FORSA file used for damage assessment, improved evaluations would be possible.

e. (U) Accuracy of JAD Information File. Assessment of large-scale simulations such as exchanges would be improved by having accurate installation and facility locations in the JAD file. During the analysis of damage assessment, errors in latitude and longitude positions and in vulnerability factors of some installations became apparent.

f. (U) Selection of Local Viability Dates. Only a few of the 34 indicators developed for the SMSA Local Viability Date (LVD) selection process turned out to affect the denial time date actually selected. Several of those not found constraining in this study might well be important in other attack situations. Also fairly arbitrary judgments were made in two major respects. One was a consensus choice of

an "agreed" availability date that for some SMSAs was earlier than that indicated by one or more of the technical criteria used or by one or more of the contributed judgments. The other was the assumption that all constraints would end at 18 months postattack or, indeed, that they would necessarily end at all. Although community response on being struck by disaster, especially when most of the rest of the nation is also affected, is impossible to predict with certainty, the quantification of a reviving national economy requires a finding or an assumption as to when the local operating circumstances are such that the productive output of surviving resources can be counted upon. To that end, the existing, and possibly additional, indicators should be reevaluated for meaningfulness and feasibility of application. Inasmuch as the final determination must remain judgmental, the bases for rendering such judgments should be kept under continuing scrutiny. For example, it should be determined which, if any, indicators are absolutely binding. Also the possibility of permanent denial (location abandonment) should be considered. For example, the new construction of some type of manufacturing capacity in an area where housing is plentiful might be less costly than the repair of such capacity where it had been damaged together with the construction of new housing in a heavily damaged metropolitan area. An additional consideration is that the cost of constructing new manufacturing capacity could be reduced by the salvaging or cannibalization of the partially damaged or even undamaged plants in areas subject to abandonment. For any particular study, the ground rules for establishing LVDs should be fixed in advance.

g. (U) Geographic Coding. A major advantage in the damage assessment procedure, wherein the impact of each weapon on each resource element is separately simulated, is the ability to provide independent assessments for individual localities. This requires that all data files involved in each local viability assessment contain the same area control code. Much delay was encountered in PONAST II in patch programming to achieve a match between old and new area codes for supply-requirement comparison runs and in hand assembly of SMSA summaries from files coded to produce only SMSA "state parts." Not only should all files needed for local viability assessment have the same SMSA list coded into their geographic control code, but also it should be possible to change that coding throughout all files without great delay in order to reflect changes in the SMSA list. As the list lengthens, hand operations become more and more costly. The SMSA list was increased from 230 (the number used in PONAST II) to 247 in February 1971 to reflect the population changes revealed in the 1970 Census. In November 1971, another increase of 21 resulted from a change adopted in the SMSA definition. A few months later, one more was added as a result of projected population growth. No new changes currently are expected, but the increase of 12 in the eight year period prior to the 1970 Census change suggests that a change every three or four years between censuses may be necessary.

h. (U) Currentness of Data. As with any massive file of demographic and economic information intended for more than a one-time use, a major problem is the reduction of reliability with the passage of time necessitating costly updating efforts which may amount to virtually creating a

new file. The population and resource category files used in PONAST II varied widely with respect to the currentness of their data. Fortunately, many of the most important files were current at the time of the study and are kept so on at least an annual basis. The categories for which this was (and is) true, together with the responsible source agency, included the following: PPH-Population and Housing (Census); GFN, GFB, and GFG-Federal Government Facilities (General Services Administration); DIA, DIN, and DIF-Military Establishments (NMCSSC); DCA-Defense Communications Facilities (Defense Communications Agency); MMP, EBT and EAG-Mineral Processing and Coal Mining (OMSF/Interior); MEI-Manufacturing (Census); MPB-Special IEB Production Capacity (BDC/Commerce); MAF and MAS-Atomic Energy Commission Facilities and Suppliers (AEC). Other important categories for which the data used were out of date by varying degrees are indicated in the following table:

TABLE 15

MAJOR CATEGORIES USING OLD DATA IN PONAST II

Subject Area	Code	Name	Date of Last Revision	Source Agency
Government	GER	Emergency Relocation	1967*	OEP
Manpower	LFI, LFO	Labor Force by Ind. and Skill	1963**	Labor
Agriculture	ALS	Livestock	1964***	Agricult.
Fuels & Power	ERB	Oil Refining	1964****	OOG/Int.
	ESP/ EJA	POL Storage	1962	OOG/ Interior
	EEG	Electric Power Generating	1965 projected to 1968	FPC
Transportation	TRC	Railroad Facilities	1956/59	ICC
	THT	Motor Trucks	1960	ICC
	THB	Highway Bridges	1960#	FHA/ Trans.
	TPP	Ports (Deepwater)	1966	MARAD/COM
Manufacturing	MDP	Defense Contractor Employment	1967	OSD/SA
Health	HMD	Health Manpower	1962	PHS/HEW
	HHH	Medical Care Facilities	1962##	PHS/HEW
	HWL/ HWS	Water Systems	1958-62/63	EPA
Education	NEC	Universities & Colleges	1957/58	HEW
Services, Trade & Management	RCE	Retail Trade	1963	Census
	WCE	Wholesale Trade	1963	Census
	RSE	Selected Services	1963	Census
	NCE	Corporate Offices	1963	Census
Financial Sys.	FRB	Federal Res. Sys.	1965	FRB
	FCB	Commercial Banks	1963###	FRB

*1971 data received since PONAST II.
**1970 data received since PONAST II.
***1969 Census of Agriculture data received since PONAST II.
****1971 data received since PONAST II.
#1970 only on Michigan and Kentucky provided and used for PONAST II.
##1970 data received since PONAST II.
###1971 data received since PONAST II.

Other major categories for which recent data were available for PONAST II but for which no systematic updating procedure has been developed included: TAC--Safe Haven Airports (1971 by FAA/Transportation); TAO--Major Civil Aircraft Overhaul Bases (1970 by FAA/Transportation); and JDL--Deep Waterway Locks (provisional 1970 for MARAD/Commerce). Category MIO, Manufacturing Total Output by I-O Sectors as used in PONAST II was generated from 1969/70 data by OEP. A special operation would be required to assign the I-O sector values of any particular year to the geographical location of manufacturing contained in the latest available Category MEI--Manufacturing file available from Census. The value of any future study or exercise would be enhanced by any updating, especially in the categories carrying the oldest data. The assurance of adequate updating would also be enhanced if procedures for it could be established on a regular sustained basis for more of the categories not now so maintained. For any particular study the MIO category must be created for the applicable date and I-O table and the currentness of the data in all other categories to be used must be reviewed for possible updating.

k. (U) Sensitivity Analysis. Subject areas should be identified within the study for which sensitivity analysis beyond that provided by the cases selected for study could provide valuable insights. As feasible provide for inclusion of such sensitivity analyses in the study.

l. (U) Improved Damage Functions. Improvements are needed in the reliability and sensitivity of nuclear weapon damage functions for resources to include such factors as EMP and firespread.

m. (U) Community Survival Considerations. Development is needed for increased sensitivity in the determination of measures required for community survival in the early postattack period.

3. (U) Recovery Analysis Measures

a. Expanded Table. A major improvement over PONAST I anticipated by the 1969 PONAST Committee, which was charged by the Joint Chiefs of Staff with planning for a new study if there should be one, was the prospective availability of an expanded I-O table beyond the 80-sector 1958 table used in PONAST I, that would be much more sensitive in revealing production bottlenecks. The data tapes for the expanded 1963 table were received from OBE in 1970. As noted above

(see Part II, paragraph B.1.), the necessary programming to develop a statement of final demand through DITT for the expanded table was not completed for the PONAST II study. In fact, not even the 86-sector aggregation of the 1963 table could be projected through DITT. As published, the full 1963 table includes almost 370 sectors. Plans exist in OEP for a working table of 173 sectors. This aggregates many of the 370 where substitutability is great, or where interest is minimal, and it also provides some disaggregation in the new construction sector. Altogether, the 173-sector table is designed to provide an acceptable balance between the addition of important detail beyond the 86-sector level and avoidance of an undue increase in the operational difficulty of handling a larger table. The ability to use this projected table should be developed as soon as possible so that it can be tested on the PONAST II problem to determine whether serious bottlenecks which were not apparent in this study would develop under the recovery plan. Any future application of the POST model should be based on an expanded table. The completion and testing of a working 1963 system at the contemplated level of disaggregation would greatly facilitate the creation of an expanded 1967 base table when the base table and the dollar benchmarks for 1967 become available (hopefully in mid-1973).

b. Manpower Constraint. The existing factors of man-year requirements per dollar unit of total output by sectors provide a constraint on production which probably is insensitive to manpower difficulties with respect to both skill and mobility limitations.

(1) Manpower data in the OEP data bank have been updated by the Department of Labor to include in one

category (LFD) 1970 labor force employment data on industry groups. They correspond to the 86 I-O sectors of the OBE tables cross-classified by 161 occupational groups and are also distributed geographically at the level of state portions of SMSAs plus balance of state. This is described on page IX-1 of the current Resource Data Catalog. Advantage should be taken of this occupational cross-classification to develop sector requirement factors for those sectors for which labor augmentation is difficult. Such factors could then be used to test for constraints analogous to the present test with the overall manpower constraint. Recovery programs could then show not only what new facilities are to be built but also what additional occupational skill training programs would be required.

(2) The manpower constraint as presently applied carries the implication that labor is completely mobile nationwide. This, of course, is not so. Although the labor force is more mobile than are many resources, movement to employment sites outside of existing commuting range, even with compulsion, could be accomplished only at a cost. With the data now available it would be possible to use local labor force or even labor skill deficits to constrain the overall economy. Careful consideration should be given to applying this constraint either as a refinement of the local viability data selection process or as an operating constraint on local capacity available for national production. The extreme case could be established by allowing unused local surpluses to be considered as unemployed and hence not available to be counted in establishing the national labor constraint on production.

c. Regional Constraints

(1) As is frequently stated, a major weakness of the I-O table as a tool for measuring the implications of changes in final demand is that the table is constructed for the national economy and hence changes in the balance of inter-regional trade induced by changes in the size and location of various producing and consuming sectors of the economy are not taken into account. The inter-regional balances, though not revealed, were properly reflected in the transportation costs in the original basic table because they were generated by the inter-regional movements that actually took place. However, in the projected case, the supposition is that the transportation pattern was unchanged from the base situation by virtue of the fact that the change to transportation was proportionate.

(2) The basic data and structure for a multiregional input-output model of the 1963 US economy has been developed by the Harvard Economic Research Project (HERP). This project developed an I-O table for each of some 44 regions showing not only internal transactions but also the total transactions of each region with all other regions.

(3) With such an array of related regional tables and a procedure, such as DITT, for reformulating the final demand for each region, the feasibility of the regional final demands could be tested against the surviving sector capacities by region. Also, once a feasible final demand statement for the nation and all regions was established the transportation requirements by region would, for the first time in the development of

postattack analytical techniques, have been redefined in postattack terms. The further development of this line of postattack analysis is vital for an improved recovery analysis capability.

d. Costing Military Requirements

(1) The statements of military support requirements were derived by applying expenditure factors for pay and for O&M to the numbers in the armed forces over time. Expenditure requirements for research and development were related to the preattack expenditure level. The requirement for military reconstruction was composed of the estimated cost of the military equipment and facilities lost in the attack or during assumed postattack operations in Europe and mainland Asia. These were costed from expenditure data classified according to the topics, associated with DOD budget categories, listed in Table IV-A-3 of Appendix A to Volume IV.

(2) A long range task (No. 3) considered by a PONAST I follow-on committee was to "develop for each of the US military services a flexible procedure for the translation of various force levels and support requirements into demands upon the sectors of the US economy for use in capabilities analyses." This can be thought of in two stages: (1) improvement in procedures for translating force level requirements into budget category requirements and (2) refinement of the budget categories in respects reflecting unique distribution of the requirements among the sectors of the economy. The most immediate and promising prospect for improvement lies in the development of improved requirements factors through extension of the Department of Defense Industrial Mobilization Production.

Planning Program which was instituted to support limited war production impact analyses. Continued development of this program and its adaptation to nuclear contingency planning would greatly facilitate the preparation and improve the sensitivity of post-nuclear attack studies.

e. Assumptions and Concepts. Numerous assumptions and concept definitions bordering on assumptions are stated in the Guideposts for Recovery (see Part II, A, 3 of Volume IV) or in paragraph 1. under the "Summary of US Recovery" (see Volume IV, Part II, F. 1). The topics covered by all of the vital assumptions from which the study is constructed are organized in outline form in Figure V-33. As a continuing effort further "to develop analytical procedures for future studies of this type," these assumptions and concepts on the procedures for quantifying them in a particular context should be revised or refined or even superseded if superior ones can be devised. For any particular study some explicit version in each of the key assumption area must be established.

f. USSR Imports. The present study did not assess the potential impact of imports in resolving bottlenecks created by the nuclear attack. Future PONAST-type studies should consider assessing the contribution which the non-Soviet Warsaw Pact countries, and possibly captured Western Europe, could make to Soviet recovery. Damage assessment for these countries need not be as intensive as for the USSR, but should be carefully done for specific industries which might aid the USSR recovery (for example the machinebuilding industries).

g. USSR Labor Force. The low casualty rate for the USSR in PONAST precluded the necessity for a detailed labor

FIGURE V-33

TOPICAL STRUCTURE OF ASSUMPTIONS AND CONCEPTS IN PONAST II RECOVERY ANALYSIS

TOPIC	BASIS OF TREATMENT
A. Supply Side - Capabilities	
1. Recognizable economy	
a. Self-sustaining capability -	from survival analysis
b. Psychological stability -	from survival analysis
c. Structural comparability	
(1) I-O table selection -	see observation number one
(2) Postattack applicability -	after appropriate modifications
2. Production capacity	
a. Concept -	maximum total output
b. Resource availability	
(1) Surviving Operable -	light or no damage
(a) Manufacturing -	VN and LVD
(b) Service -	proportionate to non-casualties
(2) Additional Potentially Usable -	moderate damage
(a) Assessment	
1 Manufacturing -	VN and LVD
2 Service -	proportionate to injuries
(b) Repair	
1 Availability -	firespread allowance
2 Time required -	repair lead time
3 Delay penalty -	deterioration
4 Cost	
a Industry -	fraction of new construction
b Housing -	unit repair cost
(3) New construction	
(a) Time required -	construction lead time
(b) Cost	
1 Investment	
a Industry -	capital/output ratio
b Housing -	unit cost by type

FIGURE V-33

TOPIC	BASIS OF TREATMENT
(2) Distribution	
a. Equipment -	capital flow matrix
b. Construction -	selected construction indirects
(4) Intensification	
(a) Source -	idle reserves, workweek, multiple shifts
(b) Extent -	manufacturing sectors - expansion limit
(c) Timing -	initial delay
c. Manpower limitation	
(1) Effectiveness -	productivity factor for labor force requirement
(2) Labor force availability -	see observation number two
(a) Augmentation -	by sources
(b) Skills -	occupational availabilities
(c) Geographical -	commuting areas
3. Current Production Adjustments	
a. Foreign Trade	
(1) Assistance to and from allies -	drains and assistance
(2) Economic warfare measures -	in third world
(3) Available trade areas -	access and damage
(4) Trade volume	
(a) Historical -	preattack flows
(b) Embargoes -	limiting deficiencies
(c) Balance -	foreign exchange deficits
b. Stockpile Operations	
(1) Strategic stockpile drawdowns -	availability
(2) DOD machine tool reserve activation -	availability

FIGURE V-33 (CONT)

UNCLASSIFIED

TOPIC	BASIS OF TREATMENT
B. Demand Side - Final Demand for Use	
1. Survival support -	basic requirements
a. Civil	
(1) Minimum standard	
(a) Per capita consumption -	category limits
(b) Durables available -	required levels
(2) Population growth -	projection
b. Military	
(1) Armed Forces	
(a) Requirement -	minimum for survival
1 Force levels -	units
2 Activity levels -	supply factors
(b) Costing -	see observation number five
(2) Research and Development -	minimum expenditure
2. Recovery requirements	
a. Military	
(1) Armed Forces	
(a) Level -	units
(b) Composition -	type
(2) Activity level	
b. Civil	
(1) Standard of Living	
(a) Per capita PCE and Non-Def.Gov. -	level
(b) Restoration of durables -	
1 Housing -	level
2 Institutional facilities -	level
3 Consumer durables -	inventories
(2) Production Base Expansion -	investment
(a) De-intensification -	level
(b) Economic growth -	level

FIGURE V-33 (CONT)

UNCLASSIFIED

force analysis. Such an analysis would have been extremely difficult because of the paucity of data on the regional distribution of skills within the Soviet Union. In any study in which casualty rates are high, further efforts would be needed to estimate the extent and impact of any manpower skill shortages.

h. Recovery Definition. Of the many assumptions, such as those indicated in Figure V-33, vital to the construction of a recovery plan for each adversary, probably the most important in setting the direction of the study, and at the same time the most fluid, are those assumptions which are central to the definition of recovery. Their importance arises from the necessity that they must be appropriate to the purpose to be served by the study and their fluidity arises from the wide latitude that prevails in what may be included in the definition. The variabilities associated with these two aspects of the recovery concept are examined in turn.

(1) Appropriateness to the Purpose. It is presumed that the purpose of the recovery analysis is to compare the ability of the adversaries to recover from the nuclear exchange. To serve this purpose best; that definition of recovery which is most appropriate to the purpose in the following respects must be adopted.

(a) Scope. It must be determined what elements of national strength are to be accounted for in the comparison of the abilities of the adversaries to recover. Military and economic recovery are obvious essentials. Others such as population size, or the medical and mental well-being of survivors might be considered.

(b) Frame of Reference. It must be established whether the recovery comparison standard is to be the absolute preattack levels of the respective adversaries or something else such as their relative status among all nations. The latter basis, though more comprehensive, is much more far-reaching in its analytical demands. It could require, among other things, the assessment of the impact of the war on all major nations.

(c) Comparability. From among possible elements of a recovery definition, such as those described in the following paragraphs, a selection must be made which will result in a definition which is as comparable for the two adversaries postattack as are preattack comparisons made in the same terms. It may be that a fully satisfactory assessment of the comparative impact will require more than one definition, each of which must be expressable as nearly as possible in the same terms for both adversaries.

(2) Plausible Definitional Elements. Several possible elements or bases for defining military and economic recovery are considered in turn.

(a) Military Recovery

1. Armed Forces Level--Alternatives:

a. Absolute preattack levels.

b. Preattack levels reduced by the percentage of national population loss.

c. Preattack levels reduced by the amount of the average of the percentage population loss of both adversaries.

d. Restore relative preattack strength for the most damaged adversary.

e. Stipulated multilateral disarmament levels.

f. Otherwise determined level.

2. Armed Forces Composition--Alternatives:

a. Preattack types of units and facilities restored with current types of equipment.

b. Restore facilities and equipment to levels commensurate with their preattack monetary (constant price) values.

c. Types of units and facilities essential to specified types of possible conflict.

d. Other stipulated types of units and facilities.

3. Activity Level. Determination of the level and composition to which the armed forces must be restored fixes the military reconstitution goal required for recovery. In the meantime, however, provision must be made for the annual support of the military forces in being throughout the recovery period. The provisions required for this support depend not only on the size of the forces as time passes but also on what kind of military activity must be provided in the recovery plan. Different activity levels may be selected as appropriate for different phases of the recovery period. Possible activity level elements include the following:

a. Armed Forces Sustenance and Civil Support. Presumably the bare minimum activity level in the absence of any external military threat to the nation would be for the personal sustenance of the armed forces personnel and

provisions required for their essential civil support function.

b. Training Duty. In the absence of any contemplated combat operation, preattack levels of training requirements could be required for armed force units during the period of reconstruction.

c. Possible Combat Activity. Any combat status for any part of the armed forces for any part of the recovery periods must be defined in terms that reflect the level of military support requirement for the forces involved. Combat actions involving such status might include:

i. Withdrawal Protection. Military rear guard actions to minimize losses to friendly forces which must be withdrawn from theaters which cannot be held.

ii. Reconstituted Nuclear Strike Deterrent. Military preparations for implementation of a reconstituted nuclear strike plan to serve as the maximum available deterrent against an enemy follow-on attack.

iii. Surveillance, Reconnaissance, and Naval Skirmishes. Military probing actions initiating and responding to hostile acts not amounting to major breaches of the stabilized defense perimeters.

iv. Reconstituted Nuclear Exchange. Military actions taken as a part of a second nuclear exchange with strike forces

surviving or restored from the initial exchange. The time of the second exchange relative to the first would govern how much general military and industrial restoration had taken place to form the resource base for the damage assessment for the second nuclear exchange and the resulting summary of residuals.

v. Other War Operations. Military actions mounting or resisting invasion which may or may not involve nuclear weapons, or guerrilla actions in allied or neutral territory within or between the otherwise stabilized defense perimeters.

(b) Civil Recovery. As with the military, the characterization of civil recovery may consist of a combination of considerations based on either the level of activity supported or the aggregate economic capacity, or both, and measured either on an absolute or on a per capita basis. Also, several different categories of expenditure are involved. The accepted categories of GNP expenditures, as they appear in the national accounts, are: (1) personal consumption expenditures (PCE); (2) investment; (3) foreign trade, and; (4) government purchases. The latter includes the expenditures for defense; which, as an element of recovery, is covered by the foregoing discussion of military recovery. The remaining government purchases (Federal, State, and local) include expenditures for current activities, for durables and for construction. The PCE category covers expenditures both for current

activities and for durables. These PCE and non-defense government expenditures, together with expenditures by persons for housing and other construction, normally included in investments, are here called "standard of living" expenditures and treated as one of three civil recovery expenditure categories. The others are "foreign trade" and "economic capacity investment" (both of which are discussed below). Here, foreign trade includes the same expenditure categories as the national accounts. The economic capacity investments include those investments made to construct and equip new and replacement capital for producers, that is, facilities useful for further production. These three classes of civil recovery expenditure categories are discussed in the following order: standard of living, foreign trade, and economic capacity investment.

1. Standard of Living. The standard of living expenditures both for current activities and for the purchase of durables and the construction of public and private facilities for personal use must be covered in the "income level" in terms of which recovery is defined. It may also be decided that recovery must include restoration of the stock of such durables and facilities to some specified "wealth level."

a. Income Level. On a strictly income basis, the standard of living could be said to have achieved recovery on one or another of the following bases:

i. Sufficient capacity would become available in all sectors to support preattack

per capita expenditures for personal consumption and non-defense government throughout the following year.

ii. Per capita PCE and non-defense government expenditures at:

(1) Immediate preattack level, or

(2) Stipulated historical level, or

(3) Other level.

b. Wealth Level. In addition to one of the income level requirements, the restoration of the stock of consumer durables (such as automobiles) and personal use private facilities (such as furnished dwelling units) and personal use public facilities (such as schools and hospitals) may be specified as a part of the objective. Such requirements may be stated on an absolute or per capita basis at one or another of the following levels:

i. Immediate preattack level, or

ii. Stipulated historical level, or

iii. Other level.

2. Foreign Trade. The role of foreign trade in the achievement of recovery actually is accounted for first in the analysis because foreign trade is treated as a prior adjustment to the aggregate final demand expenditure that can be made in a given economy. This leaves that part of the final demand which can be met internally to be applied to the recovery of the standard of living and economic capacity. The recovery objectives adopted for foreign trade presumably will correspond

to the role assigned to foreign trade during the recovery period. Thus the stated foreign trade recovery objectives will presumably be stated as the final assumption in the one or more assumptions used to characterize the composition, extent and geographical limits of foreign trade available for use in the recovery plan. Several dimensions of any positive foreign trade recovery objective need to be specified.

a. Scope. The final definition of the area with which trade will be available and any constraints or requirements on the composition either of imports or exports must be defined.

b. Level. The recovery level for foreign trade may be set on one of the following bases.

i. Preattack net levels (in the aggregate or by class or by sector).

ii. Stipulated variants of preattack net level (such as per capita or attack residual levels in trading nations).

iii. Preattack trade balance levels (in the aggregate or by class).

iv. Other.

3. Economic Capacity Investment. Beyond the investment in production capacity required to meet and sustain the standard of living plus foreign trade requirements, additional recovery requirements relating to the condition of the available capacity may also be imposed. Economic capacity

investment provisions which must, or may, be included within the recovery requirement include the following:

a. Provision of Required Production Capacity. The attainment of recovery will in any case require the investment in repair or new construction of the additional capacity required to meet the standard of living plus foreign trade production requirements, first to sustain national survival and beyond that to attain recovery.

b. Maintenance of Required Production Capacity. Recovery can be attained only if the necessary investment in capacity is made to replace surviving, restored, and new capacity as it wears out or becomes obsolete.

c. Restoration of Capacity Availability. Recovery to pre-war standards would require the provision of sufficient additional capacity to permit preattack levels of utilization. This would require the "de-intensification" involved in retiring obsolete capacity from use and in returning to the pre-war work week and numbers of shifts.

d. Economic Growth. Beyond all of the foregoing restoration requirements for the support of the standard of living plus foreign trade, recovery may be said to require defined provisions for economic growth at:

i. The preattack per capita level, or

ii. The preattack absolute level, or

VOLUME V

METHODOLOGY

APPENDIX D--ASSESSMENT OF PROMPT EFFECTS DAMAGE TO US FACILITIES

VOLUME V

METHODOLOGY

APPENDIX D--ASSESSMENT OF PROMPT EFFECTS DAMAGE TO US FACILITIES

A. DAMAGE SUSCEPTIBILITY CHARACTERIZATION

1. (U) Blast Effects

a. The susceptibility of facilities to damage from the blast effects of nuclear weapons is characterized in the READY damage assessment system with vulnerability numbers (VNs). This VN concept is taken directly from the system described in Part I of the Physical Vulnerability Handbook--Nuclear Weapons (U), a CONFIDENTIAL publication by the Defense Intelligence Agency (AP-550-1-2-INT) dated 1 June 1969. Section A of Part I describes the VN concept and presents VN characterizations for severe, moderate, and a few other specifically described classes of damage for a large variety of industrial and military facilities and equipment. Except for special cases, these descriptions are used in establishing the READY VNs. Section B of Part I of the Handbook provides the tables and figures that relate the values of weapon application variables (including yield, ground range and height of burst) to the probability of a particular class of damage to a facility of the particular susceptibility.

b. The basic VN described in the Handbook is a four part number consisting of two numerical digits, the letter P or Q and a single numerical digit. The two digit number is from the arbitrary physical vulnerability numerical scale, ranging from 01 to as high as 57, which is used to reflect damage probabilities in the tables and figures included in the

Handbook. Use of the letter P indicates that the facility is subject to damage predominantly from the crushing effect of peak overpressure (pounds-per-square-inch above normal atmospheric pressure). Q indicates that the facility is subject to damage predominantly from the displacement effects of dynamic pressure (pounds-per-square-inch pressure). The single digit number which accompanies the letter is called the "K factor" indicator. This reflects the increased damage susceptibility to a particular level of pressure associated with the longer duration of the pressure imposed by the larger yield weapons.

c. For the blast effects susceptibility characterization the READY model calls for separate VNs for severe, moderate, and light damage. Hence the READY VN is a 12-digit number consisting of three four-digit VNs. In each of these for READY the "K factor" indicator precedes the P or Q which is then followed by the two-digit physical vulnerability number. The model accepts whatever VNs are provided for the three classes of damage to the facility being assessed. The selection of VNs for a class of facilities draws upon the VN characterizations provided in the DIA Handbook.

2. (U) Thermal Effects. For its assessment of the thermal effects of nuclear weapons on facilities, the READY model also requires an indication of the susceptibility of the facility to fire. In addition to the READY VN for blast effects, therefore, the description of the facilities to be assessed must include a fire susceptibility indicator. For this a one or a zero is provided (1 = susceptible, 0 = not susceptible).

3. (U) Structural Characteristics Code. In most cases the assessment of industrial damage reflects the prospects of structural damage to the buildings or to the external framing

which houses the equipment vital to the industrial activity in question. Appropriate VNs are established based on an eight digit structural characteristics code prepared by the contributing agency from unclassified material. This code differentiates among structures on the basis of externally recognizable use and structure characteristics of the facility. For each unique digit combination of the structural characteristic code, a set of three VNs are provided plus a fire indicator (1 = susceptible, 0 = not susceptible) and a shelter indicator (column number of the structural characteristics code to be used in ascertaining the shelter available to occupants of the facility). The make-up of the shelter characteristics code is described in Appendix I of READY I DATA PREPARATION - USER'S GUIDE, NREC Technical Report No. 52 (March 1965) published by OEP. The first column entry indicates the type of facility being coded. For facilities assessed on the basis of the buildings in which they are housed, the first column entry is "B" and the subject of the remaining columns is listed in the following table.

TABLE D-1

FACILITY CODE FOR BUILDINGS

Column	Subject
1	B--Building
2	Use
3	Framing
4	Stories
5	Strength Indicators
6	Fire Resistance
7	Time-Temperature
8	Fallout Protection

The structural characteristics coding and the VNs currently assigned to the various Standard Industrial Classification (SIC) groups in the Manufacturing Establishments data file (Category MEI) are shown in Annex A.

B. DAMAGE CLASSES

1. (U) Definitions. Six classes of the postattack damage status induced by prompt weapons effects are used in the assessment of facilities with the READY model. These six classes, which are treated as mutually exclusive and all encompassing, are: destroyed, severe damage, moderate damage, fire likely, light damage and no damage. Facilities in this context include not only industrial establishments but all types of buildings, structures and inventories of equipment. The classes of damage are defined as follows:

a. Destroyed. A facility is classed as destroyed when the damage is so complete that nothing of value remains to be salvaged. Any facility within two crater radii of a ground burst ground zero is deemed to have been pulverized or covered by the crater lip regardless of its physical vulnerability hardness. The damage class of "destroyed" consists of all such facilities.

b. Severe Damage. Blast damage to an undestroyed facility which is so extensive that the construction of a new facility would be economically less costly than the repair of the damage is classed as severe damage. Structural damage (requiring replacement of framing members) of the principal buildings or structures of the facility in question is ordinarily considered to be the indicator of severe damage. Each facility in the data file which is to be assessed is provided with a VN for severe damage as described above which provides the basis for assessing severe damage, as defined here, to the facility.

c. Moderate Damage. Blast damage to an undestroyed facility which does not qualify as severe damage but is so extensive as to make the facility nonoperational in the performance of its normal function is classed as moderate damage. Exposure of working spaces to the elements or the disruption of equipment is ordinarily the immediate cause of work stoppage. As previously stated, each facility to be assessed is provided with a moderate damage VN as described above which provides the basis for assessing moderate damage, as defined here, to the facility.

d. Fire Likely. Thermal radiation received by a facility which survives in operable condition would be likely to generate fire sufficiently intense to interrupt operations if, in the first place, the facility would burn and further if the thermal radiation were sufficiently intense. To be burnable, vital elements of the facility would have to consist of combustible material; also sufficient kindling, such as textiles, paper, dry wood or dried vegetation, would have to be present and (whether inside or outside the facility) would have to be subject to direct exposure to thermal radiation. To be sufficiently intense, the radiation at the facility would have to deliver enough thermal energy (calories per square centimeter) in a short enough period of time to induce combustion in the kindling material. As previously stated, each facility to be assessed is provided with a thermal ignition indicator as a part of the VN which shows whether (or not) the facility is burnable in the sense defined above. A surviving operable (that is, no moderate or worse damage) facility that is burnable is tested to determine whether the thermal energy received is intense enough to make "fire likely" that would disrupt production

where it would not otherwise have been stopped by prompt effects. It is to be noted that the assessment of "fire likely" covers damage only from fires induced in an otherwise operable facility by thermal radiation. It does not include the prospect of damage from fire which may spread from ignited areas into areas where fires from the attack are not likely. No practical damage assessment model was available for the systematic assessment of such firespread damage. Also, "fire likely" does not reflect any additional damage which might amount to severe, imposed by fire on a moderately damage facility.

e. Light Damage. Blast damage of any description which is less than moderate and affects facilities for which fire is not likely is classed as light damage. This ordinarily includes effects such as broken windows, roofing damage, debris accumulations and the scattering of outdoor stocks which do not disrupt production but, if not corrected, would lead to conditions that did. The previously described light damage VN assigned to each facility to be assessed provides the basis for the light damage assessment.

f. No Damage. Those facilities or facility values for which no form of blast damage is probable and for which fire is not likely are assigned a no damage status. As such, they constitute the final residual damage class in the prompt effects assessment. The facilities remaining in this class may still be subject to damage from spreading fires which are not assessed. They are also subject to temporary denial of access imposed by fallout radiation which is separately assessed.

C. ASSESSMENT PROCEDURES

1. (U) Data Field Value Distribution. To make the damage assessment for a particular problem with the READY model, the determination is made for each facility as to the applicability of each damage class. These findings are reflected directly for each facility listed under the Point Analysis of Experience, Damage, and Casualties (PAEDAC) format (Figure V-19). For a summary edit, such as shown under the SASAP-R format, the task is to achieve the appropriate distribution among the six damage classes of the data field values (such as capacity or value of shipments or employment) for each facility in turn. Thereupon the values so distributed are aggregated for the respective damage class groupings that are included in the format. Categories for which data fields are not available are summarized on the basis of the record count (data field 0) distribution among the damage classes.

2. (U) Probability Statement. As stated above, in a particular application, the DIA blast effects damage assessment system gives the probability that the type of damage associated with the applicable VN will occur. The uncertainty associated with this probability statement goes to the question of the assurance that a particular blast pressure and duration will, in fact, inflict the specified type of damage to the specified type of facility. This probability does not include an uncertainty about the amount of blast pressure or its duration which would be created by a particular yield, at a particular distance and height of burst.

3. (U) Previous READY Application. In accumulating values from individual facilities in the preparation of category summaries, READY has in the past followed the practice of including the entire value of a facility in the most serious damage class for which the probability reaches .50. This is called "cookie-cutter" assessment because, up to a particular distance all facilities of a given vulnerability are included, and beyond, all are excluded. Under this system each individual facility is classed the same way in both the summary and in the point listing where the .50 probability is used to identify the applicable degree of damage. For a large number of facilities, the cookie-cutter method of summarizing gives unbiased results when the facilities in question are randomly distributed with regard to the AGZs. However, when the category of facilities is being systematically targeted, the cookie-cutter method will tend to overstate the results by disregarding the effects of a skewed distribution toward a greater number of instances of less than .50 probability of escaping the particular class of damage. Conversely, if the facility category should be distributed largely at distances just beyond the weapon radii

from the Desired Ground Zero (DGZ) at which the weapons are aimed, the cookie-cutter method would tend to understate the results by disregarding the effects of a skewed distribution toward a greater number of instances of less than .50 probability of sustaining the particular class of damage.

5. (U) Category Assessment Steps. The successive steps taken in distributing the data field value for each facility among the six damage classes are described in turn.

a. Destroyed. For any facility within two crater radii of the actual ground zero (AGZ) of a ground burst weapon, the entire data field value for the facility is assigned to the "destroyed" class. Thus, when those particular attack circumstances apply, the designated damage class is applied with a 100 percent probability. This results automatically in a "cookie-cutter" allocation of the entire facility value to this one damage class.

b. Severe Damage. For any undestroyed facility the product of the data field value and the probability of severe damage to the facility was assigned to the severe damage class for the category summary.

c. Moderate Damage. The data field value of an undestroyed facility was multiplied by the probability of moderate damage less the probability of severe damage to give the contribution from that facility to the category total of moderate damage. The total accumulation of such contributions from all facilities in the category provided the summary total of moderate damage.

d. Fire Likely. To assess the prospective increase in damage to a particular facility attributable to fire started directly by the nuclear detonations, the READY model applied tests for the two circumstances mentioned above in the definition of "fire likely" as being necessary for such fires. First, the fire susceptibility indicator was referred to in order to determine whether the facility could burn. Second, the thermal intensity was computed to determine whether the combustibility threshold was exceeded.

These are both "go - no go" tests with probabilities only of one or zero. Hence, only a "cookie-cutter" assessment of "fire likely" was made. Thus, for any undestroyed facility for which the probability of moderate damage was less than 1.0, the READY model applied the two "fire likely" tests. If the results of both were affirmative, the entire data field value was multiplied by one minus the probability of moderate damage to give the contribution from that facility to the category total of "fire likely." The total accumulation of such contributions from all facilities in the category provided the summary total of the "fire likely" class of damage.

e. Light Damage. The light damage summary was designed to include the light damage increments from all facilities not subject to "fire likely" but subject in some degree to light damage. Thus, the data field values of an undestroyed facility not subject to "fire likely" were multiplied by the probability of light damage less the probability of moderate or greater damage to give the contribution from that facility to the category total of light damage. The total accumulation of such contributions from all facilities in the category provided the summary total of light damage.

f. No Damage. The "no damage" class was designed to include the data field value contributions from undestroyed facilities not subject to "fire likely" determined by multiplying the data field values by one minus the probability of light damage or greater. The accumulation of such contributions from all such facilities in the category provided the summary total of "no damage."

APPENDIX D ANNEX A

Manufacturing Structural Characteristics Code, Vulnerability Numbers, and Fire Susceptibility Indicator

SIC Code	Structural Characteristics	Vulnerability Numbers			Fire Susceptibilty Indicator
		Severe	Moderate	Light	
1911	BISASRBA	7Q14	7Q13	0P01	1
1921-29	BISALPEA	7Q13	7Q11	0P01	1
1931	BISASRBA	7Q14	7Q13	0P01	1
1941-51	BISPLRAC	7Q13	7Q11	0P01	1
1961	BISBLPDC	7Q13	7Q11	0P01	1
1999	BISBLRAC	7Q13	7Q11	0P01	1
2011-99	BISAVNBC	7Q12	7Q10	0P01	1
2111-41	BISAVNCC	7Q12	7Q10	0P01	1
2211-99	BISALNCC	7Q13	7Q11	0P01	1
2311-99	BISBLNCC	7Q13	7Q11	0P01	1
2411-99	BIWALOEC	0P08	0P06	0P01	1
2511-99	BISBLNEC	7Q13	7Q11	0P01	1
2611-61	BISCLNEC	7Q13	7Q11	0P01	1
2711-94	BISCLNDC	7Q16	7Q14	0P01	1
2812-99	BISCLNEC	7Q13	7Q12	0P01	1
2911	QROSCTAR	7Q13	7Q13	0P01	1
2951-99	BISAEREB	6Q15	6Q14	0P01	1
3011-79	SESAHRDC	7Q14	7Q13	0P01	1
3111-99	BISAVNCC	7Q12	7Q10	0P01	1
3211-21	BISAVNBC	7Q12	7Q10	0P01	1
3229-31	BISCLNBC	7Q13	7Q12	0P01	1
3241-81	BISALNBC	7Q13	7Q11	0P01	1
3291	BISCLNBC	7Q13	7Q12	0P01	1
3292-93	BISAVNBC	7Q12	7Q10	0P01	1
3295-99	BISALNBB	7Q13	7Q11	0P01	1
3312	BISAHRBA	7Q17	6Q16	0P01	1
3312-32	BISASRBB	7Q14	7Q13	0P01	1
3333	BISALRBB	7Q13	7Q11	0P01	1
3334	BISARRBC	7Q13	7Q12	0P01	1
3339	BISALRBB	7Q13	7Q11	0P01	1
3341-99	BISARRBB	7Q13	7Q12	0P01	1
3411-99	BISALNCC	7Q13	7Q11	0P01	1
3511-19	BISASNCC	6Q15	6Q14	0P01	1
3522-44	BISASNCC	6Q15	6Q14	0P01	1
3545	BISBLNCC	7Q13	7Q11	0P01	1
3548	BISASNCC	6Q15	6Q14	0P01	1
3551-53	BISALNCC	7Q13	7Q11	0P01	1
3554	BISASNCC	6Q15	6Q14	0P01	1
3555-65	BISALNCC	7Q13	7Q11	0P01	1

SIC Code	Structural Characteristics	Vulnerability Numbers			Fire Susceptibility Indicator
		Severe	Moderate	Light	
3565	BISCVNCC	7Q13	7Q12	0P01	1
3567	BISALNCC	7Q13	7Q11	0P01	1
3569	BISASNCC	7Q14	7Q13	0P01	1
3571-79	BISBVNCC	7Q12	7Q10	0P01	1
3581-99	BISALNCC	7Q13	7Q11	0P01	1
3611-13	BISALNCC	7Q13	7Q11	0P01	1
3621-29	BISALNCC	7Q13	7Q11	0P01	1
3631	BISCVNCC	7Q13	7Q12	0P01	1
3632-44	BISALNCC	7Q13	7Q11	0P01	1
3651-79	BISAHNCC	7Q13	7Q12	0P01	1
3691-99	BISALNCC	7Q13	7Q11	0P01	1
3713-29	BISALNCC	7Q13	7Q11	0P01	1
3731	BISAHNEA	7Q17	7Q16	0P01	1
3732	BISALNEB	7Q13	7Q11	0P01	1
3741-42	BISASNCA	7Q14	7Q13	0P01	1
3751-99	BISALNCC	7Q13	7Q11	0P01	1
3811-72	BISCVNBC	7Q13	7Q11	0P01	1
3911-99	BISCVNBC	7Q13	7Q11	0P01	1

iii. Some stipulated common national level, or

iv. Other level.

e. Restoration of Stipulated Capacity. Analogous to the restoration of the military forces to their preattack levels, it might be decided that all preattack production capacity damaged or destroyed by the attack should be restored whether or not it is required by any of the foregoing investment recovery provisions.

f. Other Stipulated Capacity Status. Other requirements may be generated to attain some stipulation status of economic capacity for the generation of economic growth or for other stated objectives.

i. Lead Time Assumptions. A major factor in the times found by the study to be required for national recovery was the lead times required both for current production and for capacity construction. Significant differences among industries occur both in the production lead times and in the times required to construct capacity in them. Also, lead times assumed in the study for defense industry were substantially greater for the Soviet Union than for the United States. A systematic engineering assessment of production and construction lead times would increase the reliability of the recovery plans by more correctly identifying the bottleneck industries. It would also improve the comparability of the recovery time estimates for the adversaries.

4. (U) Expedited Production Measures. As shown in Chapter I, PONAST II has been a costly project as measured in machine hours,

manhours, and calendar time. As revealed throughout the discussion of methodology in Chapters II, III, and IV and as summarized in Section C of this Chapter, much of this cost can be charged to development--that is to say, a straightforward replication of the PONAST II analysis would require somewhat less machine hours and much less manhours and calendar time. Also, much of the manhours and calendar time expended has been absorbed in producing this five volume study aggregating approximately 1200 pages at a comparatively high level of editorial effort. A major consideration in the formulation of any kind of continuing analysis in this area will certainly include the prospect for reducing the effort and time required without impairing the possibility of attaining any vital purpose of the undertaking. In estimating the time and effort required for another similar post-nuclear attack study, the following considerations should be taken into account.

a. Much less of a revision would be required in the basic analytical techniques than was developed for PONAST II over PONAST I. Most of those required improvements in preparation and development indicated above could be accomplished without any costly improvements in the state of the art. Except for those few that would, these suggestions could be achieved with only a modest effort beyond what is currently required for ongoing activities of the agencies involved. Furthermore, the careful development in advance of the precise line of analysis, as suggested above, would permit the omission of some of the machine work ordered in the past studies but which went unused or would not again be needed.

b. On the assumption that basic findings for most of the vital elements of national strength would not differ

in nature from those revealed in PONAST II, it seems unnecessary that the published report in any analogous case study would need to treat the subject at this level of detail. Even if the basic line and detail of the analysis itself were continued at the level achieved or even extended, a report at the detail level of Volume I in PONAST II would probably suffice. Supporting writeups at the level of Volumes II, III, and IV and their Appendices, where necessary, could be prepared as unpublished supporting documents in the files of SAGA and the producing agencies.

c. A further cultivation of the technique of comparing the results of variations in other scenarios or in other vital assumptions with the results under the prime scenario, as commenced in PONAST II, promises to provide a wider breadth of analysis with a reduction in at least the rate of expenditure per problem if not in the aggregate effort.

d. For the long run, development should be sought for a procedure for achieving rapid and inexpensive assessments of the postattack implications of a whole spectrum of variables in attack objectives and capabilities without the suppression of vital constraining details which operate in this present line of analysis. Achievement of such a development would expedite the exploration of alternative attack designs and would facilitate the systematic exploration of alternative capabilities. However, the continued illumination of the postattack implications of simulated SIOP/RISOP exchanges do not have to await such development.

E. (U) CONTINUATION RESPONSIBILITIES

As summarized above, important development in the analytical procedures for post-nuclear attack study were

achieved in more than a dozen areas in RONAST II. The possibilities for continued development are identified for many more. Continued improvement in the procedures for analyzing postattack survival and recovery by those agencies responsible for US defense and postattack preparedness, and continued joint participation in such analyses by these agencies would serve to enhance the usefulness of their results, as it has in the past. Responsibilities for dealing with the contingency of a massive nuclear exchange would appear to continue so long as the military capability for waging nuclear war exists.

VOLUME V

METHODOLOGY

APPENDIX A--MANPOWER/COMPUTER SUMMARY

VOLUME V

METHODOLOGY

APPENDIX A--MANPOWER/COMPUTER SUMMARY

	Man Months	Computer Hours
Military Representatives (J-3/4/5/Services)	86.6	0
OEP (includes contributing non-defense agencies)	74.2	775
SAGA	61.8	0
DCPA (OCD)	54.6	599
DIA	48.7	8
CIA	33.4	6.3
DCA/NMCSSC	14.9	146.4
OASD(SA)	2.0	0
	376.2 man months	1534.7 hours
	or 31.3 man years	

[redacted]

VOLUME V

METHODOLOGY

APPENDIX B--NATIONAL MILITARY COMMAND

SYSTEMS SUPPORT CENTER (NMCSSC)

DATA PROCESSING METHODOLOGY FOR PONAST II

[redacted]

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when separated from
Classified enclosure

PART II--DATA PROCESSING

1. (U) Models and Data. For the Post Nuclear Attack Study (PONAST II), War Games Analysis Division (NMCSSC/DCA) supplied damage assessment summaries on blue data bases (using red strikes) and on red data bases (using blue strikes). The Resource Status Evaluation System (REST III) was the model used to generate the reports, unless specified otherwise. Most of the data bases were obtained from the National Military Command System Support Center (NMCSSC) Data Division and were in the Joint Resource Assessment Data Base Format, unless specified otherwise.

2. (U) Organization. The following chart is a list of the major summaries delivered to the various PONAST committees. Note that there are two charts; blue strikes on red targets and red strikes on blue targets. A more detailed description (including definitions of abbreviations) of the data bases and output follows in outline form.

*In the early days of the study, utilizing RISOP terminology, the game cases were known as India, for Red initiation; Sierra, for Red surprise attack; and Romeo, for Red retaliation. They were subsequently changed to Scenario A, C, and B, respectively in the edited study.

VOLUME V

METHODOLOGY

APPENDIX C--MILITARY COMMITTEE INPUT AND METHODOLOGY FOR SUPPORT OF CIVIL DEFENSE

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APPENDIX C--MILITARY COMMITTEE INPUT AND METHODOLOGY FOR SUPPORT OF CIVIL DEFENSE

(U) The remaining pages of this Appendix consist of a report by the PONAST Military Committee on military support of civil defense. This report is shown both to provide information on the military support of civil defense and also as an example of how both the requirements for and availability of this support were examined in the study.

SUBJECT: Military Support of Civil Defense (MSCD)

Refs (a) DOD Dir 3025.10 of 29 Mar 65

(b) FM 20-10

(c) PONAST II "Outline"

Encl (1) Office of Civil Defense (OCD)* Requirements for Military Support in the Postattack Recovery Period

(2) Unmobilized Military Reserve, National Guard Forces

(3) Memorandum for Record concerning State totals of Military Reserves available and State OCD requirements.

(4) Memorandum to OCD from Mr. Myers of CONARC, dated 13 Oct 71

1. Ref (a) establishes the Department of Defense policies, assigns responsibilities, and sets forth general guidance for military support of the National Civil Defense program in anticipation of or following a nuclear attack. Ref (b) sets forth the modus operandi for Military Support of Civil Defense (MSCD). Ref (c) requires that the question of military assistance to the Civil Defense Program be answered in PONAST II.

2. Encl (1) is the OCD request for military forces to support the OCD recovery effort. Encl (2) is a consolidated listing of all the non-activated Reserve and National Guard personnel including retirees, both pre- and postattack. Encl (3) is the State-by-State listing of available unmobilized personnel by category and branch of service, along with the State total available and State requirement for MSCD established by OCD.

*Since this methodology paper was prepared, OCD has been redesignated as the Defense Civilian Preparedness Agency (DCPA).

3. The objective of this paper is to provide OCD with information on the most likely source of military assistance in the Post Attack period beginning on D+1 day. To the extent they are available, all military support personnel will be provided from within each State boundary. Where small states are close together, and along State lines, interstate arrangements could certainly be made. To the extent they can be mustered, military personnel will come from Reserve, National Guard, and retired ranks. Where the necessary or needed numbers cannot be mustered, the difference will be made up out of active forces in the area assuming they do not have a more pressing combat, combat support, or self-survival operation as per Ref (2).

4. The situation in the immediate postattack time frame may require the use of active forces as a preliminary step while the induction of military reserves is carried out.

5. The memorandum from Mr. George E. Myers of CONARC appears as Encl (4). Mr. Myers points out that the Individual Reservists not mobilized are civilians, and that their status changes only by their volunteering to serve or by their post-attack mobilization by Congressional action.

6. The mobilization or Federalization of the unit personnel of the USAR and ARNG (128,000 men) would be very swift and could be accomplished by the President and keep him within the one million man mobilization limit. Although it is not expected that this limitation would remain for very long, some action by the Congress would be required before unpaid, non-unit, and retired personnel could be mobilized.

7. The estimated capabilities of Army organization for Military Support of Civil Defense (NSCD) are as listed in Reference (b) Appendix C paragraph C. 1.

The severity of casualties and physical damage clearly indicate that the surviving combat support and combat service support personnel--medical, engineer, logistical, civil affairs, communications, graves registration, etc.--would be substantially fewer than the support personnel required for State and local governments in the early postattack survival and initial recovery period. The apparent deficit between support required and surviving military resources is so great that detailed computations are not required. All surviving technical and support units, personnel and equipment are urgently needed.

Requirements for military support of civil authorities by combat arms troops for such missions as traffic control, protection of vital facilities, helping people to avoid contaminated or dangerous areas, assisting in disseminating directions and guidance to the public, and maintaining law and order have been calculated and are shown by State in the following table.

(All figures rounded to nearest 100)

AREA	Peacetime Regular Police Strength	Peacetime Aux. Police Strength (Includes Crisis Train)	Postattack Requirement	State and Local Police Available (D+1)	Military Support Required (D+1)
TOTAL			948,600	224,200	724,400
REGION 1					
Connecticut	6,476	5,754	14,600	2,600	12,000
Maine	1,934	2,806	7,500	500	7,000
Massachusetts	14,147	9,339	21,400	4,600	16,800
New Hampshire	1,633	2,022	5,700	2,800	2,900
New Jersey	14,244	13,322	37,700	5,000	32,700
New York	54,778	26,732	90,200	19,500	70,700
Rhode Island	1,887	4,033	2,100	400	1,700
Vermont	1,072	1,413	3,600	1,900	1,700
Puerto Rico	4,973	7,903	N/A	N/A	N/A
Virgin Islands			N/A	N/A	N/A
REGION 2					
Delaware	1,166	84	1,800	100	1,700
Dist. of Columbia	3,947	-0-	3,400	100	3,300
Kentucky	5,592	4,988	15,500	5,100	10,400
Maryland	8,215	1,916	15,400	1,600	13,800
Ohio	16,215	10,256	50,500	4,600	45,900
Pennsylvania	32,462	33,179	72,700	20,200	52,500
Virginia	6,912	4,149	22,100	4,000	18,100
West Virginia	2,333	1,839	10,700	1,700	9,000
REGION 3					
Alabama	4,958	6,459	16,800	5,500	11,300
Florida	12,709	7,592	47,700	12,400	35,300
Georgia	6,555	5,069	24,000	3,900	20,100
Mississippi	3,326	3,878	11,900	3,100	8,800
North Carolina	6,936	5,497	19,900	3,200	16,700
South Carolina	3,658	2,859	11,700	1,200	10,500
Tennessee	5,726	4,865	15,700	4,200	11,500
Canal Zone			N/A	N/A	N/A
REGION 4					
Illinois	25,021	12,005	47,700	11,400	36,300
Indiana	8,197	9,433	20,600	4,700	15,900
Michigan	17,553	12,333	39,200	9,000	30,200
Minnesota	6,019	7,539	21,400	7,700	13,700
Wisconsin	8,358	8,304	24,700	7,900	16,800
REGION 5					
Arkansas	2,424	3,566	7,200	2,400	4,800
Louisiana	6,975	5,914	13,500	4,200	9,300
New Mexico	1,737	1,989	4,700	1,700	3,000
Oklahoma	3,966	3,394	9,600	3,300	6,300
Texas	16,673	11,219	48,500	11,300	37,200
REGION 6					
Colorado	3,894	2,626	11,600	3,400	8,200
Iowa	3,683	3,035	15,900	4,000	11,900
Kansas	3,218	3,955	11,900	3,900	8,000
Missouri	7,978	5,387	17,700	4,600	13,100
Nebraska	2,501	1,693	7,700	2,500	5,200
North Dakota	891	1,114	3,000	1,100	1,900
South Dakota	951	700	4,000	1,100	2,900
Wyoming	619	695	800	400	400
REGION 7					
Arizona	3,647	2,433	8,400	2,500	5,900
California	40,685	19,740	53,900	12,000	41,900
Hawaii	1,616	1,244	3,500	900	2,600
Nevada	1,470	844	3,500	1,400	2,100
Utah	1,394	2,069	4,500	1,600	2,900
American Samoa	69	-0-	N/A	N/A	N/A
Guam	258	-0-	N/A	N/A	N/A
Midway-Wake			N/A	N/A	N/A
REGION 8					
Alaska	453	267	1,600	400	1,200
Idaho	1,133	1,379	4,500	1,800	2,700
Montana	1,110	1,577	3,900	1,800	2,100
Oregon	3,179	2,639	13,500	3,700	9,800
Washington	5,667	3,604	19,000	4,200	14,800

OCD FORM 277, 1 Jan 70 REPLACES OCD FORM 277, MAR. 1962, WHICH WILL NOT BE USED

UNCLASSIFIED

DEPARTMENT OF THE ARMY
OFFICE OF THE SECRETARY OF THE ARMY
OFFICE OF CIVIL DEFENSE
WASHINGTON, D.C. 20310

13 October 1971

MEMORANDUM TO: OCD (PO), ATTN: Mr. Wilson

SUBJECT: PONAST

1. Confirming our discussion of 7 October with the PONAST Study Group, the following applies to the postattack availability of military reservists for CONUS military support of civil defense (MSCD) duties.

a. The utilization of non-unit individual reservists for (postattack) military support is a question of "access." If these reservists were mobilized in advance of attack, access would be provided for since they would (through their active duty organization) be a potential force available under the "A.C." concept for MSCD; or for active military offensive or defensive roles depending upon priorities at the time. If the non-unit individual reservists were not mobilized, then they remain "civilians," and their availability for civil defense purposes can be solicited in advance. In this case, the respective service (e.g., by the Air Force method-or other) might be willing to encourage their volunteering for civil defense, if they are not mobilized in the event of nuclear attack.

b. MSCD concepts under DOD Directive 3025.10, JCS GTAD CD, and the supporting service directives, e.g., AR 500-70, define the roles of active and reserve component units. Access here is a matter of priorities at the time. However, I would assume that those units would be mobilized in the event of nuclear attack, even in a "cut-off" situation (You might remember my reference to AR 135-300 in that case).

c. Also, I believe that you will remember COL Pietsch mentioning the "Mob Designee" program and the possible revisions of MSCD concepts to incorporate that program. In that regard, I have asked Lou Walter to furnish you a copy of a recent OCD (PO) Memo which laid out the distinction between MSCD as a program and the day-to-day military participation in furtherance of the Civil Defense Program. I recommend that document as a general guide to the committee at anytime military support (participation) is discussed.

UNCLASSIFIED

ENCLOSURE (4)

13 October 1971

2. I have recommended to COL McClaran, CONARC DCSOPS Plans Division, that some liaison with the Study Group be maintained so as to make CONARC assistance readily available. This may not be possible since HQ DA is responsible for furnishing that type of support, however, results of the POMAST studies can impact upon CONARC responsibility for MSCD.

3. Back to your question of postattack MSCD forces available, nothing in the above implies a guarantee that military support will be available postattack in the quantities required and in the place needed. It follows that civil defense operational priorities can be established to define the geographical areas where assistance would produce the best returns in life and self-sufficiency, and that command authority will consider these along with other priorities at the time (e.g., a more immediate offensive threat perhaps), and hopefully the ensuing allocation of forces would be that which would result in the greatest saving of life. This means that if a threat exists which can have an end result of more lives to be lost, MSCD may not be immediately available. I believe that all this adds up to confirm the validity of OCD requirements for the training of local government reserves based upon the potential threat without regard to support which may or may not be forthcoming. At best, I would hope that any MSCD available postattack would compensate at least partially for the shortfall in the attainment of our own established goals for the organization of State and local government forces and the application of supplemental forces required to meet the effects of disaster-whatever.

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Enclosure (4)